

CAIRE Inc.

SAROS[™] Oxygen System

Model 3000

MAINTENANCE MANUAL



saros[™]



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1.1. GENERAL INFORMATION

This Maintenance Manual will familiarize you with information regarding the SAROS Oxygen System, Model 3000.

WARNING

Important safety information for hazards that might cause serious injury.

CAUTION

Important information for preventing damage to the SAROS.

DO NOT:

Information needing special attention.

IMPORTANT!

Clarifying information, specific instructions, or user reference information.

WARRANTY

1 year or 1,000 hours, whichever comes first.



1.2. SAROS OXYGEN SYSTEM SPECIFICATIONS

OXYGEN CONCENTRATOR

Dimensions <ul style="list-style-type: none"> • With battery • Without battery 	26.80" long x 4.375" diameter 23.25" long x 4.375" diameter
Weight <ul style="list-style-type: none"> • With Battery • Without Battery 	12.25 pounds (5.56 kg) 10.00 pounds (4.54 kg)
Flow Settings <ul style="list-style-type: none"> • Continuous Flow • Pulse flow 	1, 2, 3 LPM 16, 32, 48, 64, 80, 96 ml
Continuous Flow Accuracy	+/- 10% or 200ml/min, whichever is greater
Oxygen concentration	93% +/- 3% for all flow settings
Maximum System Pressure	15 psig (204.7 kPa)
Oxygen Output Pressure	4.0 psig (128.9 kPa) nominal
Oxygen Concentration Status Indicator	Green Light = Normal Operation Yellow Light Flashing = Warning or Caution, less than 85% ± 3% Red Light = Abnormal Operation, less than 70% ± 5%
Nominal Sound Level	<59 dB(A)
Operating Environment <ul style="list-style-type: none"> • Temperature • Humidity 	32° F to 109° F (0° to 43°C) 10% to 95%, Non-condensing, 82.4°F (28°C) Maximum Dew point
Storage Environment <ul style="list-style-type: none"> • Temperature • Humidity 	-4° F to 140° F (-20° to 60°C) Up to 95% Non-condensing
Nominal Power 3 LPM Continuous Flow	≤130 Watts
Nominal Battery operating time at 3 LPM Continuous Flow	30 Minutes
Continuous Flow Indication	Expressed in liters per minute (LPM)
Audible Alarm Indicators	<ul style="list-style-type: none"> • Loss of Power/Hot Battery • Low Battery/Warm Battery • Low Oxygen Output • No breath detection • O2 Flow Outside Normal Limits • Low 9V battery • Unit Malfunction
Back-Up Alarm Power	9V Internal Battery
Filters	Air Inlet Filter, HEPA and Exhaust Filter
Device Classification	IEC Class I, Type BF Applied Part, IPX1

PULSE MODE SPECIFICATIONS

Pulse Settings	16, 32, 48, 64, 80, 96 ml
autoSAT Technology	Servo-control to maintain consistent FiO2
Trigger Sensitivity	Adjustable settings of 1 (most sensitive), 2 and 3 (least sensitive)
Trigger Criteria	Cannula pressure has dropped below the trigger point (typically between 0.15 – 0.45 Cm of H2O of negative pressure)
Minimum time between breaths	1.25 seconds (max. 3 consecutive breaths)
Response to Missing Breaths	Switch to Continuous Mode if no inspiration has been detected for 60 seconds with an audible alarm.

BOLUS VOLUME AND BREATH RATES

Bolus Size ml (± 15%)	Max Breath Rate
16	40
32	40
48	40
64	40
80	37
96	31

NOTE: At breath rate above Max Breath Rate, bolus size will be reduced proportionally.

POWER ACCESSORY SPECIFICATIONS

AC Power Supply	
Input Voltage	100- 240 VAC, 50 – 60 Hz
Input Power	245 – 260 VA
Output Voltage	24 VDC
Output Power	200 W

24 VDC Cable	
Input Voltage	20 – 28 VDC
Input Current	10 A

BATTERY SPECIFICATIONS

Output Voltage	14.8 VDC
Capacity	88 W-hours
Nominal Battery Life	80% Capacity after 200 Charge/Discharge cycles
Battery Recharge Time	2.4 hours to achieve 80% capacity from a fully discharged battery

INDEPENDENT SAFETY TESTING

SAROS System and SAROS Concentrator, Model 3000	
Safety	IEC 60601-1 :1988 + A1 :1991 + A2 :1995 + Corrigendum (6/95) EN 60601-1(1990) + A1(1993) + A2(1995) + A12(1993) + A13(1996) + Corrigenda (7/94)
Electromagnetic Compatibility	FCC 15B (Sec. 107 & 109), EN55011, EN60601-1-2 :2001, EN6100-3-2, EN61000-3-3, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11, IEC 60601-1- 2 :2001, RTCA DO 160
AC Power Supply	
Safety	IEC 60601-1:1988 + A1:1991 + A2:1995
Electromagnetic Compatibility	FCC 15B (Sec. 107 & 109), EN55011, EN60601-1-2 :2001, EN6100-3-2, EN61000-3-3, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11, EN55014-1
24 VDC Cable	
Safety	Portions of IEC 60601-1:1988 + A1:1991 + A2:1995
Electromagnetic Compatibility	FCC 15B (Sec. 109), EN55011, EN60601-1-2 :2001, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000- 4-6, IEC 60601-1-2 :2001
Battery	
Safety	UL60950-1, IEC 60601-1:1988 + A1:1991 + A2:1995, IEC 62133, UN Transportation Tests T1-T8
Electromagnetic Compatibility	EN 61000-6-3 :2001 (EN55022 :1998+A1 :2001+A2 :2003), EN61000-6-1 :2001, EN61000-4- 2 :1995+A1 :1998, EN61000-4-3 :2002

1.3. HOW SAROS WORKS

INTRODUCTION

The SAROS Oxygen System, Model 3000 with autoSAT™ Technology is a portable medical device used to extract oxygen from the atmosphere, concentrate it to greater than 90% and flow it through the oxygen outlet port. The device will operate in Continuous flow or Pulse flow modes. In Continuous Flow Mode the oxygen is provided at a constant flow rate of 1, 2, or 3 LPM. In Pulse flow Mode, oxygen is supplied in a bolus at the beginning of each inspiration, providing a selectable range setting of flow between 16 ml and 96 ml, in increments of 16 ml.

SAROS is BTP (Body, Temperature, and Pressure) compensated. It delivers oxygen by accounting for difference between ambient conditions and those found in the patient’s lungs (37°C).

SAROS operates from external AC power, 24VDC or from a rechargeable Battery. The system includes a “Smart Battery” charger that recharges the Battery whenever the SAROS is connected to external power. The system monitors and controls both the power source and the Battery Charger.

SAROS has a five minute warm up/initialization period during which no alerts or codes are to be expected.

BASIC THEORY OF OPERATION

SAROS Oxygen System uses a variable speed compressor to provide both positive and negative air pressure and is driven by a Brushless DC Motor (BLDC) and drive system. The ATF® Concentrator Module accepts positively and negatively pressurized air and extracts oxygen from this air using the Pressure Swing Adsorption (PSA) process. The ATF module sub-components consist of patented rotary valves,

manifold, housing, sieve beds, and a stepper motor / gear drive system. The rotary valve system channels the gas in a sequential manner to each of the sieve beds. Each bed is pressurized to force the oxygen through the sieve and into the product tank while most of the nitrogen is separated and remains in the sieve. Once the process is maximized then the sieve beds are purged of the nitrogen. The purged nitrogen is then vented to atmosphere through the exhaust vent. The process is continuously repeated in each sieve bed. The flow of produced oxygen passes from the product tank to a flow and concentration monitoring and control system which utilizes a proprietary ultrasonic flow and concentration sensor. It then continues through a flow control valve to accurately control the flow of oxygen in continuous and pulse flow modes. The oxygen then passes through a HEPA filter and is delivered to the oxygen outlet port.

The oxygen flow rate and mode are selected by the user. In continuous flow mode, oxygen is delivered continuously at rates of 1, 2, and 3 LPM and, in pulse flow mode; a bolus is delivered at the beginning of each inspiration with selectable volume delivery approximately equivalent to rates between 16 and 96 mL.

The SAROS electronic system, together with embedded operational firmware, provide the means to manage power, control oxygen production, monitor safety functions and interface with the user. Power management functions include switching between various power inputs, driving the compressor, ATF stepper motor, and proportional valve, monitoring battery status and charging when power is available from an external source. System management functions include monitoring all flow, pressures, concentrations and safety functions. User Interface components such as buttons, illuminated indicators, LCD display and audio transducer are also monitored or controlled. The User Interface informs the user of the system status, allows the user to select a continuous flow or pulse mode flow setting and the ability to set the desired flow rate. The Utility Button the User Interface also allows the User to obtain information about the system – hours of operation, software version and 9V battery status - or make selections on various features such as Tactical or Normal Mode, Trigger Sensitivity Adjustments, Buzzer loudness and LCD Brightness and Contrast.

ATF® CONCENTRATOR MODULE

The SAROS Oxygen System, Model 3000 with autoSAT Technology uses a passive system to separate oxygen from air. Air flows into the SAROS where it is filtered and then enters the compressor. Pressurized air flows from the compressor into the ATF Concentrator Module where it is separated into oxygen and nitrogen components. The air separation process uses a rotary valve system to force air through a series of pressurized sieve beds. Through a process known as “pressure swing adsorption,” nitrogen molecules are collected on an adsorbent material or zeolite allowing the concentrated oxygen to be forced through a sieve bed into the product tank. The nitrogen molecules are then purged from the adsorbent material using a vacuum pressure cycle.

Oxygen flows from the product tank through a sensor that measures flow and concentration and then through a HEPA filter. A flow control valve regulates the flow of concentrated oxygen. The process is continuously repeated during operation.

COMPRESSOR

The SAROS compressor is a two-cylinder variable speed scroll compressor driven by a highly efficient Brushless DC (BLDC) motor. When air flows into the compressor, it passes through an air inlet mesh filter that filters out impurities. Using one cylinder, the compressor takes in filtered air, compresses it and channels the compressed gas to the ATF Module. The second cylinder creates a vacuum on the ATF module and exhausts nitrogen rich gas through an exhaust outlet muffler to suppress the noise and then to the exhaust vent at the bottom of the device.

BRUSHLESS COMPRESSOR MOTOR DRIVER (BCMD)

The BCMD drives the compressor motor based on the input power from either the battery, the AC Power Supply or the 24 VDC Cable.

COOLING FAN

A cooling fan is installed in the SAROS to provide forced air cooling to the various components in the system that generate heat.

POWER BOARD

The Power Board takes external power that comes into the SAROS from the AC Power Supply or Battery and monitors and controls power distribution to the rest of the OMNI system. The Power Board also drives the cooling fan.

SYSTEM BOARD

The System Board is the center of nearly all the SAROS functions. The System Board is a microcontroller-based system that monitors system dynamics such as temperatures, pressures, ATF stepper motor and proportional valve, product flow and concentration, and the Users' input, indicators and buzzer operation and external communications. It measures temperature of the oxygen, compressor motor, ambient temperature, and ATF temperature, BCMD, Power Board and the Battery.

The System Board utilizes a proprietary ultrasonic flow and concentration sensor and a flow control valve to accurately control the flow oxygen in the various flow delivery modes.

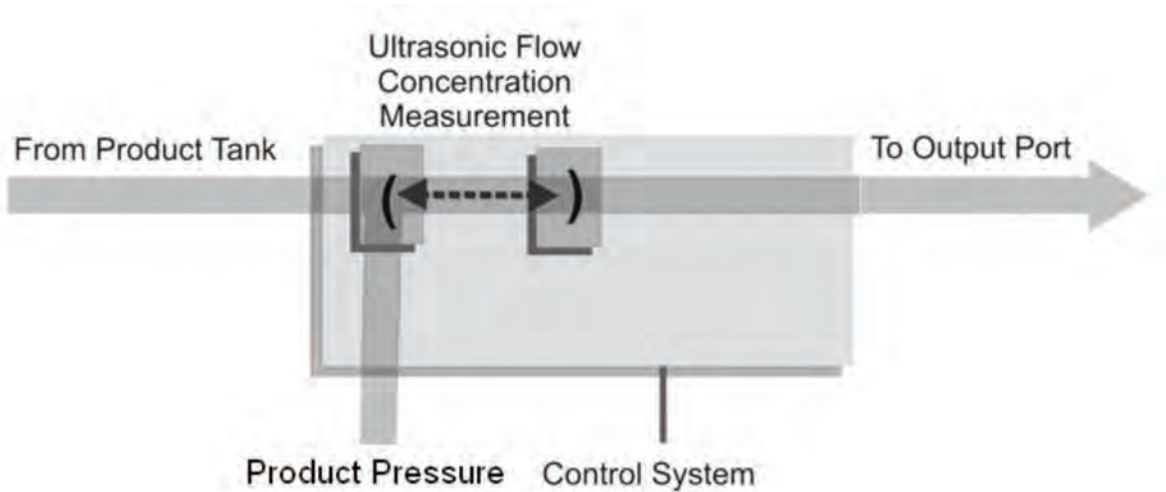


Figure 1

CONTROL PANEL

The Control Panel provides a user interface consisting of a membrane panel keyboards, Liquid Crystal Display (LCD), external power present indicator, Battery capacity indicator, alarm status indicators, and a buzzer. The user interface informs the user of the system status and allows the user to set the desired flow modes and flow rate – continuous or pulse, display mode – tactical or normal, set up system parameters and acquire system information.

When changing the control panel settings, the SAROS enters back into the stabilization period, five minutes with no docs or alerts to be expected. (Tool button is not included.)



Figure 2: User Control Panel

CONTINUOUS FLOW MODE



The user may set the SAROS oxygen flow rate and mode. Continuous Flow Mode delivers a constant flow of oxygen to the Oxygen Outlet Port at settings of 1, 2, and 3 LPM. Within the SAROS, concentrated oxygen is stored in a product tank at pressures in the range of 5 – 9 psi and is back-pressure compensated. This pressure gives Continuous Flow Mode the capability to deliver the indicated flow rate to the patient even if extension tubing is used, up to 50 feet long.

PULSE FLOW MODE WITH AUTOSAT TECHNOLOGY



The SAROS Pulse Flow Mode with autoSAT Technology delivers a high flow of oxygen at the very beginning of each inspiratory effort. The approach is based on the manner in which gas is delivered into a patient’s airway. SAROS user may select pulse volume delivery rates between 16 and 96 ml. Pulse durations vary between 100 milliseconds and 500 milliseconds due to dead space considerations. Maximum cannula length is 7 feet.

The fundamental approach to triggering and controlling the oxygen bolus in Pulse Flow Mode is: The user may select pulse trigger sensitivity in settings 1 (most sensitive), 2, or 3 (least sensitive).

The pulse will be triggered when the system meets all the following criteria:
The cannula pressure has dropped below the trigger point (typically between 0.15 and 0.45 cmH2O).

At least 1.25 seconds has passed since the last pulse began.

The SAROS autoSAT Technology consistently maintains the FiO2 by adjusting to the patient’s respiratory rate. As their rate increases, the autoSAT™ feature servo controls the device to automatically increase oxygen output to ensure uninterrupted delivery of the set bolus volume. autoSAT™ provides the patient with unparalleled performance without limiting available oxygen, enabling the system to automatically adjust to increased oxygen demands that often occur.

NOTE: To Equipment Provider: The following oxygen administration accessories are recommended for use with the Oxygen Concentrator:

- Nasal Cannula with 7 feet (2.1 m) of tubing: PN 5408-SEQ
- For any additional recommended accessories, please see the Accessories Catalog (PN ML-LOX0010) available on www.CAIREmedical.com.
- CAIRE offers the OxySafe™ as an optional accessory. This is intended to be used in conjunction with the SAROS concentrator. For customers in regions requiring compliance to EN ISO 8359:1996-Amendment 1:2012, this accessory will meet this need.

The OxySafe™ is a thermal fuse to stop the flow of gas in the event that the downstream cannula or oxygen tubing is ignited and burns to the OxySafe. It is placed in-line with the nasal cannula or oxygen tubing between the patient and the oxygen outlet of the SAROS.

For proper use of the OxySafe, always refer to the manufacturer’s instructions (included with each OxySafe kit).

CAIRE offers an OxySafe™ kits that includes a cannula headpiece, OxySafe™, and 7’ tubing: PN 20628667

UTILITY MODE



A User or Service Technician can access the Utility Mode function by pressing the Utility Button on the control panel. All information is displayed on the LCD. Advance to the next feature in the Utility Mode by depressing the Utility Button. The “+” or “-” buttons are used to toggle when a feature is selected. Pressing the Flow Mode button takes you back one step.

SERVICE MODE FUNCTIONS

Factory maintenance or service updates may sometimes be required on the SAROS. Factory and qualified factory-trained technicians can access service mode software functions by using the Service Port located on the top of the unit. .

POWER SUPPLIES

SAROS may operate from either an AC Power Supply, 24 VDC Cable or Battery. When power is available from an external supply, the SAROS will draw from the external source rather than depleting the Battery. Connection to external power is indicated when the External Power Present Indicator located on the Control Panel is illuminated.



AC POWER SUPPLY

The AC Power Supply is a universal input type, capable of accepting 100 – 240 VAC, 50/60 Hz. It is capable of delivering up to 200W at 24 VDC output. The input cord requires a grounded receptacle. Country specific cords may be used with the AC Power Supply, as the supply is equipped with a universal input receptacle. When used in a medical care facility, international safety standards require the use of hospital grade AC power cord with the SAROS.

The AC Power Supply contains protection circuits for output over-current, input over-voltage, and internal over-temperature conditions. If any of these conditions exist, output power will be a Loss of Power Alarm. Refer to Alert, Alarms and Troubleshooting Table. These three conditions are self-resetting, such that output power will resume when protection circuits fall back into acceptable operating ranges.

To adapt the SAROS to 220 VAC, just utilize the country cord or a plug adapter. An inverter to step up voltage/current is not needed.

24 VDC CABLE

The 24 VDC Cable is intended for use with 24 volt power sources, such as those found in various vehicles.



BATTERY

The Battery allows operating the SAROS away from AC or DC power. The Battery used with the SAROS contains Lithium Ion battery cells, similar to those used in laptop computers and cell phones. The SAROS Battery is approximately 88 W-hours in capacity and provides an output voltage of 12VDC to 16.6VDC. The Battery connects to the bottom of the SAROS and is secured by a mechanical latching mechanism. To set the brass locking ring into proper position, press the battery button on the bottom of the battery pack before inserting into the SAROS. The Battery can be recharged when the SAROS is connected to the AC Power Supply or the 24 VDC Cable. The Battery Gauge indicator on the SAROS LCD will have a “waterfall” effect when the Battery is charging. The fastest way to recharge the Battery is using the AC Power Supply.



The Battery has an integral safety circuit that prevents over charge, over discharge or damage due to an external short circuit of the pack. An Integral fuel gauge communicates battery voltage, current, charge state, and temperature. Based on the voltage supplied by the Battery, the system is configured to optimize battery charging by regulating the

charging voltage and current as follows:

Battery Pack Output Voltage (VDC)	Charging Voltage (VDC)	Charging Current (A)
< 10.0	FAULT	FAULT
10.0 – 11.9	16.6	0.66
> 12.0	16.6	5.60

When the SAROS is operating on Battery power, the LCD displays an estimate of the amount of time the unit can operate at the current settings within +/- 5 minutes. When the SAROS is operating on Battery and the time on battery falls below 15 minutes, the LCD time on battery characters will flash to indicate a low battery condition.

The capacity of the SAROS Battery is determined by electronics and software. While the SAROS Battery allows the concentrator to operate at its full range of capabilities, the primary purpose of the Battery is to allow an autonomous system while moving between AC or DC power sources. The SAROS’s Battery, like all lithium ion batteries, is susceptible to permanent damage from excessive heat. Exposure to excessive heat may shorten the Battery’s service life.

The Battery contains multiple temperature sensors to monitor battery cell temperature. The amount of heat the Battery can safely endure varies depending on how the Battery is being used. During discharge the system will shut down if internal battery cell temperature exceeds 59°C. While the Battery is charging, software will interrupt charger operation when the internal battery temperature exceeds 40°C or temperature is less than 5°C. In both of these cases, when internal battery cell temperature returns within these limits, the SAROS will resume normal operation. Operation near these temperature limits will not damage the Battery, but are in place to ensure that the service life of the Battery is preserved.

Heat in the Battery is generated during discharge and can also be the result of operating the SAROS in high ambient temperatures. The amount of internally generated heat varies with the flow setting – higher flows induce greater Battery heating. While high ambient temperatures are typically the result of operation on a hot day, running the SAROS with inadequate ventilation can also cause additional heat. Always ensure that the SAROS is operated in a well-ventilated space, the air intake filter is clean, and intake and exhaust vents are unobstructed.

CHARGING ALGORITHM

The charging algorithm is performed by the Power Board software and involves three basic decisions:

1. When to start charging
2. How fast to charge
3. When to stop charging

Charging begins when Battery voltage falls below 93% relative capacity. The charging current is limited by the charger capability and the rated capacity of the Battery. Under certain conditions, the SAROS may not have enough external power available to charge the batteries at the full rate. In this case, the charging rate will be limited to the available power. As the Battery accumulates charge, the charging current required will eventually fall. Battery charging will cease when the Battery voltage is greater than 16V, charge current is less than 0.66A, and relative charge is greater than 93%.

The software will only charge when the Battery temperature is at or below 40°C. The software will always run the cooling fan whenever the charger is enabled. The Battery Charger is disabled and the cooling fan is set to maximum whenever the Battery temperature exceeds 40°C. The Battery charger is disabled when temperature is less than 5°C.

All lithium ion batteries self-discharge at very low rates when not in use (disconnected from the SAROS). SAROS Batteries are shipped from SeQual in a partially charged state (nominally 40%). Do not store the SAROS with the battery installed in the unit. Remove the battery from the unit when storing to prevent damage to the battery and the unit. When the Battery is stored in a cool, dry location, it is recommended to recharge the Battery every 3 months. SeQual recommends a first in, first out rotation of Battery inventory for maximum service life.

CAUTION The Saros contains electrostatic sensitive components.

DO NOT open or handle except at a static free workstation. **DO NOT** remove cover without ESD protection.

DO NOT store the SAROS with the battery installed in the unit.

WARNING When performing Service and Repair procedures:

DO NOT touch exposed circuits during the maintenance. **DO NOT** touch moving parts.

SAROS MAIN COMPONENTS

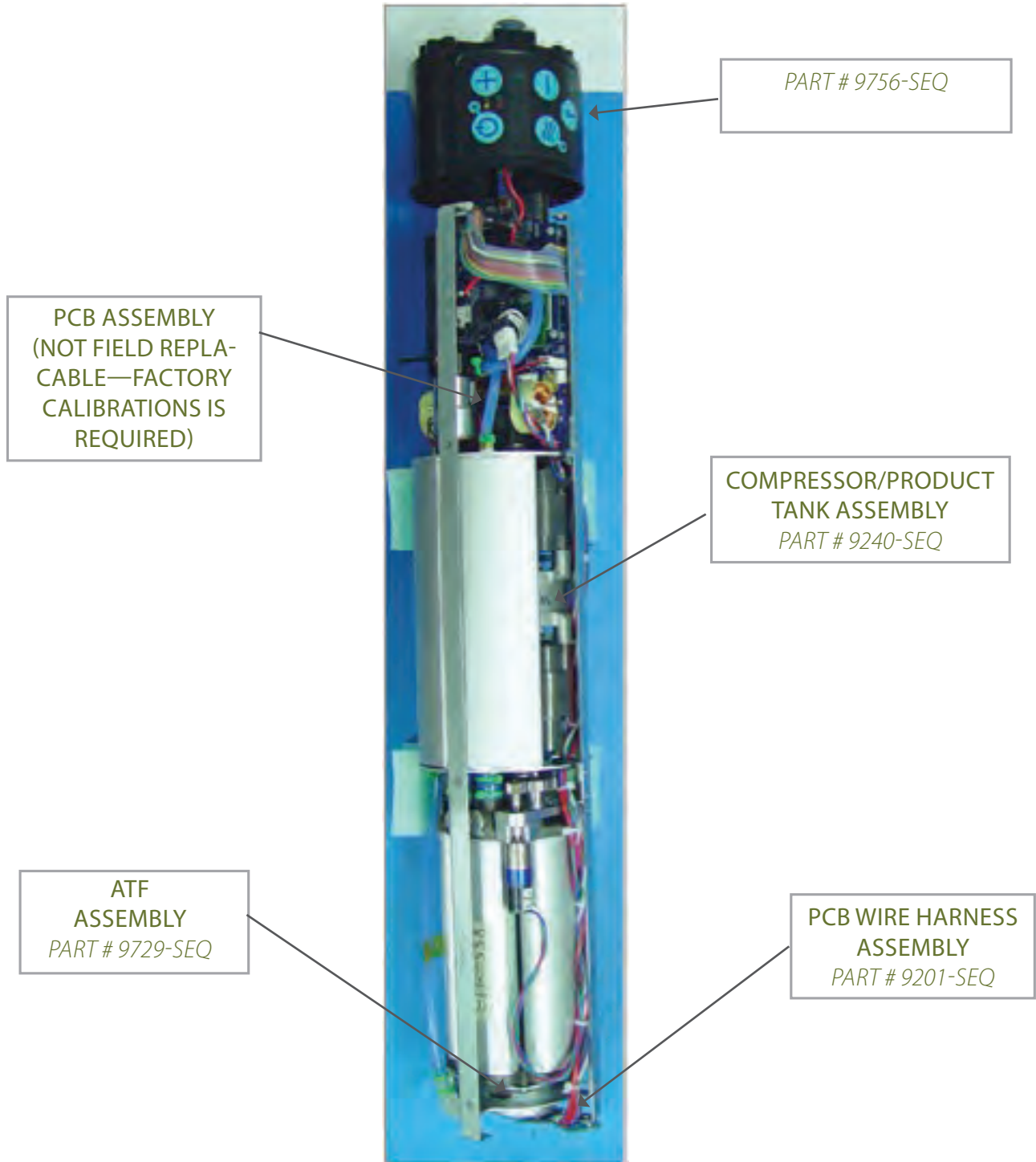


Figure 3: Inside Saros

SYSTEM SCHEMATICS AND DIAGRAMS

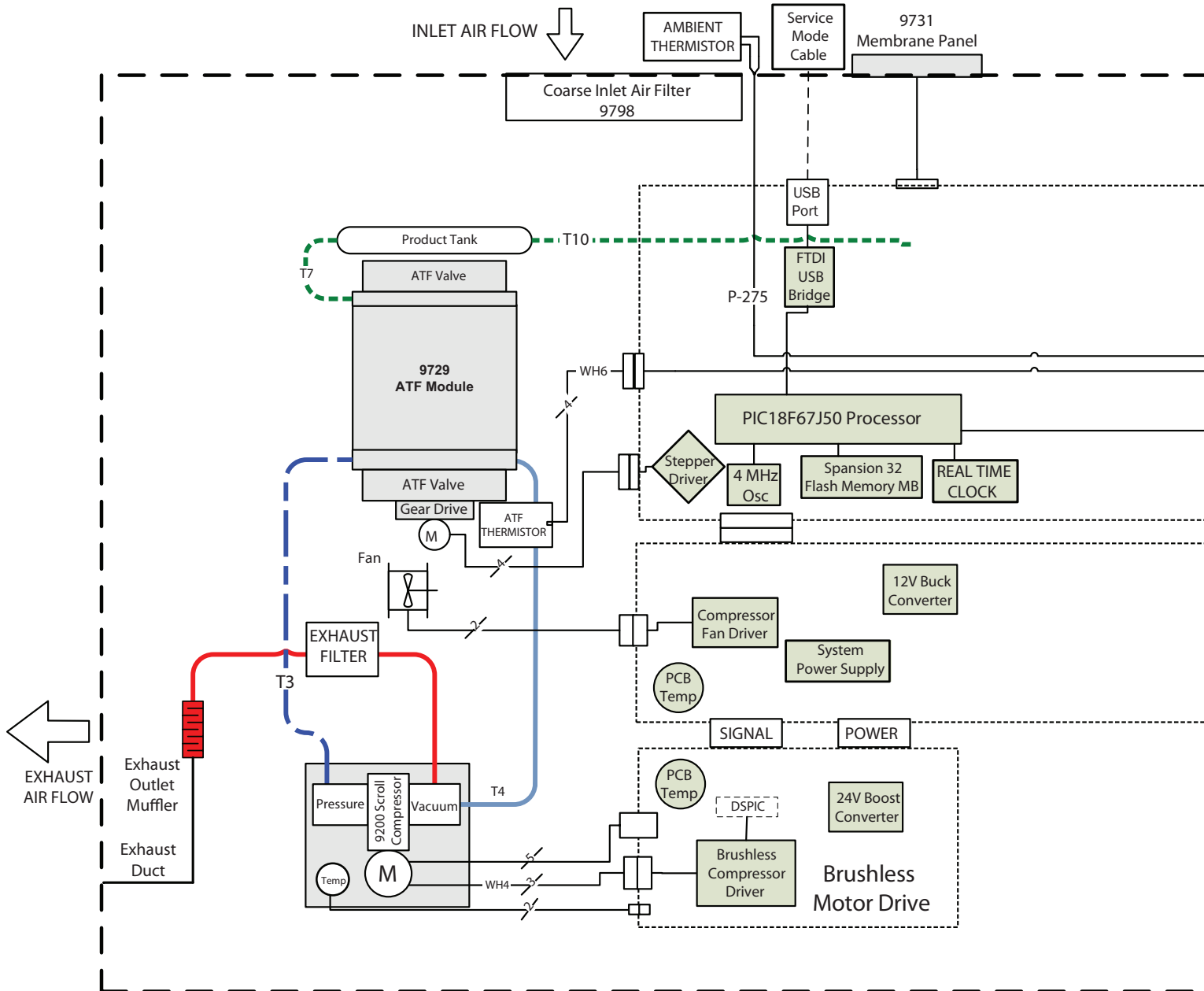
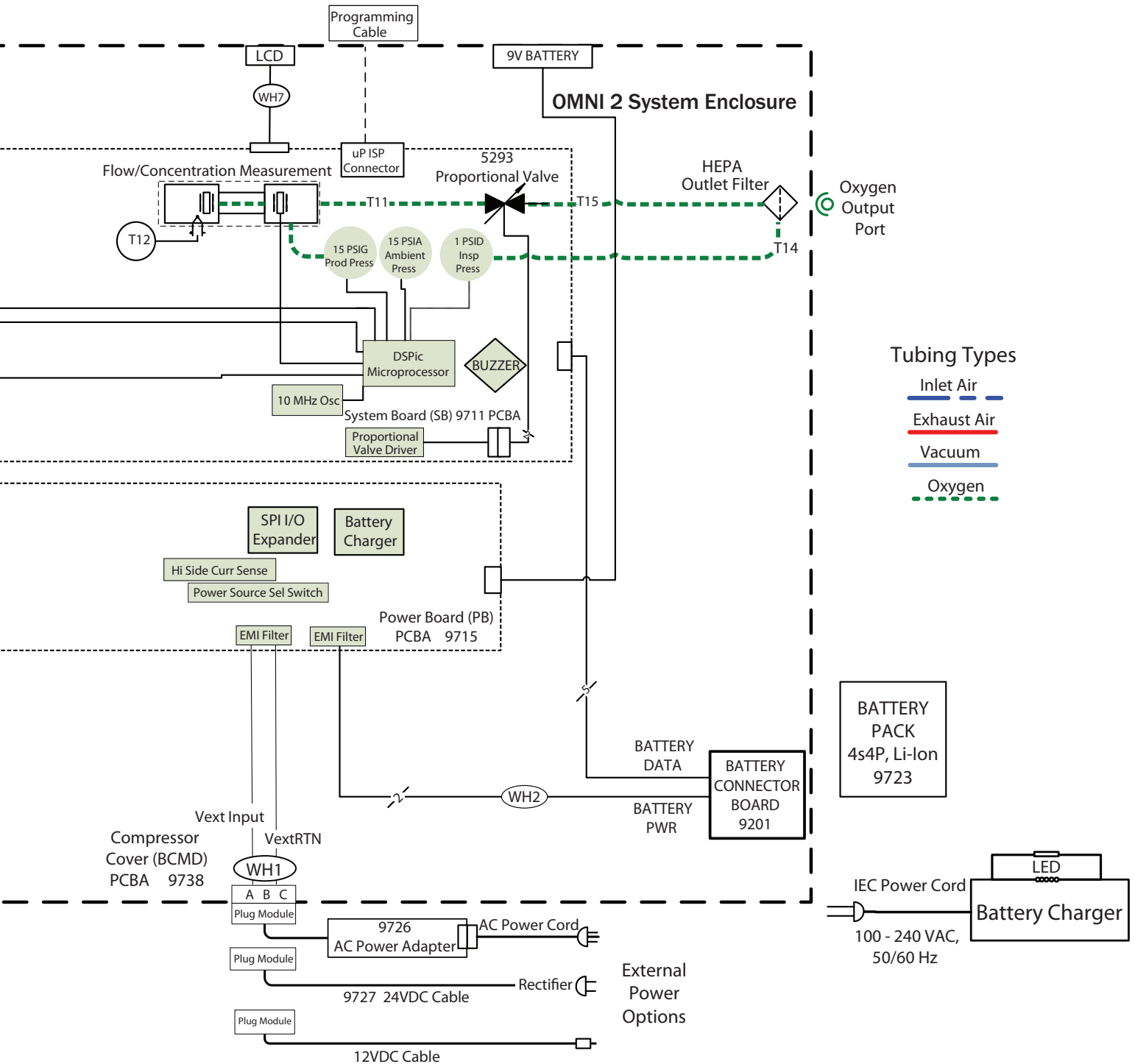


Figure 4

SAROS OXYGEN SYSTEM BLOCK DIAGRAM



2 SERVICE MAINTENANCE PROCEDURE

2.1 PERIODIC MAINTENANCE LIST

Factors to consider when performing Periodic Maintenance on the SAROS:

- High hours of Operation
- Environmental
 - o Dust/dirt/soot
 - o Heating method in the location (wood, oil, gas)
 - o Proximity to animals (Hair, Fur, Feathers)
 - o Smokers in the location
 - o Lack of external filter maintenance

Perform the following maintenance procedures every six (6) months or between patients, whichever comes first. The frequency of the periodic maintenance should be based on the environment in which the SAROS is used within.

- Check and clean the air inlet screen. Replace as needed
- Check Battery visually and functionally when received. Replace as needed.
- Inspect AC Power Supply, 24 VDC Cable and cords for damage. Replace as needed.
- Verify that the AC Power Supply and 24 VDC Cable operates with the SAROS.
- Check 9V battery. Replace if needed.
- Check HEPA Filter. Replace if needed.
- Read and record hour meter.
- Check flow rate, purity, Pulse Mode
- Test alarm functions.

2.1.1 ROUTINE MAINTENANCE

- Servicing of the internal components of this device must be conducted by a trained and qualified service technician.
- A qualified technician will perform inspections and maintenance of the ATF compressor, PCB set, alarms, internal 9 volt battery, Battery and other parts every six (6) months or as needed, whichever comes first.
- Operate the device once a month by running the device on battery power until drained. Plug in to recharge while operating or off.

WARNING

DO NOT DISASSEMBLE THE SAROS OR ATTEMPT TO PERFORM ANY MAINTENANCE TASKS OTHER THAN THOSE DESCRIBED IN THE USER CARE AND CLEANING OF THE DEVICE SECTION BELOW. DISASSEMBLING THE SAROS MAY CREATE AN ELECTRICAL SHOCK HAZARD AND WILL VOID YOUR WARRANTY. CONTACT A QUALIFIED TECHNICIAN FOR ANY INSPECTION, MAINTENANCE, OR REPAIR REQUIRED.

WARNING

DO NOT MODIFY THIS EQUIPMENT WITHOUT AUTHORIZATION OF THE MANUFACTURER.

2.2 MAINTENANCE PROCEDURES

The following section lists procedures that are necessary to maintain the SAROS. Service should only be performed by a qualified technician. To perform periodic maintenance, the only tools that should be necessary are:

- #1 Phillips Screwdriver
- #1 Flathead Screwdriver
- Needle-nose Pliers
- Wire-cutting Pliers
- Small cable ties
- 3/8" open end wrench
- ESD Mat or approved ESD system

2.2.1 REMOVING THE AIR INLET COVER

2.2.1.1 DISCONNECT POWER SUPPLIES AND REMOVE THE BATTERY IF CONNECTED.

2.2.1.2 USING A PHILLIPS #1 SCREWDRIVER, LOOSEN THE FOUR CAPTIVE SCREWS.

2.2.1.3 REMOVE COVER.



Figure 5

2.2.2 REMOVING AND CLEANING/REPLACING THE AIR INLET FILTER

2.2.2.1 GENTLY REMOVE THE FILTER SHOWN IN FIGURE 6.

2.2.2.2 IF THE FILTER IS DAMAGED, REPLACE.

2.2.2.3 FOR CLEANING, GENTLY WASH WITH WARM SOAPY WATER. ALLOW FILTER TO COMPLETELY DRY BEFORE RE-INSTALLING.

2.2.2.4 RE-INSTALL AIR INLET FILTER.

2.2.2.5 USING A PHILLIPS #1 SCREWDRIVER, RE-ATTACH THE COVER WITH SCREWS.

2.2.2.6 INITIAL AND DATE THE SERVICE AND MAINTENANCE RECORD.



Figure 6

CAUTION: OPERATING THE SAROS WITH A CLOGGED AIR INLET FILTER MAY REDUCE PERFORMANCE AND LEAD TO SYSTEM DAMAGE OR PREMATURE FAILURE.

2.2.3 REPLACING THE HEPA FILTER

2.2.3.1 DISCONNECT ALL POWER SUPPLIES INCLUDING EXTERNAL BATTERY IF CONNECTED.

2.2.3.2 USING A 3/8" OPEN END WRENCH, REMOVE THE O2 FITTING/HEPA FILTER SHOWN IN FIGURES 7 & 8.

2.2.3.3 UNSCREW THE HEPA FILTER FROM THE O2 FITTING AS SHOWN IN FIGURE 9.

2.2.3.4 REPLACE WITH NEW HEPA FILTER. DO NOT OVER TIGHTEN.

NOTE: ENSURE THAT THE O-RINGS SHOWN IN FIGURE 9 ARE POSITIONED CORRECTLY BEFORE RE-INSTALLATION.

2.2.3.5 RE-INSTALL THE O2 FITTING/HEPA FILTER. DO NOT OVER TIGHTEN.

Initial and date the Service and Maintenance Record.



Figure 7



Figure 8

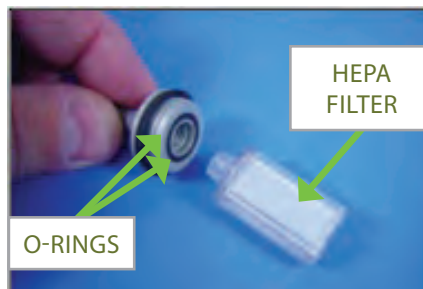


Figure 9

2.2.4 REPLACING THE 9V BATTERY

2.2.4.1 DISCONNECT POWER SUPPLIES AND REMOVE EXTERNAL BATTERY IF CONNECTED.

2.2.4.2 USING A PHILLIPS #1 SCREWDRIVER, LOOSEN THE FOUR CAPTIVE SCREWS SHOWN IN FIGURE 5.

2.2.4.3 REMOVE COVER.

2.2.4.4 REMOVE 9V BATTERY FROM WHERE SHOWN IN FIGURE 10.

2.2.4.5 DISCONNECT AND REPLACE BATTERY AS SHOWN IN FIGURE 11.

2.2.4.6 USING A PHILLIPS #1 SCREWDRIVER, REPLACE THE AIR INLET COVER.

2.2.4.7 INITIAL AND DATE THE SERVICE AND MAINTENANCE RECORD.



Figure 10



Figure 11

2.3 TEST PROCEDURES

SAROS PURITY AND FLOW RATE TEST PROCEDURE – PREFERRED METHOD

It is recommended that the SAROS be tested for oxygen concentration and flow performance. CAIRE recommended test setup is shown on the following diagram. Oxygen monitors may or may not have an internal pump to draw samples of oxygen to be measured. Placement of the oxygen monitor in the test setup depends whether they have an internal pump. Only one oxygen monitor is needed though. An oxygen monitor such as Salter Labs’ PRO2 Check Elite or equivalent may be used.

Connect the circuit per the diagram shown below.

Turn the concentrator on and set the target flow on the SAROS to 3 LPM continuous flow.

Allow the SAROS to stabilize a minimum of 5 minutes.

Verify the O2 concentration and O2 flow rates are within specification.

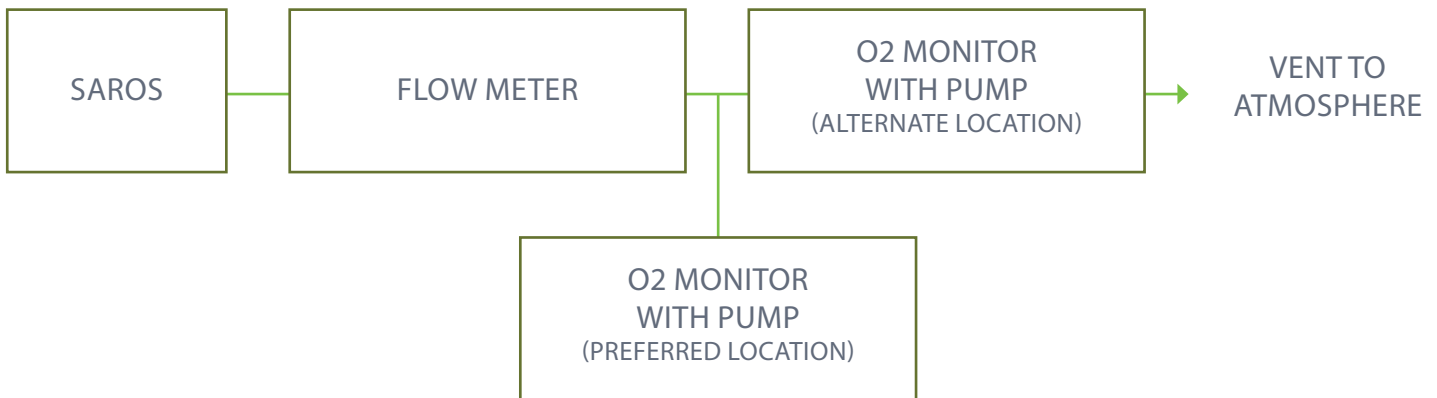


Figure 12: CAIRE Recommended Test Setup to verify performance of Oxygen Concentrator

NOTE: THE SAROS OXYGEN CONCENTRATION AND FLOW SENSOR CANNOT BE CALIBRATED IN THE FIELD. IF YOU SUSPECT THAT THE SAROS FLOW AND OXYGEN PURITY MEASUREMENT IS OUT OF CALIBRATION, PLEASE RETURN TO CAIRE FOR SERVICE.

2.4 PURITY AND FLOW RATE PROCEDURE – ALTERNATE METHOD

Attach a calibrated oxygen monitor to the oxygen outlet port in accordance with oxygen monitor manufacturer’s recommendations.

NOTE: SOME SENSING EQUIPMENT MAY RESTRICT THE ACTUAL FLOW RATE BELOW WHAT THE SAROS CAN PROVIDE AND PROVIDE INACCURATE CONCENTRATION READINGS. IF TESTING IS PERFORMED WITH THE OXYGEN MONITOR IN THE ALTERNATE LOCATION PICTURED ABOVE, ENSURE THAT THE OXYGEN MONITOR DOES NOT SIGNIFICANTLY RESTRICT OXYGEN FLOW.

2.5 ASSEMBLY AND ALARM VERIFICATION TESTS

To ensure proper assembly and functionality of the SAROS after it has been reassembled, the following steps should be followed.

Install the Battery. Plug the AC Power Supply into the wall outlet and connect it to the External Power Connector of the SAROS. Verify the unit is not in Tactical Mode.



Press and hold the “ON/OFF” Button to power ON your SAROS. The SAROS will start up in Normal Mode and Continuous Flow of 3 LPM. Allow five (5) minutes minimum for the device to reach its performance specifications. The five (5) minute warm up time is a stabilization period during which no alerts or codes are to be expected. If the device fails to reach its performance specifications after five (5) minutes, the unit will alarm according to the mode it is in.

Green Indicator	Yellow Indicator	Red Indicator	Audible Alarm	Alarm Code	Operating Condition
OFF	OFF	BLINKING	BEEPS	400	Purity <70%
OFF	BLINKING	OFF	OFF	800	Purity between 70% & 85%
ON	OFF	OFF	OFF	NA	Normal Operating Conditions

Verify that the Battery is charging as indicated by the Power Cartridge Status Gauge is moving in waterfall fashion. If the Power Cartridge Status Gauge is not moving, verify that the Battery is properly engaged.

Check the Control Panel by pressing each of the Increase/Decrease, Pulse Dose Mode and Utility Key buttons and observe that the SAROS buttons function normally.

Press the Delivery Mode button and set the SAROS to the patient’s normal Pulse Dose setting. Confirm that without breathing from the unit, after 60 seconds of no breath detected, the system changes automatically to Continuous Flow Mode.

Block the Cannula Fitting Outlet with your finger for 1 minute and confirm that the visual and audible alarm occurs. Unblock the Cannula Outlet Port. This alarm will not function during the five (5) minute stabilization period.

Disconnect the AC Power Supply and allow the SAROS to run for about one minute. Set the SAROS to the patient’s normal Continuous Mode setting. Confirm that the Power Cartridge Status Gauge is illuminated and External Power Present Indicator is off.

Remove the Battery and verify that the SAROS alarms and red Alarm Indicator is flashing and the alarm sounds. After about 5 seconds, re-install the Battery and connect the AC Supply and observe that the SAROS automatically restarts. Confirm that the External Power Present Indicator is illuminated.

Turn off SAROS and unplug the AC Power Supply.

Record results, initial and date the Service and Maintenance Record.

2.6 ALARM INDICATIONS AND CODES

NC = No Change

Description	Audio Indicator	Ext. Power LED	Battery Icon	Alarm Code	Description
All OK	OFF	NC	NC	None	This indication shall exist when no alarms are detected.
Initialization	OFF	NC	NC	None	Purity alarms shall be inhibited during the initialization period.
FLOW					
%O ₂ < 70%	ON	NC	NC	400	The alarm shall activate only when concentration has been less than 70% for more than 60 seconds. It shall clear immediately if the concentration goes above 70%.The unit shall continue production.
%O ₂ < 50%	ON	NC	NC	410	The alarm shall activate only when concentration has been less than 50% for at least 120 seconds after the warm up period has expired. The unit shall restart production.
70% < O ₂ < 85%	2 beeps of 0.5s every 119s	NC	NC	800	The alarm shall activate only when concentration has been less than 85% for more than 60 seconds. It shall clear immediately if the concentration goes above 85%.
Flow Rate Error	2 beeps of 0.5s every 119s	NC	NC	2000	The alarm shall activate when the difference between the desired flow rate and the measured flow rate exceeds 10% for a minimum duration of 60 seconds.
Breath Pressure Sensor Failure	2 beeps of 0.5s every 119s	NC	NC	A210	The alarm shall activate when a breath pressure sensor failure.
Ultrasonic Failure	ON	NC	NC	A300	O ₂ production shall stop or cannot be started.
Unable to Achieve or Maintain Product Tank Pressure	ON	NC	NC	A500	O ₂ production shall stop.
Purity Calibration Data Failure	ON	NC	NC	A600	The unit shall produce using default data.
Flow Calibration Data Failure	ON	NC	NC	A700	The unit shall produce using default data.
Ambient Pressure Sensor Failure	ON	NC	NC	AB00	O ₂ production shall continue.
Ambient Temperature Sensor Failure	ON	NC	NC	AB10	O ₂ production shall continue.

Description	Audio indicator	Ext. Power LED	Battery Icon	Alarm Code	Description
Power					
Loss of Power	ON	NC	NC	4000	This alarm shall activate during production when the system determines that valid power has been lost. O2 Production and battery charging shall stop, and the electronics shall shut down after 10 seconds.
Missing Power	ON	NC	NC	4010	This alarm shall activate if the user attempts to start the unit while there is no usable power source connected. O2 Production and battery charging shall not begin and the electronics shall shut down after 10 seconds.
Low Battery	2 beeps of 0.5s every 119s	NC	(1s/1s)	9540	The alarm shall activate when the time remaining on battery is ≤ 6 minutes. The alarm shall cease when the time remaining is ≥ 12 minutes.
Cannot Charge Battery	2 beeps of 0.5s every 119s	NC	(1s/1s)	952C	This alarm shall activate if system is attempting to charge the battery, but can't do so.
External voltage too high	ON	(1s/1s)	NC	AC00	This alarm shall activate when the external voltage is greater than 30V. O2 Production and battery charging shall not begin and the electronics shall shut down after 10 seconds.
Low 9 volt battery	3 beeps after POST	NC	NC	None	The 9 volt battery measured less than 6.5V.
Physical / Functional					
Key Stuck On	2 beeps of 0.5s every 119s	NC	NC	8110	This alarm shall activate when a key is active for greater than 7 seconds.
Compressor Stall	ON	NC	NC	9194	O2 production shall stop or cannot be started.
Compressor Driver Fault	ON	NC	NC	9195	O2 production shall stop or cannot be started.
Pulse Mode Disabled	2 beeps of 0.5s every 119s	NC	NC	A200	This alarm shall activate when a breath sensor malfunction is detected. The system shall not enter pulse mode.
Motor Controller Fails Post	ON	NC	NC	FD00	O2 production shall not be started.

Description	Audio Indicator	Ext. Power LED	Battery Icon	Alarm Code	Description
COMM					
Invalid Reset	ON	NC	NC	8000	O2 production and battery charging shall not start. The electronics shall shut down within 15 seconds when on battery power. The display shall be blanked within 15 seconds when on external power.
I/O Port Failure	ON	NC	NC	8100	O2 production and battery charging shall not start. The electronics shall shut down within 15 seconds when on battery power. The display shall be blanked within 15 seconds when on external power.
RAM Failure	ON	NC	NC	8200	O2 Production and battery charging shall stop. The electronics shall shut down within 15 seconds when on battery power. The display shall be blanked within 15 seconds when on external power.
Run Log Storage Failure	2 beeps of 0.5s every 119s	NC	NC	8300	Production shall continue. Battery charging if required shall continue.
Program Memory Failure	ON	NC	NC	8310	O2 Production and battery charging shall stop. The electronics shall shut down within 15 seconds on when on battery power. The display shall be blanked within 15 seconds when on external power.
Event Log Storage Failure	2 beeps of 0.5s every 119s	NC	NC	8320	Production shall continue. Battery charging if required shall continue.
EEPROM Data Write Failure	2 beeps of 0.5s every 119s	NC	NC	8400	Production shall continue. Battery charging if required shall continue.
Watchdog Timeout	ON	NC	NC	9000	O2 production and battery charging shall stop or cannot be started. The electronics shall shut down within 15 seconds when on battery power. The display shall be blanked within 15 seconds when on external power.
Battery Communication Error	2 beeps of 0.5s every 119s	(1s/1s)	(1s/1s)	9500	Battery shall not be charged or discharged.
IPC Failure	ON	NC	NC	A000	O2 production and battery charging shall stop or cannot be started. The electronics shall shut down after 10 seconds when on battery power. The display shall be blanked after 10 seconds when on external power.

Description	Audio Indicator	Ext. Power LED	Battery Icon	Alarm Code	Description
Temp					
ATF Temperature Sensor Failure	ON	NC	NC	8900	O2 production shall continue.
				8900	Compressor Temperature Sensor and ATF Temperature Sensor condition.
Compressor Too Hot	ON	NC	NC	9100	O2 production shall stop or cannot be started.
Compressor Temperature Sensor Failure	ON	NC	NC	9110	O2 production shall continue.
Compressor and ATF Temperature Sensor Failure	ON	NC	NC	9110	O2 production shall stop or not be started depending on Compressor Temperature Sensor and ATF Temperature Sensor condition.
Power Board Too Hot	ON	NC	NC	9200	O2 production and battery charging shall stop or cannot be started. The electronics shall shut down after 10 seconds when on battery power. The display shall be blanked after 10 seconds when on external power.
Power Board Thermistor Failure	2 beeps of 0.5s every 119s	NC	NC	9210	Production shall continue. Battery charging if required shall continue.
Motor Driver Board Too Hot	ON	NC	NC	9300	O2 production and battery charging shall stop or cannot be started.
Motor Driver Board Thermistor Failure	2 beeps of 0.5s every 119s	NC	NC	9310	Production shall continue. Battery charging if required shall continue.
Battery Too Hot	ON	NC	(1s/1s)	9510	Battery shall not be charged or discharged.
Battery Thermistor failure	2 beeps of 0.5s every 119s	NC	(1s/1s)	9550	The system shall not use the battery if the independent battery thermistor determined to be open or shorted.
Battery Chip Thermistor failure	2 beeps of 0.5s every 119s	NC	(1s/1s)	9560	The system shall not use the battery if the reported battery chip thermistor is determined to be open or shorted.
Battery Too Cold to Use	OFF	NC	No Waterfall	95C0	The battery shall not be charged or discharged.
Battery Too Cold to Charge	OFF	NC	No Waterfall	95CC	The battery shall not be charged.
Product Temperature Sensor Failure	ON	NC	NC	A410	O2 production shall continue.
				A410	Product Temperature Sensor and Ambient Temperature Sensor condition.
Battery Too Hot to Charge	OFF	NC	No Waterfall	None	The battery shall not be charged.
Product and Ambient Temperature Sensor Failure	ON	NC	NC	A410 AB10	O2 production shall stop or not be started depending on Product Temperature Sensor and Ambient Temperature Sensor condition.

2.7 COMPREHENSIVE TROUBLESHOOTING GUIDE

	Indications	Code	Possible Cause	Remedy
	During start up conditions:		5 minutes before alert conditions will sound or code	Alert condition will be silent until the warmup period is over, 5 minutes.
1	At start up, All 3 light are on (green, yellow, & red)	0400	Device warming up - >70% O2	Normal condition
2	At start up, 2 lights are on (green & yellow)	0800	Device warming up - >85% O2	Normal condition
3	At start up, 1 light remains (green)	0000	Device warmed up, Within spec 93 +/-3% O2	Ready to use
	After Start Up conditions:		Front panel setting change—alerts will be reset for 5 minute stabilization.	Follow numerically until resolved!!!
4	Continuous mode: Low O2: between 85 to 70% * (yellow light is flashing)	0800	* Low Flow for extended periods of time, filters occluded. * ATF gearmotor slow or not turning, ATF has moisture. * Compressor slow or not working * PCB set not calibrated, malfunctioning	1) Clean or Replace filter set (PN: 15096578); 2) Check gearmotor on ATF is turning, replace ATF if needed (PN: SP9729-SEQ); 3) Check Compressor is not labored, squeaking; replace if not working (PN: SP9240-SEQ); 4) Replace PCB set (PN: 9710-SEQ).
5	Continuous mode: Low O2: between 70 and 50% * (Red light is flashing, alarm beeping)	0400	* ATF gearmotor slow or not turning, ATF has moisture. * Compressor slow or not working * PCB set not calibrated, malfunctioning	1) Check gearmotor on ATF is turning, replace ATF is needed (PN: SP9729-SEQ); 2) Check Compressor is not labored, squeaking; replace if not working (PN: SP9240-SEQ); 3) Replace PCB set (PN: 9710-SEQ).
6	Loss of Power	4000	Power has been lost to the Saros (unit beeps for 2 sec, and switches to attached battery - if present)	1) Check if the front panel power verification LED is lit; 2) Check the power source for proper voltage, review spec chart to details; 3) Check/replace External power supply for functionality (PN: 9726 or PN: 9727-SEQ); 4) replace External power cconnector (PN: 9766-SEQ) 5) Replace PCB set (PN: 9710-SEQ).
7	Flow Rate error Yellow LED will be flashing	2000	A block to flow greater than 10% is detected for more than 60 sec, unit beeps and yellow light is on. Unit will establish normal use after 30 seconds of unblocked patient circuit.	1) Find tubing blockage and remove; 2) if blockage is within Saros device - remove tubing and investigate filters;
8	Compressor too hot (>115°F)	9100	Environment too hot, Compressor too hot	1) Allow device to cool; 2) Check the cooling fan, replace Compressor cooling fan if not rotating smoothly or at all (PN: 9767-SEQ) 3) If after cooling, the Compressor is damaged or squeaking, replace Compressor (PN: SP9240-SEQ).

	Indications	Code	Possible Cause	Remedy
9	Breath rate malfunction (Pulse Mode only)	A200	While in Pulse mode, the breath rate was not sensed for more than 60 sec.	<ol style="list-style-type: none"> 1) Press Mode button to re-establish Pulse Mode, if Saros switched to Continuous; 2) Ensure patient is breathing through their nose, not their mouth; 3) Adjust Pulse Sensitivity to a more sensitive setting. See menu options for adjustment; 4) Ensure the Saros does not have a humidifier attached. Acts as a water block to neg inspiration; 5) Ensure tubing length does not exceed 7 ft.
10	Battery communication error	9500	Battery is not communicating with the Saros. Battery indicator is flashing, or not there when battery is connected.	<ol style="list-style-type: none"> 1) Re-connect the battery; 2) Test the Battery on another unit to ensure the same code, replace battery (PN SP9723-SEQ) 3) Check the bridge pcb connector for damage, replace BBB wiring harness if needed (PN: 9201-SEQ) 4) Replace the PCB set (PN: 9710-SEQ).
11	Battery too HOT (>105°F)	9510	Battery indicator not scrolling - waterfalling (scroll bottom to top)	<ol style="list-style-type: none"> 1) Remove battery and allow to cool; 2) Replace with cool Battery.
12	Battery too Hot to Charge	XXXX	Battery will not waterfall (scroll bottom to top)- indicates not charging (no code expected)	<ol style="list-style-type: none"> 1) Check battery connection is proper; 2) Reset battery connection locking pin brass barrel; 3) check condition of Battery wiring harness, replace if damaged (PN: 9201-SEQ); 4) Replace PCB set (PN: 9710-SEQ).
13	Power Board too Hot (>115° F)	9200	Charging has stopped, Device shut down, the alarm is on, and the ambient temp is above temp limits.	<ol style="list-style-type: none"> 1) Allow PCB set / Device to cool in the shade or A/C environment 2) Once cooled, check functionality to spec.
14	Motor Driver Board too Hot (>115° F)	9300	Charging has stopped, Device Shut down, the alarm is on, and the ambient temp is above temp limits.	<ol style="list-style-type: none"> 1) Allow PCB set / Device to cool in the shade or A/C environment; 2) Once cooled check functionality to spec; 3) Replaced Failed PCB set (PN: SP9710).
15	Battery is too Cold (<40° F)	95CO	No waterfall effect (scroll bottom to top) on display.	<ol style="list-style-type: none"> 1) Remove Battery from device. Position battery in an environment above 40 degrees (F); 2) Allow to warm to in-spec temperature internal to the battery. Re-insert Battery; 3) Replace with warmer battery (PN: 9723).
16	Low Battery Condition	9540	Battery Icon is blinking, Yellow light is on, Device is beeping(2 beeps at 119sec), <= 6 minutes remaining.	<ol style="list-style-type: none"> 1) Plug into External power; 2) Replace with fully charged Battery (PN: 9723).
17	Front Panel Key Stuck	8110	A key is stuck for more than 7 seconds. (note: Utility or tool button/key will not activate this alarm.)	<ol style="list-style-type: none"> 1) Remove and replace front membrane panel (PN: SP9731).

DO NOT IGNORE ALARMS.

SYSTEM WILL ATTEMPT TO PRODUCE OXYGEN UNDER FAULT CONDITION BUT MAY NOT BE AT PURITY OR FLOW.

3. REMOVAL PROCEDURES

3.1 BATTERY CONNECTOR REMOVAL

3.1.1 REMOVE THE THREE SCREWS (PART# 9914-6-SEQ) AND REMOVE THE BATTERY INTERFACE PLATE (PART# 9939-SEQ).

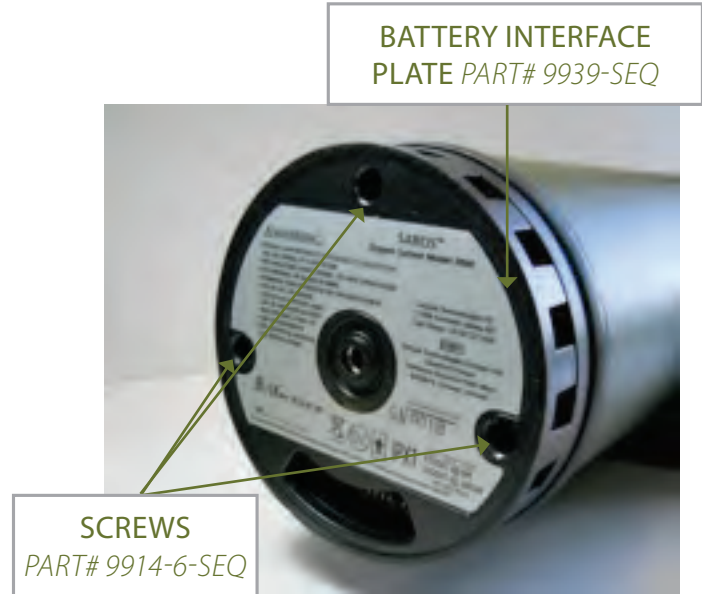


Figure 13: Removal of the 3 BIP Screws

3.1.2 REMOVING THE TWO SCREWS (PART# 9960-4-SEQ) FROM THE RAIN GUARD (PART# 9292-SEQ)

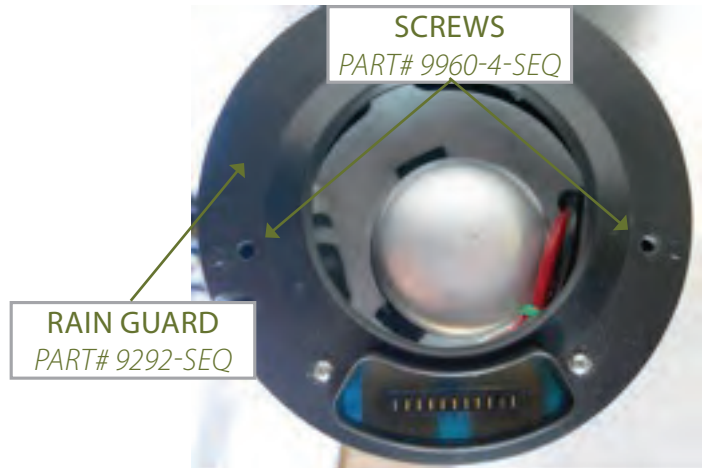


Figure 14: Removal of the 3 Rain Guard Screws

3.1.3 DETACH THE RAIN GUARD (PART# 9292-SEQ) FROM THE ALIGNMENT RING



Figure 15: Removal of the 3 Rain Guard Screws

3.1.4 REMOVE THE RING SLEEVE (PART# 9928-SEQ) TO EXPOSE WIRING.

NOTE: ENSURE BOTH O-RINGS (PART # 9374-SEQ) REMAINS WITH THE RING SLEEVE.

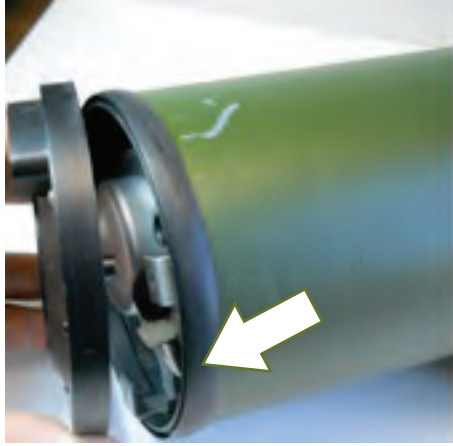


Figure 16: Removal of Sleeve Alignment Ring

3.1.5 REMOVE FIBERGLASS SLEEVE (PART# 9280-SEQ) FROM THE RAILS,



Figure 17

3.2. INLET CAP REMOVAL

NOTE: USE ESD CONTROLS WHEN REMOVING THE INLET CAP

3.2.1 LOOSEN THE FOUR CAPTIVE SCREWS (PART# 9291-SEQ) AND REMOVE THE AIR INLET COVER (PART# 9758).

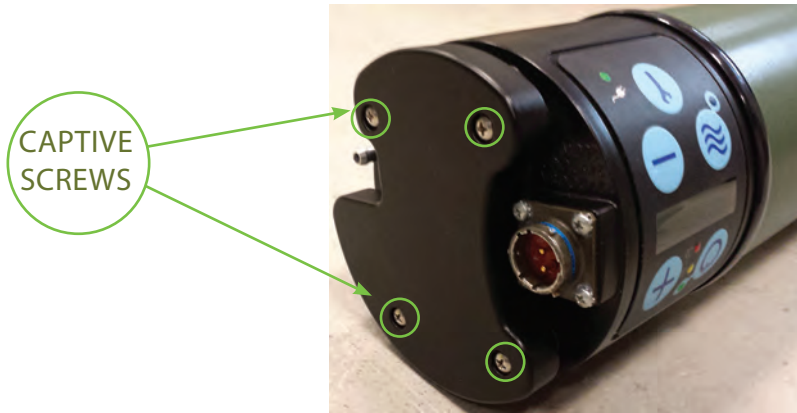


Figure 18: Air Inlet Cover Removal

3.2.2 REMOVE AND DISCONNECT THE 9V BATTERY (PART# 9257-SEQ) AND THE AIR INLET FILTER (PART# 9798-SEQ).

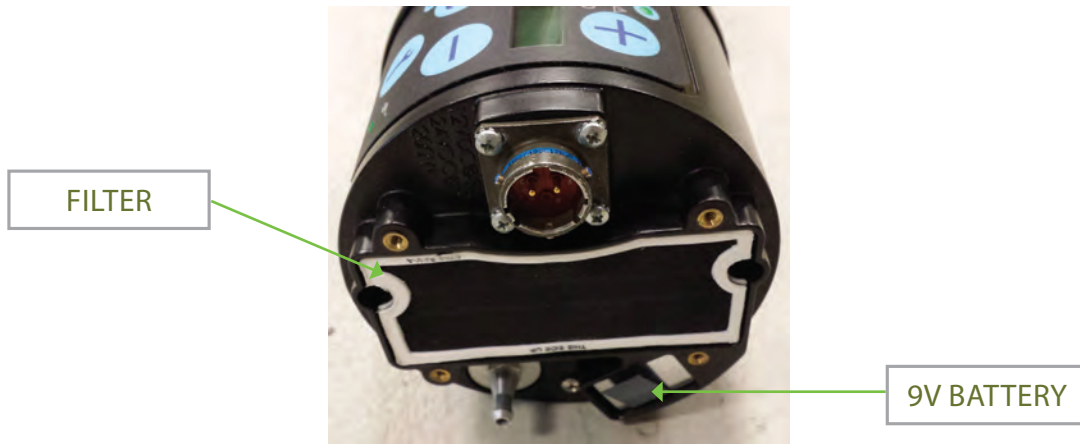


Figure 19: Filter Screen & 9V Removal.

3.2.3 REMOVE THREE INLET CAP MOUNTING SCREWS (PART# 9914-6-SEQ).

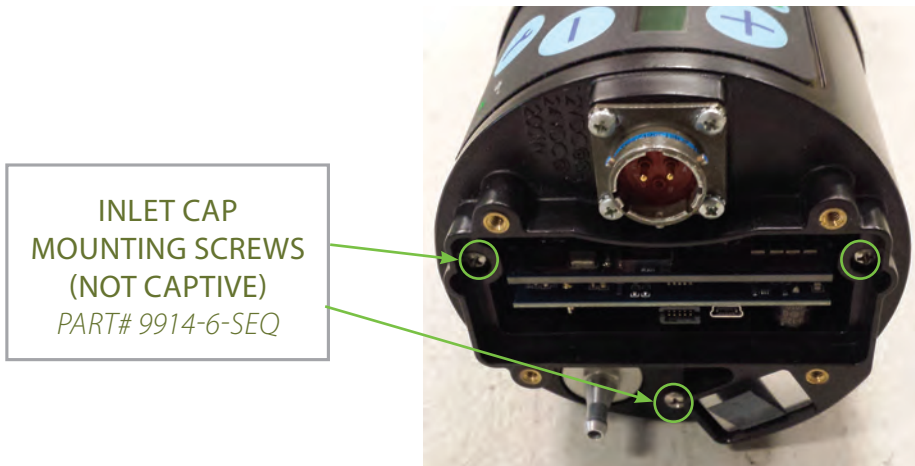


Figure 20: Inlet Cap Screw Removal

3.2.4 CUT GREEN CABLE TIE AND DISCONNECT THE OXYGEN OUTLET TUBE FROM THE FLOW VALVE.

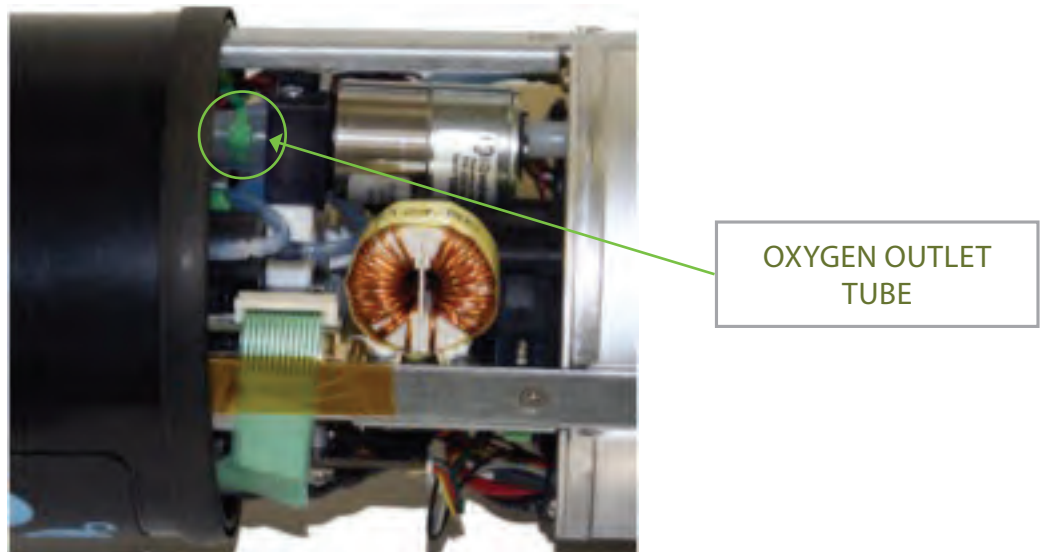


Figure 21: Oxygen Outlet Tube Disconnect.

3.2.5 REMOVE TAPE (PART# 2696-SEQ) FROM FRONT PANEL FLEX CABLE AND TOP MOUNTING STRUTS (PART# 9778-SEQ). LIFT UP LOCKING CONNECTOR AND DISCONNECT THE FRONT PANEL FLEX CABLE.

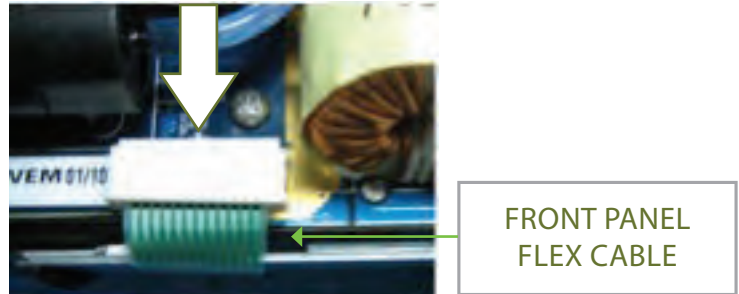


Figure 22: Front Panel Flex Cable Disconnect

3.2.6 DISCONNECT THE AMBIENT AIR THERMISTOR CONNECTOR AND 9V BATTERY CONNECTOR.

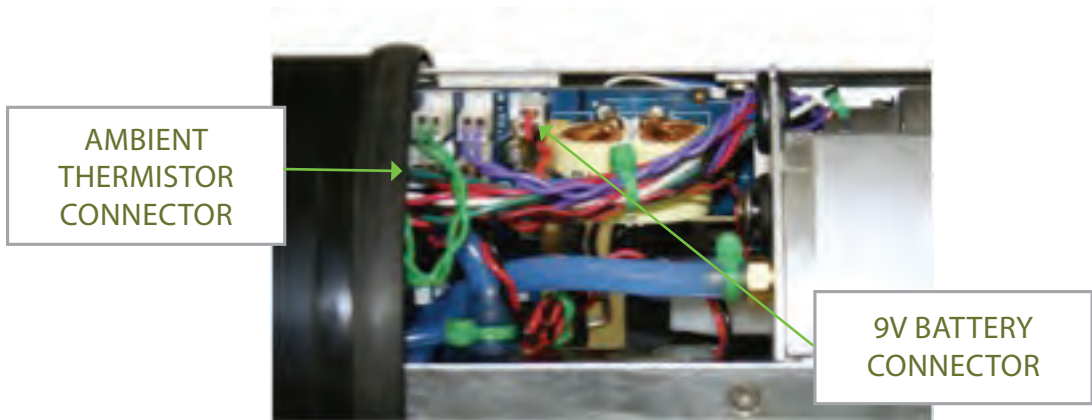


Figure 23: Thermistor Connector and 9V Battery Connector

3.2.7 LOOSEN THE SCREWS FOR THE AC POWER CONNECTOR AND REMOVE THE WIRES.

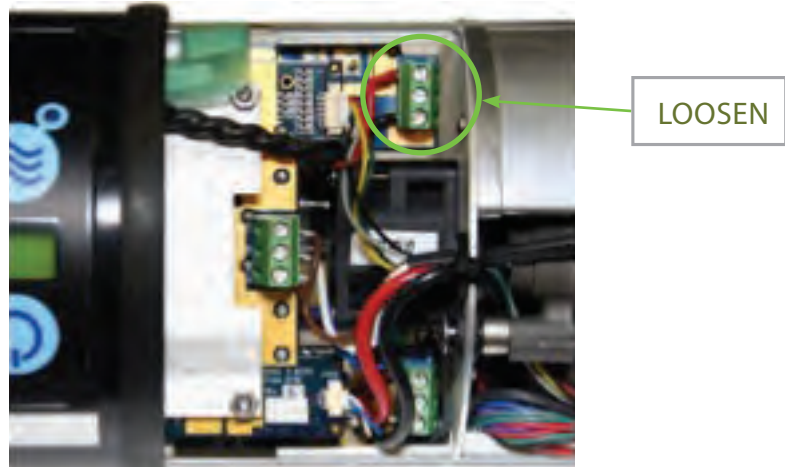


Figure 24: Inlet Cap Power

3.2.8 DISCONNECT THE BREATH DETECT TUBE.

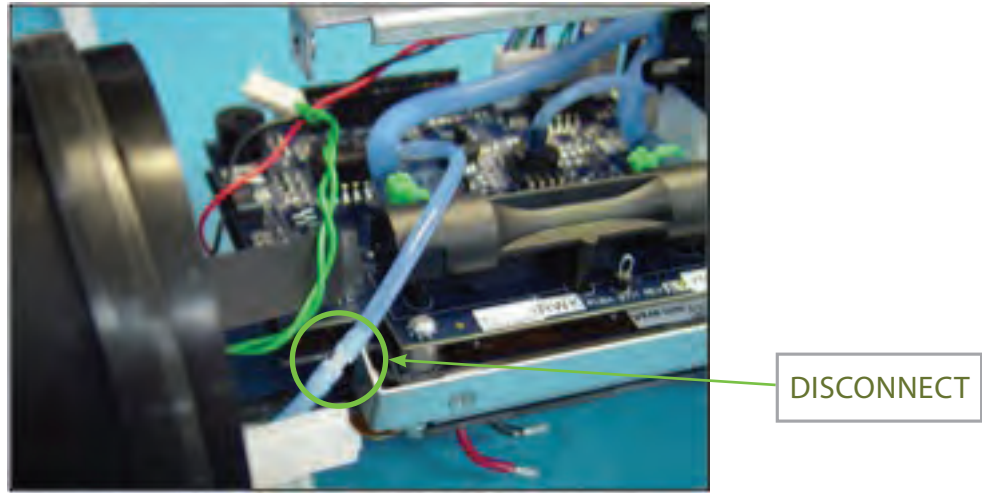


Figure 25: Tube Disconnect

3.2.9 REMOVE THE INLET CAP (PART# 9756-SEQ) AND GUIDE AC POWER CABLE UNDER THE FRAME OF THE PCB ASSEMBLY.



Figure 26: Inlet Cap Removal

3.2.10 REMOVE THE 3 SCREWS (9912-1) TO DETACH THE TOP STRUT (9778-SEQ).

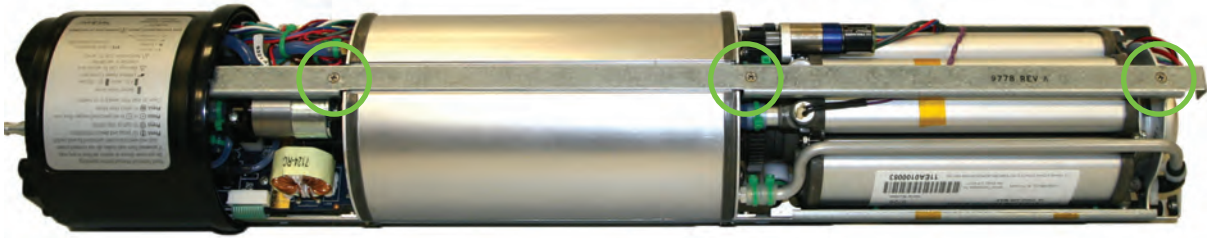


Figure 27

3.3. REMOVE PCB ASSEMBLY (REMOVABLE, NOT REPLACEABLE)

NOTE: ALWAYS USE ESD CONTROLS WHEN HANDLING THE PCB ASSEMBLY.

3.3.1 LOOSEN THE BATTERY POWER WIRE SCREWS AND REMOVE WIRES.

3.3.2 DISCONNECT THE COMPRESSOR THERMISTOR WIRES

3.3.3 DISCONNECT THE HALLS EFFECT WIRE

3.3.4 LOOSEN THE COMPRESSOR POWER SCREWS AND REMOVE THE WIRES

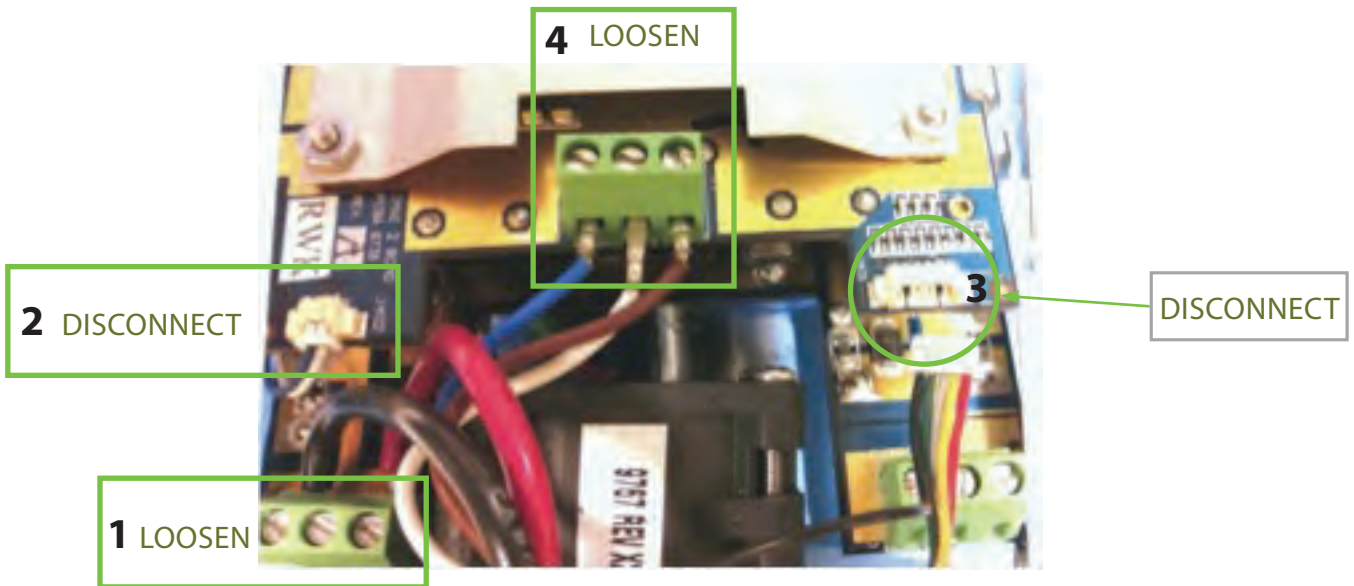


Figure 28: Battery Power Wires for Battery Interface.

3.3.5 DISCONNECT BATTERY COMMUNICATION CONNECTOR.

3.3.6 DISCONNECT THE ATF STEPPER MOTOR CONNECTOR FROM THE PCB.

3.3.7 DISCONNECT THE ATF THERMISTOR CONNECTOR FROM THE PCB

3.3.8 DISCONNECT THE FAN CONNECTOR FROM THE PCB.

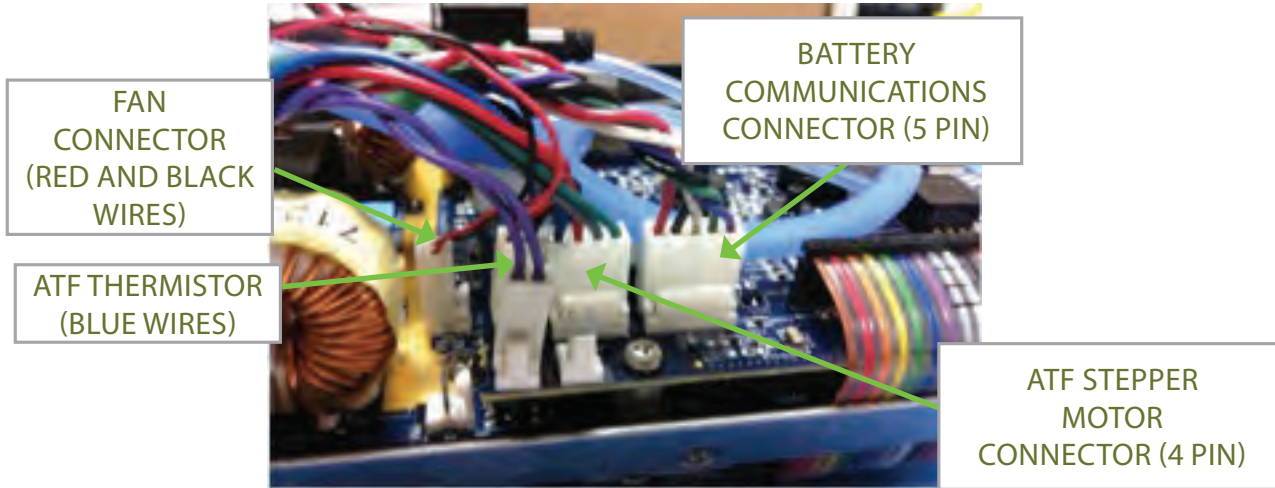


Figure 29: Communication Connector for Battery Interface
 ATF Stepper Motor Power
 Fan Disconnect
 ATF Thermistor

3.3.9 CUT THE CABLE TIE AND REMOVE THE FLOW TUBE FROM THE PRODUCT TANK

NOTE: CAP THE PRODUCT TANK IMMEDIATELY TO PREVENT ATF DESATURATION.

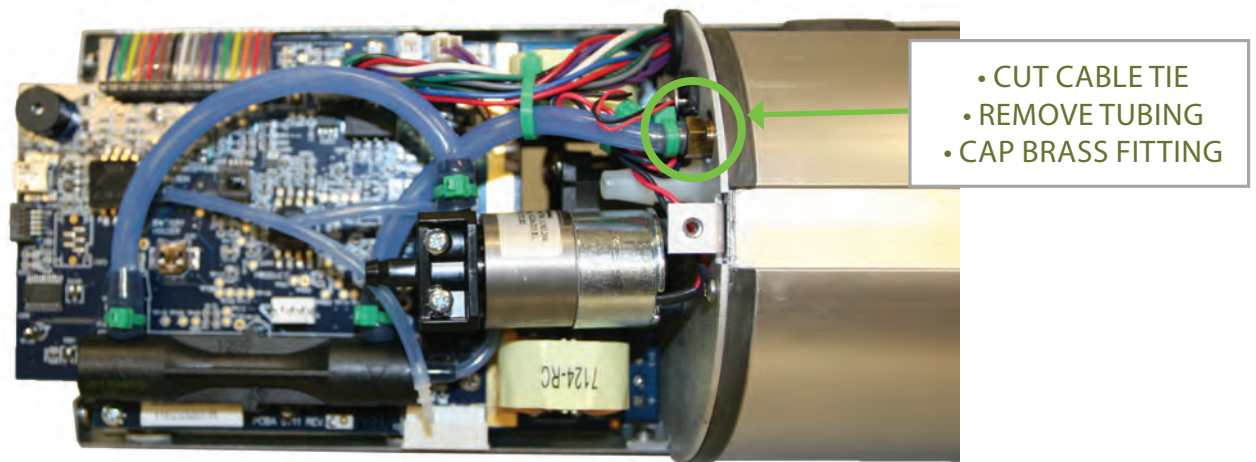


Figure 30: ATF Thermistor Disconnect

3.3.10. REMOVE 2 SCREWS ON THE LEFT STRUT (9779-SEQ)

3.3.11. REMOVE 2 SCREWS ON THE RIGHT STRUT (9780-SEQ)

3.3.12. SLIDE THE PCB ASSEMBLY AWAY FROM THE STRUTS. (PLACE IN ESD BAG.)

NOTE: ALWAYS USE ESD CONTROL WHEN HANDLING THE PCB ASSEMBLY.

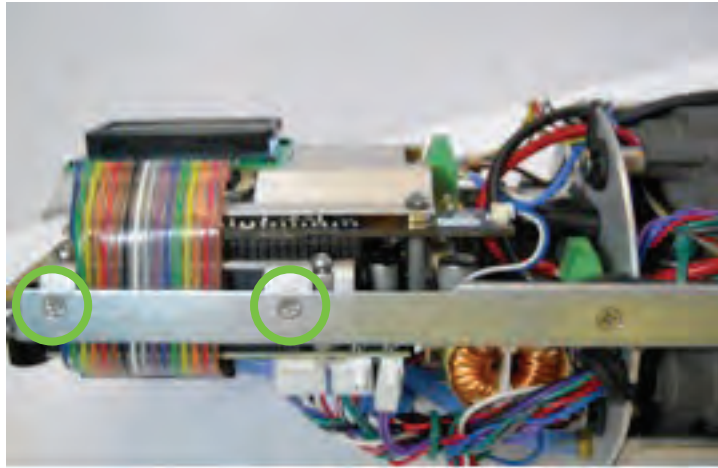


Figure 31

3.3.13 PLACE PCB SET IN ESD PROTECTIVE BAG

3.4. PROPORTIONAL VALVE REMOVAL (5293-SEQ)

3.4.1 REMOVE PROPORTIONAL VALVE WIRE FROM PCB ASSEMBLY (IF NOT DONE SO ALREADY)

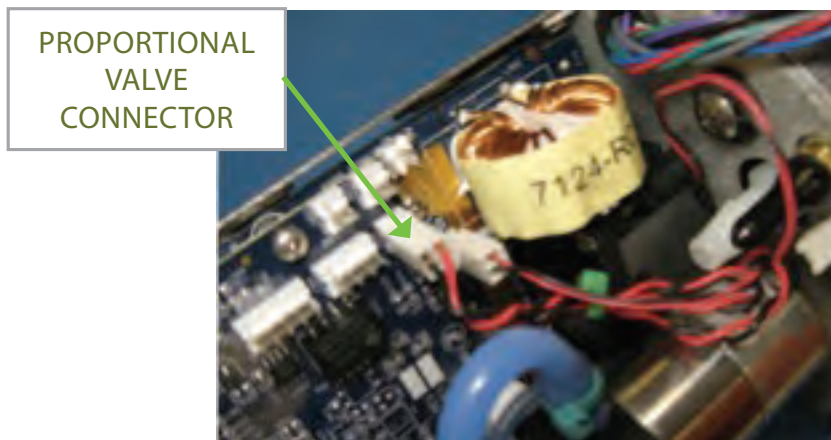


Figure 32

3.4.2 REMOVE THE TWO SCREWS FROM THE PROPORTIONAL VALVE.

NOTE: IF REMOVING THE COMPRESSOR FAN GO TO STEP 3.3

3.4.3 CUT & REMOVE CABLE TIE FROM PROPORTIONAL VALVE AND REMOVE TUBING.

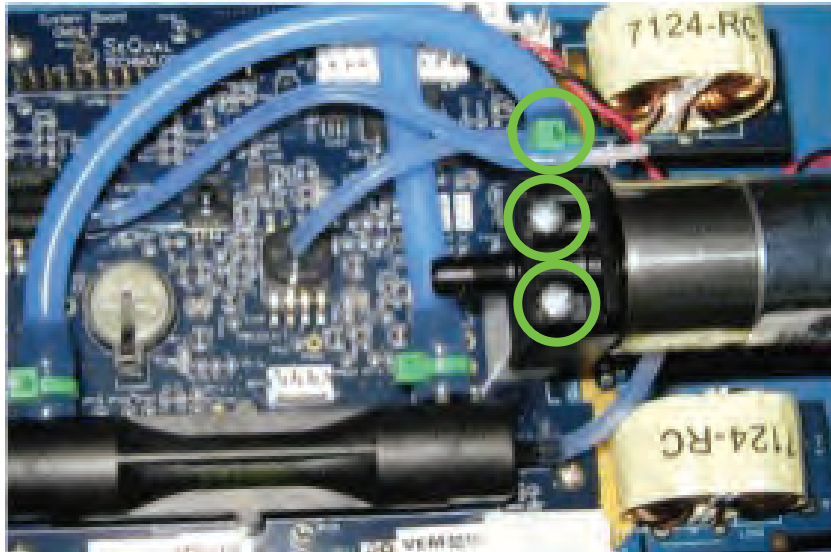


Figure 33

3.4.4 REMOVE THE PROPORTIONAL VALVE (5293-SEQ) FROM THE PROPORTIONAL VALVE BLOCK AND REPLACE

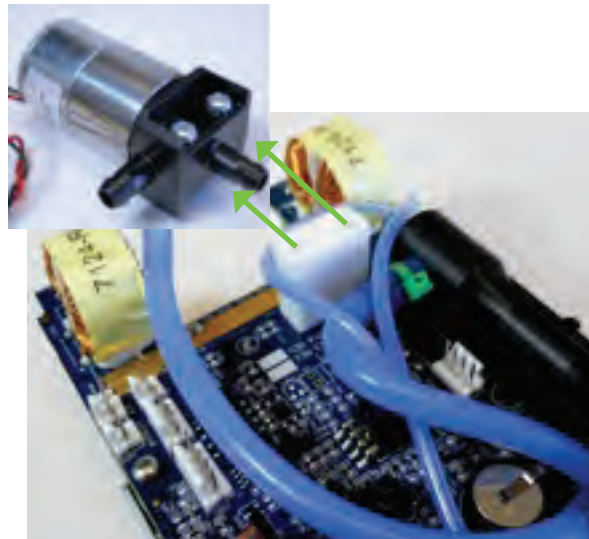


Figure 34

3.5 COMPRESSOR FAN REMOVAL (PART # 9767-SEQ)

REMOVE COMPRESSOR FAN WIRE FROM PCB ASSEMBLY (IF NOT DONE SO ALREADY)



Figure 35

3.5.1 LIFT THE PROPORTIONAL VALVE OUT OF THE WAY (See Proportional Valve Removal Step 3.4)

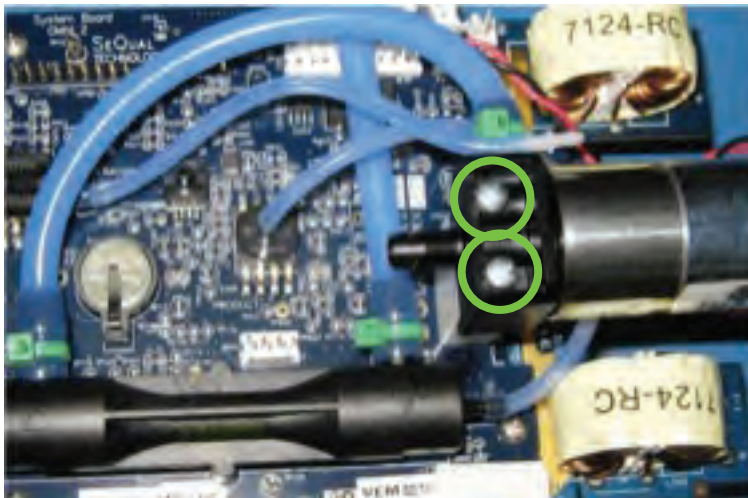


Figure 36

3.5.2 LOOSEN COMPRESSOR FAN SCREWS (9913-10-SEQ)

Remove the Fan subassembly (9767-SEQ) from the Compressor Bulkhead.

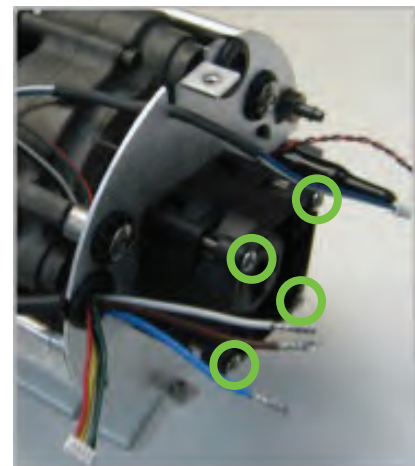


Figure 37

3.6 BATTERY CABLE REMOVAL (9201-SEQ)

3.6.1 PULL OUT THE WIRES FROM THE GROMMETS ON THE BULKHEAD OF THE COMPRESSOR AS SHOWN IN FIGURE BELOW.

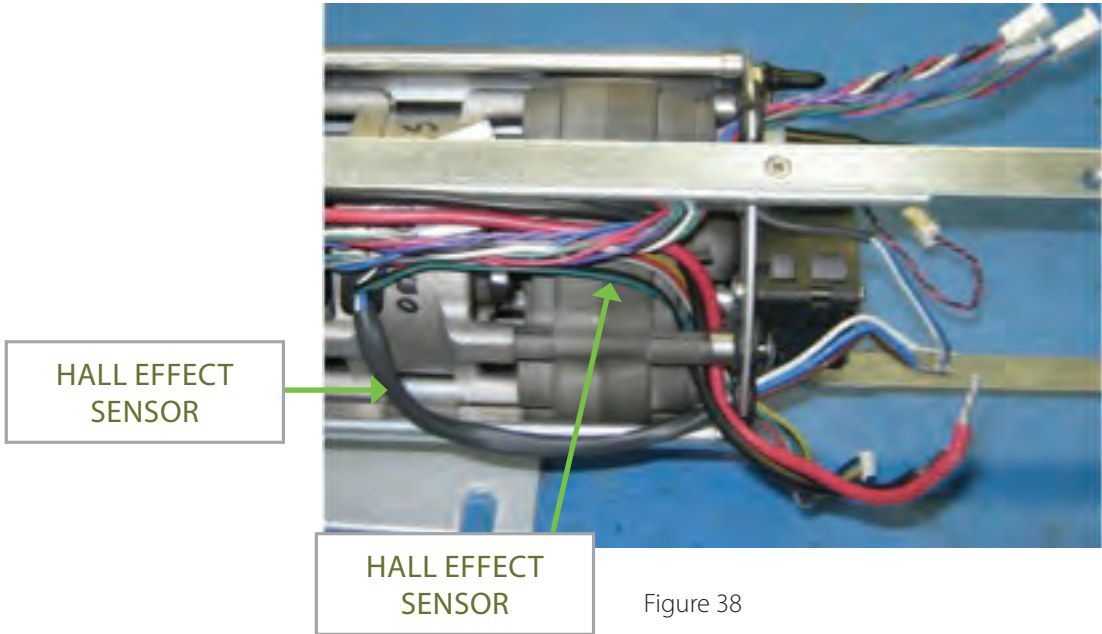


Figure 38

3.6.2 REMOVE THE TWO LARGE WIRES (BATTERY CONNECTOR CABLE) THRU THE MIDDLE BULKHEAD AS SHOWN IN FIGURE BELOW.

3.6.3 REMOVE THE WIRE SLEEVE WITH THE WIRES THRU THE BULKHEAD.

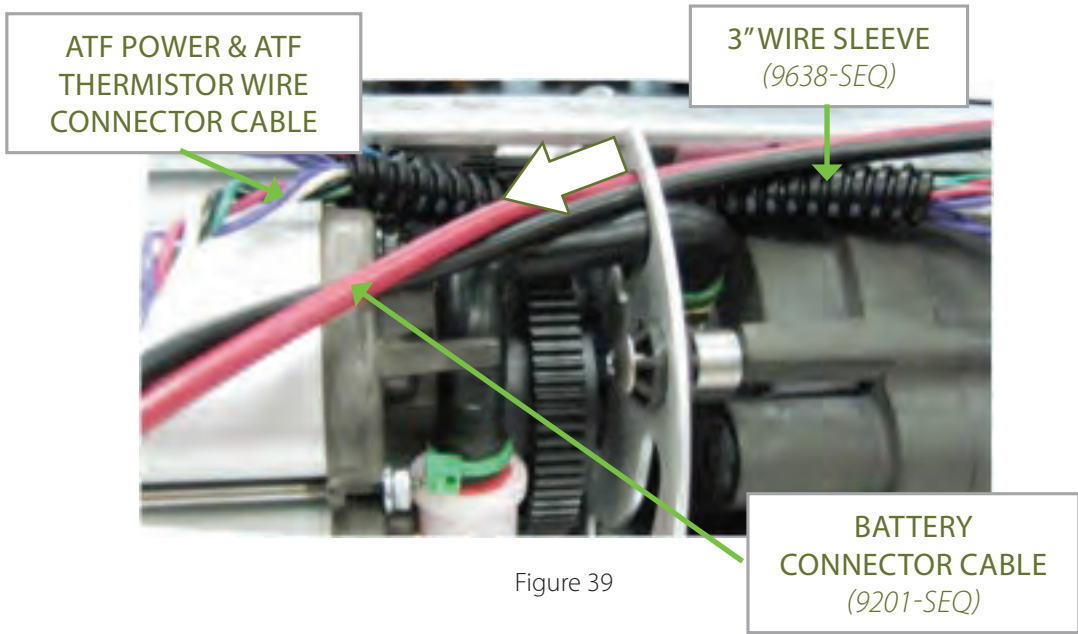


Figure 39

- 3.6.4 CUT AND REMOVE THE 6 CABLE TIES (PART# 6968-SEQ) ON THE SIDE RAIL & CABLE TIES THAT GROUP THE CABLE BUNDLE TOGETHER. CAUTION: DO NOT CUT WIRES.



Figure 40

- 3.6.5 CUT AND REMOVE ALL FOUR CABLE TIES BETWEEN THE STRUT (9779-SEQ) AND THE ATF ASSEMBLY. CAUTION: DO NOT CUT THE WIRES

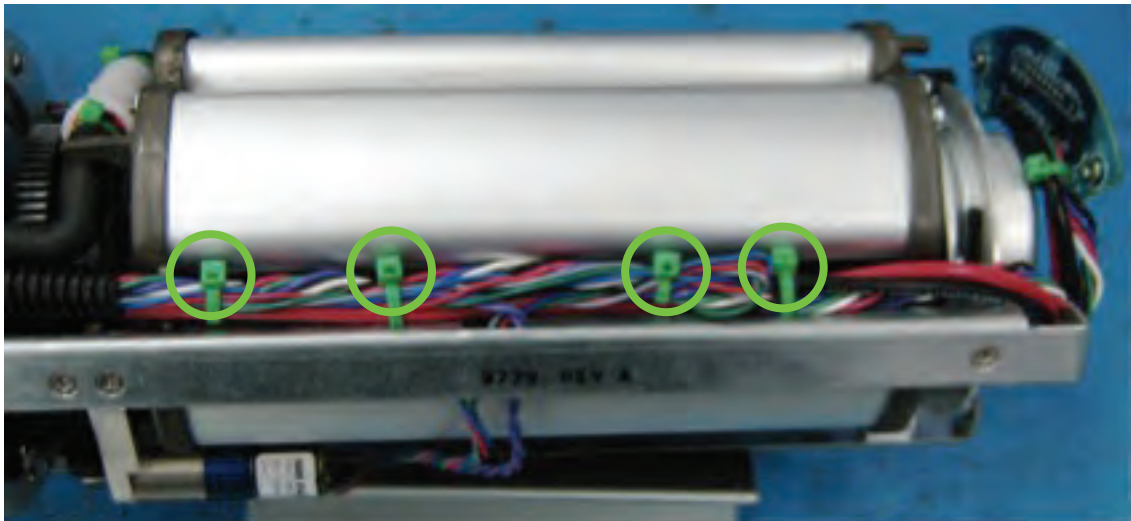


Figure 41

3.7 RAIL REMOVAL

3.7.1 REMOVE FIVE SCREWS (PART# 9912-1-SEQ) FROM LEFT STRYT (9779-SEQ).

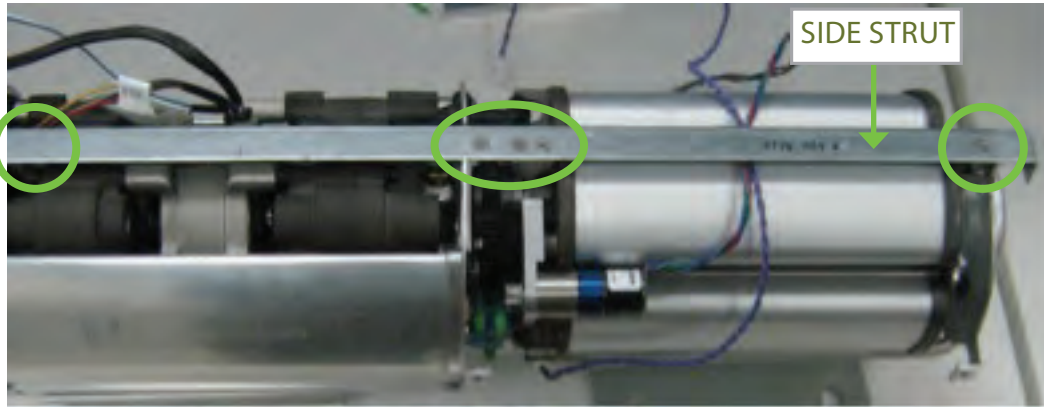


Figure 42

3.7.2 REMOVE FIVE SCREWS (PART# 9912-1-SEQ) FROM RIGHT STRYT (9780-SEQ).

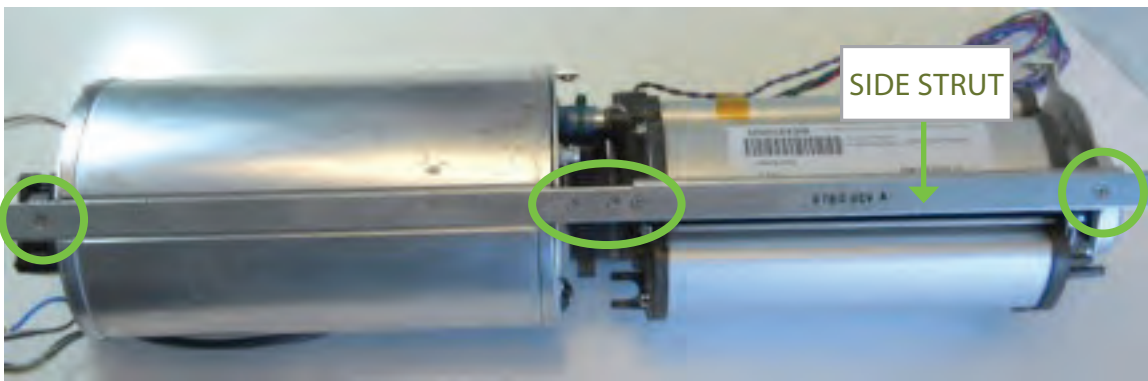


Figure 43

3.8 ATF & COMPRESSOR / TANK ASSEMBLY REMOVAL

3.8.1 REMOVE KAPTON TAPE (2696) FROM THE MUFFLER ASSEMBLY AND LEFT STRUT (9779-SEQ), AS SHOWN IN FIGURE BELOW.

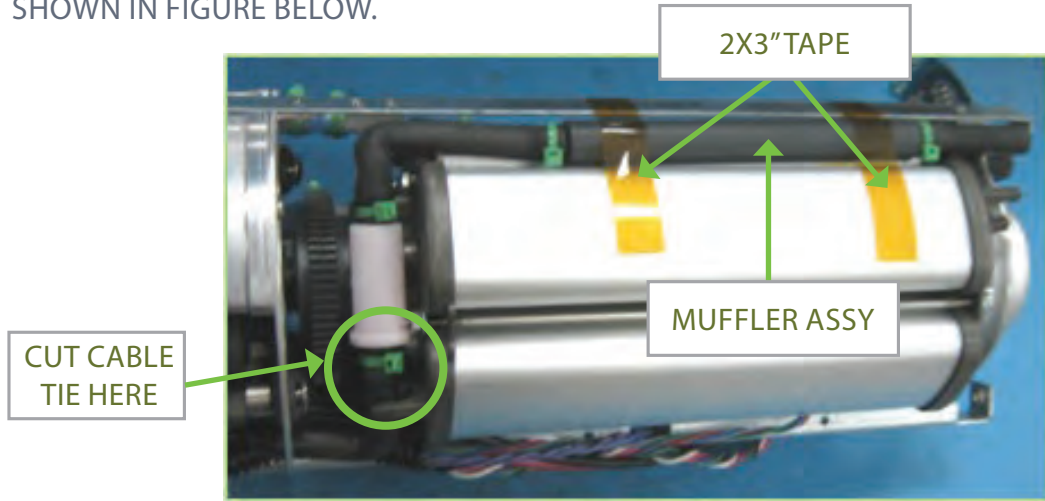


Figure 44

3.8.2 REMOVE EXHAUST TUBE AND ATF TO PRODUCT TANK TUBING. *CAP ATF OUT PORT.



Figure 45

3.8.3 CUT AND REMOVE 2 CABLE TIES (6968) AS SHOWN ON FIGURE BELOW.
NOTE: LEAVE THE CABLE TIE CLOSEST TO THE COMPRESSOR/PRODUCT TANK ASSEMBLY INTACT.

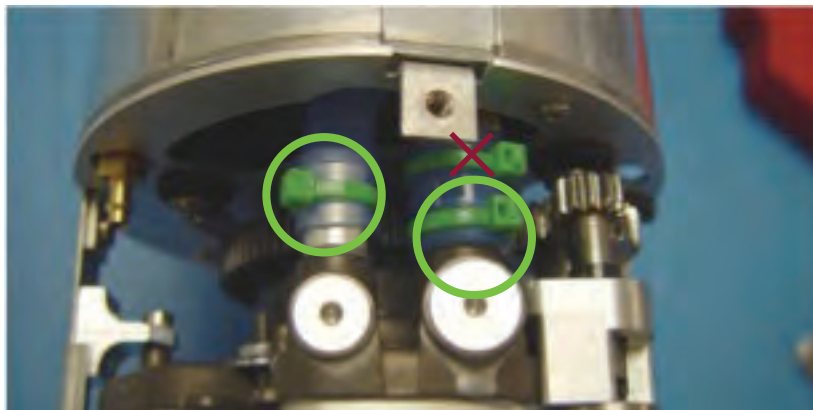


Figure 46

3.8.4 REMOVE THE SILICONE TUBING FROM THE ATF, LEAVING THE TUBING ATTACHED TO THE COMPRESSOR ASSEMBLY.

NOTE: MAY NEED TO CAREFULLY PRY TUBING FROM ATF PORTS WITH A TOOL.

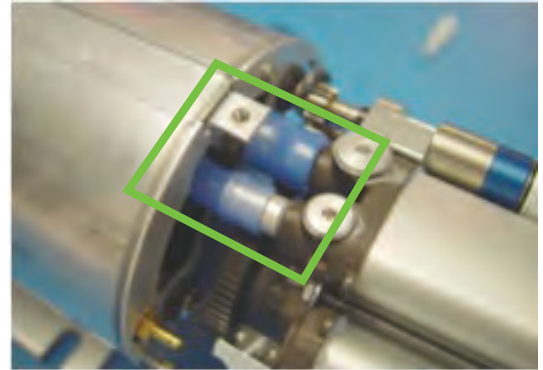


Figure 47

3.8.5 CAP BOTH ATF PORTS (FEED AND VACUUM PORTS).

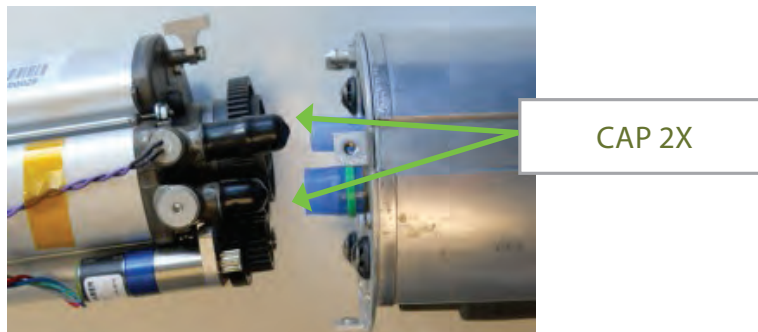


Figure 48

3.8.6 REMOVE THE ATF BULKHEAD FROM THE BOTTOM OF THE ATF MODULE ASSEMBLY AS SHOWN IN FIGURE BELOW.

NOTE: MARK THE POSITION FOR INSTALLATION.

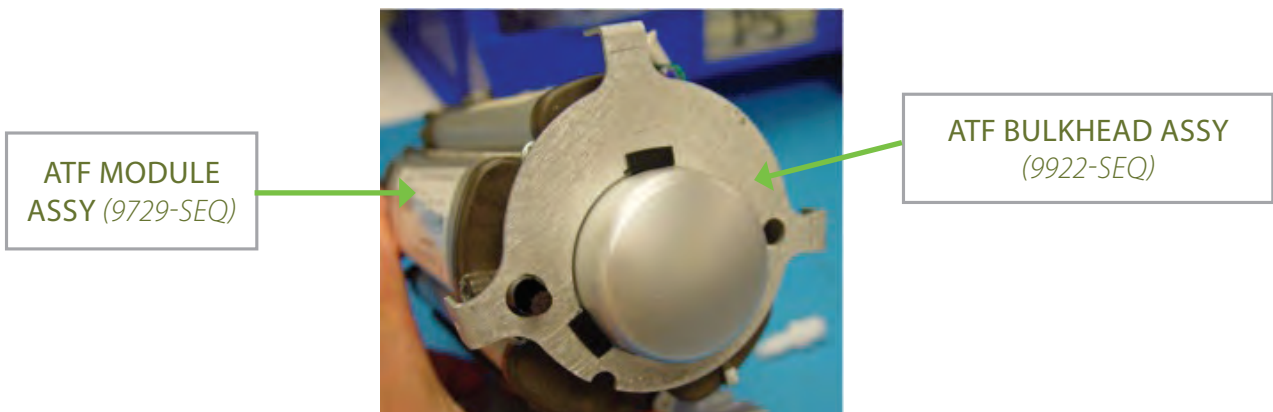


Figure 49

4 INSTALLATION PROCEDURES

4.1 GENERAL PROCEDURE

4.1.1 THREAD LOCKING PROCEDURE

When applying thread locker to screws, apply 1 drop of the appropriate thread locking fluid to the first four threads of the screw/standoffs as show in the figure below.

The Loctite 222MS will be used unless specified otherwise.

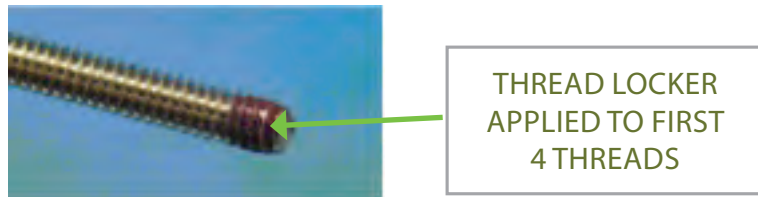


Figure 50

4.1.2 CABLE TIE INSTALLATION PROCEDURE

All cable ties will be installed using cable tie gun unless specified otherwise.



Figure 51

4.2 ATF & COMPRESSOR/PRODUCT TANK INSTALLATION

INSTALL THE ATF BULKHEAD ASSEMBLY ONTO THE BOTTOM OF ATF MODULE ASSEMBLY AS SHOWN IN FIGURES BELOW.

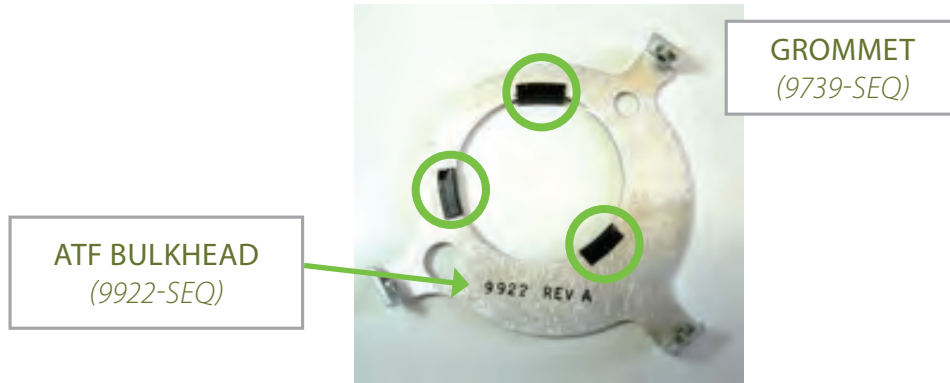


Figure 52

PLACE THE ATF ASSEMBLY AND COMPRESSOR ASSEMBLY NEXT TO EACH OTHER AND ALIGN AS SHOWN IN FIGURE BELOW.

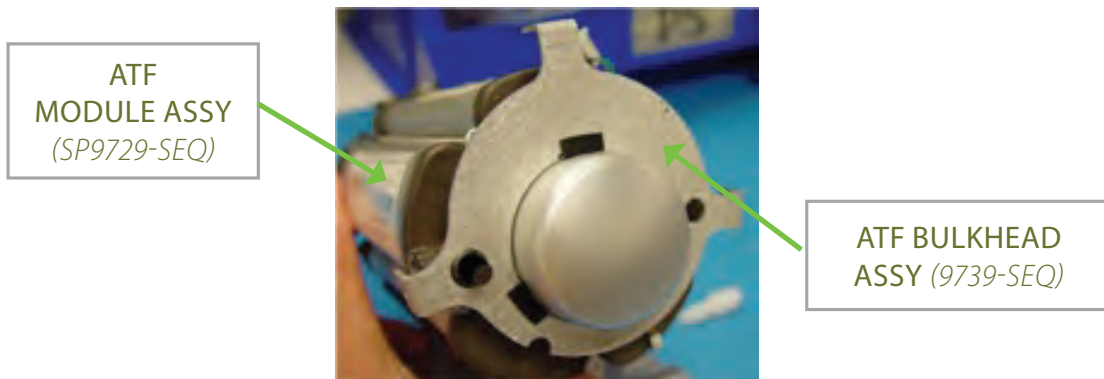


Figure 53

REMOVE CAPS (3575) FROM THE ATF.

Insert the Ports from the ATF into the tubes on the Compressor /Tank Assembly. Press the ATF & Compressor together and ensure that the hoses are positioned properly.

NOTE: PRE-WET INNER TUBING ON COMPRESSOR WITH ALCOHOL. ALSO, WET METAL BARBS ON THE ATF.

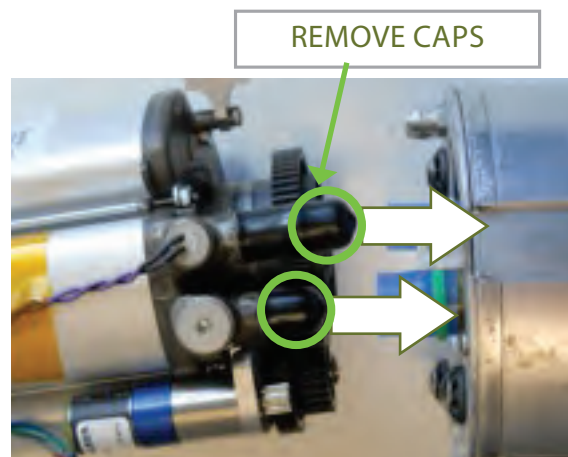


Figure 54

NOTE: USE ISOPROPYL ALCOHOL TO LUBRICATE THE TUBE AND THE BARB AND USE A MECHANICS GRABBER PLIERS TO ATTACH THE DOWNPIPE HOSE FROM THE COMPRESSOR ASSEMBLY TO THE FITTING ON THE ATF MODULE ASSEMBLY.

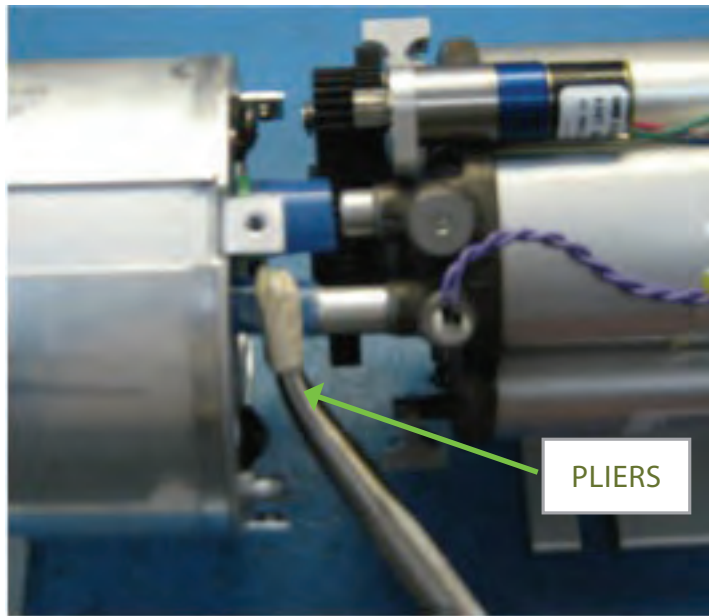


Figure 55

APPLY CAP (1137-SEQ) TO PRODUCT TANK OUTLET FITTING TO PREVENT ATF DESATURATION!

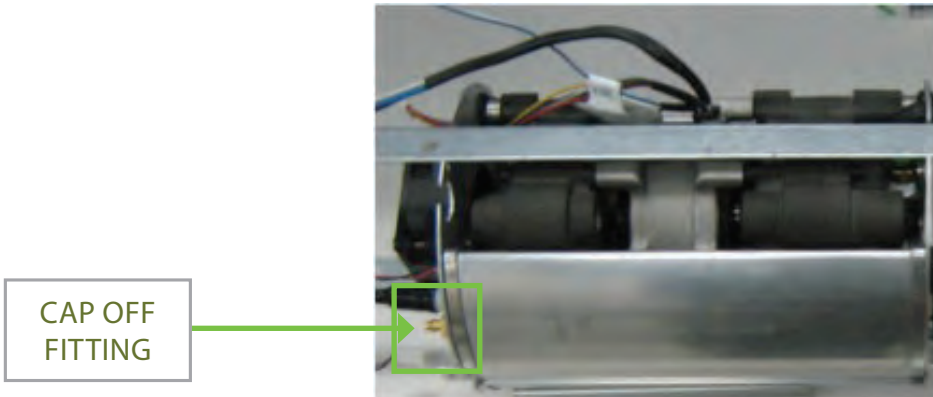


Figure 56

APPLY 2 CABLE TIES AS SHOWN ON FIGURE BELOW. NOTE: PRE LOOP ZIPTIES.

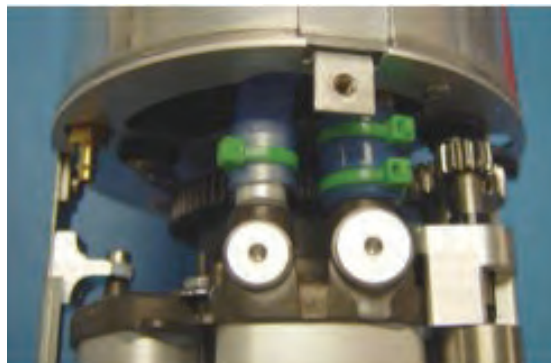


Figure 57

ATTACH THE EXHAUST FILTER, TUBE, MUFFLER ASSEMBLY AND TUBE, MUFFLER AS SHOWN IN FIGURE BELOW. NOTE: INSURE ARROW ON FILTER POINTS IN THE CORRECT DIRECTION. INSTALL CABLE TIES (6968) AS SHOWN IN FIGURE BELOW. ENSURE THE COMPRESSOR EXHAUST ELBOW TUBING IS THROUGH THE BULKHEAD BEFORE/DURING ASSEMBLY.

While applying Kapton tape, pull muffler tube to establish clearance. Make sure that tube, muffler, and muffler tube are laying down on ATF surface. NOTE: PULLING TOO HARD ON THE EXHAUST TUBE MAY CAUSE THE TUBE TO TEAR.

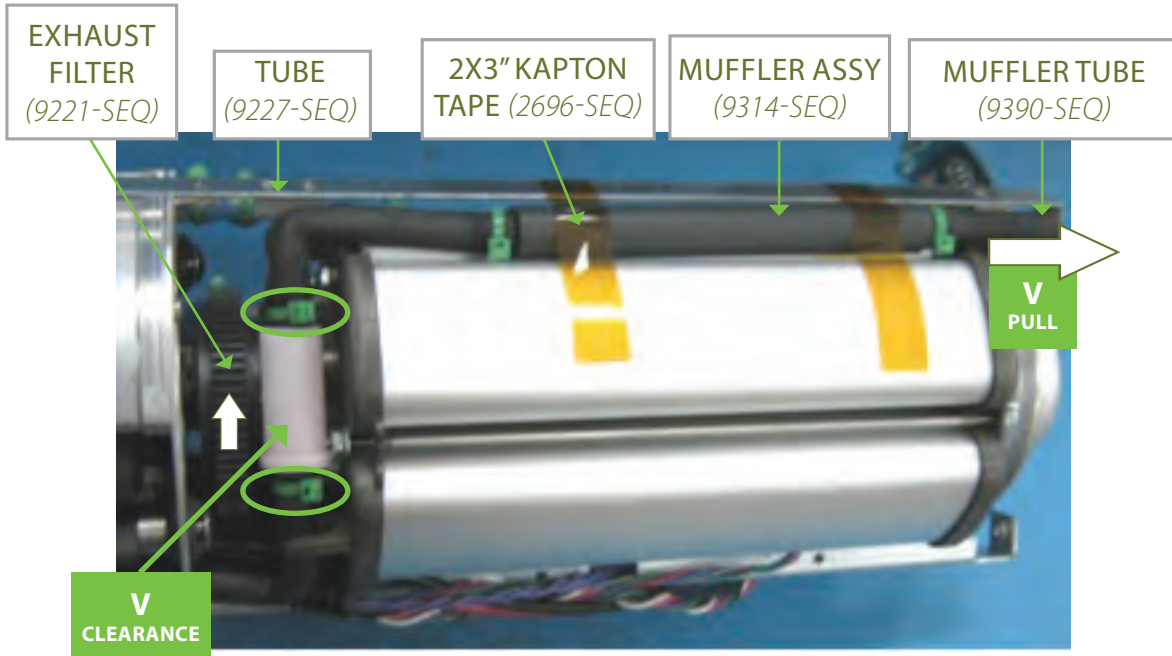


Figure 58

INSTALL THE ATF PRODUCT PIPE ONTO THE PRODUCT TANK WITH SILICONE TUBING AND SECURE WITH CABLE TIES. INSTALL THE OTHER END ONTO THE ATF WITH THE PRODUCT TUBE AND CLAMP AS SHOWN IN FIGURE BELOW.



Figure 59

4.3 RAIL INSTALLATION

ATTACH RIGHT STRUT (9780-SEQ) WITH FIVE SCREWS (9912-1-SEQ) WITH AND TORQUE TO 6.0 IN-LBS.

NOTE: TOP BULKHEAD SCREW NOT SHOWN.

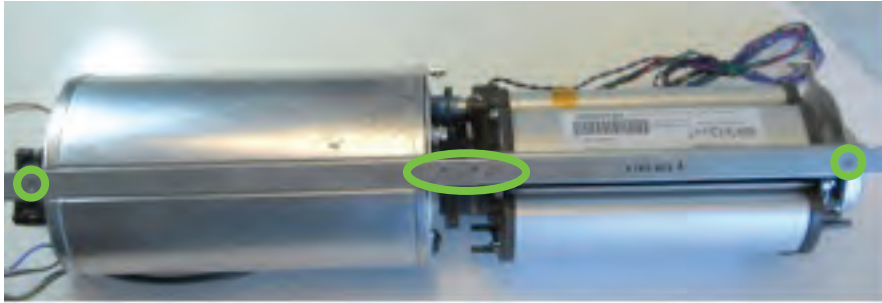
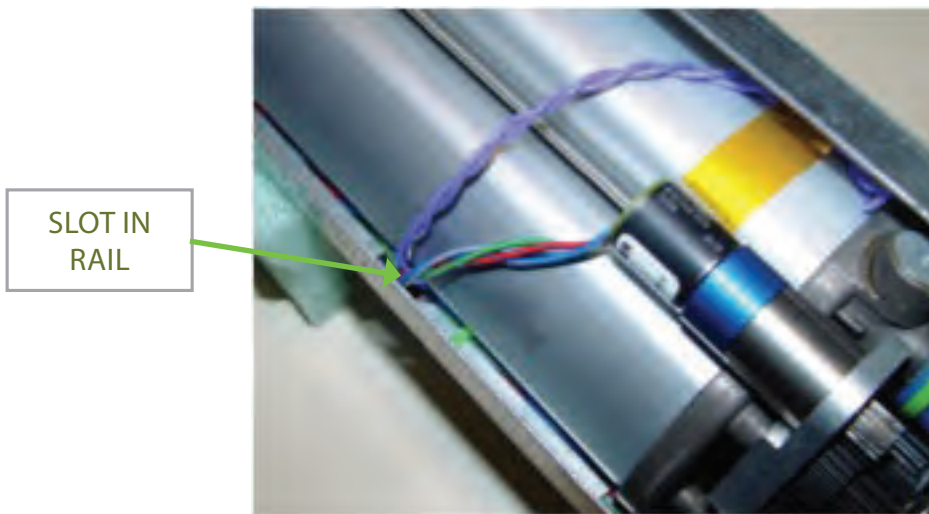


Figure 60

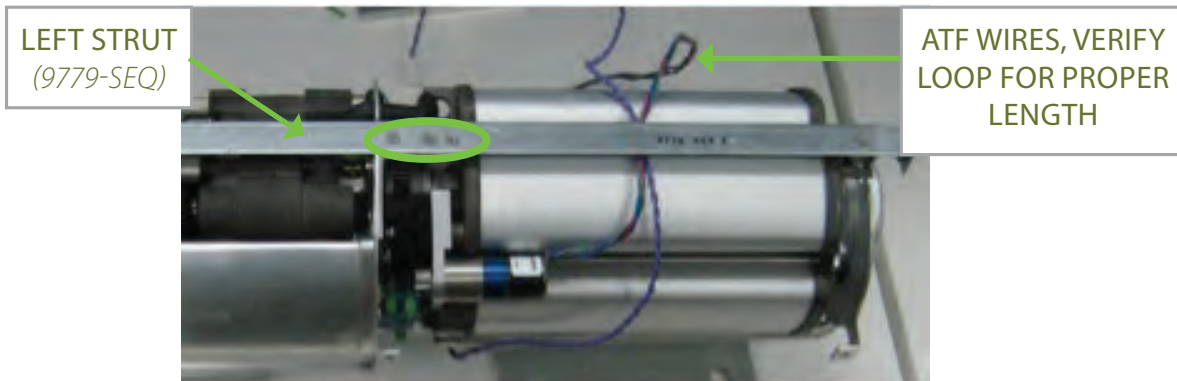
ROTATE ASSEMBLY, ROUTE THE ATF WIRES (STEPPER MOTOR AND ATF THERMISTOR WIRES) UNDER THE SLOT OF THE LEFT STRUT (9779-SEQ). NOTE: PRE-INSTALL CABLE TIES IN RAIL HOLES PRIOR TO INSTALLATION.



SLOT IN RAIL

Figure 61

SECURE THE STRUT (9779-SEQ) WITH FIVE SCREWS AND TORQUE THE SCREWS TO 6.0 IN-LB.



LEFT STRUT (9779-SEQ)

ATF WIRES, VERIFY LOOP FOR PROPER LENGTH

Figure 62

4.4. BATTERY CABLE INSTALLATION

SECURE TWO CABLE TIES THROUGH THE HOLES IN LEFT STRUT (9779-SEQ) AND ROUND ALL WIRES.

SECURE TWO CABLE TIES AROUND ALL WIRES (BATTERY CABLES & ATF BUNDLE).

APPLY ONE CABLE TIE AROUND ALL BATTERY CABLES, CLOSE TO THE BATTERY BOARD, AS IN FIGURE BELOW.

NOTE: LEAVE THE CABLE TIES LOOSE IN CASE SLACK IS NEEDED AT THE PCBA ASSEMBLY.

NOTE: ENSURE SLACK TO WIRES WHERE INDICATED.

ORIENT THE CABLE TIE KNOTS TOWARDS THE COMPRESSOR.

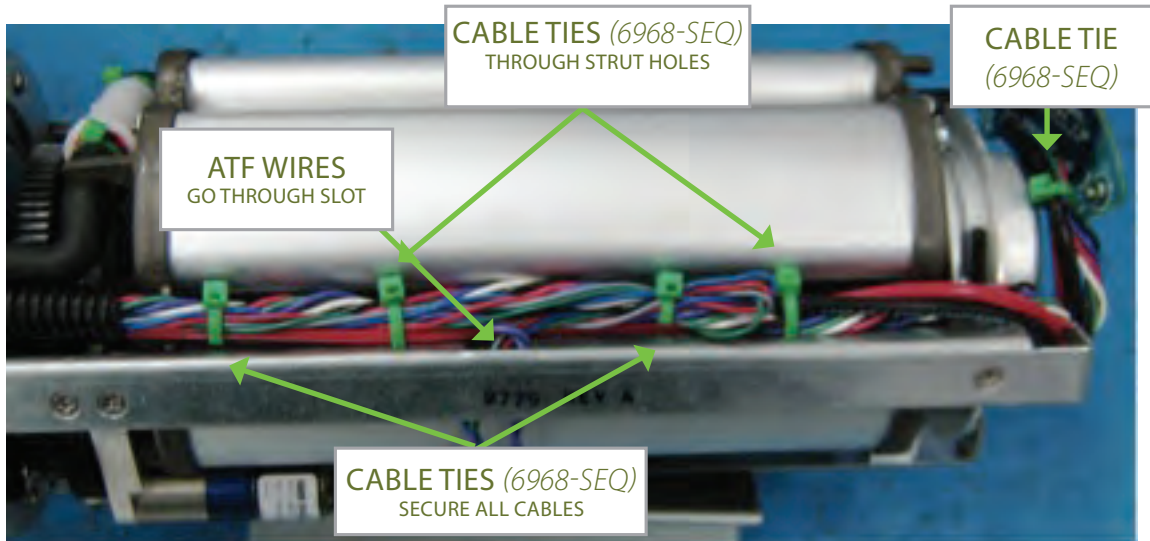


Figure 63

WRAP THE WIRE SLEEVE AROUND THE ATF WIRES AND PASS THRU THE BULKHEAD.

PASS THE TWO BATTERY WIRES FROM THE BATTERY CONNECTOR THRU THE BULKHEAD AS SHOWN IN FIGURE BELOW.

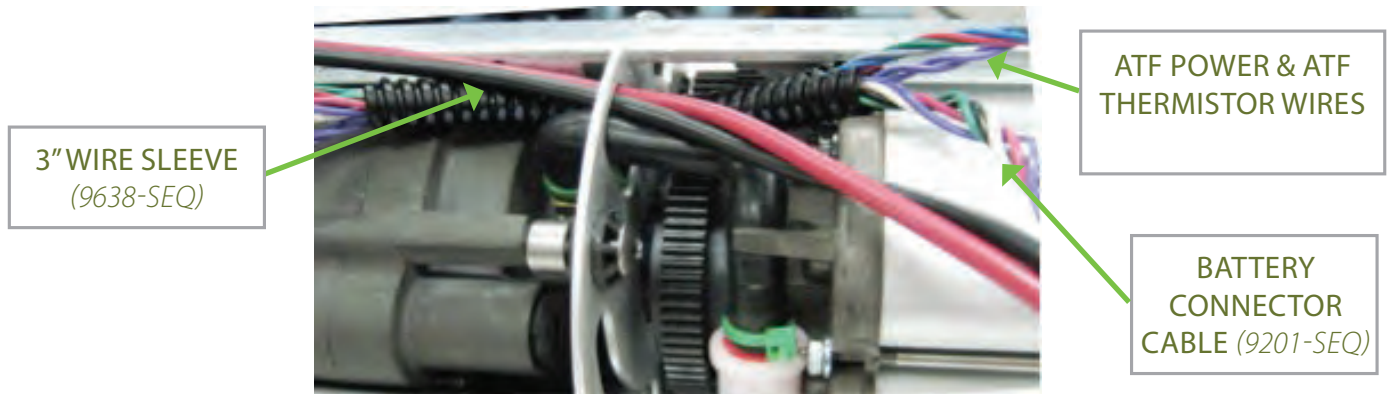


Figure 64

SECURE THE BATTERY POWER WIRES ON THE LEFT STRUT (9779-SEQ) WITH CABLE TIE.

NOTE: LEAVE THE CABLE TIES LOOSE IN CASE SLACK IS NEEDED AT THE PCBA ASSEMBLY.
NOTE: ENSURE SLACK TO WIRES WHERE INDICATED.

ORIENT THE CABLE TIE KNOTS TOWARDS THE COMPRESSOR.

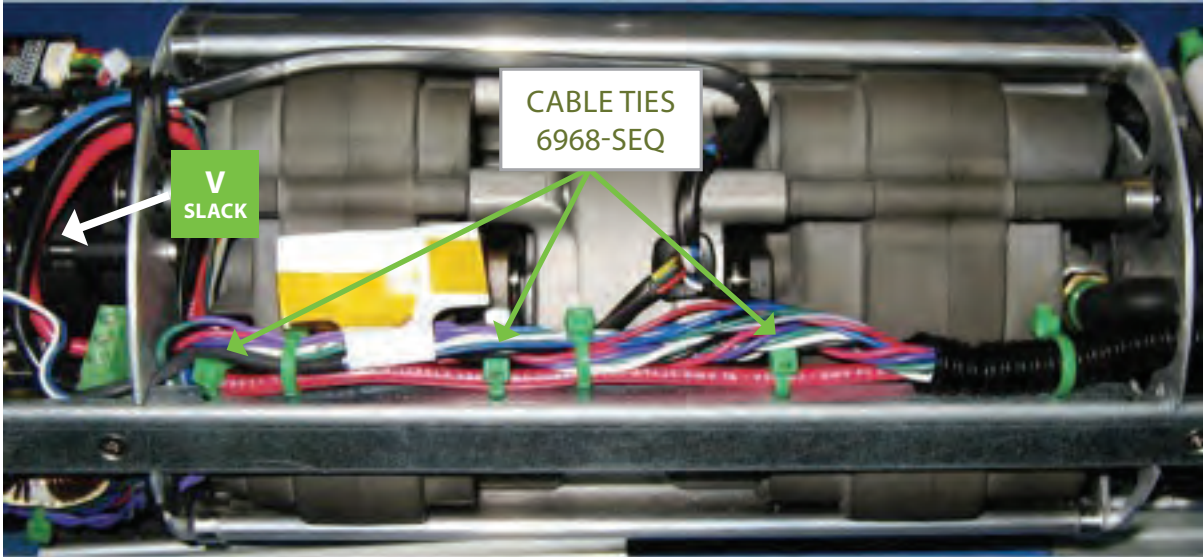


Figure 65

SECURE THE ATF BUNDLED WIRES TO THE BATTERY POWER CABLES WITH CABLE TIES.

NOTE: LEAVE THE CABLE TIES LOOSE IN CASE SLACK IS NEEDED AT THE PCBA ASSEMBLY

ENSURE THAT THERE IS SLACK ON THE WIRES ON THE AREAS INDICATED.

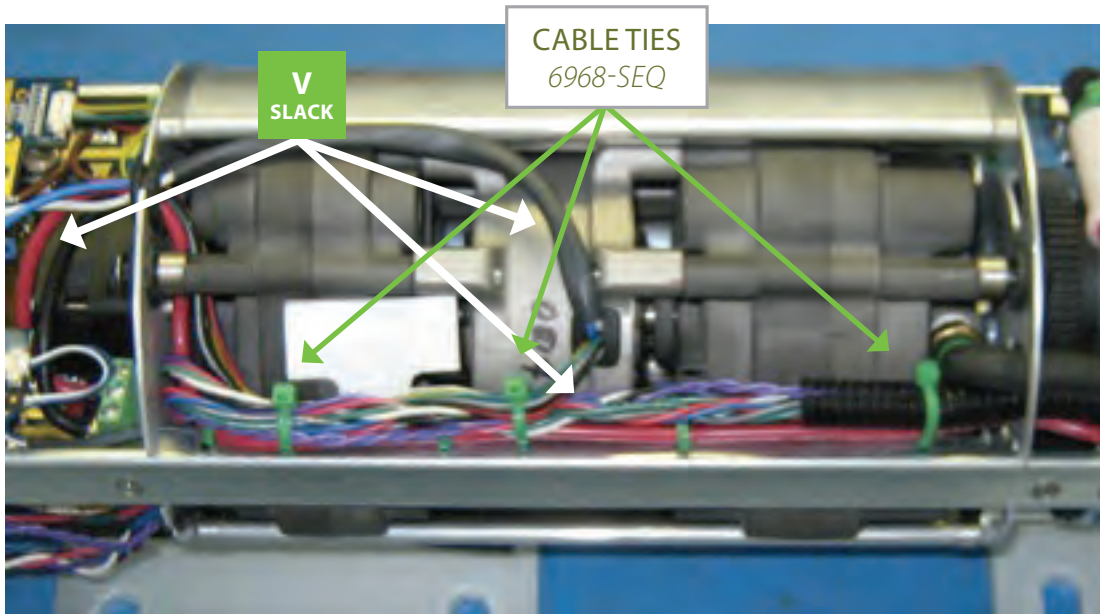


Figure 66

INSTALL THE GROMMET ONTO THE BULKHEAD TO SECURE THE ATF AND BATTERY WIRES.

ROUTE THE BATTERY POWER WIRES AND HALL EFFECT WIRE UNDER THE MOUNTING COMPRESSOR SCREW AND THROUGH THE BULKHEAD GROMMET AS SHOWN IN FIGURE BELOW.

ROUTE THE ATF WIRE BUNDLE UNDER THE STRUTS PRIOR TO RAIL INSTALLATION AND THROUGH THE BULKHEAD GROMMET AS SHOWN IN FIGURE BELOW. NOTE: DO NOT PINCH THERMISTOR CABLE IN BULK HEAD

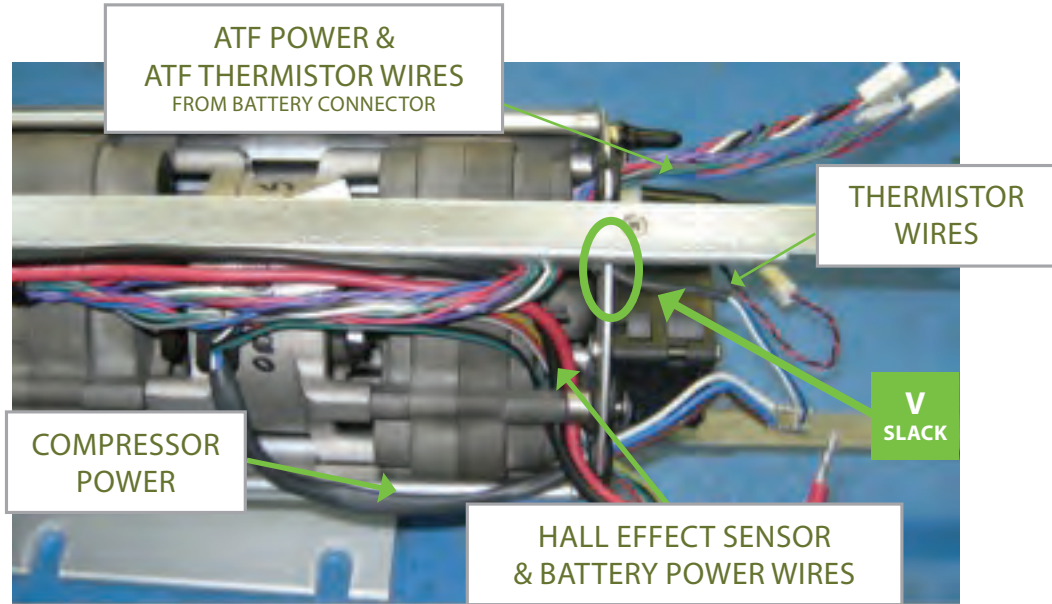


Figure 67

4.5. COMPRESSOR FAN REPLACEMENT

ATTACH THE FAN SUBASSEMBLY (9767-SEQ) WITH THE FLOW ARROWS TOWARDS THE BULKHEAD AS SHOWN ON FIGURE. APPLY LOCTITE 222MS (1405-SEQ) ON THE SCREWS AND TORQUE TO 2.0 IN-LBS.

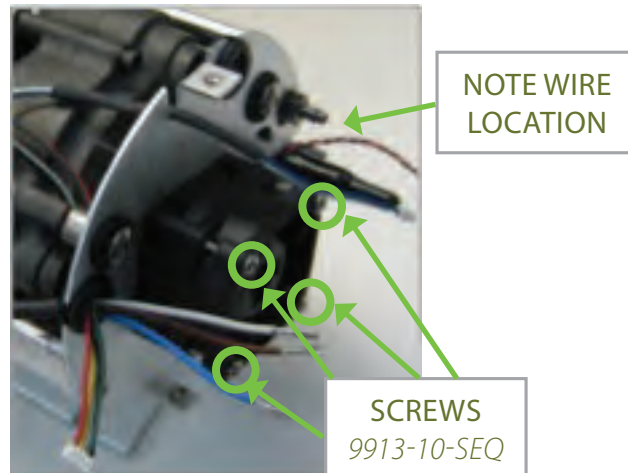


Figure 68

CONNECT THE COMPRESSOR FAN WIRE TO THE PCB ASSEMBLY (IF PCBA ASSEMBLY IS CONNECTED)

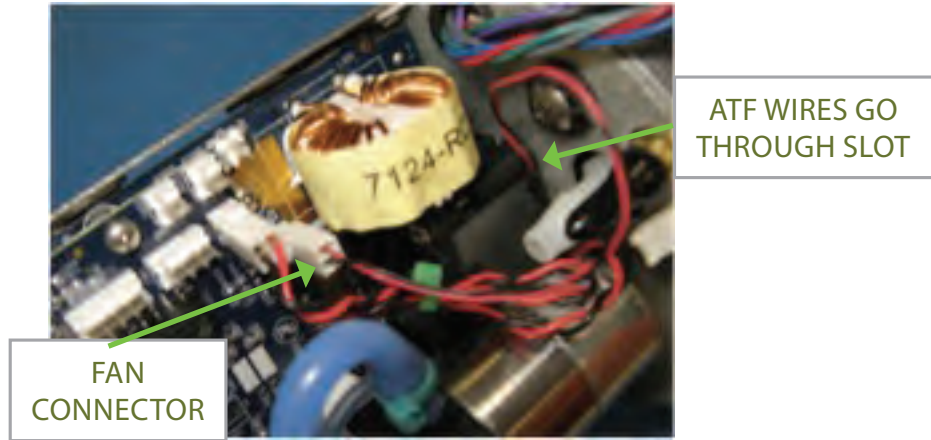


Figure 69

4.6. PROPORTIONAL VALVE REPLACEMENT (5293-SEQ)

4.6.1 ATTACH THE TWO SCREWS FROM THE PROPORTIONAL VALVE IN TO THE PROPORTIONAL BLOCK (WHITE) BELOW IT AND TORQUE TO 3.8 IN-LBS.

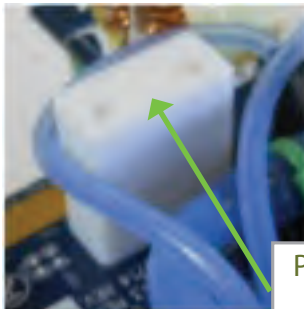


Figure 71

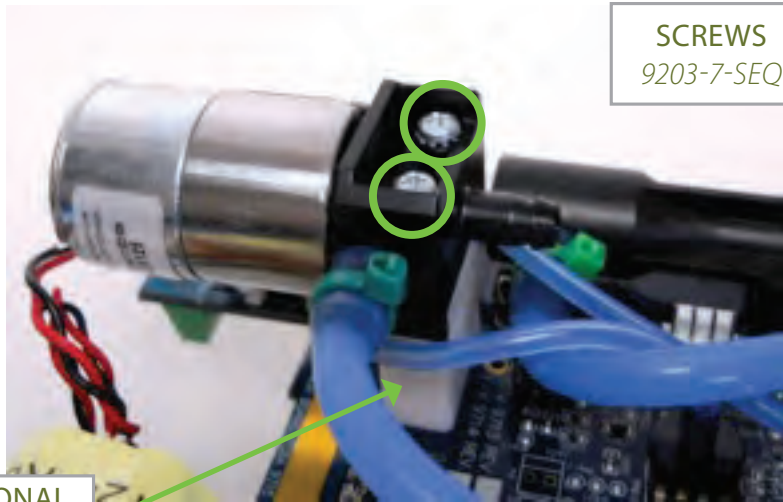


Figure 70

PROPORTIONAL
VALVE BLOCK
9231-SEQ

SCREWS
9203-7-SEQ

4.6.2 SECURE THE FLOW TUBE WITH A CABLE TIE TO THE PROPORTIONAL VALVE.

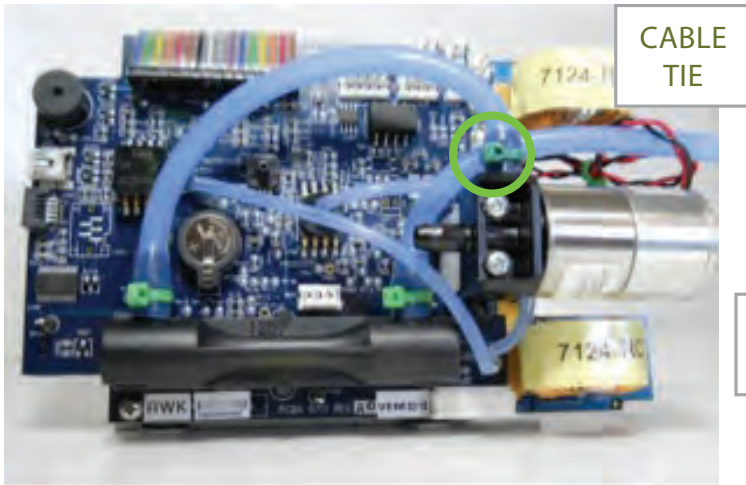


Figure 72

4.6.3 CONNECT PROPORTIONAL VALVE WIRE TO THE PCB ASSEMBLY

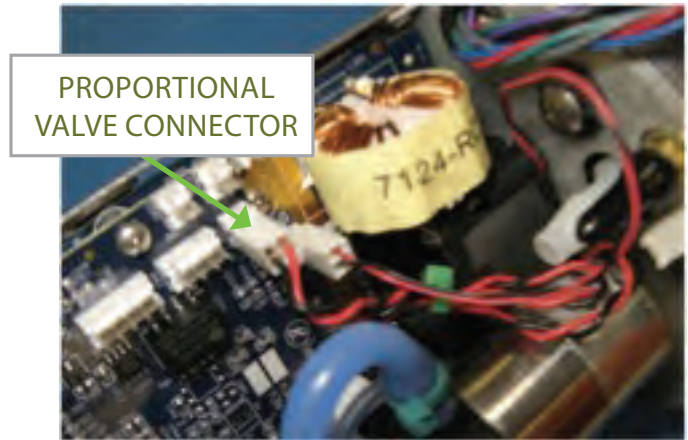


Figure 73

4.7 INSTALLATION OF PCB ASSEMBLY

4.7.1 POSITION THE PCB ASSEMBLY BETWEEN THE 2 STRUTS (9779-SEQ & 9780-SEQ)

Install 2 Screws on each side and torque the Screws to 6.0 in-lbs.

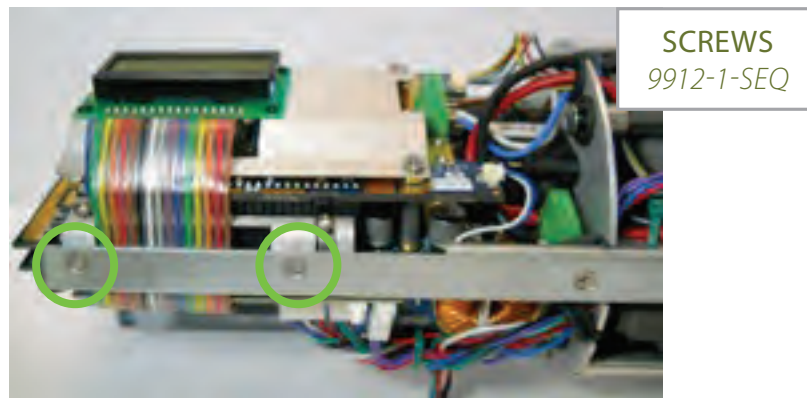


Figure 74

4.7.2 INSERT & SECURE THE BATTERY POWER AND COMPRESSOR POWER WIRES WHERE SHOWN IN FIGURE BELOW. USE A FLAT BLADE SCREWDRIVER TO TIGHTEN AND TORQUE THE SCREWS TO 4.4 IN-LBS.

NOTE: BATTERY WIRE POLARITY INDICATED ON THE PCBA. RED IS (+) AND BLACK IS (-)

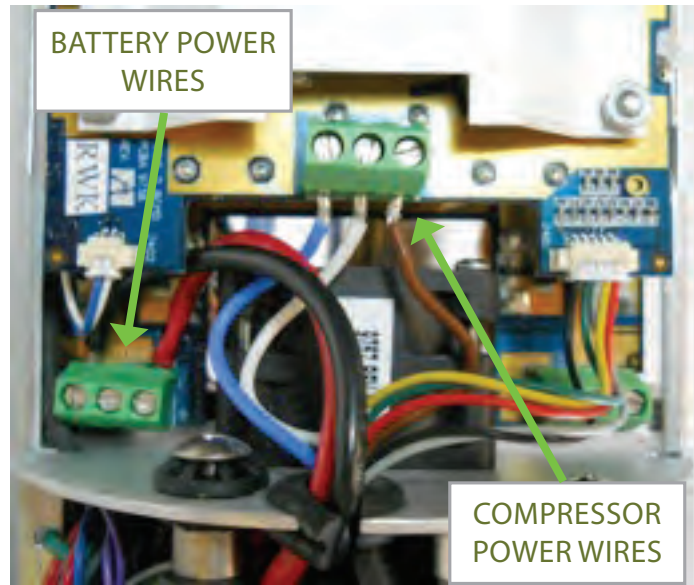


Figure 75

4.7.3 CONNECT THE THERMISTOR CONNECTOR TO THE PCBA

4.7.4 CONNECT THE HALL EFFECT CONNECTOR TO THE PCBA

NOTE: ENSURE THERE IS ENOUGH SLACK TO THE HALL EFFECT WIRE

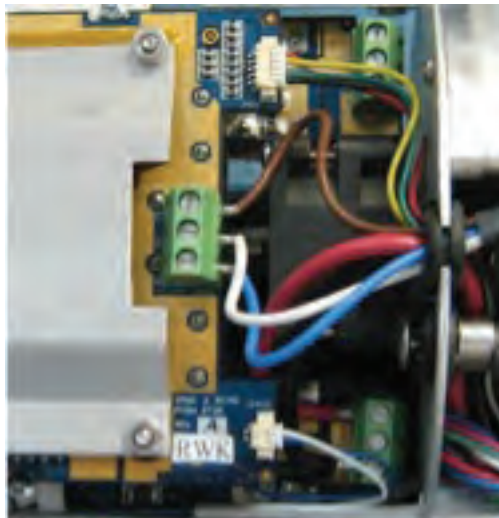


Figure 76

4.7.5 CONNECT THE FAN CONNECTOR TO THE PCB AND CONNECT FLOW TUBING.

Attach the Flow Tube into the Product Tank.

Secure the Flow Tube with Cable tie.

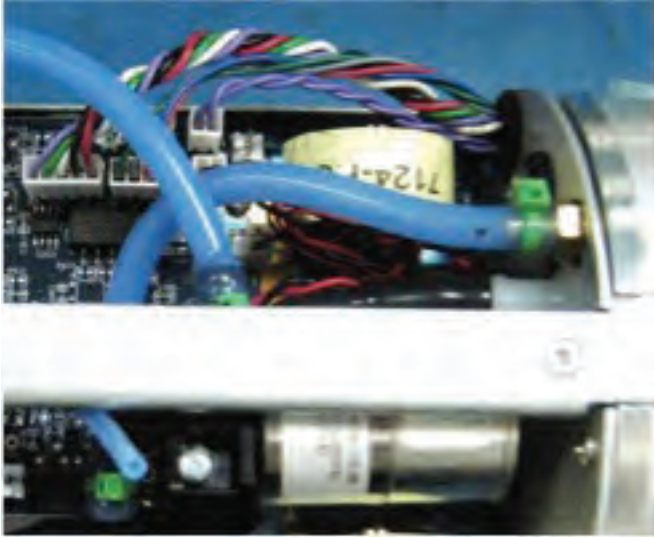


Figure 77

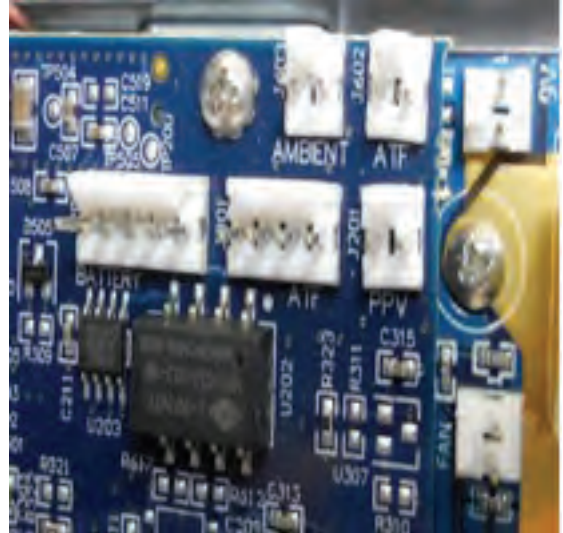


Figure 78

4.7.6 TIGHTEN & SECURE ALL WIRES CABLE TIES.

NOTE: ORIENT ALL CABLE TIE KNOTS TOWARDS THE COMPRESSOR.

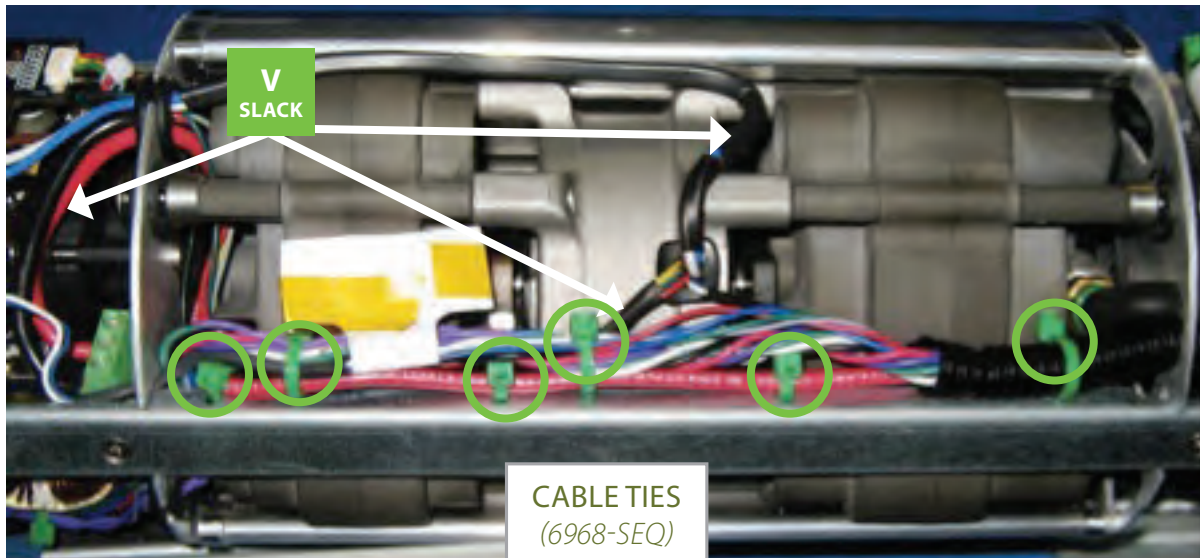


Figure 79

4.7.7 TIGHTEN & SECURE ALL WIRES CABLE TIES.

NOTE: ORIENT ALL CABLE TIE KNOTS TOWARDS THE ATF.

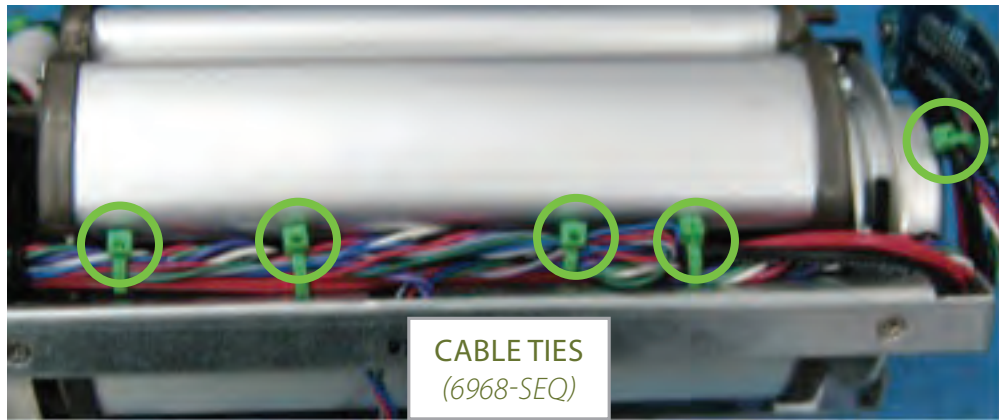


Figure 80

4.7.8 ADD CABLE TIE TO HOLD WIRES AWAY FROM THE COIL. HAND-TIGHTEN LOOSE AS IN FIGURE BELOW.

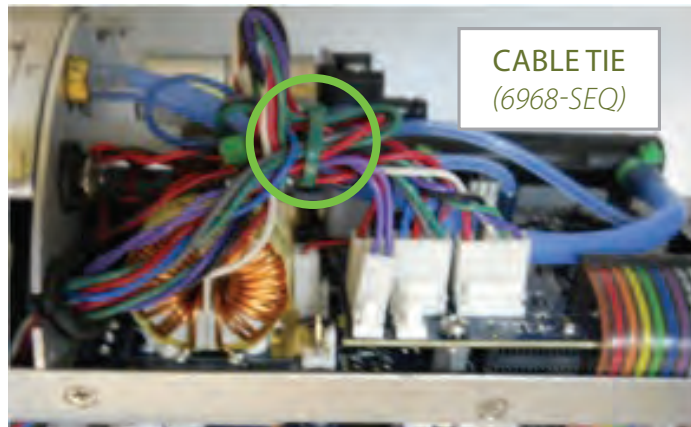


Figure 81

4.7.9 ATTACH TOP STRUT (9778-SEQ) WITH 5 SCREWS AS SHOWN ON FIGURE BELOW. TORQUE THE SCREWS TO 6.0 IN-LBS.



Figure 82

4.8 POWER CONNECTOR REPLACEMENT (9766-SEQ)

4.8.1 AFTER PERFORMING STEPS 3.2.1 THRU 3.2.8 FROM “INLET CAP REMOVAL”

4.8.2 REMOVE THE FOUR SCREWS (9203-2-SEQ) AND REMOVE THE POWER CONNECTOR (9766-SEQ).

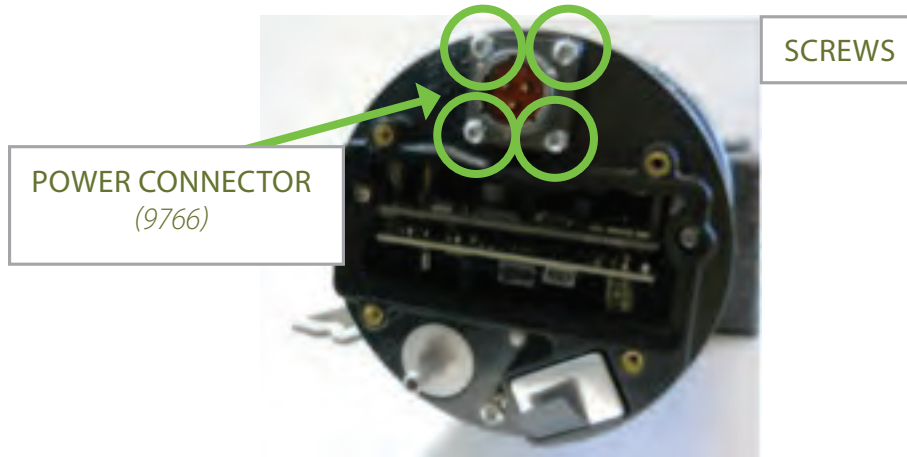


Figure 83

4.8.3 INSTALL NEW POWER CONNECTOR (9766-SEQ). USE LOCTITE 222 ON THE FOUR MOUNTING SCREWS. REPLACE O-RING (9916-3-SEQ) IF NECESSARY.



Figure 84

4.8.4 PERFORM STEPS 4.10.4 – 4.10.11 FROM SECTION “INLET CAP INSTALLATION”.

4.9 USER PANEL REPLACEMENT (9731-SEQ)

4.9.1 AFTER PERFORMING STEPS 3.2.1 THRU 3.2.8 FROM “INLET CAP REMOVAL.

4.9.2 PEEL OFF THE USER PANEL (9731-SEQ) AS SHOWN IN THE FIGURE BELOW.



Figure 85

4.9.3. CLEAN THE SURFACE SHOWN IN THE FIGURE BELOW WITH ISOPROPYL ALCOHOL BEFORE RE-APPLYING THE NEW USER PANEL.

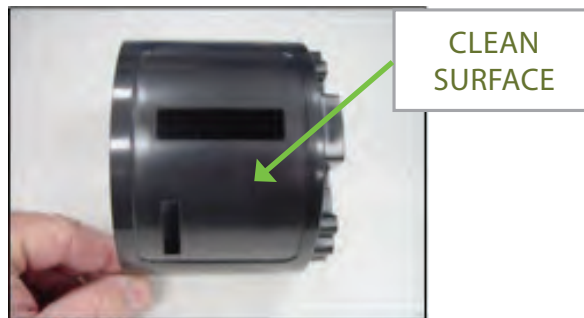


Figure 86

4.9.4 REMOVE THE PSA PROTECTIVE COVER FROM THE NEW USER PANEL (9731-SEQ). INSERT THE FLEX CABLE AS SHOWN IN THE FIGURE BELOW.



Figure 87

4.9.5 POSITION AND APPLY THE NEW USER PANEL AS SHOWN IN THE FIGURES BELOW. PRESS FIRMLY ON THE ENTIRE SURFACE OF THE NEW USER PANEL TO INSURE THAT IT IS BONDED CORRECTLY.



Figure 88



Figure 89

4.9.6 RECONNECT THE SMALL TUBE (4056-SEQ (2.3")).

4.9.7. PERFORM STEPS 4.10.4 - 4.10.11 FROM SECTION "INLET CAP INSTALLATION".

4.10 INLET CAP INSTALLATION (SP9756-SEQ)

4.10.1 PLACE O-RING IN THE RING SLEEVE



Figure 90

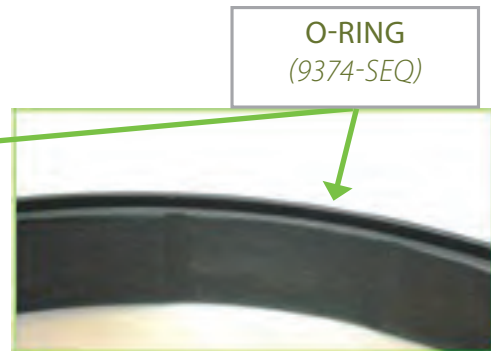


Figure 91

4.10.2 ALIGN & SLIDE THE 3 O-RINGS IN THE RING SLEEVE OVER THE 3 STRUTS

4.10.3 PLACE THE INLET CAP (9756) OVER THE STRUTS SO THAT THE LCD DISPLAY IS LINED UP WITH THE MEMBRANE PANEL WINDOW.

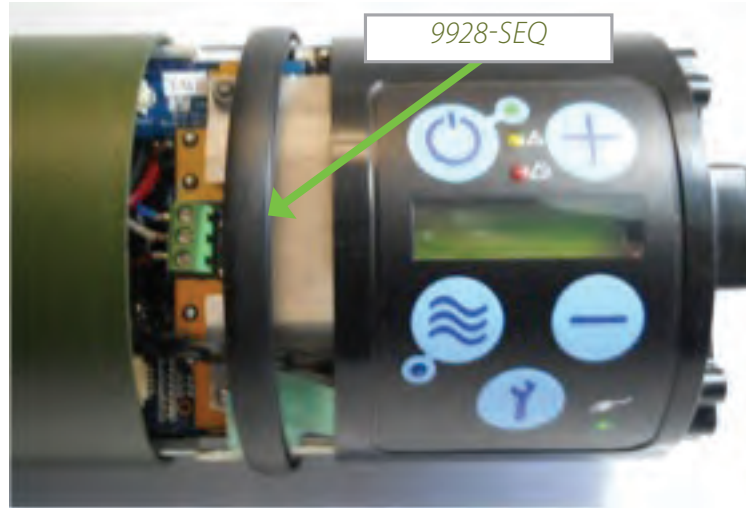


Figure 92

4.10.4 CONNECT THE BREATH DETECT TUBE

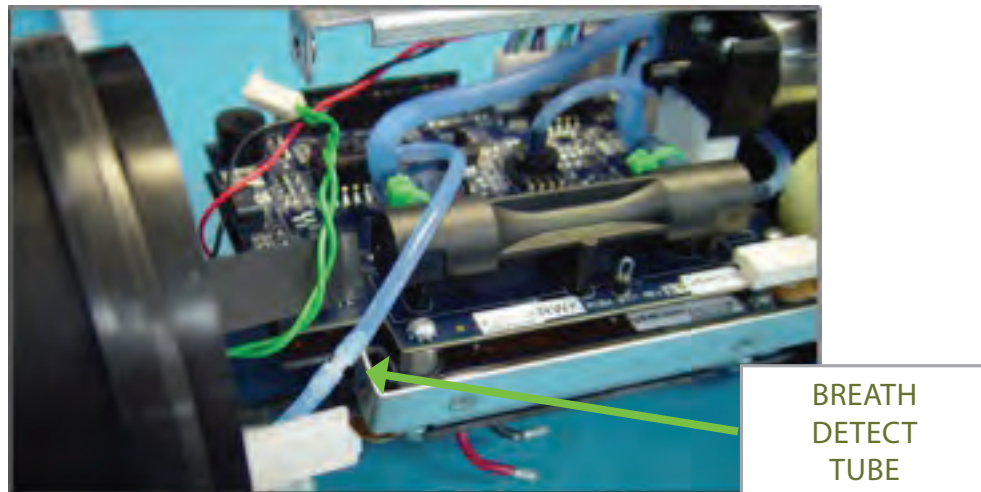


Figure 93

4.10.5 INSERT POWER HARNESS WIRES FROM THE INLET CAP AND TIGHTEN THE SCREWS TO 4.4 IN-LBS.

NOTE: BATTERY WIRE POLARITY INDICATED ON THE PCBA. RED IS (+) AND BLACK IS (-).

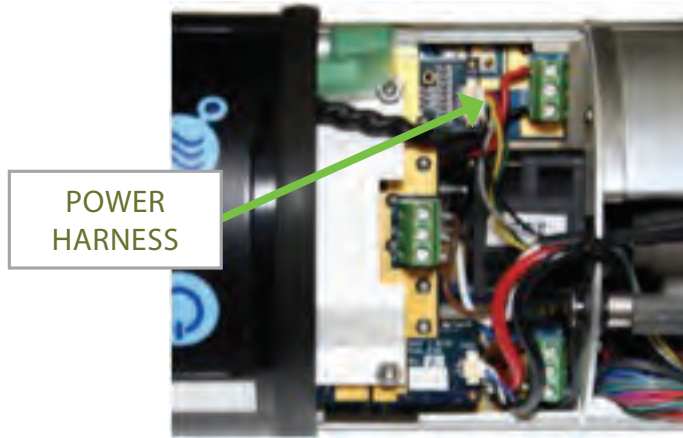


Figure 94

4.10.6 INSERT FRONT PANEL FLEX CABLE FLUSHED, WITH LOCKING CONNECTOR. APPLY 2" OF KAPTON TAPE (2696-SEQ) ON THE MOUNTING STRUT.

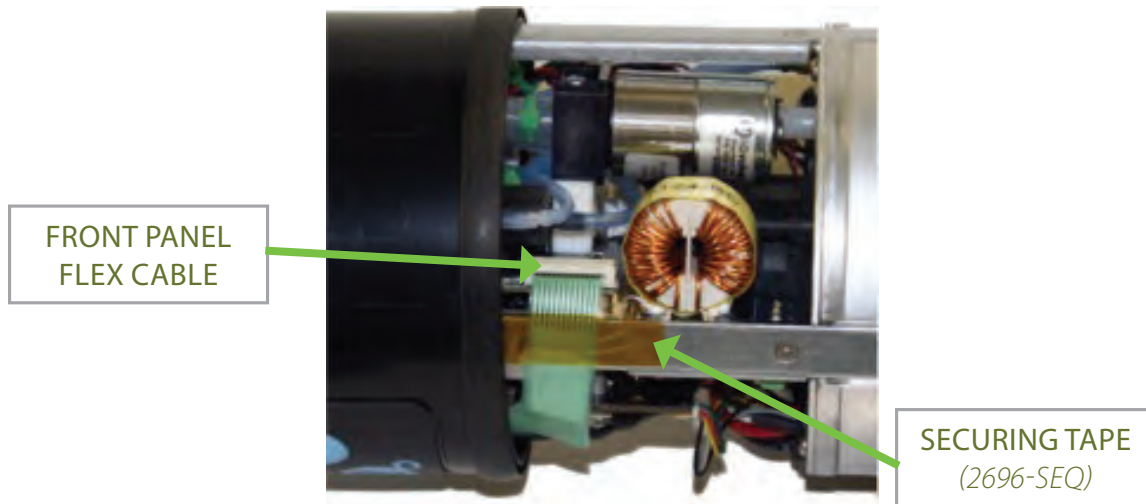


Figure 95

4.10.7 CONNECT THE AMBIENT AIR THERMISTOR AND CONNECT 9V BATTERY CONNECTOR AS SHOWN IN PICTURE BELOW.

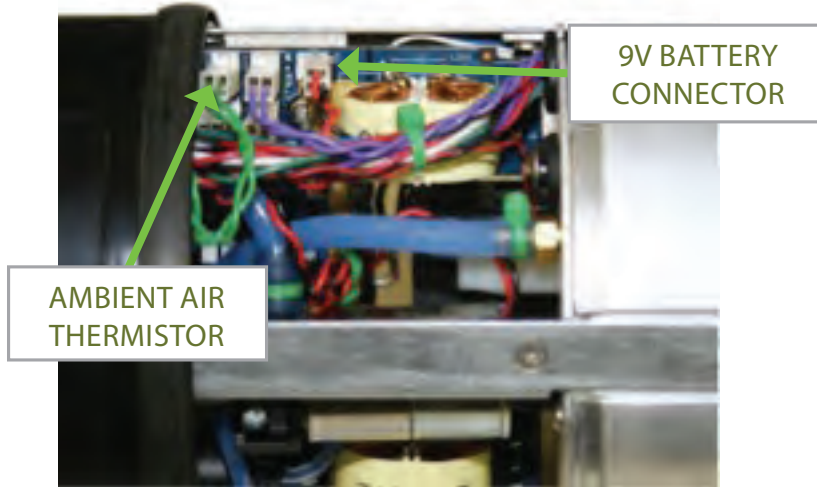


Figure 96

4.10.8 ATTACH THE OXYGEN OUTLET TUBE (6981-SEQ) TO THE FLOW VALVE OUTLET PORT AND SECURE WITH A CABLE TIE.

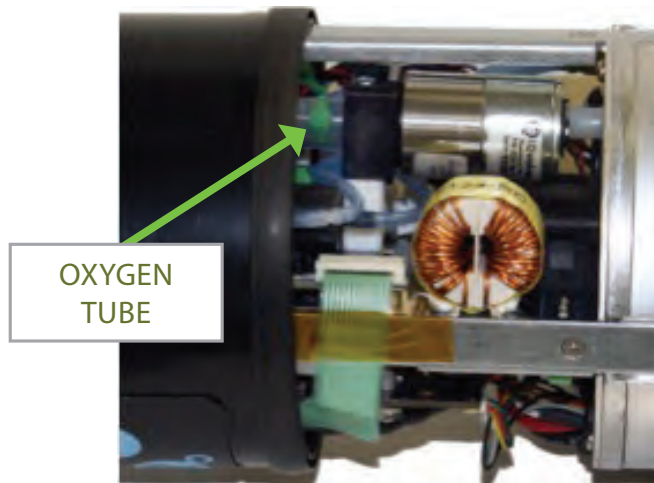
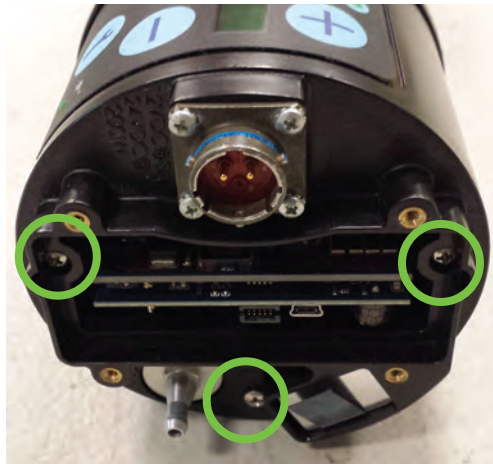


Figure 97

4.10.9 SECURE THE THREE INLET CAP MOUNTING SCREWS (9914-6-SEQ) TO EACH STRUT.



INLET CAP
MOUNTING
SCREWS
9914-6-SEQ

Figure 98

4.10.10 INSERT AND CONNECT THE 9V BATTERY (9257-SEQ)
AND THE FILTER (9798-SEQ).

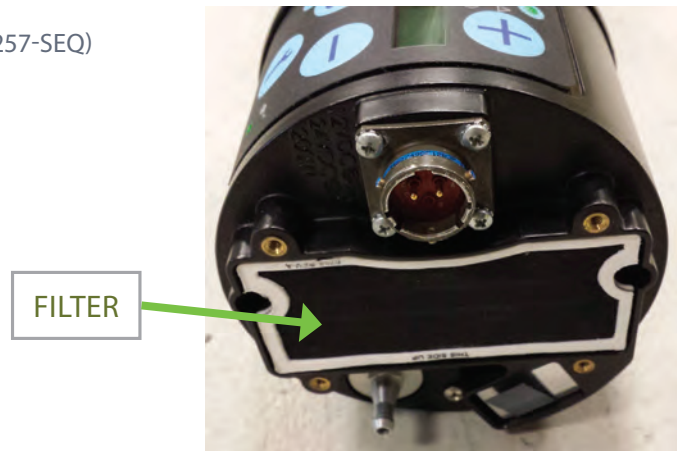


Figure 99

4.10.11. ALIGN THE AIR INLET COVER (9758-SEQ)
TO THE TOP OF THE SAROS AND TIGHTEN
THE FOUR SCREWS (P9291-SEQ).

TIGHTEN
SCREWS



Figure 100

4.11 INSTALLATION OF THE SLEEVE & BATTERY INTERFACE PLATE

4.11.1 SLIDE SLEEVE (9280-SEQ) AND RING SLEEVE WITH O-RINGS (9928-SEQ) OVER STRUTS, AND INSERT IT INTO ALIGNING RING THAT IS ATTACHED TO THE INLET CAP.



Figure 101

4.11.2 ALIGN SECOND SLEEVE (9928-SEQ) AND O-RING (9928-SEQ) OVER THE STRUTS, TO THE SLEEVE LEAVING THE BATTERY BOARD EXPOSED.

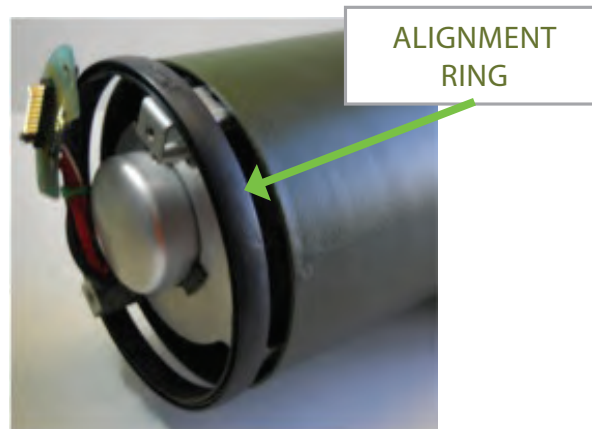


Figure 102

4.11.3 ATTACH THE BATTERY INTERFACE ASSEMBLY (9292-SEQ) TO THE RAIN GUARD BY ATTACHING THE TWO SCREWS (9960-4-SEQ).



Figure 103

4.11.4 ALIGN AND ATTACH THE EXHAUST TUBE TO THE EXHAUST PORT ON THE RAIN GUARD.



Figure 104

4.11.5 ALIGN THE THREE SCREWS (9914-6-SEQ) OF THE BATTERY INTERFACE PLATE (9939-SEQ) TO THE RAIN GUARD.



Figure 105

5. SERVICE RECORDS & RETENTION

5.1 RECORD HOURS OF OPERATION AND SOFTWARE VERSION

To help maintain the SAROS, you may obtain the Total Hours of Operation and software version numbers for the Control Board.

TO OBTAIN SYSTEM INFORMATION,
FOLLOW THESE STEPS:

Press the "Utility" Button on the control panel and advance to the following display mode for each time the icon is depressed:

- Tactical Mode
- Alarm Code
- Pulse Sensitivity
- LCD Contrast
- Tactical Volume
- Tactical Brightness
- Normal Brightness
- 9-volt Battery Status
- Hour of Operation
- System Software Version
- Motor Software Version

Alarm Code		
Pulse Sensitivity		
LCD Contrast		
Tactical Volume		
Tactical Brightness		
Normal Brightness		
9-Volt Battery Status		
Hour Meter		
System Software Version		
Motor Software Version		

Log the Results

5.2 CLEANING THE SAROS

Use mild detergent solution to clean the sleeve, control panel and power supplies. Turn OFF the SAROS and disconnect from AC or DC power before any cleaning or disinfection activity. DO NOT spray the sleeve, control panel or power supplies. Use a damp (not soaking wet) cloth or sponge. Spray the cloth or sponge with mild detergent solution to clean the sleeve, control panel or power supplies. To disinfect the SAROS, use only Lysol Brand II disinfectant (or equivalent). Proceed as directed by the manufacturer.



5.3 SERVICE AND MAINTENANCE RECORD

Whenever maintenance or service is performed on an SAROS unit, an entry should be made in the service log for that concentrator or recorded in accordance with your company's standard procedure. Whenever the sleeve of the SAROS is removed, the flow rate, purity, and alarm status should be verified per the Test Procedures in this manual.

SAROS SERIAL NUMBER _____							
Date	Hour meter Reading	Initials	Service Performed	Purity	Flow	Alarms	Comments

Sample SAROS Maintenance Record

5.4 SHIPPING AND TRANSPORTING THE SAROS

When shipping the SAROS use original packaging if possible. Always remove the Battery from the SAROS before shipping.

If original packaging material is available repack the SAROS, Battery and AC power supply and DC Cable in the designated packaging area.

If original packaging material or other CAIRE authorized shipping container is not available, contact CAIRE for replacement shipping container.

WARNING: DO NOT EXPOSE THE SAROS TO WATER. THE SAROS ENCLOSURE DOES NOT PROVIDE PROTECTION AGAINST THE HARMFUL EFFECTS OF LIQUID INGRESS. ELECTRICAL SHOCK OR DAMAGE TO THE UNIT MAY RESULT.

STORING THE SAROS

Heat and humidity may degrade the performance or severely damage the SAROS. Store the device in a cool, dry protected area away from high temperatures, moisture and humidity. Remove the Battery when storing the device.

DISCARDING

BATTERY: Contact the local city, town or country offices for instructions on proper disposal of the Battery. Alternately, SeQual may be contacted for the Battery disposal.

SAROS: Local environmental laws may prohibit disposal of electrical and/or electronic equipment such as the SAROS and AC Power Supply. Contact the local city, town or country offices for instructions on proper disposal of electrical or electronic equipment. Alternately, CAIRE may be contacted for disposal information.

5.5 MAINTENANCE AND REPLACEMENT PARTS

PREVENTATIVE MAINTENANCE PARTS	
Description	Part Number
Air Inlet Filter	9798-SEQ
9V Battery	9257-SEQ
HEPA Filter	9765-SEQ
O-Ring	9250-SEQ
O-Ring	9251-SEQ

REPLACEMENT PARTS LIST	
Description	Part Number
Power Connector	9766-SEQ
O-Ring for Power Connector	9916-SEQ
Inlet Cap Assembly - Complete	SP9756-SEQ
Membrane User Panel	9731-SEQ
ATF Assembly	SP9729-SEQ
Compressor/Product Tank/Bulkhead Assembly	SP9240-SEQ
Proportional Valve	5293-SEQ
Compressor Fan	9767-SEQ
Exhaust Filter	9221-SEQ
Kapton Tape	2696-SEQ
Cable Tie	6968-SEQ
Loctite 222MS	1405-SEQ
SAROS Membrane Panel	9731-SEQ
Power Cable Assembly	9766-SEQ
Inlet Cap Assembly	SP9756-SEQ

SAROS REPAIR KIT (PN 20535871) INCLUDES:	
Description	Part Number
O-Ring	9374-SEQ
Tubing	9273-SEQ
Tubing	4056-SEQ
Tubing	6981-SEQ
Exhaust Tube	9226-SEQ
Grommet	9739-SEQ
Wire Sleeve	9638-SEQ
Grommet	9959-SEQ
Tubing	9234-SEQ
Clamp	9369-SEQ
Cable Tie	6968-SEQ
Screw	9914-9-SEQ
Screw	9913-10-SEQ
Screw	9912-1-SEQ
Screw	9203-2-SEQ
Screw	9203-7-SEQ
Screw	9960-4-SEQ
Tube	9797-SEQ

ACCESSORIES	
Description	Part Number
AC Power Adapter	9726-SEQ
DC Power Adapter	9727-SEQ
Battery Pack	SP9723-SEQ
Humidifier Adapter	SP3509-SEQ
Carrying Strap	9380-SEQ



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