RESPIRONICS®

Trilogy 100, Trilogy 200, Trilogy 0_2 & Trilogy 202 Service & Technical Information

LIMITED WARRANTY

Respironics, Inc. warrants that the Trilogy 100, Trilogy 200, Trilogy O_2, & Trilogy 202 systems shall be free from defects of workmanship and materials and will perform in accordance with the product specifications for a period of two (2) years from the date of sale by Respironics, Inc. to the dealer. If the product fails to perform in accordance with the product specifications, Respironics, Inc. will repair or replace – at its option – the defective material or part. Respironics, Inc. will pay customary freight charges from Respironics, Inc. to the dealer location only. This warranty does not cover damage caused by accident, misuse, abuse, alteration, and other defects not related to material or workmanship.

Respironics, Inc. disclaims all liability for economic loss, loss of profits, overhead, or consequential damages which may be claimed to arise from any sale or use of this product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Accessories and replacement parts, including, but not limited to, circuits, tubing, leak devices, exhaust valves, filters, and fuses, are not covered under this warranty. However, Respironics warrants that the Product's internal and detachable battery (where supplied) will be free from defects in material and workmanship, under normal and proper use and when correctly maintained in accordance with applicable instructions, for a period of 90 days from the date of shipment by Respironics to the original purchaser. This warranty does not apply to batteries that are dropped, misused, altered, or otherwise damaged after they are shipped.

This warranty is given in lieu of all other express warranties. In addition, any implied warranties – including any warranty of merchantability or fitness for the particular purpose – are limited to two years. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

To exercise your rights under this warranty, contact your local authorized Respironics, Inc. dealer or contact Respironics, Inc. at:

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1001 Murry Ridge Lane
Murrysville, PA 15668 USA

Respironics Deutschland
Gewerbestrasse 17
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REVISION HISTORY

CHAPTER TITLE	DATE	DESCRIPTION OF CHANGES
Copyright/Warranty	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Revision History	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Table of Contents	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Introduction	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Warnings & Cautions	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Specifications	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Theory of Operation	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
System Setup	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Troubleshooting	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
	7/25/2012	*Incorporated information from the following Field Communications: FC2010-06, FC2011-12, FC2011-13, FC2011-15*
Maintenance	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.* *Section updated to document new maintenance requirements.*
	9/7/2010	*Added Performance Verification Tool.*
	7/25/2012	*Incorporated information from the following Field Communications: FC2010-22, FC2010-24, FC2010-29, FC2011-08*
Repair & Replacement	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
	9/7/2010	*Updated AC Inlet Procedure.*
	7/25/2012	*Incorporated information from the following Field Communications: FC2010-28, FC2011-29,*

CHAPTER TITLE	DATE	DESCRIPTION OF CHANGES
Repair Kits	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
	7/25/2012	*Incorporated information from the following Field Communnications: FC2011-08, FC2011-29*
Testing	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
	7/25/2012	*Incorporated information from the following Field Communications: FC2011-26, FC2011-31, FC2011-32*
Tools and Equipment	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*
Schematics	*6/11/2010*	*Manual updated to include Trilogy O_2 & Trilogy 202 devices.*

CHAPTER 1: INTRODUCTION

1.0 CHAPTER OVERVIEW

This chapter provides an introduction for the Trilogy Ventilator as well as contact and service training information.

1.1 TRILOGY 100 & TRILOGY 200 VENTILATORS INTENDED USE

The Trilogy 100 & Trilogy 200 systems provide continuous or intermittent ventilatory support for the care of individuals who require mechanical ventilation. The Trilogy 100 & Trilogy 200 are intended for pediatric through adult patients weighing at least 5 kg (11 lbs).

The device is intended to be used in home, institution/hospital, and portable applications such as wheelchairs and gurneys, and may be used for both invasive and non-invasive ventilation. It is not intended to be used as a transport ventilator.

The system is recommended to be used only with various combinations of Respironics-approved patient circuit accessories, such as patient interface devices, humidifiers, water traps, and circuit tubing.

1.2 TRILOGY O_2 & TRILOGY 202 INTENDED USE

The Respironics Trilogy O_2 & Trilogy 202 systems provides continuous or intermittent ventilatory support for the care of individuals who require mechanical ventilation with or without FiO_2 blending. Trilogy O_2 & Trilogy 202 are intended for pediatric through adult patients weighing at least 5 kg (11 lbs.).

The device is intended to be used in hospitals and institutions, and for portable applications such as wheelchairs and gurneys only when in an institutional setting. It may be used for both invasive and non-invasive ventilation. It is not intended to be used as a transport ventilator.

The system is recommended to be used only with various combinations of Respironics-approved patient circuit accessories, such as patient interface devices, humidifiers, water traps, and circuit tubing.

1.3 TRILOGY 100 & TRILOGY 200 SYSTEM OVERVIEW

This ventilator provides both pressure control and volume modes of therapy. The device can provide non-invasive or invasive ventilation. It can be used to provide total therapy to patients as they progress from non-invasive to invasive ventilation.

When prescribed, the device provides numerous special features to help make patient therapy more comfortable. For example, the ramp function allows you to lower the pressure when trying to fall asleep. The air pressure will gradually increase until the prescription pressure is reached. Additionally, the Flex comfort feature provides increased pressure relief during the expiratory phase of breathing.

The ventilator can be operated using several different power sources, including an internal Lithium-Ion battery. This battery is automatically used when the detachable Lithium-Ion battery pack, external Lead Acid battery, or AC power are not available.

1.4 TRILOGY O_2 & TRILOGY 202 SYSTEM OVERVIEW

This ventilator provides both pressure control and volume modes of therapy. The device can provide non-invasive or invasive ventilation. It can be used to provide total therapy to patients as they progress from non-invasive to invasive ventilation.

When prescribed, the device provides numerous special features to help make therapy more comfortable. For example, the ramp function allows you to lower the pressure when trying to fall asleep. The air pressure will gradually increase until the prescription pressure is reached. Additionally, the Flex comfort feature provides increased pressure relief during expiratory phase of breathing.

The ventilator can be operated using several different power sources, including an internal Lithium-Ion battery. This battery is automatically used when the detachable Lithium-Ion battery pack, external Lead Acid battery, or AC power are not available.

This ventilator is equipped with an oxygen blending module which allows oxygen to be delivered to the patient within a range of 21% to 100% concentration.

1.5 SERVICE TRAINING

Respironics offers on-site service training for the Trilogy devices for customers who have purchased the necessary test equipment and have it on-site at the time of the training request. Training includes complete disassembly of the device, troubleshooting subassemblies and components, setup of test equipment, and necessary testing.

Respironics offers Performance Verification (PV) Tool Service Training as part of their yearly training brochure. This training covers the use of the PV Tool after Preventative Maintenance or in between patient use.

For more information, contact the Service Business Development department at:

E-mail: Respironics.service.operations@philips.com
Phone: 724-387-4040

1.6 SERVICE/TECHNICAL SUPPORT STATEMENT

For technical assistance, please contact Respironics Customer Satisfaction.

U.S.A. and Canada
Phone:1-800-345-6443
Fax: 1-800-886-0245

International
Phone: 1-724-387-4000

Fax: 1-724-387-5012

CHAPTER 2: WARNINGS, CAUTIONS, & NOTES

2.0 CHAPTER OVERVIEW

Warnings, cautions, and notes are used throughout this manual to identify possible safety hazards, conditions that may result in equipment or property damage, and important information that must be considered when performing service and testing procedures. Please read this chapter carefully before servicing Trilogy Ventilators.

WARNING

Warnings indicate the possibility of injury to people.

CAUTION

Cautions indicate the possibility of damage to the device.

NOTE

Notes are used to emphasize a characteristic or important consideration.

2.1 WARNINGS

WARNINGS

- *Electronic components used in this device are subject to damage from static electricity. Repairs made to this device must be performed only in an antistatic, Electro-static Discharge (ESD)-protected environment.*
- *To assure the safety of the service technician and the specified performance of the device, Respironics requires that only trained technicians perform any repairs or adjustment to the Trilogy devices.*
- *High voltages are present inside this device. To avoid electrical shock, disconnect the electrical supply before attempting any repairs on the device.*
- *DO NOT immerse this device into any fluids.*

2.2 CAUTIONS

CAUTIONS
• *Federal law (US) restricts this device to sale by, or on the order of, a physician.*
• *Care should be taken to avoid exposure of Trilogy Ventilators to temperatures at or near the extremes of those specified in the Specifications Chapter of this manual. If exposure to such temperatures has occurred, the device should be allowed to return to room temperature before being turned on.*
• *Never place liquids on or near Trilogy Ventilators.*
• *To avoid electrical shock, disconnect the electrical supply before cleaning Trilogy Ventilators.*
• *The information in this manual is provided for service personnel reference.*

2.3 NOTES

NOTES
• *Additional Warnings, Cautions and Notes are located throughout this manual.*
• *Refer to the Trilogy Provider Manuals for additional Warnings, Cautions and Notes.*

CHAPTER 3: SPECIFICATIONS, CLASSIFICATIONS, & SYSTEM FEATURES

3.0 CHAPTER OVERVIEW

This chapter identifies the specifications, classifications, & system features for the Trilogy Ventilators.

3.1 ENVIRONMENTAL SPECIFICATIONS

	Operating	*Storage*
Temperature	*5° C to 40° C*	*-20° C to 60° C*
Relative Humidity	*15 to 95% (non-condensing)*	*15 to 95% (non-condensing)*
Atmospheric Pressure	*110 kPa to 60 kPa*	*N/A*
The operating range for the charging of the internal and detachable batteries is 10° C to 30° C. The internal and detachable batteries will power the ventilator for the full operating range of 5° C to 40° C. *Accuracies stated in this manual are based on specific environmental conditions. For stated accuracy, the environmental conditions are: Temperature: 20-30° C, Humidity: 50% relative, Altitude: nominally 380 meters*		

3.2 TRILOGY 100 & TRILOGY 200 PHYSICAL SPECIFICATIONS

Dimensions	*16.68 cm L x 28.45 cm W x 23.52 cm H*
Weight	*Approximately 5 kg (with the detachable battery installed)*

3.3 TRILOGY O_2 & TRILOGY 202 PHYSICAL SPECIFICATIONS

Dimensions	*21.13 cm L x 28.45 cm W x 23.52 cm H*
Weight	*Approximately 6.1 kg (with the detachable battery installed)*

3.4 ELECTRICAL SPECIFICATIONS

AC Voltage Source	*100 to 240 VAC, 50/60 Hz, 2.1 A*
Detachable Battery:	*Voltage: 14.4 VDC* *Capacity: 71 Wh* *Chemistry type: Lithium-Ion*
Internal Battery:	*Voltage: 14.4 VDC* *Capacity: 71 Wh* *Chemistry type: Lithium-Ion*
Type of Protection Against Electric Shock:	*Class II/Internally Powered Equipment*
Degree of Protection Against Electric Shock:	*Type BF Applied Part*
Degree of Protection Against Ingress of Water:	*Device: Drip Proof, IPX1*
Mode of Operation:	*Continuous*
Fuses:	*There are no user-replaceable fuses.*
Power Consumption:	*2.1 A @ 100 VAC = 2 10 Watts of Power Consumption*

3.5 PRESSURE SPECIFICATIONS

Output:	*4 to 50 pressure units (may be cmH_2O, hPA, or mBar depending on device setup)*

3.6 SD CARD & SD CARD READER

Use only SD cards and SD card readers available from Respironics or the following:

- SanDisk® Standard SD Card - 2.0 GB - Respironics Part Number: 1053952
- SD Card Reader/Writer - Respironics Part Number: 1047300

3.7 STANDARDS COMPLIANCE

This device is designed to conform to the following standards:

- IEC 60601-1: Medical electrical equipment - Part 1: General requirements for safety
- IEC 60601-1-2: General requirements for safety - Collateral standard: Electromagnetic compatibility - Requirements and tests
- ISO 10651-2-Lung ventilators for medical use -- Particular requirements for basic safety and essential performance -- Part 2: Home care ventilators for ventilator-dependant patients
- RTCA-D0160F section 21, category M; Emission of Radio Frequency Energy ***(Trilogy 200 Only)***

3.8 CONTROL ACCURACY

PARAMETER	RANGE	ACCURACY
IPAP	*4 to 50[1] pressure units[2]*	*Greater of 2 pressure units or 8% of setting*
EPAP	*0 to 25 pressure units for Active Circuits* *4 to 25 pressure units for Passive Circuits*	*Greater of 2 pressure units or 8% of setting*
CPAP	*4 to 20 pressure units*	*Greater of 2 pressure units or 8% of setting*
PEEP	*0 to 25 pressure units for Active Circuits* *4 to 25 pressure units for Passive Circuits*	*Greater of 2 pressure units or 8% of setting[4]*
Pressure	*4 to 50 pressure units*	*Greater of 2 pressure units or 8% of setting*
Pressure support	*0 to 30 pressure units[3]*	*Greater of 2 pressure units or 8% of setting[4]*
Tidal Volume	*50 to 2000 ml[5]*	*Greater of 10 ml or 10% of setting (Active Circuits)* *Greater of 15 ml or 15% of setting (Passive Circuits)*
Breath Rate	*0 to 60 BPM for AC mode* *1 to 60 BPM for all other modes*	*Greater of ± 1 BPM or ±10% of the setting*
Timed Inspiration	*0.3 to 5.0 seconds*	*± .1 second*
Rise Time	*1 to 6[6]*	*± 2 pressure units (the device will increase to a pressure of .67* (IPAP - EPAP) ± 2 pressure units @ the set rise time multiplied by 100 ms for pr essure supports less than or equal to 25.)*
Ramp Start Pressure	*0 to 25 pressure units for Active Circuits* *4 to 25 pressure units for Passive Circuits* *4 to 19 pressure units in CPAP mode*	*8% of setting + 2% Full Scale*
Ramp Length	*Off, 5 to 45 minutes*	*± 2 minutes*
Flex	*Off, 1 to 3[7]*	*N/A*
Flow Trigger Sensitivity	*1 to 9 l/min*	*N/A*
Trilogy 100, Trilogy 200, & Trilogy 202, Flow Cycle	*10 to 90%*	*N/A*
Trilogy O_2 Flow Cycle	*10 to 40%*	*N/A*
Apnea Rate	*4 to 60 BPM*	*Greater of 1 BPM or 10% of setting*
FiO2 Output ***(Trilogy O_2 & Trilogy 202 Only)***	*21% to 100%*	*21% to 50% is ±3%* *50% to 95% is ±5%* *100% is -5%*
O2 Input Pressure Rating ***(Trilogy O_2 & Trilogy 202 Only)***	*40 to 87 PSI*	

Specifications listed above are based on using a standard circuit (1.8 meter tubing - REF 622038; Passive Exhalation Device - REF 1040417; Active Exhalation Device with PAP - REF 1053716)

[1]Limited to 25 pressure units when using the Bi-Flex feature in S mode.

[2]Pressure units may be cmH_2O, hPa, or mBar depending on device setup.

[3]The difference between the Inspiratory Pressure and the Expiratory Pressure must never be more than 30 pressure units.

[4]Pressure Support and PEEP not to exceed 50 pressure units.

[5]Reflects compensation for BTPS.

[6]The range of values correspond to the tenths of seconds (e.g., a setting of 4 indicates a Rise Time of 0.4 seconds).

[7]Flex is not available when AVAPS is active. Flex is not available with Active Circuits.

3.9 MEASURED PATIENT PARAMETERS

PARAMETER	RANGE	ACCURACY
Vte/Vti	*0 to 2000 ml*	*Greater of 15ml or 15% of reading*
Minute Ventilation	*0 to 99 l/min*	*Calculation based on measured Vte or Vti and Respiratory Rate*
Estimated Leak Rate	*0 to 200 l/min*	*N/A*
Respiratory Rate	*0 to 80 BPM*	*Greater of 1 BPM or 10% of reading*
Peak Inspiratory Flow	*0 to 200 l/min*	*3 l/min plus 15% of reading*
Peak Inspiratory Pressure	*0 to 99 pressure units*	*Greater than 2 pressure units or 10% of reading*
Mean Airway Pressure	*0 to 99 pressure units*	*Greater than 2 pressure units or 10% of reading*
% Patient Triggered Breaths	*0 to 100%*	*N/A*
I:E Ratio	*9.9- 1: 1-9.9*	*Calculation based on Inspiratory Time and Expiratory Time*
All flows and volumes are measured at BTPS conditions.		

3.10 TRILOGY 100 SPONTANEOUS BREATHING DURING POWER FAILURE CONDITIONS

FLOW SET POINT (LPM)	INSPIRATORY RESISTANCE (PRESSURE UNITS)		EXPIRATORY RESISTANCE (PRESSURE UNITS)	
	Active Circuit	*Passive Circuit*	*Active Circuit*	*Passive Circuit*
30	*< 2.0*	*< 1.0*	*< 1.5*	*< 1.2*
60	*< 10.0*	*< 4.0*	*< 4.0*	*< 3.7*

3.11 TRILOGY 200, TRILOGY O_2, & TRILOGY 202 SPONTANEOUS BREATHING DURING POWER FAILURE CONDITIONS

FLOW SET POINT (LPM)	INSPIRATORY RESISTANCE (PRESSURE UNITS)			EXPIRATORY RESISTANCE (PRESSURE UNITS)		
	Active Circuit	*Active Circuit with Proximal Flow Sensor*	*Passive Circuit*	*Active Circuit*	*Active Circuit with Proximal Flow Sensor*	*Passive Circuit*
30	*< 3.0*	*< 3.5*	*< 2.0*	*< 2.0*	*< 2.0*	*< 1.5*
60	*< 9.0*	*< 10.5*	*< 5.0*	*< 3.0*	*< 4.5*	*< 4.0*

3.12 RESISTANCE VALUES

During a ventilator failure, both the inhalation resistance and the exhalation resistance, measured at the patient connection port, will not exceed 10 pressure units at 60 l/min. or 0.8 pressure units at 5 l/min.

3.13 WEEE/RoHS Recycling Directives

If you are subject to the WEEE/RoHS recycling directives, refer to www.respironics.com for the passport for recycling this product and the batteries.

3.14 EMC INFORMATION

3.14.1 GUIDANCE AND MANUFACTURER'S DECLARATION - ELECTROMAGNETIC EMISSIONS

This device is intended for use in the electromagnetic environment specified below. The user of this device should make sure it is used in such an environment.

EMISSIONS TEST	COMPLIANCE	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
RF emissions CISPR 11	*Group 1*	*The device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.*
RF emissions CISPR 11	*Class B*	*The device is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies building used for domestic purpose.*
Harmonic emissions IEC 61000-3-2	*Class A*	
Voltage fluctuations/Flicker emissions IEC 61000-3-3	*Complies*	

3.14.2 GUIDANCE AND MANUFACTURER'S DECLARATION - ELECTROMAGNETIC IMMUNITY

This device is intended for use in the electromagnetic environment specified below. The user of this device should make sure it is used in such an environment.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
Electrostatic Discharge (ESD) *IEC 61000-4-2*	*±6 kV contact* *±8 kV air*	*±8 kV contact* *±15 kV air*	*Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.*
Electrical fast Transient/burst *IEC 61000-4-4*	*±2 kV for power supply lines* *±1 kV for input-output lines*	*±2 kV for supply mains* *±1 kV for input/output lines*	*Mains power quality should be that of a typical home or hospital environment.*
Surge *IEC 61000-4-5*	*±1 kV differential mode* *±2 kV common mode*	*±1 kV differential mode* *±2 kV for common mode*	*Mains power quality should be that of a typical home or hospital environment.*
Voltage dips, short interruptions and voltage variations on power supply input lines *IEC 61000-4-11*	*<5% U_T (>95% dip in U_T) for 0.5 cycle* *40% U_T (60% dip in U_T) for 5 cycles* *70% U_T (30% dip in U_T) for 25 cycles* *<5% U_T (>95% dip in U_T) for 5 sec*	*<5% U_T (>95% dip in U_T) for 0.5 cycle* *40% U_T (60% dip in U_T) for 5 cycles* *70% U_T (30% dip in U_T) for 25 cycles* *<5% U_T (>95% dip in U_T) for 5 sec*	*Mains power quality should be that of a typical home or hospital environment. If the user of the device requires continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power supply or a battery.*
Power frequency (50/60 Hz) magnetic field *IEC 61000-4-8*	*3 A/m*	*3 A/m*	*Power frequency magnetic fields should be at levels characteristic of a typical home or hospital environment.*
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

3.14.3 GUIDANCE AND MANUFACTURER'S DECLARATION - ELECTROMAGNETIC IMMUNITY

This device is intended for use in the electromagnetic environment specified below. The user of this device should make sure it is used in such an environment.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL (FDA)	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
Conducted RF IEC 61000-4-6	*3 Vrms 150 kHz to 80 MHz outside ISM bands[a]*	*3 V*	*Portable and mobile RF commu nications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance:* $d = 1.2\sqrt{P}$
	10Vrms 150 kHz t o 80 MHz in ISM bands[a]	*10 V*	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	*10 V/m 80 MHz to 2.5 GHz*	*10 V/m 26 MHz to 2.5 Gz*	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz *where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).* *Field strengths from f ixed RF tran smitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range.b* *Interference may occur in the vicinity of equipment marked with the following symbol:* 

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the device is used exceeds the applicable RF compliance level above, the device should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the device.

b Over the frequency range 150 kHz to 80 MHz, the field strengths should be less than 3 V/m.

3.14.4 RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE AND MOBILE RF COMMUNICATIONS EQUIPMENT

The device is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of this device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this device as recommended below, according to the maximum output power of the communications equipment.

RATED MAXIMUM POWER OUTPUT OF TRANSMITTER (WATTS)	SEPARATION DISTANCE ACCORDING TO FREQUENCY OF TRANSMITTER (METERS)			
	150 kHz to 80 MHz outside ISM Bands $d = 1.2\sqrt{P}$	*150 kHz to 80 MHz outside ISM Bands* $d = 1.2\sqrt{P}$	*80 MHz to 800 MHz* $d = 1.2\sqrt{P}$	*800 MHz to 2.5 GHz* $d = 2.3\sqrt{P}$
0.01	*0.12*	*0.12*	*0.12*	*0.23*
0.1	*0.38*	*0.38*	*0.38*	*0.73*
1	*1.2*	*1.2*	*1.2*	*2.3*
10	*3.8*	*3.8*	*3.8*	*7.3*
100	*12*	*12*	*12*	*23*

*For transmitters rated at a maximum output power not listed above, the recommended separation distance **d** in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter manufacturer.*

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.76 5 MHz to 6.795 MHz;13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

Note 3: An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range of 80 MHz and 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could interference if it is inadvertently brought into patient areas.

Note 4: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

3.15 FRONT PANEL FEATURES

The front panel contains the control buttons, visual indicators, and display screen.

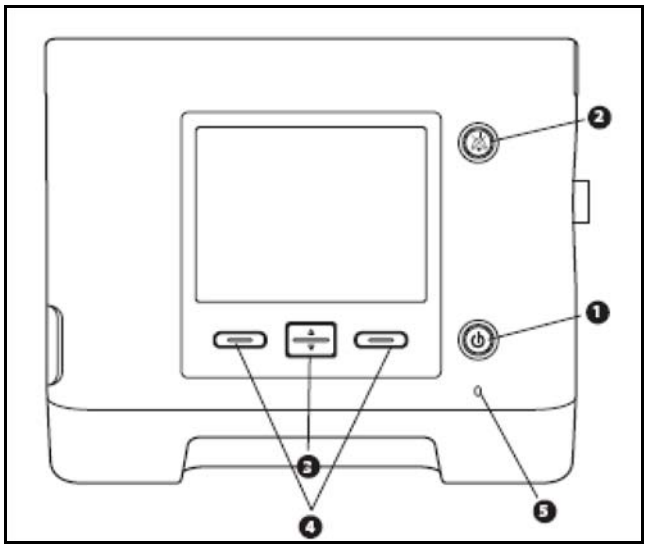

FIGURE 3-1: FRONT PANEL CONTROLS & DISPLAY SCREEN

NOTE

When you start therapy, the display backlight and the backlights on the buttons turn on, the red and yellow alarm LEDs turn on momentarily, and an audible indicator sounds to indicate that therapy has started. The Startup screen appears on the display.

WARNING

To make sure the device is operating properly at start-up, always verify that the audible tone sounds and the Audio Pause LED lights red and then yellow momentarily.

3.15.1 BUTTONS

The following buttons are included on the front panel of the device.

1. **Start/Stop Button** - This button turns the airflow on or off, starting or stopping therapy.
2. **Alarm Indicator and Audio Pause Button** - This button serves two purposes: it temporarily silences the audible portion of an alarm, and it also acts as an alarm indicator. When silencing an alarm, if the cause of the alarm is not corrected, the alarm sounds again after one minute. Each time the button is pressed, the alarm silence period resets to one minute.
3. **Up/Down Button** - This button allows you to navigate the display menu and edit device settings.
4. **Left and Right Buttons** - These buttons allow you to select display options or perform certain actions specified on-screen.

3.15.2 VISUAL INDICATORS

Several power and alarm indicators appear on the front panel.

1. **AC Power LED** - In the lower right hand corner of the front panel, a green LED indicates that the AC power is applied to the device. This light remains on as long as adequate AC power is available.
2. **Keypad Backlight LEDs** - The Start/Stop, Up/Down, and Left/Right buttons all have a white LED that lights up if the keypad backlight is turned on in the device Options menu.
3. **Red Alarm LED** - On the Audio Pause button, a red light flashes to indicate a high priority alarm.
4. **Yellow Alarm LED** - On the Alarm Indicator/Audio Pause button, a yellow light flashes to indicate a medium priority alarm. A solid yellow light indicates a low priority alarm.

3.15.3 DISPLAY SCREEN

The display screen allows you to view settings, system status information, real-time patient data, alarms, and logs. You can also modify certain settings on the display screen.

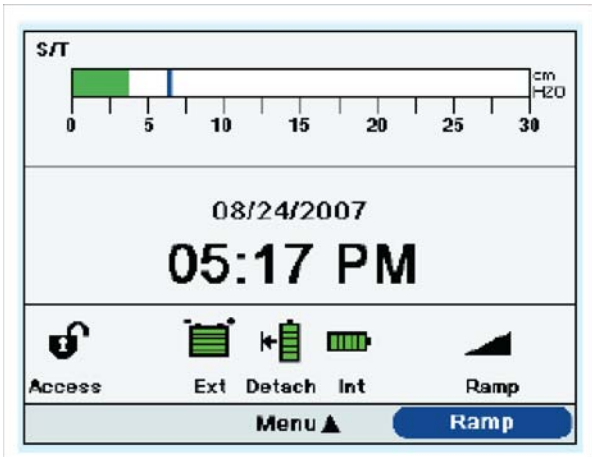

FIGURE 3-2: SAMPLE DISPLAY SCREEN

3.16 TRILOGY 100 & TRILOGY 200 SIDE PANEL FEATURES

The ventilator's side panels contain the following connectors and features.

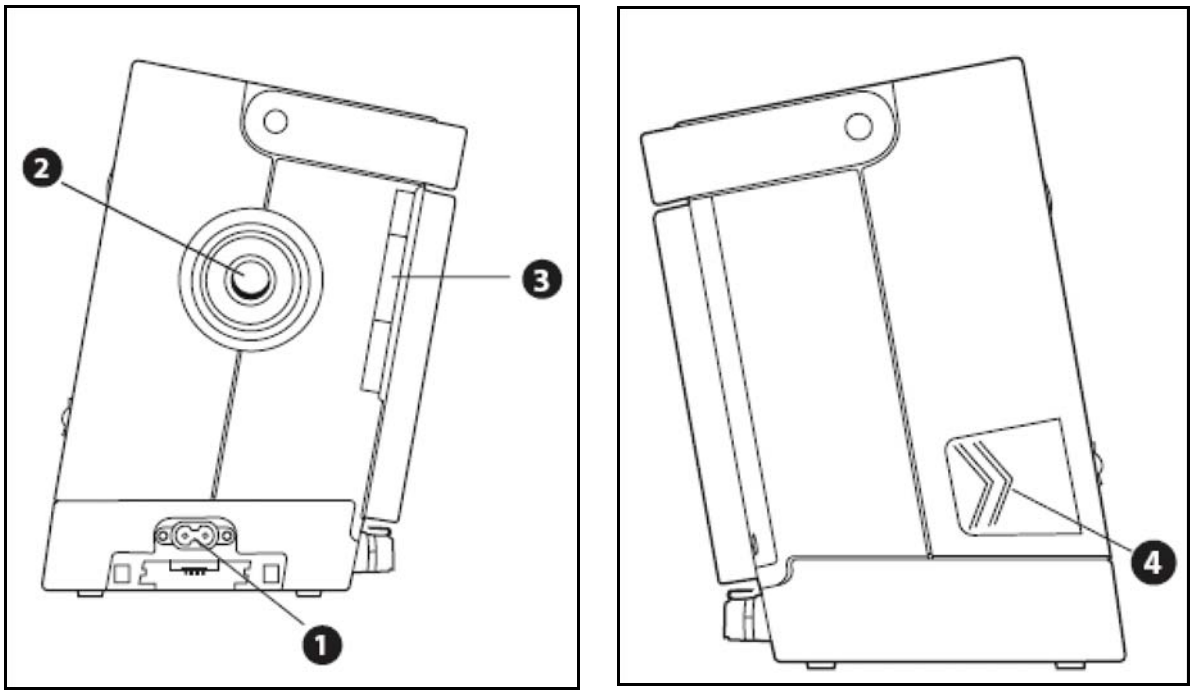

FIGURE 3-3: RIGHT & LEFT SIDE PANEL

1. **AC Power Inlet** - You can plug the AC power cord into this connector, located on the right side of the ventilator.
2. **Breathing Circuit Connection** - The breathing circuit connector is located on the right side of the device. You can connect your circuit tubing system here.
3. **Exhalation Porting Block** - The porting block used here depends on whether you are using the Whisper Swivel II or the active exhalation device. The Passive Exhalation Porting Block is shown here.
4. **Secure Digital (SD) Data Card Slot** - On the left side of the device is a slot for the optional SD Data Card. You can have the patient record usage and therapy information from the device on the SD card.

3.17 TRILOGY 100 & TRILOGY 200 REAR PANEL FEATURES

The ventilator's rear panel has the connectors and features.

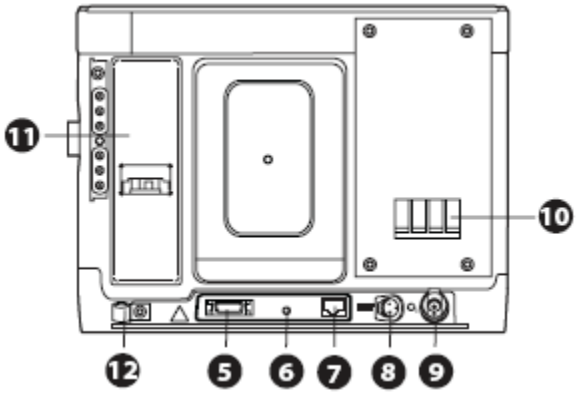

FIGURE 3-4: REAR PANEL

5. **Serial Connector** - You can use this connector to connect the device to a computer running PC Direct or Alice Sleepware software or to other Respironics' devices such as Ailce 5 or AOM. Use the Trilogy RS232 Serial cable to connect the Trilogy to the external device or computer.
6. **Remote Alarm/Nurse Call Connector** - If you are using an optional remote alarm or nurse call with the ventilator, you can connect the Respironics remote alarm adapter cable or nurse call adaptor cable to this connector.
7. **Ethernet Connector (when available)**- You can connect a PC or router to this connector to upload therapy information to a secure website so you can review therapy information remotely or remotely troubleshoot and service the device.
8. **External Battery Connector (DC Power Inlet)** - You can connect an external, stand-alone lead acid battery here, using the Respironics External Battery cable.
9. **Oxygen (O_2) Inlet Connector** - If using low flow, supplemental oxygen, connect the oxygen source to this connector using one of the O_2 Inlet Quick Connects provided with the device.
10. **Air Inlet and Filter** - Insert the filter supplied with the device into the air inlet.
11. **Detachable Battery Pack Slot** - If you are using the Respironics Lithium-Ion detachable battery pack to power the device, attach it here.
12. **Cord Retainer** - Wrap the power cord around this cord retainer to prevent someone from accidentally disconnecting the power cord.

3.18 TRILOGY O_2 & TRILOGY 202 SIDE PANEL FEATURES

The ventilator's side panels contain the following connectors and features.

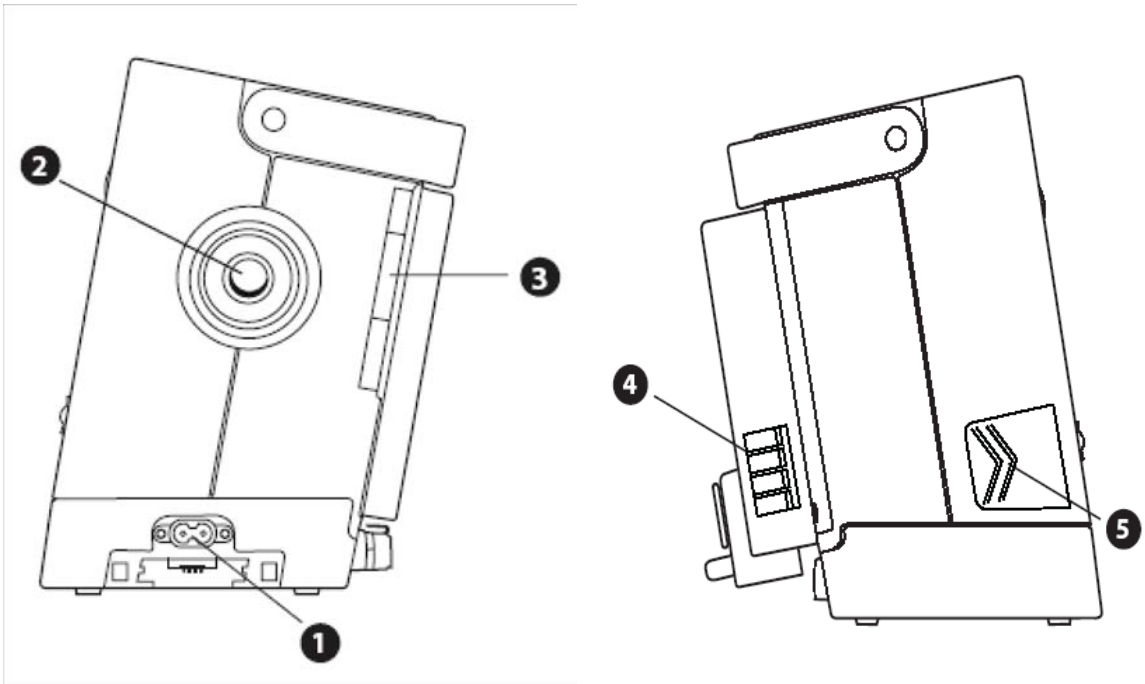

FIGURE S: RIGHT & LEFT SIDE PANEL

1. **AC Power Inlet** - You can plug the AC power cord into this connector, located on the right side of the Trilogy Ventilator.
2. **Breathing Circuit Connection** - The breathing circuit connector is located on the right side of the device. You can connect your circuit tubing system here.
3. **Exhalation Porting Block** - the porting block used here depends on whether you are using the passive exhalation device or the active exhalation valve. The Passive Exhalation Porting Block is shown here. If you are using the active exhalation device, attach the Active Exhalation Porting block.
4. **Air Inlet and Filter** - Insert the filter supplied with the device into the air inlet.
5. **Secure Digital (SD) Data Card Slot -** On the left side of the device is a slot for the optional SD Data Card. You can have the patient record usage and therapy information from the device on the SD card.

3.19 TRILOGY O_2 & TRILOGY 202 REAR PANEL FEATURES

The ventilator's rear panel has the connectors and features.

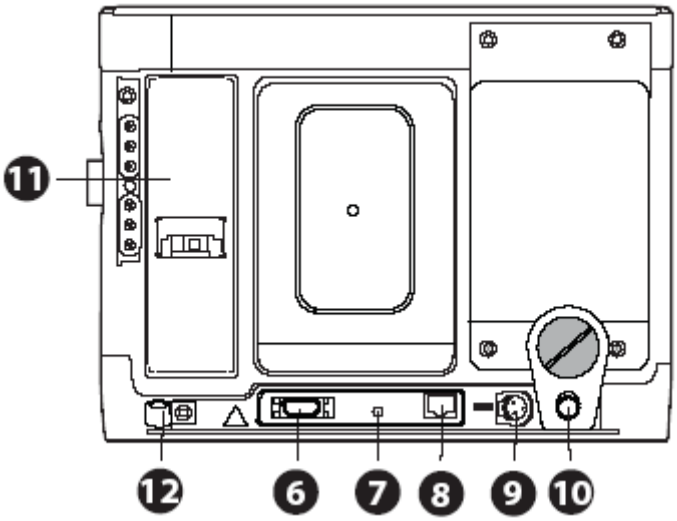

FIGURE A: REAR PANEL

6. **Serial Connector** - You can use this connector to connect the device to a computer running PC Direct or Alice Sleepware software or to other Respironics' devices such as Ailce 5 or AOM.
7. **Remote Alarm Connector** - If you are using an optional remote alarm with the Trilogy, you can connect the Respironics remote alarm adapter cable or nurse call cable to this connector (DB9 or Phone Connection).
8. **Ethernet Connector (when available)** - You can connect a PC or router to this connector to upload therapy information to a secure website so you can review therapy information remotely or remotely troubleshoot and service the device.
9. **External Battery Connector (DC Power Inlet)** - You can connect an external, stand-alone lead acid battery here, using the Respironics External Battery cable.
10. **Oxygen (O_2) Blending Module** - If using high pressure supplemental oxygen, connect the oxygen source to this DISS connector.
11. **Detachable Battery Pack Slot** - If you are using the Respironics Lithium-Ion detachable battery pack to power the device, attach it here.
12. **Cord Retainer** - Wrap the power cord around this cord retainer to prevent someone from accidentally disconnecting the power cord.

3.20 POWER SOURCES

The ventilator accesses power from potential sources in the following order:

- AC Power
- External Battery
- Detachable Battery Pack

- Internal Battery

WARNING

Before connecting the battery, shutoff and disconnect any oxygen sources connected to the ventilator, and move the battery at least 1.83 meters (6 feet) away from any oxygen sources.

3.20.1 AC POWER SOURCE

An AC power cord is provided with the device. You can connect the pronged end of the power cord to a wall outlet that is not controlled by a wall switch and connect the socket end of the cord to the power inlet on the back of the device.

3.20.2 EXTERNAL BATTERY

CAUTION

- *Do not use the same external battery to operate both the ventilator and any other equipment.*
- *An external battery should only be connected to the ventilator using the Respironics Trilogy External Battery Cable. This cable is fused, pre-wired and properly terminated to ensure safe connection to a standard deep cycle lead acid battery. Use of any other adaptor or cable may cause improper operation of the ventilator.*

The ventilator can operate from a 12 VDC deep cycle marine-type (lead acid) battery using the Respironics Trilogy External Battery Cable. This cable is pre-wired and properly terminated to ensure safe connection of an external battery to the ventilator. Battery operating time depends on the characteristics of the battery and usage of the device.

Due to a variety of factors, including battery chemistry, battery age, and use profile, the capacity of the external battery as shown on the Trilogy display is only an estimate of the actual remaining capacity.

Refer to the instructions supplied with the Respironics External Battery Cable for detailed information on how to operate the device using an external battery.

3.20.3 DETACHABLE BATTERY

CAUTION
• *The detachable and internal batteries wear out based on the amount of use (hours or full charge-discharge cycles). The battery capacity and life are also reduced by operation at higher temperatures.* • *Only use the Respironics Trilogy Detachable Battery with the device.* • *Prolonged operation or storage at elevated temperatures may reduce the service life of the detachable or internal battery and other internal components of the ventilator.*

Respironics offers a detachable Lithium-ion battery pack. To use the detachable battery pack, snap the battery into place on the back of the ventilator. When the device is not connected to an AC power source or an external battery, the detachable battery will power the device, if attached. The length of time the ventilator will operate on battery power depends on many factors such as device settings, battery charge level, and condition or age of the battery. When fully charged, a new battery can power the ventilator for approximately three hours under typical patient conditions.

Whenever the ventilator is connected to AC power, it will automatically recharge the detachable battery pack. A completely discharged detachable battery will reach 80% charge status within 8 hours, when charging at approximately 23° C ambient temperatures.

One side of the detachable battery has a set of LEDs that indicate the amount of charge left on the battery. You can press the button below the LEDs to view how much charge remains:

LED	BATTERY CAPACITY
All 5 LEDs are lit	*80-100% capacity*
4 LEDs are lit	*60-79% capacity*
3 LEDs are lit	*40-59% capacity*
2 LEDs are lit	*20-39% capacity*
1 LED is lit	*10 to 19% capacity*
1 LED flashes	*1 to 9% capacity*
0 LEDs are lit	*0% capacity*

3.20.4 INTERNAL BATTERY

CAUTION

The internal battery is NOT intended to serve as a primary power source. It should only be used when other sources are not available, or briefly when necessary; for example when changing power sources.

The device contains an internal battery that can be used as a backup power source. It is intended for use during short periods while switching between external power sources, emergency situations, or short durations when the user needs to be mobile. The length of time the ventilator will operate on internal power depends on many factors such as device settings, battery charge level, and condition or age of the battery. When fully charged, a new battery can power the ventilator for approximately three hours under typical patient conditions.

Whenever the ventilator is connected to AC power, it will automatically recharge the internal battery. A completely discharged internal battery will reach 80% charge status within 8 hours, when charging at 23° C ambient temperature.

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CHAPTER 4: THEORY OF OPERATION

4.0 CHAPTER OVERVIEW

This document describes the theory of operation for the seven printed circuit boards employed by the Trilogy ventilator support system.

4.1 AC/DC POWER SUPPLY

The AC/DC power supply is capable of accepting universal AC input supply of 100 - 240VAC @ 50/60Hz. It generates a 30±2VDC nominal output with ripple voltage no greater than 250mVp-p over its entire operating range. It is capable of delivering 3A (90 Watts) continuous and 5A (150Watts) peak (10% duty cycle) output current.

The AC/DC power supply uses isolated fly-back topology. It incorporates the “TOPSwitch” (U1) from Power Integrations with an internal high voltage power MOSFET. It operates at a switching frequency of 66±7 KHz. The output of the power supply is regulated via a 3-terminal precision voltage regulator (U2).

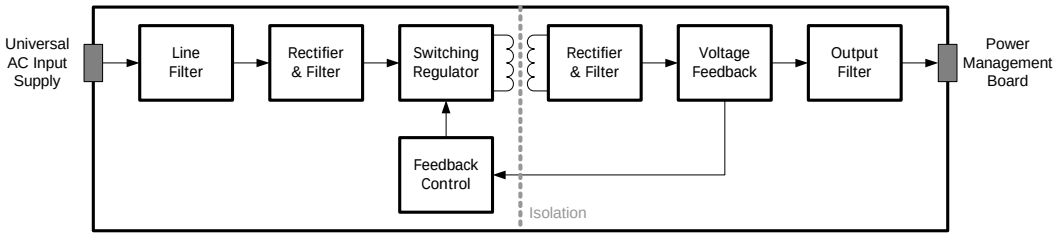

FIGURE 4-1 AC/DC POWER SUPPLY BLOCK DIAGRAM

The DC output of the AC/DC power supply is isolated from the AC input using the transformer (T1) and opto-isolator (U3). The power supply can maintain 4000VAC isolation between primary and secondary, with less than 1mA leakage current when held for 10 seconds. The physical spacing and galvanic isolation maintained at 4mm. Slots are cut on the power supply board to satisfy adequate spacing where needed and to facilitate air flow.

The power supply is able to survive a DC short indefinitely and recover to normal operation after the DC short is removed. The operator should be careful and avoid touching any components on the power supply board while the unit is plugged into an AC source or even several minutes after AC power is removed. There is a risk of electrical shock that could cause serious injury or death. Assure C2 is thoroughly discharged before attempting to service any components.

4.2 POWER MANAGEMENT BOARD

The Trilogy ventilator is designed to accept four power sources each providing enough power to support the complete functionality and performance of the ventilator. The power management board controls all these power sources for the Trilogy ventilator. The power sources are used according to the predefined hierarchy and rules set forth. The power management board is also capable of removing all power from the ventilator except for those devices powered by a low current supply to conserve power when the ventilator is turned off or running on battery. Lastly, the power management board provides a source of power diagnostic information through analog sense voltages and the SMBus to the CPU.

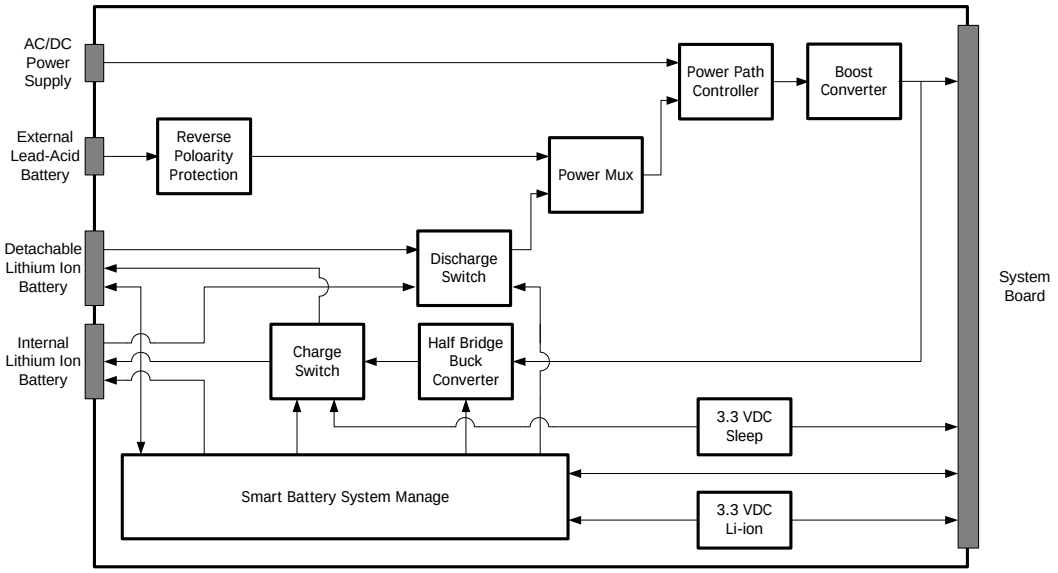

FIGURE 4-2 POWER MANAGEMENT BOARD BLOCK DIAGRAM

AC/DC power supply - It is the primary source of power for the Trilogy ventilator. It supplies 29±1VDC to the power management board and the Trilogy ventilator may draw up to a maximum of 3A continuous and 5A peak current from this power source. When this supply is available no current is drawn from any other remaining power source.

External Pb-Acid Battery - The Trilogy ventilator can operate on an external Pb-acid battery with output voltage between 11VDC to 28VDC when the AC/DC power supply is not available. The external Pb-acid battery input is reverse polarity protected (Q1). The Trilogy ventilator can not charge the external Pb-acid battery and can not use this source to charge the lithium ion batteries.

Detachable Lithium Ion Battery - This power source is used by the Trilogy ventilator when AC/DC power supply and external Pb-acid battery power supply is not available. It provides 12VDC to 16.4VDC supply to the ventilator and is rated for 4.16Ah @ 14.4V. The Trilogy ventilator may draw a maximum of 7.5A continuous or 14A peak current from the detachable lithium ion battery source. This battery is charged by the AC/DC power supply only when its capacity is less than 100%, the environment is safe to charge the battery and when charging would not overburden the AC/DC power supply.

Internal Lithium Ion Battery - This is the fourth and last available power source for the Trilogy ventilator. It is permanently located inside the unit and is identical to the detachable lithium ion battery (i.e. 12VDC to 16.4VDC, 4.2 Ah capacity). If the internal lithium ion battery is totally discharged and no other power source is available, the Trilogy ventilator will turn OFF, enable the power fail alarm and enter a low power state.

Boost Converter - The boost converter (U1) generates the regulated 29VDC supply used by the system board. When the AC/DC power supply output voltage is greater than 28VDC the boost converter is OFF. If the AC/DC power supply is not available one of the battery sources is selected. The boost converter will then boost that battery voltage to 29VDC. When the input to the boost converter falls below 7VDC it is disabled.

Power Path Controller - The power path controller (U6) selects either the battery power supply or the AC/DC power supply to run the ventilator. When AC/DC supply is available the power path controller turns ON the AC/DC supply MOSFET (Q20) allowing the boost converter to receive its power from the AC/DC supply. When AC/DC supply in not available the power path controller turns ON the two parallel battery MOSFETs (Q25 & Q26) allowing the boost converter to receive its power from the battery supply. Initially, upon power up the circuitry powers the system with these MOSFETs acting as forward biased diodes until the sense and status lines for the power path controller have reached equilibrium.

Power Mux - The power path switch driver (U2) selects either the Pb-acid battery source or the lithium ion battery source to power the system. It does so by controlling 4 N-channel MOSFETs (Q11, Q12, Q13, & Q14) configured as two back to back ideal diode sources. This circuitry also disables all battery current when Trilogy enters the low power state by turning the N-Channel MOSFETs OFF.

Smart Battery System Manager - The smart battery system manager (U3) controls both the internal and detachable lithium ion batteries. Both batteries are equipped with smart technology and communicate with the power management board using the standard SMBus protocol. The smart battery system manager allows the CPU to communicate with either battery and contains memory for battery status and charger information while simultaneously monitoring the status and alarms bits of both batteries to prevent hazardous operation of either battery.

The software queries battery information about once per second. If the detachable lithium ion battery is disconnected, the comparator (U3) will quickly switch power to the internal lithium ion battery. Thereby continuing to power the system before the software realizes that a disconnect has happened. This comparator also prevents the software from disabling the internal lithium ion battery when there is no detachable battery present. The detachable battery is only disabled by the software if the software determines it to be a counterfeit battery.

Each lithium ion battery will power the system until its capacity falls below 10% of its full charge capacity. When both the lithium ion batteries are at less than 10% of the full charge capacity, they share the current drawn by the ventilator. This is done such that the battery with the greater capacity provides more current and both batteries reach 0% capacity simultaneously.

When both lithium ion batteries are at less than 100% charge capacity, both batteries share a maximum of 2A charge current according to their relative charge state. This is done such that the battery with less capacity receives greater charge current and both batteries reach 100% capacity simultaneously. The charge voltage and current limit used for each lithium ion battery is set at 16.9V and 2A respectively using resistors (R39, R35). In addition, the current sense resistor (R26) disables the battery charging operation when the total current output from the power supply exceeds 4A to prevent overloading of the power supply.

The smart battery system manager also generates an internal 5VDC supply to control all internal functions from the greatest available power source. A voltage divider network (R28 & R38) sets the AC present threshold at 22VDC coming from the AC/DC power supply. The smart battery system manger (U3) uses an internal comparator with a 1.19V reference to determine if AC is present.

Half Bridge Buck Converter - The buck converter (Q17, Q18, L4, & C33) generates the lithium ion battery charge voltage for both the lithium ion batteries. The charge switch is controlled by the smart battery system manager (U3).

Charge Switch - The charge switches (Q3, Q4, Q5, & Q6) facilitate charge current sharing between the two lithium ion batteries when they simultaneously request a charge. It is controlled by the smart battery system manager (U3) which provides charge current inversely proportional to the relative battery capacity using the charge switch.

Discharge Switch - The discharge switches (Q7, Q8, Q9 & Q10) are used to control the discharge of the lithium ion batteries. The smart battery system manager (U3) controls the discharging of the internal and detachable lithium ion battery. The input MOSFETs (Q7, Q8) are turned OFF to prevent any accidental charging of a battery if reverse current is measured in the battery discharge path.

3.3VDC Supply - There are two 3.3VDC supplies generated on the power management board. First, the linear voltage regulator (U12) generates a 3.3VDC supply used when the ventilator is in the low power mode. And second, the switching regulator (U9) generates a 3.3VDC supply used by the logic circuitry on the board. The switching regulator (U9) is in shutdown mode when the Trilogy ventilator is in low power mode.

4.3 SYSTEM BOARD

A system board is the central printed circuit board in the Trilogy ventilator. It contains circuitry to interface with all other printed circuit board assemblies in the Trilogy ventilator with the exception of the power supply board. It generates and manages most of the internal power supply voltages for the Trilogy ventilator and contains the complete motor control circuitry.

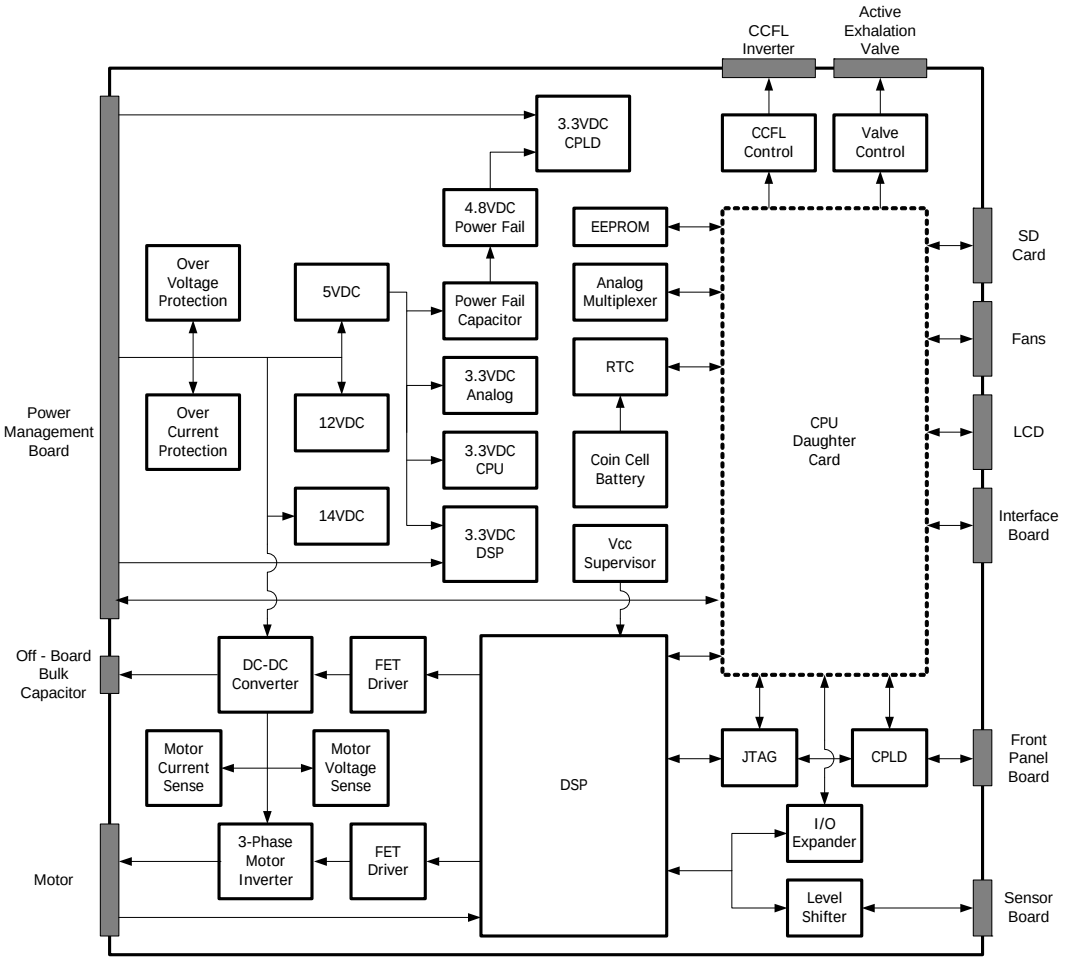

FIGURE 4-3 SYSTEM BOARD BLOCK DIAGRAM

12VDC Supply - The dual switcher (U2) generates the 12VDC (2.5A max) supply using the 29VDC nominal supply from the power management. This supply is used by the MOSFET driver IC's, CCFL inverter, the front panel LEDs and to generate the 7VDC power supply for the sensor board.

5VDC Supply - The dual switcher (U2) generates the 5VDC (2.5A max) supply using the 29VDC nominal supply from the power management. This supply is used to generate the 3.3VDC supplies, power the motor hall sensors, power the system protection circuits and power some components on the interface board.

14VDC Supply - The step down switching regulator (U18) generates the 14VDC supply. This is a dedicated power supply to power the sensor board.

3.3VDC Supply - There are several 3.3VDC supplies generated on the system board.

- Buck regulator (U5) generates the 3.3VDC supply for the DSP. The 3.3VDC li-ion supply generated on the power management board acts as a back up to this supply
- Linear voltage regulator (U6) generates the 3.3VDC supply used by the analog signal conditioning circuits
- Step-down DC/DC converter (U4) generated the 3.3VDC supply for the CPU
- Linear voltage regulator (U3) generates the 3.3VDC supply for the CPLD

Power Fail Supply - The 5VDC supply is also used to charge the 2.5F ultra capacitor (C113). In the event of a power failure, the DC/DC converter (U24) uses the charge stored in the ultra capacitor to generate 4.8VDC nominal supply for power failure alarm generation.

Digital Signal Processor (DSP) - The Trilogy system board uses the DSP (U7) to control the motor and acts as a watchdog for the main CPU. It uses internal timers, interrupts, PWM, ADC and peripherals to run the motor control algorithm. It has six 12-bit ADC inputs available used to monitor motor voltage, DC to DC output voltage, motor current, system current, 1.2VDC reference voltage and motor temperature. It uses the SPI bus to communicate with the sensor board and the 16-bit I/O expander (U17).

Complex Programmable Logic Devices (CPLD) - The CPLD is used for power fail operations, low power mode, power up/wakeup and alarm functions of the Trilogy ventilator. It has a dedicated JTAG programming connector (J9) and operated of a 3.3VDC supply.

DC-DC Converter - The DC to DC converter controls the voltage and current applied to the motor to produce the desired speed. The converter consists of two N-channel FETs (Q3 & Q4) with an LC filter output stage. The LC filter reduces both the ripple current and ripple voltage. The FETs are driven by the half bridge power MOSFET driver (U10) controlled by the DSP. It also acts as a buffer between the motor control and the rest of the system through a blocking diode (CR10).

3 Phase Motor Inverter - The current through the six phases of the motor are controlled using the inverter. The inverter produces multi-phase current of variable frequency to provide the appropriate torque to control the motor speed. The inverter stages consist of three half bridge power MOSTFET drivers (U13, U15 & U16) controlling six N-channel MOSFETs (Q6 to Q11). The control signals for the driver are generated by the DSP.

Motor (external) - The motor used is a Brushless DC motor with low inductance, a WYE wound stator and 3 hall sensors located 120° apart (J5). A built in temperature sensor mounted on the motor board is used by the DSP to monitor the motor temperature.

Off Board Storage Capacitor - An off board bulk capacitor (J6) stores the regenerative energy of the motor during deceleration. It provides the ripple current necessary to accelerate and decelerate the motor and filter the motor free wheeling voltage from damaging the MOSFETs.

Over Voltage Protection - The comparator (U31) determines if an over voltage condition occurs on the high side of the DC-DC converter. If the measured voltage exceeds 35V, a precision current (U33 & Q28) sink is enabled to shunt current through the bleeder resistors (R174 & R175).

Over Current Protection - The system current is measured by the high side current monitor (U12) in conjunction with the current sense resistor (R54). The buffer amplifiers (U36) drive the comparator (U29) with a current limit set at 5.5A with 500mA of hysteresis. When the system current increase above the current set point limit current to the motor is temporarily disabled and the motor spins freely until the current drops to a safe level.

Motor Current Sense - A current sense resistor (R39) measures the bidirectional current through three motor phases. The op-amp (U11: C) filters the current sense output before being used by the DSP to control the motor.

Motor Voltage Sense - The terminal voltage across the motor is monitored using a resistor divider network (R73 & R74) along with the op-amp circuit (U11:A). This signal is used by the DSP to control the motor.

Motor Temperature Sensing - Motor temperature monitored by the DSP using thermistor mounted on the motor. If motor temperature rises above the set point the DSP limits the current going to the motor to keep it cool.

Active Exhalation Valve Control - The active exhalation valve consists of a two valve system. One valve dumps the pilot pressure while the other provides proportional control of the pilot pressure. Both the valves are controlled by the CPU via connector on the system board (J10). To control the proportional valve the CPU generates an analog control voltage uses a 16-bit DAC (U27). This signal drives a precision current sink (U28 and Q5) controlling the current flow through the proportional active exhalation valve.

Analog Multiplexer - The analog multiplexer (U26) is used by the CPU to monitor critical power supply voltages and the oxygen concentration (signal generated by the interface board). The CPU selects one channel at a time using the multiplexer channel select input.

Fans - There are three fan connections on the system board. These include the internal lithium ion battery cooling fan, motor cooling fan and exhaust fan mounted behind the power supply. The battery cooling fan and exhaust fan are controlled by the CPU while the motor cooling fan is controlled by the DSP.

Real Time Clock (RTC) - The RTC is set and read by the CPU using the I2C interface. Back-up power to the RTC is provided by a 20mm coin cell battery (B1) on the system board.

Cold Cathode Fluorescent Lamp (CCFL) - The power supply and brightness control circuit for the CCFL backlight inverter are on the system board (J20). The 12VDC supply is used to power the CCFL inverter and the CPU generates the PWM signal used to control the brightness of the CCFL backlight inverter using op-amplifier (U20).

EEPROM - The system board contains a 32Kbit SPI controlled EEPROM (U8) for the storage of calibration and therapy data.

System LED - A blinking green led (CR14) is used to indicate normal system operation.

Vcc Supervisor - The microprocessor supervisory (U19) monitors the 3.3VDC DSP power supply. If the power supply falls below 3.08VDC the microprocessor supervisory will reset the DSP.

LCD - The CPU generates all the signals to control the LCD but the physical interface for the LCD is on the system board (J3).

JTAG - The DSP can be programmed via the JTAG interface (J2) on the system board or on the CPU board.

4.4 CPU DAUGHTER CARD

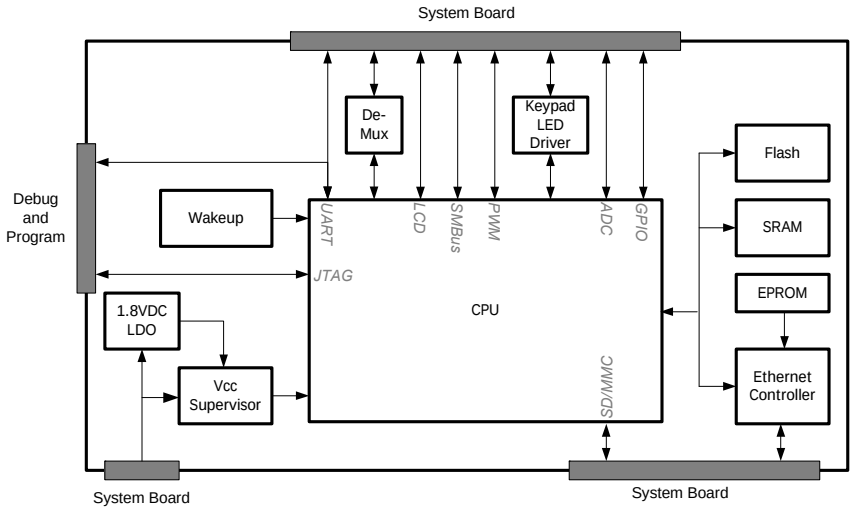

FIGURE 4-4 CPU DAUGHTER CARD BLOCK DIAGRAM

3.3VDC Supply - The CPU daughter card (except the core) operates on a 3.3VDC supply. This power is provided by the system board via the interface connector (J1).

1.8V Supply - The CPU has a core power requirement of 1.8VDC (250mA) generated by the fixed low-dropout linear voltage regulator (U5).

VCC Supervisor - A dual voltage supervisor (U10) monitors both the 3.3VDC and 1.8 VDC supplies. The thresholds for the supplies are set at 2.93V and 1.68V respectively. These thresholds preserve the system within the recommended operating ranges of the CPU, SDRAM and FLASH.

Central Processing Unit (CPU) - The Trilogy ventilator uses a 32-bit System-on-chip RISC Core CPU (U1). The processor is the brains behind all ventilator functions. Some of the key futures of the processor include the LCD controller, Synchronous and Asynchronous memory controller, MMC/SD controller, SMBUS interface and two UARTs.

There are two clock inputs used by the processor - a 14.7456 MHz crystal for system clock functions and a 32.768 kHz crystal for the RTC and power down modes. Even if the RTC is never used, the 32.768 kHz crystal must be connected to provide proper state transition.

Three external pins can generate a system reset. If any of these three lines is pulled low, a system reset will occur.

1. Power on Reset asserted by the dual VCC supervisor.
2. Power fail signal generated using pull-up resistor, and
3. User reset line connected to the system board through the slimstack connector.

The CPU provides the interface to the SD/MMC card. The physical interface for the SD/MMC card is a 6 wire interface (one signal, one clock and four data) on the system board.

Two of the three available UART ports of the Processor are used, one for the RS-232 communication through the system board connector while the other for debug operations through the debug connector.

Wakeup - The wakeup circuit is a result of a unique requirement for the CPU. Approximately 1 to 2 seconds after the supply voltage reach a stable operating condition the CPU requires a rising edge on the wakeup signal to boot. To generate this wakeup signal a 555 timer (U9) is used. When power is applied the timer generates a 100Hz square wave output used as the wakeup signal for the CPU.

SDRAM - The CPU daughter card has a 64MB synchronous dynamic random access memory (SDRAM) (U2). This memory is controlled by the processor using the built-in SDRAM controller. This memory is used by the CPU as a “scratch pad”. The SDRAM has a 13-bit address line (2-bit bank select and 11-bit address input line) and 32-bit data bus operates at 100MHz. The SDRAM is powered by the 3.3VDC supply.

Flash Memory The CPU daughter card has a 32MB nonvolatile, electrically block erasable (Flash) programmable memory (U3) configured for 16 bit word size. It stores the application code for the CPU. The flash memory is organized as thirty-two 128KB erase blocks and each block can be individually written and erased. The flash memory has a 22-bit address and 16-bit data bus. It is powered by 3.3VDC supply.

Ethernet Controller - The CPU daughter card provides a MAC to PHY interface using the Ethernet (non-PCI) controller (U6). This device is a mixed signal (Analog/Digital) device, that through the use of a 16 bit parallel interface generates the 4 necessary outputs signals for the 10/100 Mbps IEEE 8023 Ethernet communication. The PHY interface is a 4B5B/Manchester encoder/decoder. The Ethernet chip is powered by the 3.3VDC supply and uses an external clock input of 25MHz.

EERPOM - A serial EEPROM (U13) is connected to a SPI peripheral of the Ethernet controller. It is used by the controller to store default communication information and parameters.

Keypad LED Driver - The CPU uses a keypad led driver (U7) to provide eight additional I/O ports. The driver also provides higher output current capacity and to act as a possible ESD buffer for front panel LEDs.

4.5 SENSOR BOARD

The sensor board is the main source of pressure and flow feedback for the Trilogy ventilator. It supplies the system board with real time digital pressure and flow data. This data is processed by the system board and used to control the blower speed and supply the prescribed pressure and flow support to the patient.

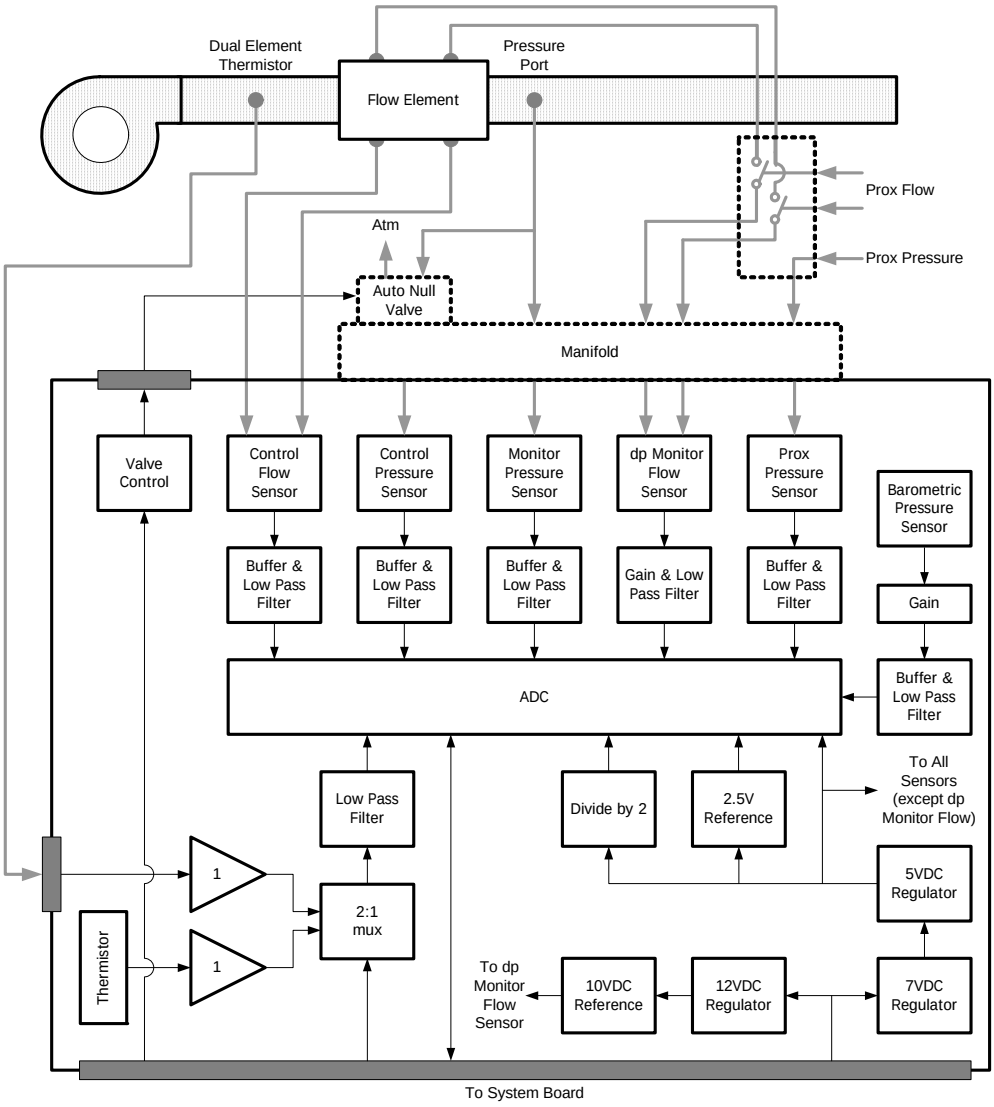

FIGURE 4-5 SENSOR BOARD BLOCK DIAGRAM

The circuitry on the board contains seven sensors, sensor conditioning circuits, ADC (Analog to Digital Converter), and linear and reference voltage sources. Six of the sensors are on board and one (the dual element temperature sensor) is located in the air stream and connected to the board through cabling (J1). Signals that are critical for patient therapy have separate sensors for control functions (machine blower control) and monitoring functions (alarms and patient parameters). All sensors are powered by the 5VDC regulator (U7) except dp monitor flow sensor (MT4) which is powered by the 10VDC precision reference (U10). All sensor outputs are ratio-metric to the power supply.

Power Supply - The system board supplies the sensor board with bulk 14VDC (J4). The bulk 14VDC is regulated to 7VDC and 12VDC by voltage regulators U8 and U9 respectively. Precision reference (U10) generates the 10VDC using 12VDC to power the monitor flow sensor. Linear regulator (U7) generates the 5VDC using 7VDC to power the remaining sensor board with the exception of the solenoid valve.

The precision reference voltage regulator (U5) generates a 2.5VDC output signal used by the ADC (U10) and the instrumentation amplifier (U6). The ADCs internal reference gain amplifier generates a ratio-metric 4.096VDC reference voltage using this 2.5VDC voltage. The divide-by-two circuit generates a 2.5VDC signal. This signal is ratio-metric voltage of 5VDC supply. It is buffered and used as an input to the ADC (U2).

Pressure Sensors - The monitor pressure signal is measured using the monitor pressure sensor (MT1). It generates 0.2 to 4.7 VDC output for pressures range of 0 to 102 cm H20 pressure. The output of the sensor is buffered and filtered using an anti-aliasing real pole filter with a cutoff frequency set at 222 Hz. The proximal and control pressure signals are measured using the proximal and control pressure sensor (MT2 and MT3 respectively). They generate 0.5 to 4 VDC output for pressure range of 0 to 105 cm H20. The output of both the sensors is buffered and filtered using an anti-aliasing real pole filter with a cutoff frequency set at 222 Hz.

Flow Sensors - The monitor flow signal is measured using the monitor flow sensor (MT4). It generates a -25mv to +25mV output for pressures in the range of -10.5 to +10.5 cm H20. At the output of the sensor is amplified and filtered using the instrumentation amplifier (U6). The filter used is a 2 stage passive low pass filter with a cutoff frequency of 222Hz. The control flow signal is measured using the control flow sensor (MT5). It generates a 0.25 to 4VDC output for differential pressures in the range of -5 to +5 cm H20. The output of the device is a square root relationship with regard to voltage and dP. The output of the sensor is buffered and filtered using an anti-aliasing real pole filter with a cutoff frequency set at 222 Hz.

Barometric Pressure Sensor - The atmospheric pressure is measured using the barometric pressure sensor (MT6). The output of the sensor is scaled by a factor of .797 using a resistive divider network (R18 & R19). The output is then buffered and filtered using an anti-aliasing real pole filter with a cutoff frequency set at 222 Hz.

Temperature Sensor - A dual element temperature sensor measures the air stream temperature. This sensor is a negative temperature coefficient with nominal resistance of 10K @25°C. One output of the dual element temperature sensor is buffered and fed to the 2:1 multiplexer (U4). The other input is from the on board thermistor RT1 which has a negative temperature coefficient and a nominal resistance of 100k @ 25°C. The output of the multiplexer is filtered by a single pole low pass passive RC circuit. Based on the input to the 2:1 multiplexer from the system board, output of one thermistor is supplied to the ADC.

Analog to Digital Converter - The analog outputs of all these sensors are converted to digital signals using the 16 bit SAR (successive approximation register) ADC (U2). The ADC communicates with the system board via the 4 wire SPI bus interface (J4).

Plastic Manifold – The plastic manifold provides a mechanical pneumatic connection to the sensors and allows for mounting of the solenoid valve.

Solenoid Valve - The sensor board uses a solenoid valve to auto null/vent the control pressure sensor to atmosphere periodically via port 1 of the plastic manifold. The solenoid valve is externally mounted on the manifold and powered by a 29VDC nominal supply provided by the system board (J2). The N-Channel Power MOSFET (Q2) turns the solenoid valve ON-OFF.

4.6 FRONT PANEL BOARD

The front panel board provides the user interface support in the Trilogy ventilator. It includes circuitry for the keypad, keypad backlight, audible alarm, visual alarm, and AC present indicator.

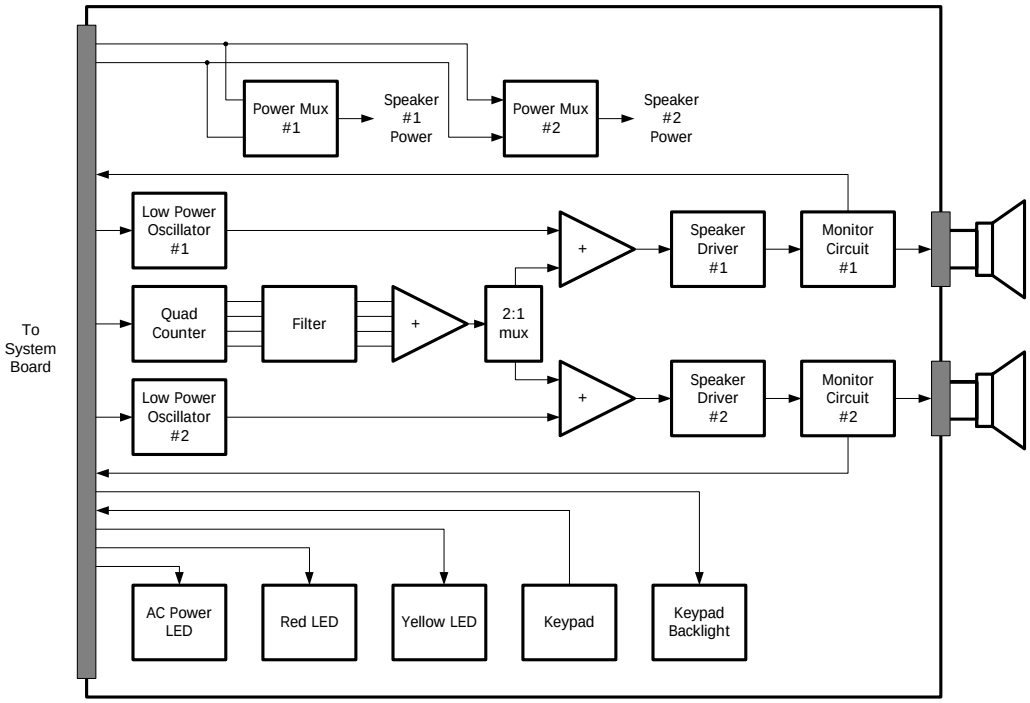

FIGURE 4-6 FRONT PANEL INTERFACE BOARD BLOCK DIAGRAM.

AC Power LED – A green LED (CR3) indicates the presence of AC/DC supply to the Trilogy ventilator.

Red LED – Two red LED's (CR2 & CR19) are used to indicate urgent and high priority alarm conditions. They are driven by two separate control lines from the CPU and the CPLD for redundancy during power fail conditions. Compared to normal operation, during power fail the red LED's have lower luminous intensity achieved using current limiting resistors (R105, R106) to preserve power consumption.

Yellow LED – Two yellow LED's (CR4 & CR5) are used to indicate low priority alarm conditions.

Keypad / User Input Switch Circuit – The front panel has 6 four-legged metal dimple types dome switches for user input. They support alarm silence, start/stop, left, right, up, and down functions. All share active low signal configuration. They are powered by the 3.3V power supply with the exception of the start/stop and right function keys which use the 3.3V_PLD to support additional function during the power fail and low power mode.

Keypad Backlight - An array of 12 white LED's (CR7 to CR18) are used to provide back light for the keypad. All the while LED's are controlled by a common switch (Q2).

Audible Alarm Signal - Each speaker has a mono-tone and a multi-tone audio alarm signal source. The mono tone audio alarm signal is generated by the low power oscillators (U3 & U5) running at a fixed frequency of 2.9 KHz. This frequency is set using external resistors (R12 & 14). The multi-tone audio alarm signal is generated using a combination of four harmonic signals. The 4-bit binary counter (U6) receives a square wave signal at various frequencies to generate these four harmonic signals. Each of the four harmonics signals is wave shaped using high-pass (RC) filters and low-pass (active) filter (U1). A summing amplifier (U2) then adds the

four harmonic signals and generates the multi-tone audio alarm signal. Based on the input to the 2:1 multiplexer (U4) the multi-tone signal is fed to one speaker driver circuit at a time.

Audible Alarm Driver - The two audio alarm signals are fed to the respective piezo speaker drivers (U7 & U11) via the summing amplifiers (U14 & U15). The piezo speaker drivers have integrated boost converters and audio power amplifiers capable of driving the speaker load with a 16Vp-p signal. They provide pop-and-click removal function through bypass capacitors (C17 & C49) which determine the turn-on time of the audio amplifier. In addition, the speaker driver circuit provides the band switch function for a soft alarm sounding, and low power shutdown to support low power mode.

Speaker Monitoring Circuit - The operation of each speaker is verified using the current monitors sub-circuit. When a speaker is turned ON the high-side current shunt monitor (U8 & U12) generates an output current proportional to the differential voltage generated across the current sense resistors (R27 & R59). The output signal is used by the comparators (U9 & U17) to generate the alarm status signals for the CPU to verify speaker operation. The reference voltage for the comparators (U9 & U17) is set at 193mV.

Speaker Circuit Power - There are two independent power sources available to power the two speaker circuitry. The power mux (U13 & U16) select one of the two available power sources for each speaker circuitry. Both the speaker circuits use the different power supplies as primary and backup supplies.

4.7 INTERFACE BOARD

The interface board provides the means for the Trilogy ventilator to communicate with external devices such as the humidifier and other accessory devices. It includes circuitry for ethernet communication, RS-232 and RS-485 communication, oxygen sensing, remote alarm interface and accessory power generation.

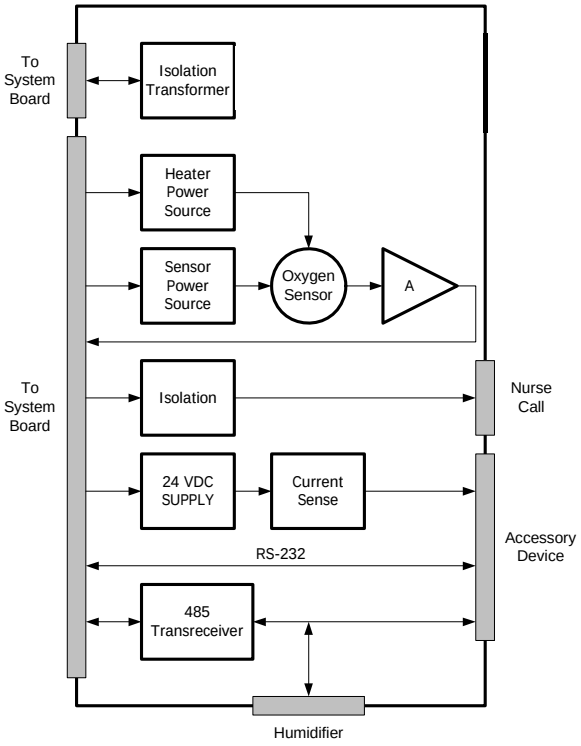

FIGURE 4-7 INTERFACE BOARD BLOCK DIAGRAM

Oxygen Sensor - The Trilogy ventilator uses a ceramic zerconia solid-electrolyte oxygen sensor (U8) mounted on the interface board to detect hazardous level of oxygen leak inside the unit. A buck-boost switching regulator (U7) supplies a constant 1.5W power to the ceramic heater for oxygen sensor heater. A linear voltage regulator (U16) generates the 3.3 VDC supply for the oxygen sensor output gain amplifier (U10). In addition, it is also used to generate the 1.8VDC supply (U9) to power the oxygen sensing element. The power to the heater element and to the sensing element on the oxygen sensor can be disabled by using the switch (Q5). This helps to prolong the sensor life when not used. There is a minimum recommended delay of 3 minutes for the oxygen sensor to warm up and generate valid oxygen concentration measurements.

Remote Alarm (Nurse Call) Interface - The remote alarm sub-circuit generates the alarm signal for the Respironics remote alarm device and nurse call system. Electric isolation between the Trilogy ventilator and the remote alarm device is achieved using optical isolators (U3 & U6).

Regulated 24VDC supply - The interface board receives 29VDC bulk power supply from the system board and generates a regulated 24VDC supply using the linear voltage regulator (U1). The supply is used as power source for the accessory module and can be disabled by the system board using the switch (Q4). The high side current shunt monitor (U2) uses a current sense resistor (R14) to monitor the output current of the regulated 24VDC supply. If output current of the supply increases above 400mA the linear voltage regulator (U1) is shut down.

RS-232 Communication - The Trilogy ventilator supports standard full duplex RS-232 serial communication protocol. It is used for debug mode communications only.

RS-485 Communication - When available, the Trilogy ventilator supports standard multi-drop half duplex RS-485 serial communication protocol. It is used by the Trilogy ventilator to communicate with the humidifier and accessory devices.

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CHAPTER 5: SYSTEM SETUP

NOTE

Please refer to the appropriate Provider and/or User Manual for additional information.

5.0 CHAPTER OVERVIEW

This chapter provides information regarding setup and operation of the Trilogy Ventilator as needed for servicing, repairing, and testing of the device.

5.1 KEYPAD LOCK FEATURE

There is a Keypad Lock feature that users can enable from the Options menu. It is intended to prevent accidental changes to device settings. This feature will lock the navigation keys (Up, Down, Left, and Right keys). If the Keypad Lock is enabled, a Keypad Unlock message will display on the bottom of the screen any time you press one of the navigation keys, as shown below.

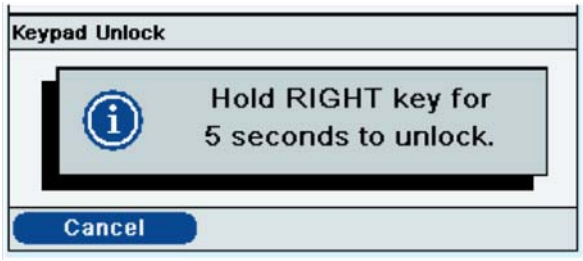


FIGURE 5-1: KEYPAD UNLOCK MESSAGE

If the keypad is locked, you must unlock it before you can enter the Menu. To unlock the keypad and enter the menu, you must first hold the Right button for 5 seconds to unlock the keypad. An audible indicator sounds when the keypad is successfully unlocked. Once the display is unlocked, you can enter the Menu as you normally would by pressing the Up button.

NOTE

- *There is a keypad lock inactivity time-out period. After you have unlocked the keypad as indicated, the keypad will re-lock after five minutes of inactivity to prevent someone from accidentally pressing a button and changing any of the settings.*
- *When Keypad Lock is enabled, the Left, Right, and Up/Down buttons are locked while the ventilator is turned on. The Alarm Indicator/Audio Pause and Start/Stop buttons continue to function normally.*
- *The Keypad will automatically unlock if an alarm or informational message occurs and will remain unlocked the entire time alarms are active.*
- *Pressing the Left (Cancel) button will cancel the Keypad Unlock action.*

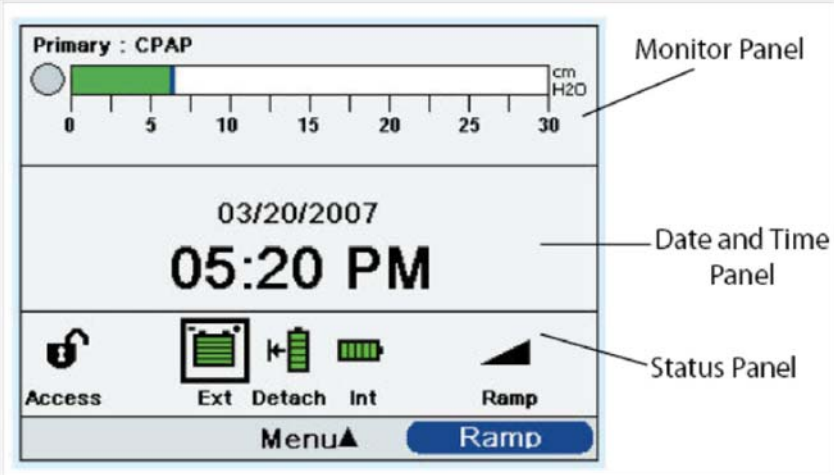
5.2 ACCESSING THE STARTUP AND MONITOR SCREENS

1. After you press the On/Off button to begin therapy, the Startup screen below appears momentarily, indicating the device name and the software version.

NOTE

No Soft Buttons display on the Monitor screen if Keypad Lock is enabled.

2. The next screen that appears is the Monitor screen. The appearance of this screen will vary, depending on how you set up the device. If Detailed view is turned off in the options menu, your screen will look like the screen shown below.



NOTE

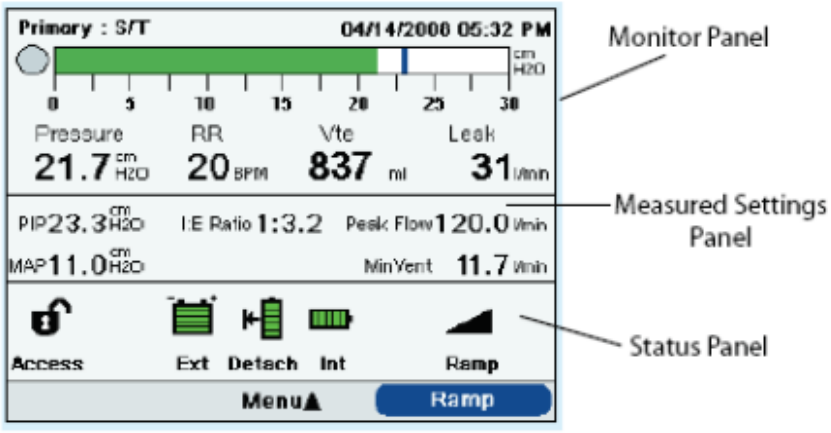
The symbols that appear on the Monitor Screen are described in detail later in this chapter.

a. The top section of the screen, called the Monitor panel, shows the therapy mode and, if you set up a dual prescription for the patient, the Prescription indicator appears, indicating Primary or Secondary prescription. The patient breath symbol also displays during a patient-triggered breath, and a bar graph displays the current pressure level.

b. The center section of the screen displays the current date and time.

c. The bottom section, called the Status panel, displays certain symbols that indicate features being used, such as Ramp, as well as battery status.

3. If Detailed view is turned on in the Options Menu, the Monitor screen will look like the screen shown below.



This screen contains more detailed information about the therapy.

a. The top Monitor panel contains the Prescription indicator if a dual prescription exists, the therapy mode, a graph displaying the current pressure, and the current date and time. Additionally, this panel also displays patient pressure, respiratory rate (RR), exhaled tidal volume (Vte), and leak.

b. The second panel in Detailed view is the Measured Settings panel. It provides patient-related data including Peak Inspiratory Pressure (PIP), Minute Ventilation, Peak Inspiratory Flow, Mean Airway Pressure (MAP), and I:E Ratio.

c. The third panel is the Status panel and shows the same information displayed in the Detailed View Off screen, including features in use such as Ramp and battery status.

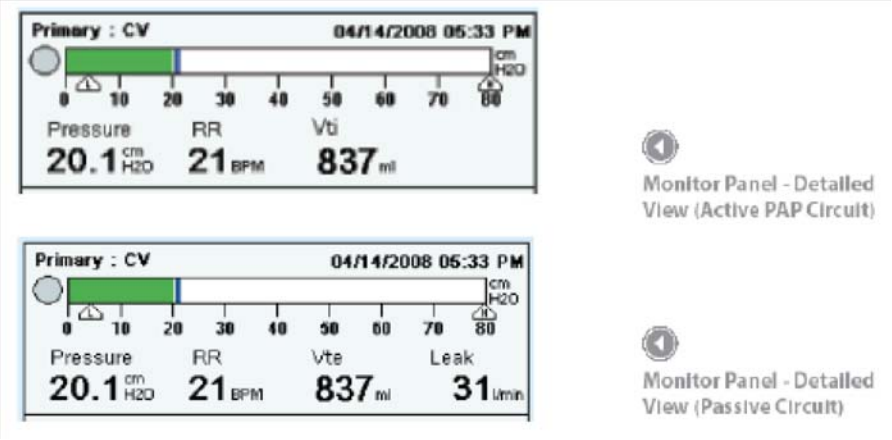
5.3 MONITOR SCREEN INDICATORS

This section describes the following indicators:

- Monitor Panel Indicators
- Measured Settings Panel Indicators
- Status Panel Indicators

5.3.1 MONITOR PANEL INDICATORS

All of the indicators that may appear on the Monitor Panel are described in detail in the following table. The Detailed view is shown below. The monitor panels for the Active circuit and Passive circuit are different, so both panels are shown. Some of these items do not appear in the Detailed View Off screen.



INDICATOR	DESCRIPTION
Prescription	*If you set up a dual prescription for the patient, the words "Primary" or "Secondary" appear in the top left corner of the panel to indicate which prescription is active.*
Therapy Mode	*The current therapy mode displays at the top of the panel (for example, CPAP, S, S/T, etc.). If a special feature such as Flex, AVAPS, or Sigh is active, this feature will appear next to the therapy mode.*
Date and Time	*If you are in Detailed view, the current date and time appear in the top right hand corner of the panel. (In Detailed View Off, they appear in the center panel.)*
Patient Breath 	*This symbol displays during a patient-triggered breath.*

INDICATOR	DESCRIPTION
Airway Pressure Manometer and Peak Pressure Symbol	*The manometer (bar graph) displays the airway pressure in the patient circuit at all times. The manometer bar moves to the right as pressure increases during inhalation, and moves to the left as pressure decreases during exhalation. The peak pressure is also indicated on this bar. It is positioned according to the maximum patient pressure reached during each breath. The Peak Pressure symbol appears as a blue bar on the manometer. If a High Inspiratory Pressure alarm occurs, the Peak Pressure symbol changes from blue to red.*
Low Pressure Indicator 	*If you enable a volume therapy mode, this indicator appears below the manometer bar, indicating the low pressure alarm setting.*
High Pressure Indicator 	*If you enable a volume therapy mode, this indicator appears below the manometer bar, indicating the high pressure alarm setting.*
Pressure	*This indicator displays the current patient pressure. This only appears in detailed view.*
Respiratory Rate (RR)	*This indicator displays the measured respiratory rate in Breaths Per Minute (BPM). This only appears in detailed view.*
Exhaled Tidal Volume (Vte)	*This indicator displays the estimated exhaled tidal volume in milliliters and reflects compensation for BTPS. This only appears in detailed view when Passive Circuit is selected.*
Inhaled Tidal Volume (Vti)	*This indicator displays delivered tidal volume in milliliters and reflects compensation for BTPS. This only appears in detailed view when Passive Circuit is selected.*
Leak	*This indicator displays the total leak (non-returned flow), between the unit outlet and the patient, averaged over the previous breath. This only appears in detailed view when the Passive Circuit is selected.*

5.3.2 TRILOGY 100 & TRILOGY 200 MEASURED SETTINGS PANEL

All of the indicators that may appear on the Measured Settings panel (available only in Detailed view), are described in the following table.

INDICATOR	DESCRIPTION
PIP	*Peak Inspiratory Pressure displays the maximum pressure delivered to the patient during the previous breath.*
I:E Ratio	*Displays a comparison of the time spent in inspiration to the time spent in expiration during the previous breath.*
Peak Flow	*Displays the maximum inspiratory flow delivered to the patient during the previous breath in l/min BTPS.*
MAP	*Displays the Mean Airway Pressure, which is the weighted average of pressure in the patient's airway over 6 breaths.*
MinVent	*Minute ventilation displays the amount of air delivered to the patient over the last minute in l/min BTPS.*

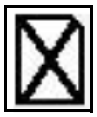
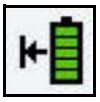
TRILOGY O_2 & TRILOGY 202 MEASURED SETTINGS PANEL

All of the indicators that may appear on the Measured Settings panel (available only in Detailed view), are described in the following table.

INDICATOR	DESCRIPTION
PIP	*Peak Inspiratory Pressure displays the maximum pressure delivered to the patient during the previous breath.*
I:E Ratio	*Displays a comparison of the time spent in inspiration to the time spent in expiration during the previous breath.*
Peak Flow	*Displays the maximum inspiratory flow delivered to the patient during the previous breath, reflecting compensation for BTPS.*
MAP	*Displays the Mean Airway Pressure, which is the weighted average of pressure in the patient's airway over 6 breaths.*
FiO_2	*Displays the FiO_2 setpoint.*
MinVent	*Minute ventilation displays the amount of air delivered to the patient over the last minute, reflecting compensation for BTPS.*

5.3.3 STATUS PANEL INDICATORS

All of the indicators that may appear on the Status Panel are described in the following table.

INDICATOR	DESCRIPTION
	*Indicates that the device is in Full Menu Access mode, which means you can adjust all prescription settings. Respironics recommends that you change the device to Limited Menu Access mode before giving the device to the patient, so patients cannot adjust their prescription settings. Only trained health care professionals and home care providers should adjust prescription settings.*
	*Displays when a Secure Digital (SD) memory card is inserted in the ventilator.*
	*Displays when the ventilator detects an error with the SD card.*
	*Displays at all times when an external battery is attached to the ventilator. The level of green shading shown in the symbol indicates the battery capacity and will go down as the battery charge level decreases. When the entire symbol is green, the battery is fully charged.*
	*Displays at all times when a detachable battery is attached to the ventilator. The level of green shading shown in the symbol indicates the battery capacity and will go down as the battery charge level decreases. When the entire symbol is green, the battery is fully charged.*
	*Displays at all times, indicating the status of the internal battery. The level of green shading shown in the symbol indicates the battery capacity and will go down as the battery charge level decreases. When the entire symbol is green, the battery is fully charged.*
	*A black box displays around the battery that is currently supplying power to the ventilator when AC power is not available. (In the status panel shown above, the external battery is in use, so the*  *symbol displays.)*

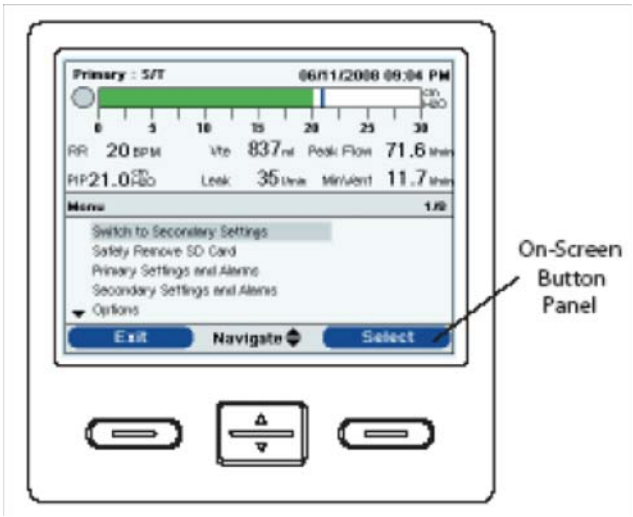
INDICATOR	DESCRIPTION
	*A yellow lightning bolt symbol displays with the Detachable or Internal battery symbol to indicate when the battery is charging. (In the status panel shown here, the detachable battery is being charged, so the*  *symbol appears.*
	*Displays when the Audio Pause button has been pressed and Audio Pause is active. The alarm is silenced for one minute when the Audio Pause button is pressed.*
	*Displays when the Ramp feature is active.*

NOTE

If a battery in use is very low (less than 20 minutes remaining), the inside of the box surrounding the battery symbol will change to yellow and all of the indicators in the battery will be empty. If a battery in use is near depletion (less than 10 minutes remaining), the inside of the box surrounding the battery symbol will change to red, and all of the bar indicators in the battery will be empty. These color changes only occur for the last available battery source.

5.3.4 ON-SCREEN BUTTON PANEL

The illustration below shows the on-screen button panel on the Main Menu screen, in relation to the buttons on the front of the Trilogy Ventilator.



NOTE

The on-screen buttons will vary depending on what screen you are in and what settings are enabled on your device.

At the very bottom of the display screen is the on-screen button panel. This panel corresponds with the control buttons on the ventilator.

- The left on-screen button specifies the action for the Left button on the device.
- The center on-screen button specifies the action for the Up/Down buttons on the device.
- The right on-screen button specifies the action for the Right button on the device.

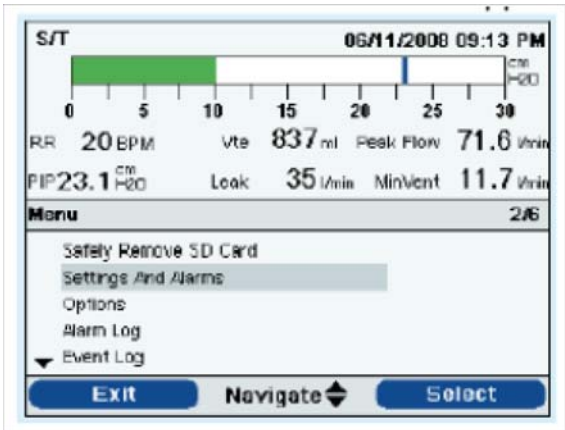
5.3.5 NAVIGATING THE MENU SCREENS

To navigate through all of the menu screens and settings:

- Use the Up/Down button to scroll through the menu options and settings.
- Use the Left and Right buttons to perform the actions specified on the Left and Right on-screen buttons.

5.4 CHANGING AND VIEWING SETTINGS IN FULL MENU ACCESS MODE

You can view and change settings using the Menu screens when the device is in Full Menu Access mode. To enter the Menu screens from the Monitor screen, press the Up button on the ventilator. The Main Menu screen shown below appears.



NOTE

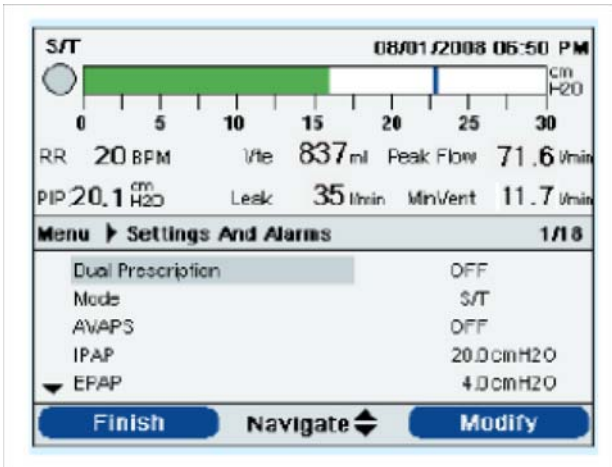
- *In the example Main Menu screen shown, the 2/6 that appears in the Menu banner indicates that item 2 is highlighted from a total of 6 items in the menu.*
- *For some therapy settings, once you reach the highest or lowest setting available, pressing the Up/Down button again will cycle back through the settings. For the parameters that do not wrap, when you reach the highest or lowest setting possible, a "Limit Reached" message appears in the Menu Banner on-screen.*
- *If you change a setting but decide you do not want to save it, you can press the Left button to cancel the change*

Choose from the following selections on the Main Menu screen:

- **Safely Remove SD Card**: This option will appear if an SD card is inserted in the ventilator. Select this option when you want to remove the SD card. When the "Remove SD Card" confirmation message appears, remove the card. If you press the left (cancel) button or don't remove the card within 60 seconds, the confirmation message will close and the ventilator will continue writing to the card.
- **Settings and Alarms:** View and change prescription settings and alarms.
- **Options**: View and change device settings, such as Full or Limited Access mode, Detailed View, Language, etc.
- **Alarm Log:** View a list of the 20 most recent alarms that have occurred.
- **Event Log:** View a list of all events that have occurred, such as ventilator setting changes, ventilator inoperative conditions, alarms, etc.
- **Information:** View detailed information about the device, such as the device's software version and serial number.

5.5 CHANGING THE DEVICE SETTINGS AND ALARMS

From the Main Menu screen, use the Up/Down button to highlight the Settings and Alarms menu, and press the Right button to select the menu. A screen similar to the one below appears.



5.5.1 DEVICE SETTINGS COMMON TO ALL THERAPY MODES

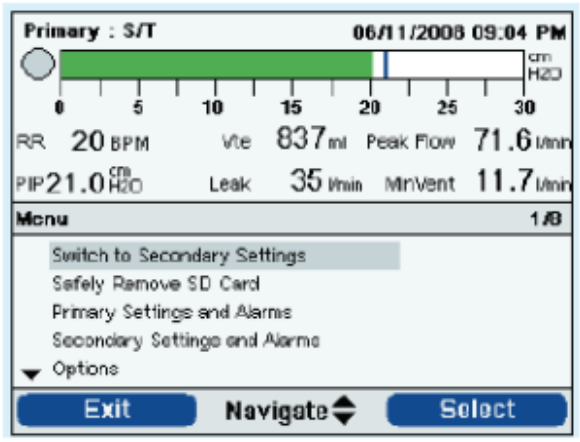
Some of the settings on this menu will vary depending on the therapy mode you select. The section below describes all of the settings that are common to all therapy modes.

DUAL PRESCRIPTION SETTING

You can turn the dual prescription setting on or off. Enable the setting if you want to create two separate prescriptions for the patient. For instance, you may want to set up a daytime prescription and then a separate nighttime prescription. If you enable this setting, then the menu options on the Main Menu will change to include new options:

- Switch to Primary/Secondary Settings
- Primary Settings and Alarms
- Secondary Settings and Alarms

The Main Menu screen will look like the screen below.



5.5.2 MODE SETTING

You can change the Mode setting on the Setting and Alarms screen to one of the following therapy modes:

- CPAP - Continuous Positive Airway Pressure
- S - Spontaneous Ventilation
- S/T - Spontaneous/Timed Ventilation
- T - Timed Ventilation
- PC - Pressure Control Ventilation
- PC-SIMV - Pressure Controlled Synchronized Intermittent Mandatory Ventilation
- CV - Control Ventilation
- AC - Assist Control Ventilation
- SIMV - Synchronized Intermittent Mandatory Ventilation

5.5.3 CIRCUIT TYPE

There are two types of circuit types you can select:

- Passive
- Active PAP
- Active Flow (Trilogy 200, Trilogy O_2, & Trilogy 202 Only)

The Passive circuit uses the Whisper Swivel II passive exhalation device. The Active PAP circuit type uses an active exhalation device with a proximal air pressure sensing connection. The Active Flow circuit type uses an active exhalation device with a proximal flow sensor.

When using the Passive circuit, the ventilator displays estimated patient pressures based on the resistance of the standard patient circuit (Whisper Swivel II with 1.8 meter tubing). Adding accessories to the patient circuit (humidifier, water trap, etc.) may cause an increase in circuit resistance and cause the device to display slightly higher pressures than what is actually delivered to the patient.

With the Active PAP or Active Flow circuit type selected, patient pressure is measured directly and is not affected by any change in circuit resistance.

The Passive circuit provides leak compensation. When using the Passive circuit in Volume Ventilation, the set Vti is delivered to the patient above the calculated circuit and cuff (or mask) leak. This is different from traditional active circuit ventilation where the cuff (or mask) leak reduces the tidal volume delivered to the patient. Volume ventilation with the Passive circuit delivers an inspiratory tidal volume close to the device setting regardless of leak; this should be considered when transitioning a patient from an active to a passive circuit. With a Passive circuit, Vte is estimated based on the calculated sum of circuit and cuff (or mask) leak.

The Active Flow circuit monitors proximal flow and proximal pressure. When using the Active Flow circuit configuration, flow trigger with leak compensation may be enabled. The default setting when using the Active Flow Circuit is Leak Compensation **On**. The clinician has the option to turn off the leak compensation;

however, unintentional leak will not be compensated. Both options measure the flow at the proximal flow sensor. Leak compensation is not available with PAP circuit configuration.

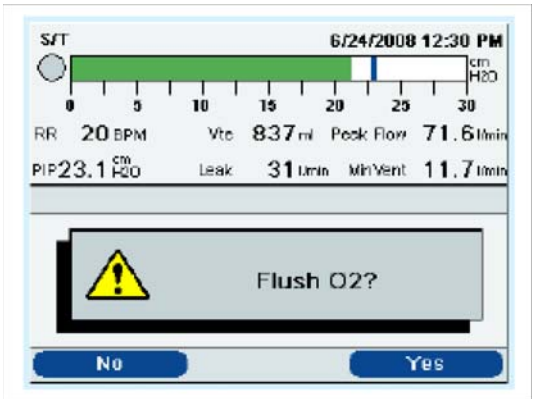
NOTE

- *To change the circuit type, you must be in the Setup screen with the airflow turned off.*
- *When the Circuit Type setting is set to Passive Circuit, all Ramp Start Pressure settings in all modes will maintain the minimum range.*
- *When the Circuit Type setting is set to Active PAP Circuit, the Flex feature is unavailable.*

5.5.4 FiO_2

You can set the Fractional Inspired Oxygen, which blends in a certain amount of oxygen into the air stream delivered to the patient. The amount of oxygen blended is based on this setting. You can set the FiO_2 from 21% to 100% in increments of 1.

A Flush feature is also available for the FiO_2 setting. A Flush button appears on-screen if the FiO_2 setting is greater than 21%. Pressing this button displays the following confirmation screen:



Selecting **Yes** allows you to temporarily increase the delivered oxygen concentration to 100% for two minutes. After two minutes is completed, the oxygen concentration will return to the previous FiO_2 setting. Selecting **No** cancels the action and does not changed the FiO_2 setting.

5.5.5 CIRCUIT DISCONNECT

WARNING

You should not rely on any single alarm to detect a circuit disconnect condition. The Low Tidal Volume, Low Minute ventilation, Low Respiratory rate, and Apnea alarms should be used in conjunction with the Circuit Disconnect alarm.

This setting enables or disables the circuit disconnect alarm. If enabled, an audible alarm will sound when a large, continuous air leak (such as mask removal) has been detected in the circuit.

You can choose **Off** to disable the alarm. Or, you can increase or decrease the setting from 10 to 60 seconds in 5 second increments. For example, a setting of 10 means that the alarm will sound after the circuit has been disconnected for 10 seconds.

5.5.6 APNEA

This setting enables or disables the apnea alarm. If enabled, an audible alarm will sound when an apnea is detected.

You can choose **Off** to disable the alarm. Or, you can increase or decrease the setting from 10 to 60 seconds in 5 second increments. For example, a setting of 10 means that the alarm will sound if the time between spontaneous breaths exceeds 10 seconds.

5.5.7 LOW VTE

This setting enables or disables the Low Vte alarm. The alarm activates when the estimated exhaled tidal volume is less than or equal to this setting. You can choose **Off** to disable this alarm, or you can increase or decrease the setting from 40 ml to 2000 ml in 5 ml increments. It cannot be set higher than the High Vte setting.

When AVAPS is **On**, the alarm activates when the calculated tidal volume is less that 90% of the target tidal volume setting. This alarm can be set to on or off.

5.5.8 HIGH VTE

This setting enables or disables the High Vte alarm. The alarm activates when the estimated exhaled tidal volume is greater than or equal to this setting. You can choose **Off** to disable this alarm, or you can increase or decrease the setting from 50 ml to 2000 ml in 5 ml increments. It cannot be set lower than the Low Vte setting, except to be turned off.

5.5.9 LOW VTI

This setting enables or disables the Low Vti alarm. The alarm activates when the measured inhaled tidal volume is less than or equal to this setting. You can choose **Off** to disable this alarm, or you can increase or decrease the setting from 40 ml to 2000 ml in 5 ml increments. It cannot be set higher than the Vti setting.

5.5.10 HIGH VTI

This setting enables or disables the High Vti alarm. The alarm activates when the measured inhaled tidal volume is greater than or equal to this setting. You can choose **Off** to disable this alarm, or you can increase or decrease the setting from 40 ml to 2000 ml in 5 ml increments. It cannot be set lower than the Vti setting except to be turned off.

5.5.11 LOW MINUTE VENTILATION

This setting enables or disables the Low Minute Ventilation alarm. The alarm activates when the calculated minute ventilation is less than or equal to this setting. You can choose Off to disable this alarm, or you can increase or decrease the setting from 1l/min to 99 l/min in 1 l/min increments. It cannot be set higher than the High Minuted Ventilation setting.

5.5.12 HIGH MINUTE VENTILATION

This setting enables or disables the High Minute Ventilation alarm. The alarm activates when the calculated minute ventilation reaches or exceeds this setting. You can choose Off to disable this alarm, or you can increase or decrease the setting from 1l/min to 99 l/min in 1 l/min increments. It cannot be set lower than the Low Minute Ventilation setting except to be turned off.

5.5.13 Low Respiratory Rate

This setting enables or disables the Low Respiratory Rate alarm. The alarm activates when the measured respiratory rate is less than or equal to this setting. You can choose Off to disable this alarm, or you can increase or decrease the setting from 4 BPM to 80 BPM in 1 BPM increments. It cannot be set higher than the High Respiratory Rate setting.

5.5.14 High Respiratory Rate

This setting enables or disables the High Respiratory Rate alarm. The alarm activates when the measured respiratory rate reaches or exceeds this setting. You can choose Off to disable this alarm, or you can increase or decrease the setting from 4 BPM to 80 BPM in 1 BPM increments. It cannot be set lower than the Low Respiratory Rate except to be turned off.

5.5.15 Low Inspiratory Pressure

This setting configures the Low inspiratory Pressure alarm. It is only user-settable in CV, AC, and SIMV modes. It cannot be set lower than PEEP + 2 pressure units or higher than the High Inspiratory Pressure. For passive circuits, you can increase or decrease the Low Inspiratory Pressure from 6 to 40 pressure units in increments of 1. For active circuits, you can increase or decrease the setting from 2 to 40 pressure units in increments of 1. For pressure modes, this alarm is not user-settable.

5.5.16 High Inspiratory Pressure

This setting enables or disables the High inspiratory Pressure alarm. It is only user-settable in CV, AC, and SIMV modes. The High Inspiratory Pressure cannot be set lower than the Low Inspiratory Pressure. You can increase or decrease the High Inspiratory Pressure from 10 to 80 pressure units in increments of 1. For pressure modes, this alarm is not user-settable.

5.6 Additional Setting Specific to Therapy Modes

The Settings and Alarms menu also contains many additional settings specific to the various therapy modes. The specific settings for each therapy mode are described below.

5.6.1 Continuous Positive Airway Pressure (CPAP) Mode

In addition to the general settings described in the previous section of this manual, you can also set the following setting in CPAP mode.

1. CPAP

   You can increase or decrease the CPAP pressure setting from 4 to 20 pressure units in increments of 1.

NOTE

If the CPAP pressure is set to 4 (the minimum setting), the Ramp Length setting will be unavailable.

2. Trigger Type

   The Trilogy can be set to trigger breaths based on automatic flow thresholds or specific flow settings. You can select either **Auto-Trak** or **Flow Trigger** as the Trigger Type. When Auto-Trak is selected, the AutoTrak trigger initiates based on automatic flow thresholds. When Trigger Type is

set to Flow Trigger, Flow Trigger Sensitivity and Flow Cycle Sensitivity become active, and the trigger initiates based on the Flow Trigger Sensitivity setting.

NOTE

Auto-Trak is only available if the Passive Circuit is selected.

Trigger Type is not available when Active PAP or Active Flow circuit is selected. Flow trigger is the triggering method used for Active PAP and Active Flow circuits.

3. Flow Trigger Sensitivity

   If you set the Trigger Type to Flow Trigger, the Flow Trigger Sensitivity setting displays. You can increase or decrease the setting from 1 to 9 l/min in 1 l/min increments.

   The flow trigger initiates when the patient's inspiratory effort creates a flow equal to or greater than the flow sensitivity setting

NOTE

Flow Trigger with leak compensation is only available if the Active Flow circuit is selected.

4. Leak Compensation **(Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**

   If you are using an Active Flow circuit, you can turn Leak Compensation **On** or **Off**.

NOTE

Enabling Leak Compensation when using the Active Flow Circuit configuration only affects triggering and does not affect tidal volume delivery or Vte measurement.

5. Flow Cycle Sensitivity

   If you set the Trigger Type to Flow Trigger, the Flow Cycle Sensitivity setting displays. You can increase or decrease the setting from 10 to 40 percent (%) in 1% increments for Trilogy 100 and from 10 to 90 (%) in 1% increments for Trilogy 200, Trilogy O_2, & Trilogy 202.

6. Ramp Length

   The Ramp Length allows you to set the ramp time. You can disable Ramp by selecting Off, or you can increase or decrease the Ramp Length setting from 5 to 45 minutes in 5-minute increments.

NOTE

The Ramp Start Pressure setting will not display if the Ramp Length is set to Off or if the CPAP pressure is set to 4 pressure units.

7. Ramp Start Pressure

   You can increase or decrease the ramp start pressure in increments of 1 to 4 pressure units to the CPAP pressure setting. The patient also has access to this setting, unless the ramp length is set to Off.

NOTE

Ramp Start Pressure is less than or equal to CPAP -1 pressure unit in CPAP mode.

8. Flex

   You can enable or disable the Flex setting. Off disables the setting and prevents the patient from using Flex. To enable the setting, set Flex to 1, 2, or 3. The patient also has access to this setting, if Flex is enabled. The Flex feature is not available when using an active circuit.

NOTE

- *In CPAP mode, Flex is only available when CPAP is greater than 4 pressure units.*
- *In S mode, Flex is only available when EPAP is greater than or equal to 4 pressure units and IPAP is less than or equal to 25 pressure units.*

5.6.2 SPONTANEOUS (S) MODE

In addition to the general settings described in the previous section of this manual, you can also set the following setting in S mode.

1. AVAPS

   AVAPS is only available if Flex is not enabled.

   You can disable AVAPS by selecting **Off**, or you can enable AVAPS by selecting **On**. If you select Off, the IPAP setting displays. If you select On, the IPAP Max Pressure and IPAP Min Pressure display. These settings are described below.

NOTE
AVAPS is only available if the Passive Circuit is selected.

2. IPAP

NOTE
IPAP, IPAP Max, or IPAP Min cannot be set to more than 30 pressure units above EPAP.

   The IPAP setting displays if AVAPS is Off. You can increase or decrease the Inspiratory Positive Airway Pressure (IPAP) from 4 to 50 pressure units in increments of 1. IPAP is limited to a maximum of 25 pressure units when Flex is enabled. You cannot set the IPAP setting lower than the EPAP setting.

3. IPAP Max Pressure

   The IPAP Max Pressure setting displays if AVAPS is enabled. You can increase or decrease the setting from 4 to 50 pressure units in increments of 1. The IPAP Max Pressure must be equal to or greater than the IPAP Min value.

4. IPAP Min Pressure

   The IPAP Min Pressure setting displays if AVAPS is enabled. You can increase or decrease the setting from 4 to 50 pressure units in increments of 1. The IPAP Min Pressure must be equal to or greater than the EPAP value, and it must be less than or equal to the IPAP Max Pressure.

5. EPAP

NOTE
EPAP cannot be set to more than 30 pressure units below IPAP, IPAP Max, or IPAP Min.

   You can increase or decrease the Expiratory Positive Airway Pressure (EPAP) from 4 to 25 pressure units in increments of 1. For active circuits, EPAP can be set to zero.

   When AVAPS is disabled, the EPAP setting must be less than or equal to the IPAP setting. When AVAPS is enabled, the EPAP pressure must be less than or equal to the IPAP Min Pressure.

6. Tidal Volume

   The Tidal Volume setting displays if AVAPS is enabled. You can increase or decrease the setting from 50 to 2000 ml in 5 ml increments. Use this setting to establish the target volume of gas which the ventilator will produce and deliver during each Spontaneous breath.

NOTE

In CV, AC, and SIMV modes, the tidal volume setting is limited by the Inspiratory Time, to maintain the system's minimum and maximum peak flows.

7. Rise Time

NOTE

The Rise Time setting only displays if Flex is disabled. If the Flex is enabled, the device will use a rise time of 3.

   You can adjust the rise time to find the most comfortable setting for the patient. Increase or decrease the setting from 1 to 6 until you find the right setting. The rise time of 1 to 6 corresponds to tenths of a second (e.g., a setting of 4 equals 0.4 second rise time).

8. Apnea Rate

NOTE

In S/T, T, PC, PC-SIMV, SIMV, CV, and AC modes, the Apnea Rate is greater than or equal to the Breath Rate and is limited by the current Inspiratory Time setting to maintain a minimum 1:1 I:E ratio.

   If the Apnea alarm is enabled, you can set the Apnea Rate from 4 to 60 BPM in 1 BPM increments. In S mode, the Apnea Rate is greater than or equal to 1:2 I:E ratio.

5.6.3 SPONTANEOUS/TIMED (S/T) MODE

All of the settings described in the S Mode section are also available in S/T mode, except the Flex setting. In addition to those settings, the settings below are also available in S/T mode.

1. Breath Rate

NOTE

In volume modes, the Breath Rate range is limited by the current Inspiratory Time setting to maintain a minimum 1:1 I:E ratio.

   In AC mode, you can increase or decrease the Breath Rate setting from 0 to 60 BPM, while in all other modes, you can increase or decrease the setting from 1 to 60 BPM in 1 BPM increments. Use the Breath Rate setting to establish the minimum rate of mandatory breaths that the ventilator will deliver per minute.

2. Inspiratory Time

   You can adjust the Inspiratory Time setting from 0.3 to 5.0 seconds in 0.1 second increments. Inspiratory Time is the duration for the inspiratory phase of a mandatory breath.

NOTE

- *In pressure modes, the inspiratory time range is limited by the current Breath Rate setting to maintain a minimum 1:1 I:E ratio.*
- *In volume modes, the inspiratory time range is limited by the current Tidal Volume and Breath Rate settings to maintain a minimum 1:1 I:E ratio and the system's minimum and maximum peak flow.*

5.6.4 TIMED (T) MODE

All of the settings available in S/T mode are available in T mode, except for the Trigger Type setting. Please refer to the descriptions in the S and S/T Mode sections of this chapter for detailed information on the T mode settings.

5.6.5 PRESSURE CONTROL MODE

All of the settings available in S/T mode are available in PC mode, except for the Flow Cycle Sensitivity setting (when Flow Trigger is enabled). Please refer to the descriptions in the S and S/T Mode sections of this chapter for detailed information on the PC mode settings.

5.6.6 PRESSURE CONTROL SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION (PC-SIMV) MODE

The following settings, described in the S and S/T mode sections of this section, also are available in PC-SIMV mode:

- Breath Rate
- Inspiratory Time
- Trigger Type
- Flow Trigger Sensitivity (if Trigger Type is set to Flow Trigger)
- Flow Cycle Sensitivity (if Trigger Type is set to Flow Trigger)
- Rise Time

In addition to these, the following settings are also available in PC-SIMV mode.

1. Pressure

   You can increase or decrease the Pressure setting from 4 to 50 pressure units in increments of 1. This is the pressure the ventilator will deliver during the inspiratory phase of a mandatory or assist breath.

2. Pressure Support

   You can increase or decrease the Pressure Support setting from 0 to 30 pressure units in increments of 1. This is the pressure support the ventilator will deliver during the inspiratory phase of a Spontaneous breath.

NOTE

In PC-SIMV mode, you can not set up Pressure Support for Mandatory and Assist b reaths (Pressure - PEEP) greater than 30 pressure units.

3. PEEP

   The Positive End Expiratory Pressure (PEEP) setting can be increased from 0 to 25 pressure units in active circuits and 4 to 25 pressure units in passive circuits, in increments of 1. PEEP is the positive pressure maintained in the patient circuit during exhalation. The PEEP must be less than or equal to the pressure setting.

NOTE

The Pressure Support and PEEP settings together cannot exceed 50 pressure units.

5.6.7 CONTROL VENTILATION (CV) MODE

The following settings, described in the previous sections of this chapter, are also available in CV mode:

- Tidal Volume
- Breath Rate
- Inspiratory Time
- PEEP
- High Inspiratory Pressure
- Low Inspiratory Pressure

NOTE

The Low Inspiratory Pressure is limited to PEEP +2 in CV, AC, and SIMV modes.

In addition to these, the following settings are also available in CV mode.

1. Flow Pattern

NOTE

The Flow Pattern setting might be limited to only Ramp or Square based on the Tidal Volume, Inspiratory Time, and Breath Rate settings to maintain the minimum and maximum peak flows.

   You can choose either Ramp or Square for the Flow Pattern setting.

2. Sigh

   You can enable or disable the Sigh setting by selecting **On** or **Off**. A Sigh is a breath that is delivered every 100 breaths at 150% of the normal volume.

5.6.8 ASSIST CONTROL (AC) MODE

The AC mode contains the following settings described in the S, S/T, PC-SIMV, and CV mode sections in this chapter. Please refer to the descriptions in those sections for detailed information.

- Tidal Volume
- Breath Rate
- Inspiratory Time
- Flow Pattern
- PEEP
- Trigger Type
- Flow Trigger Sensitivity
- Sigh
- High Inspiratory Pressure
- Low Inspiratory Pressure

NOTE

Flow Cycle Sensitivity is not available in AC mode.

5.6.9 SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION (SIMV) MODE

NOTE

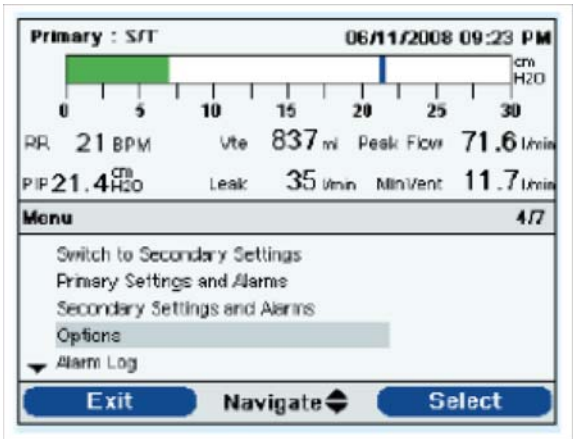
The High Inspiratory Pressure is greater than or equal to PEEP + Pressure Support in SIMV mode.

The SIMV mode contains the following settings described in the S, S/T, PC-SIMV, and CV mode sections in this chapter. Please refer to the descriptions in those sections for detailed information.

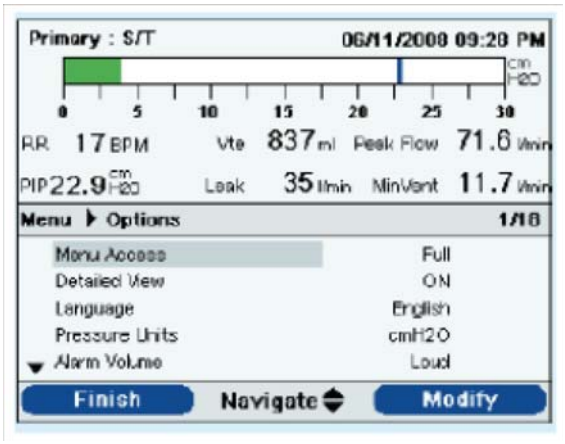
- Tidal Volume
- Breath Rate
- Inspiratory Time
- Pressure Support
- Flow Pattern
- PEEP
- Trigger Type
- Sigh
- Rise Time
- High Inspiratory Pressure
- Low Inspiratory Pressure

5.7 VIEWING AND CHANGING OPTIONS MENU ITEMS

From the Main Menu screen, select the Options item, as shown below.



The Options menu appears, shown in the screen below.



The following settings are available on the Options menu.

- **Menu Access –** You can select Full or Limited menu access. Full menu access allows operators to access all ventilator and prescription settings. Limited menu access allows operators to access only certain settings and does not allow them to change prescription settings. To prevent patients from tampering with prescription settings, do not give them Full menu access.

- **Detailed View –** You can turn Detailed View on or off using this setting. Detailed view displays additional settings and therapy information on the Monitor screen. The figures below show examples of the Monitor screen with Detailed View on or off.

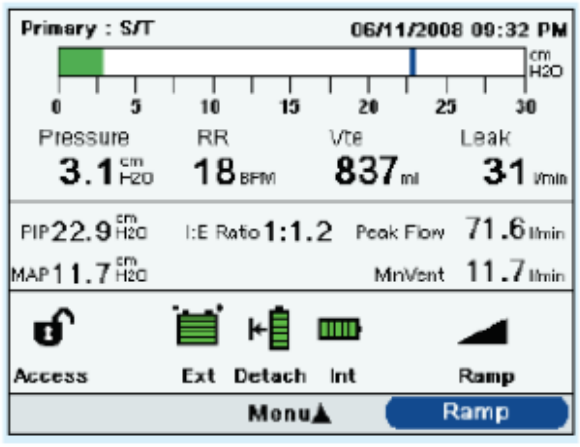


FIGURE 5-1: DETAILED VIEW ON

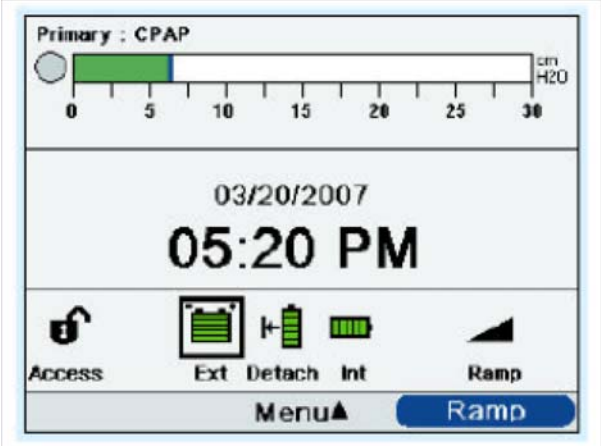


FIGURE 5-2: DETAILED VIEW OFF

- **Language –** The next item on the Options menu allows you to select the Language that the software will appear in (English, French, German, etc.). The information on the screens will display in the language selected here.
- **Pressure Units –** The next item allows you to select the pressure units that will display on the screens. You can choose either:
  - cmH2O
  - hPa
  - mBar

  All pressure units on the screens will display in the unit of measure selected here.

- **Alarm Volume –** You can adjust the volume of the Trilogy alarms using this setting. Select either Loud or Soft as the alarm volume options.

WARNING

Make sure the alarm volume is sufficiently louder than the room noise level to ensure that the audible alarm can be heard by the caregiver.

- **Keypad Lock –** You can enable or disable the Keypad Lock feature, which is described in detail earlier in this section. Enabling the Keypad Lock feature can prevent someone from accidentally pressing a button and changing any of the settings. Select On to enable the feature or Off to disable it.
- **Keypad Backlight –** The next item you can set is the Keypad Backlight. You can turn the backlight On or Off using this setting. Whenever you press the On/Off button to begin therapy, the keypad backlight temporarily lights up. Once therapy is being provided, the keypad will be lit according to this Keypad Backlight setting. If the setting is On, the backlight remains on while therapy is provided. If the setting is Off, the backlight remains off while therapy is provided.
- **LCD Brightness –** The LCD display is lit by a backlight. The backlight turns on when the initial Startup screen displays. You can adjust the brightness of the LCD backlight from 1 – 10, with 1 being the dimmest setting and 10 being the brightest.
- **Screen Saver –** You can change the screen saver to reduce power consumption or dim the screen in a dark room. You can choose the following settings:
  - Off: No screen saver displays and the LCD backlight remains lit at your brightness setting.
  - Breath: The display appears as a black screen, with only the patient breath indicator and manometer visible.
  - Black: The display's backlight is turned off and the display is black with no information visible.
  - Dim: The display's backlight is decreased, so that the display is still visible but not as bright.

  If enabled, the screen saver will display after 5 minutes of no keypad activity. Pressing any button on the device will exit the screen saver. Also, any alarm or informational message will exit the screen saver.

NOTE

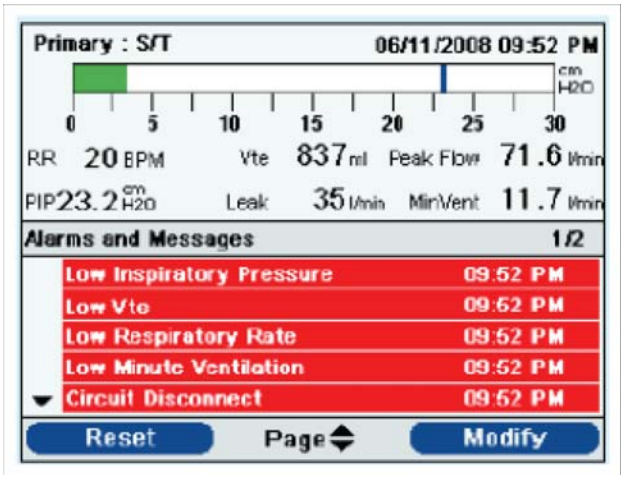
Setting the screen saver to Black allows the device to run for a longer period of time on battery power.

- **Date Format –** You can choose either mm/dd/yyyy or dd/mm/yyyy as the date format that will display on the Trilogy screens.
- **Time Format –** You can choose to display either an AM/PM time format or 24 Hour time format (for example, 2:49PM or 14:49).
- **Month –** The month defaults to the current month. The adjustable range is from 1 (January) – 12 (December).
- **Day –** The day defaults to the current day. The adjustable range is from 1 – 31. The maximum value is based on the selected month.
- **Year –** The year defaults to the current year. The adjustable range is from 2000 – 2099.

- **Hour –** The hour defaults to the current hour. The adjustable range is from 12AM – 12PM or 0-23, depending on the selected Time Format.
- **Minute –** The minute defaults to the current minute. The adjustable range is from 0 – 59.
- **IP Address Mode –** You can change the IP address mode to either DHCP or Static, depending on the type of network you are using (if applicable).
- **Operational Hours –** The operational hours displays the total number of hours that the Trilogy blower has been on since the last time this value was reset. You can reset this value to zero (0) if desired (e.g., each time you give the device to a new patient). This value helps you determine how often the patient is using the device. The Operational Hours shown here differs from the Blower Hours shown on the Information screens. The Blower Hours displayed in the Information screen is the total number of hours that the blower has been working over the life of the device. You cannot reset this value.

5.8 VIEWING THE ALARM LOG

From the Main Menu screen, you can select Alarm Log to access the Alarm Log screen. An example is shown below.



NOTE

In the Alarm Log screen, the 1/2 shown in the Menu banner indicates that page 1 of 2 alarm pages is being viewed at this time.

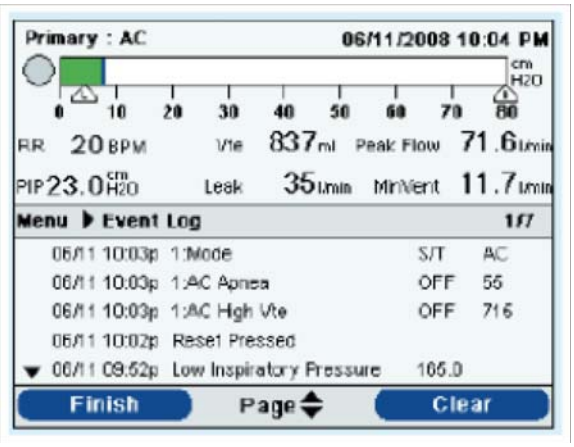
The alarm log displays the alarms in chronological order with the most recent events displayed first. It lists the 20 most recent alarms or messages that appeared on the Trilogy display. When the Trilogy is in Limited Menu access mode, the alarm log cannot be cleared. It can be cleared when in Full Menu access mode. Depending on how many alarms have occurred, the alarm log may be several pages long. The entries in the alarm log use the same names that displayed when the alarm initially occurred and was displayed in the Alarm View.

NOTE

In Full Menu access mode, you can press the Right (Clear) button to clear the alarm log if desired.

5.9 VIEWING THE EVENT LOG

From the Main Menu screen, you can select Event Log to access the Event Log Screen. An example is shown below.



The event log displays a list of all events that have occurred, such as ventilator setting changes, ventilator inoperative conditions, alarms, etc., in chronological order with the most recent events displayed first. When the Trilogy is in Limited Menu access mode, the event log is not available. It can be viewed and cleared when in Full Menu access mode. You can page through the event log if it is multiple pages. The number of pages appears in the upper right corner of the panel (in the example above, shown as 1/6).

In the event log descriptions, any description beginning with a **1:** or **2:** is a prescription change event. The 1 represents a change to a primary setting and the 2 represents a change to a secondary setting. This is followed by the setting that was changed.

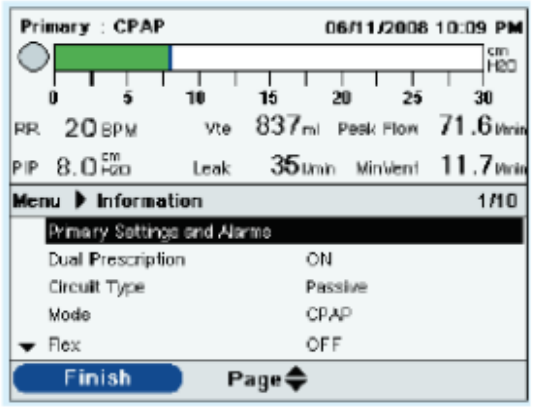
The last two columns indicate setting and alarm changes. If the entry is a setting change, the first column shows the old setting value and the last column shows the new setting. If the entry is an alarm, the first column shows the value that triggered the alarm and the last column shows the number of seconds that the alarm was active.

NOTE

In Full Menu access mode, you can press the Right (clear) button to clear the event log if desired.

5.10 VIEWING DEVICE INFORMATION

From the Main Menu screen, you can select Information to access the Information screen. You can also view the Information screen by holding the Down key for 5 seconds. This causes the detailed view of the Monitor Screen and the Information Menu to be displayed temporarily. This key sequence is valid from the Monitor Screen while in Full or Limited Access. An example is shown below.



The Information screen provides you with a summary of the current prescription settings, device settings, and system settings. You can use the Up/Down buttons to scroll through the information.

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CHAPTER 6: TROUBLESHOOTING & ALARMS

6.0 CHAPTER OVERVIEW

This chapter identifies the alarms associated with the Trilogy Ventilator. This chapter should be used to help service technicians diagnose problems with the Trilogy Ventilator, along with determining what parts, if any, need to be replaced.

6.1 TRILOGY VENTILATOR ALARMS

There are three types of alarms:

- High Priority - Requires immediate response by the operator.
- Medium Priority - Requires prompt response by the operator.
- Low Priority - Requires operator awareness. These alarms alert you to a change in the ventilator status.

Additionally, the ventilator also displays informational messages and confirmation alerts that notify you of conditions that need attention but do not qualify as alarm conditions.

NOTE

If multiple alarms occur at the same time, all alarms are processed and displayed, but the alarms are ordered first by priority and then by occurrence, with the newest, highest priority alarms at the top of the list. The alarm precedence is in the following order: high priority, medium priority, low priority, and informational messages.

NOTE

Not all alarms are available in every therapy mode; some alarms are mode dependant.

6.2 AUDIBLE AND VISUAL ALARM INDICATORS

When an alarm condition occurs:

- The alarm LED indicator on the Audio Pause button lights
- The audible alarm sounds
- A message appears on the screen describing the type of alarm
- The remote alarm (if applicable) is activated

Each of these is described in detail below.

6.2.1 ALARM LED INDICATORS

The Alarm Indicator/Audio Pause button on the front of the ventilator lights up as follows whenever an alarm is detected:

- Red Flashing Indicator - When the device detects a high priority alarm, the Alarm Indicator/Audio Pause button flashes red.
- Yellow Flashing Indicator - When the device detects a medium priority alarm, the Alarm Indicator/ Audio Pause button flashes yellow.

- Yellow Solid Indicator - When the device detects a low priority alarm, a solid yellow light appears on the Alarm Indicator/Audio Pause button.

The Alarm Indicator/Audio Pause button does not light up when informational messages or confirmation alerts display.

6.2.2 AUDIBLE INDICATORS

NOTE

For the alarm indicators noted throughout this manual, each "dot" represents an audible beep.

An audible indicator sounds whenever a power failure or a high, medium, or low priority alarm is detected. Additionally, an audible indicator sounds for informational messages and to confirm that certain actions have occurred (for example, when an SD card is inserted or removed from the device).

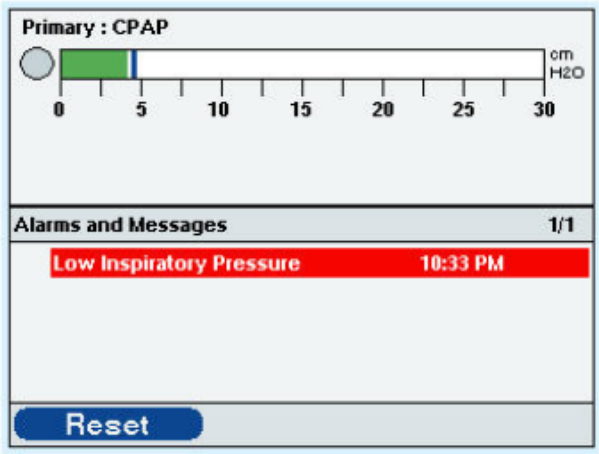
- **Ventilator Inoperative Audible Indicator** – When a ventilator inoperative alarm occurs, a continuous audible alarm sounds. The alarm descriptions later in this chapter display this indicator as: ▬▬▬
- **Power Failure Audible Indicator** – When a power failure occurs, a series of beeps sounds in a 1 beep pattern, repeating one second on, then one second off. The alarm descriptions later in this chapter display this indicator as: • •
- **High Priority Audible Indicator** – When a high priority alarm is detected, a series of beeps sound in the following pattern, which is repeated twice: 3 beeps, a pause, and then 2 more beeps. This indicator continues until the cause of the alarm is corrected or the audible alarm is paused. The alarm descriptions later in this chapter display this indicator as: • • • • • • • • • •
- **Medium Priority Audible Indicator** – When a medium priority alarm is detected, a series of beeps sound in a 3-beep pattern. This pattern repeats until the cause of the alarm is corrected or the audible alarm is paused. The alarm descriptions later in this chapter display this indicator as: • • •
- **Low Priority Audible Indicator** – When a low priority alarm is detected, a series of beeps sound in a 2-beep pattern. This pattern repeats until the cause of the alarm is corrected or the audible alarm is paused. The alarm descriptions later in this chapter display this indicator as: • •
- **Informational Messages and Confirmation Audible Indicators** – When an informational message appears on screen, a brief, 1- beep audible indicator sounds. Additionally, when the device detects that a certain action has been completed (for example, when the Start/Stop button is pressed to start therapy, or when an SD card is inserted or removed from the device) a brief, 1-beep audible indicator sounds. The alarm descriptions later in this chapter display this indicator as: •

6.2.3 ALARM MESSAGES

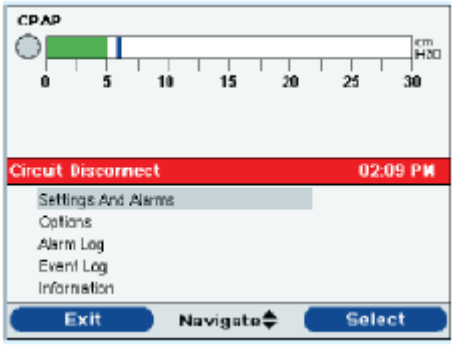
NOTE

An alarm message will also display in the Menu Banner if a menu is active when an alarm occurs.

When the ventilator detects an alarm, the Alarms and Messages Screen is displayed showing a description of the alarm condition. When an alarm message appears, it will be highlighted in red if it is a high priority alarm or in yellow if it is a medium or low priority alarm. (The highlight color matches the alarm LED color on the Alarm Indicator/Audio Pause button.) If an alarm is manually reset by the user, the Alarms and Messages screen is removed and the Monitoring Screen is re-displayed. If the alarm self-cancels, the Alarms and Messages screen remains displayed, but the highlight from the active alarm is removed, the LED is unlit, and the audible alarm stops. The screen below is an example of a possible alarm message.

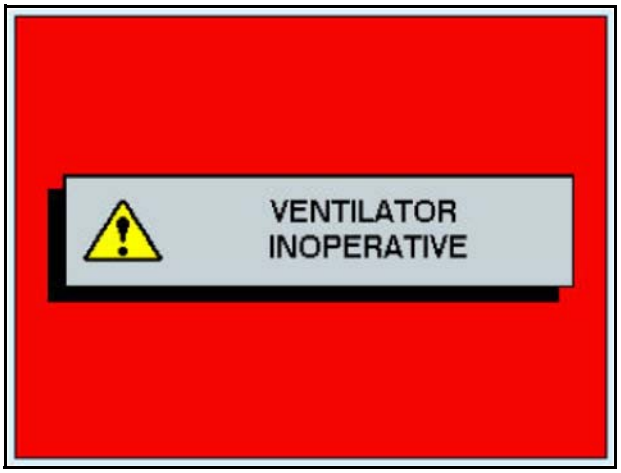


If a menu is displayed on the screen when an alarm occurs, the description of the newly generated alarm is displayed in the menu banner area. This is done so that the modification to the current parameter can be completed before addressing the alarm condition in case the modification affects the alarm condition. The screen below is an example of an alarm message displayed in the menu banner.

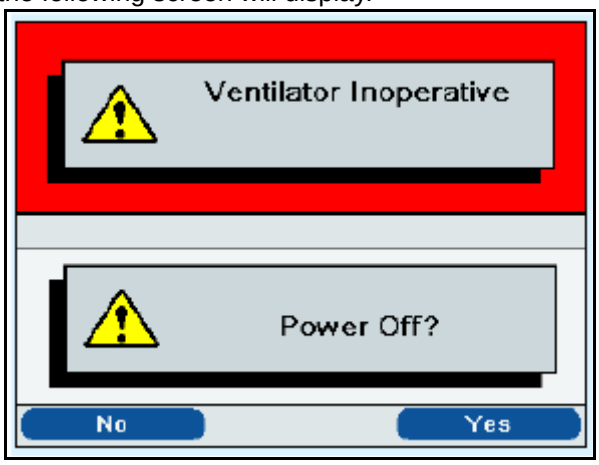


The Alarms and Messages Screen will automatically display in place of the Monitor screen when exiting from the menu system using the Exit soft key when an alarm is displayed in the menu banner. If an alarm is manually reset by the user or self-cancels, the menu banner on-screen before the alarm occurred will reappear.

If a Ventilator Inoperative alarm occurs, the entire display screen turns red and the Ventilator inoperative message appears on-screen, as shown below.



To turn the ventilator off from a Ventilator Inoperative condition, use the normal power off sequence. When the Start/Stop button is selected, the following screen will display.



Select the Right button (Yes) to turn the ventilator off and stop the audible alarm. Selecting the Left button (No) will return the screen to the Ventilator Inoperative Alarm Screen without silencing the audible alarm.

6.2.4 Remote Alarm

When the ventilator detects an alarm condition, if you are using a remote alarm system, a signal is sent from the ventilator to activate the remote alarm.

6.3 Audio Pause and Alarm Reset Features

This section describes the Audio Pause and Alarm Reset features.

6.3.1 Audio Pause

When an alarm occurs, you can temporarily silence the audible indicator by pressing the Alarm Indicator/Audio Pause button. The alarm is silenced for 60 seconds and then will sound again if the cause of the alarm has not been corrected. Each time the Alarm Indicator/Audio Pause button is pressed, the alarm silence period resets to one minute.

When Audio Pause is active, the Alarm Indicator/Audio Pause symbol appears if you are on the Monitor screen. Additionally, an “Audio Pause” message displays in the menu banner on the Alarm Display screen.

You can ‘pre-silence’ alarms that have not yet occurred by pressing the Alarm Indicator/Audio Pause button while no alarms are active. Then, if an alarm occurs, the audible indicator does not sound until the Audio Pause time limit has expired.

6.3.2 ALARM RESET

The Reset button is used to clear the currently active alarm(s) from the display and stop the LED and audible alarm indicator. This button should be selected after the situation causing the alarm(s) has been corrected. All active alarms are cancelled and alarm detection is restarted when this button is selected.

The ventilator self-cancels certain alarms if the cause of the alarm is corrected, shutting off the alarm LED, the audible alarm, and the alarm background color. However, the alarm text remains on the screen. You can manually reset an alarm by pressing the Left button (Reset). The Audio Pause function is cancelled if the alarm is manually reset.

NOTE

- *Alarm Reset will not affect ventilator inoperative alarms.*
- *When the device automatically resets an alarm, the alarm message remains displayed until you select the Left (Reset button).*

6.3.3 ALARM VOLUME CONTROL

You can adjust the Alarm Volume from the Options menu. You can select Loud or Soft, depending on your preference.

WARNING

Make sure the alarm volume is set loud enough to be heard by the caregiver.

6.3.4 WHAT TO DO WHEN AN ALARM OCCURS

WARNING

You should not rely on any single alarm to detect a circuit disconnect condition. The Low Tidal Volume, Low Minute Ventilation, Low Respiratory Rate, and Apnea alarms should be used in conjunction with the Circuit Disconnect alarm.

Complete the following steps when an alarm occurs:

1. Look at the alarm indicators and listen to the audible alarm sound. Note the color of the Alarm Indicator/Audio Pause button (red or yellow) and whether the LED is solid or flashing.
2. Look at the display to check the alarm message that appears on-screen and whether it is high-lighted in red or yellow.
3. Press the Alarm Indicator/Audio Pause button to temporarily silence the audible alarm. A visual indicator displays if you are on the Monitor screen or an “Audio Pause” message appears in the menu banner on the Alarm Display screen.

4. Look up the alarm in the alarm descriptions later in this section to determine the source of the alarm and the appropriate action.

6.4 ALARM SUMMARY TABLE

The following table summarizes all of the high, medium, and low priority alarms and informational messages.

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Loss of Power	*High*	• •	*It may occur when a complete power failure has occurred and power was lost while the device was providing therapy. This may happen if the internal battery was the only power source in use and was completely depleted.*	*Red flashing button; Blank screen*	*Shuts down*
Ventilator Inoperative	*High*	[redacted]	*It occurs when the ventilator detects an internal error or a condition that may affect therapy.*	*Red flashing button; "Ventilator Inoperative" message*	*Shuts down if can't provide therapy safely. Or, continues to operate at a limited level*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Ventilator Service Required	*High*	• • • • •	*It occurs when the device cannot perform to specification, a backup safety feature is compromised, or the delivery of therapy is compromised. If the problem is not corrected, the device will generate a reminder message once per hour, or whenever power is cycled, until the issue is corrected. Additionally, if the device is powered off, a reminder message will immediately appear when the device is turned on again.*	*Red flashing button; "Ventilator Service Required" message*	*Operates*
Check Circuit	*High*	• • • • •	*It occurs when the device detects a problem with the patient circuit, such as pinched or detached tubing, water condensation in the proximal pressure lines, or problems with the active exhalation device.*	*Red flashing button; "Check Circuit" message*	*Operates*
Low Circuit Leak	*High*	• • • • •	*It occurs when the system detects a problem with the leak device in the passive circuit.*	*Red flashing button; "Low Circuit Leak" message*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
High Expiratory Pressure	*High*	• • • • •	*It occurs when the delivered pressure exceeds the target patient pressure during the expiratory phase by 5 pressure units. This may be due to pinched tubing or the patient having a fast breath rate. The alarm will automatically terminate when the delivered pressure comes within 5 pressure units during the expiratory phase.*	*Red flashing button; "High Expiratory Pressure" message*	*Operates*
Low Expiratory Pressure	*High*	• • • • •	*It occurs when the delivered pressure is 5 pressure units or more below the target patient pressure during the expiratory phase. The alarm will automatically terminate when the delivered pressure comes within 5 pressure units of the target patient pressure during the expiratory phase.*	*Red flashing button; "Low Expiratory Pressure" message*	*Operates*
High Internal Oxygen	*High*	• • • • •	*It occurs when there is a leak in the internal air delivery system that allows oxygen to build up inside the device. The alarm is generated when the internal oxygen concentration reaches 5% above ambient levels.*	*Red flashing button; "High Internal Oxygen" message*	*Continues to operate when internal oxygen concentration reaches 5% above ambient levels.*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
High Oxygen Flow ***(Trilogy O_2 & Trilogy 202 Only)***	*High*	• • • • •	*It occurs when the concentration of oxygen from the device is 10% above the FiO_2 set point for more than 30 seconds. This could be caused by a problem with the output of the oxygen source.*	*Red flashing button; "High Oxygen Flow" message*	*Operates*
Low Oxygen Flow ***(Trilogy O_2 & Trilogy 202 Only)***	*High*	• • • • •	*It occurs when the concentration of oxygen from the device is 10% below the FiO_2 set point for more than 30 seconds. This could be caused by the oxygen source being disconnected from the device, an occlusion in the tubing from the oxygen source to the device, or a problem with the output of the oxygen source.*	*Red flashing button; "Low Oxygen Flow" message*	*Operates*
High Oxygen Inlet Pressure ***(Trilogy O_2 & Trilogy 202 Only)***	*High*	• • • • •	*It occurs when the pressure of the oxygen from the source measures greater than 87 psi.*	*Red flashing button; "High Oxygen Inlet Pressure" message*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Low Oxygen Inlet Pressure ***(Trilogy O_2 & Trilogy 202 Only)***	*High*	• • • • •	*It occurs when the pressure of the oxygen from the oxygen source measures less than 40 psi. This could be caused by the oxygen source being disconnected from the device, an occlusion in the tubing from the oxygen source to the device, or a problem with the output of the oxygen source.*	*Red flashing button; "Low Oxygen Inlet Pressure" message*	*Operates*
Circuit Disconnect	*High*	• • • • •	*It occurs when the breathing circuit is disconnected or has a large leak. The alarm will automatically terminate when the leak is fixed for 6 seconds and breaths are delivered again.*	*Red flashing button; "Circuit Disconnect" message*	*Operates*
Apnea	*High*	• • • • •	*It occurs when the patient has not triggered a breath within the time specified in the apnea alarm setting. The alarm will automatically terminate when two consecutive patient breaths are detected that meet the apnea alarm time setting.*	*Red flashing button; "Apnea" message*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
High Vte	*High*	• • • • •	*It occurs when the estimated exhaled tidal volume is greater than the High Vte setting. The alarm will automatically terminate when a breath occurs in which the estimated exhaled tidal volume does not reach the High Vte alarm setting for three consecutive breaths.*	*Red flashing button; "High Vte" message*	*Operates*
Low Vte	*High*	• • • • •	*It occurs when the estimated exhaled tidal volume is less than the Low Vte alarm setting. The alarm will automatically terminate when a breath occurs in which the estimated exhaled tidal volume exceeds the Low Vte alarm setting for three consecutive breaths.*	*Red flashing button; "Low Vte" message*	*Operates*
High Vti	*High*	• • • • •	*It occurs when the delivered tidal volume is greater than the High Vti alarm setting. The alarm will automatically terminate when a breath occurs in which the delivered tidal volume does not reach the High Vti alarm setting for three consecutive breaths.*	*Red flashing button; "High Vti" message*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Low Vti	*High*	• • • • •	*It occurs when the delivered tidal volume is less than the Low Vti alarm setting. The alarm will automatically terminate when a breath occurs in which the delivered tidal volume exceeds the Low Vti alarm setting for three consecutive breaths.*	*Red flashing button; "Low Vti" message*	*Operates*
High Respiratory Rate	*High*	• • • • •	*It occurs when the respiratory rate is greater than the High Inspiratory Rate alarm setting. The alarm will automatically terminate when the measured respiratory rate is less than the High Respiratory Rate alarm setting.*	*Red flashing button; "High Respiratory Rate" message*	*Operates*
Low Respiratory Rate	*High*	• • • • •	*It occurs when the respiratory rate is less than the Low Respiratory Rate alarm setting. The alarm will automatically terminate when the measured respiratory rate is greater than the Low Respiratory Rate alarm setting.*	*Red flashing button; "Low Respiratory Rate" message*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
High Inspiratory Pressure	*High*	*• (for first two consecutive occurrences)* *• • •(for 3rd consecutive occurrence)* *• • • • • (for 10th consecutive occurrence)*	*It occurs in several stages and escalates from an audible beep for the first two occurrences to a high priority alarm if the problem continues. It is detected differently for volume and pressure therapy modes.* ***For volume modes**, the alarm will sound if the measured patient pressure exceeds the High Inspiratory Pressure setting specified by the clinician. The alarm will automatically terminate when the peak inspiratory pressure is less then or equal to the High Inspiratory Pressure alarm setting.* ***For pressure modes**, the alarm occurs when the delivered pressure exceeds the target patient pressure by 5 pressure units or more during the inspiratory phase. The device will automatically cycle to the expiratory phase and continue to operate. The alarm will automatically terminate when the delivered pressure falls within 5 pressure units of the target patient pressure during the inspiratory phase*	*Peak Pressure symbol turns red. When condition first occurs, a beep will sound. When condition occurs for third time, button flashes yellow and yellow "High Inspiratory Pressure" message appears. When condition occurs for 10th time, button flashes red and red "High Inspiratory Pressure" message appears.*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Low Inspiratory Pressure	*High*	• • • • •	*It is detected differently for volume and pressure therapy modes.* ***For volume modes****, the alarm will sound if the measured patient pressure is less than the Low Inspiratory Pressure setting by the clinician. The alarm will automatically terminate when the peak pressure at the end of the breath is greater than or equal to the Low Inspiratory Pressure alarm setting.* ***For pressure modes****, the alarm occurs when the delivered pressure is 5 pressure units or more below the target patient pressure during the inspiratory phase. the alarm will automatically terminate when the delivered pressure comes within 5 pressure units of the target patient pressure during the expiratory phase.*	*Red flashing button: "Low Inspiratory Pressure" message*	*Operates*
High Minute Ventilation	*High*	• • • • •	*It occurs when the patient's minute ventilation is greater than the High Minute Ventilation alarm setting. The alarm will automatically terminate when the calculated minute ventilation is less than the High Minute Ventilation alarm setting.*	*Red flashing button; "High Minute Ventilation" message*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Low Minute Ventilation	*High*	• • • • •	*It occurs when the patient's minute ventilation is less than the Low Minute Ventilation alarm setting. The alarm will automatically terminate when calculated minute ventilation is greater than the Low Minute Ventilation alarm setting.*	*Red flashing button; "Low Minute Ventilation" message*	*Operates*
Low Battery	*Escalates from Medium to High*	• • • *(Medium - when approx. 20 minutes remain)* • • • • • *(High - when approx. 10 minutes remain)*	*It occurs when the last battery available is low or nearly depleted. This alarm occurs in two stages. When approximately 20 minutes of battery run time remains, a medium priority alarm is generated. If no action is taken and the battery continues to deplete, the alarm escalates to a high priority alarm when approximately 10 minutes of battery run time remains.*	*Medium Priority - Yellow flashing button. "Low Detachable Battery," "Low External Battery," or "Low Internal Battery" message appears in yellow, On Status Panel, box around battery is yellow* *High Priority - Red flashing button. "Low Detachable Battery," "Low External Battery," or "Low Internal Battery" message appears in red, On Status Panel, box around battery is red*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
High Temperature	*Escalates from Medium to High*	• • • *for medium* • • • • • *for high*	*It occurs when the estimated patient airstream temperature or the ventilator internal temperature is too high. The alarm occurs in several stages. Internal fans are started when the medium priority alarm is generated. If the condition causing the high temperature is not corrected and the temperature continues to rise, the alarm will escalate to the high priority alarm.*	*Yellow flashing button and yellow "High Temperature" message appears. If condition worsens, button flashes red and red "High Temperature" message appears.*	*Operates*
Replace Detachable Battery	*Low or High, depending on cause of alarm*	• • *for low* • • • • • *for high*	*It occurs when the detachable battery is nearing the end of its useful life or a failure in the detachable battery that prevents it from charging or discharging has been detected. The alarm occurs in several stages, from low to high priority. If the alarm is reset without removing the battery, the alarm will be regenerated once every hour until the detachable battery is removed. The detachable battery is not used, and the power source is switched to the next available power source if the alarm is the high priority alarm.*	*"Replace Detachable Battery" message appears. If battery is nearing end of useful life, message appears with yellow background and button is solid yellow. If battery fails, message appears with red background and button flashes red.*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Ventilator Service Recommended	*Medium*	• • •	*It occurs when the device has detected an error, but the error will not affect device performance or safety. Therapy and safety are not compromised. If the problem is not corrected, the device will generate a reminder message once per day, or whenever power is cycled, until the issue is corrected. Additionally, if the device is powered off, a reminder message will immediately appear when the device is turned on again.*	*Yellow flashing button; "Ventilator Service Recommended" message*	*Operates*
Keypad Stuck	*Low*	• •	*It occurs when a key becomes lodged inside the case of the device.*	*Solid yellow button; "Keypad Stuck" message*	*Operates*
Battery Discharging Stopped Due to Temperature	*Info*	•	*This info message occurs when the detachable or internal battery becomes overheated while providing power for the device. The battery is not used and the power source is switched to the next available power source.*	*"Batt Discharge Stopped - Temp." message*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Battery Not Charging Due to Temperature	*Info*	•	*This info message occurs when the detachable or internal battery becomes too hot while charging or the device was in too cold an environment before charging started. Battery charging stops until the battery cools or warms sufficiently.*	*"Batt Not Charging - Temp." message*	*Operates*
Battery Not Charging	*Info*	•	*This info message occurs when the device has detected an error condition with the battery that prevents it from accepting a charge. Battery charging stops.*	*"Detach Battery Not Charging" or "Internal Battery Not Charging" message*	*Operates*
Check External Battery	*Info*	•	*This info message occurs when a bad connection exists to the external battery or the external battery failed. The device continues to operate using power from the detachable battery, if available, or the internal battery.*	*"Check External Battery" message*	*Operates*
Battery Depleted	*Info*	•	*This info message occurs when the affected battery is fully depleted. The device continues to operate using the next available power source.*	*"External Battery Depleted" or "Detachable Battery Depleted" message appears*	*Operates*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
AC Power Disconnected	*Info*	•	*This info message occurs when the AC power source was lost, and the device has switched to an alternate power source (either a detachable or external battery, if connected, or the internal battery if no other source is available). If AC power returns, the ventilator will beep, but no message will appear on the display.*	*"AC Power Disconnected" message, and a box appears around battery in use.*	*Switches to alternate power source*
External Battery Disconnected	*Info*	•	*This info message occurs when the external battery power source is lost and the device has switched to an alternate power source (either a detachable battery, if connected, or the internal battery if no other source is available). If external power returns, the ventilator will beep, but no message will appear on the display.*	*"External Batt Disconnected" message, and a box appears around battery in use.*	*Switches to alternate power source*

ALARM	PRIORITY	AUDIBLE	DESCRIPTION OF ALARM	VISUAL(ALARM INDICATOR BUTTON AND DISPLAY)	DEVICE ACTION
Detachable Battery Disconnected	*Info*	•	*This info message occurs when the detachable battery power source is lost and the device has switched to an alternate power source (the internal battery if not other source is available). If detachable battery power returns, the ventilator will beep, but no message will appear on the display.*	*"Detachable Batt Disconnected" message, and a box appears around battery in use.*	*Switches to alternate power source*
Start On Battery	*Info*	•	*This info message indicates that the ventilator has started on battery power and no AC power is available. The device operator should verify that this is what is wanted.*	*"Start On Battery" message appears.*	*Operates*
Card Error	*Info*	•	*This info message occurs when an unusable SD card is inserted into the ventilator. The device continues to operate but data cannot be logged onto the SD card.*	*"Card Error" message appears*	*Operates*

6.5 TROUBLESHOOTING TABLE

DEVICE ACTION	POSSIBLE CAUSES	POSSIBLE ACTION
Unit does not power on	• *No power available* • *Front Panel Board On/Off circuit faulty* • *System/CPU PCA does not recognize keypress*	• *Verify AC or Batteries are present* • *Replace the Front Panel PCA* • *Replace the System/ CPU Subassembly PCA*
Unit power on, but Blower will not start	• *Blower not connected to PCA* • *Blower faulty* • *Faulty motor drive on PCA*	• *Check connection from Blower to PCA* • *Replace Blower* • *Replace System/CPU Subassembly PCA*
Unit is on, but Display is blank	• *LCD not connected properly* • *Inverter not connected properly* • *Faulty Driver on System/CPU PCA*	• *Check LCD Cable* • *Check Inverter and connection* • *Replace System/CPU Subassembly PCA*
Unit and Display are on, but AC Power LED and Keypad are not functioning	• *Front Panel not connected properly* • *Faulty Front Panel board*	• *Check connection from Front Panel to System.* • *Replace Front Panel Board*
Audible Alarm does not beep 3 times at startup	• *Speakers not connected properly* • *Faulty Speakers* • *Faulty Front Panel PCA* • *Faulty System/CPU PCA*	• *Check Speaker connections* • *Replace Speakers* • *Replace Front Panel PCA* • *Replace System/CPU Subassembly PCA*
Any of the red (~1.5 sec), yellow (~1.5 sec), and white (~3 sec) LEDs do not light during startup	• *Front Panel not connected properly* • *Faulty Front Panel board*	• *Check connection from Front Panel to System* • *Replace Front Panel Board*

Display flashes on and off sporadically	• *Bad power source* • *CPU resetting*	• *Verify good power source* • *Replace System/CPU Subassembly*
Unit does not detect Detachable Battery	• *Internal connections not connected properly* • *Faulty Detachable Battery*	• *Check connection on Power Management Board* • *Replace Detachable Battery*
Unit does not detect Internal Battery	• *Battery not connected properly* • *Faulty Internal Battery*	• *Check connection on Power Management Board* • *Replace Internal Battery*
Unit does not detect External Lead Acid battery	• *Battery not connected properly internally and/or externally* • *Faulty External Lead Acid battery*	• *Check connections on Power Management Board and on outside of the unit* • *Replace External Lead Acid battery*
One alarm has much lower pitch or tone than other alarm	• *Faulty Speaker* • *Faulty Front Panel PCA*	• *Replace Speaker* • *Replace Front Panel Board*
Display blank, but backlight working	• *Dislodged LCD (ribbon) cable* • *Faulty LCD (ribbon) cable*	• *Verify LCD cable/ connections* • *Replace LCD Cable*

Detachable Battery Error Received during Repair Test	• *The Following are the associate Test Step Failures:* • *160 0040.0240 Uninterrupted Operation [33m 34s] N/A Pass TRUE Pass* • *Test Step Failures Associated with a defective Detachable Battery Connector Assembly* • *161 0040.0250 AC Power Source Recognition [33m 34s] N/A EQ 120V AC Power 120V AC Power Pass* • *162 0040.0260 Lead-Acid Power Source EPAP Current [34m 36s] A 0.50 to 7.00 1.88 Pass* • *163 0040.0270 Lead-Acid Power Source IPAP Current [34m 36s] A 0.50 to 15.00 3.57 Pass* • *164 0040.0280 Detachable Li-Ion Battery (at 46% Cap.) [34m 36s] mA -3.00 to 0.00 -5.00 Fail* • *165 0040.0290 Internal Li-Ion Battery (at 57% Cap.) [34m 36s] mA -3.00 to 0.00 0.00 Pass*	• *Replace the faulty Detachable Battery Connector Assembly.* • *Recalibrate the Trilogy.* • *Perform the necessary Run-In.* • *Perform Repair Test.*
High Pos Flow at Calibration	• *Flow Straightener damaged or missing*	• *Ensure Flow Straightener is installed in Flow Sensor Assembly correctly and is no t damaged.*
Trilogy Error Code relating to Battery issues	• *Unit needs to be rebooted* • *Erroneous read by Charger chip from power sequencing*	• *Reboot unit using RASP command or allow unit to go to sleep* • *Remove all pow er from unit, which includes physically disconnecting the Internal Battery, then reconnect.*
Internal Battery fails current test or does not go into requested mode	• *Faulty Detachable Battery* • *Faulty Power Management Board*	• *Replace Detachable Battery if found faulty.* • *Replace Power Management Board.*

Detachable Battery fails current test or does not go into requested mode	• *Faulty External Battery* • *Faulty Power Management Board*	• *Replace External Battery.* • *Replace Power Management Board.*
Unit won't reach Pressure Therapy settings in Run-in	• *Incorrect settings* • *Tubing setup incorrectly*	• *Verify settings.* • *Verify tubing is connected properly and there are no leaks.* • *Verify Active Exhalation Valve is functioning properly.*
Failures involving pressure or flow tests	• *Tubing or porting block issues* • *Faulty Sensor PCA*	• *Verify tubing and porting block are connected properly and not leaking.* • *If possible, verify faulty Sensor PCA, replace if suspected*
Solid alarm when using Lead Acid or AC power fail alarm with known good Li-ion's	• *CPU possibly rebooting or not running*	• *Remove all power to reset and if possible obtain error logs; replace System/CPU PCA if suspected*
Vent Service Required before software upgrade	• *E143 (Pressure Span) in Error Log*	• *Upgrade software. If error persists, or is not E143, refer to the proper Error Code Section of th is chapter.*
Trilogy error code relating to battery issues	• *Device software communication to the batteries*	• *Evaluate test report and/or Trilogy error log. If there is nothing conclusive from the evaluation, retest the unit.*

High Pressure Leak Fail - this is indicative of a leak on the O2 flow side ***(Trilogy O_2 & Trilogy 202 Only)***	• *Verify seating of the O_2 proportional valve* • *Verify connection of green tube to manifold* • *Verify green tube to port clip adaptor* • *Verify O-rings on port clip adapter to pressure sensor are present* • *Pressure sensor leaking*	• *Reseat as needed or replace manifold if suspect.* • *Reseat or replace green tube/port clips as needed.* • *Reseat or replace O-rings as needed.* • *Replace PCA if all other related parts were verified not to leak.*
Low Pressure Leak Fail - This is indicative of a leak on the air flow side ***(Trilogy O_2 & Trilogy 202 Only)***	• *Verify Interface between air duct and lower portion of air element seated properly* • *Verify air element to mixer is intact and O-rings are not rolled* • *Verify mixer to O_2 element is intact and O-rings are not rolled* • *Verify O_2 element to manifold is intact and O-rings are not rolled* • *Verify seating of the O_2 proportional valve* • *Verify sense tubes from both O_2 and air elements to associated flow sensors are seated properly and free from holes or defects* • *Ensure tubes are connected properly*	• *Reseat or replace as needed.* • *Replace manifold if suspect.* • *Reseat all connections and retest.*
Valve Functional Fail - Indicative of valve not properly opening or impeded air path ***(Trilogy O_2 & Trilogy 202 Only)***	• *Verify seating on the O_2 proportional valve* • *Foreign material in air path* • *Faulty wire connection from O_2 proportional valve to board* • *Faulty OBM PCA*	• *Reseat as needed or replace manifold.* • *Remove material if possible, otherwise replace manifold if suspect.* • *Reseat connection or replace suspect part.* • *Verify connector is seated, otherwise replace PCA*

PCA Communication Fail - Indicative of PCA not communicating ***(Trilogy O_2 & Trilogy 202 Only)***	• *Faulty OBM to Trilogy Serial Cable* • *Faulty PCA*	• *Verify cable connection, reseat or replace as needed* • *Verify connector integrity. Reseat Cable at PCA* • *Replace PCA.*
Fan Test Fail - Indicative of a fan now working ***(Trilogy O_2 & Trilogy 202 Only)***	• *Faulty OBM Fan* • *Connection between fan and board* • *Faulty PCA*	• *Verify fan cable connection.* • *Reseat connection.* • *Replace Fan.* • *Replace PCA*
Current Test Fails - Indicative of idle current not within limits ***(Trilogy O_2 & Trilogy 202 Only)***	• *Faulty PCA*	• *Reseat connections* • *Replace PCA*
Vent may not have any Vent Service Messages *Vent does not recognize when AC is connected* *Batteries will not charge with AC connected* *Vent gives low battery alarms and eventually shuts itself off (with alarm)* *Turning vent On may result in HW or SW power fail* *Vent will power up and operate fine with external Lead Acid or externally charged detachable battery* *Failure of Power Supply PCA*	• *U1 failure on Power Supply PCA*	• *Replace Power Supply PCA*

Customer reports Vent Service Recommended alarm *Error generated under the following conditions:* • *06/25/2009 11:56:25 E-00284 0 65535 ERR_PWR_UPGRADE_AC_IN_USE BEEP_ONLY* • *06/25/2009 11:56:24 E-00119 0 65535 ERR_LI_ION_CHARGING_NO_AC ROUTINE_SERVICE* • *06/25/2009 11:56:24 E-00166 0 65535 ERR_UI_RESET_KEY_PRESS KEYPRESS* • *06/25/2009 11:56:20 E-00179 0 65535 ERR_PWR_REDUCTION_AC_DISCONNECTED INFO_ALARM* *Specifically, the series of events is:* • *AC is connected (but not yet recognized by vent)* • *Batteries begin to charge (immediately with application of AC)* • *Vent detects batteries are charging* • *Reset key is pressed* • *"Vent Service Recommended" error triggered (the vent detected that batteries are charging, has a triggered timer but has not yet detected AC)* • *Vent recognizes AC is present (~3 seconds after actual connection)*	• *Condition in 6.06 and earlier*	• *When generated under the circumstances described above the E-199 error does not indicate a problem with the vent hardware and there is nothing that needs to be repaired or replaced on the ventilator.* • *Install latest Software.*

Typically characterized by an out of box failure *Initial power up sequence (example only actual codes and order may be vary):* • *13:59:12 E-249 ERR_AC_CONNECTED* • *13:59:13 E-252 ERR_INT_LI_ION_CONNECTED* • *13:59:13 E-336 ERR_INT_LI_ION_EXITED_SHIP_MODE* • *13:59:25 E-189 URGENT_SERVICE ERR_LOSS_OF_VBATT_LI_POWER* • *13:59:30 E-272 URGENT_SERVICE ERR_VBATT_SENSE_LOW* *Both battery icons on the display are red*	• *BPNG System Condition*	• *Disconnect internal battery for a few seconds* • *Reconnect battery and reassemble* • *Verify battery errors do not return* • *Install latest software*
Test Equipment or Trilogy Error code relating to Battery issues	• *Device SW communication to the Batteries*	• *Evaluate Test Report and/or Trilogy Error Log. If there is nothing conclusive from the evaluation, retest the unit.*
Failed Motor Temp Test during Final Testing	• *Motor not warmed up enough* • *Faulty Motor Temp Sensor* • *Motor Temp circuit on PCA*	• *Run unit for min. of 20 minutes in S/T mode, 20/4, 10BPM, Ti=1,Tr=3* • *Verify valid reading; Replace Blower assembly if faulty* • *Verify Motor Temp sensor in Blower Assembly with Test Setup; if reading is valid, replace System/Cpu in the unit*

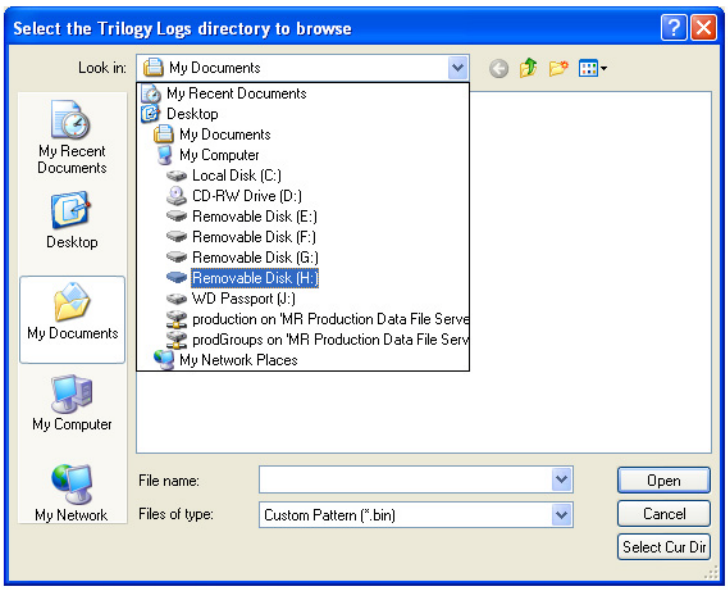
No Display Backlight and Blower does not run	• *12v circuit faulty* • *System/CPU Board faulty*	• *12v Line shorted possibly due to C13 on Interface PCA shorted; replace pca if confirmed faulty* • *Replace System/Cpu if confirmed faulty*
E308 in the Error Log	• *Stirring or Battery Fan intermittent*	• *Review the Optional Text line for E341 Fan entries in the Error Log for Fan Stalled entries. Replace respective fan if any Fan Stall's are logged and verified not to be process related*
E-009 in Error Log caused by Interface PCA. This condition includes No Display and a Vent Inop Audio Indication	• *Capacitor at C13 of the Interface PCA displays evidence of a short condition. C13 is a filter cap located in line to the 12V main. The shorted cap resulted in a short condition throughout the 12V main.*	• *Visually inspect C12 and C13 for evidence of discoloration. Measure the contacts of C12 or C13 to TP ground for a short.* • *Replace Interface PCA*

E-009 in Error Log caused by Blower Failure.	• *Impeller won't rotate*	• *Attempt to rotate impeller. If unsuccessful or physical resistance is present, replace the blower.* • *Measure phase resistance by performing the following: Pin 7 (Blue) to Pin 8 (Violet) should read no more than 0.8 ohm, Pin 7 (Blue) to Pin 9 (Grey) should read no more than 0.8 ohm, and Pin 8 (Violet) to Pin 9 (Grey) should read no more than 0.8 ohm.* • *Measure the motor case resistance by measuring Pin 7 to case, Pin 8 to case, and Pin 9 to case. Measurement should read open.* • *If the Blower fails any of the conditions above, visually inspect the motor drive circuit on the System PCA for hardware defects. It may be necessary to replace the Blower Assembly and the System PCA.* • *If the Blower Assembly is electrically sound and there is no evidence of physical or thermal damage to the motor drive circuit, replace the System PCA.*

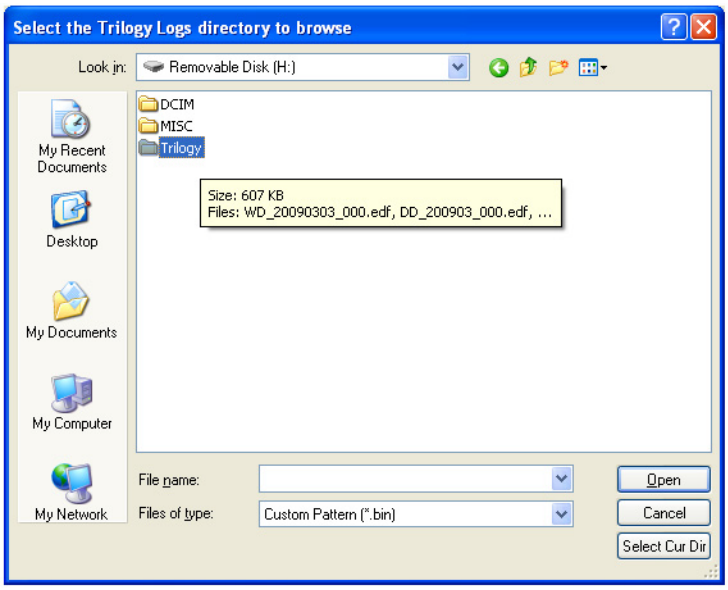
E-009 in Error Log caused by System PCA.	• *The System/CPU PCA has the potential to contribute to a vent in-op error. In some cases the vent in-op condition caused by the system/CPU PCA may not be able to be duplicated at the servicing center.*	• *Replace the System/ CPU PCA.*

6.6 DOWNLOADING TRILOGY ALARM ERROR CODE INFORMATION

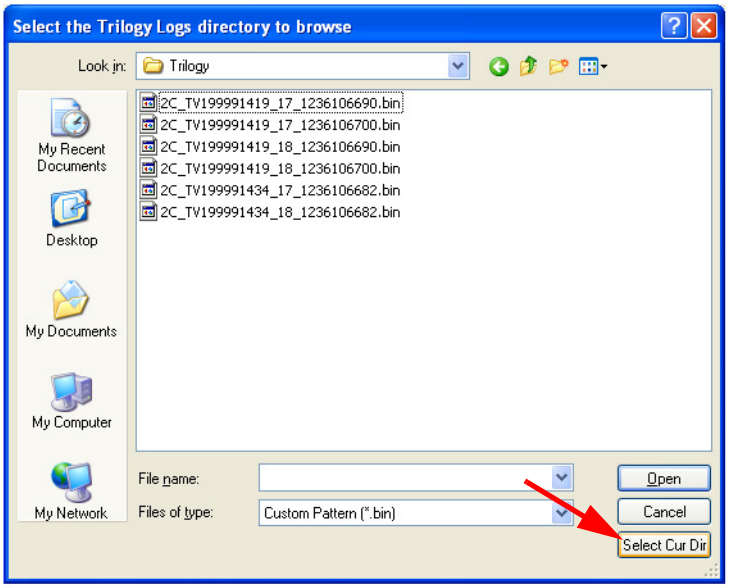
1. Insert a SD Card into the SD Card slot on the Trilogy Ventilator.
2. Press down the Audio Pause and Down Button at the same time.
3. Scroll down in the menu until you come to ‘Write Event Log to SD Card”. Select OK.
4. After write is complete, scroll back up to and select “Safely Remove SD Card”
5. Remove the SD Card from the Trilogy Ventilator.
6. Connect an SD Card Reader to your PC.
7. Place the SD Card into the SD Card reader.
8. Double click on the Trilogy Tool Box Icon.
9. Click on the BrowseUUTLogs Menu.
10. Select the location of the SD Card or PC Folder containing the Log Downloads.



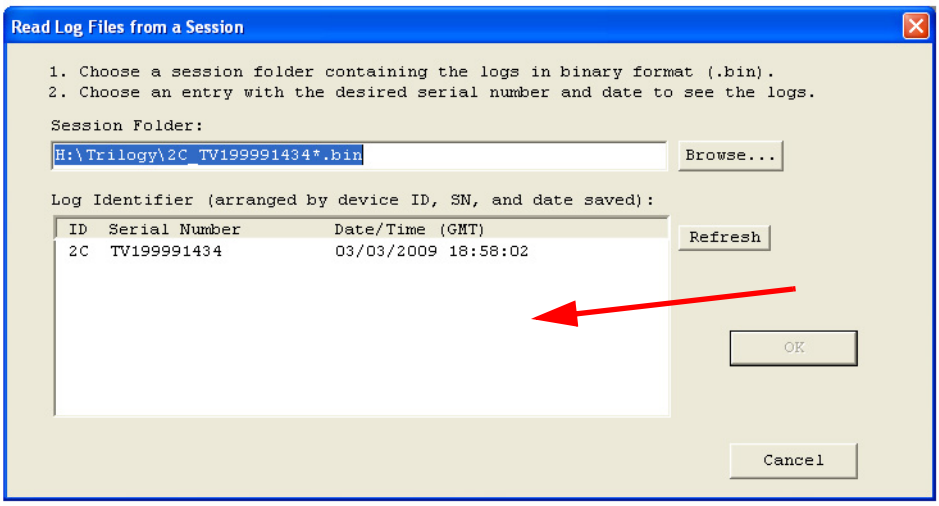
11. Select the Trilogy Folder.



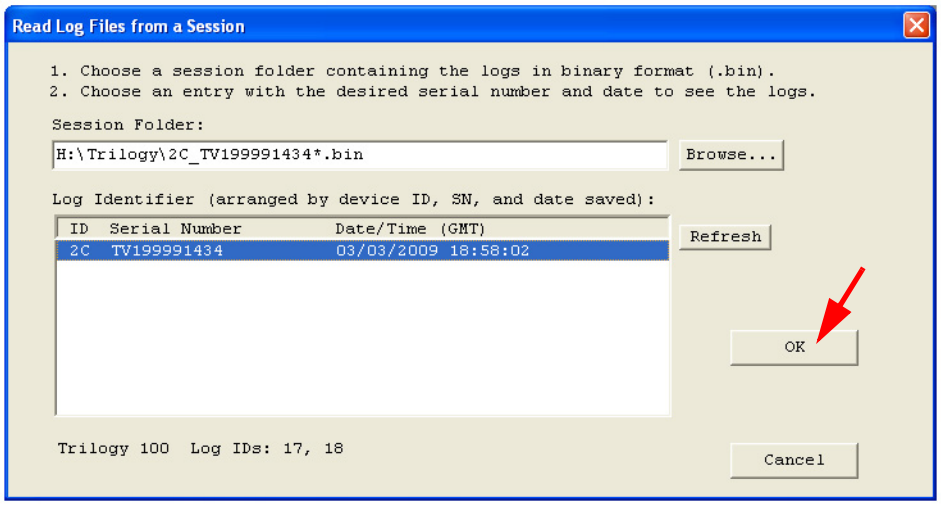
12. At the screen below, select the “Select Cur Dir” button. Do not select individual files.



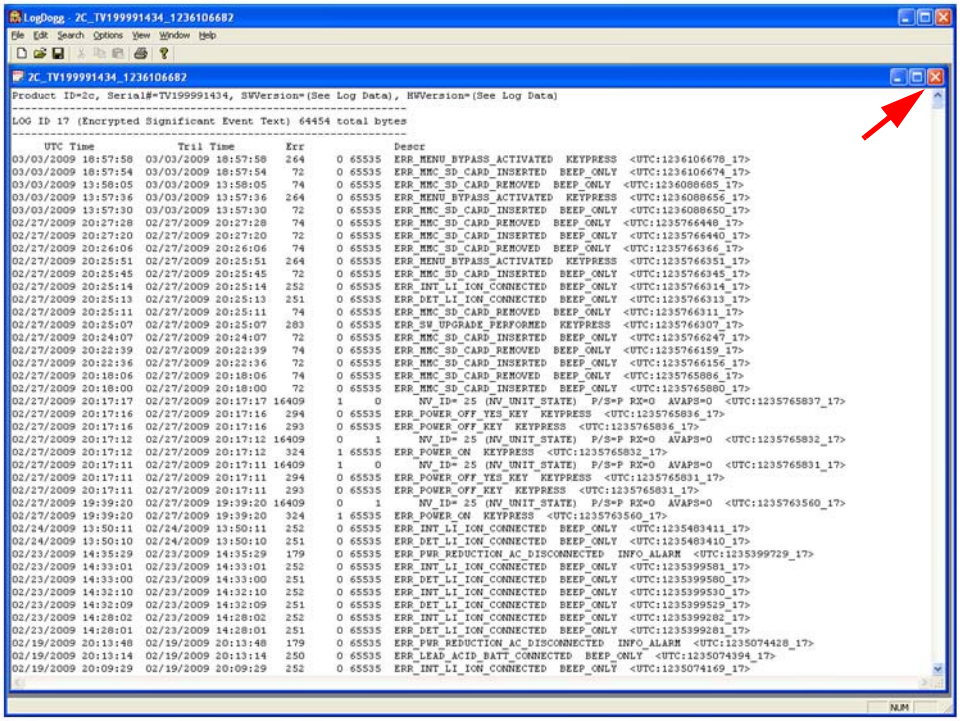
13. The UUT for which you wish to view the files, will appear in the “Log Identifier” window.



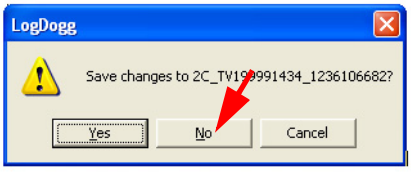
14. Select the file for the UUT you wish to view and then click on the “OK” button.



15. The encrypted files will then be displayed in the window. To close the file, select the red “X” in the top right corner of the window.



16. Select “No” to exit the program.



6.7 TRILOGY ERROR CODES AND CORRECTIVE ACTIONS

NOTE
Use the corrective action(s) listed in section 6.5 (Troubleshooting Table) before using corrective action(s) listed in the error code charts below.

6.7.1 VENTILATOR INOPERATIVE ALARM ERROR CODES

ERROR CODE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
E-009	• *Motor Capacitor not installed* • *Motor Connector not soldered properly* • *Motor Rotor Locked or other mechanical problem*	• *Check the Capacitor* • *Check Motor connector* • *Replace Motor* • *Replace System/CPU PCA*
E-014	• *Board revision resistors are not installed* • *Software is running on wrong revision of the board*	• *Load Correct Software* • *Replace System/CPU PCA*
E-021	• *Problem with serial communication between DSP and Host*	• *Replace System/CPU PCA*
E-037	• *Host CPU is constantly rebooting*	• *Reinstall Software* • *Replace System/CPU PCA*
E-071	• *Parameter Settings corrupted*	• *Replace System/CPU PCA*
E-073	• *Parameter Settings corrupted*	• *Replace System/CPU PCA*
E-076	• *Defective EEPROM*	• *Replace System/CPU PCA*
E-077	• *Defective EEPROM* • *Program Execution Error*	• *Replace System/CPU PCA*
E-090	• *Software does not support newer/older revision of Hardware* • *Board revision resistors on System/CPU PCA are setup incorrect*	• *Reinstall software* • *Replace the System/CPU PCA*
E-101	• *Program Execution Error*	• *Contact Respironics Product Support*
E-103	• *Control Flow Sensor out of electrical spec*	• *Check Tubing* • *Check Manifold* • *Replace Sensor PCA*

E-125	• *3 reboots occurred within 24 hours*	• *Examine error logs for reasons for reboots* • *Proceed accordingly*
E-141	• *Motor connector not soldered correctly* • *Motor Rotor Locked or other mechanical problem*	• *Check Bulk Capacitor* • *Check Motor connector* • *Replace Motor* • *Replace System/CPU PCA*
E-145	• *Both control and Monitoring Pressure sensors failed.* • *ADC failed*	• *Check tubing* • *Check manifold* • *Replace Sensor PCA*
E-146	• *Both control and Monitoring Pressure sensors failed.* • *ADC failed*	• *Check tubing* • *Check manifold* • *Replace Sensor PCA*
E-158	• *A serious alarm has occurred before six breaths have been taken after blower is turned on. The lack of therapy data causes back up therapy not to be initiated and the ventilator to beco me completely inoperative. The alarms that would initiate this possible scenario are: both pressure sensors failing, both pressure and flow sensors failing, a failu re of non-volatile memory, or a high pressure patient alarm*	• *None - r ecorded for informational purposes to indicate that backup therapy could not be provided for the Ventilator Inoperative condition currently active*
E-160	• *Obstructed intake* • *Obstructed flow path* • *Obstructed or disconnected pressure tubing* • *Faulty Blower*	• *Check Inlet filter / Air Path for obstruction* • *Check circuit* • *Check internal tubing* • *Replace Blower*
E-163	• *Control Flow Sensor out of electrical specification*	• *Check tubing* • *Check manifold* • *Replace Sensor PCA*

E-172	• *Unit is exceeding 60cm of delivered pressure* • *High pressure sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	• *Check the tubing for pinched or blocked tubes* • *Check the circuit for leaks* • *Check the Active Exhalation Valve functionality* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor board* • *Replace the System/CPU PCA*
E-253	• *Communication failure* • *The Host CPU is unable to communicate with the DSP*	• *Replace the System/CPU PCA*
E-323	• *When the device encounters errors while it has started to apply the Rx Setting from the SD Card, the device stops the Rx update and tries to restore back the old setting on the device. During the restoration of these old settings of the device, if there is an error this error code is generated*	• *Replace System/CPU Subassembly*
E-357	• *Control Flow Sensor out of electrical spec*	• *Check tubing* • *Check manifold* • *Replace Sensor Board PCA*
E-361	• *Assigned product ID unknown and invalid*	• *Recalibrate Unit* • *Replace System/CPU Subassembly*

6.7.2 VENTILATOR SERVICE REQUIRED ALARM ERROR CODES

ERROR CODE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
E-017	• *Big Motor Capacitor not installed or wrong value or at the end of life cycle*	• *Install or Replace Capacitor* • *Replace System/CPU PCA*
E-023	• *Internal watchdog on DSP failed*	• *Replace System/CPU PCA*
E-031	• *Problem with +3.3V_DSP* • *U23 failure* • *DSP failure*	• *Replace System/CPU PCA*
E-032	• *Faulty Sensor Board Cable* • *Faulty Sensor Board Circuitry*	• *Check Sensor Board Cable* • *Replace Sensor Board PCA* • *Replace System/CPU PCA*
E-036	• *Cpld not programmed* • *Pin 15 of U30 shorted* • *Cpld failed*	• *Replace System/CPU PCA*
E-064	• *Unit not calibrated* • *Calibration Table corrupted*	• *Recalibrate the device* • *Replace the System/CPU PCA*
E-065	• *Unit not calibrated* • *Calibration Table corrupted*	• *Recalibrate the device* • *Replace the System/CPU PCA*
E-066	• *Unit not calibrated* • *Calibration Table corrupted*	• *Recalibrate the device* • *Replace the System/CPU PCA*
E-067	• *The sensor has drifted.*	• *Replace Sensor Board PCA*
E-068	• *Error indicates a short in the Li-Ion battery discharge path on the Power Management PCA. Normally, the Host software recognizes a useable Detachable and Internal battery and attempts to disable the discharge path of the Internal Battery. Since the Internal Battery discharge path has failed shorted, current will be shared by the Internal and Detachable Battery*	• *Replace Power Management PCA*
E-069	• *The sensor has drifted.*	• *Replace Sensor Board PCA*
E-070	• *The sensor has drifted.*	• *Replace Sensor Board PCA*
E-080	• *The sensor has drifted.*	• *Replace Sensor Board PCA*

E-094	• *Barometric pressure sensor is reading maximum or minimum counts for an extended period of time*	• *Replace the Sensor Board PCA*
E-100	• *Software error* • *Bad table written by Production or Field Service Calibration*	• *Recalibrate the device* • *Replace the System/CPU PCA*
E-106	• *Speaker 1 failed or not installed*	• *Install speaker 1* • *Check connection between front panel and system board* • *Replace the Front Panel PCA* • *Replace the System/CPU PCA*
E-107	• *Speaker 2 failed or not installed*	• *Install speaker 2* • *Check connection between front panel and system board* • *Replace the Front Panel PCA* • *Replace the System/CPU PCA*
E-119	• *Battery charging is detected when there is no AC present*	• *Replace Power Management PCA*
E-130	• *The sensor has drifted.*	• *Check tubing* • *Check manifold* • *Replace the Sensor Board PCA*
E-131	• *Control pressure sensor is reading maximum or minimum counts for an extended period of time*	• *Check tubing* • *Check manifold* • *Check the Sensor Board Cable* • *Replace the Sensor PCA* • *Replace the System/CPU PCA*
E-132	• *Monitor pressure sensor is reading maximum or minimum counts for an extended period of time*	• *Check tubing* • *Check manifold* • *Check the Sensor Board Cable* • *Replace the Sensor PCA* • *Replace the System/CPU PCA*
E-133	• *Proximal pressure sensor is reading maximum or minimum counts for an extended period of time*	• *Check tubing* • *Check manifold* • *Check the Sensor Board Cable* • *Replace the Sensor PCA* • *Replace the System/CPU PCA*

E-134	• *Control flow sensor is reading maximum or minimum counts for an extended period of time*	• *Check tubing* • *Check manifold* • *Check the Sensor Board Cable* • *Replace the Sensor PCA* • *Replace the System/CPU PCA*
E-135	• *Monitor flow sensor is reading maximum or minimum counts for an extended period of time*	• *Check tubing* • *Check manifold* • *Check the Sensor Board Cable* • *Replace the Sensor PCA* • *Replace the System/CPU PCA*
E-136	• *Air stream Temperature 1 sensor is reading maximum or minimum counts for an extended period of time*	• *Check Airstream Temp Sensor connections* • *Replace Sensor* • *Replace Sensor Board* • *Replace System/CPU PCA*
E-137	• *dP Pressure Temperature sensor is reading maximum counts for an extended period of time*	• *Check dP Pressure Temp Sensor* • *Replace Sensor* • *Replace Sensor Board PCA* • *Replace System/CPU PCA*
E-138	• *Barometric Pressure sensor is reading a count outside of its valid range*	• *Replace the Sensor PCA* • *Replace the System/CPU PCA*
E-139	• *Software Error*	• *Recalibrate the device* • *Replace the System/CPU PCA*
E-143	• *Control or Monitoring Pressure sensor has drifted too far away from the other*	• *Turn off Blower and allow 30 seconds for drift processing to complete* • *Replace the Sensor PCA*
E-147	• *The sensor has drifted.*	• *Replace Sensor Board*

E-149	• *Before a drift is computed for this sensor, its auto-null valve is opened to atmosphere. A test is performed to ensure that the valve has fully opened in accordance with the time provided by the technical specification. This is performed by ensuring that the control pressure has dropped significantly enough after the valve has opened and a de-bounce time has expired. If the pressure reading before the valve was opened was not high enough (due to ventilator therapy settings) to provide a valid criteria regarding a significant drop in pressure, then the check is not performed. When this condition is in effect for a consecutive number of attempted drifts, the error is reported*	• *Replace Sensor Board* • *Replace System/CPU PCA*
E-159	• *Problem with power management board or batteries - unit would not go into Sleep when AC Power removed*	• *Replace Power Management PCA* • *Replace System/CPU PCA*
E-161	• *Internal Li-Ion has a TDA due to Discharge Overcurrent or Discharge Short Circuit* • *PMB fault* • *System Board fault* • *Internal Li-Ion fault*	• *Replace Power Management PCA* • *Replace Internal Li-Ion battery* • *Replace System/CPU PCA*
E-164	• *Monitor Flow Sensor out of electrical spec*	• *Check tubing* • *Check manifold* • *Replace Sensor Board*
E-174	• *Can't communicate with Charger Chip* • *PMB fault* • *Internal Li-Ion fault* • *Detachable Li-Ion fault*	• *Replace Power Management PCA* • *Replace Internal Li-Ion battery* • *Replace Detachable Li-Ion battery* • *Replace System/CPU PCA*
E-175	• *Can't communicate with Internal Li-Ion battery after five tries and charger is not trying to wake-up charge the battery* • *Could take up to 210 seconds for alarm to be reported because the Charger is trying to wake-up charge the Internal Li-Ion* • *PMB fault* • *Internal Li-Ion fault*	• *Replace Power Management PCA* • *Replace Internal Li-Ion battery*

E-177	• *Internal Li-Ion battery not Authentic* • *Fake battery* • *PMB fault* • *Internal Li-Ion fault*	• *Replace Internal Li-Ion battery* • *Replace Power Management PCA*
E-189	• *Detachable or Internal Li-Ion usable and V_battLi < 9 volts for greater than 10 sec indicates Li-Ion battery unable to power the System* • *PMB fault*	• *Replace Power Management PCA*
E-191	• *AFE chip does not receive the appropriate frequency on the WDI pin from the Gas Gauge chip. Both of these chips are i the Li-Ion battery pack.* • *Internal Li-Ion fault*	• *Replace Internal Li-Ion battery* • *Replace Power Management PCA*
E-193	• *Internal Li-Ion battery permanent failure*	• *Replace Internal Li-Ion battery*
E-195	• *Internal Li-Ion Battery State of Health ≤ 50%.* • *Full charge capacity (FCC) is less than 51% of the Design Capacity* • *Internal Li-Ion FCC error* • *Internal Li-Ion fault* • *Internal Li-Ion end of life*	• *Cycle the Internal Li-Ion (discharge battery so that capacity change is > 50%, then rest for > 2 hours. Charge to 100%, then rest for > 2 hours)* • *Replace Internal Li-Ion battery*
E-197	• *Internal Li-Ion not present as indicated by the Charger Chip status* • *PMB fault* • *Internal Li-Ion battery pack fault*	• *Replace Power Management PCA* • *Replace Internal Li-Ion battery*
E-199	• *Detachable Battery harness failure* • *Power Management Board Failure* • *Circuitry failure*	• *Replace Detachable Battery harness* • *Replace the Power Management PCA* • *Replace the System/CPU PCA*
E-200	• *Circuitry failure*	• *Replace the System/CPU PCA*
E-201	• *Power Management Board Failure* • *Circuitry failure*	• *Replace the Power Management PCA* • *Replace the System/CPU PCA*
E-202	• *Circuitry failure*	• *Replace the System/CPU PCA* • *Replace Interface PCA*
E-203	• *Circuitry failure*	• *Replace System/CPU PCA*

E-204	• *U3 failure* • *CPLD failure*	• *Replace System/CPU PCA*
E-205	• *Error indicates a shorted Q25, Q26 in the battery discharge path on the Power Management PCA. If either FET is shorted and AC is connected, then AC voltage will be connected to the Pb Acid battery terminals if one is connected and enabled. This may bring down the AC supply due to excessive current because the AC supply is trying to charge the PB Acid. If the AC supply folds back the unit should run properly*	• *Replace the Power Management PCA*
E-207	• *Q11 failure on Power Management PCA*	• *Replace Power Management PCA*
E-208	• *Internal Li-Ion Cycle Count exceeded ≥ 475 cycles* • *Internal Li-Ion end of life*	• *Replace Internal Li-Ion battery*
E-265	• *Checks if Li-Ion battery is present by attempting to communicate when the Charger CHip safety signal indicates the battery is not present. Safety signal from the Li-Ion may be disconnected or Charger CHip may have a fault so it is not detecting a Li-Ion battery*	• *Replace the Internal Battery* • *Replace the Power Management PCA*
E-267	• *FCC > 150% of the Li-Ion design capacity* • *Corrupted Gas Gauge*	• *Cycle the Internal Li-Ion (discharge battery so that capacity change is > 50%, then rest for > 2 hours. Charge to 100%, then rest for > 2 hours)* • *Replace Internal Li-Ion battery*
E-269	• *Error indicates an open VBULK FET. This MOSFET connects the output of the AC/DC supply to the input of the boost converter. Unit will not run on AC power. Will use battery power if available*	• *Replace Power Management PCA*
E-270	• *Error indicates an open Q11, which controls the discharge of the Li-Ion batteries post VbattLi. When the Lithium Ion power is selected, this FET is turned on. If Q11 fails open, there will be no Li-Ion battery power to the system*	• *Replace Power Management PCA*
E-271	• *Error indicates an open Q13, Q14 in the Lead Acid battery discharge path on the Power Management PCA. When Pb Acid is selected by the hardware or software, VBATTSENSE would be low. If AC is disconnected, there would be no battery backup from the Li-Ion battery*	• *Replace Power Management PCA*

E-272	• *Charger chip failure* • *FET failure*	• *Replace Power Management PCA*
E-273	• *Unit not calibrated* • *Calibration table corrupted*	• *Recalibrate the device* • *Replace the System/CPU PCA*
E-274	• *Unit not calibrated* • *Calibration table corrupted*	• *Recalibrate the device* • *Replace the System/CPU PCA*
E-290	• *One or more "Ventilator Service Required" errors are active in the system*	• *Examine the Significant Event Log error log. The first column of data contains the first error code that is causing this error message.* • *Address according to this first error code* • *Each time you address an error, cycle the motor (OFF to ON to OFF) and check the Significant Event Log again until this alarm is no longer sounded* • *Remove all power from the unit and then reapply power, then turn the motor ON to see if this message is still reported*
E-302	• *Voltage reference on internal ADC failed*	• *Replace System/CPU PCA*
E-311	• *Unit wasn't calibrated or calibration table was destroyed*	• *Recalibrate* • *Replace System/CPU PCA*
E-333	• *U24 circuitry failure* • *U26 circuitry failure*	• *Replace System/CPU PCA*
E-338	• *Unit not calibrated* • *Calibration Table corrupted*	• *Recalibrate* • *Replace System/CPU PCA*
E-340	• *CPLD stopped sending alive signal to the Host CPU*	• *Replace System/CPU PCA*
E-344	• *Failure of Oxygen Blending Module*	• *Recalibrate the device* • *Replace the Blending Module PCA*
E-345	• *Internal O_2 sensor at end of life or watchdog failure*	• *Replace OBM PCA*
E-349	• *Communication between Host and OBM was lost*	• *Replace OBM PCA* • *Replace Interface PCA*

E-356	• *Before a drift is computed for this sensor, its auto-null valve is opened to atmosphere. A test is performed to ensure that the valve has fully opened in accordance with the time provided by the technical specification*	• *Replace Sensor PCA* • *Replace System/CPU PCA*
E-358	• *Proximal Flow Sensor out of electrical spec.*	• *Check tubing* • *Check manifold* • *Replace Sensor PCA*
E-364	• *Internal Li Ion Battery Fuse Open*	• *Replace Internal Li-Ion Battery*

6.7.3 ON-SCREEN ERROR CODES

ERROR CODE	ON-SCREEN MESSAGE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
E-053	*High Vte*	• *The measured Exhaled Tidal Volume is greater than or equal to the alarm setting* • *Flow Sensor problem* • *Active exhalation valve problem*	• *Check device and circuit setup if patient circuit is available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings.* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and re-calibrate*
E-054	*Low Vte*	• *The measured Exhaled Tidal Volume is less than or equal to the alarm setting* • *High leak* • *Flow sensor problem* • *Active exhalation valve problem*	• *Check device and circuit setup if patient circuit is available* • *Check the circuit tubing for pinched or blocked tubes if patient circuit is available* • *Check the circuit for leaks if patient circuit is available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*
E-081	*Card Error*	• *Faulty SD Card*	• *Use different SD Card*
E-083	*Card Error*	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	• *Use correct MMC/SD card* • *Re-insert card* • *Replace System/CPU PCA*
E-084	*Card Error*	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	• *Use correct MMC/SD card* • *Re-insert card* • *Replace System/CPU PCA*

E-085	*Card Error*	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	• *Use correct MMC/SD card* • *Re-insert card* • *Replace System/CPU PCA*
E-086	*Card Error*	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	• *Use correct MMC/SD card* • *Re-insert card* • *Replace System/CPU PCA*
E-087	*Card Error*	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	• *Use correct MMC/SD card* • *Re-insert card* • *Replace System/CPU PCA*
E-088	*Card Error*	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	• *Use correct MMC/SD card* • *Re-insert card* • *Replace System/CPU PCA*
E-089	*Card Error*	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	• *Use correct MMC/SD card* • *Re-insert card* • *Replace System/CPU PCA*
E-093	*Keypad Stuck*	• *Key is providing reading that it has been held down for 2 minutes*	• *Check the Keypad for stuck keys* • *Replace the Front Panel PCA* • *Replace the System/CPU PCA*
E-109	*High Expiratory Pressure*	• *Unit is not reaching the exhaled pressure setting; Patient Pressure during exhalation is greater than or equal to Exhaled Pressure Setting = 5 cm for 5 seconds or more*	• *Check device and circuit setup if patient circuit available* • *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*

E-110	*Low Inspiratory Pressure*	• *Unit is not reaching the inhalation pressure setting; In CPAP, S, S/T, T, PC, and PC-SIMV modes, the lowest Patient Pressure delivered during inhalation is less than the lowest inhalation pressure - 5 cm; In CV, AC, and CIMV modes, the lowest Patient Pressure delivered during inhalation is less than the Low PIP Alarm setting* • *Low pressure sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	• *Check device and circuit setup if patient circuit available* • *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the circuit for leaks if patient circuit is available* • *Check the Active Exhalation Valve functionality, if it is attached* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*
E-111	*High Respiratory Rate*	• *The measured Breath Rate is greater than or equal to the alarm setting* • *False triggering* • *Alarm/setting mismatch* • *Spontaneous breathing above the alarm*	• *Check device and circuit setup if patient circuit available* • *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the circuit for leaks if patient circuit is available* • *Check the Active Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*

E-112	*Low Respiratory Rate*	• *The measured Breath Rate is less than or equal to the alarm setting* • *Alarm/setting mismatch* • *Spontaneous breathing below the alarm high leak*	• *Check device and circuit setup if patient circuit available* • *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the circuit for leaks if patient circuit is available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*
E-113	*High Minute Ventilation*	• *The measured Minute Ventilation is gr eater than or equal to the alarm setting* • *Alarm/setting mismatch* • *Low breath rate (leak)* • *High exhaled tidal volume (flow sensor problem, active exhalation valve problem)*	• *Check device and circuit setup if patient circuit available* • *Check the circuit for leaks if patient circuit is available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*

E-114	*Low Minute Ventilation*	• *The measured Minute Ventilation is less than or equal to the alarm setting* • *Alarm/setting mismatch* • *High leak* • *High breath rate* • *Low exhaled tidal volume (flow sensor problem)*	• *Check device and circuit setup if patient circuit available* • *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the circuit for leaks if patient circuit is available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*
E-115	*High Vti*	• *The measured inhaled tidal volume is greater than or equal to the alarm setting* • *Flow sensor problem* • *Active exhalation valve problem*	• *Check device and circuit setup if patient circuit available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*
E-116	*Low Vti*	• *The measured inhaled tidal volume is less than or equal to the alarm setting* • *High leak* • *Flow sensor problem* • *Active exhalation valve problem*	• *Check device and circuit setup if patient circuit available* • *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the circuit for leaks if patient circuit is available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the alarm settings against the therapy settings* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*

E-118	*Low Circuit Leak*	• *The leak in the system is to o small* • *Wrong circuit* • *Blocked tubes* • *Sensor problems*	• *Check device and circuit setup* • *Check the circuit tubing for pinched or blocked tubes* • *Check the circuit setting against the circuit being used* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA and recalibrate*
E-120	*Apnea*	• *Spontaneous breathing has not been detected within the alarm time* • *High leak*	• *Check device and circuit setup* • *Check the circuit tubing for pinched or blocked tubes* • *Check the circuit for leaks* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor Board PCA and recalibrate*
E-121	*Circuit Disconnect*	• *High flow condition has bee n detected* • *High leak* • *Flow Sensor problem*	• *Check device and circuit setup* • *Check the circuit tubing for pinched or blocked tubes* • *Check the circuit for leaks* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor Board PCA and recalibrate*
E-162	*Replace Detachable Battery*	• *Detachable Li-Ion has a TDA due to Discharge Overcurrent or Discharge Short Current* • *PMB fault* • *System Board fault* • *Detachable Li-Ion fault*	• *Replace Detachable Li-Ion* • *Replace Power Management PCA* • *Replace System CPU PCA*

E-165	*Low Expiratory*	• *When the Expiratory pressure is less than or equal to the EPAP/CPAP/PEEP - 5 pressure units in value for 5 seconds or more* • *Deactivated if the Att ained Expiratory Pressure > EP AP/ PEEP/CPAP - 5 pressure units*	• *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the circuit for leaks if patient circuit available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the tubing for leaks, kinks, or blockages* • *Replace the sensor board*
E-170	*High Inspiratory Pressure*	• *Unit is ex ceeding the inhalation pressure setting; IN CPAP, S, S/T, T, PC, and PC-SIMV modes, the highest Patient Pressure delivered during inhalation is gr eater than the highest inhalation pressure + 5 cm; In CV, AC, and SIMV mo des, the highest Patient Pressure delivered during inhalation is gr eater than the High PIP Alarm setting* • *High pressure Sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	• *Check the circuit tubing for pinched or blocked tubes if patient circuit available* • *Check the circuit for leaks if patient circuit available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA*
E-171	*High Inspiratory Pressure*	• *Unit is ex ceeding the inhalation pressure setting; IN CPAP, S, S/T, T, PC, and PC-SIMV modes, the highest Patient Pressure delivered during inhalation is gr eater than the highest inhalation pressure + 5 cm; In CV, AC, and SIMV mo des, the highest Patient Pressure delivered during inhalation is gr eater than the High PIP Alarm setting* • *High pressure sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	• *Check the circuit tubing for pinched of blocked tubes if patient circuit is available* • *Check the circuit for leaks if patient circuit is available* • *Check the Ac tive Exhalation Valve functionality, if it is attached* • *Check the tubing for leaks, kinks, or blockages* • *Replace the Sensor PCA*

E-173	*Start On Battery*	• *Vent was started on battery power*	• *None - recorded for informational purposes to indicate the unit was started without AC power.*
E-176	*Replace Detachable Battery*	• *Can't communicate with Detachable Li-Ion battery and charger is not trying to wake-up charge the battery. Could take up to 210 seconds for alarm to be reported because the charger is trying to wake-up charge the Detachable Li-Ion* • *PMB fault* • *Detachable Li-Ion fault*	• *Replace the Power Management PCA* • *Replace the Detachable Li-Ion*
E-178	*Replace Detachable Battery*	• *Detachable Li-Ion battery not authentic* • *Fake battery* • *PMB fault* • *Detachable Li-Ion fault*	• *Replace Detachable Li-Ion* • *Replace Power Management PCA*
E-179	*AC Power Disconnected*	• *AC was disconnected* • *PMB fault* • *AC Power Supply fault* • *Power Cord fault* • *A/D channel fault*	• *Verify AC connected* • *Replace Power Management PCA* • *Replace AC Power Supply* • *Replace System/CPU PCA*
E-180	*External Batt Disconnected*	• *Lead Acid was disconnected* • *Power Cord fault* • *PMB fault* • *A/D channel fault*	• *Connect Lead Acid* • *Verify Lead Acid Battery Cord* • *Replace Power Management PCA* • *Replace System/CPU PCA*
E-181	*Detach Batt Disconnected*	• *Detachable Li-Ion was disconnected* • *Li-Ion connector fault* • *PMB fault* • *A/D channel fault*	• *Verify Detachable Li-Ion connected* • *Replace Detachable Li-Ion cable* • *Replace Power Management PCA* • *Replace System/CPU PCA*
E-183	*Low External Battery*	• *Low battery - Lead Acid has ≤ 20 minutes run time remaining and it is last available power source*	• *Charge Lead Acid Battery* • *Replace Lead Acid Battery*

E-184	*Low Detachable Battery*	• *Low battery - Detachable Li-Ion has ≤ 20 minutes run time remaining and it is last available power source*	• *Charge Detachable Li-Ion Battery* • *Replace Detachable Li-Ion Battery*
E-185	*Low Internal Battery*	• *Low battery - Internal Li-Ion has ≤ 20 minutes run time remaining and it is last available power source*	• *Charge Internal Li-Ion Battery*
E-186	*Low External Battery*	• *Depleted battery - Lead Acid has ≤ 10 minutes run time remaining and it is last available power source*	• *Charge Lead Acid battery* • *Replace Lead Acid battery*
E-187	*Low Detachable Battery*	• *Depleted battery - Detachable Li-Ion has ≤ 10 minutes run time remaining and it is last available power source*	• *Charge Detachable Li-Ion Battery* • *Replace Detachable Li-Ion battery*
E-188	*Low Detachable Battery*	• *Depleted battery - Internal Li-Ion has ≤ 10 minutes run time remaining and it is last available power source*	• *Charge Internal Li-Ion Battery*
E-192	*Replace Detachable Battery*	• *AFE chip does not receive the appropriate frequency on the WDI pin from the Gas Gauge chip. Both of these chips are in the Li-Ion battery pack* • *Detachable Li-Ion fault*	• *Replace Detachable Li-Ion battery* • *Replace Power Management Board*
E-194	*Replace Detachable Battery*	• *Detachable Li-Ion Battery Permanent Failure*	• *Replace Detachable Li-Ion battery*
E-196	*Replace Detachable Battery*	• *Detachable Li-Ion State of Health ≤ 50%. Full Charge Capacity (FCC) is less than 51% of the design capacity* • *Detachable Li-Ion FCC error* • *Detachable Li-Ion fault* • *Detachable Li-Ion end of life*	• *Cycle the Detachable Li-Ion (discharge battery so that capacity change is > 50%, then rest for > 2 hours. Charge to 100%, then rest for > 2 hours)* • *Replace Detachable Li-Ion battery*
E-206	*Replace Detachable Battery*	• *Corruption of battery gas gauge*	• *Replace Battery* • *Cycle the Detachable Li-Ion (diecharge battery so that capacity change is > 50%, then rest for > 2 hours. Charge to 100%, then rest for > 2 hours)*

E-209	*Replace Detachable Battery*	• *Detachable Li-Ion Cycle Count ≥ 5500 cycles* • *Detachable Li-Ion end of life*	• *Replace Detachable Li-Ion Battery*
E-218	*Batt Discharge Stopped-Temp.*	• *Internal Li-Ion charge current greater than 4 Amp s for greater than 2 sec. Battery charge FET is turned off. High temperature during discharge. Battery recovers if temperature is less than 55° C.*	• *Inspect fans* • *Replace cooling fan(s)*
E-219	*Batt Discharge Stopped-Temp.*	• *Detachable Li-Ion charge current greater than 4 A mps for greater than 2 sec. Battery charge FET is turned off. High temperature during discharge. Battery recovers if temperature is less than 55° C.*	• *Inspect fans* • *Replace cooling fan(s)*
E-230	*Battery Not Charging - Temp.*	• *Internal Li-Ion temp > 45° C or < 0° C w hen charging is initiated. Resets when temp ≤ 42° C and ≥ 3° C* • *Internal Li-Ion temp > 50° C or < -2.5° C d uring charging. Resets when temp 42° C and ≥ 0.5° C* • *High/low ambient temperature* • *Cooling fan(s) fault* • *Detachable Li-Ion fault*	• *Inspect fans* • *Replace cooling fan(s)* • *Replace Internal Li-Ion*
E-231	*Battery Not Charging - Temp.*	• *Detachable Li-Ion temp > 45° C or < 0 ° C when charging is initiated. Resets when temp ≤ 42° C and ≥ 3° C* • *Detachable Li-Ion temp > 50° C or < -2.5° C during charging. Resets when temp 42° C and ≥ 0.5° C* • *High/low ambient temperature* • *Cooling fan(s) fault* • *Detachable Li-Ion fault*	• *Inspect fans* • *Replace cooling fan(s)* • *Replace Detachable Li-Ion*

E-234	*Upgrade Failed Screen*	• *Unable to op en the new software file on the card*	• *Reformat card and replace new software file on the card* • *Re-insert card, retry upgrade*
E-235	*Upgrade Failed Screen*	• *Unable to read the new software file on card* • *The new software file on the card is corrupt*	• *Reformat card and replace new software file on the card* • *Re-insert card, retry upgrade*
E-236	*Upgrade Failed Screen*	• *The user tried to u pgrade to an older version of software*	• *Reformat card and replace new software file on the card* • *Re-insert card, retry upgrade*
E-237	*Upgrade Failed Screen*	• *The user tried to upgrade to a version of software that is not intended for the Trilogy Ventilator*	• *Reformat card and replace new software file on the card* • *Re-insert card, retry upgrade*
E-238	*Upgrade Failed Screen*	• *The new software file on the card is corrupt*	• *Reformat card and replace new software file on the card* • *Re-insert card, retry upgrade*
E-239	*Upgrade Failed Screen*	• *Unable to program the new software on the Host CPU*	• *Replace System/CPU PCA*
E-240	*Upgrade Failed Screen*	• *The user tried to upgrade to a version of software that is not intended for the Trilogy Ventilator*	• *Reformat card and replace new software file on the card* • *Re-insert card, retry upgrade*
E-241	*Upgrade Failed Screen*	• *Unable to program the new software on the DSP*	• *Replace System/CPU PCA*
E-242	*Upgrade Failed Screen*	• *Unable to program the new software on the Host CPU*	• *Reformat card and replace new software file on the card.* • *Re-insert card, retry upgrade* • *Replace System/CPU PCA*
E-245	*Software stops blower and Loss of All Power sounds*	• *Last battery depleted*	• *Replace or charge the battery*
E-246	*Internal Battery Not Charging*	• *Unable to charge Internal Li-Ion battery after 30 minutes* • *PMB fault* • *Internal Li-Ion fault* • *Detachable Li-Ion fault*	• *Replace Internal Li-Ion* • *Replace Detachable li-Ion* • *Replace Power Management PCA*

E-247	*Detach Battery Not Charging*	• *Unable to charge Detachable Li-Ion battery after 30 minutes* • *PMB fault* • *Detachable Li-Ion fault* • *Internal Li-Ion fault*	• *Replace Detachable Li-Ion* • *Replace Internal Li-Ion* • *Replace Power Management PCA*
E-266	*Replace Detachable Battery*	• *Checks if Li-Ion battery is present by attemp ting to communicate when t he Charger Chip safety sign al indicates the battery is not present. Safety signal from the Li-Ion may b e disconnected or Charger Chip may have fault so it is not detecting a Li-Ion battery*	• *Replace the Power Management PCA* • *Replace Detachable Battery*
E-280	*External Battery Depleted*	• *Lead Acid was depleted*	• *Replace or charge Lead Acid*
E-281	*Detachable Battery Depleted*	• *Detachable Li-Ion was depleted*	• *Replace or Charge Detachable Li-Ion*
E-282	*Internal Battery Depleted*	• *Internal Li-Ion was depleted* • *Internal Li-Ion discharge FET off*	• *Charge Internal Li-Ion* • *Replace Internal Li-Ion*
E-283	*Upgrade Screen Complete*	• *Software upgrade completed successfully*	• *None - re corded for informational purposes to indicate that a software upgrade was completed*
E-291	*Check Circuit*	• *Patient circuit does not match Circuit Type* • *Tubing on active circuit not connected properly* • *Tubing on active circuit fell off* • *One of dual sensors failed*	• *Change circuit or Circuit Type* • *Reconnect tubing correctly* • *Reconnect tubing* • *Install correct porting block* • *Replace Sensor PCA*
E-299	*Card Error*	• *When the SD Ca rd does not have enough memory available to write EDF (3 days of Waveform and 1 year of Annotations and Detailed data) and Event Log (CSV) Files*	• *Erase unnecessary files on card.* • *Ensure card > 75 MB* • *Use new card*

E-300	*Card Error*	• *When the Card is detected as a write protected SD Card*	• *Check write pr otect switch on card* • *Use new card* • *Replace System/CPU PCA*
E-301	*Card Error*	• *Error in creating files/ directories on the SD Card*	• *Use new card* • *Replace System/CPU PCA*
E-305	*High Internal Oxygen*	• *Disconnected O_2 tubing* • *O_2 level between 25% and 35%*	• *Connect/replace O_2 tubing* • *Replace Interface PCA*
E-307	*High Temperature*	• *It could be caused by air stream temperature, motor temperature or batteries temperature*	• *Check/replace fans* • *Replace batteries* • *Replace motor* • *Replace air stream temperature sensor*
E-308	*High Temperature*	• *It could be caused by air stream temperature, motor temperature or batteries temperature*	• *Check/replace fans* • *Replace batteries* • *Replace motor* • *Replace air stream temperature sensor*
E-309	*Check External Battery*	• *Lead Acid is usea ble and current is being drawn from the Li-Ion battery* • *External Battery Cable fault* • *Faulty connection to Leak Acid battery terminals* • *PMB fault* • *A/D channel fault* • *High impedance Lead Acid battery*	• *Check connections* • *Replace External Battery Cable* • *Replace Lead Acid Battery* • *Replace Power Management PCA* • *Replace System/CPU PCA*
E-312	*Prescription Change screen displayed at time of Rx Update*	• *If usable Rx found on the SD Card for the device.*	• *None - re corded for informational purposes that the prescription was read successfully from the SD card.*
E-313	*Prescription Review screen displayed at time of Rx Update*	• *Rx from the SD Card is ready for user review*	• *None - re corded for informational purposes that the prescription was read successfully from the SD card.*

E-314	*Failed -Card is read only*	• *If the Rx is only for the current device and the card is read only*	• *Check write protect switch on card* • *Replace System/CPU PCA*
E-315	*Failed - Serial Number*	• *If the Serial Number in the Rx Card does not match the Serial Number of the device*	• *None - recorded for informational purposes that the serial number in the prescription does not match the serial number for the device.*
E-316	*Failed - Circuit Type*	• *If the circuit type in the Rx on the card does not match the Circuit Type in the device*	• *None - recorded for informational purposes that the circuit type in the prescription does not match the circuit type for the device.*
E-317	*Prescription Change Failed*	• *Failure to update the Rx due to the errors in the Rx settings*	• *None - recorded for informational purposes to indicate that the prescription had bad settings.*
E-318	*Prescription Change Complete*	• *Rx update is complete*	• *None - recorded for informational purposes to indicate that the prescription update was completed successfully.*
E-319	*Prescription Change Cancelled*	• *Rx update is cancelled by the user by either UI option or by pulling out of the card before Rx Update is complete*	• *None - recorded for informational purposes indicate that the prescription update was not completed.*
E-320	*Prescription Change Failed*	• *failure to update the Rx due to error in the file format or errors in reading the file*	• *None - recorded for informational purposes to indicate that the prescription data on the card could not be read.*
E-321	*Prescription Change failed*	• *Rx version incorrect for the device*	• *None - recorded for informational purposes to indicate that the version of the prescription data on the SD card was bad.*
E-322	*Prescription Change Failed*	• *Rx checksum is incorrect*	• *None - recorded for informational purposes to indicate that the prescription on the SD card had a bad checksum.*

E-342	*High Priority*	• *Pressure at Oxygen Blending Module inlet below 40 psi*	• *Check supply pressure* • *Check inlet pressure sensor connections* • *Replace OBM PCA*
E-343	*High Priority*	• *Pressure at Oxygen Blending Module above 87 psi*	• *Check supply pressure* • *Check inlet pressure sensor connections* • *Replace OBM PCA*
E-348	*Upgrade Failed Screen*	• *OBM did not accept new software version*	• *Reformat card and replace new software file on card* • *Re-insert card; retry upgrade*
E-351	*Low Oxygen Flow*	• *Delivered oxygen concentration less than FiO_2 set point - 10%*	• *Check supply pressure* • *Check inlet pressure sensor connections* • *Check internal flow element for leaks* • *Replace OBM Module* • *Replace OBM PCA*
E-352	*High Oxygen Flow*	• *Delivered oxygen concentration greater than FiO_2 setpoint + 10%*	• *Check inlet pressure* • *Replace OBM valve* • *Replace OBM PCA*
E-359	*High Internal Oxygen*	• *O_2 level inside OBM > 30%*	• *Connect O_2 tubing in OBM* • *Disconnect O_2 source or replace sensor in OBM*
E-360	*Low Vte*	• *The desired tidal volume cannot be delivered within the limits of the IPAP MIn and Max settings* • *High leak* • *Flow Sensor problem*	• *Check the tubing (inside and outside unit) for leaks, kinks, or blockages* • *Replace the sensor board and recalibrate*
E-362	*Low SpO_2*	• *The %SpO2 sign al received from the pulse oximete r accessory is less than t he alarm setting.*	• *Check the pulse oximeter accessory.* • *Check the Low SpO2 alarm setting against the %SpO2 signal received from the pulse oximeter accessory.*

6.7.4 LOG ONLY CODES

ERROR CODE	PROBABLE CAUSE	PROBABLE ACTION
E-015	• Hardware current limiting is not working correctly	• Replace the System/CPU PCA • Replace Motor
E-016	• Problem with power management board or batteries (if no AC present)	• Replace respective battery • Replace the Power Management Board
E-018	• Problem with DC/DC circuitry or possibly motor	• If repeatable at power up or blower off/on cycle (logs a new E-018 error each time) then replace both the Motor/Blower assembly AND replace System/CPU Subassembly & If only single logged error & not repeatable, do not replace motor or system CPU subassembly. Update software to latest revision.
E-019	• Problem with DC/DC circuitry	• If repeatable at power up or blower off/on cycle (logs a new E-019 error each time) then replace Motor & replace System/CPU Subassembly & If only single logged error & not repeatable, do not replace motor or system CPU subassembly. Update software to latest revision.
E-022	• Motor Temperature sensor failed • Problem with U37 circuitry	• Replace Motor • Replace System/CPU PCA
E-078	• Unable to read a valid time from the RTC chip	• Replace the System/CPU PCA
E-079	• The time read from the RTC does not match time on Host CPU	• Replace the System/CPU PCA
E-122	• Unable to write to Event Log	• Replace the System/CPU PCA
E-123	• Error indicates a shorted Q29 in the Li-Ion Battery discharge path on the Power Management PCA. This MOSFET prevents a low mA leak current from the Internal Battery when the discharge path is disabled by either the Host software or the hardware	• Replace the Power Management PCA
E-182	• The data is corrupted.	• Recalibrate

E-198	• *U4 circuitry failure.* • *U26 circuitry failure.* • *U40 circuitry failure.*	• *Replace System/CPU Subassembly*
E-211	• *Detachable Li Ion cell voltage less than 2.5 volts for greater than 2 sec. Battery discharge FET is turned off. Battery discharged too low. Battery recovers if cell voltage is greater than 3 volts.*	• *Charge Detachable Li Ion battery.*
E-212	• *Internal Li Ion cell voltage less than 10 volts for greater than 6 sec. Battery discharge FET is turned off. Battery discharged too low. Battery recovers if cell voltage is greater than 12 volts.*	• *Charge Internal Li Ion battery.*
E-213	• *Detachable Li Ion cell voltage less than 10 volts for greater than 6 sec. Battery discharge FET is turned off. Battery discharged too low. Battery recovers if cell voltage is greater than 12 volts.*	• *Charge Detachable Li Ion battery.*
E-220	• *Internal Li Ion battery capacity is equal to 0%. Battery discharged.*	• *Charge Internal Li Ion battery.*
E-221	• *Detachable Li Ion battery capacity is equal to 0%. Battery discharged.*	• *Charge Detachable Li Ion battery.*
E-289	• *One or more "Ventilator Service Recommended" errors are active for device equipped with software prior to version 10.4*	• *Examine the Significant Event Log error log. The first column of data contains the first error code that is cau sing this error message* • *Address according to this first error code* • *Each time you address an error, cycle the motor (OFF to ON to OFF) and check the Significant Event Log again until this alarm is no longer sounded* • *Remove all power from the unit and then reapply power, then turn the motor ON to see if this message is still reported*
E-304 (Bad)	• *Bad Voltage Level = Less than 400 mV* • *Text Displayed in LOG: The acceptable voltage range is 400 mV to 1 VDC* • *O_2 sensor failed*	• *Replace Interface PCA*

E-304 (Good)	• *Erroneous Code* • *Text Displayed in LO G: Opt.Text=O2 Sensor GOOD O2 Level: 400mV to 1V* • *Good Voltage Level = 400mV to 1V*	• *No Action Required*
E-334	• *Internal Li Ion was unsealed (programmable parameters are accessible) and was re-sealed by the software.*	• *Retest if not repeatable* • *Replace Internal Battery if error code is repeatable.*
E-335	• *Detachable Li Ion was unsealed (programmable parameters are accessible) and was re-sealed by the software.*	• *Retest if not repeatable* • *If Detachable discharge FET's are programmed off during testing with Internal battery present and functioning and DUT reboots, then replace PMB.* • *DUT power source should have switched to Internal battery but did not. This causes the software to reseal the battery on reboot and report ERR__RE_SEALED_DET_LI_ION* • *Replace Detachable Battery if error code is repeatable and programming of Discharge FETs of the Detachable Batteries was not involved.*
E-354	• *Units O2 sensor not calibrated* • *O2 Sensor Calibration Table corrupted* • ***NOTE:** E354 is expected and allowable when the O2 sensor Cal has Failed, and the Pprox, Sensor, and Device Cal Tables are Active.*	• *Recalibrate Unit.* • *Replace System/CPU Subassembly*

6.7.5 SYSTEM REBOOT CODES

ERROR CODE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
E-001	• *Bad boot flash location in DSP*	• *Replace System/CPU Subassembly*
E-002	• *Bad boot flash location in DSP*	• *Replace System/CPU Subassembly*
E-003	• *Bad boot flash location in DSP*	• *Replace System/CPU Subassembly*
E-004	• *Bad internal DSP RAM*	• *Replace System/CPU Subassembly*
E-005	• *Program Execution Error*	• *Replace System/CPU Subassembly*
E-006	• *Program Execution Error*	• *Replace System/CPU Subassembly*
E-008	• *Program Execution Error*	• *Replace System/CPU Subassembly if repeatable*
E-020	• *Problem with serial communication between DSP and Host*	• *Replace System/CPU Subassembly*
E-024	• *Program Execution Error*	• *Replace System/CPU Subassembly*
E-025	• *Program Execution Error*	• *Replace System/CPU Subassembly*
E-026	• *Program Execution Error*	• *Replace System/CPU Subassembly*
E-027	• *Program Execution Error*	• *Replace System/CPU Subassembly*
E-042	• *Corrupt software in flash* • *Corrupt software in RAM*	• *Reinstall software* • *Replace System/CPU Subassembly*
E-043	• *Defective RAM chip*	• *Replace System/CPU Subassembly*
E-058	• *Program Execution Error – executing a bad instruction*	• *Reinstall software* • *Replace System/CPU Subassembly*
E-060	• *Program Execution Error – fetching an instruction from outside of memory range*	• *Reinstall software* • *Replace System/CPU Subassembly*
E-061	• *Program Execution Error – accessing data from outside of memory range*	• *Reinstall software* • *Replace System/CPU Subassembly*
E-062	• *Program Execution Error – ARM-reserved exception for microprocessor issue*	• *Program Execution Error – ARM-reserved exception for microprocessor issue*
E-063	• *Program Execution Error – interrupt that is not used by the system was triggered.*	• *Program Execution Error – ARM-reserved exception for microprocessor issue*

E-075	• *Defective EEPROM.* • *Program Execution Error.*	• *Replace System/CPU Subassembly*
E-288	• *Program Execution Error*	• *Program Execution Error*
E-292	• *Unreliable communication with the DSP*	• *Replace System/CPU Subassembly*

6.8 TEST EQUIPMENT ERRORS

The Errors detailed in this section will display on-screen fo the PC while running the Field Service Application and will not be found in the Trilogy Device Error Log.

6.8.1 ERROR CODES: 5000 TO 5999

ERROR CODE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
5103	• *Pressure unstable*	• *Check all connections with equipment and unit and RETEST Unit*
5104	• *Flow unstable*	• *Check all connections with equipment and unit and RETEST Unit*
5105	• *Pressure Reading Failure*	• *Check all connections with equipment and unit and RETEST Unit*

6.8.2 ERROR CODES: 6000 TO 6999

ERROR CODE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
6001	• *No reply received. Communication protocol violation.* • *Can be any errors that have been generated during any RASP operation.*	• *Check all connections with equipment and unit and RETEST Unit*
6002	• *Message not accepted or interface not supported.* • *Can be any errors that have been generated during any RASP operation.*	• *Check all connections with equipment and unit and RETEST Unit*
6003	• *Time out: no message available or incomplete message. Check serial cable and power to the unit.* • *Can be any errors that have been generated during any RASP operation.*	• *Check all connections with equipment and unit and RETEST Unit*

6.8.3 ERROR CODES: 7000 TO 7999

ERROR CODE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
7100	• *Error in "Heise – Command Expected Reply.vi" Command Sent = <command>; Expected Reply = <expected reply>; Actual Reply = <actual reply received>"*	• *Check all connections with equipment and unit and RETEST Unit*
7101	• *"Heise will not zero"*	• *Check all connections with equipment and unit and RETEST Unit*
7103	• *TSI 4040: could not complete Write operation.*	• *Check all connections with TSI driver and unit and RETEST Unit*
7104	• *TSI 4000 Series: could not complete Read operation.*	• *Check all connections withTSI driver and unit and RETEST Unit*
7105	• *TSI 4000 Series: Init command must be run before using others driver's commands.*	• *Check all connections with TSI driver and unit and RETEST Unit*
7106	• *TSI 4000 Series: there is no command acknowledge returned*	• *Check all connections with TSI driver and unit and RETEST Unit*
7107	• *TSI 4000 Series: device returned an internal error*	• *Check all connections withTSI driver and unit and RETEST Unit*
7108	• *TSI 4000 Series: device returned invalid measurements*	• *Check all connections with TSI driver and unit and RETEST Unit*
7131	• *Serial Device: time out, could not complete Write operation*	• *Check all connections with Serial Device equipment and unit and RETEST Unit*
7132	• *Serial Device: time out, could not complete read operation*	• *Check all connections with Serial Device equipment and unit and RETEST Unit*
7151	• *No reply from the device*	• *Check all connections with DPI 150 differential pressure indicator driver and unit and RETEST Unit*
7152	• *Internal error*	• *Check all connections with DPI 150 differential pressure indicator driver and unit and RETEST Unit*
7153	• *Differential pressure is not stable*	• *Check all connections with DPI 150 differential pressure indicator driver and unit and RETEST Unit*

6.8.4 ERROR CODES: 8000 TO 8999

ERROR CODE	PROBABLE CAUSE	PROBABLE CORRECTIVE ACTION
8001	• *Invalid test "Pass" condition: Strings and Booleans do not have “Range” conditions.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8002	• *Invalid (unknown) test step. Check the test group and test step descriptors.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8003	• *Time out occurred because a negative flow setpoint was not achieved during Cal verification.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8004	• *Time out occurred because a positive flow setpoint was not achieved during Cal verification.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8005	• *Cal station was unable to reach one or more flow set points during negative flow calibration.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8006	• *Cal station was unable to reach one or more flow set points during positive flow calibration.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8007	• *Cal station was unable to reach one or more flow set points during air leak test.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8008	• *The UUT does not report existence of an expanded keypad.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8009	• *The capacity of the Detachable Li-Ion battery is out of the expected limits. The test can not be carried out. Replace the battery and run the test again.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8010	• *The Detachable Li-Ion Battery is depleted or not connected. Internal Li-Ion Battery can't be set in Ship Mode.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*

8011	• *EPAP must not exceed 4-25cmH2O range.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8012	• *IPAP must not exceed 4-50cmH2O range.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8013	• *Difference between IPAP and EPAP must not exceed 30cmH2O and EPAP must not be greater than IPAP.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8014	• *Invalid power supply source: HW Power Fail test requires UUT to be powered from Detachable Li-Ion battery.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8015	• *The number of cycles of the Detachable Li-Ion battery exceeds the allowable limit. Dispose this battery. Use a new appropriately charged battery and run the test again.*	• *Dispose the battery.* • *Use a new appropriately charged battery and run the test again.* • *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8016	• *Time out occurred because a pressure setpoint was not achieved in the allowed time frame during pressure calibration, pressure verification or max pressure test.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8017	• *Time out occurred because a pressure setpoint was not achieved in the allowed time frame during pressure calibration, pressure verification or max pressure test.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8018	• *Differential Pressure has not stabilized in the allowed time frame: dP Calibration cannot be carried out.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8019	• *Relative Humidity and Ambient air temperature data are not available: device calibration cannot be carried out.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8020	• *Failed to run Humidifier Simulator.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*

8021	• *Failed to run O2 Blender Simulator.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8022	• *Detachable Li-Ion Battery's FETs did not go into the requested state.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8023	• *Internal Li-Ion Battery's FETs did not go into the requested state.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8024	• *The UUT failed to accept or set active the new Charger table.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8025	• *Shop air pressure has not reached the requested pressure setpoint. O2 low flow path test or OBM O2 sensor calibration can not be carried out.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8026	• *The Trilogy Porting Block is leaking. The task can not be carried out.* • *Pneumatic circuitry* • *Sensor PCA*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit* • *Inspect / verify successive porting blocks are faulty* • *Inspect / V erify tubing of test e quipment & if needed, inside unit* • *Inspect / verify the Sensor PCA for manifold leaks*
8027	• *Zero reference flow is out of the allowable limits. Please make sure that all the hoses are connected/disconnected as instructed.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8028	• *The calculated CRC does not match the CRC in the test configuration file.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8029	• *The calculated CRC does not match the CRC in the fixture configuration file.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8030	• *Unknown Trilogy model number.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8031	• *The calculated CRC does not match the CRC in the error codes file.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8032	• *False Start Blower upon Exiting Deep Sleep.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*

8033	• *Unknown Trilogy Cal table.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8034	• *There is no UUT connected to serial port.* • *Serial cable intermittent* • *UUT stopped communicating*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit* • *Ensure Serial cable is seated properly; replace if damaged* • *Verify unit functions and communicates thru RASP; remove all power if not* • *Note- If the unit failed on the Test station for 8034 in a manner consistent with the CPU 'locking up', the System PCA should be replaced as a precaution.*
8035	• *There is no Trilogy device connected as a source of negative flow.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8036	• *OBM's air inlet plug is leaking. The OBM gasket leak test cannot be carried out.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8037	• *Time out occurred because Trilogy device could not mount the SD card.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8038	• *The calculated CRC does not match the CRC in the approved personnel file.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8039	• *Splash screen image file is empty, corrupted or not found.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8040	• *The splash screen image file's CRCs do not match the calculated ones.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8041	• *The splash screen image file does not belong to the UUT model number.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8042	• *Error occurred when setting or clearing Oxygraf analyzer.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8043	• *Unknown RASP device or invalid embedded software revision limits.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8044	• *There are unprocessed test steps. The test configuration file might be corrupted or obsolete.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*

8045	• *A mismatch between the UUT Model Number and its Serial Number (RASP ID) was detected.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8046	• *A mismatch between the UUT Serial Number and the DHR Serial Number was detected.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8047	• *A mismatch between the UUT Model Number and the DHR Model Number was detected.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8048	• *Invalid RASP device ID.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8049	• *The board manufacturer's firmware was detected. Upgrade the UUT firmware.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8050	• *The hardware platform defined by S/N and M/N does not match the one detected via HW check.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8051	• *Detachable Li-Ion Battery's FETs did not turn OFF when requested.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8052	• *Detachable Li-Ion Battery's FETs did not turn ON when requested.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8053	• *Internal Li-Ion Battery's FETs did not turn OFF when requested.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8054	• *Internal Li-Ion Battery's FETs did not turn ON when requested.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8055	• *UUT has not accepted the Device table*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8056	• *Invalid battery manufacturing date.*	• *Check all connections with equipment used for Trilogy Calibration and unit and RETEST Unit*
8057	• *One or more models were not found in the model configuration file.*	• *Uninstall and reinstall the most recent version of the Field Service Application (FSA) Software.*

8058	• *One or more models were found twice in the model configuration file.*	• *Uninstall and reinstall the most recent version of the Field Service Application (FSA) Software.*
8059	• *The model configuration file's CRC does not match the calculated one.*	• *Uninstall and reinstall the most recent version of the Field Service Application (FSA) Software.*

CHAPTER 7: MAINTENANCE

7.0 CHAPTER OVERVIEW

This chapter describes the Maintenance intervals and procedures for the Trilogy Ventilator.

7.1 ROUTINE MAINTENANCE

Routine maintenance involves periodic checking, cleaning, and/or replacing the following items as necessary:

- Air Inlet Filter
- Enclosures

7.1.1 AIR INLET FILTER

Under normal usage, you should clean the inlet filter at least once every two weeks and replace it with a new filter every six months or sooner if needed.

7.1.2 ENCLOSURES

Commensurate with hospital or homecare policies, Respironics recommends cleaning the cabinet and inspecting for damage as necessary.

7.2 PREVENTIVE MAINTENANCE

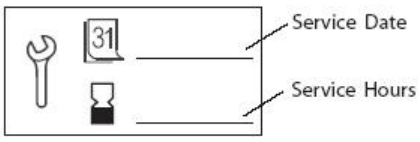
The following Preventive Service procedures will be followed by authorized service personnel at the intervals outlined in the maintenance schedule below. Preventive Maintenance must be performed by Respironics or a Respironics' trained location.

Your new Respironics Trilogy ventilator includes a PM Service Due label affixed to the bottom of your device. The Service Date line on the label is blank, which allows you to document the date when service is due. The Service Hours line will have 10000 hours recorded. Service is due every 10000 blower hours or 24 months whichever comes first depending on the usage of the device or 17,500 blower hours for blower maintenance.

During the initial install, you will need to record the date and hours (if not already written) on the blank label to maximize your in-service interval. Record the service date as 24 months from the date first placed on a patient. Record the hours as 10000 blower hours for initial usage.

The device blower hours are listed in the device software in the information menu.

A new blank label should be applied to the Trilogy Ventilator after the 10000 hours or 24 months maintenance and after the 17,500 Blower Maintenance has been performed. The label should be completed according to the table below with the new next maintenance due blower hours and new next maintenance due date (should be 24 months from date of completed Maintenance) before returning the ventilator.



WHEN TO COMPLETE	LABEL INFORMATION	LABEL COMPLETED BY
First ever product use	• *Record 10000 on the bottom line and 24 months from date of install on the top line.*	• *Trilogy Dealer*
After first 10000 hours / 24 months maintenance completion	• *Record 17,500 on the bottom line and add date 24 months from 10000 / 24 months maintenance completion date. For example if the maintenance was completed on 01/01/2012 (MM/DD/YYYY) the date recorded on the top line should be 1/1/2014 (MM/DD/YYYY).*	• *Service Technician*
After first 17,500 blower maintenance completion	• *Record 27,500 on the bottom line and add date 24 months from blower maintenance completion date. For example if the maintenance was completed on 01/01/2012 (MM/DD/YYYY) the date recorded on the top line should be 01/01/2014 (MM/DD/YYYY).*	• *Service Technician*
After second 10000 hours / 24 months maintenance completion	• *Record 35,000 on the bottom line and add date 24 months from 10000 hours / 24 months maintenance completion date. For example if the maintenance was completed on 01/01/2012 (MM/DD/YYYY) the date recorded on the top line should be 01/01/2014 (MM/DD/YYYY).*	• *Service Technician*
After second 17,500 blower maintenance completion	• *Record 45,000 on the bottom line and add date 24 months from blower maintenance completion date. For example if the maintenance was completed on 01/01/2012 (MM/DD/YYYY) the date recorded on the top line should be 01/01/2014 (MM/DD/YYYY).*	• *Service Technician*

NOTES

NOTE 1: *The hours used above may vary based on the return. If the device is returned for blower maintenance and there were 19,000 blower hours recorded the next maintenance due hours should be recorded as 29,000.*

NOTE 2: *After the initial 10000 hours or 24 months Maintenance has been performed, if a device is returned the second time using the date interval and it has not reached the blower maintenance interval perform the 10000 hours / 24 months maintenance again and the label should be completed to show the due date for the Blower Maintenance again.*

For example - Service completes the 10000 hours / 24 months Maintenance on 01/01/2012 (MM/DD/YYYY), they complete the Preventive Maintenance to show 17,500 as the Maintenance due hours and 1/1/2014 for the Maintenance due date. On 01/01/2014 (MM/DD/YYYY) the device was returned for Maintenance as the label states and there are only 12,000 hours recorded on the blower. At this point you may contact the customer to see if they would like the blower maintenance performed early.

If they decide to have the blower maintenance performed complete the maintenance and record 22,000 on the bottom line for the next maintenance due hours and 1/1/2016 on the top line for the next maintenance due date.

If they decide to not have the blower maintenance performed perform the 10000 hours / 24 months maintenance and once completed record 17,500 on the bottom line for next maintenance due hours and 1/1/2014 on the top line for the next maintenance due date.

7.2.1 TRILOGY RECOMMENDED MAINTENANCE SCHEDULE

TIME / HOURS OF SERVICE	RECOMMENDED MAINTENANCE
Prior to initial use on a patient	• *Charge Internal and Detachable Batteries to 100% capacity by plugging ventilator into an AC power source for up to 8 hours* • *Perform System Checkout Procedure per Trilogy Clinical Manual*
Prior to long term storage after initial use	• *Charge both Internal and Detachable batteries to 100% capacity prior to storage.*
While in storage after initial connection to AC Power, every 3 months	• *Recharge internal and detachable batteries to 100% capacity by plugging ventilator into an AC power source. Batteries should recharge in 8 hours or less.*
If in use, every two weeks	• *Inspect and clean air inlet filter*
If in use, every 6 months	• *Replace air inlet filter* • *Inspect enclosures and external connections for damage and contact Respironics service if necessary* • *Inspect power cord for damage and replace if necessary.*
Every 10000 hours or 24 Months, whichever comes first	• *Refer to appropriate section below.*
Every 17,500 hours	• *Refer to appropriate section below.*

7.2.2 10000 HOURS OR 24 MONTHS (WHICHEVER COMES FIRST) MAINTENANCE ITEMS

ITEM	ACTION
Blower Hours/Date of Maintenance	*Record the blower hours and maintenance date.*
Lithium Ion Battery Cycle Count Limit	*Check the Cycle Count on the Detachable and Internal Batteries. Procedure listed below.* *The service technician has the ability to access the number of cycles that both the Detachable and Internal batteries have gone through. The Internal Battery has the capacity to reach 475 cycles and the Detachable Battery has the capacity to reach 500 cycles before the battery life is exhausted. Respironics recommends checking the cycle count of both batteries during the annual preventive maintenance. By viewing and recording the cycle count the service technician will be able to determine if the batteries need to be replaced based on the number of cycles accumulated since the last annual preventive maintenance that was performed on the Trilogy. Below is an example of how the technician may determine if the batteries need replaced.* *Internal Battery Cycle Capacity: 475 cycles* *Internal Battery Cycles Used: 125 cycles* *Internal Battery Cycles remaining: 350 cycles* *Detachable Battery Cycle Capacity: 500 cycles* *Detachable Battery Cycles Used: 125 cycles* *Detachable Battery Cycles remaining: 375 cycles* *This example shows that the Trilogy Internal Battery and Detachable Battery went through 125 cycles from the last annual preventive maintenance leaving 375 cycles for the Detachable Battery and 350 cycles for the Internal Battery. By using this method, the service technician can assume that the batteries will have enough cycles remaining until the next annual preventive maintenance is performed.* *Respironics recommends that you replace the Detachable and Internal batteries when they have logged 400 or greater cycles.*
Replace Inlet Filter (RI p/n 1035443)	*Replace the Inlet Filter.*
Outer Enclosure	*Clean the Outer Enclosure.*
SD Card Interface	*Inspect the Door Hinge and foam. Inspect the Latch/Release mechanism.*
Connectors	*Verify the integrity of connectors on the rear of the unit, including the AC cord retainer.*

ITEM	ACTION
Porting Blocks	*Check O-Rings around the porting blocks for cracks, wear, or incorrect fit. Lubricate or replace the porting block as necessary.*
Detachable Battery (if present)	*Verify the latch and guide mechanism is intact and functional. Compare the capacity LEDs on the Detachable Battery Pack to the Detachable Battery Icon on the User Interface. The Charge levels should be within 1 level of each other.*
Handle	*Verify the Handle is free of defects. Check O-Rings around the handle for cracks, wear, or incorrect fit. Lubricate or replace as necessary.*
Rubber Feet	*Verify that all of the Rubber Feet are present.*
Power Cord	*Inspect the power Cord for any cracks/cuts.*
Perform Field Service Application (FSA) PM Test Procedure or Performance Verification (PV) Tool	*Preform the Field Service Application PM Test Procedure[a] or the Performance Verification Tool[b].*

[a] If the unit fails the Field Service Application PM Test Procedure refer to the Troubleshooting Chapter of this service manual to determine the corrective action that needs taken. If the corrective action required the device to be repaired, perform the Field Service Application Repair Test. If the corrective action did not require the device to be opened, re-run the PM Test.

[b] If the unit fails the PV tool, return the device to an authorized Service Facility for troubleshooting and/or repair.

7.2.3 17, 500 BLOWER MAINTENANCE ITEMS

ITEM	ACTION
Blower Hours/Date of Maintenance	*Record the blower hours and maintenance date.*
Blower Assembly (RI p/n 1054951)	*Replace the Blower Assembly with a new Blower Assembly.*
Lithium Ion Battery Cycle Count Limit	*Check the Cycle Count on the Detachable and Internal Batteries. Procedure listed below.* *The service technician has the ability to access the number of cycles that both the Detachable and Internal batteries have gone through. The Internal Battery has the capacity to reach 475 cycles and the Detachable Battery has the capacity to reach 500 cycles before the battery life is exhausted. Respironics recommends checking the cycle count of both batteries during the annual preventive maintenance. By viewing and recording the cycle count the service technician will be able to determine if the batteries need to be replaced based on the number of cycles accumulated since the last annual preventive maintenance that was performed on the Trilogy. Below is an example of how the technician may determine if the batteries need replaced.* *Internal Battery Cycle Capacity: 475 cycles* *Internal Battery Cycles Used: 125 cycles* *Internal Battery Cycles remaining: 350 cycles* *Detachable Battery Cycle Capacity: 500 cycles* *Detachable Battery Cycles Used: 125 cycles* *Detachable Battery Cycles remaining: 375 cycles* *This example shows that the Trilogy Internal Battery and Detachable Battery went through 125 cycles from the last annual preventive maintenance leaving 375 cycles for the Detachable Battery and 350 cycles for the Internal Battery. By using this method, the service technician can assume that the batteries will have enough cycles remaining until the next annual preventive maintenance is performed.* *Respironics recommends that you replace the Detachable and Internal batteries when they have logged 400 or greater cycles.*
Replace Inlet Filter (RI p/n 1035443)	*Replace the Inlet Filter.*
Outer Enclosure	*Clean the Outer Enclosure.*
SD Card Interface	*Inspect the Door Hinge and foam. Inspect the Latch/Release mechanism.*

ITEM	ACTION
Connectors	*Verify the integrity of connectors on the rear of the unit, including the AC cord retainer.*
Porting Blocks	*Check O-Rings around the porting blocks for cracks, wear, or incorrect fit. Lubricate or replace the porting block as necessary.*
Detachable Battery (if present)	*Verify the latch and guide mechanism is intact and functional. Compare the capacity LEDs on the Detachable Battery Pack to the Detachable Battery Icon on the User Interface. The Charge levels should be within 1 level of each other.*
Handle	*Verify the Handle is free of defects. Check O-Rings around the handle for cracks, wear, or incorrect fit. Lubricate or replace as necessary.*
Rubber Feet	*Verify that all of the Rubber Feet are present.*
Power Cord	*Inspect the power Cord for any cracks/cuts.*
Cables and Internal Tubing	*Remove the Bottom Enclosure and verify the integrity of cable connectors and internal tubing.*
Cleaning	*Remove the Bottom Enclosure and vacuum out the bottom of the unit using an Anti-static vacuum.*
*Perform the Field Service (FSA) Application Repair Test**	*Once the Blower Assembly has been replaced preform the Field Service Application Repair Test*.*
** If the unit fails the Field Service Application Repair Test refer to the Troubleshooting section of this service manual to determine the corrective action that needs taken. Once the corrective action has been performed run the FSA Repair Test..*	

7.3 TRILOGY VENTILATOR MAINTENANCE RECORD

MODEL NUMBER	SERIAL NUMBER

DATE PURCHASED	BLOWER HOURS

BLOWER ASSEMBLY *(Date Replaced)*	INLET FILTER *(Date Replaced)*

INTERNAL BATTERY CYCLE COUNT LIMIT *(Cycles Remaining)*	DETACHABLE BATTERY CYCLE COUNT LIMIT *(Cycles Remaining)*

7.4 PERFORMANCE VERIFICATION (PV) TOOL

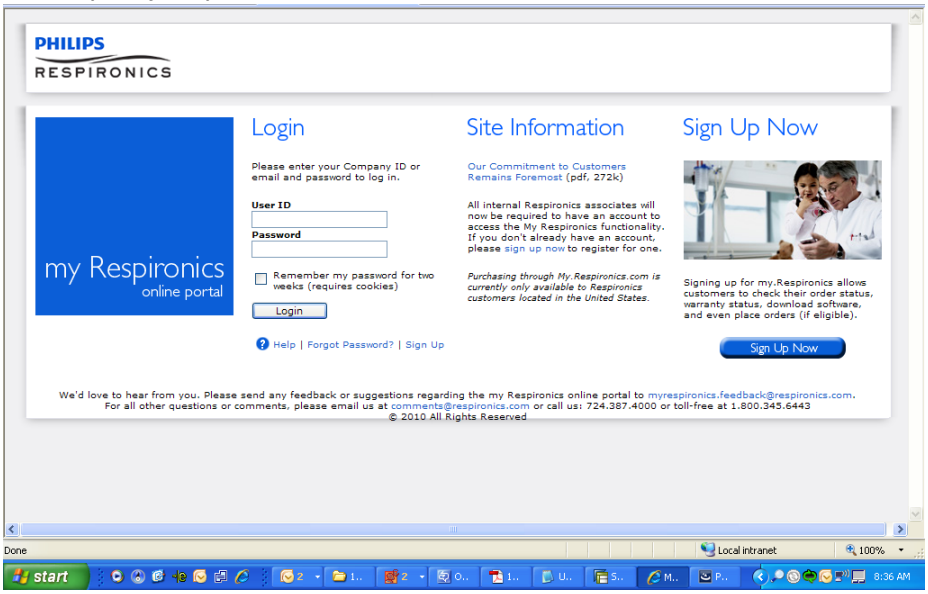
The Performance Verification (PV) Tool software will provide the trained user the ability to verify the essential performance and safety of the Trilogy unit under test (UUT).

7.4.1 DOWNLOADING THE PV TOOL

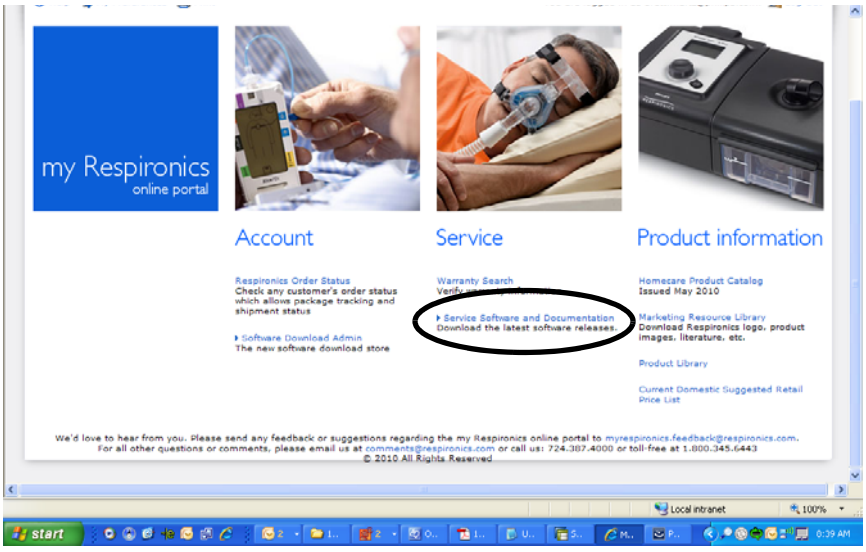
You must be a registered user to download the PV Tool. To become a registered user, you must successfully complete the Trilogy PV Tool Service Training class and the registration process listed on the website.

Once you have access to download the software, perform the following:

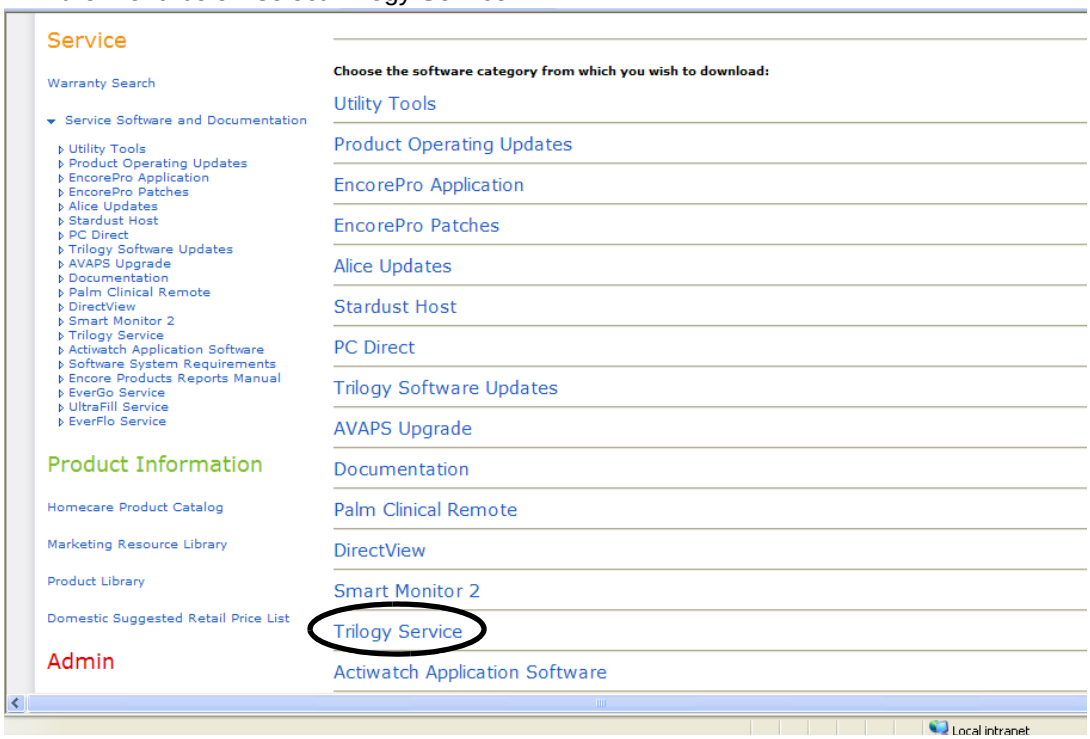
1. Log into http://my.respironics.com.



2. Click on the Service Software and Documentation link.



3. In the menu below select Trilogy Service.

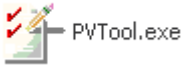


4. Click on the Download button adjacent to the PV Tool software.
5. When you click on the Download button, the “Run or Save?” window will appear.
6. Click on Save to download the software and save it to a specific location on your PC.
7. Follow the on-screen prompts to “Save” the software.
8. After download is complete, open folder where file was saved.
9. Double click the install file to install the application onto your computer.
10. Follow the on-screen prompts to complete the installation.
11. You must restart your computer after this installation. Once the computer restarts there will be a new icon on the desktop screen of the computer.

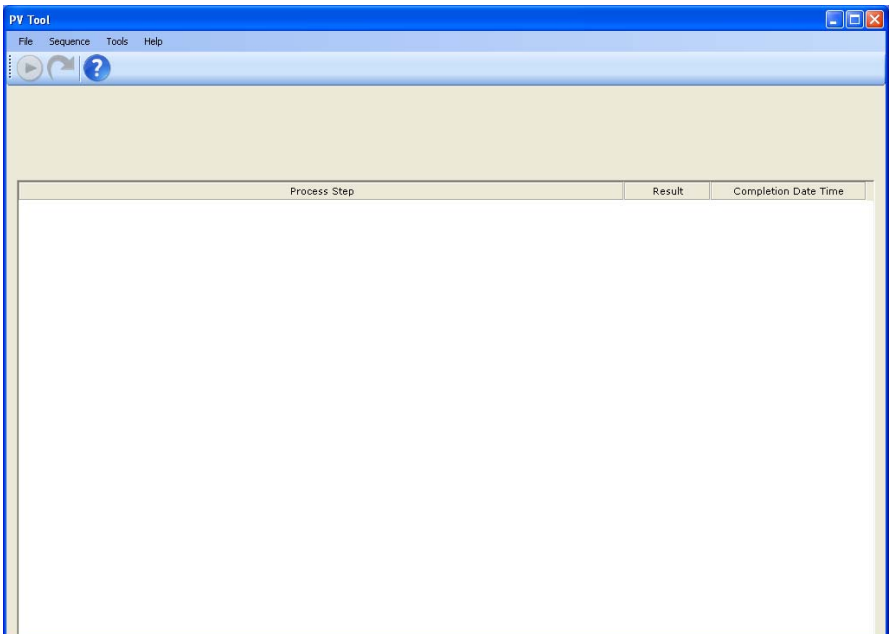
7.4.2 OPENING THE PV TOOL

This section describes how to access the PV Tool after it is installed on your PC along with detailing the Menus and Options that the PV Tool offers.

1. To access the PV Tool, either select the icon from the desktop if you have created one, or select “Start --> All Programs -->Respironics -->Performance Verification Tool”.



2. The following screen will appear.



7.4.3 GETTING STARTED

After the user double-click on the Performance Verification Tool desktop icon or selects the Performance Verification Tool option from the Windows Start Menu, the main window appears. The Main window consists of:

- Menu Bar
- Tool Bar
- Overview Panel

MENU BAR

The Menu bar at the top of the screen contains four items:

- File
- Sequence
- Tools
- Help

File Pull-Down Menu

The file pull- down menu contains the following items:

MENU ITEM	DESCRIPTION
New	*Allows the user to begin a new test. The user should select the product they would like to test and then select the open button to open the test program sequence.*
Open	*Allows the user to access completed tests.*

MENU ITEM	DESCRIPTION
Print	*Allows the user to print completed test data sheets. The print option is only available for completed tests.*
Exit	*Allows the user to exit the PV Tool Program.*

Sequence Pull-Down Menu

The sequence pull-down menu contains the following items:

MENU ITEM	DESCRIPTION
Run	*Allows the user to begin a test. The user may also use the Run Icon instead of this menu option.*
Resume	*Allows the user to resume a paused test. The user may also use the Resume Icon instead of this menu option*

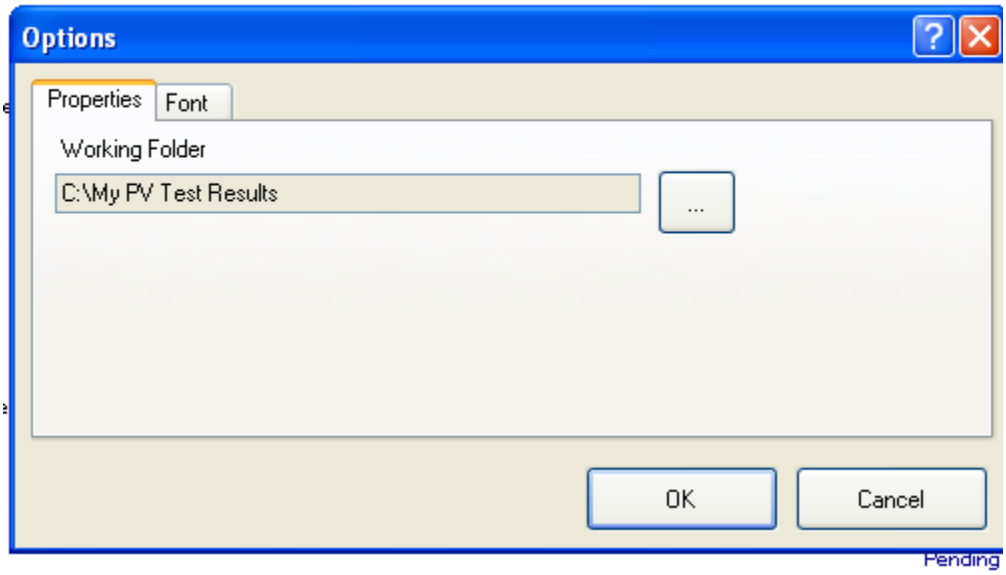
Tools Pull-Down Menu

The tools pull-down menu contains the following items:

MENU ITEM	DESCRIPTION
Options	*Displays an Options screen, which allows the user to modify his/her working folder or modify font type and size.*
RASP	*The reset device function allows the user to return the UUT to its original mode in the case that there was an interruption or hang up in the previous test which left the UUT in a non-responsive state.*

Options Window

The options pop-up window is show below.



Changing the Properties

Under the Properties tab, the user can change the folder location where the saved test files are stored.

1. To change the Working Folder where the test files are saved, click on the button to the right of the field to browse to a new location.
2. Select the new folder where the user wants the files to be saved, and click the OK button to return to the Properties tab. The user must select a valid location in the file system.

Changing Font

Under the Font tab, the user can select the font and size the user would like the PV Tool to display.

Help Pull-Down Menu

The help pull-down menu contains the items:

MENU ITEM	DESCRIPTION
PV Tool Help	*Displays the Performance Verification instructions for use.*
About...	*Displays the name and software version of the application, as well a s copyright, legal, and licensing notices.*

TOOL BAR

The options on the tool bar are enabled or disabled on the current test state.

ITEM	DESCRIPTION
	*Select this icon to run the test.*
	*Select this icon to resume a test.*
	*Select this icon to read attached help files.*
	*Select this icon to pause a test.*
	*Select this icon to reject a test.*

OVERVIEW PANEL

The Overview Panel on the Main window displays the test sequence along with session information once a test has been selected.

7.4.4 RUNNING THE TRILOGY PV TOOL

REQUIRED EQUIPMENT

- Computer (Minimum requirements):
  - 400MHZ Processor
  - 256MB RAM
  - 500MB Hard Disk Space
  - CDROM Drive
  - RS-232 Port or USB Port with RS-232 Adapter
  - Windows Pointing Device (Mouse)
  - Video,16-bit color, 800 x 600 Resolution
  - Monitor capable of displaying 16-bit color, 800 x 600 resolution
  - Printer (Optional)

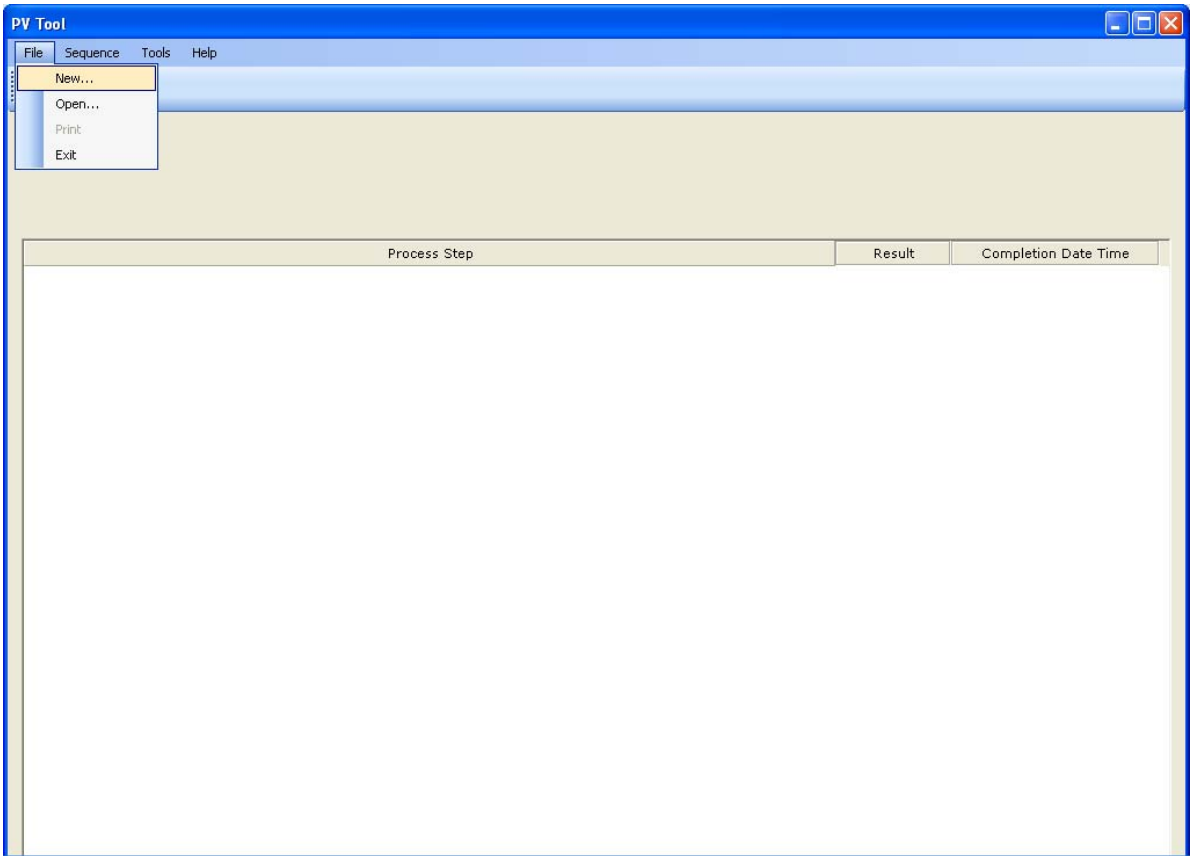
- Operating Systems supported: Windows XP (SP3), Windows Vista (32 and 64 bit), Windows 7 (32 and 64 bit)

- Flow Measurement Device
  - Recommended – TSI Certifier FA Plus Test System (Includes – tubing, additional pick-off port, and filter) – Respironics Part Number 1040310 or any device that meets the following requirements: Capable of measuring Flow 0 – 200 SLPM in external patient tubing with an accuracy of +/- 2% of reading or 0.1slpm, whichever is greater. Flow Measurement Device must display readings in SLPM to a minimum resolution of one decimal point.
- Pressure Measurement Device
  - Recommended – TSI Certifier FA Plus Test System (Includes – tubing, additional pick-off port, and filter) – Respironics PN 1040310 or any device that meets the following requirements: Capable of measuring pressure 0 – 80 cmH_2O in external patient tubing with an accuracy of +/- 0.3 cmH_2O. Pressure Measurement Device must display readings in cmH_2O to a minimum resolution of one decimal point.
- Atmospheric Pressure Measurement Device
  - Recommended – TSI Certifier FA Plus Test System (Includes – tubing, additional pick-off port, and filter) – Respironics PN 1040310 or any device that meets the following requirements: Capable of measuring atmospheric pressure 374.9 – 890 mmHg (14.76 – 35 in Hg) with an accuracy of +/- 7.62 mmHg (0.3 in Hg). Atmospheric Pressure Measurement Device must display atmospheric pressure readings in mmHg with a minimum resolution of two decimal points.
- Temperature Measurement Device
  - Recommended – TSI Certifier FA Plus Test System (Includes – tubing, additional pick-off port, and filter) – Respironics PN 1040310 or any device that meets the following requirements: Capable of measuring air temperature 0 – 50 degrees C in external patient tubing with an accuracy of +/- 1 degree C. Temperature Measurement Device must display air temperature in C with a minimum resolution of one degree C.
- Resistance Measurement Device
  - Recommended – Fluke 87 – V (Includes test leads) – Respironics PN 1071681 or any device that meets the following requirements: Capable of measuring resistance 0 – 10 Mohms with an accuracy of 1% of measured range. Resistance Measurement Device must display resistance measurement in ohms with a minimum resolution of one decimal point.
- Additional Required Test Equipment when using Recommended Measurement Devices
  - Trilogy Nurse Call Adapter Cable (Respironics Part Number 1045290 [2.5mm Nurse Call] or Part Number 1080249 [RJ9 Nurse Call] or 1080250 [RJ9 to 2.5mm Adapter for use with Part Number 1045290])
  - Trilogy Device to PC Data Cable (Respironics Part Number 1046972)
  - SD Card (for loading Trilogy software) or any 1 or 2 Gig SD Card (Respironics Part Number 1051801)
  - Test Orifice, .25” ID (Respironics Part Number 332353)
  - Outlet Port (Respironics Part Number 312710)
  - Whisper Swivel II (Respironics Part Number 332113)
  - Exhalation Porting Block, Active w/PAP (Respironics Part Number 1054670)
  - Smoothbore Tubing; 6ft (Respironics Part Number 622038)

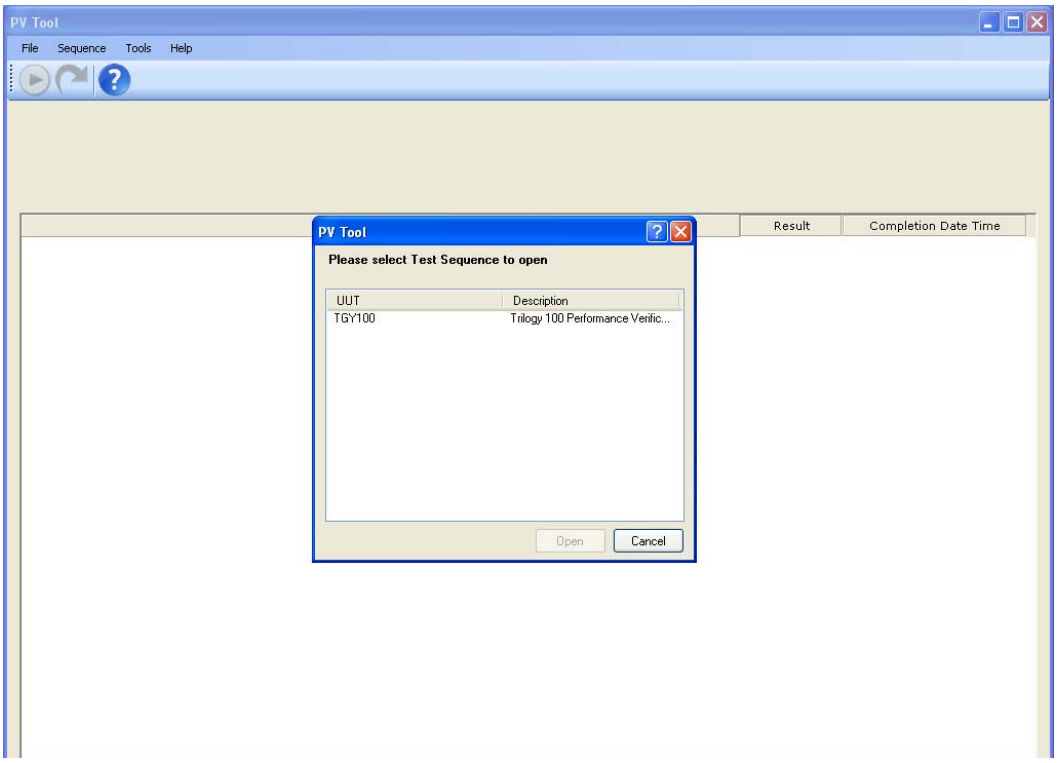
- 3/16” ID Tubing connect Prox pressure to outlet port (Local Supplier or Respironics Part Number 1060747 (Test hardware Kit))
- 1/8” ID Tubing to connect circuit pressure to pressure measurement device (Local Supplier or Respironics Part Number 1060747 Test hardware Kit)
- Auto DC Battery Cable (Respironics Part Number 1067424)
- Trilogy Detachable Battery (Respironics Part Number 1043570)
- Portable Battery Pack (14.4AH) (Respironics Part Number 1028869) or Deep-Cycle Marine Battery (Local Supplier) or DC Power Source capable of providing 15 VDC and 24 Amps DC (Respironics Part Number 1071678)

PROCEDURE

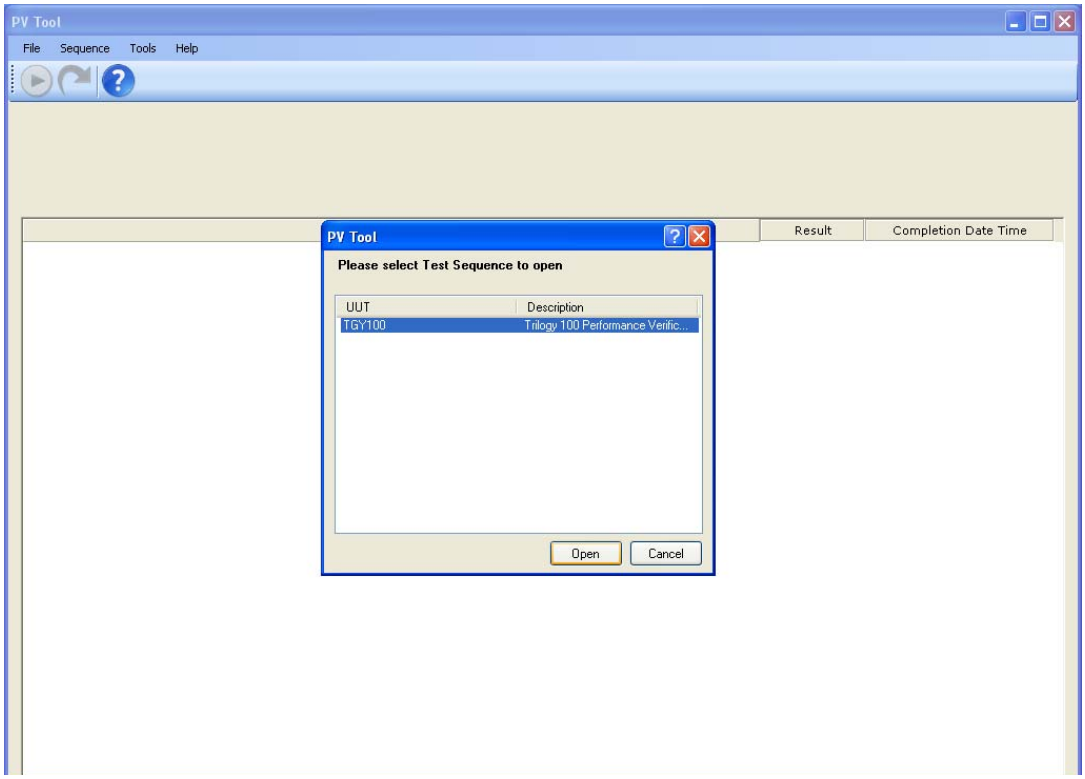
1. From the main menu, click on File.
2. Click on New.



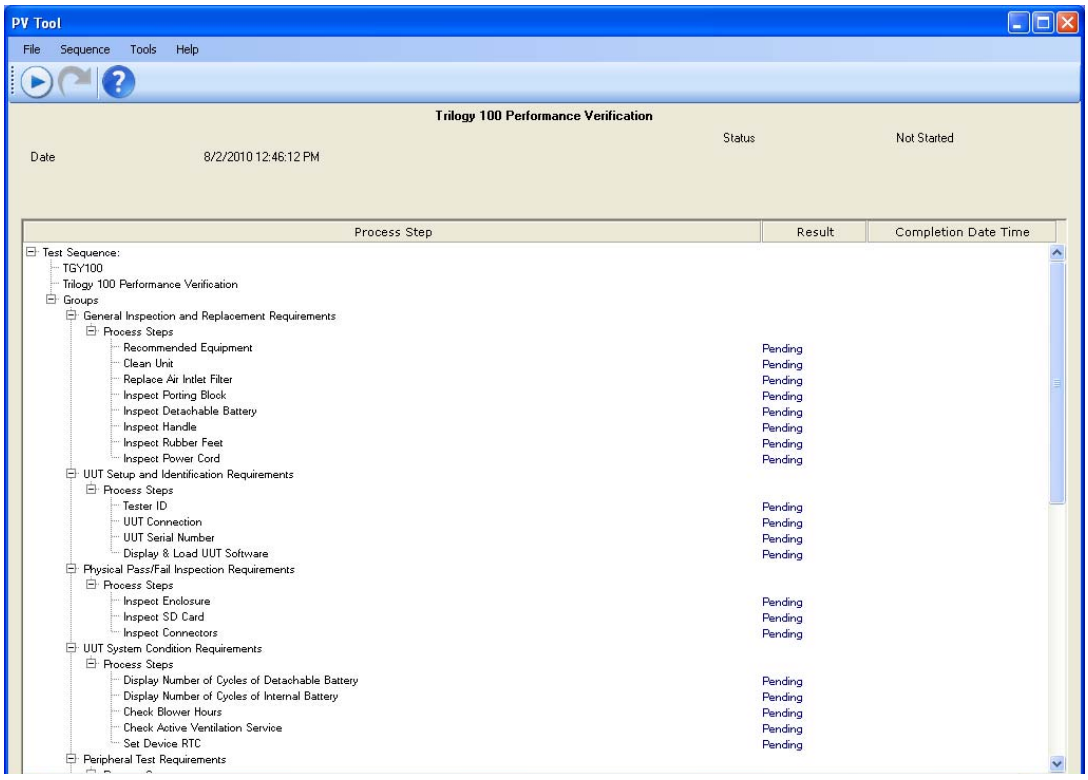
3. The following screen will appear.



4. Click on the test you want to run and select Open.



5. The following screen will appear.



6. To begin the test either select run from the file menu or click the run icon.
7. Using the on-screen prompts and associated help files complete the PV.
8. At the end of a successful or failed test a test report will be generated for you to sign and keep with your records. A soft copy of the test report will also be saved to your hard drive.

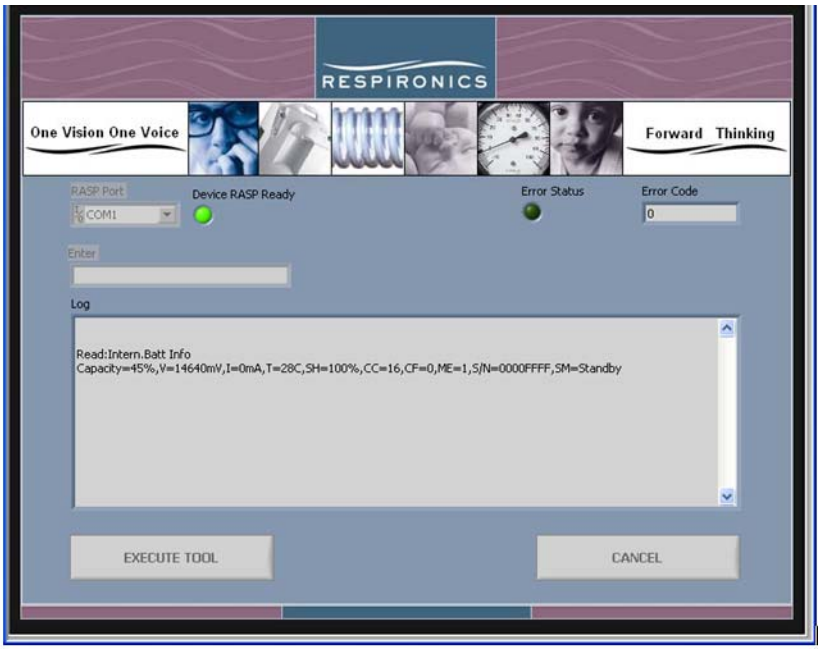
7.5 CHECKING THE INTERNAL BATTERY AND DETACHABLE BATTERY CYCLE COUNTS

1. Double click on the Trilogy Tool Box Icon.

NOTE

If the Trilogy Toolbox software is not downloaded to your computer, refer to the Testing Chapter of this manual for download instructions.

2. Select Read from the Menu Bar.
3. Select either Detach.Batt info (Detachable Battery) or Inter.Batt info (Internal battery) depending on which battery you would like to read the cycle counts for.
4. Once selected the battery information will display in the Log window. The screen abbreviations are as follows:
   - **Capacity –** Battery capacity displayed as a percentage.
   - **V –** Battery Voltage displayed in millivolts.
   - **I –** Battery Current displayed in miliamps
   - **T –** Battery Temperature displayed in Celsius.
   - **SH –** State of Health displayed as a percentage.
   - **CC –** Battery Cycle Count displayed as a number between 0 and 500.
   - **CF –** Condition Flag displayed as a 1 or 0.
   - **ME –** Max Error displayed as a percentage.
   - **S/N –** Battery Serial Number displayed as a number.
   - **SM –** Ship Mode displays either Standby or Success.



7.6 INTERNAL BATTERY CONDITIONING PROCEDURE

Respironics recommends replacement of the Internal Battery when the battery reaches 400 or more cycles. If the Internal Battery is not replaced and the Cycle Count is greater than 400 or the Max Error is greater than 25% then the following procedure must be performed to ensure it is still functioning properly.

1. Remove the Detachable Battery.
2. Set the device to the following therapy settings:
   - T mode
   - IPAP = 34 pressure units
   - EPAP = 4 pressure units
   - BPM = 10
   - Rise Time = 1
   - Inspiratory Time = 1 second
3. Connect AC, turn on Ventilator and charge battery to 100% capacity. Battery is fully charged when the Lightning bolt charge indicator is not displayed.
4. Disconnect AC and allow battery to discharge until Ventilator turns off.
5. Allow battery to rest for a minimum of 5.5 hours. Do not connect AC power and do not attempt to turn the Ventilator on.
6. Connect AC power and allow the Internal Battery to charge to 100%. Battery is fully charged when the Lightning bolt charge indicator is not displayed.
7. Allow battery to rest for minimum 2.5 hours. Do not disconnect AC power during this time.
8. Open the Trilogy Toolbox software and read the Internal Battery State of Health and MaxError using the Tool Box. Refer to Section 7.5 for more instructions.

NOTE

If the Trilogy Toolbox software is not downloaded to your computer, proceed to the Testing Chapter of this manual for download instructions.

9. The Internal Battery must have a State of Health $\geq$ 60% and MaxError =1%. If the Internal Battery does not meet the pass criteria it must be replaced.

7.7 CLEANING AND DISINFECTION PROCEDURES

7.7.1 CLEANING THE VENTILATOR

The ventilator's exterior surface and the exterior of the detachable battery pack (if using) should be cleaned before and after each patient use, and more often if needed.

WARNING

To avoid electrical shock, always unplug the power cord from the wall outlet or external battery before cleaning.

CAUTION

- *Do not immerse the device in liquid or allow any liquid to enter the enclosure, inlet filter, or any opening. This may result in equipment damage.*
- *Do not use harsh detergents, abrasive cleaners, or brushes to clean the ventilator system. Use only the cleaning agents and methods described below.*

1. Unplug the device and clean the front panel and exterior of the enclosure as needed using a clean cloth dampened with any of the following cleaning agents:
   - Water
   - Soapy water or a mild detergent
   - Hydrogen Peroxide (3%)
   - Isopropyl Alcohol (91%)
   - 10% bleach solution (10% bleach, 90% water)
2. Do not allow any liquid to drip into the ventilator case or detachable battery pack. After cleaning, use a soft, dry cloth to remove any residual cleaner. Use extra care when cleaning the display. Abrasive cleaners can scratch the display.
3. Allow the device to dry completely before plugging in the power cord.

7.7.2 CLEANING AND REPLACING THE AIR INLET FILTER

CAUTION

- *Operating the device with a dirty filter may prevent the system from working properly and may damage the device.*
- *A dirty inlet filter may cause high operating temperatures that may affect device performance. Examine the inlet filter for integrity and cleanliness before each use. When the filter becomes dirty, it must be replaced to ensure normal device operation.*

Under normal usage, you should clean the grey foam filter at least once every two weeks and replace it with a new filter every six months or sooner if needed.

1. If the device is operating, stop the airflow by pressing the On/Off button. Disconnect the device from the power source.
2. Remove the filter from the enclosure by gently squeezing the filter in the center and pulling it away from the device.
3. Examine the filter for cleanliness and integrity.
4. Wash the gray foam filter in warm water with a mild detergent. Rinse thoroughly to remove all detergent residue. Allow the filter to air dry completely before reinstalling it. If the foam filter is torn or damaged, replace it. (Only Respironics-supplied filters should be used as replacement filters.)

CAUTION

Never install a wet filter into the device. It is recommended that you clean the filter in the morning and alternate using the two foam filters provided with the system to ensure sufficient drying time for the cleaned filter.

5. Reinstall a dry filter.

7.8 REQUIRED & RECOMMENDED RETROFIT PARTS

The items listed in this section are either required or recommended to be retrofitted into the Trilogy devices during the next service interval, including PM.

7.8.1 AC INLET RETROFIT

For any Trilogy unit returned to a Trilogy Authorized service location, with a serial number before TVX10052632 (see note) will have a redesigned AC Inlet Connector installed.

NOTE

The "X" in the serial number above is representative of the model number in all serial numbers for the different Trilogy units (T100, T200, etc). Although important, this number has no bearing on the build date. Any unit build date identified by its serial number beyond the year 2010, month 05, day 26 and the 32nd unit built that day will have the redesigned AC Inlet Connector.

ACTION REQUIRED

Inspect the AC Inlet Connector for physical damage and to determine if the device is equipped with the original design AC Inlet Connector. If the device is equipped with the original design AC Inlet Connector, replace it with the redesigned AC Inlet Connector. If it is determined that the AC Inlet Connector needs to be replaced it must be replaced by a Respironics Trilogy Authorized Service Center. Follow the procedures in the Repair & Replacement section of this manual.

7.8.2 BOTTOM ENCLOSURE AND INTERFACE PCA RETROFIT

When a device is returned for service, and after troubleshooting it is determined that an old style Interface PCA and/or Bottom Enclosure need replaced the old style parts will be replaced using the new kits that contain the new style Interface PCA and Bottom Enclosure.

Replacement of the old style parts to the new style parts will only be done when it is determined that the component needs replaced. Replacement of the old style parts is not to be done during routine maintenance unless during testing it is determined that the Interface PCA or Bottom Enclosure needs replaced.

ACTION REQUIRED

When it is determined that a Bottom Enclosure or Interface PCA needs replaced the following steps should be followed.

1. Determine if the device has the old style Bottom Enclosure or Interface PCA.
2. If the old style bottom enclosure is present then the device contains the old style Interface PCA. If the device contains the old style items, both the Bottom Enclosure and Interface PCA need replaced.
3. If the device contains the new style Bottom Enclosure and Interface PCA then only the faulty component is to be replaced.
4. Obtain the proper repair kits as detailed in the Repair Kits Affected Parts Section.
5. If the device had the new style Bottom Enclosure and Interface PCA installed a Customer Letter (Contained in Part Number 1084497) and RJ to 2.5 mm Adapter cable (Contained in Part Number 1080250) should be returned with the serviced device.

AFFECTED PARTS

The numbers below should be used when placing orders for Bottom Enclosure and Interface PCA repair kits. The old part numbers are no longer order able from Respironics.

NEW PART NUMBER	DESCRIPTION	OLD PART NUMBER	DESCRIPTION
1084499	RP-Trilogy Base Enclosure-INT	1045295	RP-Trilogy Base Enclosure-INT
1084500	RP-Trilogy Base Enclosure-DOM	1061269	RP-Trilogy Base Enclosure-DOM
1084501	RP-Trilogy Base Enclosure-JAPAN	1061268	RP-Trilogy Base Enclosure-JAPAN
1084502	RP-Trilogy O2 Bottom Enclosure	1070258	RP-Trilogy O2 Bottom Enclosure
1084503	RP-Trilogy LA Bottom Enclosure	1070256	RP-Trilogy LA Bottom Enclosure
1084504	RP-Trilogy 202 International Bottom Enclosure	1075638	RP-Trilogy 202 International Bottom Enclosure
1084505	RP-Trilogy 202 Bottom Enclosure Kit-DOM	1075608	RP-Trilogy 202 Bottom Enclosure Kit-DOM
1084485	RP-Trilogy Interface PCA Kit	1045297	RP-Trilogy Interface PCA Kit
1084497	Trilogy Bottom Enclosure Replacement Letter		
1080250	RJ9 to 2.5mm 3" Female Adapter Cable		

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CHAPTER 8: REPAIR & REPLACEMENT

8.0 CHAPTER OVERVIEW

This chapter illustrates the replaceable components for the Trilogy Ventilators. Procedures for replacing the components are also provided in this chapter.

NOTE

Refer to the Testing Section for required testing after component replacement.

NOTE

Refer to the Repair Kits Section for proper repair kit identification.

WARNING

- *To prevent electrical shock, disconnect the electrical supply before attempting to make any repairs to the Trilogy Ventilators.*

CAUTION

- *Electronic components used in this device are subject to damage from static electricity. Repairs made to this device must be performed only in an antistatic, ESD-protected environment.*
- *During all repair and replacement procedures, ensure that any connections that are broken during the process (fittings, tubing, and hoses) are reconnected securely.*
- *When using a leak detector, be careful that it does not come in contact with any electrical components.*
- *Using the Trilogy Toolbox Application, place the unit in "Ship Mode" prior to any disassembly of the unit. Otherwise, ensure that the Internal Battery connection is the first to be disconnected and last to be reconnected during re-assembly.*

8.1 EXTERNAL COMPONENT REMOVAL/INSTALLATION

8.1.1 DETACHABLE BATTERY PACK REPLACEMENT

FIGURE 8-1: DETACHABLE BATTERY PACK REMOVAL/INSTALLATION

Removal

1. Lift the black handle and remove the Detachable Battery Pack from the ventilator using the pull tab.

Installation

1. With the pull tab on the Detachable Battery Pack oriented at the top, place the black tab into the slot located on the bottom of the Detachable Battery compartment and push the detachable battery pack into place.

8.1.2 INLET FILTER REPLACEMENT

Removal

1. Grasp the Inlet Filter and remove it from the Inlet Air Path Assembly (Trilogy 100 & Trilogy 200) or from the Oxygen Blending Module (Trilogy O_2 & Trilogy 202).

Installation

1. Place the Inlet Filter into the slot on the Inlet Air Path Assembly (Trilogy 100 & Trilogy 200) or the slot on the Oxygen Blending Module (Trilogy O_2 & Trilogy 202).

8.1.3 INLET AIR PATH ASSEMBLY REPLACEMENT (TRILOGY 100 & TRILOGY 200 ONLY)

Removal

1. Remove the four screws securing the Inlet Air Path Assembly to the ventilator.

FIGURE 8-2: AIR PATH ASSEMBLY SCREW LOCATIONS

2. Pull the Inlet Air Path Assembly up and away from the ventilator.

Installation

1. Place the Inlet Air Path Assembly into place on the ventilator.
2. Ensure the Air Path Foam is properly in place (Gray (foam) side down).
3. Secure the Inlet Air Path Assembly to the ventilator, tightening the four screws to 8 in-lbs.

8.1.4 OXYGEN BLENDING MODULE REPLACEMENT

Removal

1. Remove the four screws securing the Inlet Air Path Assembly to the ventilator.
2. Remove the Oxygen Blending Module tube from the port on the Rear Enclosure.
3. Remove the four pin connector from the slot on the Rear Enclosure.
4. Remove the Grommet from the hole in the Rear Enclosure.
5. Remove the Oxygen Blending Module from the Rear Enclosure.

Installation

1. Connect the four pin connector to the slot on the Rear Enclosure, and seat grommet into opening, verifying no wires are pinched.
2. Connect the Oxygen Blending Module tube to the port on the Rear Enclosure, verifying the tube is routed over top of the green tube.
3. Seat the Oxygen Blending Module onto the Rear Enclosure.
4. Secure the Oxygen Blending Module to the Rear Enclosure with four screws, tightening to 8 in-lbs.

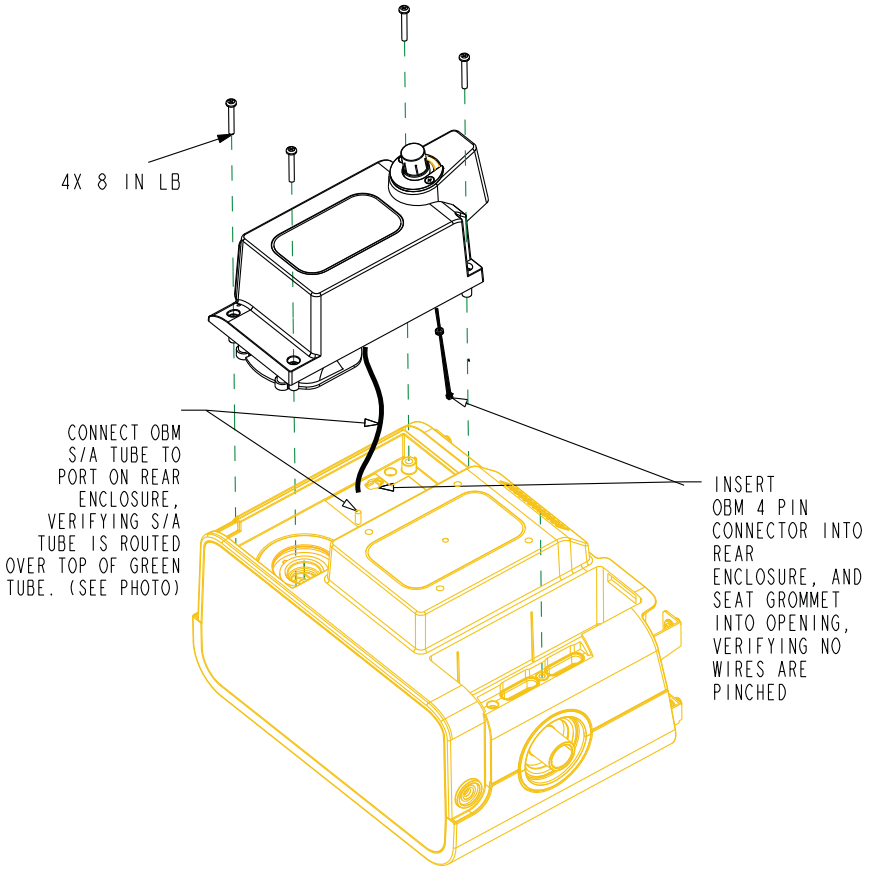


FIGURE 8-3: OXYGEN BLENDING MODULE REMOVAL/INSTALLATION

8.1.5 AIR PATH FOAM REPLACEMENT

FIGURE 8-4: AIR PATH FOAM REMOVAL/INSTALLATION

Removal

1. Remove the Inlet Air Path Assembly or Oxygen Blending Module. Refer to the Inlet Air Path Assembly Section or Oxygen Module Assembly Section for more details.
2. Remove the Air Path Foam from the ventilator.

Installation

1. Place the Air Path Foam into the ventilator. Ensure that the grey (foam) side is facing down.
2. Install the Inlet Air Path Assembly or Oxygen Blending Module. Refer to the Inlet Air Path Assembly Section or Oxygen Module Assembly Section for more details.

8.1.6 ACTIVE/PASSIVE PORTING BLOCK REPLACEMENT

Removal

1. Remove the screw securing the Active/Passive Porting Block to the ventilator.

2. Lift the Active/Passive Porting Block straight up away from the ventilator.

Installation

1. Push the Active/Passive Porting Block into place.
2. Secure the Active/Passive Porting Block to the ventilator using one screw.

8.1.7 HANDLE REPLACEMENT

Removal

1. Remove the two 1/8” Hex screws securing the handle to the ventilator.

FIGURE 8-5: SCREW REMOVAL (REPEAT FOR OTHER SIDE)

2. Remove the Handle from the Ventilator.
3. Remove the two handle o-rings from the ventilator.

Installation

1. Insert the two handle o-rings in the ventilator.
2. Secure the handle to the ventilator by tightening the two 1/8” Hex screws to 8 in-lbs.

8.2 FRONT/REAR/BOTTOM ENCLOSURE REMOVAL

CAUTION

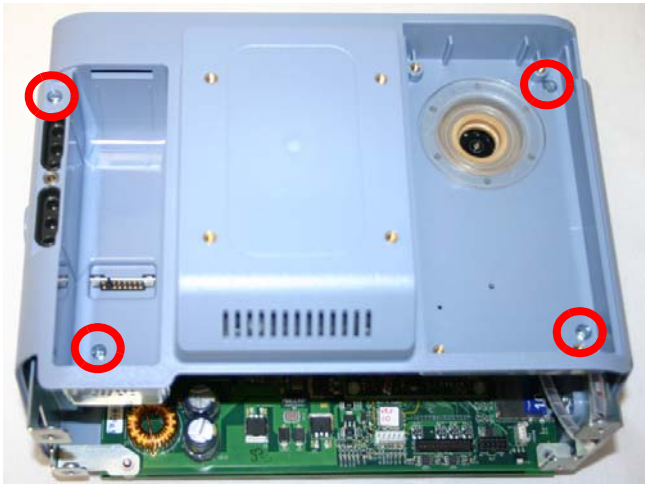
Circuitry is powered if the Internal battery is connected.

1. Remove the Detachable Battery Pack. Refer to the Detachable Battery Pack Replacement Section for more details.
2. Remove the Inlet Air Path Assembly or Oxygen Blending Module. Refer to the Inlet Air Path Assembly Section or Oxygen Blending Module Section for more details.
3. Remove the Air Path Foam. Refer to the Oxygen Blending Module Replacement Section for more details.
4. Remove the Active/Passive Porting Block. Refer to the Active/Passive Porting Block Replacement Section for more details.
5. Remove the Handle. Refer to the Handle Replacement Section for more details.
6. Lay the Trilogy on its top to expose the Bottom Enclosure.
7. Remove the four screws securing the Bottom Enclosure to the Trilogy.

FIGURE 8-6: BOTTOM ENCLOSURE SCREW LOCATIONS

8. With the LCD facing you lift up the Bottom Enclosure and remove the Alarm connections from Speaker 1 and Speaker 2 on the Front Panel Board.
9. Lay the ventilator LCD side down on a protected surface.
10. **IMPORTANT TO BE DISCONNECTED FIRST:** Remove the Internal Battery Cable from J2 on the Power Management Board.
11. Remove the OBM wire harness from J7 on the Interface PCA (Trilogy O_2 and Trilogy 202 Only).
12. Remove the DC Battery Cable from J4 on the Power Management Board.
13. Remove the oxygen tube from the Exhalation Control Module.
14. Remove the Ethernet Cable from J19 on the System Board.
15. Remove the Interface Cable from J7 on the System Board.
16. Remove the AC Connector from J1 on the Power Supply Board.
17. Remove the Battery Fan Cable from J18 on the System Board.
18. Remove the Capacitor wires from J6 on the System Board.

19. Slide the Bottom Enclosure away from the Front and Rear Enclosures. Proceed to the Bottom Enclosure Assembly Component Removal/Installation section for instructions on how to remove/ install the Bottom Enclosure Assembly components.
20. Remove the four screws securing the Front and Rear Enclosures together.

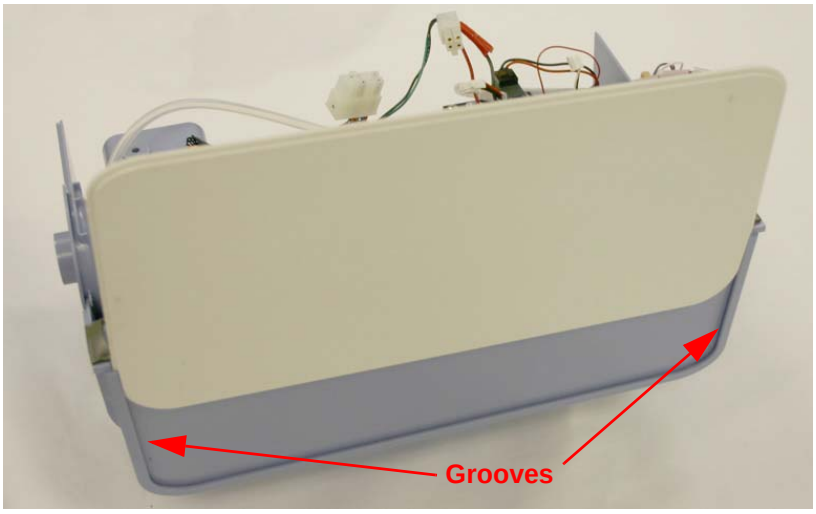


21. While holding the enclosures together place the Trilogy on its top so the opening is facing up.
22. Gently slide the Front and Rear Enclosures apart.
23. Remove the Sensor Cable from J4 on the Sensor Board.
24. Remove the Blower Cable from J5 on the System Board.
25. Remove the Blower Fan Cable from J17 on the System Board.
26. Remove the tape securing the Exhalation Control wires to the metal support.
27. Remove the Exhalation Control Module wires from J10 on the System Board.
28. Remove the Exhaust Fan wires from J1 on the System Board.
29. Remove the Detachable Battery Cable from J1 and J3 on the Power Management Board.
30. Cut the two tie wraps securing the Blower wires to the plastic support bracket.
31. Slide the Front and Rear Enclosures Apart.
32. Remove the Top Plate from the device.
33. The Front and Rear Enclosure are now disconnected. Proceed to the Front or Rear Enclosure Assembly Component Removal/Installation sections for instructions on how to remove/install the Assembly components. Also, Refer to the Oxygen Blending Module Components Section for instructions on how to remove/install the Oxygen Blending Module components.

8.2.1 TOP PLATE REMOVAL

Removal

1. Disconnect the Front, Rear, and Bottom Assemblies. Refer to the Front/Rear/Bottom Enclosure Removal Section for more details.
2. Slide the Top Plate out of the groves in the top of the Front or Rear Assemblies.



Installation

1. Slide the Top Plate into the groves in the top of the Front or Rear Assemblies.
2. Install the Front, Rear, and Bottom Assemblies. Refer to the Front/Rear/Bottom Enclosure Installation Section for more details.

8.3 BOTTOM ENCLOSURE ASSEMBLY COMPONENT REMOVAL/INSTALLATION

	COMPONENT NAME	CONTAINED IN
1.	Battery Fan Cover	1045171
2.	Battery Fan	1045180
3.	Capacitor	1045302
4.	Internal Battery	1055806 / 1055957
5.	Interface PCA	1045297
6.	Speaker	1045311
7.	Speaker Hold-Down	1045301
8.	Base Enclosure Assembly	1045295 / 1061268 / 1061269 1070256
9.	Oxygen Connector	1045298
10.	DC Power Connector	1045300
11.	AC Power Connector	1045299

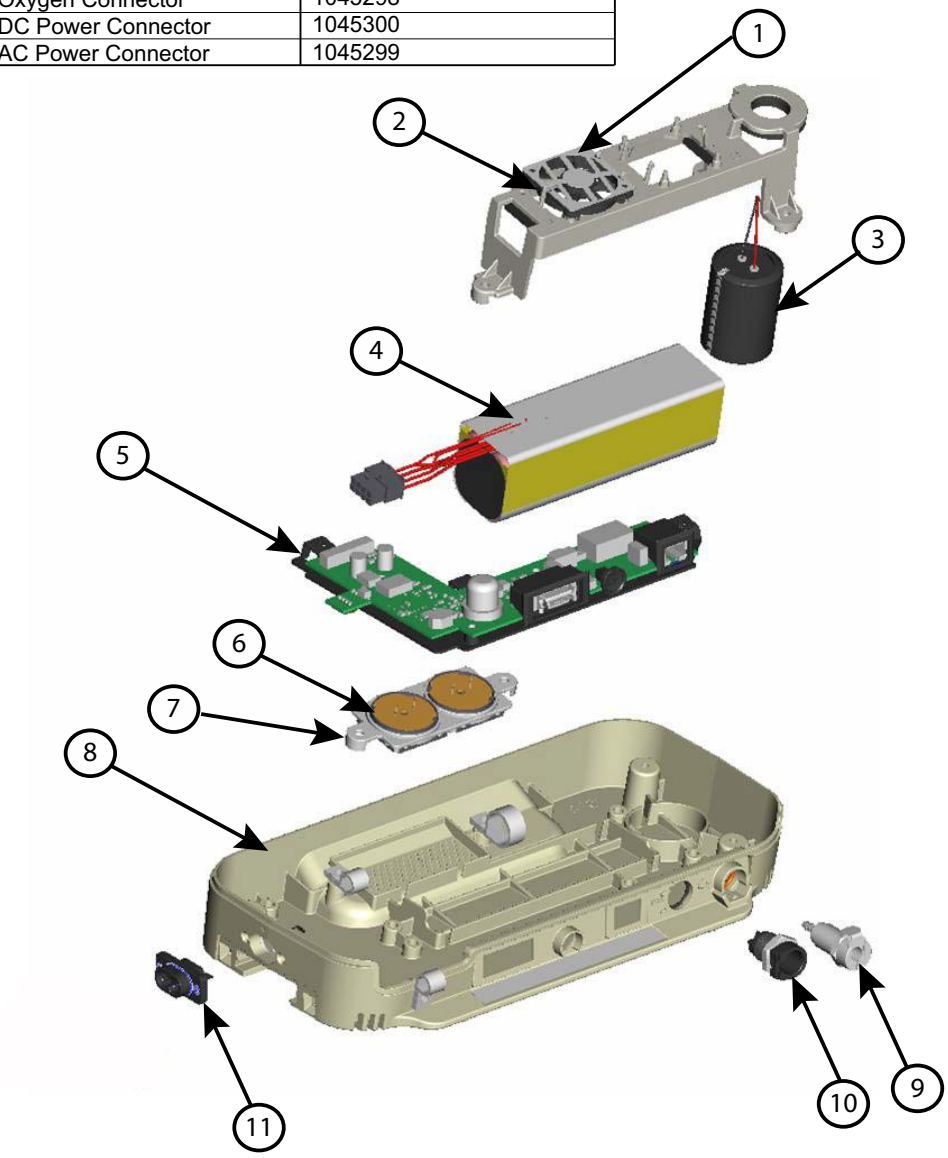


FIGURE 8-7: BOTTOM ENCLOSURE ASSEMBLY

8.3.1 AC POWER CONNECTOR REPLACEMENT

Removal

1. Using a small phillips screwdriver and a 1/4” wrench, remove the two screws securing the AC Connector to the Bottom Enclosure. Discard the old screws and locking nuts if new screws and locking nuts are provided in your RP Kit.

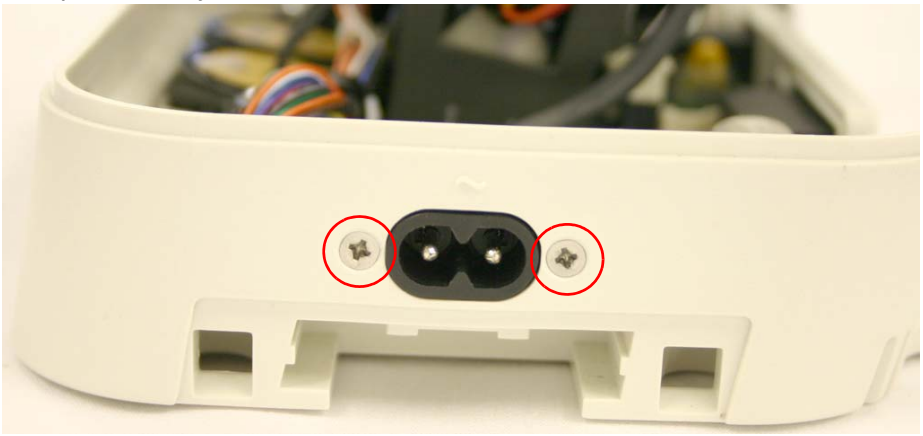


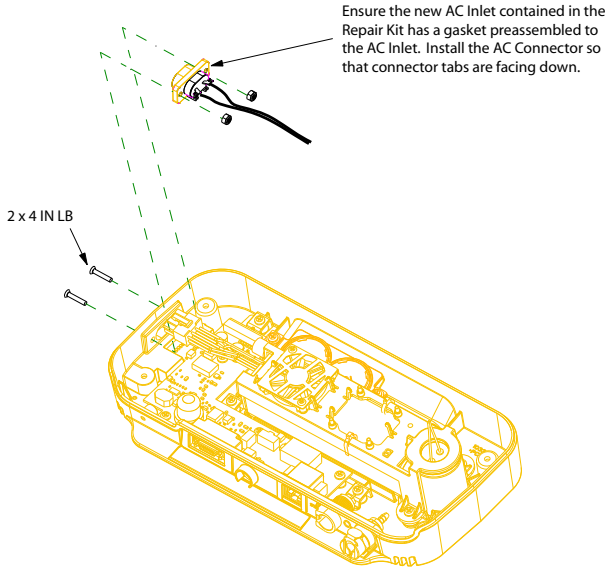
FIGURE 8-8: SCREW LOCATIONS

2. Remove the AC Power Connector from the Bottom Enclosure.

Installation

1. The new AC Inlet should have a new gasket attached to the plastic. Ensure that the Gasket is still in place.
2. Slide the AC Power Connector into the proper slot in the Bottom Enclosure. Slide the AC Power Connector into the proper slot in the Bottom Enclosure.

3. Using a 4 in-lbs torque wrench and a 1/4” wrench, secure the AC Connector to the Bottom Enclosure (new screws and locking nuts should be used if they are provided in RP Kit).



NOTE

*If **ONLY** the AC Power Connector is replaced, you can use either the Performance Verification Tool located in the Maintenance Section of this manual or the Field Service Application located in the Testing Section of this manual as the Final Test Tool.*

8.3.2 DC POWER CONNECTOR REPLACEMENT

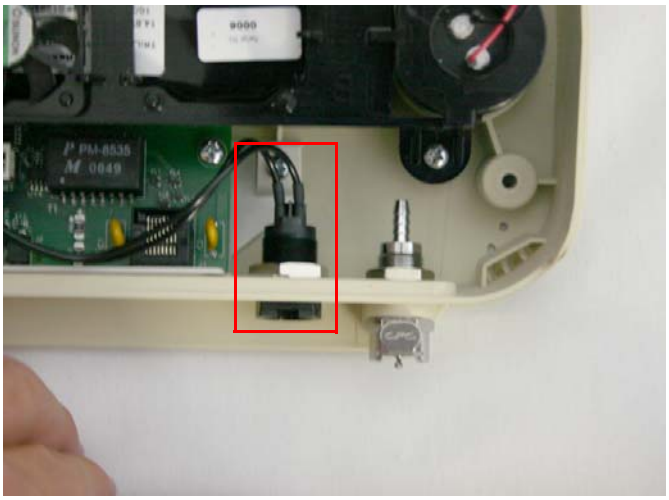


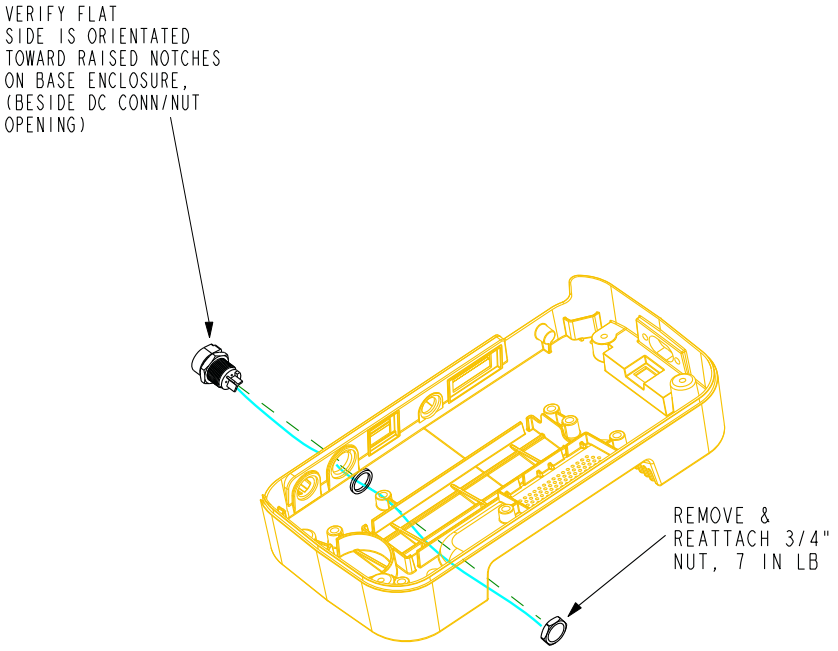
FIGURE 8-9: DC POWER CONNECTOR

Removal

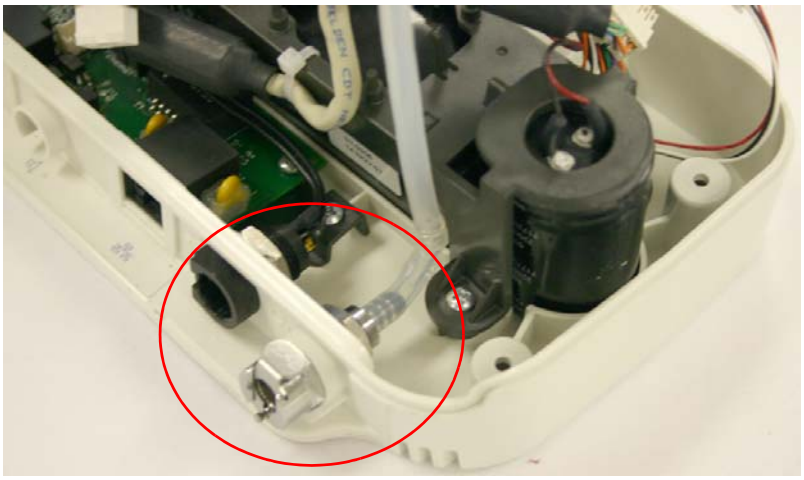
1. Using a 3/4” wrench, remove the nut securing the DC Connector to the Bottom Enclosure.
2. Remove the DC Connector from the Bottom Enclosure.

Installation

1. Place the DC Connector into its slot in the Bottom Enclosure.
2. Using a 3/4” wrench, connect the DC Connector to the Bottom Enclosure by tightening the nut to 7 in-lbs.



8.3.3 OXYGEN OUTLET REPLACEMENT

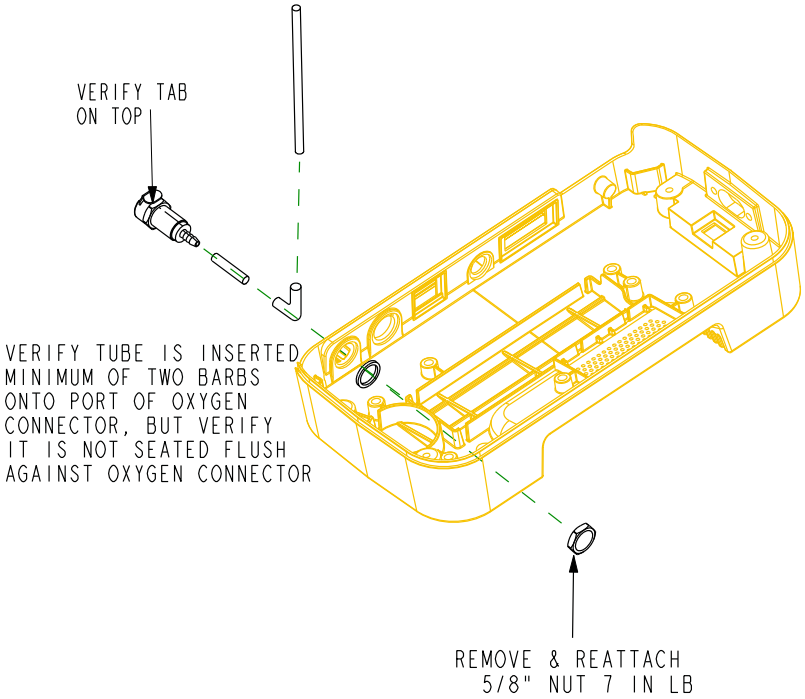


Removal

1. Using a 5/8” wrench, remove the nut securing the Oxygen Outlet to the Bottom Enclosure.
2. Remove Oxygen Outlet and tubing from the Bottom Enclosure.

Installation

1. Place the Oxygen Outlet into its slot in the Bottom Enclosure.
2. Connect the tubing to the Oxygen Outlet as shown below.
3. Using a 5/8” wrench, connect the Oxygen Outlet to the Bottom Enclosure by tightening the nut to 7 in-lbs.



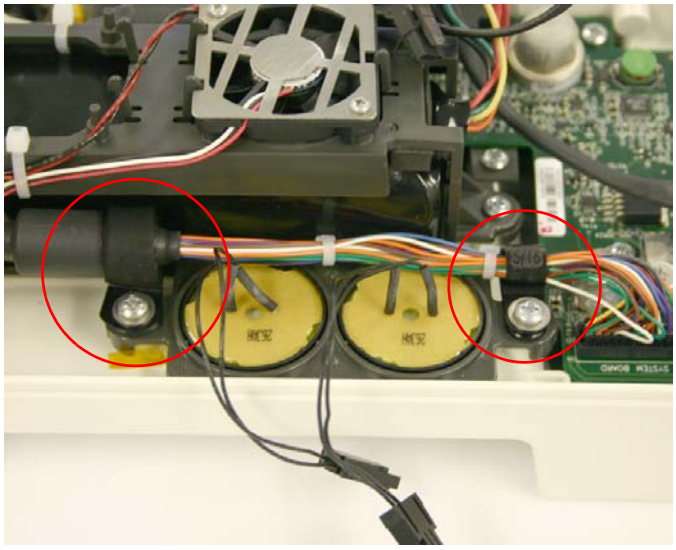
8.3.4 SPEAKER REPLACEMENT

Removal

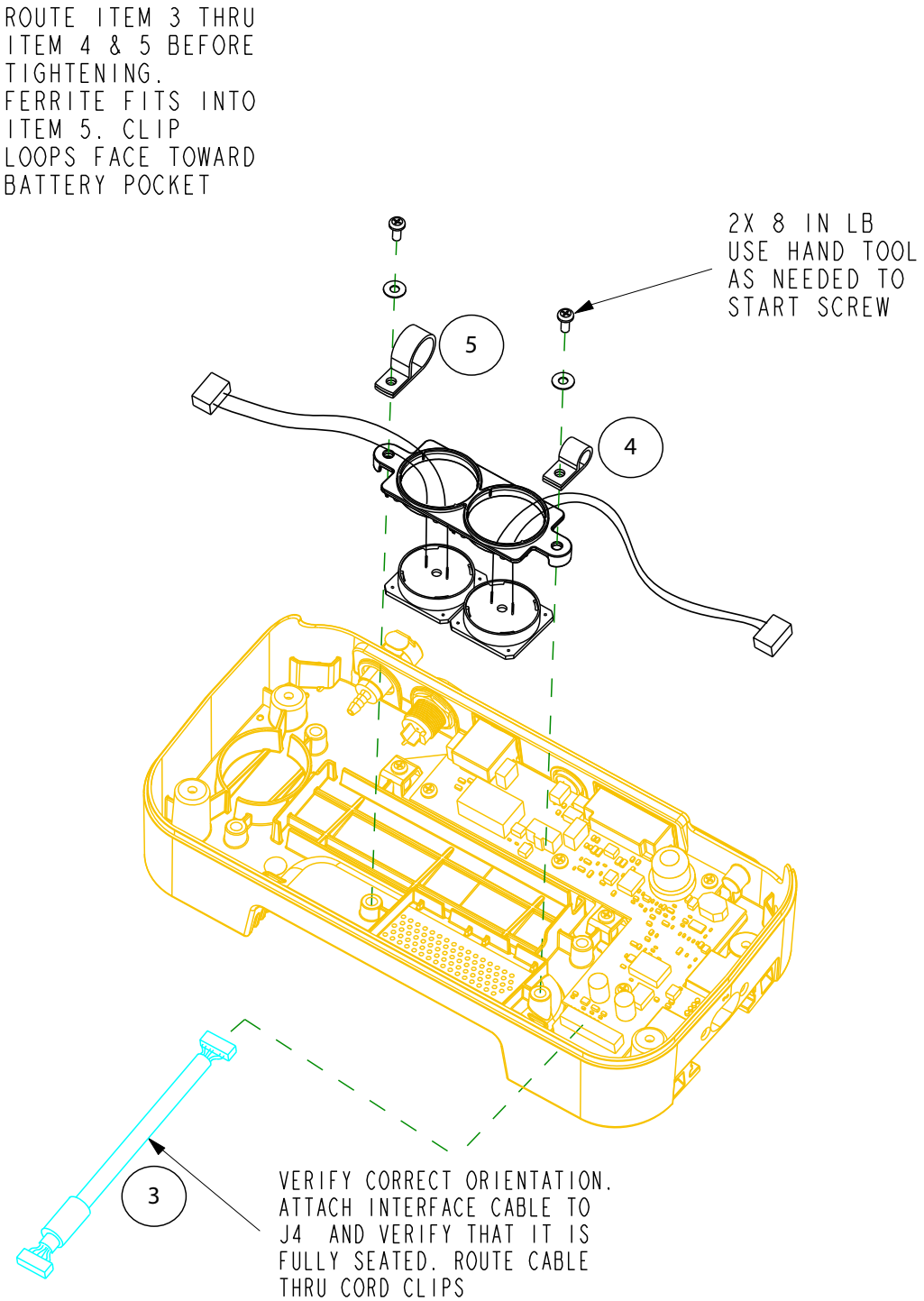
1. Remove the two screws securing the Hold-Down and two cord clips to the Bottom Enclosure.
2. Remove the Speakers from the device.

Installation

1. Place the Speaker in the Bottom Enclosure.
2. Place the Hold-Down into its position in the Bottom Enclosure.
3. With the Bottom Enclosure positioned with the AC Inlet on the right, place the cord clips in their proper position (the 5/16” cord clip should be positioned on the right and the larger cord clip on the left).



4. Ensure the Interface Cable is properly routed through the cord clips.
5. Secure the cord clips and hold-down to the Bottom Enclosure by tightening the two screws to 8 in-lbs.


ROUTE ITEM 3 THRU ITEM 4 & 5 BEFORE TIGHTENING.
FERRITE FITS INTO ITEM 5. CLIP LOOPS FACE TOWARD BATTERY POCKET
2X 8 IN LB
USE HAND TOOL AS NEEDED TO START SCREW
5
4
3
VERIFY CORRECT ORIENTATION. ATTACH INTERFACE CABLE TO J4 AND VERIFY THAT IT IS FULLY SEATED. ROUTE CABLE THRU CORD CLIPS

8.3.5 INTERNAL BATTERY FAN REPLACEMENT

Removal

1. Unscrew the Battery Fan Cover from the Battery Fan.

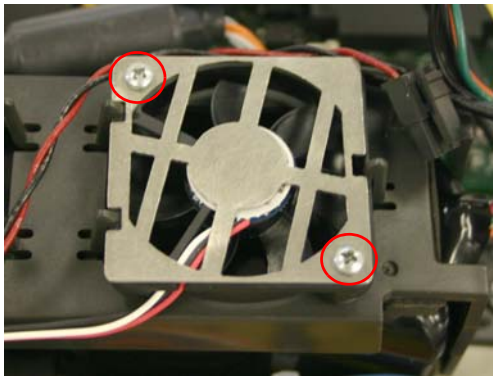


FIGURE 8-10: BATTERY FAN COVER

2. Cut the Tie warp securing the Fan wires to the Capacitor/Internal Battery Fan Retainer.
3. Release the locking tabs securing the Internal Battery Fan to the Capacitor/Internal Battery Retainer.

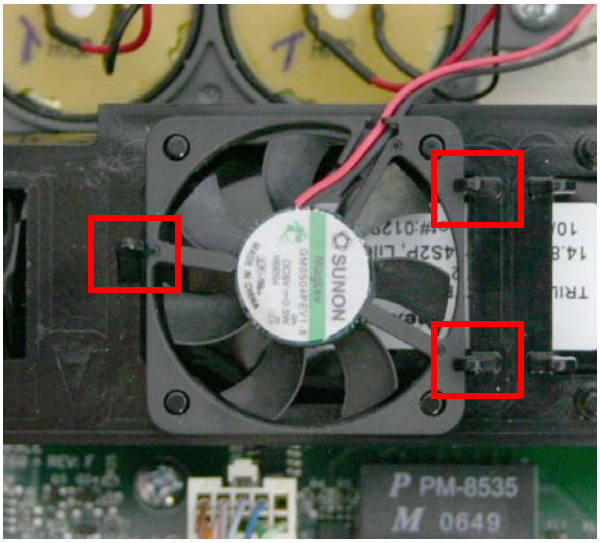


FIGURE 8-11: INTERNAL BATTERY FAN LOCKING TABS (BATTERY SHOWN WITHOUT BATTERY FAN COVER)

4. Remove the Internal Battery Fan from the Capacitor/Internal Battery Fan Retainer.

Installation

1. Align the holes in the Internal Battery Fan with the pins on the Retainer.
2. Push the Internal Battery Fan down until it locks in place.

3. Using a tie wrap secure the Fan wires to the Capacitor/Internal Battery Fan Retainer. The wires are to be secured to the front of the Capacitor/Battery Retainer with the wire tie in the orientation below. The wires must be loose and not pinched by the wire tie.

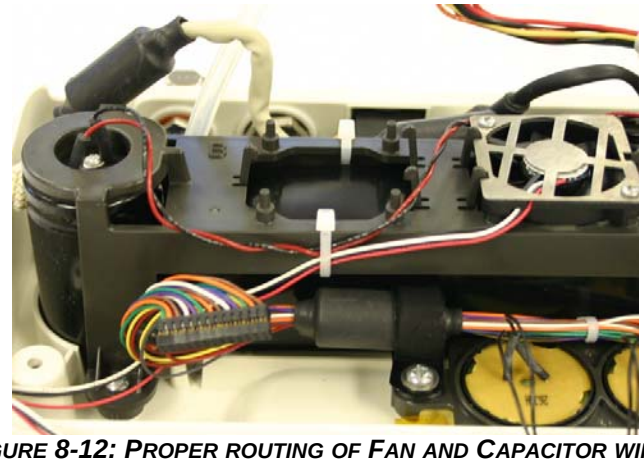
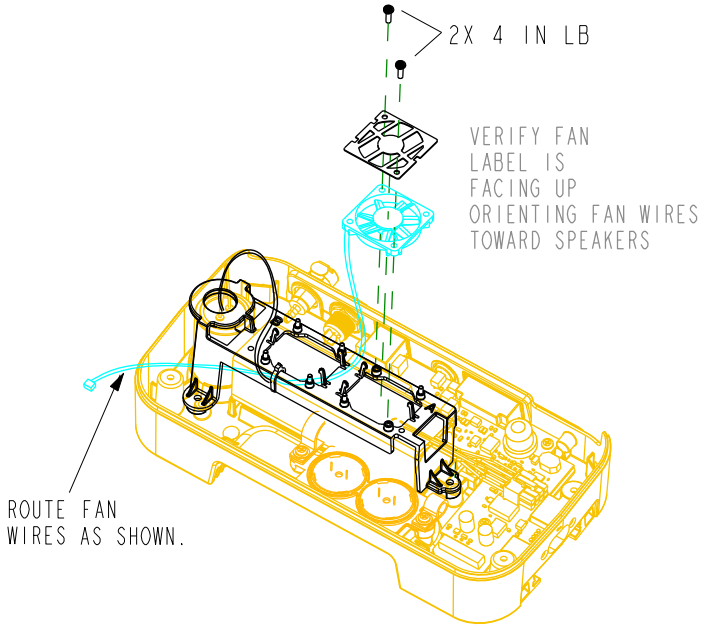


FIGURE 8-12: PROPER ROUTING OF FAN AND CAPACITOR WIRES

4. Secure the Battery Fan Cover to the Battery Fan by tightening it to 4 in-lbs.



8.3.6 CAPACITOR/INTERNAL BATTERY REPLACEMENT

Removal

1. Remove the three screws securing the Capacitor/Internal Battery Retainer to the Bottom Enclosure.

FIGURE 8-13: CAPACITOR/INTERNAL BATTERY FAN RETAINER SCREWS

2. Cut the two tie wraps securing wires to the Capacitor/Internal Battery Retainer.
3. Remove the Capacitor and/or Internal Battery.

Installation

1. Place the Capacitor into its slot in the Bottom Enclosure.
2. Route the Internal Battery cable through the slot in the Internal Battery/Capacitor retainer.

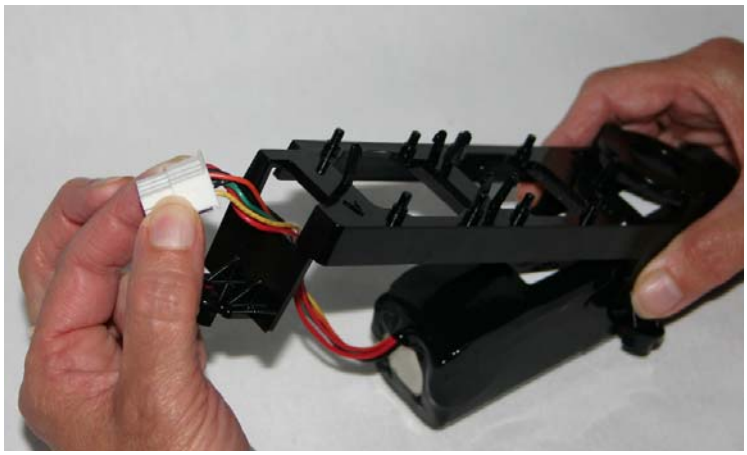
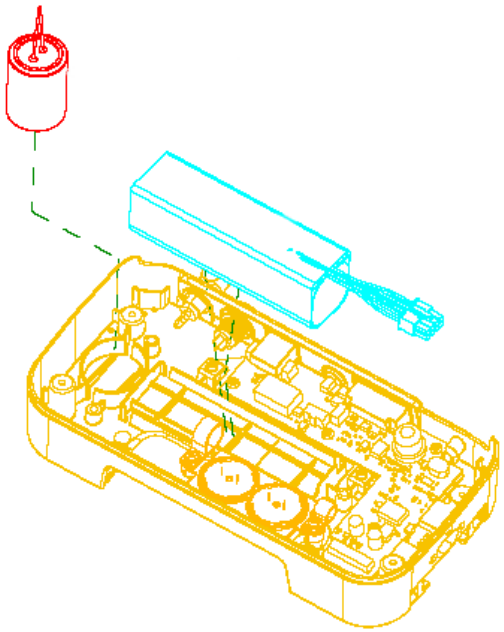
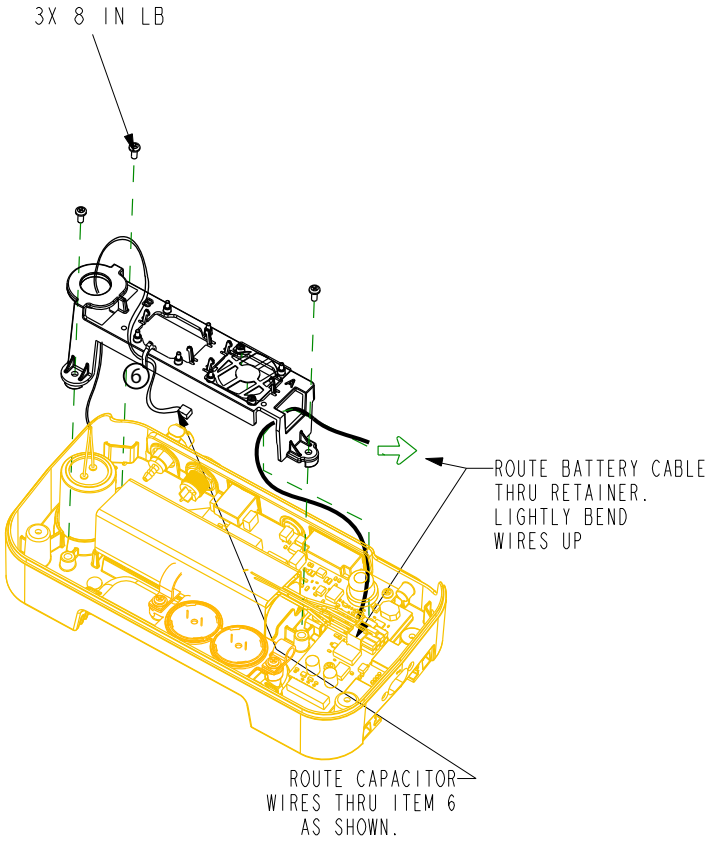


FIGURE 8-14: PROPER CABLE ROUTING

3. Secure the Capacitor and/or Internal Battery to the Bottom Enclosure using the Capacitor/Battery Retainer. Tighten the three screws to 8 in-lbs.
4. Using a tie wrap, secure the Capacitor wires to the Capacitor/Internal Battery Retainer.




3X 8 IN LB
6
ROUTE BATTERY CABLE
THRU RETAINER.
LIGHTLY BEND
WIRES UP
ROUTE CAPACITOR
WIRES THRU ITEM 6
AS SHOWN.

8.3.7 INTERFACE PCA REPLACEMENT

Removal

1. Remove the Internal Battery/Capacitor Retainer.
2. Remove the Interface to System Board Cable from J4 on the Interface PCA.
3. Remove the Ethernet to System Board Cable from J5 on the Interface PCA.

FIGURE 8-15: ETHERNET TO SYSTEM BOARD CABLE CONNECTION

4. Remove the four screws securing the Interface PCA to the Interface Board Retainer.

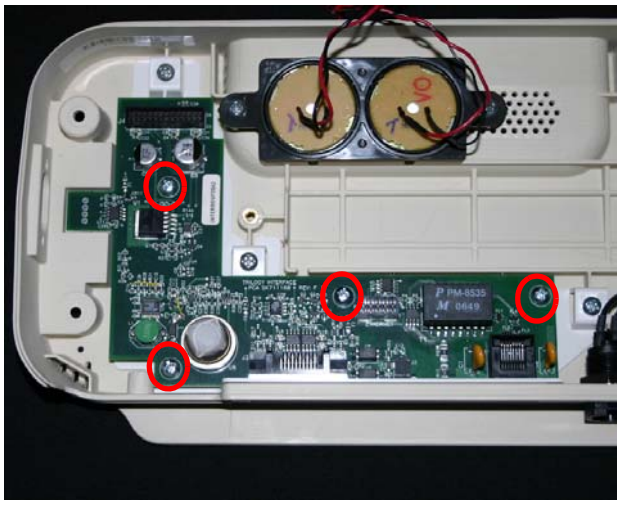
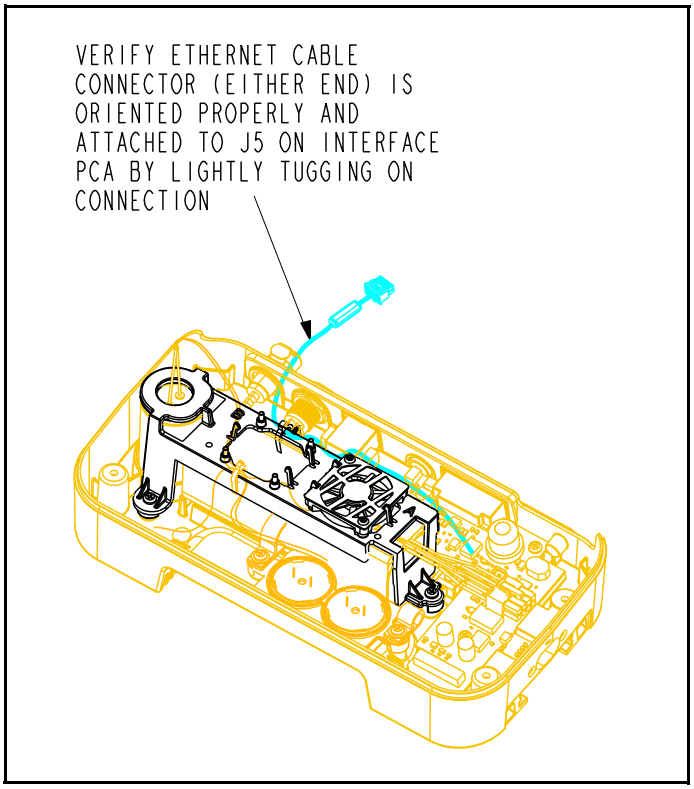


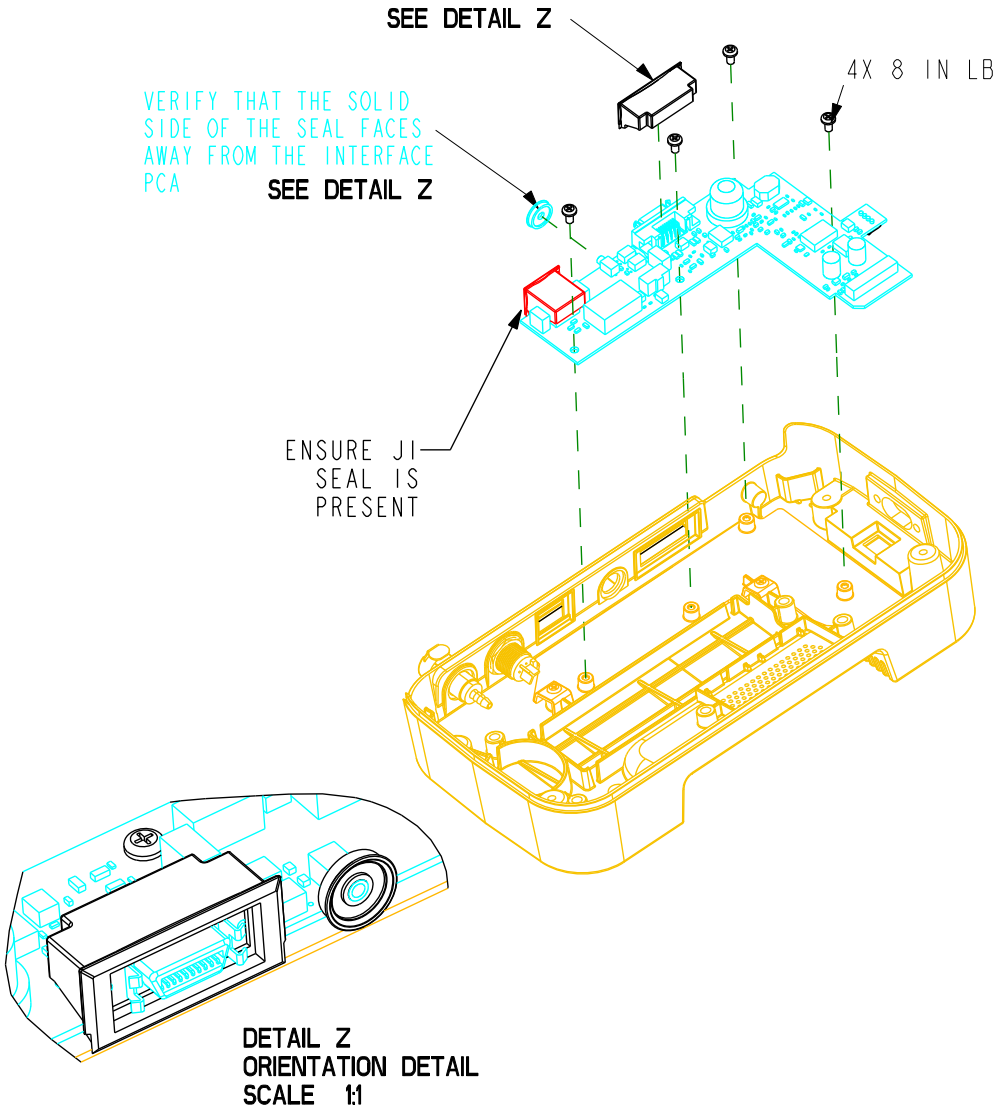
FIGURE 8-16: INTERFACE PCA SCREW LOCATIONS

Installation

1. Secure the Interface PCA to the Bottom Enclosure by tightening the screws to 8 in-lbs.
2. Connect the Ethernet to System Board Cable to J5 on the Interface PCA.



3. Connect the Interface to System Board Cable from J4 on the Interface PCA.
4. Connect the Interface PCA to the Interface PCA Retainer.


SEE DETAIL Z
4X 8 IN LB
VERIFY THAT THE SOLID SIDE OF THE SEAL FACES AWAY FROM THE INTERFACE PCA
SEE DETAIL Z
ENSURE JI SEAL IS PRESENT
DETAIL Z
ORIENTATION DETAIL
SCALE 1:1

8.3.8 INTERFACE PCA RETAINER REPLACEMENT

Removal

1. Remove to the Interface PCA. Refer to the Interface PCA Replacement section for more detailed instructions.
2. Remove the two screws securing the Interface PCA Retainer to the Bottom Enclosure.

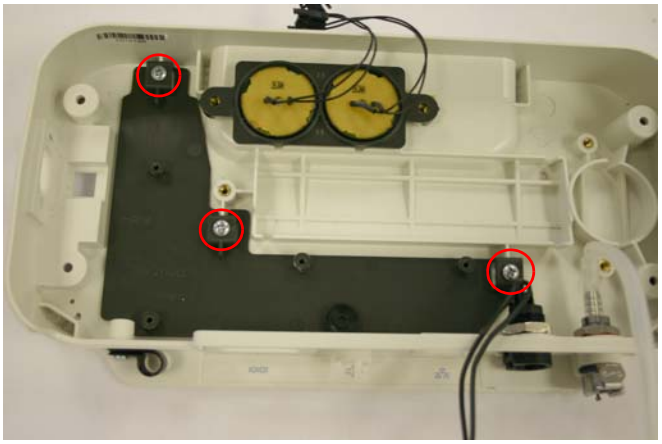
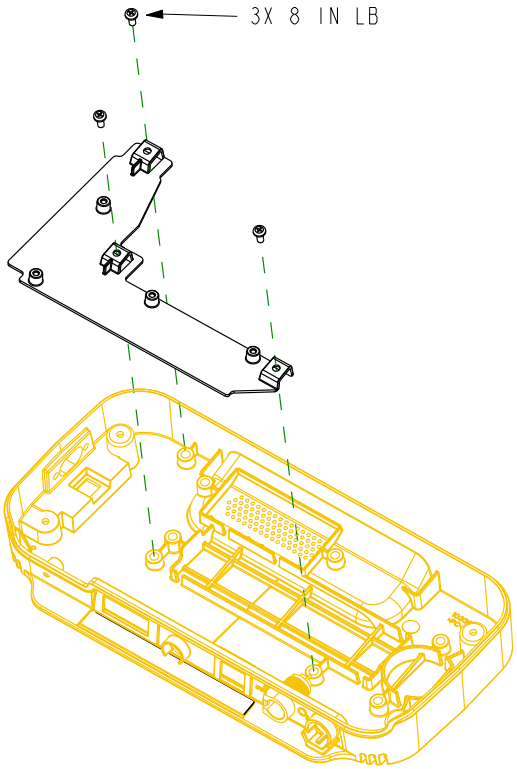


FIGURE 8-17: INTERFACE PCA RETAINER SCREW LOCATIONS

Installation

1. Place the Interface PCA Retainer into the Bottom Enclosure.
2. Secure the Interface Board Retainer to the Bottom Enclosure by tightening the screws to 8 in-lbs.



8.3.9 BOTTOM ENCLOSURE REPLACEMENT

Removal

1. Remove the AC Power Connector. Refer to the Interface PCA Retainer Replacement Section for more details.
2. Remove the DC Power Connector. Refer to the DC Power Connector Replacement Section for more details.
3. Remove the Oxygen Outlet. Refer to the Oxygen Outlet Replacement Section for more details.
4. Remove the Sonalert. Refer to the Speaker Replacement Section for more details.
5. Remove the Internal Battery Fan. Refer to the Internal Battery Fan Replacement Section for more details.
6. Remove the Capacitor and Internal Battery. Refer to the Capacitor/Internal Battery Replacement Section for more details.
7. Remove the Interface PCA. Refer to the Interface PCA Replacement Section for more details.
8. Remove the Interface PCA retainer. Refer to the Interface PCA Retainer Replacement Section for more details.

Installation

1. Install the Interface PCA retainer. Refer to the Interface PCA Retainer Replacement Section for more details.
2. Install the Interface PCA. Refer to the Interface PCA Replacement Section for more details.
3. Install the Capacitor and Internal Battery. Refer to the Capacitor/Internal Battery Replacement Section for more details.
4. Install the Internal Battery Fan. Refer to the Internal Battery Fan Replacement Section for more details.
5. Install the Sonalert. Refer to the Speaker Replacement Section for more details.
6. Install the Oxygen Outlet. Refer to the Oxygen Outlet Replacement Section for more details.
7. Install the DC Power Connector. Refer to the DC Power Connector Replacement Section for more details.
8. Install the AC Power Connector. Refer to the Interface PCA Retainer Replacement Section for more details.
9. Print a generic Serial/Model Number label. The label must be in accordance with the following specifications: Label Size = 1-1/8” x 2” (maximum size), Font Size = 10 point (minimum)

IMPORTANT!

The new label MUST include the same Model Number, and Serial Number as those of which are on the original label.

10. Affix the new label to the Bottom Enclosure in the same location as the original label. Affix the clear overlay (RI p/n 221013) over the printed label. Two clear overlays are provided with the Bottom Enclosure RP Kit.
11. Affix the Warning label in the same location as the original Warning Label.

8.4 FRONT ENCLOSURE ASSEMBLY COMPONENT REMOVAL/INSTALLATION

	COMPONENT NAME	CONTAINED IN
1.	Front Enclosure	1045182 / 1070252
2.	KeyPad	1045183
3.	Inverter PCA	1045163
4.	LCD Screen	1045184
5.	LCD Cable Ferrite	1045164 & 1045195
6.	LCD Cable	1045225
7.	Front Panel/Keypad LED PCA	1045200
8.	System PCA Support	1045195
9.	PCB Module Plate "A"	1045197
10.	System PCA w/Daughter Board	1045199
11.	Power Management PCA	1045201
12.	PCB Module Plate "B"	1045198
13.	Power Management PCA Support	1045196

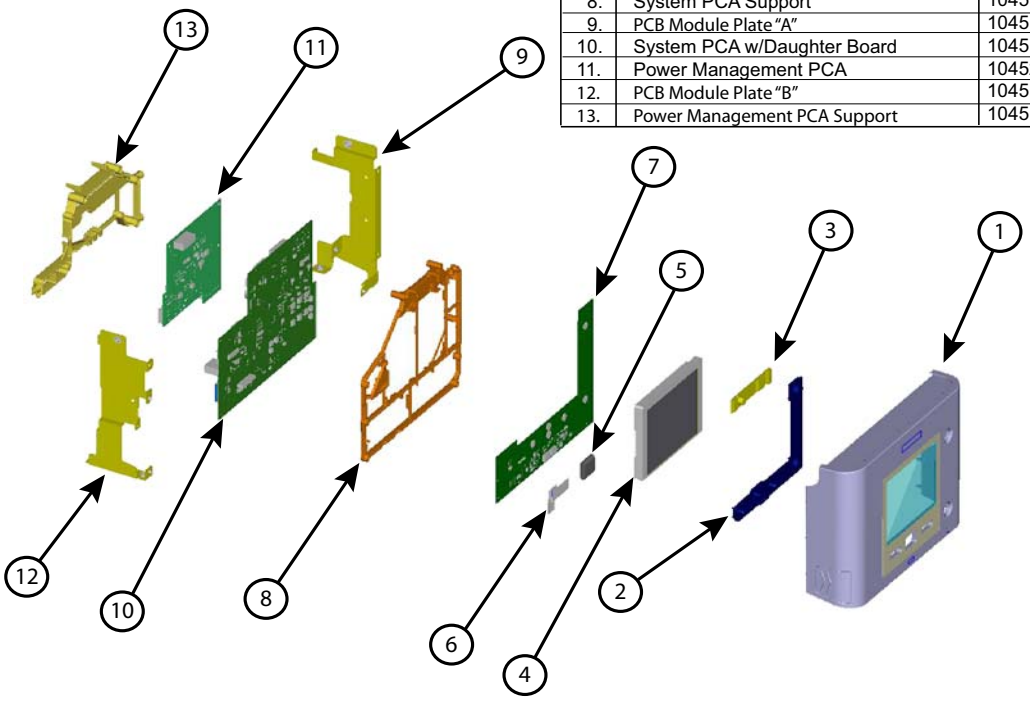


FIGURE 8-18: FRONT ENCLOSURE ASSEMBLY

8.4.1 KEYPAD/FRONT ENCLOSURE REPLACEMENT

Removal

1. Remove the four screws securing the metal brackets to the front case. Three of the four screws are located between the metal bracket and the Front Enclosure.

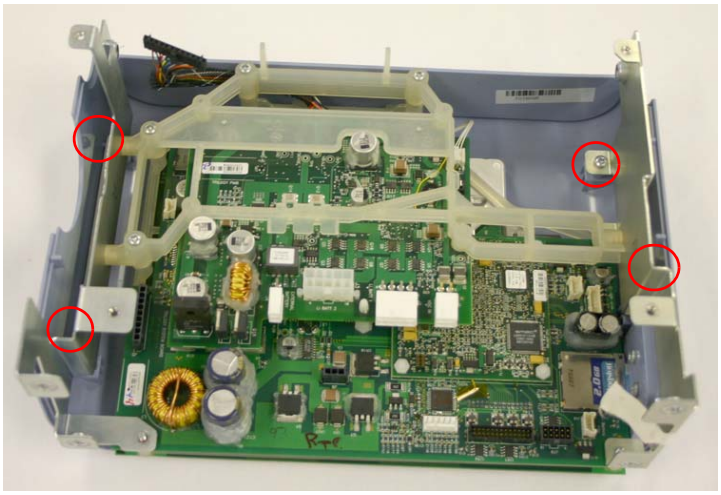


FIGURE 8-19: METAL BRACKET SUPPORT SCREW LOCATIONS

2. Remove the assembly secured by the metal brackets out of the Front Enclosure to expose the Keypad.
3. Remove the Keypad.

FIGURE 8-20: KEYPAD REMOVAL

FIGURE 8-21: FRONT ENCLOSURE WITH KEYPAD REMOVED

Installation

1. Install the Keypad into the Front Enclosure.
2. Place the assembly secured with the metal brackets into the Front Enclosure.
3. Secure the Metal Brackets to the Front Enclosure by tightening the screw to 8 in-lbs.

8.4.2 FRONT PANEL PCA REPLACEMENT

Removal

1. Remove the 4 screws connecting the Front Panel PCA to the Power Management Board Support.

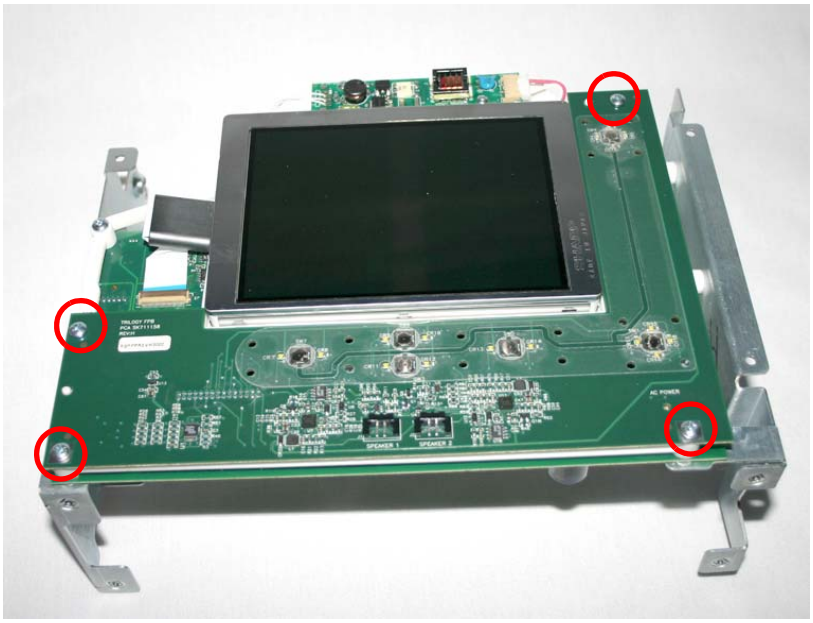


FIGURE 8-22: MOUNTING SCREW LOCATIONS

2. Remove the Front Panel PCA from the Assembly.

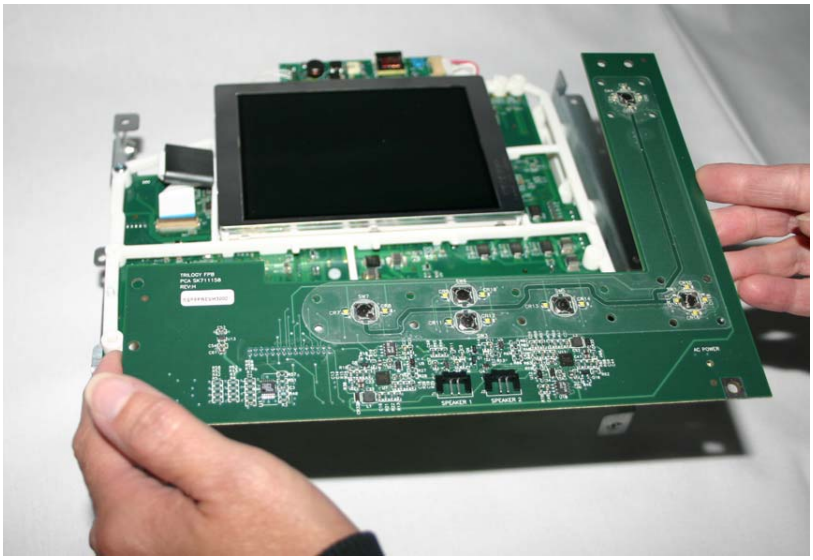


FIGURE 8-23: FRONT PANEL PCA REMOVAL

Installation

1. Place the Front Panel PCA on the Power Management Board Support.
2. Secure the Front Panel PCA to the Power Management Board Support by tightening the screws to 8 in-lbs. The two long screws go on the bottom and the two short screws go on the top.

8.4.3 PCA INVERTER REPLACEMENT

Removal

1. Remove the connection from location J20 on the Power Management Board.

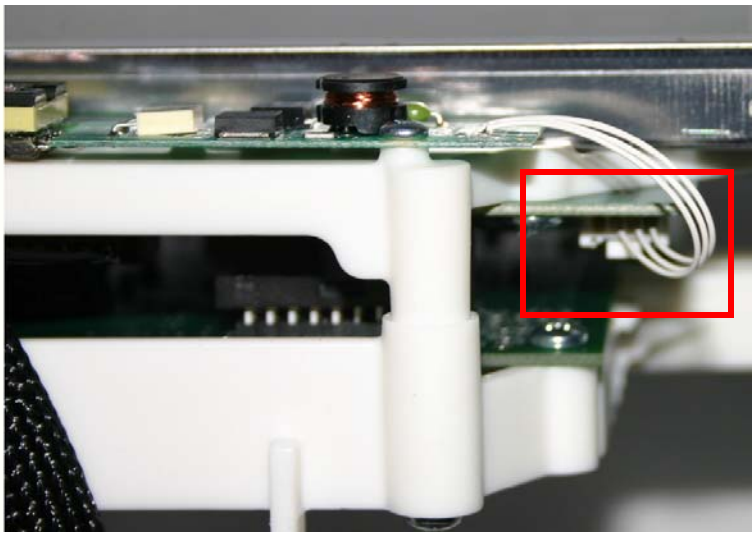


FIGURE 8-24: LOCATION J20 ON THE POWER MANAGEMENT PCA

2. Remove the LCD connection from location J2 on the PCA Inverter.

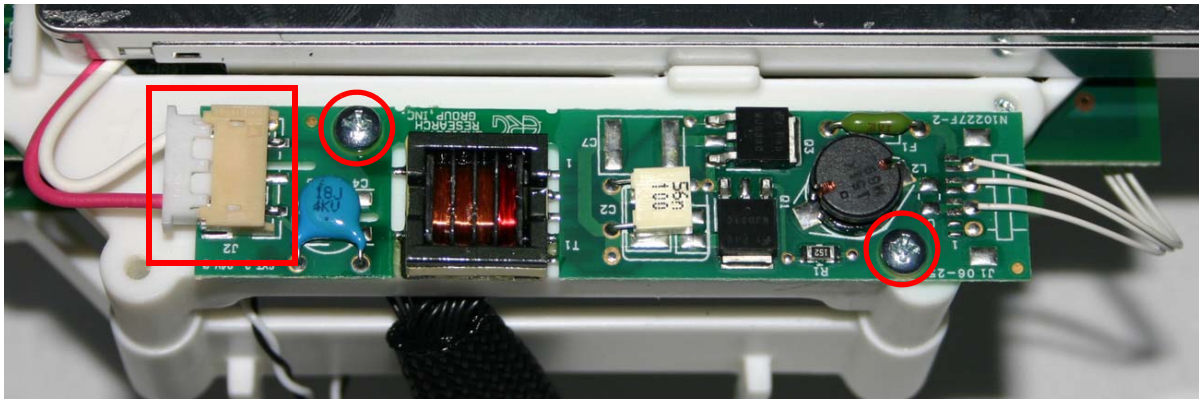


FIGURE 8-25: LOCATION J2 ON THE PCA INVERTER & SCREW LOCATIONS

3. Remove the two screws securing the PCA Inverter to the Power Management Board Support. Refer to Figure 8-25.

Installation

1. Secure the PCA Inverter to the Power Management Board Support by tightening the screws to 6 in-lbs.
2. Connect the LCD Cable to J2 on the PCA Inverter.
3. Connect the PCA Inverter to J20 on the Power Management Board.

8.4.4 METAL SUPPORT BRACKET REPLACEMENT

Removal

1. Remove the Front Panel PCA. Refer to the Front Panel PCA Replacement Section for more details.
2. Remove the PCA Inverter. Refer to the PCA Inverter Replacement Section for more details.
3. Remove the one remaining screw connecting the Power Management PCB Support to the Metal Bracket.

FIGURE 8-26: REMAINING SCREW

4. On a scratch proof surface, carefully turn the assembly over (LCD facing down).
5. Remove the 3 screws securing the PCB Supports to the side of the Metal Support Brackets.

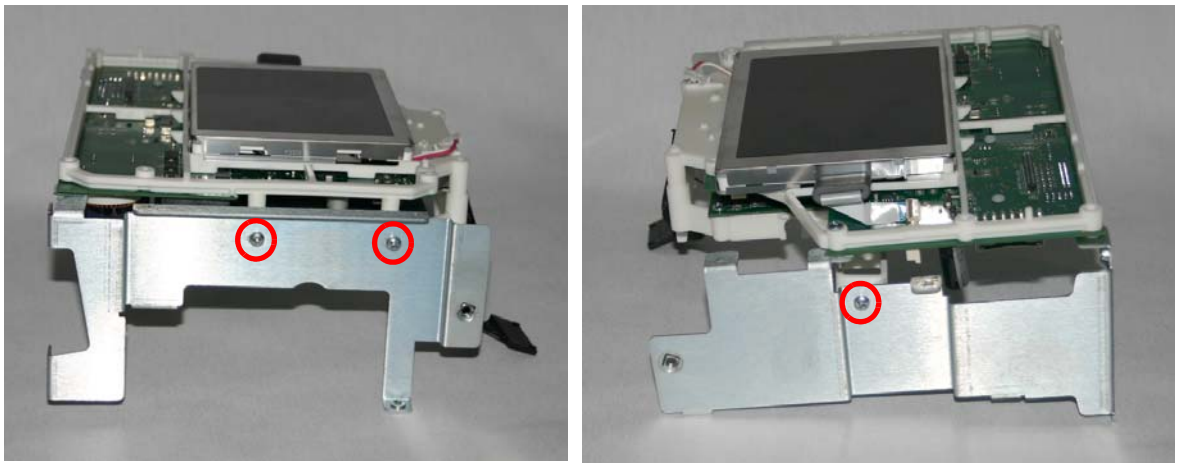


FIGURE 8-27: SCREWS SECURING THE METAL BRACKETS TO THE PCB SUPPORTS

Installation

1. Secure the PCB Supports to the side walls of the Metal Support Brackets by tightening the screws to 8 in-lbs.
2. Secure the Power Management PCB Support to the Metal Bracket.
3. Install the PCA Inverter. Refer to the PCA Inverter Replacement Section for more details.
4. Install the Front Panel PCA. Refer to the Front Panel PCA Replacement Section for more details.

8.4.5 POWER MANAGEMENT PCA REPLACEMENT

Removal

1. Remove the Keypad/Front Enclosure. Refer to the Keypad/Front Enclosure Replacement Section for more details.
2. Remove the Front Panel PCA. Refer to the Front Panel PCA Replacement Section for more details.
3. Remove the PCA Inverter. Refer to the PCA Inverter Replacement Section for more details.
4. Remove the Metal Support Brackets. Refer to the Metal Support Bracket Replacement Section for more details.
5. Remove the four screws securing the Power Management PCA support to the System PCA Support.

FIGURE 8-28: SCREW LOCATIONS

6. Depress the locking tab on the plastic standoff and firmly lift the Power Management PCA straight up and away from the System PCA.

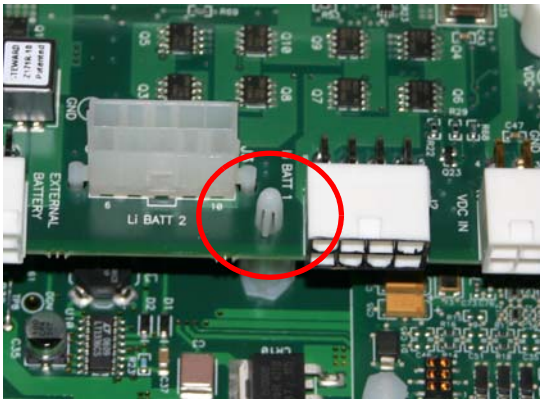


FIGURE 8-29: LOCKING TAB

7. Remove the four screws securing the Power Management PCA Support to the Power Management PCA.

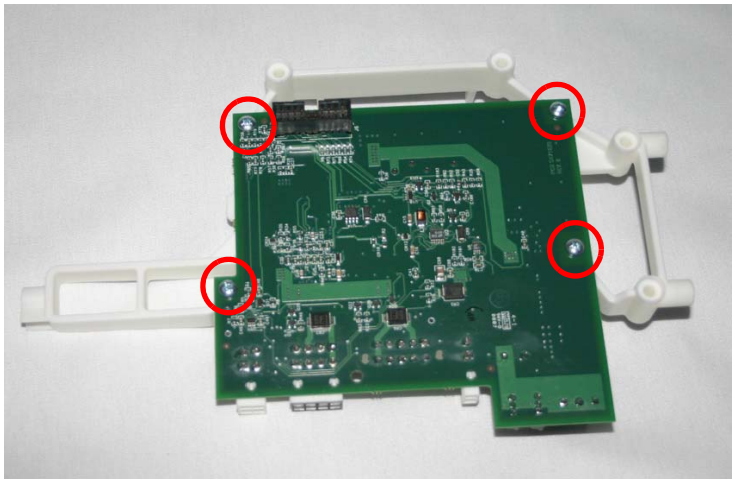


FIGURE 8-30: PCB SUPPORT SCREWS

Installation

1. Secure the Power Management PCA to the Power Management PCA Support by tightening the screws to 8 in-lbs.
2. Align the locking tab with the slot in the Power Management PCA. While firmly pressing down secure the Power Management PCA to the System PCA
3. Using the four screws, secure the Power Management PCA support to the System PCA support by tightening the screws to 12 in-lbs.
4. Install the Metal Support Brackets. Refer to the Metal Support Bracket Replacement Section for more details.
5. Install the PCA Inverter. Refer to the PCA Inverter Replacement Section for more details.
6. Install the Front Panel PCA. Refer to the Front Panel PCA Replacement Section for more details.
7. Install the Keypad/Front Enclosure. Refer to the Keypad/Front Enclosure Replacement Section for more details.

8.4.6 SYSTEM PCA REPLACEMENT

IMPORTANT

After the System PCA has been replaced you must go to ***http://my.respironics.com*** *to download the latest firmware to the Trilogy Device. Follow the Operating Software Updates procedure located in the Testing Chapter of this Service Manual to complete the firmware installation. Once the latest firmware has been loaded to the device proceed to the Trilogy 100 Tool Box Application and set the device table. Once the Firmware is loaded and the device table is set proceed with the Field Service Application Repair Test. If the firmware is not loaded and the device table is not set, the device will not operate or pass the Field Service Application Repair Test.*

Removal

1. Remove the Keypad/Front Enclosure. Refer to the Keypad/Front Enclosure Replacement Section for more details.
2. Remove the Front Panel PCA. Refer to Front Panel PCA Replacement Section for more details.
3. Remove the PCA Inverter.
4. Remove the Metal Support Brackets. Refer to Metal Support Bracket Replacement Section for more details.
5. Remove the Power Management PCA. Refer to the Power Management PCA Replacement Section for more details.
6. Lift up the brown tab and remove the LCD Cable from location J3 on the System PCA.

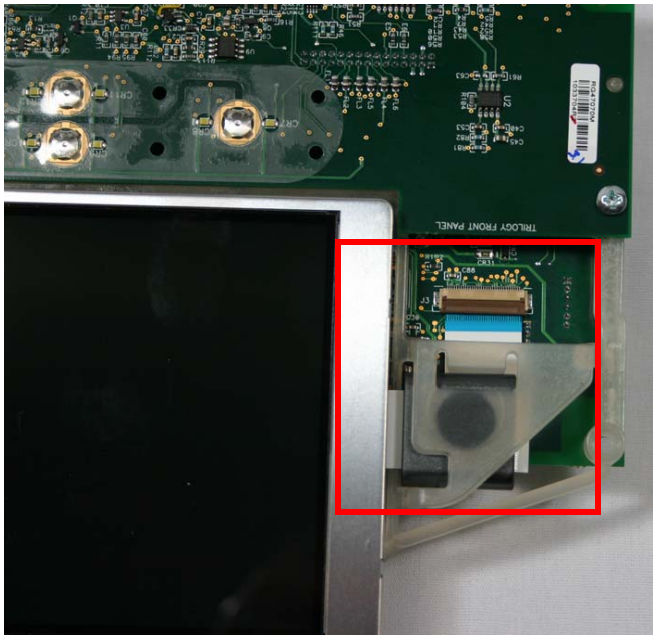


FIGURE 8-31: LCD CABLE AT LOCATION J3

7. Remove the two screws securing the System PCA to the System PCA Support.

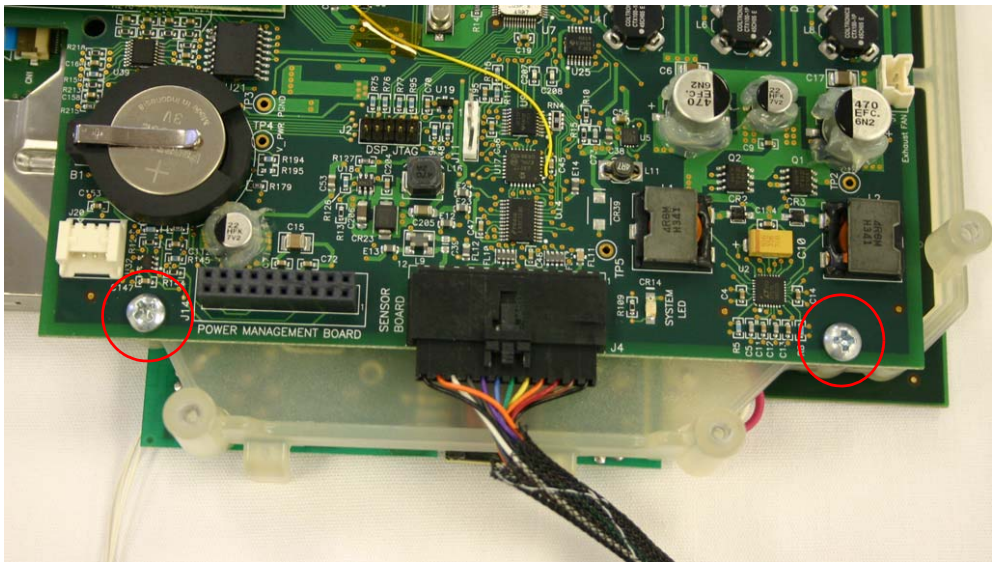


FIGURE 8-32: SCREW LOCATIONS

8. Remove the System PCA to
9. Cable from location J4 on the System PCA.

Installation

1. Connect the System PCA to Sensor PCA Cable to J4 on the System PCA.
2. Secure the Sensor PCA to the System PCA Support by tightening the screws to 8 in-lbs.
3. Connect the LCD Cable to J3 on the System PCA.
4. Install the Power Management PCA. Refer to the Power Management PCA Replacement Section for more details.
5. Install the Metal Support Brackets. Refer to the Metal Support Bracket Replacement Section for more details.
6. Install the PCA Inverter. Refer to the PCA Inverter Replacement Section for more details.
7. Install the Front Panel PCA. Refer to the Front Panel PCA Replacement Section for more details.
8. Install the Keypad/Front Enclosure. Refer to the Keypad/Front Enclosure Replacement Section for more details.

8.4.7 LIQUID CRYSTAL DISPLAY (LCD) REPLACEMENT

Removal

1. Remove the Keypad/Front Enclosure. Refer to the Keypad/Front Enclosure Replacement Section for more details.
2. Remove Front Panel PCA. Refer to the Front Panel PCA Replacement Section for more details.
3. Remove the PCA Inverter. Refer to the PCA Inverter Replacement Section for more details.
4. Remove the Metal Support Brackets. Refer to the Metal Support Bracket Replacement Section for more details.
5. Remove the Power Management PCA. Refer to the Power Management PCA Replacement Section for more details.
6. Remove the System PCA. Refer to the System PCA Replacement Section for more details.
7. Lift up the brown locking tab, slide the cable through the ferrite, and remove LCD Cable from LCD.

FIGURE 8-33: LCD CABLE

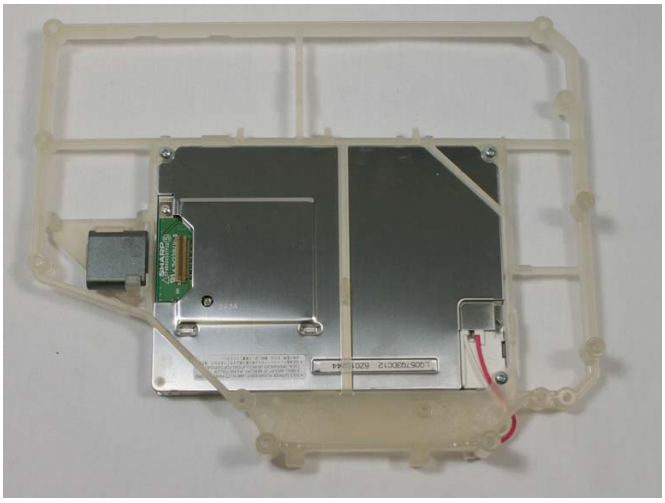


FIGURE 8-34: LCD CABLE REMOVED

8. Remove the three screws securing the LCD to the System Board Support.

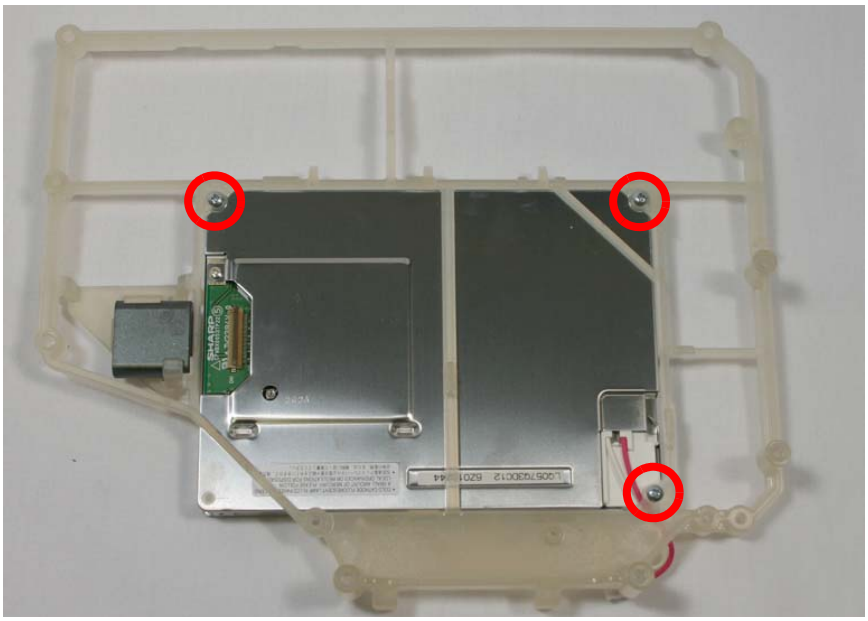


FIGURE 8-35: SCREW LOCATIONS

Installation

1. Slide the LCD Cable through the Ferrite and connect it to LCD.
2. Secure the LCD to the System Board Support by tightening the screws to 6 in-lbs.
3. Install the System PCA. Refer to the System PCA Replacement Section for more details.
4. Install the Power Management PCA. Refer to the Power Management PCA Replacement Section for more details.
5. Install the Metal Support Brackets. Refer to the Metal Support Bracket Replacement Section for more details.
6. Install the PCA Inverter. Refer to the PCA Inverter Replacement Section for more details.
7. Install the Front Panel PCA. Refer to the Front Panel PCA Replacement Section for more details.
8. Install the Keypad/Front Enclosure. Refer to the Keypad/Front Enclosure Replacement Section for more details.

8.5 REAR ENCLOSURE ASSEMBLY COMPONENT REMOVAL/INSTALLATION

	COMPONENT NAME	CONTAINED IN
1.	Top Plate	1045586
2.	Bellows Clip	1045307
3.	Sensor PCA Assembly	1045152 / 1070248
4.	Rear Enclosure	1045149
5.	Detachable Battery Connector Assembly	1045166
6.	Exhaust Fan	1045178
7.	Vent Exhaust Outlet Air Path Assembly	1045178
8.	Detachable Battery Retainer	1045167
9.	Flow Sensor Assembly	1045150 / 1070249
10.	Transition Tube	1045154
11.	Porting Block Adaptor	1045174
12.	Power Supply PCA	1045151
13.	Transition Tube Locator	1045165
14.	Motor Blower Assembly	1054951
15.	Active Exhalation Control Module	1045153
16.	Active Exhalation Control Module O-rings	1045153

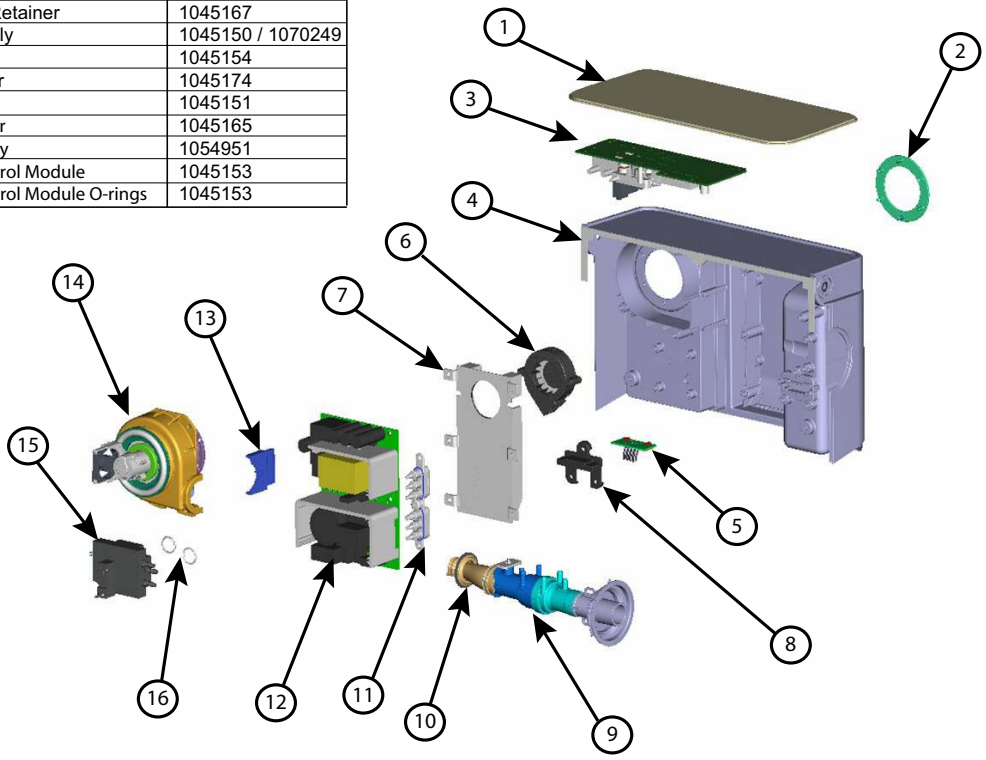


FIGURE 8-36: REAR ENCLOSURE ASSEMBLY

8.5.1 DETACHABLE BATTERY CONNECTOR ASSEMBLY REPLACEMENT

Removal

1. Remove the connection from J2 located on the Trilogy Power Supply Board.
2. Remove the three screws connecting the Detachable Battery Connector Assembly to the Rear Enclosure.

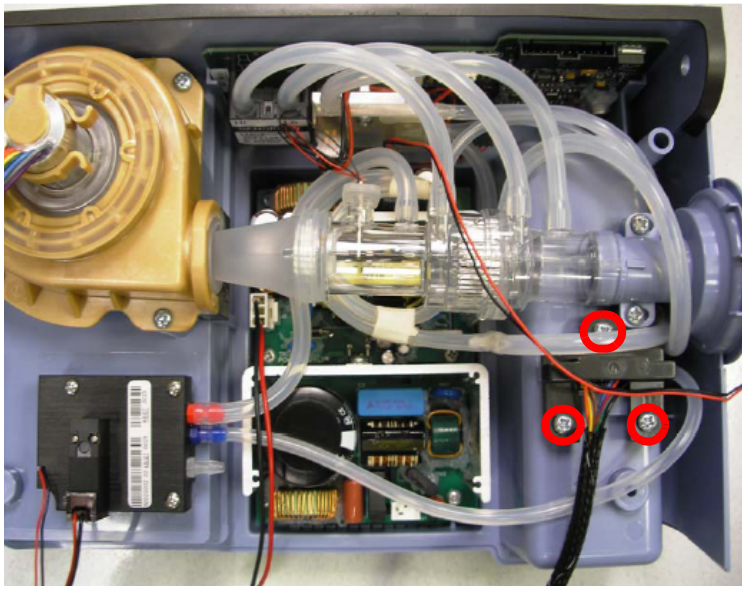


FIGURE 8-37: DETACHABLE BATTERY CONNECTOR SCREW LOCATIONS

3. Separate the Retainer from the Detachable Battery Assembly.

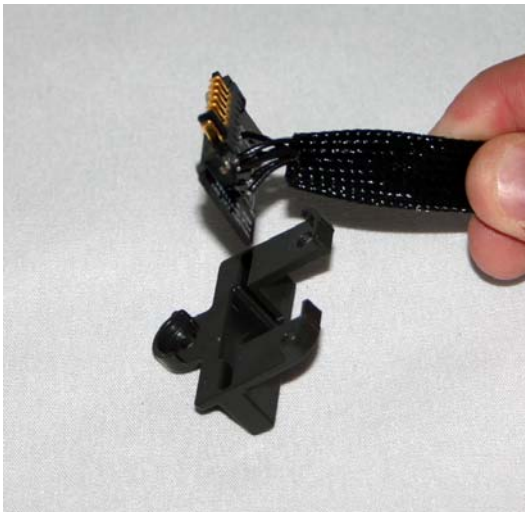


FIGURE 8-38: SEPARATING THE DETACHABLE BATTERY ASSEMBLY FROM THE RETAINER

Installation

1. Slide the Detachable Battery Connector Assembly into the Retainer.
2. Secure the Detachable Battery Connector Assembly to the Rear Enclosure by tightening the screws to 8 in-lbs.
3. Connect the two-prong connector to location J2 on the Trilogy Power Supply Board.

8.5.2 STIRRING FAN/STIRRING FAN RETAINER REPLACEMENT

Removal

1. Lift the center tab straight up to release the adhesive on the back of the tab from the Motor Blower Assembly.
2. Pull the Stirring Fan Retainer away from the Motor Blower Assembly.

FIGURE 8-39: STIRRING FAN RETAINER REMOVAL

3. Push the tabs on Stirring Fan Retainer out to remove the Stirring Fan from the Retainer.

Installation

1. Remove the adhesive backing from the Stirring Fan Retainer.
2. Clip the Stirring Fan Retainer onto the Motor Blower Assembly.
3. Place the Stirring Fan into the Stirring Fan Retainer.

NOTE
Verify that the Fan label is toward the Motor.

8.5.3 ACTIVE EXHALATION MODULE REPLACEMENT

Removal

1. Remove the tubing from the Exhalation Module ports.

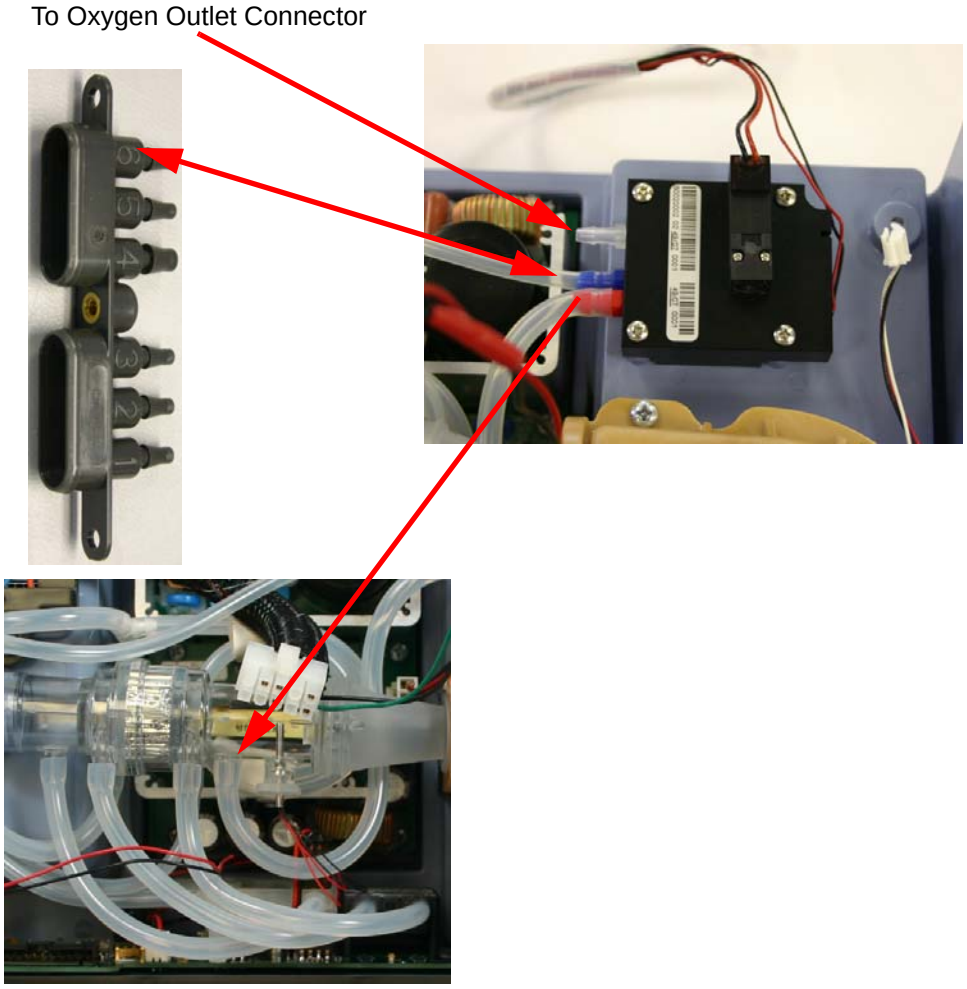


FIGURE 8-40: TUBING CONNECTIONS AND SCREW LOCATIONS

2. Remove the four screws securing the Active Exhalation Module to the Rear Enclosure.

Installation

1. Ensure the two O-rings are properly in place on the Active Exhalation Module.

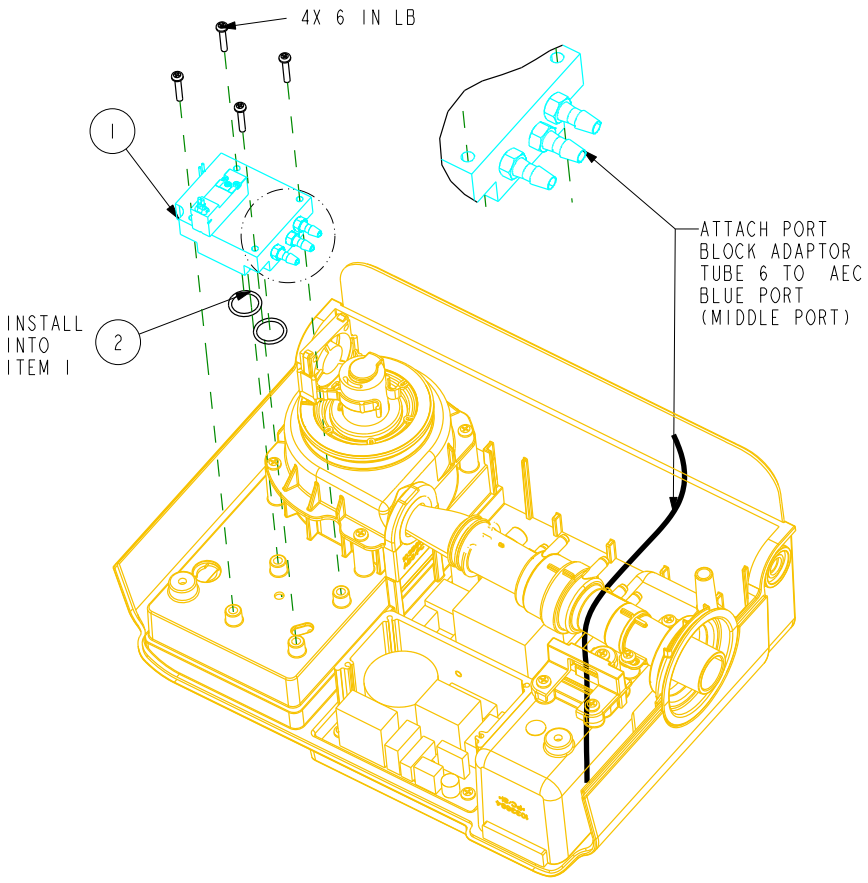


FIGURE 8-41: REMOVAL/INSTALLATION OF ACTIVE EXHALATION MODULE

2. Connect the Active Exhalation Module to the Rear Enclosure by tightening the four screws to 6 in-lbs.
3. Connect the tubing to the Active Exhalation Module ports.

8.5.4 MOTOR BLOWER ASSEMBLY REPLACEMENT

Removal

1. Remove the three screws securing the Isolation Assembly to the Rear Enclosure.

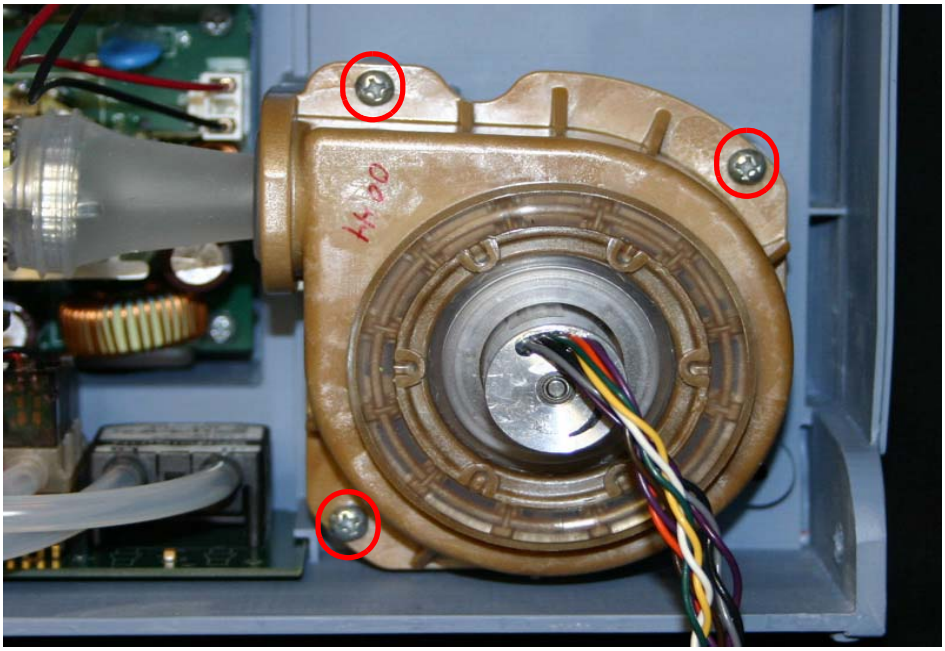


FIGURE 8-42: SCREW LOCATION

2. Slightly lift the entire Motor Blower Assembly up and out of the Rear Enclosure.
3. Disconnect the Transition Tube from the Flow Element Assembly.

Installation

1. Connect the Transition Tube to the Flow Element Assembly. Refer to Figure 8-43 for more detailed instructions.
2. Place the Assembly into the Rear Enclosure.
3. Secure the Assembly to the Rear Enclosure by tightening the screws to 8 in-bs.
4. Once the Motor Blower Assembly is secured, turn the enclosure over and wrap the Bellow around the Blower until it seals.

8.5.5 TRANSITION TUBE REPLACEMENT

Removal

1. Remove the Motor Blower Assembly. Refer to the Motor Blower Assembly Replacement Section for more details.
2. Remove the Transition Tube from the Flow Sensor Assembly.

FIGURE 8-43: DISCONNECTING/INSTALLING THE TRANSITION TUBE FROM FLOW SENSOR ASSEMBLY

Installation

1. Connect the small end of the Transition Tube to the Motor Blower Assembly. Verify proper alignment of the Transition Tube.
2. Connect the large end of the Transition Tube around the end of the Flow Sensor Assembly. Verify proper alignment of the Transition Tube.
3. Seat the Transition Tube disk into the Locator.
4. Install the Motor Blower Assembly. Refer to the Motor Blower Assembly Replacement Section for more details.

8.5.6 TRILOGY 100 FLOW SENSOR ASSEMBLY REPLACEMENT

Removal

1. Remove the all of the tubing, including the Transition Tube, from the Flow Sensor Assembly.
2. Remove the two screws securing the Flow Sensor Assembly to the Rear Enclosure.

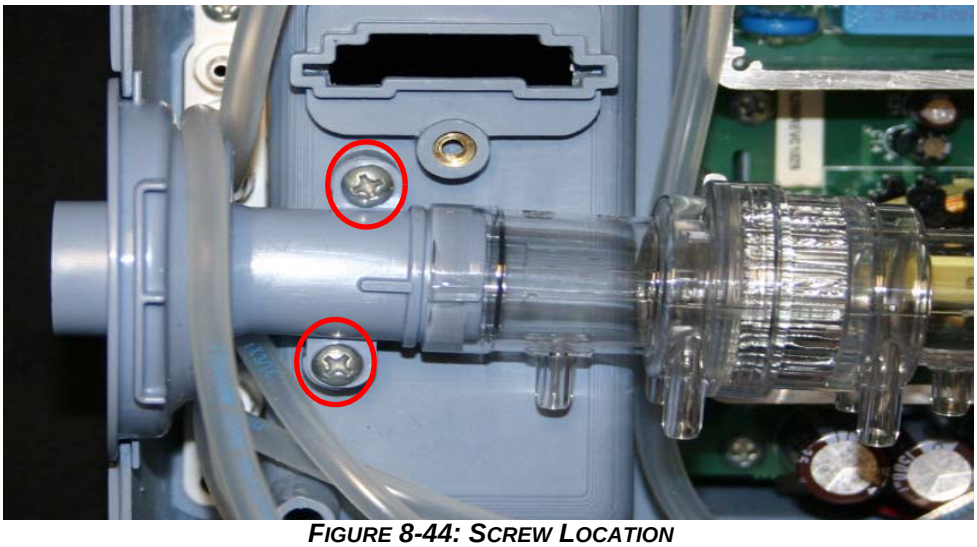


FIGURE 8-44: SCREW LOCATION

3. Remove the Outlet Flow Path Thermistor and Temperature Sensor Caps from the Flow Sensor Assembly.
4. Pull the Flow Sensor Assembly from the Rear Enclosure.

Installation

1. Ensure the two porting block caps are installed on the Flow Sensor Assembly.

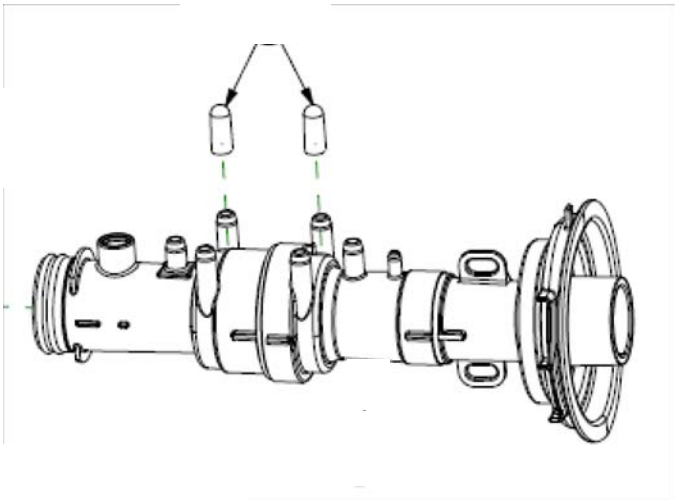


FIGURE 8-45: PORTING BLOCK CAP INSTALLATION

2. Place the Flow Sensor Assembly into the correct location in the Rear Enclosure.

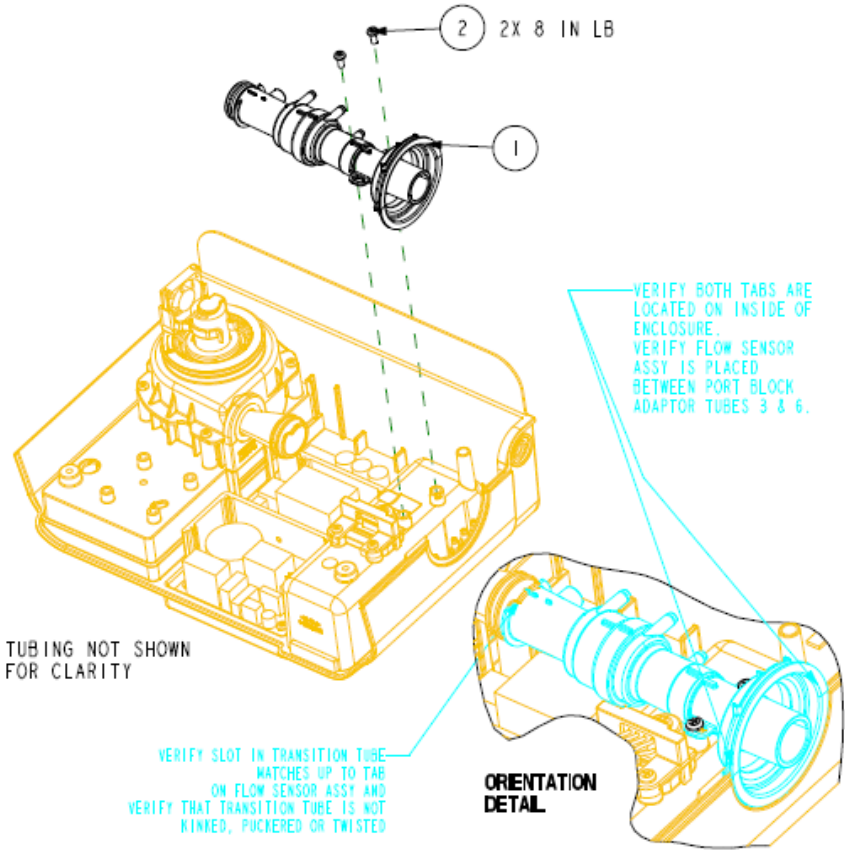


FIGURE 8-46: FLOW SENSOR ASSEMBLY INSTALLATION

3. Place the Temperature Sensor Cap and Outlet Flow Path Thermistor into the proper location in the Flow Sensor Assembly.

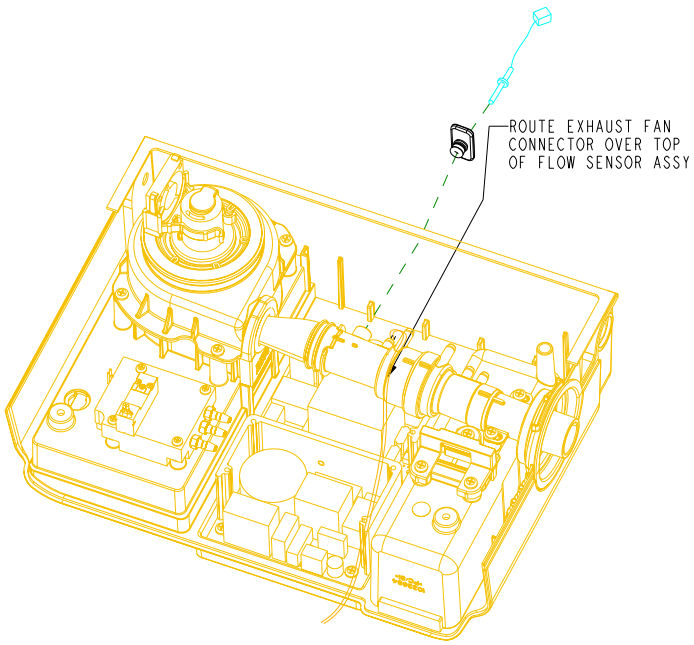


FIGURE 8-47: SENSOR CAP INSTALLATION

4. Secure the Flow Sensor Assembly to the Rear Enclosure by tightening the screws to 8 in-lbs.

5. Install all of the tubing back to the proper location. Refer to the drawings below.

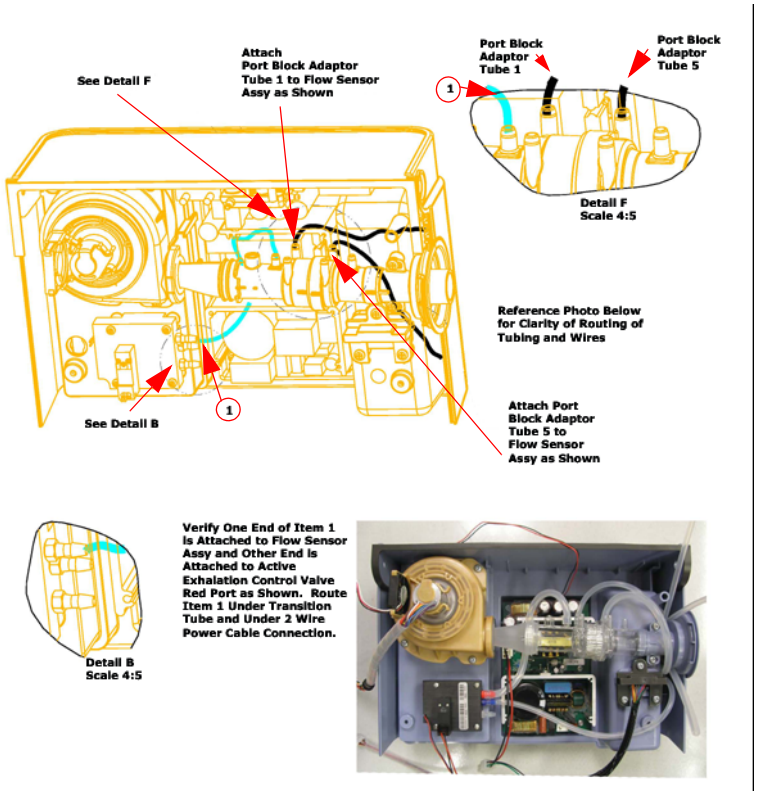


FIGURE 8-48: PROPER TUBING CONNECTIONS 1

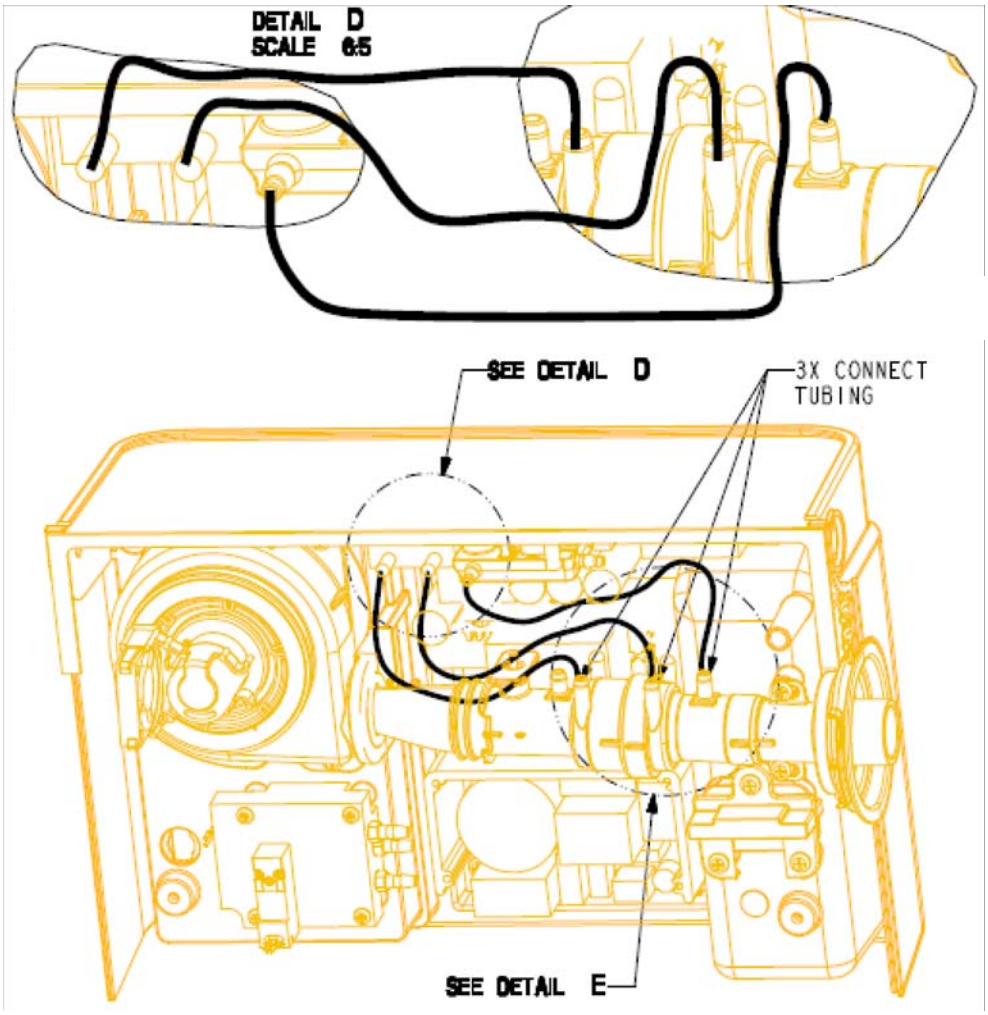


FIGURE 8-49: PROPER TUBING CONNECTIONS 2

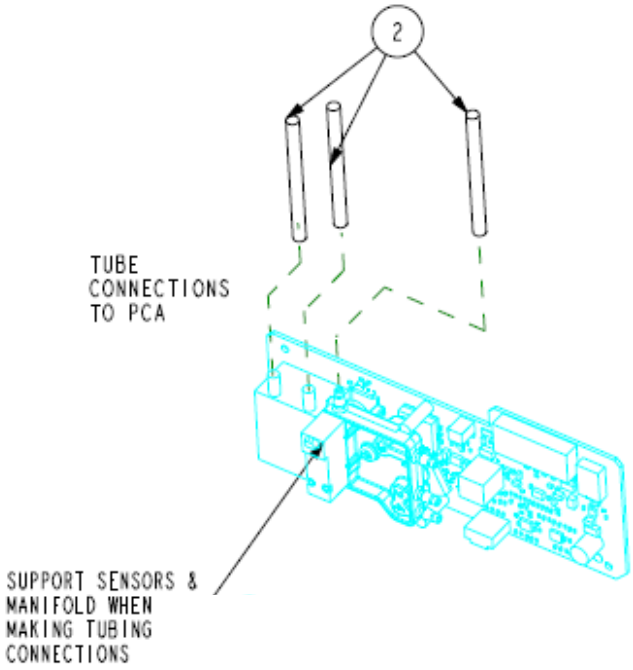


FIGURE 8-50: PROPER TUBING CONNECTIONS 3

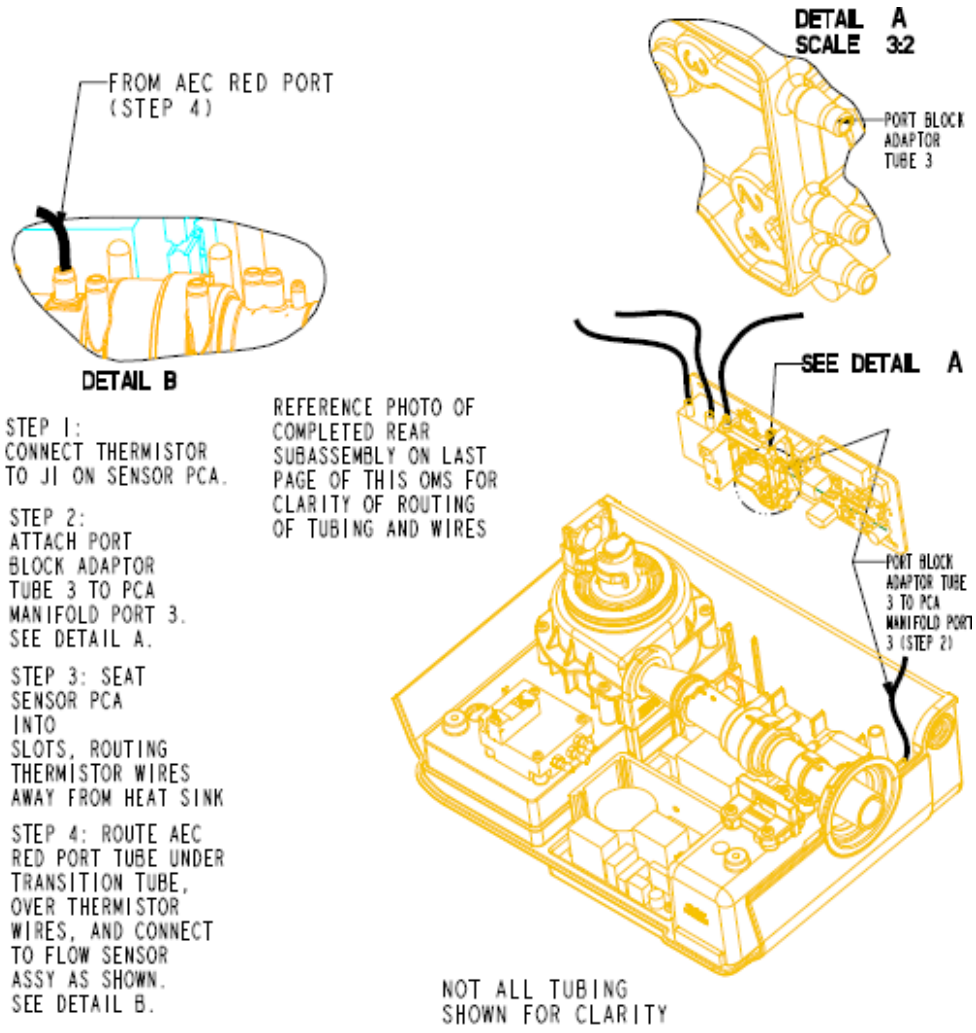


FIGURE 8-51: PROPER TUBING CONNECTIONS 4

8.5.7 TRILOGY 200, TRILOGY O_2, & TRILOGY 202 FLOW SENSOR ASSEMBLY REPLACEMENT

Removal

1. Remove the all of the tubing, including the Transition Tube, from the Flow Sensor Assembly.
2. Remove the two screws securing the Flow Sensor Assembly to the Rear Enclosure.

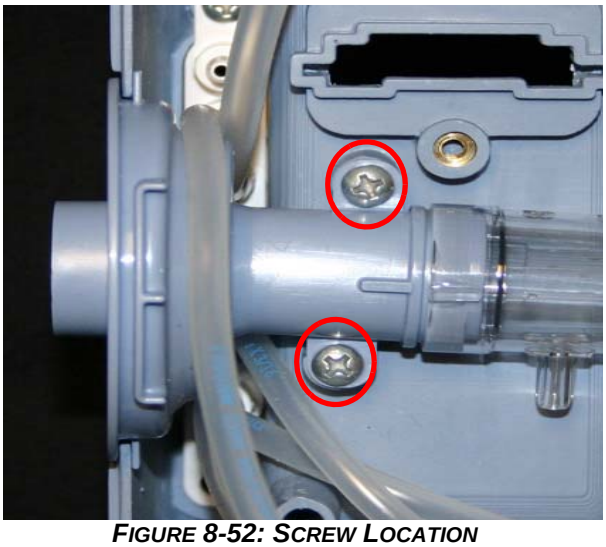


FIGURE 8-52: SCREW LOCATION

3. Remove the Outlet Flow Path Thermistor and Temperature Sensor Cap from the Flow Sensor Assembly.
4. Pull the Flow Sensor Assembly from the Rear Enclosure.

Installation

1. Ensure the two porting block caps are installed on the Flow Sensor Assembly.

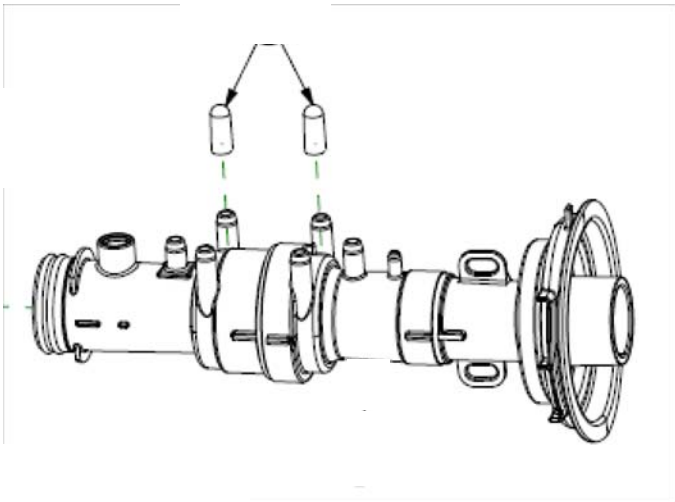


FIGURE 8-53; PORTING BLOCK CAP INSTALLATION

2. Place the Flow Sensor Assembly into the correct location in the Rear Enclosure.

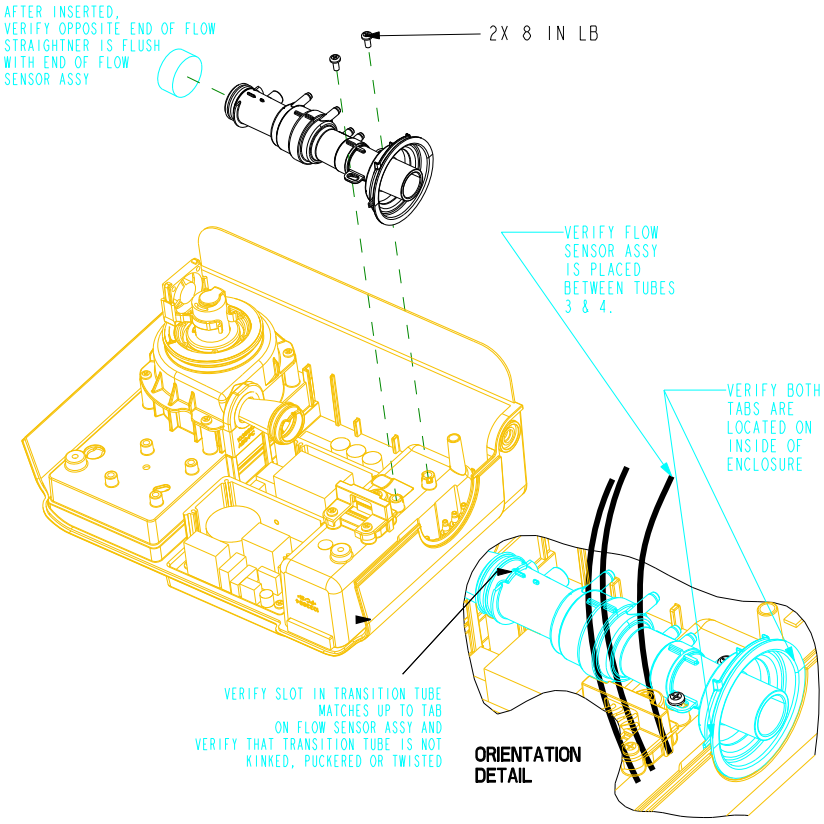


FIGURE 8-54: FLOW SENSOR INSTALLATION

3. Place the Temperature Sensor Cap and Outlet Flow Path Thermistor into the proper location in the Flow Sensor Assembly.

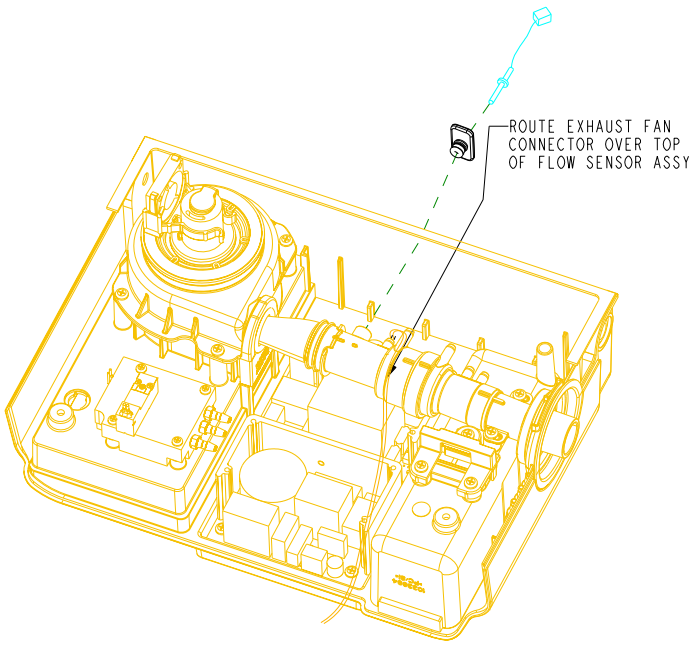


FIGURE 8-55: TEMPERATURE SENSOR CAP INSTALLATION

4. Secure the Flow Sensor Assembly to the Rear Enclosure by tightening the screws to 8 in-lbs.

5. Install all of the tubing back to the proper location. Refer to the drawings below.

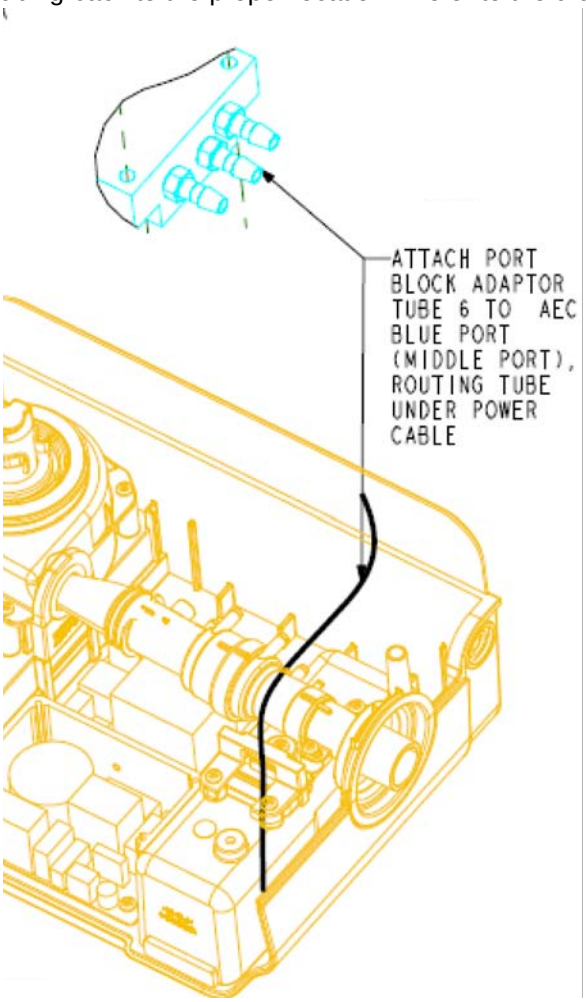


FIGURE 8-56: PROPER TUBING CONNECTIONS 1

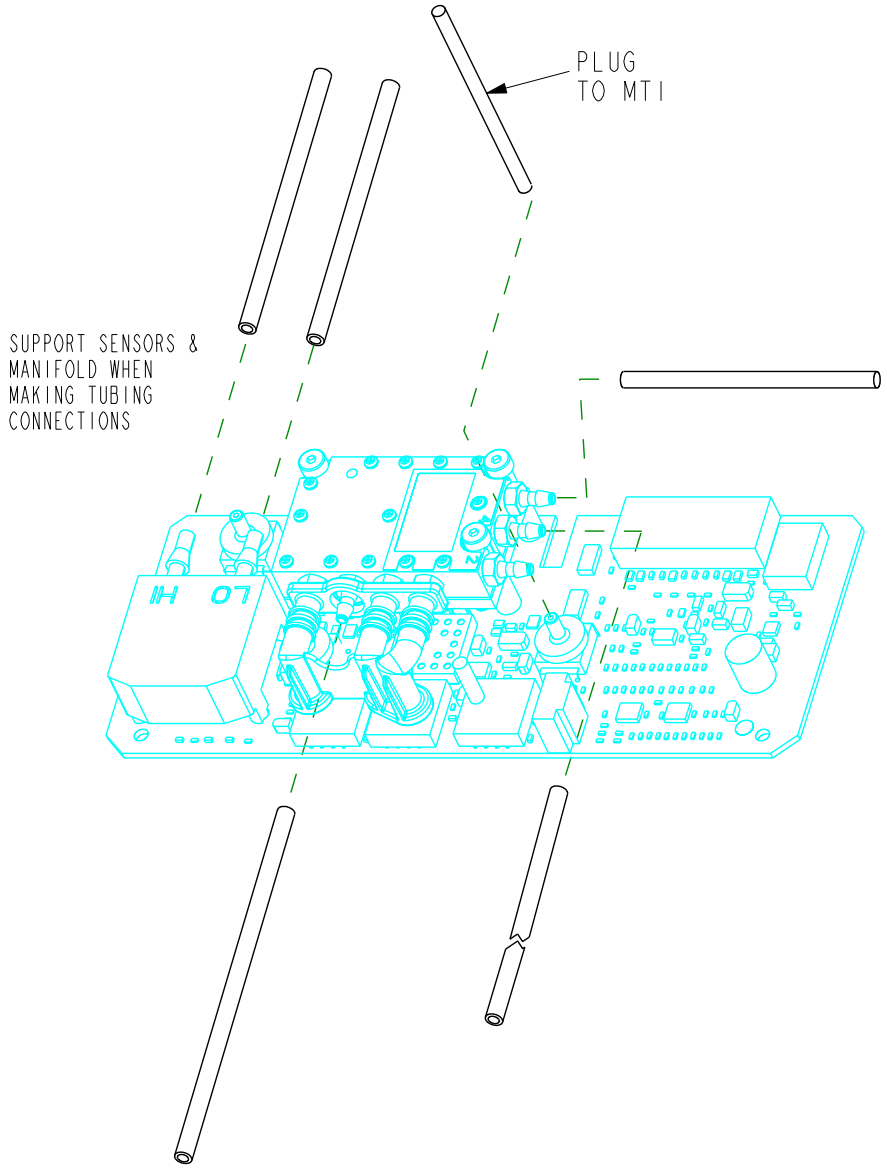


FIGURE 8-57: PROPER TUBING CONNECTIONS 2

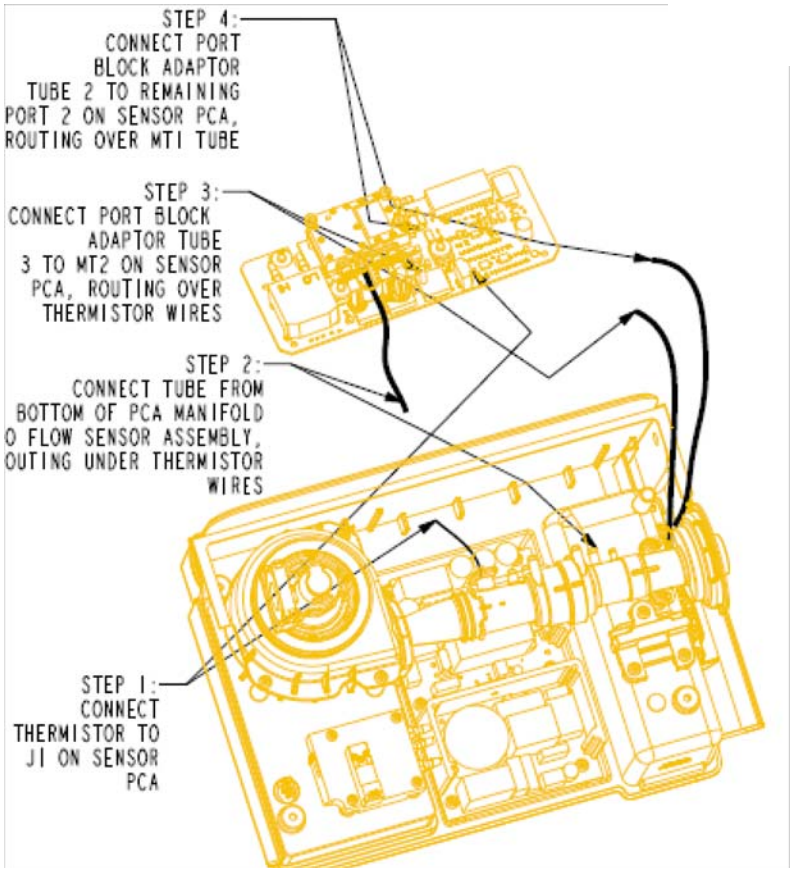


FIGURE 8-58: PROPER TUBING CONNECTIONS 3

8.5.8 PORTING BLOCK ADAPTOR REPLACEMENT

Removal

1. Remove the Flow Sensor Assembly. Refer to the Trilogy 100 Flow Sensor Assembly Section or the Trilogy 200, Trilogy O_2, & Trilogy 202 Section for more information for more details.
2. Remove all of the tubing connected to the Porting Block Adaptor.
3. Remove the two screws connecting the Porting Block Adaptor to the Rear Enclosure.

Installation

1. For Trilogy 100 device ensure the porting block caps are installed as shown.

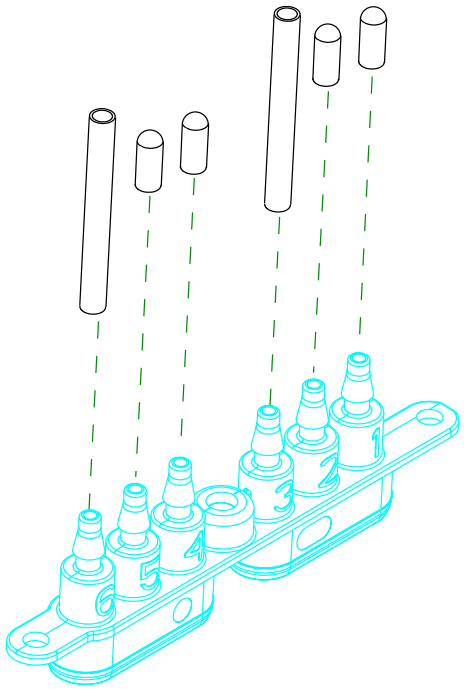


FIGURE 8-59: TRILOGY 100 TUBING & CAP PLACEMENT

2. For Trilogy 200, Trilogy O_2, & Trilogy 202 devices ensure the porting block caps are installed as shown.

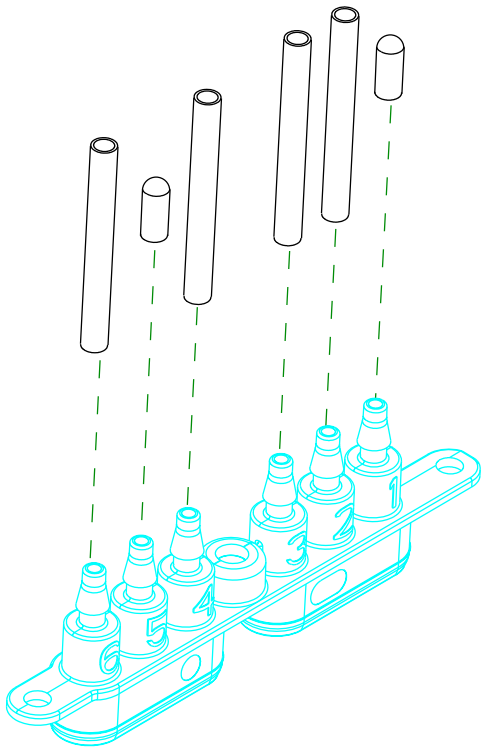


FIGURE 8-60: TRILOGY 200, TRILOGY O_2, & TRILOGY 202 TUBING & CAP PLACEMENT

3. Connect the Porting Block Adaptor to the Rear Enclosure by tightening the screws to 8 in-lbs.

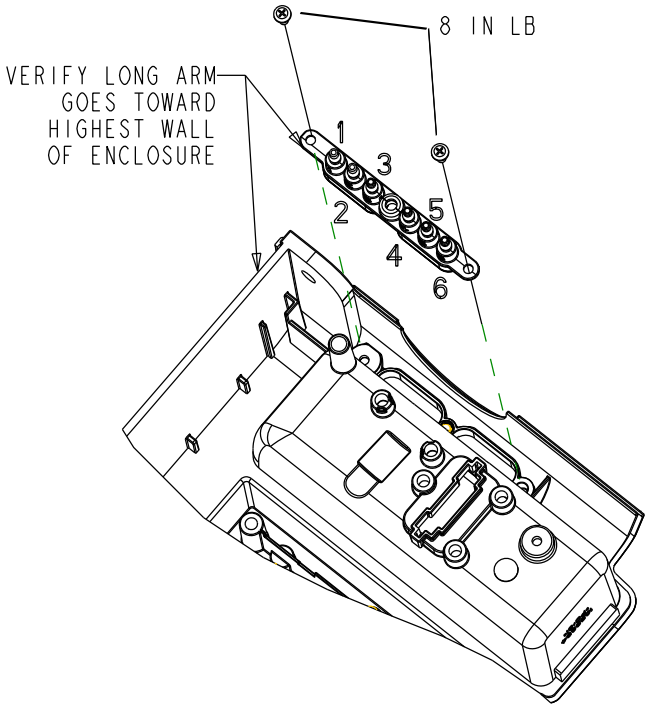


FIGURE 8-61: PORTING BLOCK INSTALLATION

NOTE

Verify that the long arm of the Porting Block Adaptor goes towards the highest wall of the enclosure.

4. Connect the correct tubing to the proper location on the Porting Block Adaptor.
5. Install the Flow Sensor Assembly. Refer to the Trilogy 100 Flow Sensor Assembly Section or the Trilogy 200, Trilogy O_2, & Trilogy 202 Section for more information for more details.

8.5.9 TRILOGY 100 SENSOR PCA REPLACEMENT

Removal

1. Slide the Sensor PCA out of the Rear Enclosure.

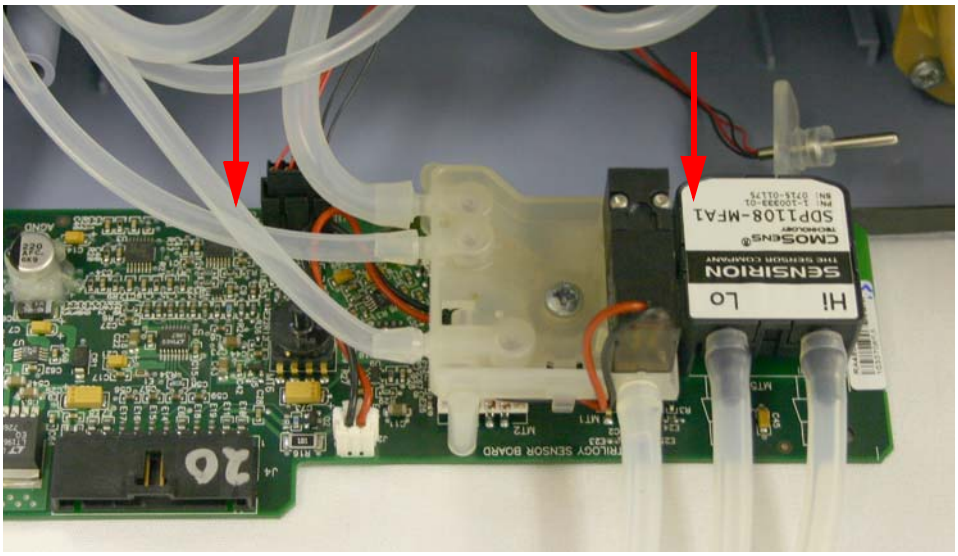


FIGURE 8-62: SENSOR PCA REMOVAL

2. Remove any tubing connected to the Sensor PCA.

Installation

1. Slide the Sensor PCA into the grooves in the Rear Enclosure.

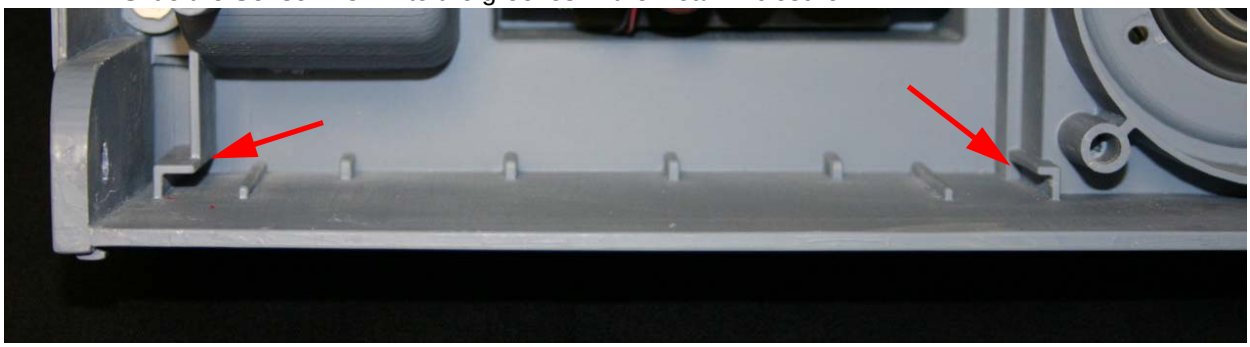


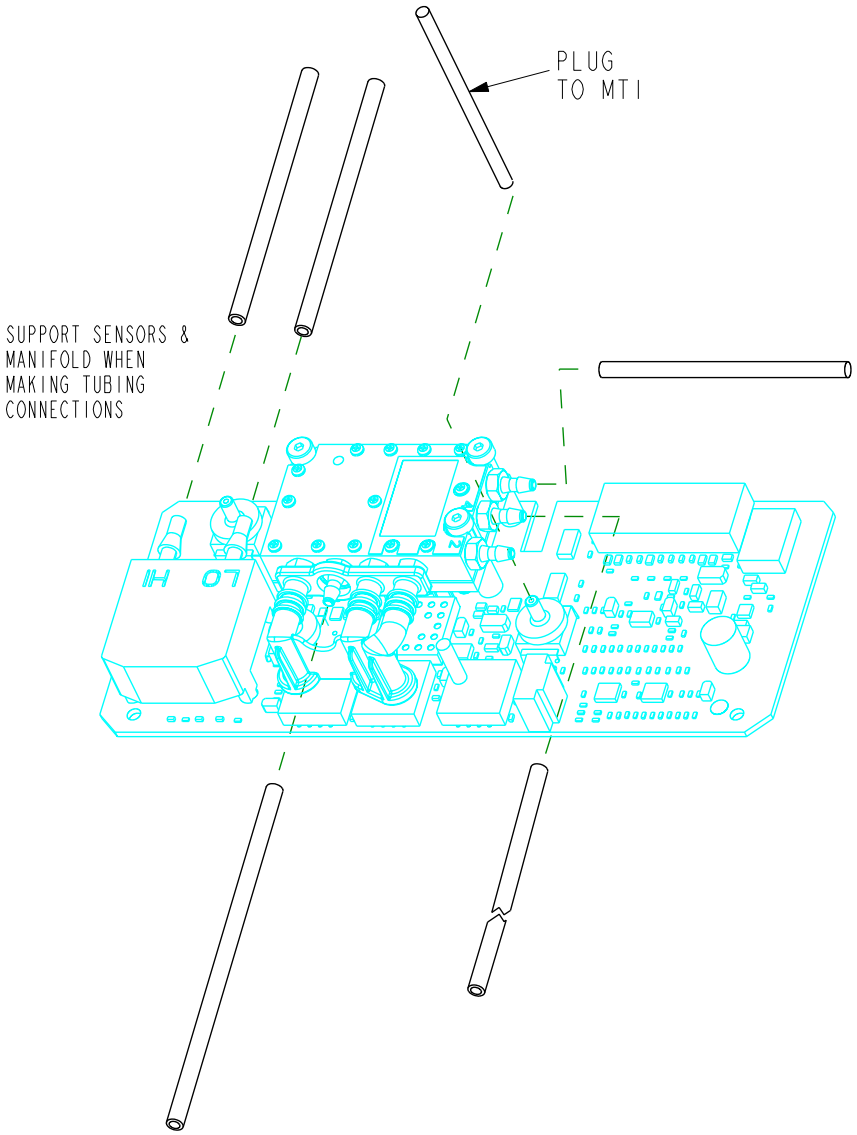
FIGURE 8-63: GROOVE LOCATION

2. Connect the proper tubing to the Sensor PCA. Refer to Figure 8-50.
3. Using the Trilogy Tool Box Application, erase the Sensor Table prior to running the Field Service Application Repair Test.

8.5.10 TRILOGY 200, TRILOGY O_2, & TRILOGY 202 SENSOR PCA REPLACEMENT

Removal

1. Slide the Sensor PCA out of the Rear Enclosure.
2. Remove any tubing connected to the Sensor PCA.



Installation

1. Connect thermistor to J1 on Sensor PCA.
2. Connect tube from bottom of PCA Manifold to Flow Sensor Assembly, routing under the thermistor wires
3. Connect the Porting Block Adaptor tube 3 to MT2 on Sensor PCA, routing over thermistor wires.
4. Connect Port Block Adaptor Tube 2 to remaining port on Sensor PCA, routing over MT1 Tube.

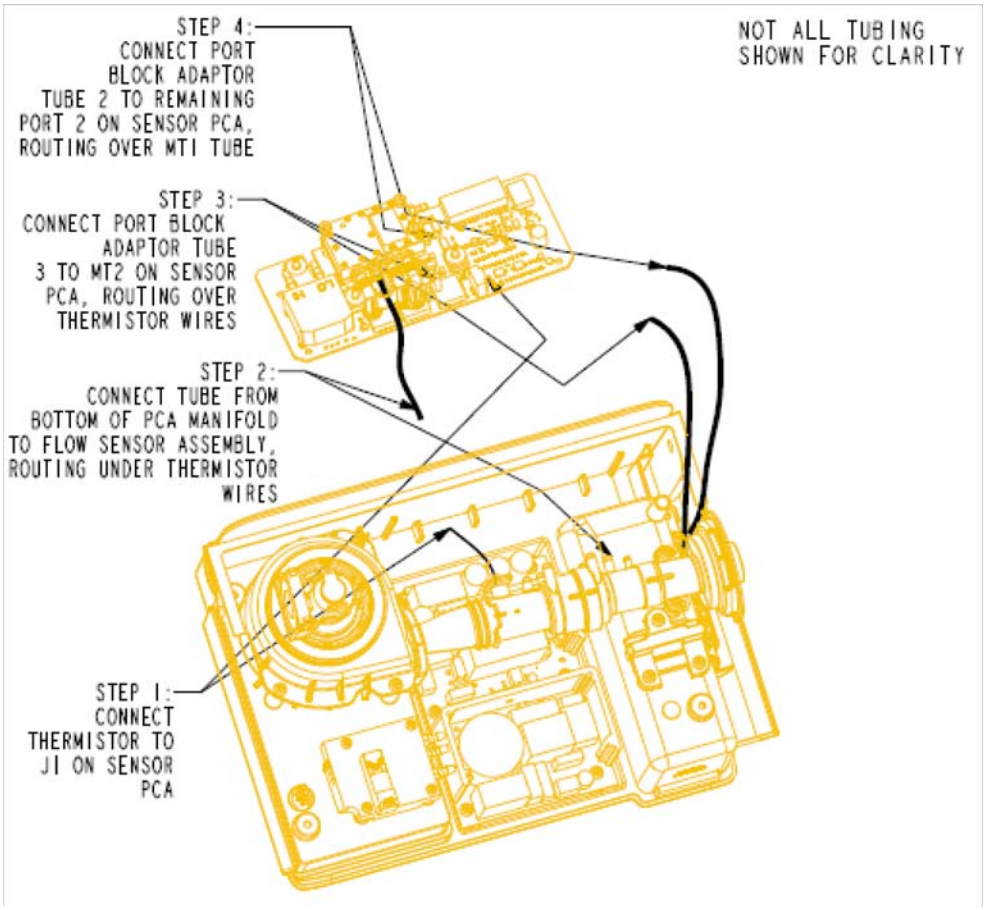


FIGURE 8-64: TUBING AND ELECTRICAL CONNECTIONS

5. Follow the steps in the Figure below to insert the PCA in the enclosure and make the final connections.

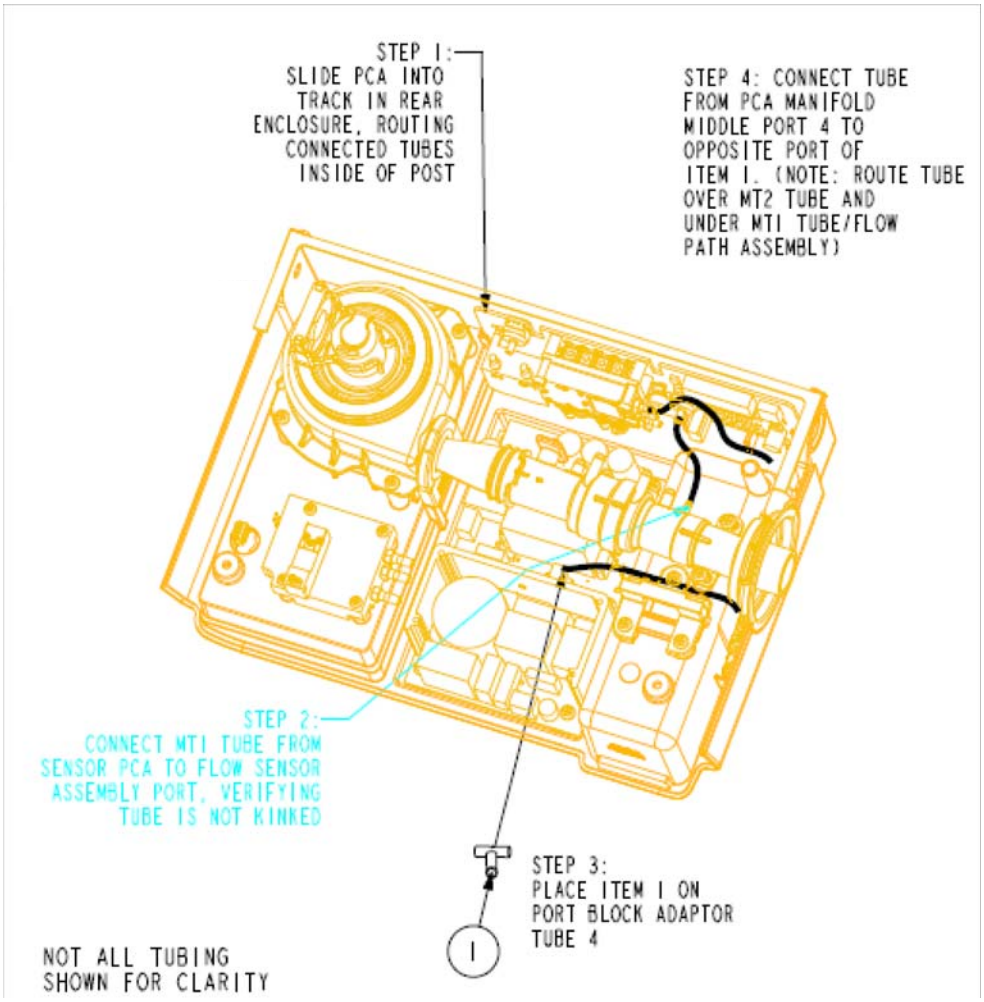


FIGURE 8-65: PCA PLACEMENT AND FINAL CONNECTIONS8

6. Ensure items 1, 2, 3, and 4 are assembled properly.

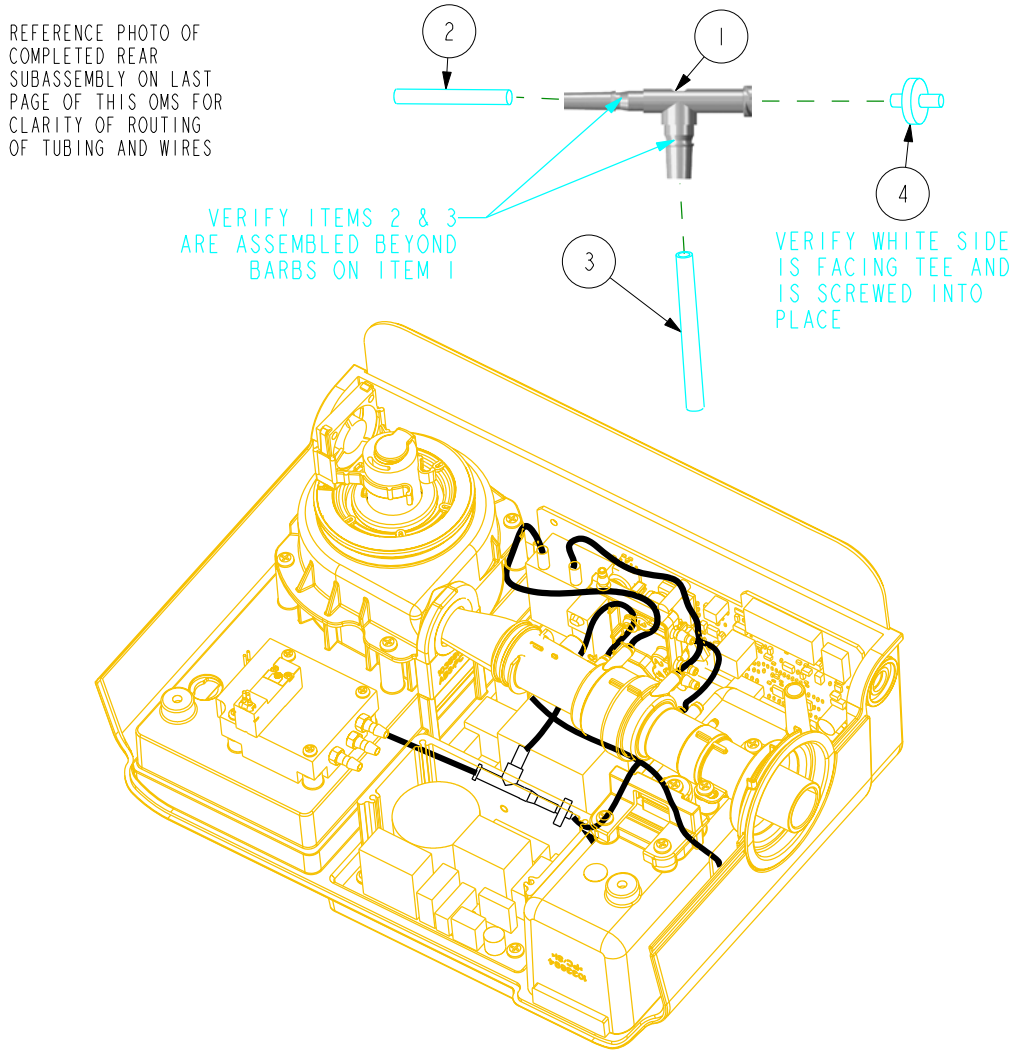


FIGURE 8-66: TEE TUBING CONNECTIONS

7. Ensure part 2 is attached to the Active Exhalation Control Valve red port.
8. Ensure item 3 is connected from the Filter/Tee to the Flow Sensor Assembly, routing the tube under the Flow Path Assembly and over the thermistor.
9. Connect the Tube from the Sensor PCA Manifold top port to filter, routing over MT2 tube and under MT1 tube and Flow Path Assembly.
10. Ensure the coiled pice of tubing has a plug attached to the end.
11. Ensure the coiled tube is attached to the Tee and nested under the Flow Sensor Assembly, with tubing routed under the filter/Tee Assembly.
12. Connect Sensirion Hi and Lo tubes to Outlet Flow Path.
13. Using the Trilogy Tool Box Application, erase the Sensor Table prior to running the Field Service Application Repair Test.

8.5.11 POWER SUPPLY PCA REPLACEMENT

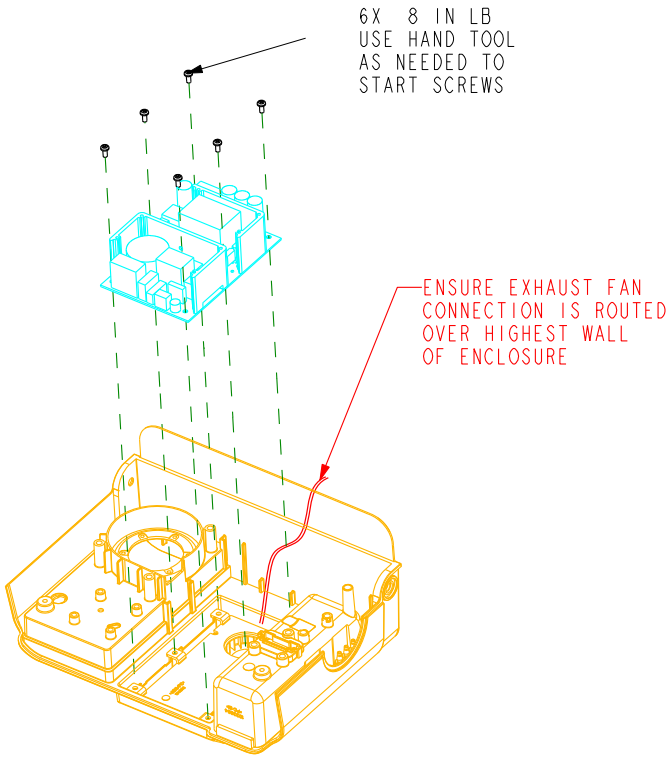
Removal

1. Remove the Motor Blower Assembly. Refer to the Motor Blower Assembly Replacement Section for more details.
2. Remove the Transition Tube. Refer to the Transition Tube Replacement Section for more details.
3. Remove the Flow Sensor Assembly. Refer to the Trilogy 100 Flow Sensor Assembly Section or the Trilogy 200, Trilogy O_2, & Trilogy 202 Section for more information for more details.
4. Remove the Sensor PCA. Refer to the Trilogy 100 Sensor PCA Section or the Trilogy 200 & O_2 Sensor PCA Section for more details.
5. Remove the Power Supply PCA to Power Management Board Cable from location J2 on the Power Supply PCA.
6. Remove the six screws securing the Power Supply PCA to the Rear Enclosure.

FIGURE 8-67: SCREW LOCATION

Installation

1. Connect the Power Supply to the Rear Enclosure by tightening the screws to 8 in-lbs.



2. Connect the Power Supply PCA to Power Management Board Cable to location J2 on the Power Supple PCA.
3. Install the Sensor PCA. Refer to the Trilogy 100 Sensor PCA Section or the Trilogy 200 & O_2 Sensor PCA Section for more details.
4. Install the Flow Sensor Assembly. Refer to the Trilogy 100 Flow Sensor Assembly Section or the Trilogy 200, Trilogy O_2, & Trilogy 202 Section for more information for more details.
5. Install the Transition Tube. Refer to the Transition Tube Replacement Section for more details.
6. Install the Motor Blower Assembly. Refer to the Motor Blower Assembly Replacement Section for more details.

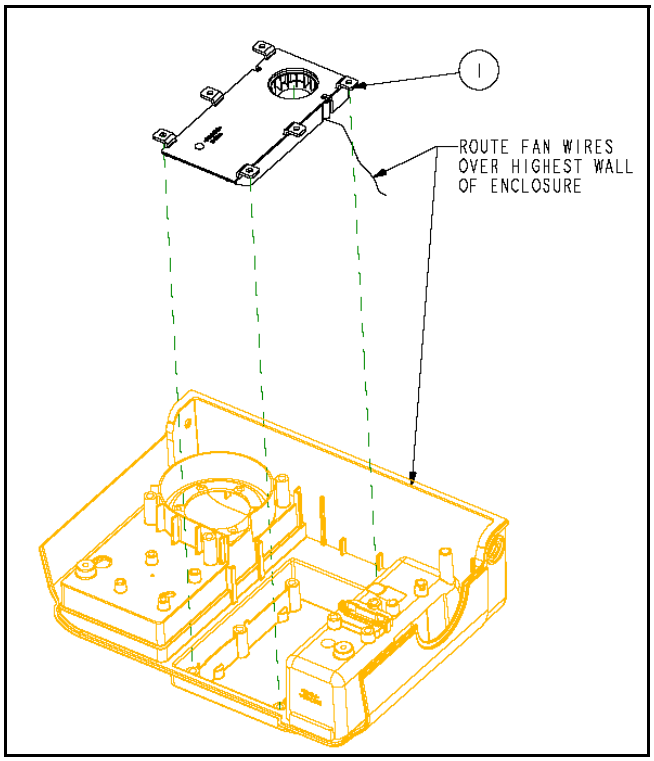
8.5.12 EXHAUST FAN ASSEMBLY REPLACEMENT

Removal

1. Remove the Motor Blower Assembly. Refer to the Motor Blower Assembly Replacement Section for more details.
2. Remove the Transition Tube. Refer to the Transition Tube Replacement Section for more details.
3. Remove the Flow Sensor Assembly. Refer to the Trilogy 100 Flow Sensor Assembly Section or the Trilogy 200 & Trilogy O_2, & Trilogy 202 Section for more information for more details.
4. Remove the Sensor PCA. Refer to the Trilogy 100 Sensor PCA Section or the Trilogy 200 & O_2 Sensor PCA Section for more details.
5. Remove the Power Supply PCA. Refer to the Power Supply PCA Replacement Section for more details.
6. Lift the Exhaust Fan Assembly up and out of the Rear Enclosure.

Installation

1. Place the Exhaust Fan Assembly in the Rear Enclosure. Route the Fan wires over the highest wall of the enclosure.



2. Place the Power Supply PCA over top of the Exhaust Fan Assembly and secure it to the Rear Enclosure by tightening the screws to 8 in-lbs.
3. Connect the Power Supply PCA to Power Management Board Cable to location J2 on the Power Supple PCA.
4. Install the Sensor PCA. Refer to the Trilogy 100 Sensor PCA Section or the Trilogy 200 & O_2 Sensor PCA Section for more details.
5. Install the Flow Sensor Assembly. Refer to the Trilogy 100 Flow Sensor Assembly Section or the Trilogy 200, Trilogy O_2, Trilogy 202 Section for more information for more details.

6. Install the Transition Tube. Refer to the Transition Tube Replacement Section for more details.
7. Install the Motor Blower Assembly. Refer to the Motor Blower Assembly Replacement Section for more details.

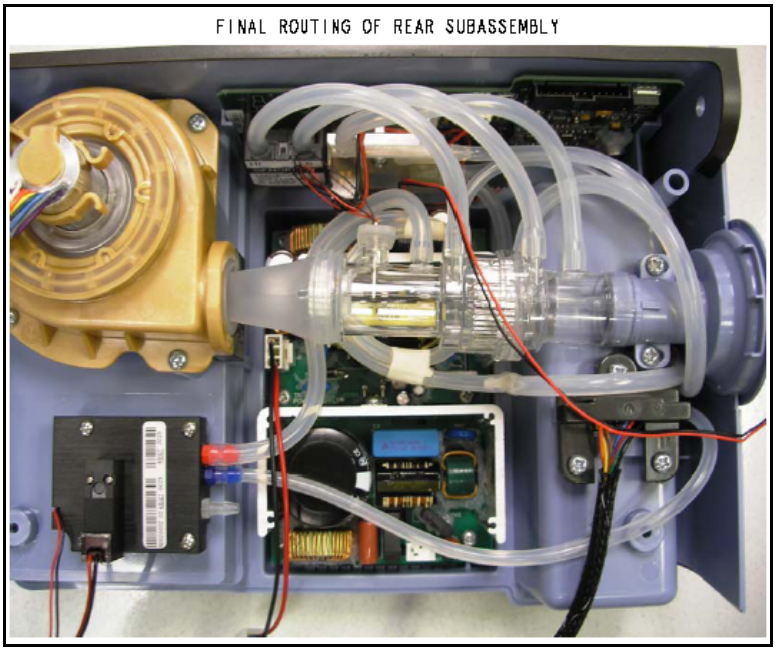


FIGURE 8-68: PROPER ROUTING OF TRILOGY 100 TUBING AND WIRING

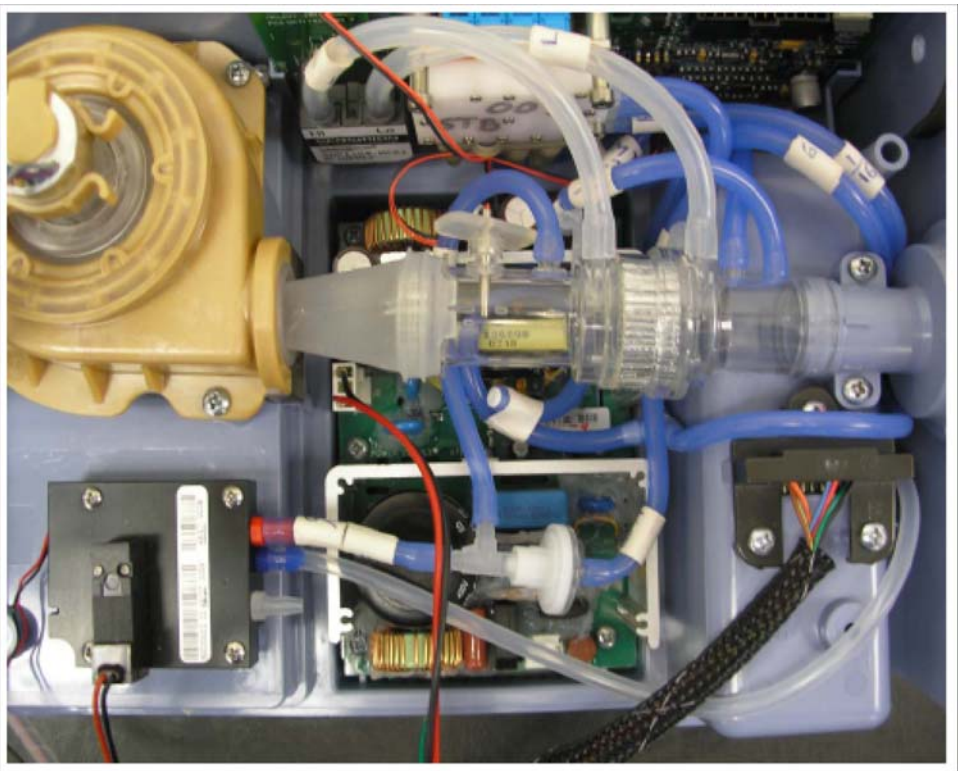


FIGURE 8-69: PROPER ROUTING OF TRILOGY 200, TRILOGY O_2, TRILOGY 202 TUBING AND WIRING

8.6 FRONT/REAR/BOTTOM ENCLOSURE INSTALLATION

1. **IMPORTANT TO BE CONNECTED LAST:** Connect the Internal Battery Cable to J2 on the Power Management Board
2. Place the Top Plate in the groves on the Front and Rear Enclosure.
3. Move the enclosure close enough to connect the wiring.
4. Using two tie wraps, secure the Ferrite on the Blower wires to the plastic support bracket.
5. Connect the Detachable Battery cable to J1 and J3 on the Power Management Board.
6. Connect the Exhaust Fan to J1 on the System Board.
7. Connect the Exhalation Control Module to J10 on the System Board.
8. Secure the Exhalation Control Module Wires to the Metal Support using cloth tape.
9. Connect the Blower Fan to J17 on the System Board.
10. Connect the Blower to J5 on the System Board.
11. Connect the Sensor Cable to J4 on the Sensor Board.
12. Ensuring not to pinch tubing or wiring, slide the Front and Rear Enclosures completely together.
13. Secure the Front and Rear Enclosures together by tightening the screws to 8 in-lbs.
14. The Front and Rear Enclosure are now in place. It is now time to connect the Bottom Enclosure.
15. Connect the Capacitor to J6 on the System Board.
16. Connect the Battery Fan Cable to J18 on the System Board.
17. Connect the AC Connector to J1 on the Power Supply Board.
18. Connect the Power Supply to location J1 on the Power Management Board.
19. Connect the Interface Cable to J7 on the System Board.
20. Connect the Ethernet Cable to J19 on the System Board.
21. Connect the Oxygen Tube to the Exhalation Control Module.
22. Connect the DC Battery Cable to J4 on the Power Management Board.
23. Connect the OBM wire harness to J7 on the Interface PCA (Trilogy O_2 and Trilogy 202 Only).
24. **IMPORTANT TO BE CONNECTED LAST:** Connect the Internal Battery Cable to J2 on the Power Management Board.

CAUTION
Once the Internal Battery Cable is connected, power may be active.

25. Ensure all wiring connections are still connected and the Oxygen Tube is still connected.
26. Fold the Bottom Enclosure over to seal the enclosure together. Ensure that the wiring and tubing is clear of the seam and not kinked.
27. Lift up the device and turn the device to have the LCD face you. Gently lift up one end of the Bottom Enclosure and connect the Alarms to Speaker 1 and Speaker 2 on the front Panel Board. Ensure that the wiring and tubing is clear of the seam and not kinked.
28. Secure the Bottom Enclosure to the Front and Rear Enclosures by tightening the screws to 8 in-lbs.
29. Connect the Active/Passive Port. Refer to the Active/Passive Porting Block Replacement Section for more details.
30. Insert the Air Path Foam. Refer to the Air Path Foam Replacement Section for more details.

31. Connect the Inlet Air Path Assembly or Oxygen Blending Module Assembly. Refer to the Inlet Air Path Assembly Section or the Oxygen Blending Module Assembly procedure for more details.

8.7 OXYGEN BLENDING MODULE COMPONENT REPAIR & REPLACEMENT PROCEDURES

NOTE

All Trilogy O2 and 202 Oxygen Blending Module PCA's come with embedded software, which may not be aligned with the current released production build version of Trilogy software represented on my.respironics.com. In order to match the O2 and 202 PCA software to the Trilogy software, after Oxygen Blending Module PCA replacement, unit software must be reloaded onto the device. This applies even when the unit software is the same as the posted Trilogy software on my.respironics.com.

8.7.1 OXYGEN BLENDER FILTER/WHISPER CAP REPLACEMENT

Removal

1. Pull the Whisper Cap from the Air Inlet Duct.
2. Remove the Filter from the Air Inlet Duct.

Installation

1. Place the Filter into the Air Inlet Duct.
2. Place the Filter Cap over the Filter and ensure it is securely in place (you will hear a snap).

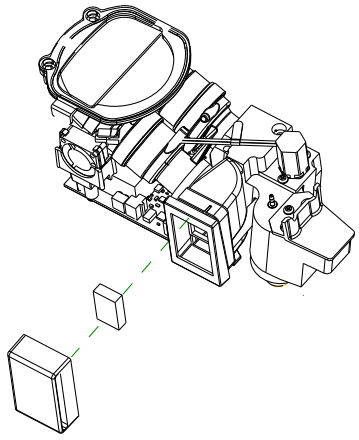


FIGURE 8-70: FILTER AND WHISPER CAP REMOVAL/INSTALLATION

8.7.2 OXYGEN BLENDER HOUSING REMOVAL

Removal

1. Remove the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
2. Remove the metal ring from the front of the Housing.
3. Remove the six screws securing the Manifold to the Housing.
4. Lift the Manifold out of the Housing.

Installation

1. Place the Manifold into the Housing.
2. Secure the Manifold to the Housing by tightening the four screws to 8 in-lbs.
3. Secure the two screws that connect the Mixer the to Housing by tightening the screws to 6 in-lbs.
4. Secure the metal ring to the assembly by tightening the screws to 6 in-lbs.
5. Install the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.

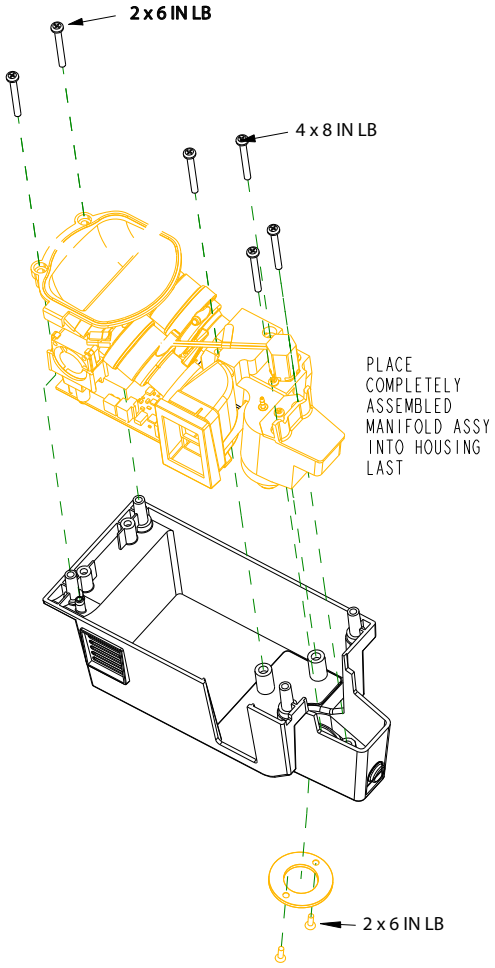


FIGURE 8-71: OXYGEN BLENDER HOUSING REMOVAL/INSTALLATION

8.7.3 MIXING ELEMENT/FLOW ELEMENT TUBES REPLACEMENT

Removal

1. Remove the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
2. Remove the Oxygen Blender Housing. Refer to the Oxygen Blender Housing Removal Section for more details.
3. Release the Pressure Sensor Clip from the PCA.
4. Remove the rest of the tubing from the Flow Element Tubes.
5. Remove the screw securing the Mixing Element to the PCA.
6. Pull the Mixing element still connected to the Flow Element Tubes away from the Manifold.
7. Unscrew the screw securing the Flow Element Tubes to the Mixing Element.

Installation

1. Ensure that the two o-rings are in place at the end of the Flow Element Tubes.
2. Dip the end of the Flow Element Tubes in an alcohol bath and inert them into the Mixing Element.
3. Secure the Flow Element Tubes to the Mixing Element by securing the screw to 6 in-lbs.

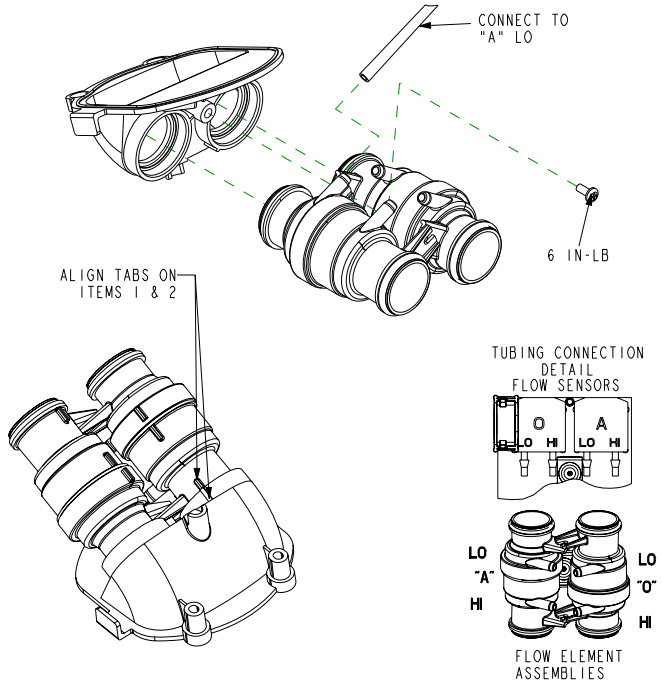


FIGURE 8-72: MIXING ELEMENT/FLOW TUBES REPLACEMENT

4. Ensure that the two o-rings are in place at the other end of the Flow Element Tubes.

5. Using a standoff, secure the Mixing Element to the PCA be securing the screw to 6 in-lbs.

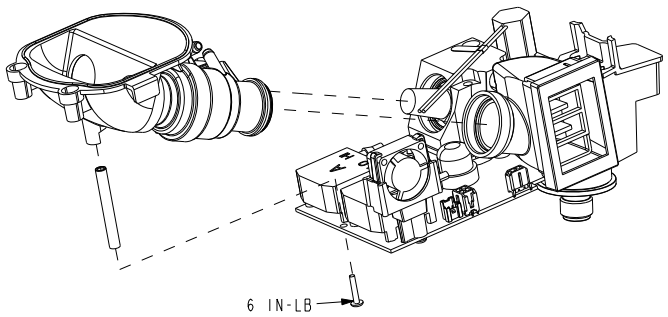


FIGURE 8-73: TUBE INSERTION AND STANDOFF PLACEMENT

6. Reconnect the tubing to the Flow Element Tubes and ensure it is connected properly to the PCA flow sensors.
7. Ensuring that the two small o-rings are in place reconnect the Pressure Sensor Clip to the PCA.
8. Install the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
9. Install the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.

8.7.4 OXYGEN BLENDER PCA/PCA SPACER REPLACEMENT

Removal

1. Remove the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
2. Remove the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
3. Remove the Mixing Element/Flow Element Tubes. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
4. Disconnect the Valve connection from location P4 on the PCA.
5. Remove the two screws that secure the PCA to the Manifold.
6. Remove the screw that connect the PCA Spacer to the Manifold.

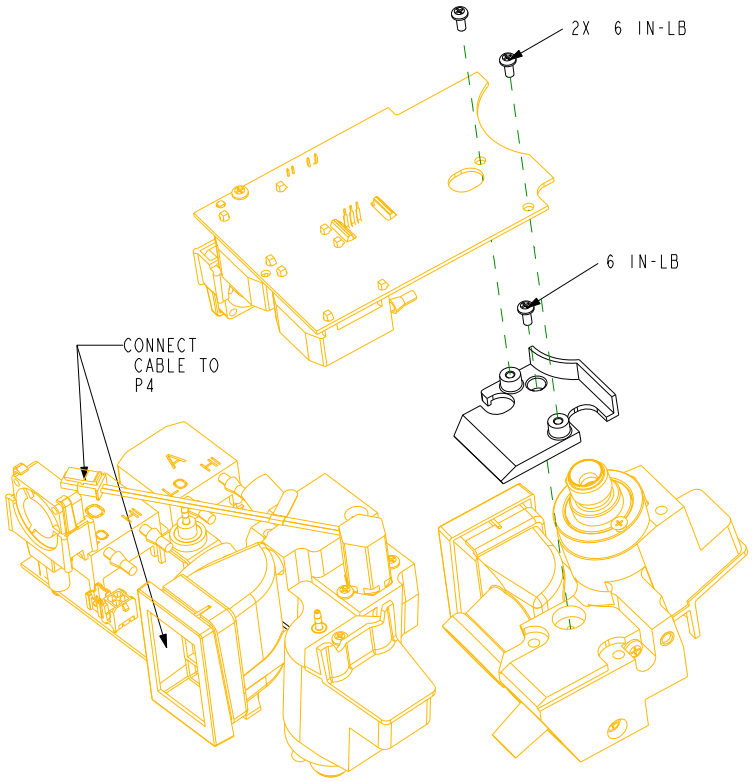


FIGURE 8-74: OXYGEN BLENDER PCA/PCA SPACER REMOVAL/INSTALLATION

Installation

1. Connect the PCA Spacer to the Manifold by tightening the screw to 6 in-lbs.
2. Connect the PCA to the Manifold be securing the two screws to 6 in-lbs.
3. Connect the Valve Wire to location P4 on the Main PCA.
4. Install the Mixing Element/Flow Element Assembly. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
5. Install the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
6. Install the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
7. Reload the current Trilogy Firmware located on my.respironics.com.

8.7.5 OXYGEN BLENDER PRESSURE SENSOR PORT CLIP REPLACEMENT

Removal

1. Remove the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
2. Remove the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
3. Remove the Mixing Element/Flow Element Tubes. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
4. Remove the Oxygen Blender PCA/PCA Spacer. Refer to Oxygen Blender PCA/PCA Spacer Replacement Section for more details.
5. Unlatch the Port Clip from the bottom of the Oxygen Blender PCA.
6. Remove the Port Clip with green tube attached and two o-rings from the Oxygen Blender PCA.

Installation

1. Verify the green tube is inserted flush against the mating surface on the new Port Clip.
2. Insert the first new o-ring into the new Port Clip.
3. Insert the second new o-ring onto U24 on the Oxygen Blender PCA.
4. Insert the Port Clip with the first new o-ring over U24.
5. Latch the Port Clip onto the Oxygen Blender PCA.

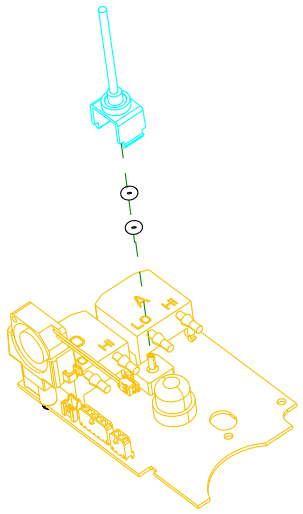


FIGURE 8-75: PORT CLIP REMOVAL/INSTALLATION

6. Install the Oxygen Blender PCA/PCA Spacer. Refer to Oxygen Blender PCA/PCA Spacer Replacement Section for more details.
7. Install the Mixing Element/Flow Element Tubes. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
8. Install the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
9. Install the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.

8.7.6 OXYGEN BLENDER FAN REPLACEMENT

Removal

1. Remove the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
2. Remove the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
3. Disconnect the Fan wire from location P5 on the Oxygen Blender PCA.
4. Remove the Fan from the Fan Bracket.

Installation

1. Secure the Fan to the Fan Bracket.

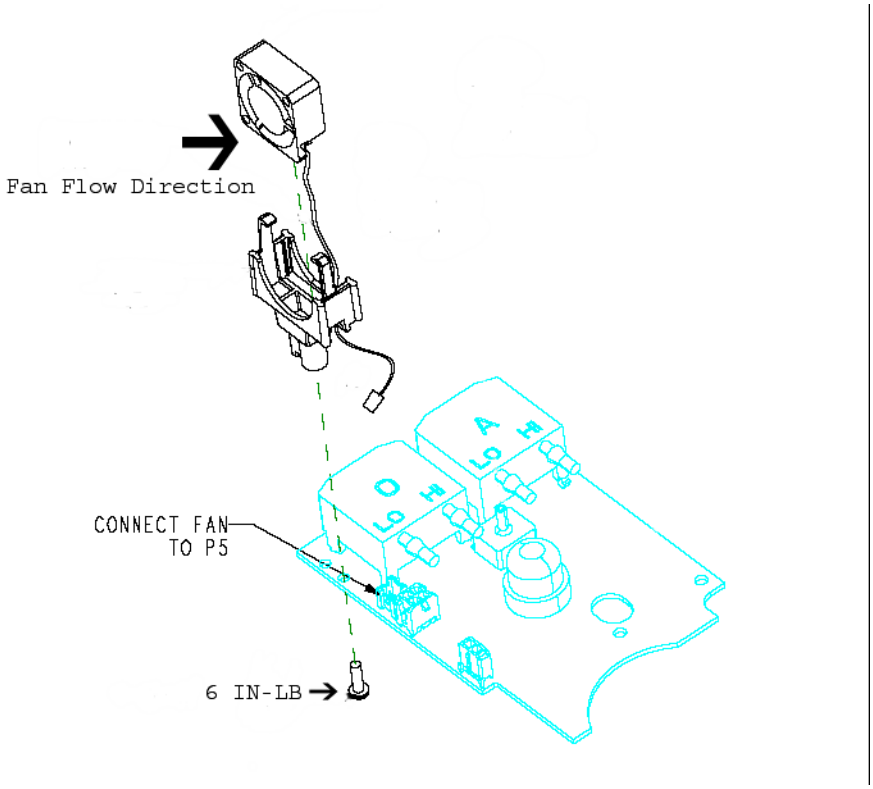


FIGURE 8-76: FAN REMOVAL/INSTALLATION

2. Connect the Fan Wire to location P5 on the Oxygen Blender PCA.
3. Install the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
4. Install the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.

8.7.7 AIR INLET DUCT ASSEMBLY REPLACEMENT

Removal

1. Remove the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
2. Remove the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
3. Remove the Mixing Element/Flow Element Assembly. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
4. Remove the two screws that secure the Air Inlet Duct Assembly to the Manifold.

Installation

1. Connect the Air Inlet Duct Assembly to the Manifold by tightening the screws to 8 in-lbs.

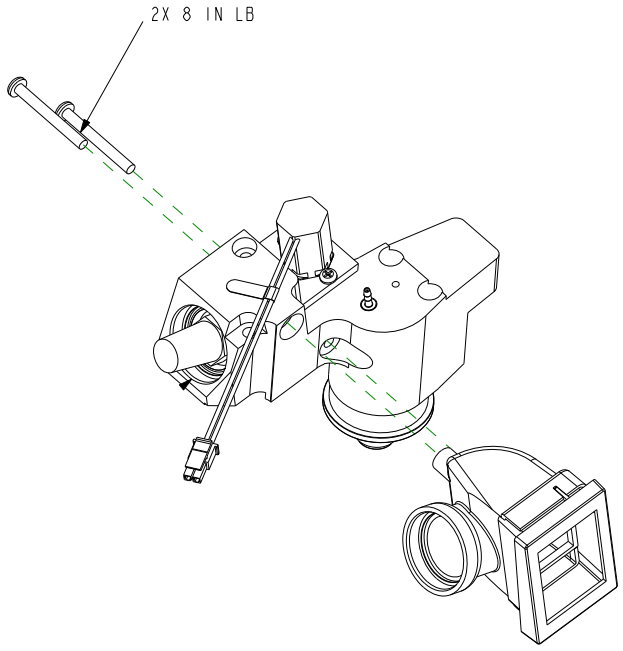


FIGURE 8-77: AIR INLET DUCT INSTALLATION

2. Install the Mixing Element/Flow Element Assembly. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
3. Install the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
4. Install the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.

8.7.8 LOWER MANIFOLD COVER REPLACEMENT

Removal

1. Remove the screw that secures the Lower Manifold Cover to the Manifold.

Installation

1. Connect the Lower Manifold Cover to the Manifold by tightening the screw to 6 in-lbs.

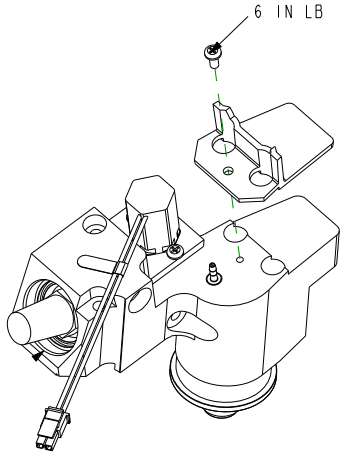


FIGURE 8-78: LOWER MANIFOLD COVER INSTALLATION

8.7.9 MANIFOLD REPLACEMENT

Removal

1. Remove the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.
2. Remove the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
3. Remove the Mixing Element/Flow Element Assembly. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
4. Remove the Oxygen Blender PCA. Refer to Oxygen Blender PCA/PCA Spacer Replacement Section for more details.
5. Remove the Air Inlet Duct Assembly. Refer to the Air Inlet Duct Assembly Replacement Section for more details.
6. Remove the Lower Manifold Cover. Refer to the Lower Manifold Cover Replacement Section for more details.

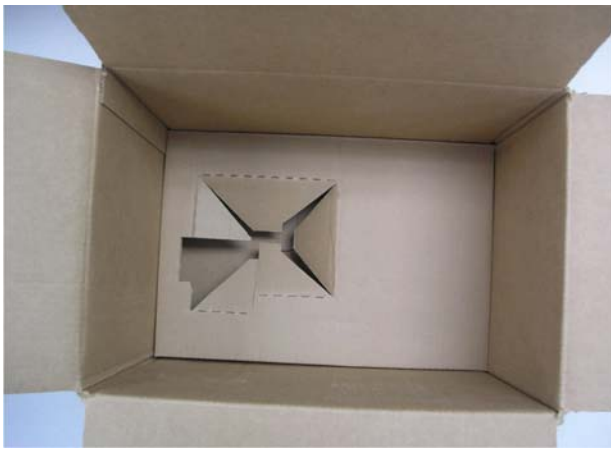
Installation

1. Install the Lower Manifold Cover. Refer to the Lower Manifold Cover Replacement Section for more details.
2. Install the Air Inlet Duct Assembly. Refer to the Air Inlet Duct Assembly Replacement Section for more details.
3. Install the Oxygen Blender PCA. Refer to Oxygen Blender PCA/PCA Spacer Replacement Section for more details.
4. Install the Mixing Element/Flow Element Assembly. Refer to Mixing Element/Flow Element Tubes Replacement Section for more details.
5. Install the Oxygen Blender Housing. Refer to Oxygen Blender Housing Removal Section for more details.
6. Install the Filter/Whisper Cap. Refer to Oxygen Blender Filter/Whisper Cap Replacement Section for more details.

8.8 PACKAGING ASSEMBLY PROCEDURE

1. Form device shipper box and seal, using 3 inch tape.

2. Form & insert the Bottom Pad and place it into shipper.



3. Place device with handle down into appropriately-sized Polybag, folding excess polybag around device.

4. Place the bagged device into shipper.

5. Form four roll-up spacers and place them into the shipper.

6. Form the spacer pad and place it inside the shipper.

7. Form the Top pad and insert into the shipper box.

8. Close the shipper box and seal with 3 inch tape.
9. Place shipping labels on the outside of the shipper box.

CHAPTER 9: REPAIR KITS

9.0 CHAPTER OVERVIEW

This chapter illustrates the names and components for each of the repair kits for the Trilogy Ventilators. For technical assistance or replacement part ordering information, contact Respironics Product Support.

USA and Canada

Phone: 1-800-345-6443
Fax: 1-800-866-0245
Email: service@respironics.com

International

Phone: 1-724-387-4000
Fax: 1-800-387-5012

Visit Respironics Home Page on the World Wide Web at:

www.respironics.com

9.1 REPAIR KIT REFERENCE TABLE

NOTE

For kits with multiple part number listings, refer to the individual page to ensure proper ordering.

PART NUMBER(S)	REPAIR KIT NAME	PAGE IDENTIFIER
1045299	*AC Power Connector Cable Kit*	*page 12*
1045153	*Active Exhalation Control Module Kit*	*page 24*
1084499/1084500/1084501/ 1084502/1084503/1084504/ 1084505	*Base Enclosure Kits*	*page 18*
1045180	*Battery Fan Kit*	*page 10*
1045171	*Battery Fan Shield Kit*	*page 25*
1045307	*Bellows Clip Kit*	*page 33*
1045309	*Blower Bellows Kit*	*page 6*
1045302	*Capacitor Kit*	*page 10*
1045303	*Capacitor/Battery Retainer Assembly Kit*	*page 7*
1045589	*DC Inlet O-ring Kit*	*page 45*
1045300	*DC Power Connector Cable Kit*	*page 11*
1045166	*Detachable Battery Connector Assembly Kit*	*page 22*
1045167	*Detachable Battery Retainer Kit*	*page 21*
1079058	*Enclosure Auxiliary Cover Kit*	*page 58*
1045181	*Enclosure Seal Kit*	*page 29*
1045178	*Exhaust Fan Assembly Kit*	*page 27*
1067047	*FAA Label Kit*	*page 58*
1045150/1070249	*Flow Sensor Assembly Kits*	*page 28*
1045168	*Flow Straightener Kit*	*page 27*
1045200	*Front Panel/Keypad LED PCA Kit*	*page 36*
1045306	*Handle Kit*	*page 6*
1045590	*Handle O-ring Kit*	*page 46*
1045587	*Inlet Air Path Assembly Kit*	*page 7*
1045296	*Interface Board Retainer Kit*	*page 20*
1084485	*Interface PCA Kit*	*page 34*
1055806/1055957	*Internal Battery Pack Kits*	*page 8*
1045183	*Keypad Kit*	*page 16*
1045184	*LCD Kit*	*page 39*
1054951	*Motor Blower Assembly Kit*	*page 34*
1045588	*O2 Inlet O-ring Kit*	*page 45*

PART NUMBER(S)	REPAIR KIT NAME	PAGE IDENTIFIER
1045170	*Outlet Flow Path Thermistor Kit*	*page 26*
1045298	*Oxygen Connector Kit*	*page 11*
1045163	*PCA Inverter Kit*	*page 32*
1045197	*PCB Module Plate “A” Kit*	*page 16*
1045198	*PCB Module Plate “B” Kit*	*page 17*
1045196	*PCB Support for Power Management PCA Kit*	*page 13*
1045195	*PCB Support for System PCA Kit*	*page 12*
1035443/1029330	*Pollen Filter Kits*	*page 5*
1045174	*Porting Block Adaptor Kit*	*page 23*
1045304	*Power Cord Clamp Kit*	*page 13*
1045201	*Power Management PCA Kit*	*page 37*
1045151	*Power Supply PCA Kit*	*page 38*
1058376	*Preventive Maintenance Label Kit*	*page 47*
1045149/1070251	*Rear Enclosure Kits*	*page 31*
1045403	*Removable Air Path Foam Kit*	*page 5*
1029360	*Rubber Feet Kit*	*page 47*
1051801	*SD Card Kit*	*page 39*
1045152/1070248	*Sensor Board Assembly Kits*	*page 35*
1045310/1055430	*Shipping Container Kits*	*page 40*
1045301	*Speaker Hold-Down Kit*	*page 8*
1064699	*Speaker Kit*	*page 32*
1045308	*Stirring Fan Foam Kit*	*page 40*
1045176	*Stirring Fan Kit*	*page 23*
1045177	*Stirring Fan Retainer Kit*	*page 25*
1045204	*System Board to Ethernet Cable Kit*	*page 9*
1045203	*System Board to Interface PCA Cable Kit*	*page 9*
1045164	*System Board to LCD Cable Ferrite Kit*	*page 14*
1045225	*System Board to LCD Cable Kit*	*page 15*
1045202	*System Board to Sensor Board Cable Kit*	*page 15*
1045199	*System Board w/ Daughter Board Kit*	*page 37*
1045169	*Temperature Sensor O-ring Kit*	*page 26*
1045586	*Top Plate Enclosure Kit*	*page 44*
1045154	*Transition Tube Kit*	*page 24*
1045165	*Transition Tube Locator Kit*	*page 21*
1045172	*Trilogy 100 Tubing Kit*	*page 38*
1070250	*Trilogy 200, Trilogy O2, & Trilogy 202 Tubing Kit*	*page 57*
1076003	*Trilogy Base Seal Kit*	*page 58*

PART NUMBER(S)	REPAIR KIT NAME	PAGE IDENTIFIER
1045182/1070253/1070252/ 1075607	*Trilogy Front Enclosure Kits*	*page 30*
1045175	*Trilogy Hardware Kit*	*page 38*
1070135	*Trilogy O2 & Trilogy 202 Blender Plastic Threaded Cap*	*page 56*
1054773	*Trilogy O2 & Trilogy 202 Oxygen Blender Filter Duct*	*page 53*
1054870	*Trilogy O2 & Trilogy 202 Oxygen Blender Flow Element*	*page 48*
1054872	*Trilogy O2 & Trilogy 202 Oxygen Blender Housing*	*page 50*
1054772	*Trilogy O2 & Trilogy 202 Oxygen Blender Lower Manifold*	*page 54*
1054774	*Trilogy O2 & Trilogy 202 Oxygen Blender Manifold Assembly*	*page 56*
1054871	*Trilogy O2 & Trilogy 202 Oxygen Blender Mixing Element*	*page 49*
*1054867***	*Trilogy O2 & Trilogy 202 Oxygen Blender PCA*	*page 47*
1054875	*Trilogy O2 & Trilogy 202 Oxygen Blender PCA Spacer*	*page 51*
1054868	*Trilogy O2 & Trilogy 202 Oxygen Blender Pressure Sensor Port Clip*	*page 55*
1054775	*Trilogy O2 & Trilogy 202 Oxygen Blender Purge Fan*	*page 54*
1054876	*Trilogy O2 & Trilogy 202 Oxygen Blender Tubing Kit*	*page 57*
1054869	*Trilogy O2 & Trilogy 202 Oxygen Blender Whisper Cap*	*page 48*
1054874	*Trilogy O2 & Trilogy 202 Oxygen Blender Wire Harness*	*page 52*
1070259	*Trilogy Porting Block Adaptor Cap Kit*	*page 57*
1045173	*Tubing Elbow Kit*	*page 14*
1045312/1045402/1058857/ 1070257/1070255/1075609/ 1075637	*Warning Label Kits*	*page 41*

*** All Trilogy O2 and 202 Oxygen Blending Module PCA's come with embedded software, which may not be aligned with the current released production build version of Trilogy software represented on my.respironics.com. In order to match the O2 and 202 PCA software to the Trilogy software, after Oxygen Blending Module PCA replacement, unit software must be reloaded onto the device. This applies even when the unit software is the same as the posted Trilogy software on my.respironics.com.*

9.2 POLLEN FILTER KITS

PART NUMBER: 1035443 (1 PACK)/1029330 (2 PACK)	
Included in Kit	**Tools Required**
Pollen Filter	None

9.3 REMOVABLE AIR PATH FOAM KIT

PART NUMBER: 1045403	
Included in Kit	**Tools Required**
Removable Air Path Foam	Phillips Screwdriver

9.4 HANDLE KIT

PART NUMBER: 1045306	
Included in Kit	**Tools Required**
Trilogy Handle	1/8” Hex Wrench

9.5 BLOWER BELLOWS KIT

PART NUMBER: 1045309	
Included in Kit	**Tools Required**
Blower Bellow	Phillips Screwdriver

9.6 INLET AIR PATH ASSEMBLY KIT

PART NUMBER: 1045587	
Included in Kit	**Tools Required**
Inlet Air Path Assembly	Phillips Screwdriver

9.7 CAPACITOR/BATTERY RETAINER ASSEMBLY KIT

PART NUMBER: 1045303	
Included in Kit	**Tools Required**
Capacitor/Battery Retainer Assembly	Phillips Screwdriver

9.8 INTERNAL BATTERY PACK KITS

PART NUMBER: 1055806		PART NUMBER: 1055957	
Included in Kit	**Tools Required**	**Included in Kit**	**Tools Required**
International/Domestic Internal Battery Pack	Phillips Screwdriver	Japanese Internal Battery Pack	Phillips Screwdriver

9.9 SPEAKER HOLD-DOWN KIT

PART NUMBER: 1045301	
Included in Kit	**Tools Required**
Speaker Hold-Down	Phillips Screwdriver

9.10 SYSTEM BOARD TO ETHERNET CABLE KIT

PART NUMBER: 1045204	
Included in Kit	**Tools Required**
System Board to Ethernet Cable	Phillips Screwdriver

9.11 SYSTEM BOARD TO INTERFACE PCA CABLE KIT

PART NUMBER: 1045203	
Included in Kit	**Tools Required**
System Board to Interface PCA Cable	Phillips Screwdriver

9.12 CAPACITOR KIT

PART NUMBER: 1045302	
Included in Kit	**Tools Required**
Capacitor	Phillips Screwdriver

9.13 BATTERY FAN KIT

PART NUMBER: 1045180	
Included in Kit	**Tools Required**
Battery Fan	Phillips Screwdriver

9.14 DC Power Connector Cable Kit

PART NUMBER: 1045300	
Included in Kit	**Tools Required**
DC Power Connector Cable	Phillips Screwdriver 3/4” Wrench

9.15 Oxygen Connector Kit

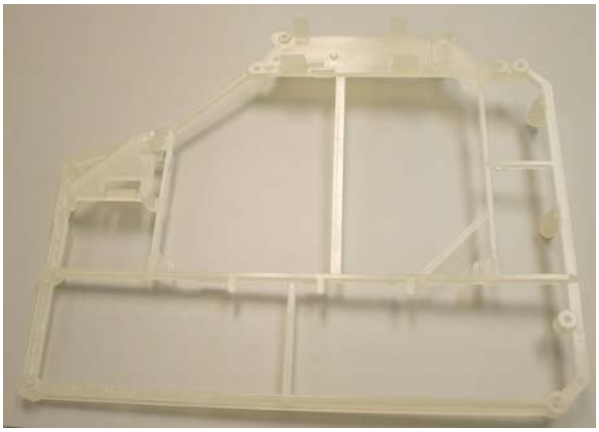
PART NUMBER: 1045298	
Included in Kit	**Tools Required**
Oxygen Connector	Phillips Screwdriver 5/8” Wrench

9.16 AC Power Connector Cable Kit

PART NUMBER: 1045299	
Included in Kit	**Tools Required**
AC Power Connector Cable w/ Gasket (comes assembled)	Phillips Screwdriver 1/4” Wrench

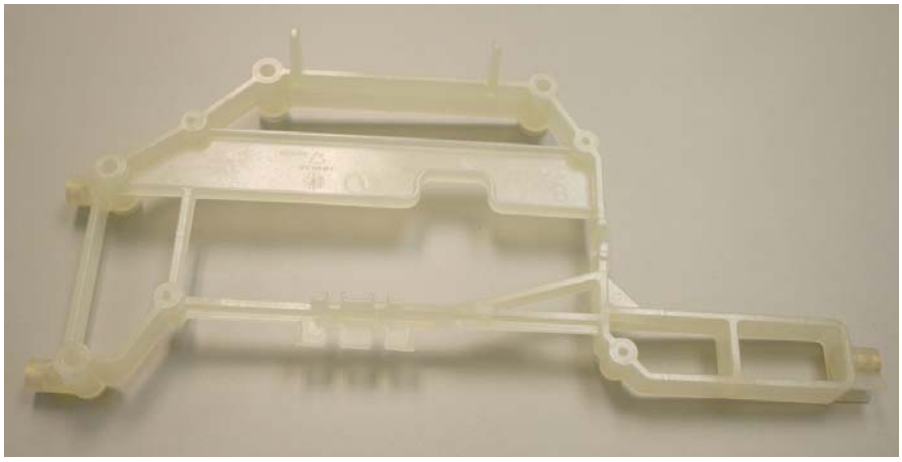
9.17 PCB Support for System PCA Kit

PART NUMBER: 1045195	
Included in Kit	**Tools Required**
PCB Support for System PCA w/ Ferrite (comes assembled)	Phillips Screwdriver 1/8” Hex Wrench



9.18 PCB Support for Power Management PCA Kit

PART NUMBER: 1045196	
Included in Kit	**Tools Required**
PCB Support for Power Management PCA	Phillips Screwdriver 1/8” Hex Wrench



9.19 Power Cord Clamp Kit

PART NUMBER: 1045304	
Included in Kit	**Tools Required**
Power Cord Clamp	Phillips Screwdriver

9.20 TUBING ELBOW KIT

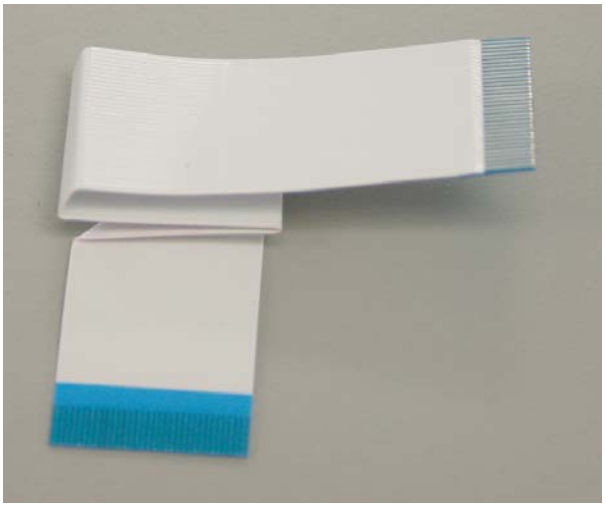
PART NUMBER: 1045173	
Included in Kit	**Tools Required**
Tubing Elbow	Phillips Screwdriver

9.21 SYSTEM BOARD TO LCD CABLE FERRITE KIT

PART NUMBER: 1045164	
Included in Kit	**Tools Required**
Ferrite	Phillips Screwdriver

9.22 SYSTEM BOARD TO LCD CABLE KIT

PART NUMBER: 1045225	
Included in Kit	**Tools Required**
System Board to LCD Cable	Phillips Screwdriver 1/8” Hex Wrench



9.23 SYSTEM BOARD TO SENSOR BOARD CABLE KIT

PART NUMBER: 1045202	
Included in Kit	**Tools Required**
System Board to Sensor Board Cable	Phillips Screwdriver 1/8” Hex Wrench

9.24 KEYPAD KIT

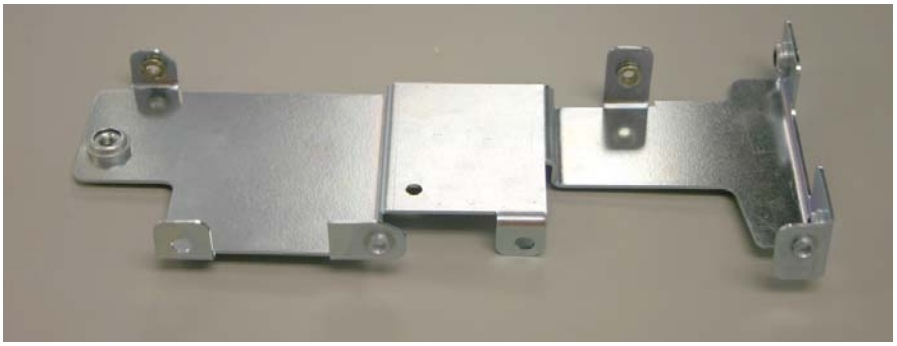
PART NUMBER: 1045183	
Included in Kit	**Tools Required**
Keypad	Phillips Screwdriver 1/8” Hex Wrench

9.25 PCB MODULE PLATE “A” KIT

PART NUMBER: 1045197	
Included in Kit	**Tools Required**
PCB Module Plate “A”	Phillips Screwdriver 1/8” Hex Wrench

9.26 PCB MODULE PLATE “B” KIT

PART NUMBER: 1045198	
Included in Kit	**Tools Required**
PCB Module Plate “B”	Phillips Screwdriver 1/8” Hex Wrench



9.27 BASE ENCLOSURE KITS

PART NUMBER: 1084499	
Included in Kit	**Tools Required**
Base Enclosure Assembly Clear Overlay (x2) Trilogy 100/Trilogy 200 Warning Label - International	Phillips Screwdriver

PART NUMBER: 1084500	
Included in Kit	**Tools Required**
Base Enclosure Assembly Clear Overlay (x2) Trilogy 100/Trilogy 200 Warning Label - Domestic	Phillips Screwdriver

PART NUMBER: 1084501	
Included in Kit	**Tools Required**
Base Enclosure Assembly Clear Overlay (x2) Trilogy 100/Trilogy 200 Warning Label - Japanese	Phillips Screwdriver

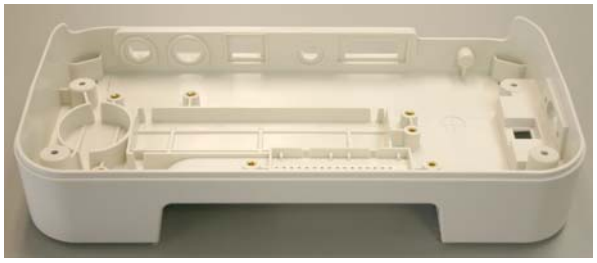
PART NUMBER: 1084502	
Included in Kit	**Tools Required**
Base Enclosure Assembly Clear Overlay (x2) Trilogy O_2 Warning Label - Japanese	Phillips Screwdriver

PART NUMBER: 1084503	
Included in Kit	**Tools Required**
Base Enclosure Assembly Clear Overlay (x2) Trilogy 100/Trilogy 200 Warning Label - Latin America	Phillips Screwdriver

PART NUMBER: 1084504	
Included in Kit	**Tools Required**
Base Enclosure Assembly Clear Overlay (x2) Trilogy 202 Warning Label - International	Phillips Screwdriver

PART NUMBER: 1084505	
Included in Kit	**Tools Required**
Base Enclosure Assembly Clear Overlay (x2) Trilogy 202 Warning Label - Domestic	Phillips Screwdriver





9.28 INTERFACE BOARD RETAINER KIT

PART NUMBER: 1045296	
Included in Kit	**Tools Required**
Interface Board Retainer	Phillips Screwdriver

9.29 TRANSITION TUBE LOCATOR KIT

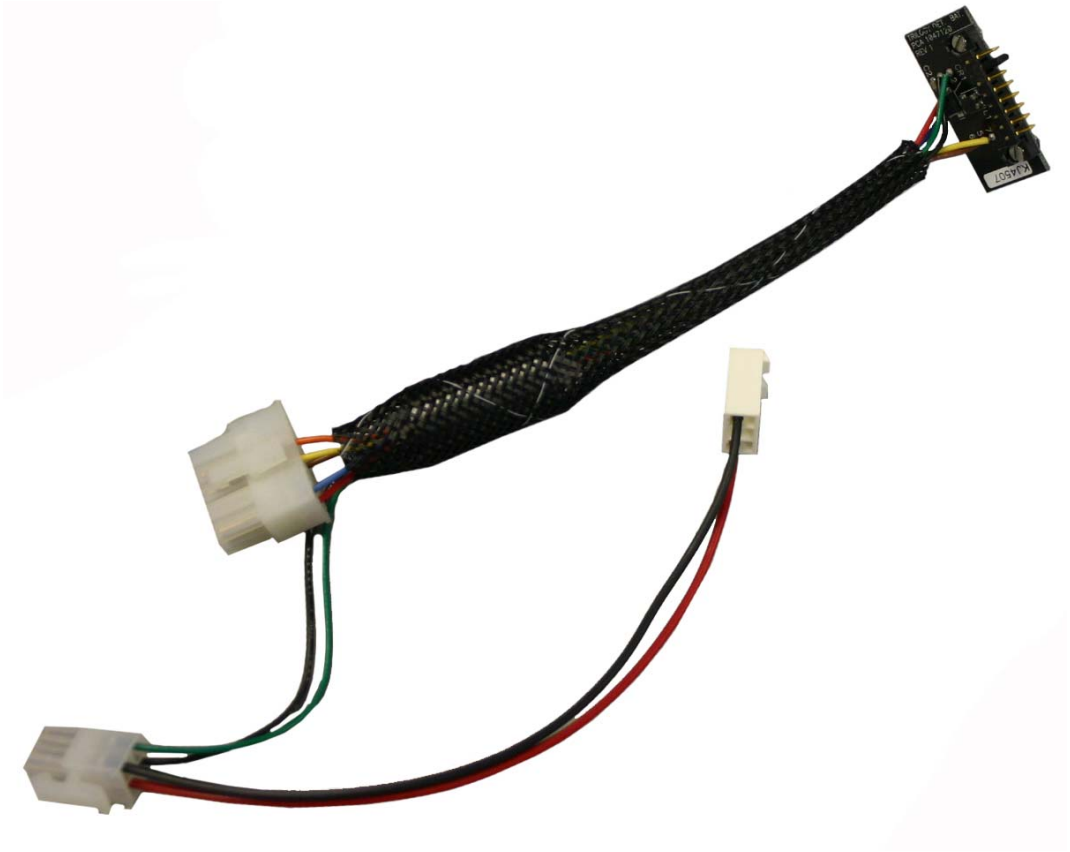
PART NUMBER: 1045165	
Included in Kit	**Tools Required**
Transition Tube Locator	Phillips Screwdriver 1/8” Hex Wrench

9.30 DETACHABLE BATTERY RETAINER KIT

PART NUMBER: 1045167	
Included in Kit	**Tools Required**
Detachable Battery Retainer	Phillips Screwdriver 1/8” Hex Wrench

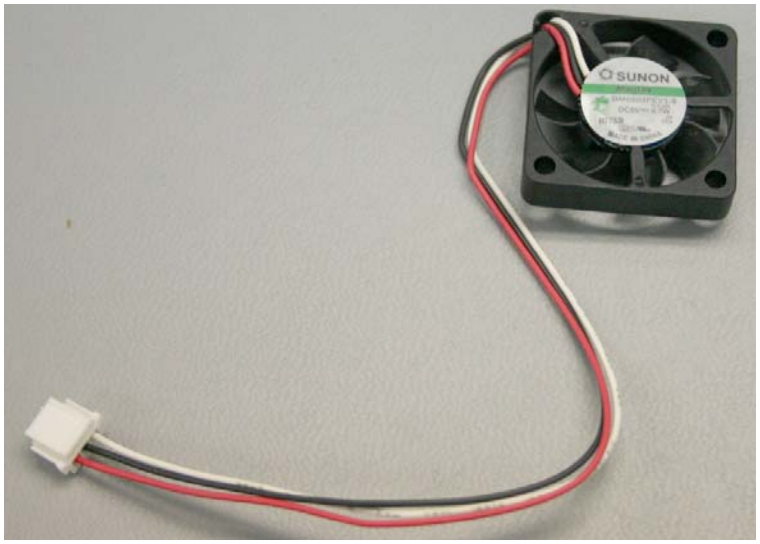
9.31 DETACHABLE BATTERY CONNECTOR ASSEMBLY KIT

PART NUMBER: 1045166	
Included in Kit	**Tools Required**
Detachable Battery Connector Assembly	Phillips Screwdriver 1/8” Hex Wrench



9.32 STIRRING FAN KIT

PART NUMBER: 1045176	
Included in Kit	**Tools Required**
Stirring Fan	Phillips Screwdriver 1/8” Hex Wrench



9.33 PORTING BLOCK ADAPTOR KIT

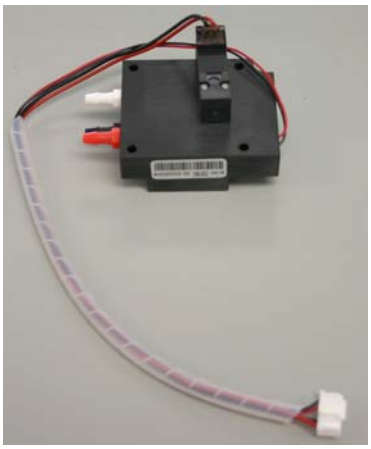
PART NUMBER: 1045174	
Included in Kit	**Tools Required**
Porting Block Adaptor	Phillips Screwdriver 1/8” Hex Wrench

9.34 TRANSITION TUBE KIT

PART NUMBER: 1045154	
Included in Kit	**Tools Required**
Transition Tube	Phillips Screwdriver 1/8” Hex Wrench

9.35 ACTIVE EXHALATION CONTROL MODULE KIT

PART NUMBER: 1045153	
Included in Kit	**Tools Required**
Active Exhalation Control Module O-rings (x2)	Phillips Screwdriver 1/8” Hex Wrench

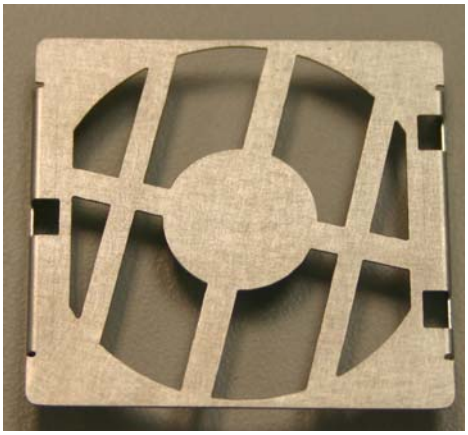


9.36 STIRRING FAN RETAINER KIT

PART NUMBER: 1045177	
Included in Kit	**Tools Required**
Stirring Fan Retainer Stirring Fan Foam	Phillips Screwdriver 1/8” Hex Wrench

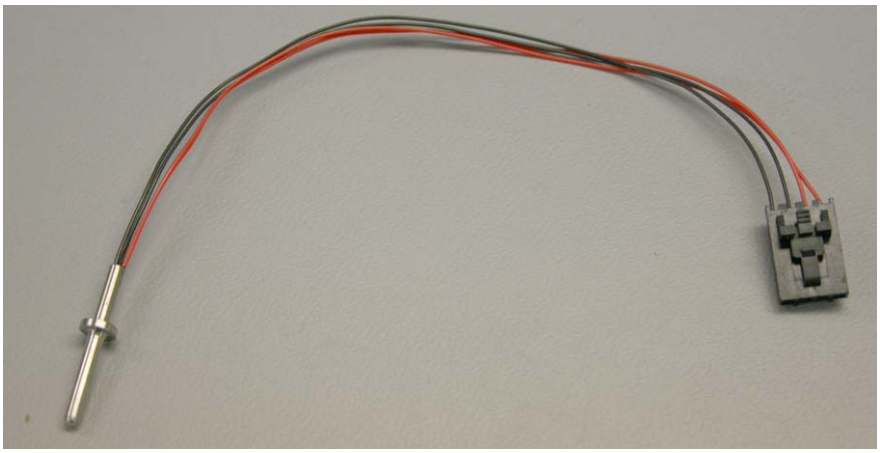
9.37 BATTERY FAN SHIELD KIT

PART NUMBER: 1045171	
Included in Kit	**Tools Required**
Battery Fan Shield	Phillips Screwdriver



9.38 OUTLET FLOW PATH THERMISTOR KIT

PART NUMBER: 1045170	
Included in Kit	**Tools Required**
Outlet Flow Path Thermistor	Phillips Screwdriver 1/8” Hex Wrench



9.39 TEMPERATURE SENSOR O-RING KIT

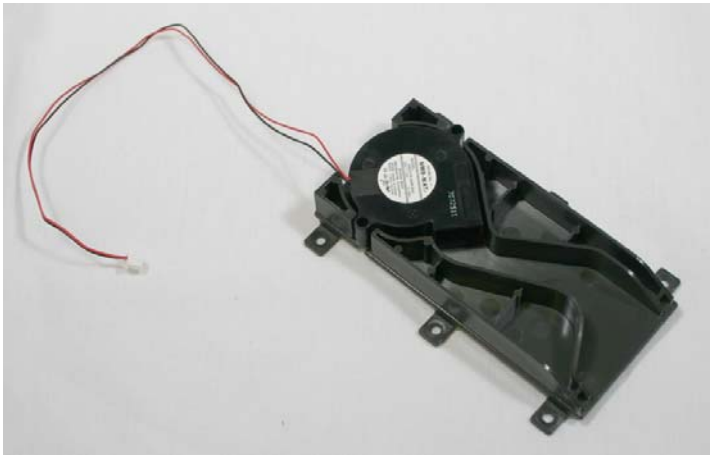
PART NUMBER: 1045169	
Included in Kit	**Tools Required**
Temperature Sensor O-ring	Phillips Screwdriver 1/8” Hex Wrench

9.40 Flow Straightener Kit

PART NUMBER: 1045168	
Included in Kit	**Tools Required**
Flow Straightener	Phillips Screwdriver 1/8” Hex Wrench Chamfer tool M100311

9.41 Exhaust Fan Assembly Kit

PART NUMBER: 1045178	
Included in Kit	**Tools Required**
Exhaust Fan Assembly	Phillips Screwdriver 1/8” Hex Wrench



9.42 FLOW SENSOR ASSEMBLY KITS

PART NUMBER: 1045150	
Included in Kit	**Tools Required**
Trilogy 100 Flow Sensor Assembly	Phillips Screwdriver 1/8” Hex Wrench

PART NUMBER: 1070249	
Included in Kit	**Tools Required**
Trilogy 200/Trilogy 202/Trilogy O_2 Flow Sensor Assembly	Phillips Screwdriver 1/8” Hex Wrench

9.43 ENCLOSURE SEAL KIT

PART NUMBER: 1045181	
Included in Kit	**Tools Required**
Enclosure Seal	Phillips Screwdriver 1/8” Hex Wrench

9.44 TRILOGY FRONT ENCLOSURE KITS

PART NUMBER: 1045182	
Included in Kit	**Tools Required**
Trilogy 100 Front Enclosure	Phillips Screwdriver 1/8” Hex Wrench

PART NUMBER: 1070253	
Included in Kit	**Tools Required**
Trilogy O_2 Front Enclosure	Phillips Screwdriver 1/8” Hex Wrench

PART NUMBER: 1070252	
Included in Kit	**Tools Required**
Trilogy 200 Front Enclosure	Phillips Screwdriver 1/8” Hex Wrench

PART NUMBER: 1075607	
Included in Kit	**Tools Required**
Trilogy 202 Front Enclosure	Phillips Screwdriver 1/8” Hex Wrench

9.45 REAR ENCLOSURE KITS

PART NUMBER: 1045149	
Included in Kit	**Tools Required**
Trilogy 100/Trilogy 200 Rear Enclosure	Phillips Screwdriver 1/8” Hex Wrench

PART NUMBER: 1070251	
Included in Kit	**Tools Required**
Trilogy 202/Trilogy O_2 Rear Enclosure (contains hole for Oxygen Blending Module connection)	Phillips Screwdriver 1/8” Hex Wrench

9.46 PCA INVERTER KIT

PART NUMBER: 1045163	
Included in Kit	**Tools Required**
PCA Inverter	Phillips Screwdriver 1/8” Hex Wrench

9.47 SPEAKER KIT

PART NUMBER: 1064699	
Included in Kit	**Tools Required**
Speaker	Phillips Screwdriver

9.48 BELLOWS CLIP KIT

PART NUMBER: 1045307	
Included in Kit	**Tools Required**
Bellows Clip	Phillips Screwdriver

9.49 MOTOR BLOWER ASSEMBLY KIT

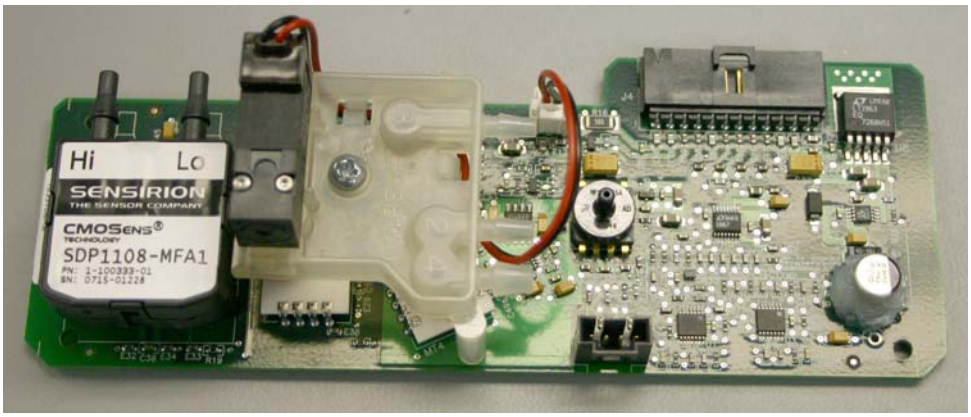
PART NUMBER: 1054951	
Included in Kit	**Tools Required**
Motor Blower Assembly w/ Isolation Assembly	Phillips Screwdriver 1/8” Hex Wrench

9.50 INTERFACE PCA KIT

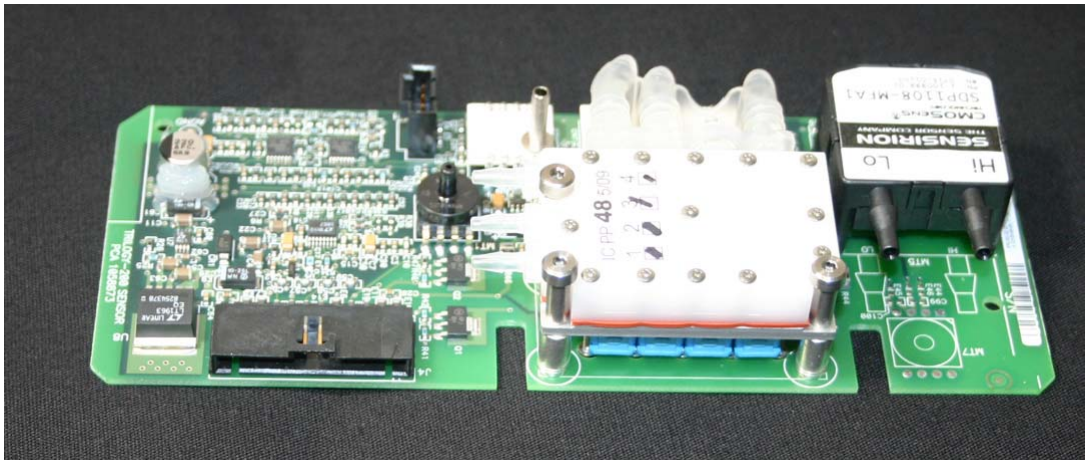
PART NUMBER: 1084485	
Included in Kit	**Tools Required**
Interface PCA	Phillips Screwdriver

9.51 SENSOR BOARD ASSEMBLY KITS

PART NUMBER: 1045152	
Included in Kit	**Tools Required**
Trilogy 100 Sensor Board Assembly	Phillips Screwdriver 1/8” Hex Wrench

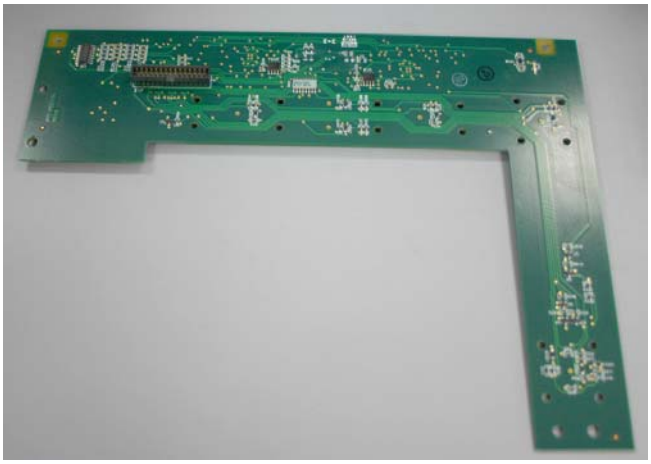


PART NUMBER: 1070248	
Included in Kit	**Tools Required**
Trilogy 200/Trilogy 202/Trilogy O_2 Sensor Board Assembly	Phillips Screwdriver 1/8” Hex Wrench



9.52 FRONT PANEL/KEYPAD LED PCA KIT

PART NUMBER: 1045200	
Included in Kit	**Tools Required**
Front Panel/Keypad LED PCA	Phillips Screwdriver 1/8” Hex Wrench

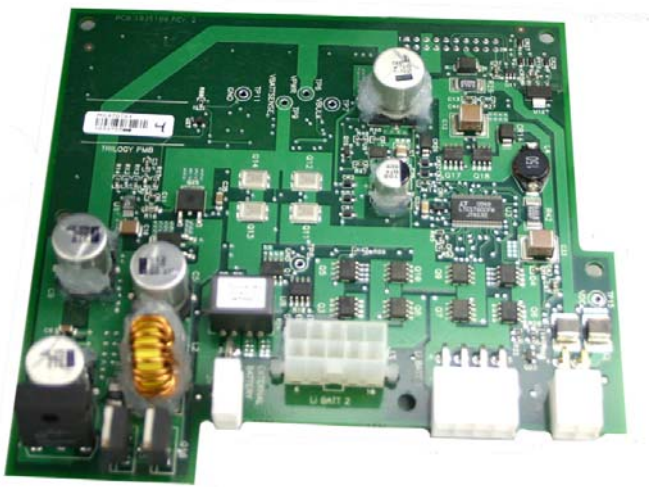


9.53 System Board w/ Daughter Board Kit

PART NUMBER: 1045199	
Included in Kit	**Tools Required**
System Board w/ Daughter Board	Phillips Screwdriver 1/8” Hex Wrench

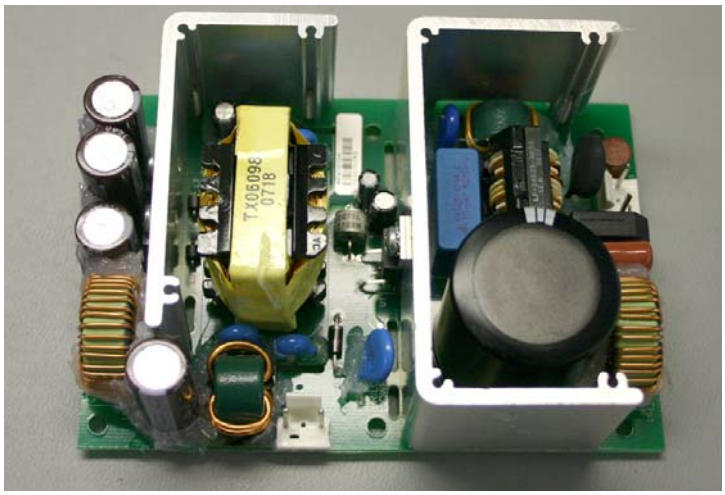
9.54 Power Management PCA Kit

PART NUMBER: 1045201	
Included in Kit	**Tools Required**
Power Management PCA	Phillips Screwdriver 1/8” Hex Wrench



9.55 Power Supply PCA Kit

PART NUMBER: 1045151	
Included in Kit	**Tools Required**
Power Supply PCA	Phillips Screwdriver 1/8” Hex Wrench



9.56 Trilogy 100 Tubing Kit

PART NUMBER: 1045172	
Included in Kit	**Tools Required**
Trilogy 100 Tubing	Phillips Screwdriver 1/8” Hex Wrench

9.57 Trilogy Hardware Kit

PART NUMBER: 1045175	
Included in Kit	**Tools Required**
Trilogy Hardware Kit	

9.58 LCD KIT

PART NUMBER: 1045184	
Included in Kit	**Tools Required**
Trilogy Color 5.7 Inch LCD	Phillips Screwdriver 1/8” Hex Wrench

9.59 SD CARD KIT

PART NUMBER: 1051801	
Included in Kit	**Tools Required**
1 GB SD Card	None

9.60 SHIPPING CONTAINER KITS

PART NUMBER: 1045310 (1 PACK) / 1055430 (10 PACK)	
Included in Kit	**Tools Required**
Trilogy Shipping Container	

9.61 STIRRING FAN FOAM KIT

PART NUMBER: 1045308	
Included in Kit	**Tools Required**
Stirring Fan Foam	

9.62 WARNING LABEL KITS

PART NUMBER: 1045312	
Included in Kit	**Tools Required**
Trilogy 100/Trilogy 200 Warning Label (International)	N/A

PART NUMBER: 1045402	
Included in Kit	**Tools Required**
Trilogy 100/Trilogy 200 Warning Label (Japanese)	N/A

PART NUMBER: 1058857	
Included in Kit	**Tools Required**
Trilogy 100/Trilogy 200 Warning Label (Domestic)	N/A

PART NUMBER: 1070257	
Included in Kit	**Tools Required**
Trilogy O_2 Warning Label	N/A

PART NUMBER: 1070255	
Included in Kit	**Tools Required**
Trilogy 100/Trilogy 200 Warning Label (Latin America)	N/A

PART NUMBER: 1075609	
Included in Kit	**Tools Required**
Trilogy 202 Warning Label (Domestic)	N/A

PART NUMBER: 1075637	
Included in Kit	**Tools Required**
Trilogy 202 Warning Label (International)	N/A

9.63 TOP PLATE ENCLOSURE KIT

PART NUMBER: 1045586	
Included in Kit	**Tools Required**
Top Plate	Phillips Screwdriver 1/8” Hex Wrench

9.64 O_2 INLET O-RING KIT

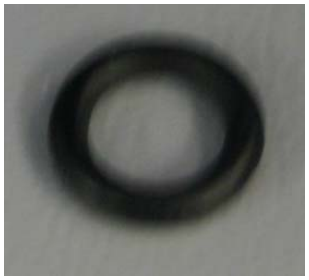
PART NUMBER: 1045588	
Included in Kit	**Tools Required**
O_2 Inlet O-ring	Phillips Screwdriver 1/8” Hex Wrench 5/8” Wrench

9.65 DC INLET O-RING KIT

PART NUMBER: 1045589	
Included in Kit	**Tools Required**
DC Inlet O-ring	Phillips Screwdriver 1/8” Hex Wrench 3/4” Wrench

9.66 HANDLE O-RING KIT

PART NUMBER: 1045590	
Included in Kit	**Tools Required**
Handle O-ring	1/8” Hex Wrench



9.67 Rubber Feet Kit

PART NUMBER: 1029360	
Included in Kit	**Tools Required**
Rubber Feet	None

9.68 Preventive Maintenance Label Kit

PART NUMBER: 1058376	
Included in Kit	**Tools Required**
Preventive Maintenance Label (10 pack)	None

9.69 Trilogy O_2 & Trilogy 202 Oxygen Blender PCA

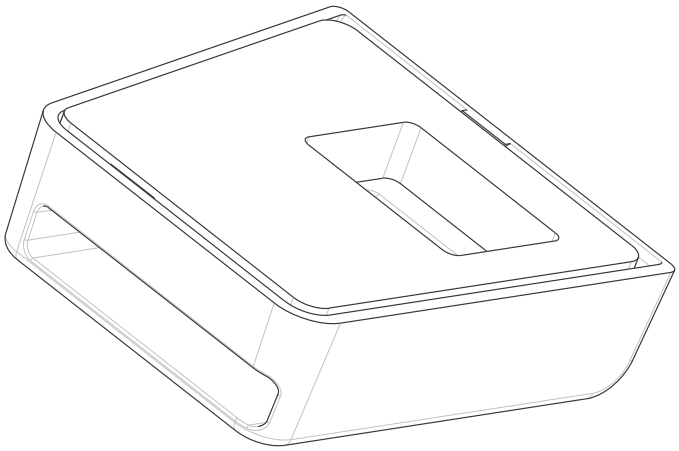
PART NUMBER: 1054867	
Included in Kit	**Tools Required**
Oxygen Blender PCA	None

NOTE

All Trilogy O2 and 202 Oxygen Blending Module PCA's come with embedded software, which may not be aligned with the current released production build version of Trilogy software represented on my.respironics.com. In order to match the O2 and 202 PCA software to the Trilogy software, after Oxygen Blending Module PCA replacement, unit software must be reloaded onto the device. This applies even when the unit software is the same as the posted Trilogy software on my.respironics.com.

9.70 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER WHISPER CAP

PART NUMBER: 1054869	
Included in Kit	**Tools Required**
Oxygen Blender Whisper Cap	None

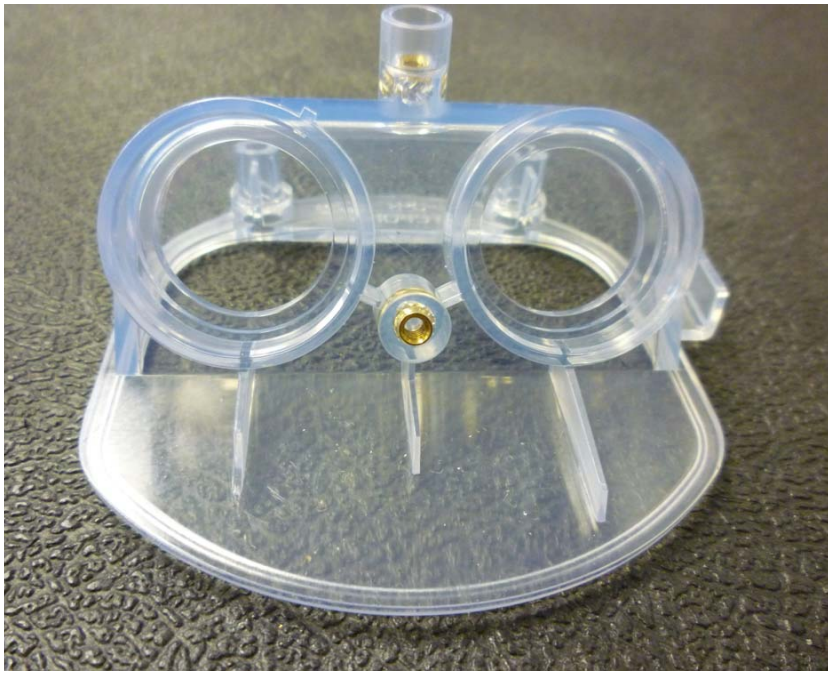


9.71 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER FLOW ELEMENT

PART NUMBER: 1054870	
Included in Kit	**Tools Required**
Oxygen Blender Flow Element	None

9.72 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER MIXING ELEMENT

PART NUMBER: 1054871	
Included in Kit	**Tools Required**
Oxygen Blender Mixing Element	None



9.73 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER HOUSING

PART NUMBER: 1054872	
Included in Kit	**Tools Required**
Oxygen Blender Housing	None

9.74 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER PCA SPACER

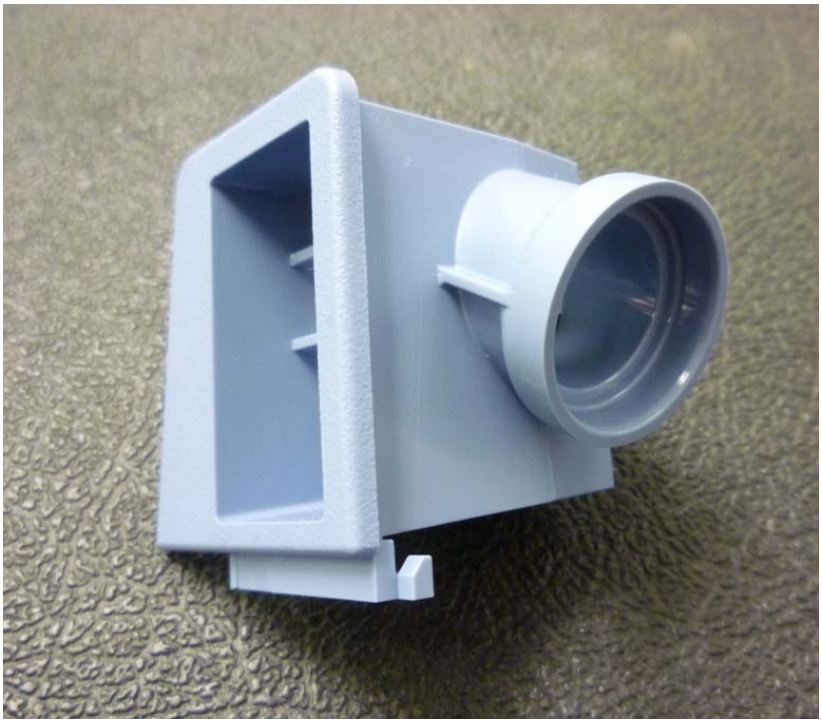
PART NUMBER: 1054875	
Included in Kit	**Tools Required**
Oxygen Blender PCA Spacer	None

9.75 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER WIRE HARNESS

PART NUMBER: 1054874	
Included in Kit	**Tools Required**
Oxygen Blender Wire Harness	None

9.76 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER FILTER DUCT

PART NUMBER: 1054773	
Included in Kit	**Tools Required**
Oxygen Blender Filter Duct	None



9.77 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER PURGE FAN

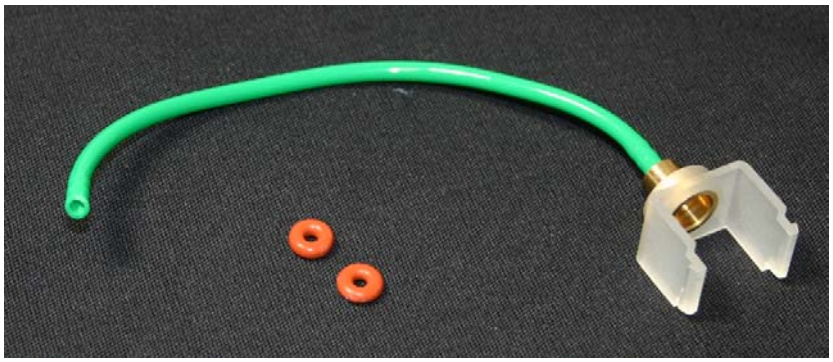
PART NUMBER: 1054775	
Included in Kit	**Tools Required**
Oxygen Blender Purge Fan	None

9.78 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER LOWER MANIFOLD

PART NUMBER: 1054772	
Included in Kit	**Tools Required**
Oxygen Blender Lower Manifold	None

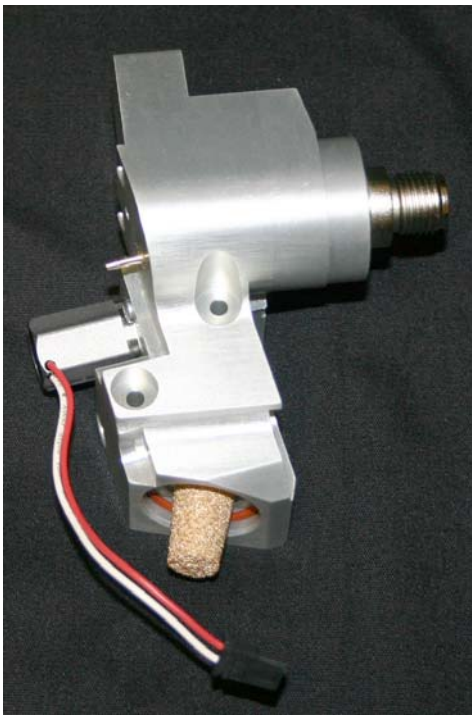
9.79 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER PRESSURE SENSOR PORT CLIP

PART NUMBER: 1054868	
Included in Kit	**Tools Required**
Oxygen Blender Pressure Sensor Port Clip	None



9.80 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER MANIFOLD ASSEMBLY

PART NUMBER: 1054774	
Included in Kit	**Tools Required**
Oxygen Blender Manifold Assembly	None



9.81 TRILOGY O_2 & TRILOGY 202 BLENDER PLASTIC THREADED CAP

PART NUMBER: 1070135	
Included in Kit	**Tools Required**
Oxygen Blender Plastic Threaded Cap	None

9.82 TRILOGY 200, TRILOGY O_2, & TRILOGY 202 TUBING KIT

PART NUMBER: 1070250	
Included in Kit	**Tools Required**
Trilogy 200 / Trilogy O_2 / Trilogy 202 Tubing	None

9.83 TRILOGY O_2 & TRILOGY 202 OXYGEN BLENDER TUBING KIT

PART NUMBER: 1054876	
Included in Kit	**Tools Required**
Oxygen Blender Tubing	None

9.84 TRILOGY PORTING BLOCK ADAPTOR CAP KIT

PART NUMBER: 1070259	
Included in Kit	**Tools Required**
Porting Block Adaptor Cap	None

9.85 FAA Label Kit

PART NUMBER: 1067047	
Included in Kit	**Tools Required**
FAA Label (Qty: 10)	None

9.86 Trilogy Base Seal Kit

PART NUMBER: 1076003	
Included in Kit	**Tools Required**
Base Enclosure Seals	None

9.87 Enclosure Auxiliary Cover Kit

PART NUMBER: 1079058	
Included in Kit	**Tools Required**
Enclosure Auxiliary Cover	None

CHAPTER 10: TRILOGY TESTING & CALIBRATION

10.0 CHAPTER OVERVIEW

This chapter provides the necessary performance, service, and safety (optional) testing procedures. The intervals for the specific tests are listed in the testing procedure sections below.

10.1 TRILOGY 100 CHECKOUT PROCEDURE

This test procedure should be performed prior to connecting the device to a patient or in between patient usage. Test both the active and passive circuits if you want to do a complete checkout on the device. The tests should be performed as described in order to verify proper operation of the device.

NOTE

The actual circuit configuration to be used on the patient should be used to perform the system checkout.

10.1.1 TOOLS REQUIRED

- Active Exhalation Porting Block with PAP (RI p/n 1054670)
- Passive Exhalation Porting Block (RI p/n 1040372)
- Active Exhalation Device with PAP (RI p/n 1053716)
- Whisper Swivel II (RI p/n 332113)
- Test Lung (RI p/n 1021671)
- Small Flat Head Screwdriver

WARNING

If you notice any unexplained changes in the performance of the device, if it is making unusual sounds, if the device or detachable battery are dropped, if water is spilled into the enclosure or if the enclosure is cracked or broken, discontinue use and contact Respironics or an authorized service center for service.

10.1.2 VISUAL INSPECTION

1. Verify that the enclosure is not broken and that all applicable screws are in place.
2. Verify that the device handle, SD Card door, and Detachable Battery are secure and in good working order.
3. Verify that the rubber feet are on the bottom of the device.

10.1.3 INITIAL SETUP

1. Connect the power cord to the device and then to an AC outlet.
2. Attach the test lung to the patient connection end of the desired circuit (Active PAP or Passive).
3. Access the Setup Screen. Reference the System Setup section for more information.

10.1.4 SETTING AND ALARMS TESTS

Complete the following steps to set up the settings and alarms tests.

SETUP

Settings and Alarms Menu

Modify the settings in the Setting and Alarms menu to match those shown below in Table 10-1. If necessary refer to the System Setup Section for instructions on modifying ventilator settings.

TABLE 10-1: VENTILATOR SETTINGS IN THE SETTING AND ALARMS MENU

SETTING	VALUE
Dual Prescription	*Off*
Circuit Type	*Active PAP or Passive*
Therapy Mode	*S/T*
AVAPS (passive circuit only)	*Off*
IPAP	*20 pressure units*
EPAP	*4 pressure units*
Breath Rate	*12 BPM*
Inspiratory Time	*1.6 seconds*
Trigger Type (passive circuit)	*Auto-Trak*
Flow Trigger Sensitivity (active PAP circuit)	*6.0 l/min*
Flow Cycle Sensitivity (active PAP circuit)	*20%*
Rise Time	*1*
Ramp Length	*Off*
All other alarms	*Off*

Options Menu

Modify the settings in the Options menu to match those shown below in Table 10-2.

TABLE 10-2: VENTILATOR SETTING IN THE OPTIONS MENU

SETTING	VALUE
Menu Access	*Full*
Detailed View	*On*
All other settings	*Discretionary*

Turn Device Power On

Press the Start/Stop button on the front of the ventilator. The system will begin operating using the defined ventilation settings.

VERIFY THE HIGH TIDAL VOLUME ALARM

This procedure verifies that the High Tidal Volume alarm is working properly. For passive circuits, this will verify the High Vte alarm. For active with PAP circuits, this will verify the High Vti alarm. It assumes that you have attached the test lung, verified the ventilator settings, and turned on ventilator power.

Change Alarm Ventilator Setting

Modify the High Tidal Volume alarm setting to match the one shown below in Table 10-3.

TABLE 10-3: HIGH TIDAL VOLUME ALARM SETTING

SETTING	VALUE
High Vte/High Vti	*50 ml*

Verify the Alarm

NOTE
Do not use the "Reset" button to manually reset the alarm. Instead, use the "Modify" button to change ventilator settings. This applies to all tests.

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The High Tidal Volume alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Setting

Modify the High Tidal Volume alarm setting to match the one shown below in Table 10-4.

TABLE 10-4: RESET HIGH TIDAL VOLUME ALARM SETTING

SETTING	VALUE
High Vte/Vti	*500 ml*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator setting and change the following value shown in Table 10-5.

TABLE 10-5: RESTORE VENTILATOR SETTINGS

SETTING	VALUE
High Vte/Vti	*Off*

VERIFY THE LOW TIDAL VOLUME ALARM

This procedure verifies that the Low Tidal Volume alarm is working properly. For passive circuits, this will verify the Low Vte alarm. For active with PAP circuits, this will verify the Low Vti alarm. It assumes that you have attached the test lung, verified the ventilator settings, and turned on ventilator power.

Change Alarm Ventilator Setting

Modify the Low Tidal Volume alarm setting to match the one shown below in Table 10-6.

TABLE 10-6: LOW TIDAL VOLUME ALARM SETTING

SETTING	VALUE
Low Vte/Vti	*500 ml*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Low Tidal Volume alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the Low Tidal Volume alarm setting to match the one shown below in Table 10-7.

TABLE 10-7: RESET LOW TIDAL VOLUME ALARM SETTING

SETTING	VALUE
Low Vte/Vti	*50 ml*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator setting and change the following value shown in Table 10-8.

TABLE 10-8: RESTORE VENTILATOR SETTINGS

SETTING	VALUE
Low Vte/Vti	*Off*

VERIFY THE CIRCUIT DISCONNECT ALARM

This procedure verifies that the Circuit Disconnect alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power.

Change Circuit Disconnect Ventilator Setting

Modify the Circuit Disconnect ventilator settings to match the one shown below in Table 10-9.

TABLE 10-9: VENTILATOR SETTINGS

SETTING	VALUE
Circuit Disconnect	*10 Seconds*

Disconnect Test Lung

Disconnect the test lung from the circuit.

NOTE
The Low Inspiratory Pressure Alarm may also be detected.

Verify the Alarm

Wait approximately 10 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Circuit Disconnect alarm condition appears on the screen, highlighted in red

Reconnect Test Lung

Reconnect the test lung to the circuit.

Verify Reset

Wait at least 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator setting and change the following value shown in Table 10-10.

TABLE 10-10: RESTORE VENTILATOR SETTINGS

SETTING	VALUE
Circuit Disconnect	*Off*

VERIFY THE HIGH INSPIRATORY PRESSURE ALARM

This procedure verifies that the High Inspiratory Pressure alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power.

Change Ventilator Settings

Modify the ventilator settings and change the following values shown below in Table 10-11.

TABLE 10-11: VENTILATOR SETTINGS

SETTING	VALUE
Mode	*CV*
Tidal Volume	*500 ml*
Breath Rate	*12 BPM*
Inspiratory Time	*1.0 seconds*
Flow Pattern	*Ramp*
PEEP	*4 pressure units*
Sigh	*Off*
Circuit Disconnect	*Off*

TABLE 10-11: VENTILATOR SETTINGS

SETTING	VALUE
Low Inspiratory Pressure	*6 pressure units*
High Inspiratory Pressure	*10 pressure unit*
Apnea	*Off*
All other alarms	*Off*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The Medium Priority audible indicator sounds
- A yellow light flashes on the Alarm Indicator/Audio Pause button
- The High Inspiratory Pressure alarm condition appears on the screen, highlighted in yellow

NOTE

If this alarm is not reset within 3 occu rrences, the alarm is elevated to High Priority, and the High Priority Indicators occur.

Modify Ventilator Alarm Settings

Modify the High Inspiratory Pressure setting to match the one shown in Table 10-12.

TABLE 10-12: RESET HIGH INSPIRATORY PRESSURE ALARM

SETTING	VALUE
High Inspiratory Pressure	*60 pressure units*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The Medium Priority audible indicator has stopped sounding
- The yellow light on the Alarm Indicator/Audio Pause button has stopped flashing

VERIFY THE LOW INSPIRATORY PRESSURE ALARM

This procedure verifies that the Low Inspiratory Pressure alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power.

Change Ventilator Settings

Modify the ventilator settings and change the following values shown below in Table 10-13.

TABLE 10-13: VENTILATOR SETTINGS

SETTING	VALUE
Mode	*CV*
Tidal Volume	*500 ml*
Breath Rate	*12 BPM*
Inspiratory Time	*1.0 seconds*
Flow Pattern	*Ramp*
PEEP	*4 pressure units*
Sigh	*Off*
Circuit Disconnect	*Off*
Low Inspiratory Pressure	*40 pressure units*
High Inspiratory Pressure	*60 pressure units*
Apnea	*Off*
All other alarms	*Off*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator /Audible Pause button
- The Low Inspiratory Pressure alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the Low Inspiratory Pressure setting to match the one shown below in Table 10-14.

TABLE 10-14: RESET LOW INSPIRATORY PRESSURE ALARM SETTING

SETTING	VALUE
Low Inspiratory Pressure	*6 pressure units*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority Indicator has stopped sounding
- The red light on the Audio Pause/Alarm Indicator button has stopped flashing

10.1.5 BATTERY FUNCTION VERIFICATION

Make sure the batteries are functioning properly and fully charged before usage.

VERIFY THE DETACHABLE AND INTERNAL (LITHIUM-ION) BATTERIES FUNCTION

1. Connect AC Power to the device and verify that the green AC LED on the front panel is lit.
2. Verify that the detachable battery is properly installed.
3. Turn the device on and verify that both the detachable and internal battery symbols appear on the display. Verify if either battery is less than fully charged (the charge symbol will display on the respective battery.)
4. Disconnect the AC Power source from the device.
   - Verify that the AC Power Disconnected alarm message appears on the display and the green AC LED is not lit. Press Reset.
   - Verify that the detachable battery symbol shows the level of charge noted in the previous step and that the device continues to operate.
   - Verify that the detachable battery symbol has a black box around it to indicate that it is in use.
5. Disconnect the detachable battery pack from the device.
   - Verify that the Detach Batt Disconnected alarm message appears on the display. Press Reset.
   - Verify that the internal battery symbol shows the same level of charge as noted above and the device continues to operate.
   - Verify that the internal battery symbol has a black box around it to indicate that it is in use.
6. Reconnect the Detachable Battery and AC Power source.

VERIFY THE EXTERNAL BATTERY FUNCTION (OPTIONAL)

1. Connect AC Power to the device and verify that the green AC LED is lit.
2. Connect the external battery cable to the external battery and to the ventilator.
3. Verify that the external battery symbol is shown on the display and some level of charge is present.
4. Disconnect the AC Power source from the device.
   - Verify that the AC Power Disconnected alarm message appears on the display and the green AC LED is not lit. Press Reset.
   - Verify that the external battery symbol shows the level of charge as noted in the previous step and the device continues to operate.
   - Verify that the external battery symbol has a black box around it to indicate that it is in use.
5. Reconnect the AC Power source.

ALARM AND EVENT LOG CLEAN-UP

1. In the Setup Menu, select **Alarm Log**.
2. Press **Clear** to clear the log file.
3. Press **Yes** to confirm.
4. Press **Finish** to complete.
5. In the Setup Menu, select **Event Log**.
6. Press **Clear** to clear the log file.
7. Press **Yes** to confirm.
8. Press **Finish** to complete.

RESULTS

All portions of this checkout procedure should be completed prior to connection to the patient. If any of the tests fail to complete as indicated, if possible, correct the error, clear the alarm and resume testing.

10.2 TRILOGY 100 CHECKOUT PROCEDURE DATA SHEET

10.2.1 VISUAL INSPECTION

Damaged Parts?	*YES*	*NO*

10.2.2 SETTING & ALARM TESTS

High Tidal Volume Alarm Setting?	*PASS*	*FAIL*

Low Tidal Volume Alarm Setting?	*PASS*	*FAIL*

Circuit Disconnect Alarm Setting?	*PASS*	*FAIL*

High Inspiratory Pressure Alarm Setting?	*PASS*	*FAIL*

Low Inspiratory Pressure Alarm Setting?	*PASS*	*FAIL*

Battery Function Verification?	*PASS*	*FAIL*

Signature:_____

Date:_____

Serial Number: _____

10.3 TRILOGY 200 CHECKOUT PROCEDURE

This chapter details the test procedures that should be performed by the clinician prior to connecting the device to the patient. Test the Active PAP, Active Flow, and Passive circuit types if you want to do a complete checkout on the device. The tests should be performed as described in order to verify proper operation of the device. Some of the procedures in this chapter require you to change settings on the device.

NOTE

The actual circuit configuration to be used on the patient should be used to perform the system checkout.

10.3.1 TOOLS REQUIRED

- Universal Porting Block
- Active PAP Exhalation Device
- Active Flow Exhalation Device with Flow Sensor
- Trilogy Universal Active PAP Tube Adapter
- Whisper Swivel II
- Test Lung
- Small Flat Head Screwdriver

10.3.2 VISUAL INSPECTION

1. Verify that the enclosure is not broken and that all applicable screws are in place.
2. Verify that the device handle, SD Card door, and detachable battery are secure and in good working order.
3. Verify that the rubber feet are on the bottom of the device.

10.3.3 INITIAL SETUP

1. Connect the power cord to the device and then to an AC outlet.
2. Attach the test lung to the patient connection end of the desired circuit (Active PAP, Active Flow, or Passive).
3. Follow the instructions in System Setup Section to access the Setup Screen.

10.3.4 SETTINGS AND ALARM TESTS

Complete the following steps to set up the settings and alarms tests.

SETUP

Settings And Alarms Menu

Modify the settings in the Settings and Alarms menu to match those shown below.

SETTING	VALUE
Dual Prescription	*Off*
Circuit Type	*Active PAP, Active F low or Passive*
Therapy Mode	*S/T*
AVAPS (passive circuit only)	*Off*
IPAP	*20 pressure units*
EPAP	*4 pressure units*
Breath Rate	*12 BPM*
Inspiratory Time	*1.6 seconds*
Trigger Type (passive circuit)	*Auto-Trak*
Flow Trigger Sensitivity (active PAP circuit)	*6.0 l/min*
Leak Compensation (Active Flow circuit type	*On*
Flow Cycle Sensitivity (Active PAP or Active Flow circuit type)	*20%*
Rise Time	*1*
Ramp Length	*Off*
All other alarms	*Off*

Options Menu

Modify the settings in the Options menu to match those shown below.

SETTING	VALUE
Menu Access	*Full*
Detailed View	*On*
All other settings	*Discretionary*

Turn Device Power On

Press the Start/Stop button on the front of the ventilator. The system will begin operating using the defined ventilation settings.

VERIFY THE HIGH TIDAL VOLUME ALARM

NOTE
Do not use the "reset" button to manually reset the alarm. Instead, use the "Modify" button to change ventilator settings. This note applies to all tests.

This procedure verifies that the High Tidal Volume alarm is working properly. For Passive and Active Flow circuits, this will verify the High Vte alarm. For Active PAP circuits, this will verify the High Vti alarm. It assumes that you have attached the test lung, verified the ventilator settings, and turned on ventilator power as described in the Initial Setup section.

Change Alarm Ventilator Setting

Modify the High Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
High Vte/High Vti	*50 ml*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The High Tidal Volume alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the High Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
High Vte/High Vti	*500 ml*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator settings and change the following value shown below.

SETTING	VALUE
High Vte/High Vti	*Off*

VERIFY THE LOW TIDAL VOLUME ALARM

This procedure verifies that the Low Tidal Volume alarm is working properly. For Passive and Active Flow circuits, this will verify the Low Vte alarm. For Active PAP circuits, this will verify the Low Vti alarm. It assumes that you have attached the test lung, verified the ventilator settings, and turned on ventilator power as described in the Initial Setup section.

Change Alarm Ventilator Setting

Modify the Low Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
Low Vte/Low Vti	*500 ml*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Low Tidal Volume alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the Low Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
Low Vte/Low Vti	*50 ml*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator settings and change the following value shown below.

SETTING	VALUE
Low Vte/Low Vti	*Off*

VERIFY CIRCUIT DISCONNECT ALARM

This procedure verifies that the Circuit Disconnect alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power as described in the Initial Setup section.

NOTE
The Low Inspiratory or Low Expiratory Pressure Alarm may also be detected.

Change Circuit Disconnect Ventilator Setting

Modify the Circuit Disconnect ventilator setting to match the value shown below.

SETTING	VALUE
Circuit Disconnect	*10 seconds*

Disconnect Test Lung

Disconnect the test lung from the circuit.

Verify the Alarm

Wait approximately 10 seconds and verify the following alarm signals:

- The High Priority Audible Indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Circuit Disconnect alarm condition appears on the screen, highlighted in red

Reconnect Test Lung

Reconnect the test lung to the circuit.

Verify Reset

Wait at least 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator settings and change the following values shown below.

SETTING	VALUE
Circuit Disconnect	*Off*

VERIFY THE HIGH INSPIRATORY PRESSURE ALARM

This procedure verifies that the High Inspiratory Pressure alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power as described in the Initial Setup section.

NOTE

If this alarm is not reset within 3 occurrences, the alarm is elevated to High Priority, and the High Priority Indicators occur.

Change Ventilator Settings

Modify the ventilator settings and change the following values shown below.

SETTING	VALUE
Mode	*CV*
Tidal Volume	*500 ml*
Breath Rate	*12 BPM*
Inspiratory Time	*1.0 seconds*
Flow Pattern	*Ramp*
PEEP	*4 pressure units*
Sigh	*Off*
Circuit Disconnect	*Off*
Low Inspiratory Pressure	*6 pressure units*
High Inspiratory Pressure	*10 pressure units*
Apnea	*Off*
All other alarms	*Off*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The Medium Priority audible indicator sounds
- A yellow light flashes on the Alarm Indicator/Audio Pause button
- The High Inspiratory Pressure alarm condition appears on the screen, highlighted in yellow

Modify Ventilator Alarm Settings

Modify the High Inspiratory Pressure setting to match the one shown below.

SETTING	VALUE
High Inspiratory Pressure	*60 pressure units*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The Medium Priority audible indicator has stopped sounding
- The yellow light on the Alarm Indicator/Audio Pause button has stopped flashing

VERIFY THE LOW INSPIRATORY PRESSURE ALARM

This procedure verifies that the Low Inspiratory Pressure alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power as described in the Initial Setup section.

Change Ventilator Settings

Modify the ventilator settings and change the following values shown below.

SETTING	VALUE
Mode	*CV*
Tidal Volume	*500 ml*
Breath Rate	*12 BPM*
Inspiratory Time	*1.0 seconds*
Flow Pattern	*Ramp*
PEEP	*4 pressure units*
Sigh	*Off*
Circuit Disconnect	*Off*
Low Inspiratory Pressure	*40 pressure units*
High Inspiratory Pressure	*60 pressure units*
Apnea	*Off*
All other alarms	*Off*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Low Inspiratory Pressure alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the Low Inspiratory Pressure setting to match the one shown below.

SETTING	VALUE
Low Inspiratory Pressure	*6 pressure units*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

10.3.5 Battery Function Verification

Make sure the batteries are functioning properly and fully charged before patient use.

Verify the Detachable and Internal (Lithium-Ion) Batteries Function

1. Connect AC Power to the device and verify that the green AC LED on the front panel is lit.
2. Verify that the detachable battery is properly installed.
3. Turn the device on and verify that both the detachable and internal battery symbols appear on the display. Verify that if either battery is less than fully charged, the charge symbol will display on the respective battery.
4. Disconnect the AC Power source from the device.
   - Verify that the AC Power Disconnected alarm message appears on the display and the green AC LED is not lit. Press Reset.
   - Verify that the detachable battery symbol shows the level of charge noted in the previous step and that the device continues to operate.
   - Verify that the detachable battery symbol has a black box around it to indicate that it is in use.
5. Disconnect the detachable battery pack from the device.
   - Verify that the Detach Batt Disconnected alarm message appears on the display. Press Reset.
   - Verify that the internal battery symbol shows the same level of charge as noted in Step C and the device continues to operate.
   - Verify that the internal battery symbol has a black box around it to indicate that it is in use.
6. Reconnect the Detachable Battery and AC Power source.

Verify the External Battery Function (If Available)

1. Connect AC Power to the device and verify that the green AC LED is lit.
2. Connect the external battery cable to the external battery and to the ventilator.
3. Verify that the external battery symbol is shown on the display and some level of charge is present.
4. Disconnect the AC Power source from the device.
   - Verify that the AC Power Disconnected alarm message appears on the display and the green AC LED is not lit. Press Reset.
   - Verify that the external battery symbol shows the level of charge as noted in the previous step and the device continues to operate.
   - Verify that the external battery symbol has a black box around it to indicate that it is in use.
5. Reconnect the AC Power source.

Alarm and Event Log Clean-Up

1. In the Setup Menu, select Alarm Log.
   a. Press Clear to clear the log file.
   b. Press Yes to confirm.

c. Press Finish to complete.

2. In the Setup Menu, select Event Log.
   a. A. Press Clear to clear the log file.
   b. Press Yes to confirm.
   c. Press Finish to complete.

RESULTS

All portions of this checkout procedure should be completed prior to connection to the patient. If any of the tests fail to complete as indicated, if possible, correct the error, clear the alarm and resume testing. If correction of the failed portion is not possible, return the device to Respironics or an authorized service center for service and repair.

10.4 TRILOGY 200 CHECKOUT PROCEDURE DATA SHEET

10.4.1 VISUAL INSPECTION

	YES	NO
Damaged Parts?		

10.4.2 SETTING & ALARM TESTS

	PASS	FAIL
High Tidal Volume Alarm Setting?		

	PASS	FAIL
Low Tidal Volume Alarm Setting?		

	PASS	FAIL
Circuit Disconnect Alarm Setting?		

	PASS	FAIL
High Inspiratory Pressure Alarm Setting?		

	PASS	FAIL
Low Inspiratory Pressure Alarm Setting?		

	PASS	FAIL
Battery Function Verification?		

Signature:_____

Date:_____

Serial Number: _____

10.5 TRILOGY O_2 & TRILOGY 202 CHECKOUT PROCEDURE

This chapter details the test procedures that should be performed by the clinician prior to connecting the device to the patient. Test the Active PAP, Active Flow, and Passive circuit types if you want to do a complete checkout on the device. The tests should be performed as described in order to verify proper operation of the device. Some of the procedures in this chapter require you to change settings on the device.

10.5.1 TOOLS REQUIRED

- Universal Porting Block
- Active PAP Exhalation Device
- Active Flow Exhalation Device with Flow Sensor
- Trilogy Universal Active PAP Tube Adapter
- Whisper Swivel II
- Test Lung
- High Pressure O_2 Hose
- Oxygen Monitor
- Small Flat Head Screwdriver

10.5.2 VISUAL INSPECTION

1. Verify that the enclosure is not broken and that all applicable screws are in place.
2. Verify that the device handle, SD Card door, and detachable battery are secure and in good working order.
3. Verify that the rubber feet are on the bottom of the device.

10.5.3 INITIAL SETUP

1. Connect the power cord to the device and then to an AC outlet.
2. Attach the test lung to the patient connection end of the desired circuit (Active PAP, Active Flow, or Passive).
3. Connect the device to a suitable high pressure O_2 source.
4. Connect and set up an external O_2 monitor per the manufacturer's instruction manual.
5. Follow the instructions in Chapter 5 to access the Setup Screen.

10.5.4 SETTINGS AND ALARMS TESTS

Complete the following steps to set up the settings and alarms tests.

SETUP

Settings And Alarms Menu

Modify the settings in the Settings and Alarms menu to match those shown below.

SETTING	VALUE
Dual Prescription	*Off*
Circuit Type	*Active PAP, Active Flow, or Passive*
Therapy Mode	*S/T*
AVAPS (passive circuit only)	*Off*
IPAP	*20 pressure units*
EPAP	*4 pressure units*
FiO_2	*45%*
Breath Rate	*12 BPM*
Inspiratory Time	*1.6 seconds*
Trigger Type (passive circuit type)	*Auto-Trak*
Flow Trigger Sensitivity (Active PAP or Active Flow circuit type)	*6.0 l/min*
Leak Compensation (Active Flow circuit type)	*On*
Flow Cycle Sensitivity (Active PAP or Active Flow circuit type)	*20%*
Rise Time	*1*
Ramp Length	*Off*
All other alarms	*Off*

Options Menu

Modify the settings in the Options menu to match those shown below.

SETTING	VALUE
Menu Access	*Full*
Detailed View	*On*
All other settings	*Discretionary*

Turn Device Power On

Press the Start/Stop button on the front of the ventilator. The system will begin operating using the defined ventilation settings.

VERIFY THE HIGH TIDAL VOLUME ALARM

This procedure verifies that the High Tidal Volume alarm is working properly. For Passive and Active Flow circuits, this will verify the High Vte alarm. For Active PAP circuits, this will verify the High Vti alarm. It assumes that you have attached the test lung, verified the ventilator settings, and turned on ventilator power as described in the Initial Setup section.

NOTE
Do not use the "reset" button to manually reset the alarm. Instead, use the "Modify" button to change ventilator settings. This note applies to all tests.

Change Alarm Ventilator Setting

Modify the High Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
High Vte/High Vti	*50 ml*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The High Tidal Volume alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the High Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
High Vte/High Vti	*500 ml*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator settings and change the following value shown below.

SETTING	VALUE
High Vte/High Vti	*Off*

VERIFY THE LOW TIDAL VOLUME ALARM

This procedure verifies that the Low Tidal Volume alarm is working properly. For Passive and Active Flow circuits, this will verify the Low Vte alarm. For Active PAP circuits, this will verify the Low Vti alarm. It assumes that you have attached the test lung, verified the ventilator settings, and turned on ventilator power as described in the Initial Setup section.

Change Alarm Ventilator Setting

Modify the Low Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
Low Vte/Low Vti	*500 ml*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Low Tidal Volume alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the Low Tidal Volume alarm setting to match the one shown below.

SETTING	VALUE
Low Vte/Low Vti	*50 ml*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator settings and change the following value shown below.

SETTING	VALUE
Low Vte/Low Vti	*Off*

VERIFY CIRCUIT DISCONNECT ALARM

This procedure verifies that the Circuit Disconnect alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power as described in the Initial Setup section.

NOTE
The Low Inspiratory or Low Expiratory Pressure Alarm may also be detected.

Change Circuit Disconnect Ventilator Setting

Modify the Circuit Disconnect ventilator setting to match the value shown below.

SETTING	VALUE
Circuit Disconnect	*10 seconds*

Disconnect Test Lung

Disconnect the test lung from the circuit.

Verify the Alarm

Wait approximately 10 seconds and verify the following alarm signals:

- The High Priority Audible Indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Circuit Disconnect alarm condition appears on the screen, highlighted in red

Reconnect Test Lung

Reconnect the test lung to the circuit.

Verify Reset

Wait at least 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

Restore Ventilator Settings

Modify the ventilator settings and change the following values shown below.

SETTING	VALUE
Circuit Disconnect	*Off*

VERIFY THE HIGH INSPIRATORY PRESSURE ALARM

This procedure verifies that the High Inspiratory Pressure alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power as described in the Initial Setup section.

NOTE
If this alarm is not reset within 3 occurrences, the alarm is elevated to High Priority, and the High Priority Indicators occur.

Change Ventilator Settings

Modify the ventilator settings and change the following values shown below.

SETTING	VALUE
Mode	*CV*
Tidal Volume	*500 ml*
FiO_2	*21%*
Breath Rate	*12 BPM*
Inspiratory Time	*1.0 seconds*
Flow Pattern	*Ramp*
PEEP	*4 pressure units*
Sigh	*Off*
Circuit Disconnect	*Off*
Low Inspiratory Pressure	*6 pressure units*
High Inspiratory Time	*10 pressure units*
Apnea	*Off*
All other alarms	*Off*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The Medium Priority audible indicator sounds
- A yellow light flashes on the Alarm Indicator/Audio Pause button
- The High Inspiratory Pressure alarm condition appears on the screen, highlighted in yellow

Modify Ventilator Alarm Settings

Modify the High Inspiratory Pressure setting to match the one shown below.

SETTING	VALUE
High Inspiratory Pressure	*60 pressure units*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The Medium Priority audible indicator has stopped sounding
- The yellow light on the Alarm Indicator/Audio Pause button has stopped flashing

VERIFY THE LOW INSPIRATORY PRESSURE ALARM

This procedure verifies that the Low Inspiratory Pressure alarm is working properly. It assumes that you have attached the test lung, verified ventilator settings, and turned on ventilator power as described in the Initial Setup section.

Change Ventilator Settings

Modify the ventilator settings and change the following values shown below.

SETTING	VALUE
Mode	*CV*
Tidal Volume	*500 ml*
FiO_2	*21%*
Breath Rate	*12 BPM*
Inspiratory Time	*1.0 seconds*
Flow Pattern	*Ramp*
PEEP	*4 pressure units*
Sigh	*Off*
Circuit Disconnect	*Off*
Low Inspiratory Pressure	*40 pressure units*
High Inspiratory Time	*60 pressure units*
Apnea	*Off*
All other alarms	*Off*

Verify the Alarm

Wait up to 40 seconds and verify the following alarm signals:

- The High Priority audible indicator sounds
- A red light flashes on the Alarm Indicator/Audio Pause button
- The Low Inspiratory Pressure alarm condition appears on the screen, highlighted in red

Modify Ventilator Alarm Settings

Modify the Low Inspiratory Pressure setting to match the one shown below.

SETTING	VALUE
Low Inspiratory Pressure	*6 pressure units*

Verify Reset

Wait 40 seconds and verify the following auto-reset conditions:

- The High Priority audible indicator has stopped sounding
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing

VERIFY THE O_2 BLENDING OPERATION

This procedure verifies that the Low Oxygen Flow alarm and the Low Oxygen Inlet Pressure alarm are working properly. These alarms apply to all circuit types. It assumes that you have attached the test lung, verify the ventilator settings, and turned on the ventilator power as described in the Initial Setup section.

Setup

1. Connect an external O_2 Monitor (in accordance with the recommended manufacture's guidelines) in-line with the patient tube. Make sure the O_2 monitor is properly calibrated before proceeding.
2. Connect the ventilator's oxygen input port to a source of high pressure O_2 (60 psi nominal). Turn on O_2 flow to the ventilator.

Ventilator Settings

Set the ventilator FiO_2 setting to 45%.

Verify Blending

1. Turn on the ventilator.
2. Verify the set level of FiO_2 is satisfied using an external O_2 monitor.

Verify alarm

1. Shut off or disconnect the source of high pressure O_2 to the ventilator.
2. Wait 1 minute and verify the following alarm signals:

- The Priority audible indicator sounds.
- A red light flashes on the Alarm Indicator/Audio Pause Button.
- The following alarm conditions appear on the screen, highlighted in red:
  - Low Oxygen Flow
  - Low Oxygen Inlet Pressure

Verify Reset

1. Reconnect or turn on the source of high pressure O_2 to the ventilator.
2. Wait 1 minute and verify the following:

- The set level of FiO_2 is satisfied using an external O_2 monitor.
- The High Priority audible indicator has stopped sounding.
- The red light on the Alarm Indicator/Audio Pause button has stopped flashing.

10.5.5 BATTERY FUNCTION VERIFICATION

Make sure the batteries are functioning properly and fully charged before patient use.

VERIFY THE DETACHABLE AND INTERNAL (LITHIUM-ION) BATTERIES FUNCTION

1. Connect AC Power to the device and verify that the green AC LED on the front panel is lit.
2. Verify that the detachable battery is properly installed.
3. Turn the device on and verify that both the detachable and internal battery symbols appear on the display. Verify that if either battery is less than fully charged, the charge symbol will display on the respective battery.
4. Disconnect the AC Power source from the device.
   - Verify that the AC Power Disconnected alarm message appears on the display and the green AC LED is not lit. Press Reset.
   - Verify that the detachable battery symbol shows the level of charge noted in the previous step and that the device continues to operate.
   - Verify that the detachable battery symbol has a black box around it to indicate that it is in use.
5. Disconnect the detachable battery pack from the device.
   - Verify that the Detach Batt Disconnected alarm message appears on the display. Press Reset.
   - Verify that the internal battery symbol shows the same level of charge as noted in Step C and the device continues to operate.
   - Verify that the internal battery symbol has a black box around it to indicate that it is in use.
6. Reconnect the Detachable Battery and AC Power source.

VERIFY THE EXTERNAL BATTERY FUNCTION (IF AVAILABLE)

1. Connect AC Power to the device and verify that the green AC LED is lit.
2. Connect the external battery cable to the external battery and to the ventilator.
3. Verify that the external battery symbol is shown on the display and some level of charge is present.
4. Disconnect the AC Power source from the device.
   - Verify that the AC Power Disconnected alarm message appears on the display and the green AC LED is not lit. Press Reset.
   - Verify that the external battery symbol shows the level of charge as noted in the previous step and the device continues to operate.
   - Verify that the external battery symbol has a black ••box around it to indicate that it is in use.
5. Reconnect the AC Power source.

ALARM AND EVENT LOG CLEAN-UP

1. In the Setup Menu, select Alarm Log.

a. Press Clear to clear the log file.
b. Press Yes to confirm.
c. Press Finish to complete.

2. In the Setup Menu, select Event Log.
   a. A. Press Clear to clear the log file.
   b. B. Press Yes to confirm.
   c. Press Finish to complete.

RESULTS

All portions of this checkout procedure should be completed prior to connection to the patient. If any of the tests fail to complete as indicated, if possible, correct the error, clear the alarm and resume testing. If correction of the failed portion is not possible, return the device to Respironics or an authorized service center for service and repair.

10.6 TRILOGY O_2 & TRILOGY 202 CHECKOUT PROCEDURE DATA SHEET

10.6.1 VISUAL INSPECTION

Damaged Parts?	*YES*	*NO*

10.6.2 SETTING & ALARM TESTS

High Tidal Volume Alarm Setting?	*PASS*	*FAIL*

Low Tidal Volume Alarm Setting?	*PASS*	*FAIL*

Circuit Disconnect Alarm Setting?	*PASS*	*FAIL*

High Inspiratory Pressure Alarm Setting?	*PASS*	*FAIL*

Low Inspiratory Pressure Alarm Setting?	*PASS*	*FAIL*

Verify the O_2 Blending Operation?	*PASS*	*FAIL*

Battery Function?	*PASS*	*FAIL*

Signature:_____

Date:_____

Serial Number: _____

10.7 DOWNLOADING THE TRILOGY FIELD SERVICE APPLICATION (FSA), TRILOGY TOOLBOX APPLICATION (TBA), AND LV2009 SYSTEM DEPLOYMENT SOFTWARE

NOTE

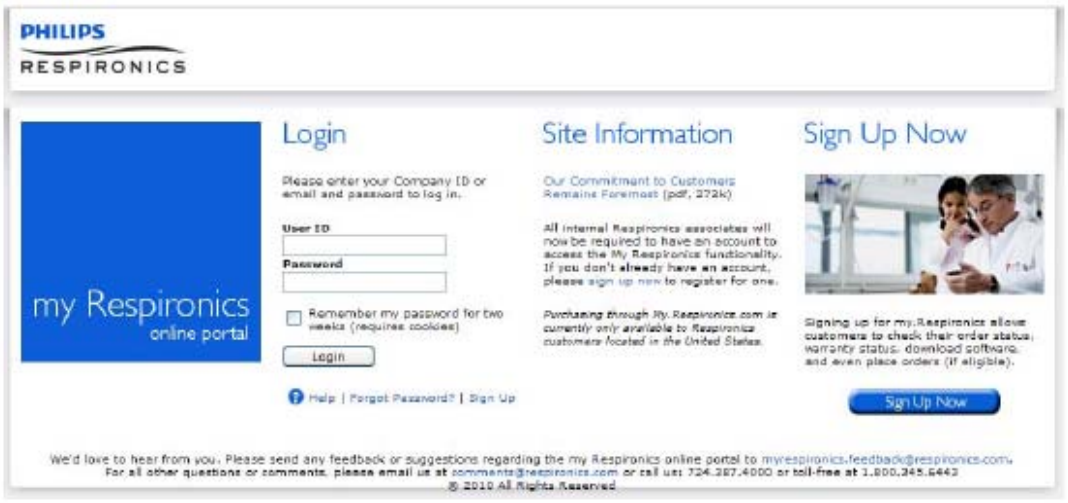
Respironics service software is now available at http://my.respironics.com. In the event that you are unable to access this site, log onto http://servicesoftware.respironics.com. to download Respironics service software.

It is recommended to periodically check my.respironics.com for new releases firmware and test software.

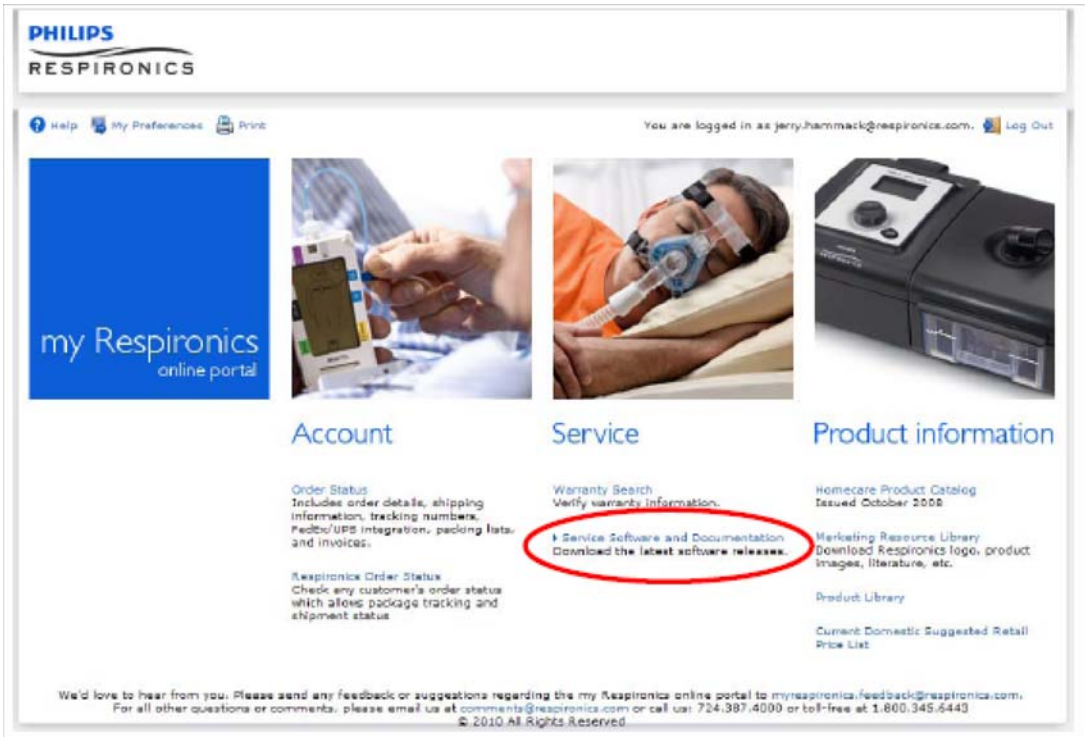
You must be a registered user in order to download the *Trilogy Field Service Application, Trilogy Toolbox Application, and LV2009 System Deployment Software*. To become a registered user and to download Trilogy Software and Documentation, you must successfully complete the Trilogy Service Training class.

Once you have access to download the software, perform the following:

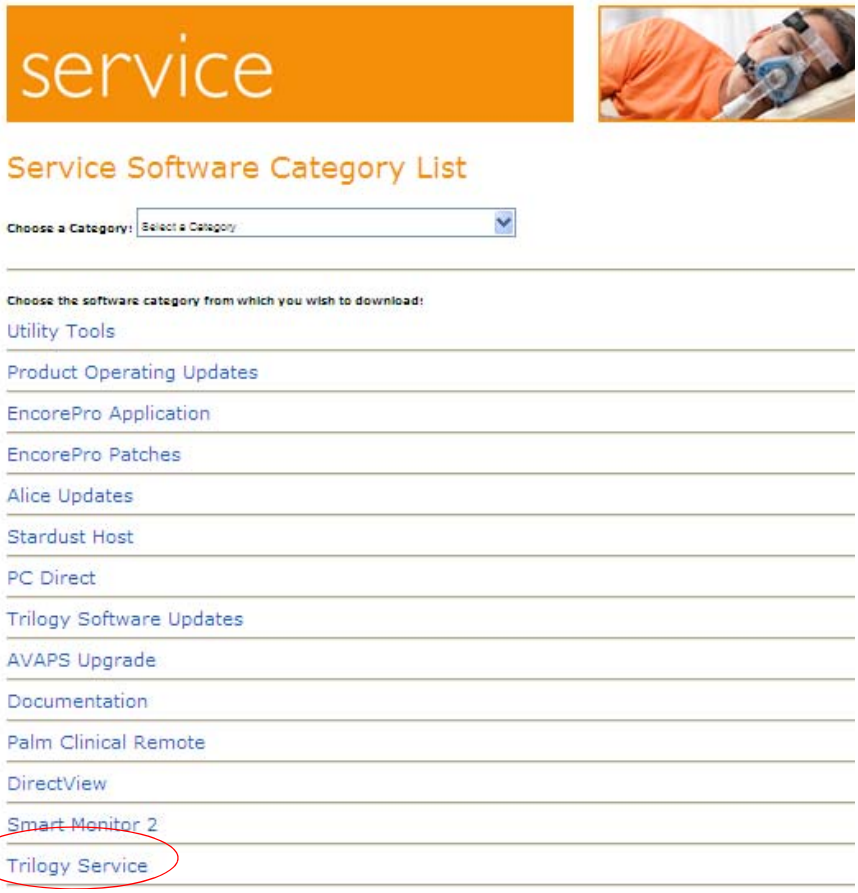
1. Log into **http://my.respironics.com**.



2. Click on the **Service Software** link.



3. In the *menu below*, select *Trilogy Service*.



4. Click on the ***Download*** button adjacent to the software you wish to download - *Trilogy Toolbox, Trilogy Field Service Application Software, or LV2009 System Deployment Software.*

NOTE

Screen Shots used below might not reflect the current released version of so ftware packages. Reme mber to periodically log onto ***http://my.respironics.com*** *and check for Trilogy software and firmware updates.*

IMPORTANT!

The programs may be downloaded in any order, but the applications must be installed to the computer in the order of LV2009 System Deployment Software, FSA, then TBA.

IMPORTANT!

Install the LV2009 System Deployment software before the Field Service Application and the Trilogy Toolbox Application. When installing the LV2009 System Development Software you will see a series of on-screen prompts. Use all of the default settings associated with the on-screen prompts until you get to the software version screen.

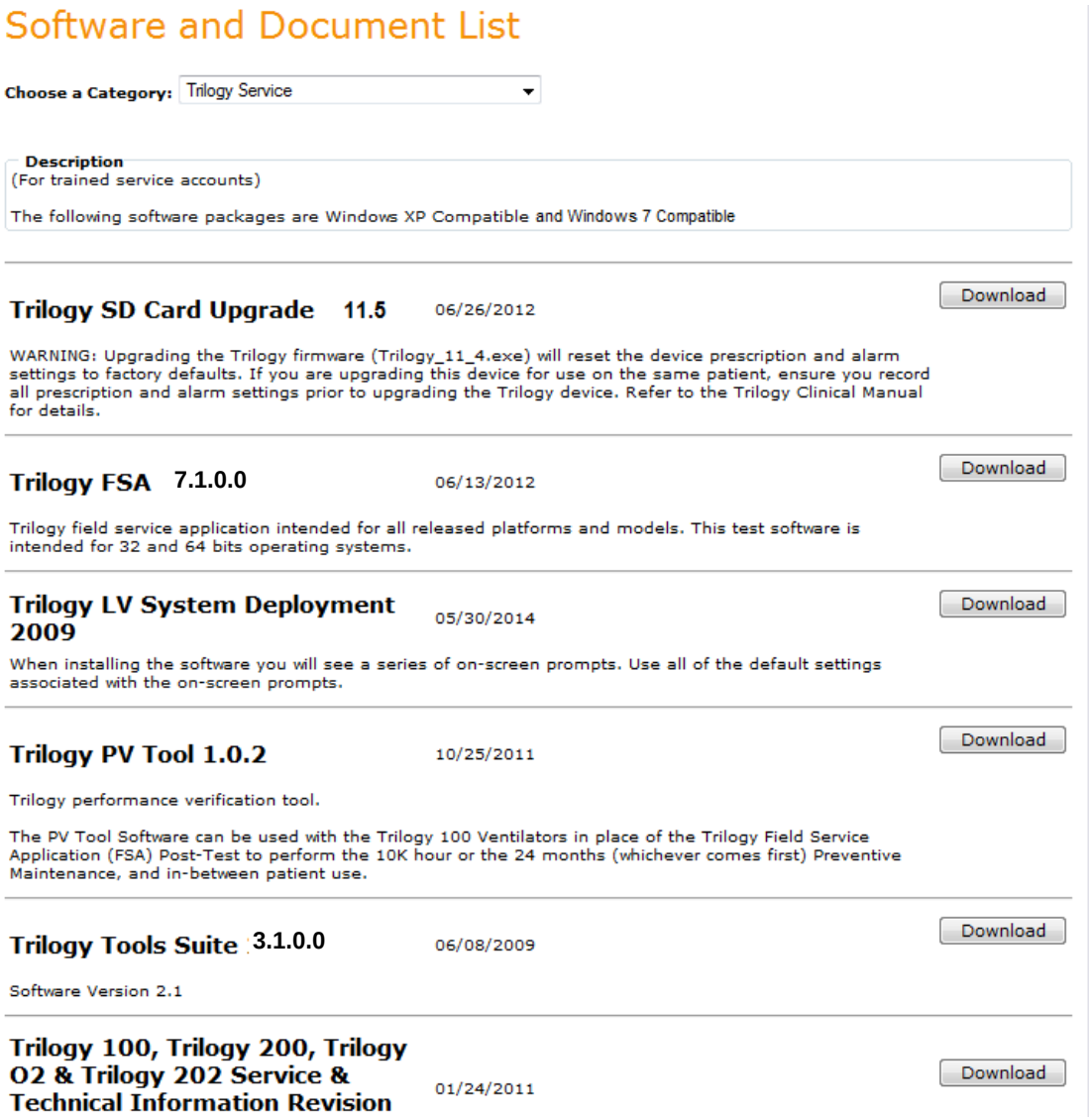


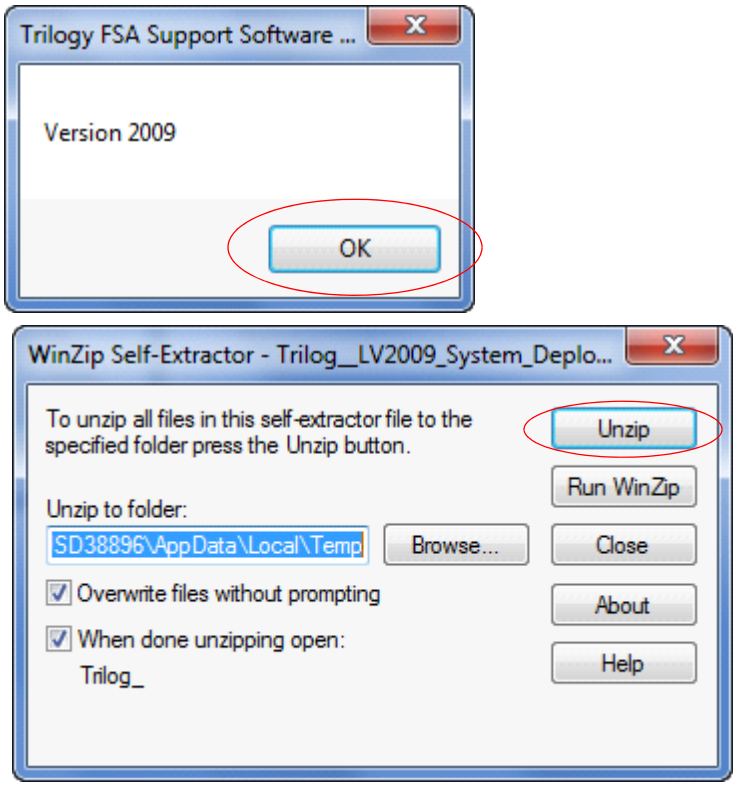
FIGURE 10-1: DOWNLOADING SOFTWARE SAMPLE SCREEN

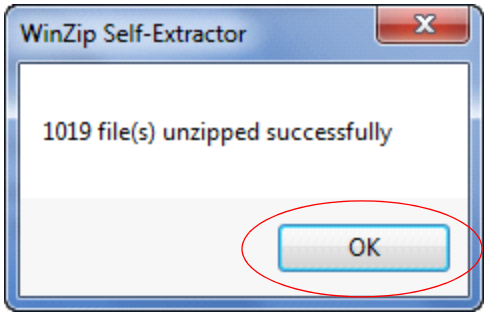
IMPORTANT NOTE

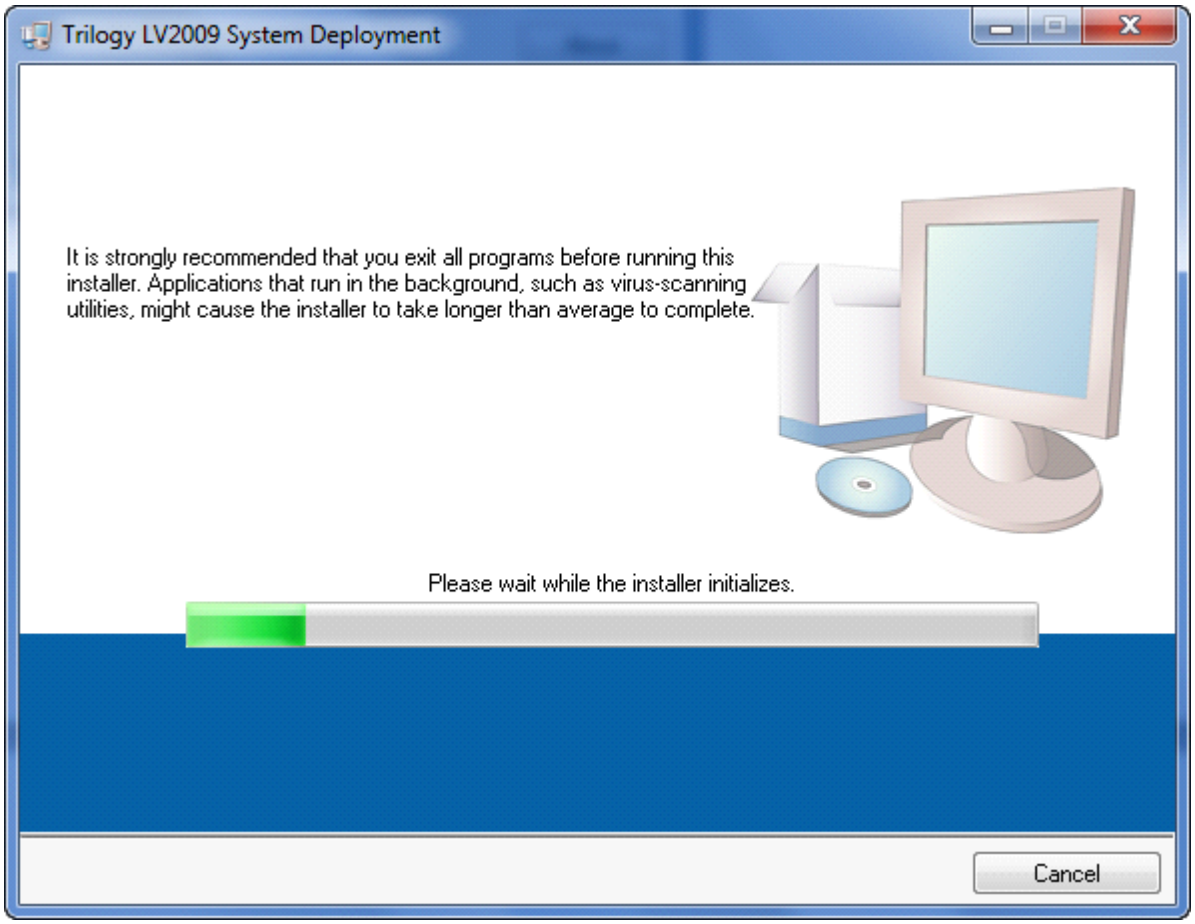
At anytime that you update any of the software applications, all applications must be completely removed using the ADD/REMOVE PROGRAMS feature of Windows; then all applications must be installed in the following order: LV2009 System Deployment Software, FSA and TBA.

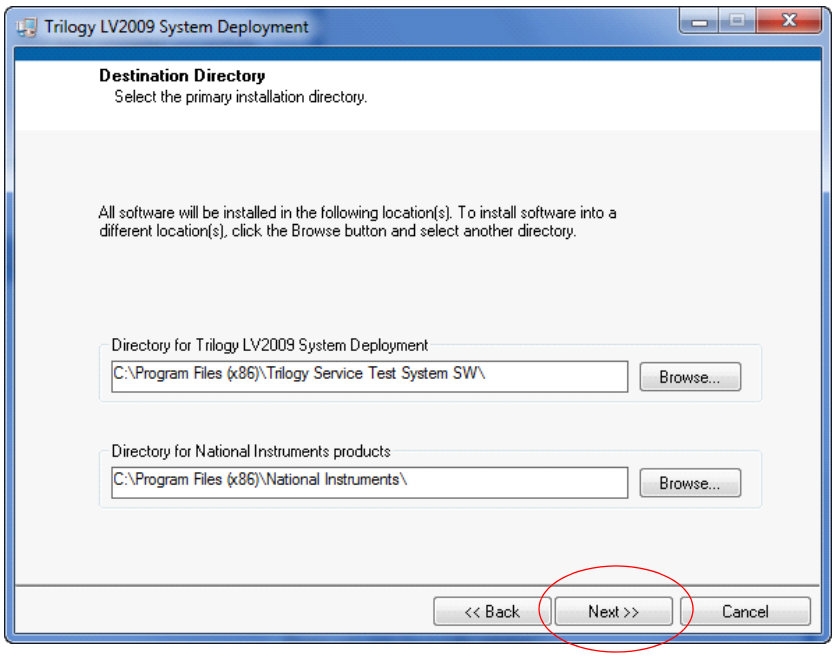
When you click on the **Download** button, the "Run or Save?" window will appear.

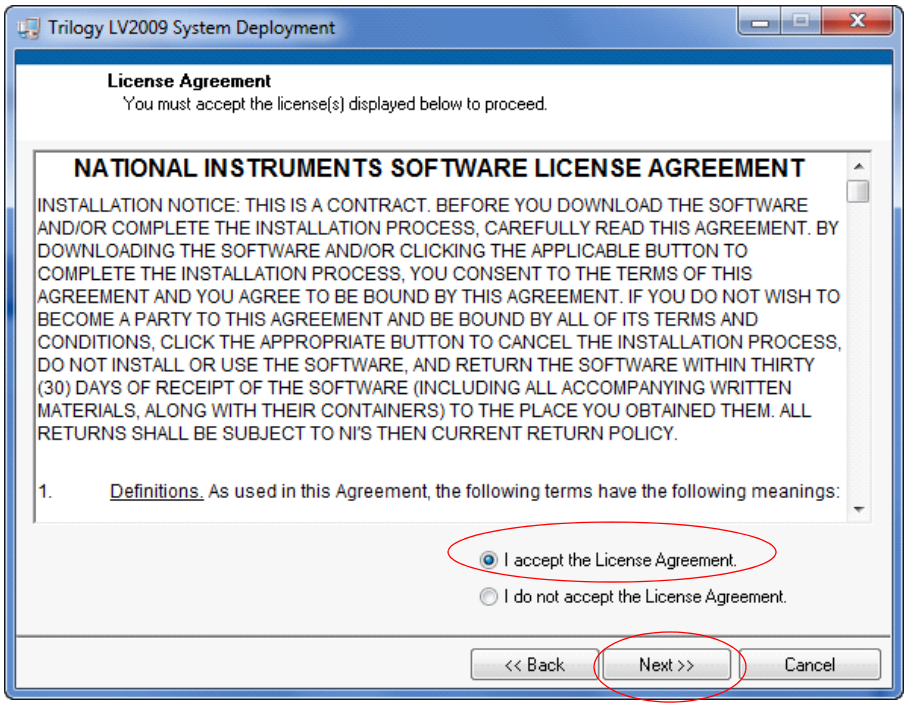
5. Click on **Save** to download the software and save it to a flash drive.
6. Follow the on-screen prompts to "Save" the software.
7. Open the folder that the applications were downloaded to.
8. Next, begin the installation process for each of the applications. Remember that the applications must be installed to the computer hard drive in the proper order (LV2009 System Deployment Software, FSA, TBA).
9. From the folder, select the LV2009 System Deployment for installation by double clicking with the mouse the "Trilogy_LV2009_System_Deployment.exe" file.
10. Follow the prompts and select the options highlighted by the RED Circles.

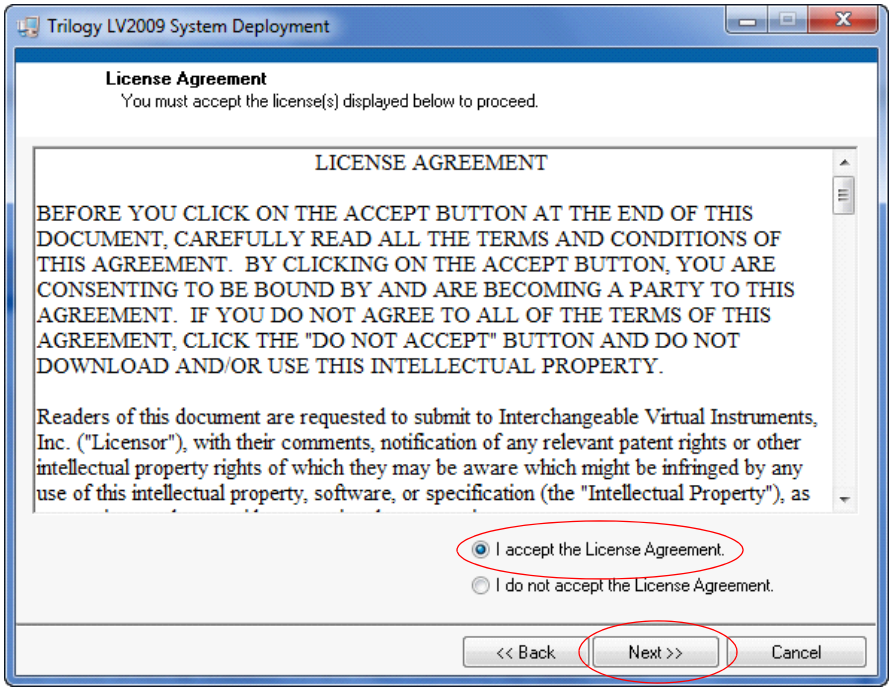


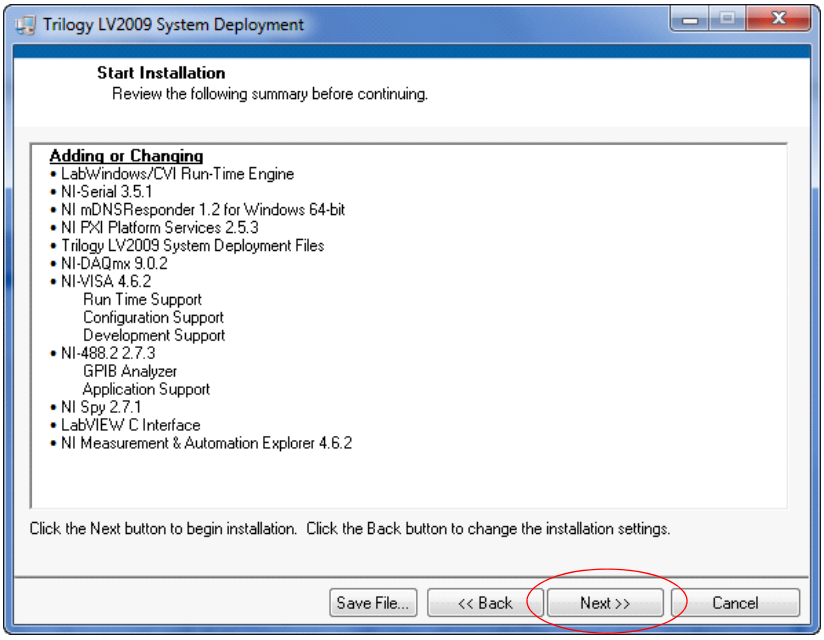

WinZip Self-Extractor
1019 file(s) unzipped successfully
OK

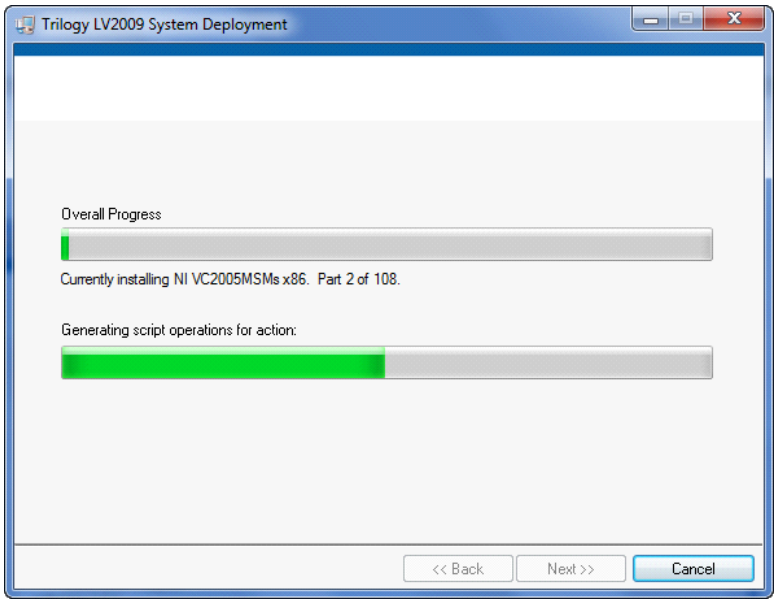

Trilogy LV2009 System Deployment
It is strongly recommended that you exit all programs before running this installer. Applications that run in the background, such as virus-scanning utilities, might cause the installer to take longer than average to complete.
Please wait while the installer initializes.
Cancel

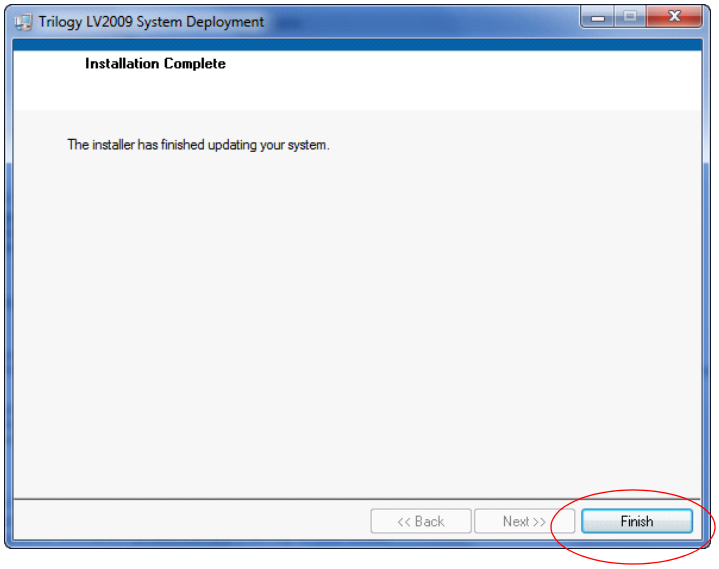

Trilogy LV2009 System Deployment
Destination Directory
Select the primary installation directory.
All software will be installed in the following location(s). To install software into a different location(s), click the Browse button and select another directory.
Directory for Trilogy LV2009 System Deployment
C:\Program Files (x86)\Trilogy Service Test System SW\
Browse...
Directory for National Instruments products
C:\Program Files (x86)\National Instruments\
Browse...
<< Back
Next >>
Cancel

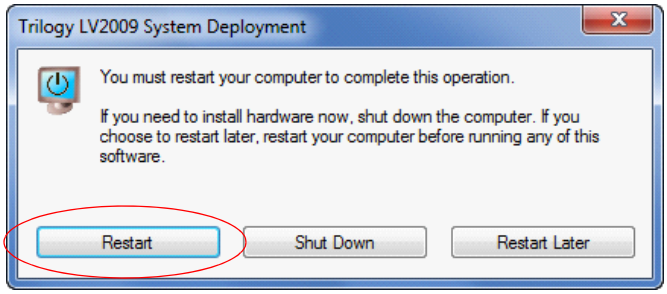

Trilogy LV2009 System Deployment
License Agreement
You must accept the license(s) displayed below to proceed.
NATIONAL INSTRUMENTS SOFTWARE LICENSE AGREEMENT
INSTALLATION NOTICE: THIS IS A CONTRACT. BEFORE YOU DOWNLOAD THE SOFTWARE AND/OR COMPLETE THE INSTALLATION PROCESS, CAREFULLY READ THIS AGREEMENT. BY DOWNLOADING THE SOFTWARE AND/OR CLICKING THE APPLICABLE BUTTON TO COMPLETE THE INSTALLATION PROCESS, YOU CONSENT TO THE TERMS OF THIS AGREEMENT AND YOU AGREE TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT WISH TO BECOME A PARTY TO THIS AGREEMENT AND BE BOUND BY ALL OF ITS TERMS AND CONDITIONS, CLICK THE APPROPRIATE BUTTON TO CANCEL THE INSTALLATION PROCESS, DO NOT INSTALL OR USE THE SOFTWARE, AND RETURN THE SOFTWARE WITHIN THIRTY (30) DAYS OF RECEIPT OF THE SOFTWARE (INCLUDING ALL ACCOMPANYING WRITTEN MATERIALS, ALONG WITH THEIR CONTAINERS) TO THE PLACE YOU OBTAINED THEM. ALL RETURNS SHALL BE SUBJECT TO NI'S THEN CURRENT RETURN POLICY.
1. Definitions. As used in this Agreement, the following terms have the following meanings:
I accept the License Agreement.
I do not accept the License Agreement.
<< Back
Next >>
Cancel


Trilogy LV2009 System Deployment
License Agreement
You must accept the license(s) displayed below to proceed.
LICENSE AGREEMENT
BEFORE YOU CLICK ON THE ACCEPT BUTTON AT THE END OF THIS DOCUMENT, CAREFULLY READ ALL THE TERMS AND CONDITIONS OF THIS AGREEMENT. BY CLICKING ON THE ACCEPT BUTTON, YOU ARE CONSENTING TO BE BOUND BY AND ARE BECOMING A PARTY TO THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, CLICK THE "DO NOT ACCEPT" BUTTON AND DO NOT DOWNLOAD AND/OR USE THIS INTELLECTUAL PROPERTY.
Readers of this document are requested to submit to Interchangeable Virtual Instruments, Inc. ("Licensor"), with their comments, notification of any relevant patent rights or other intellectual property rights of which they may be aware which might be infringed by any use of this intellectual property, software, or specification (the "Intellectual Property"), as
I accept the License Agreement.
I do not accept the License Agreement.
<< Back
Next >>
Cancel


Trilogy LV2009 System Deployment
Start Installation
Review the following summary before continuing.
Adding or Changing
• LabWindows/CVI Run-Time Engine
• NI-Serial 3.5.1
• NI mDNSResponder 1.2 for Windows 64-bit
• NI PXI Platform Services 2.5.3
• Trilogy LV2009 System Deployment Files
• NI-DAQmx 9.0.2
• NI-VISA 4.6.2
Run Time Support
Configuration Support
Development Support
• NI-488.2 2.7.3
GPIB Analyzer
Application Support
• NI Spy 2.7.1
• LabVIEW C Interface
• NI Measurement & Automation Explorer 4.6.2
Click the Next button to begin installation. Click the Back button to change the installation settings.
Save File...
<< Back
Next >>
Cancel

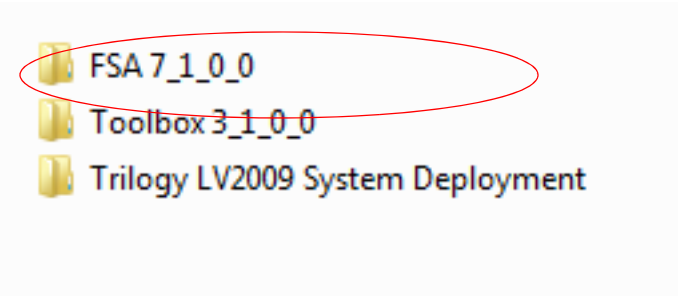

Trilogy LV2009 System Deployment
Overall Progress
Currently installing NI VC2005MSMs x86. Part 2 of 108.
Generating script operations for action:
<< Back
Next >>
Cancel

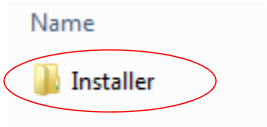


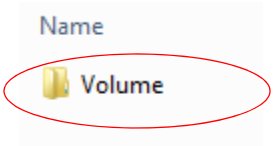


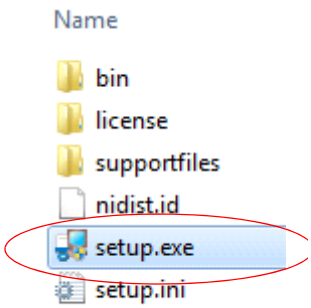
11. You must restart your computer after the LV2009 System Deployment Software has been installed.
12. Select the “Service Release_x_x_x_x.exe” file, where the x’s represent the current version of FSA, by double clicking with the mouse on the application.

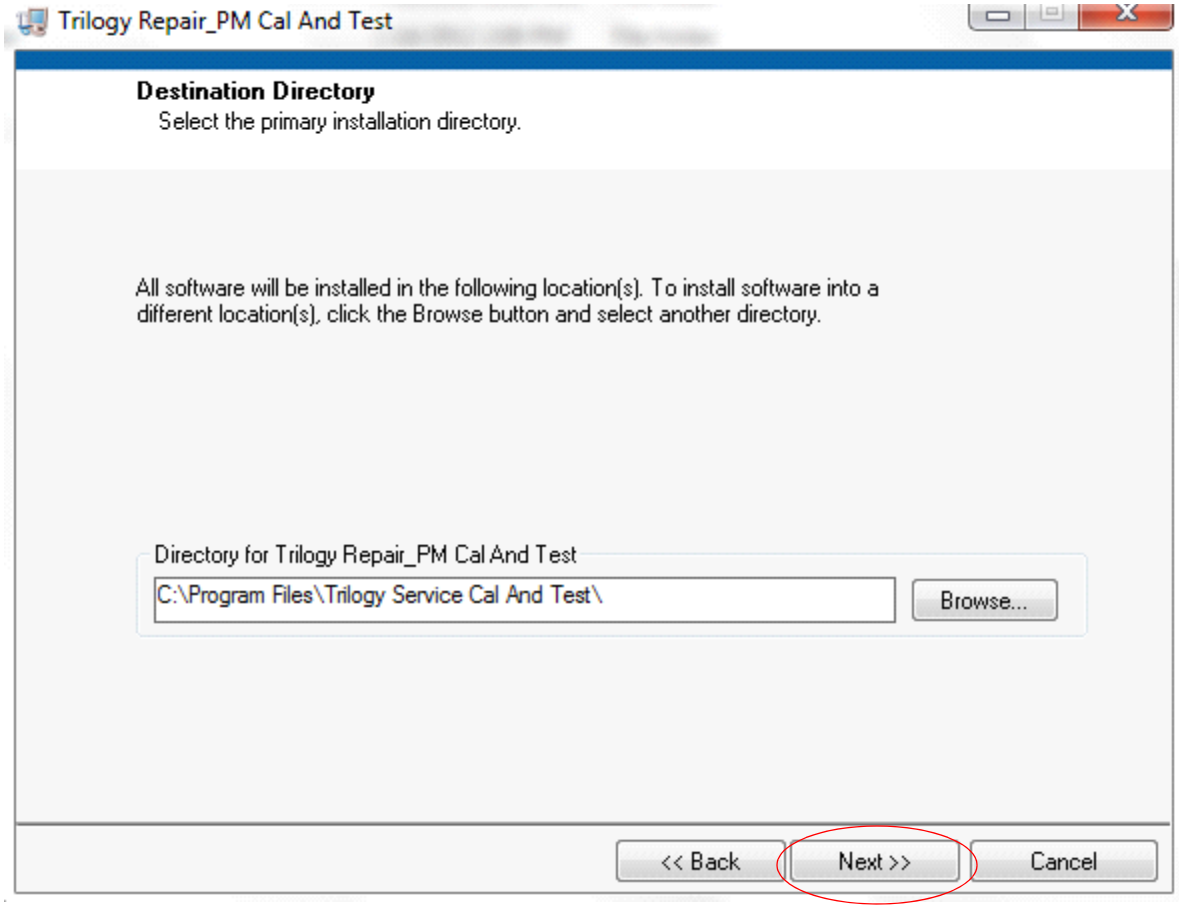
13. Follow the prompts and select the options highlighted by the RED Circles.

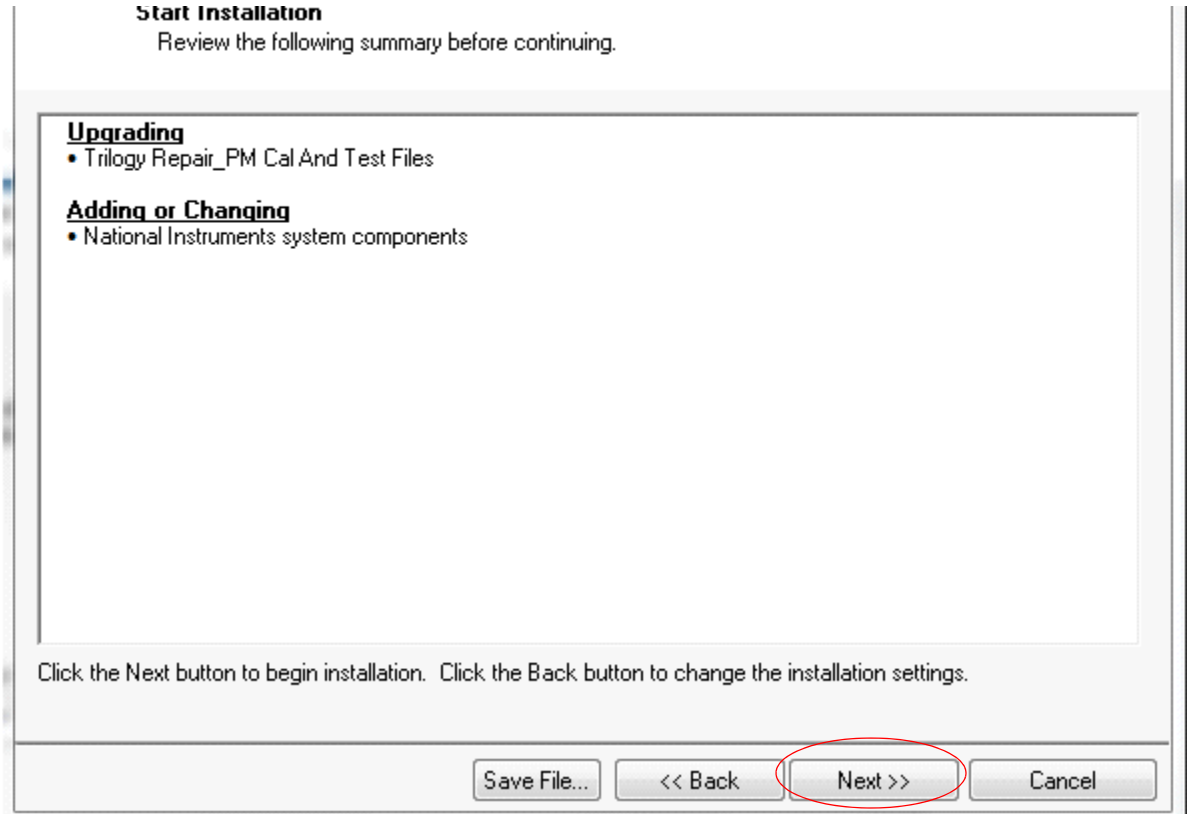


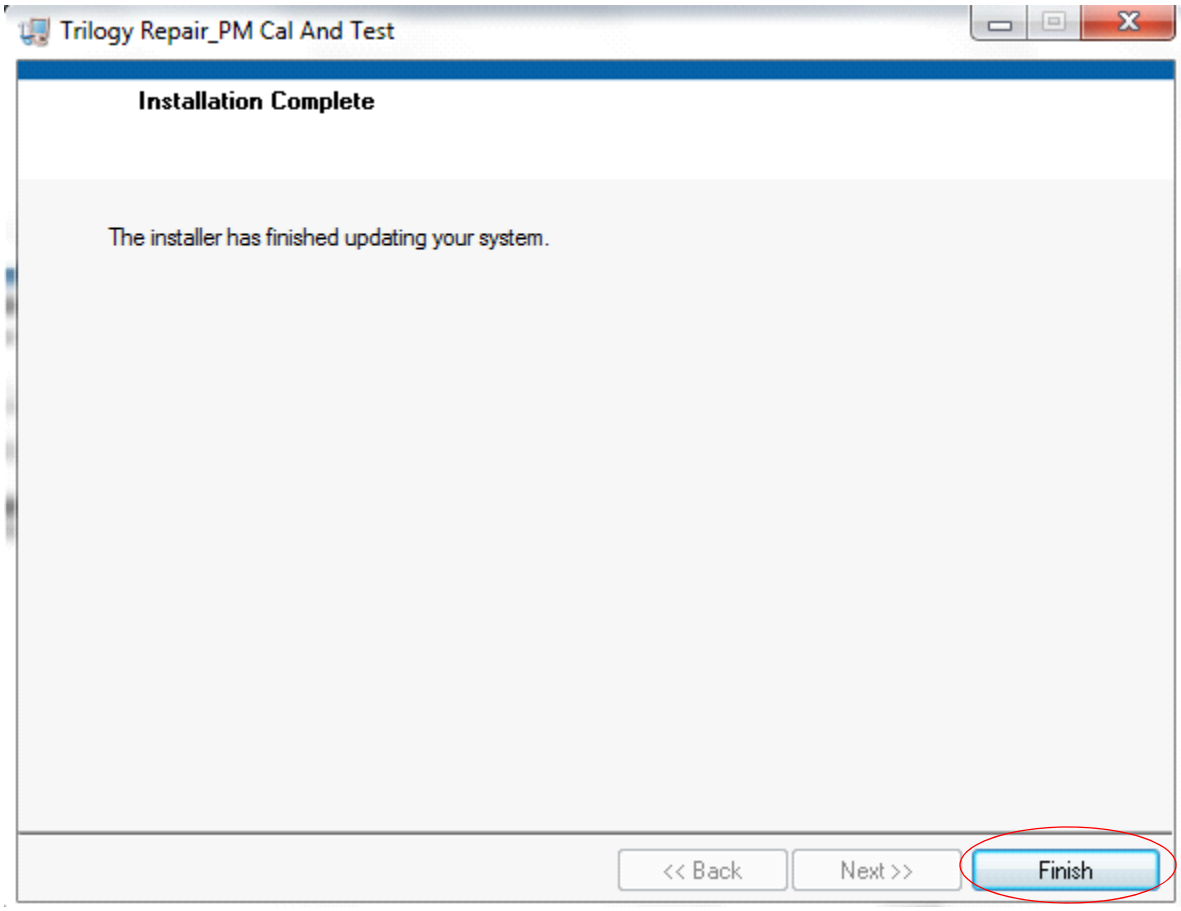







Trilogy Repair_PM Cal And Test
Destination Directory
Select the primary installation directory.
All software will be installed in the following location(s). To install software into a different location(s), click the Browse button and select another directory.
Directory for Trilogy Repair_PM Cal And Test
C:\Program Files\Trilogy Service Cal And Test\
Browse...
<< Back
Next >>
Cancel

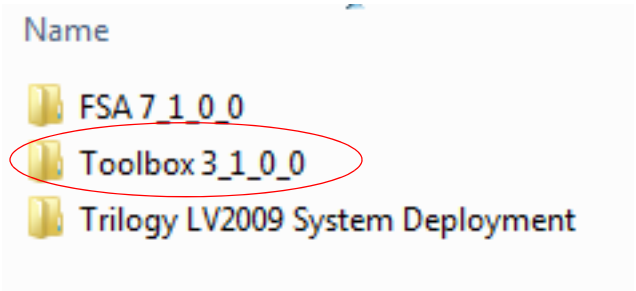

Start Installation
Review the following summary before continuing.
Upgrading
• Trilogy Repair_PM Cal And Test Files
Adding or Changing
• National Instruments system components
Click the Next button to begin installation. Click the Back button to change the installation settings.
Save File...
<< Back
Next >>
Cancel



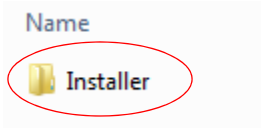
14. You must restart your computer after this installation. Once the computer restarts there will be 4 new Icons on the Desktop screen of the computer.

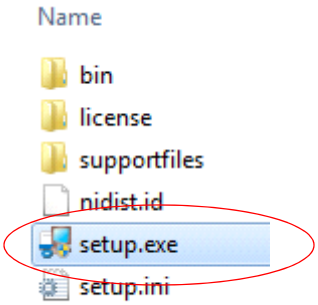
15. There are two options of the Trilogy Field Service Application:
    - Repair Test - Provides calibration and verification after the device Run-in
    - Preventative Maintenance (PM) Test - Provides verification of calibration and performance during the 10,000 hour/24 month Preventative Maintenance.

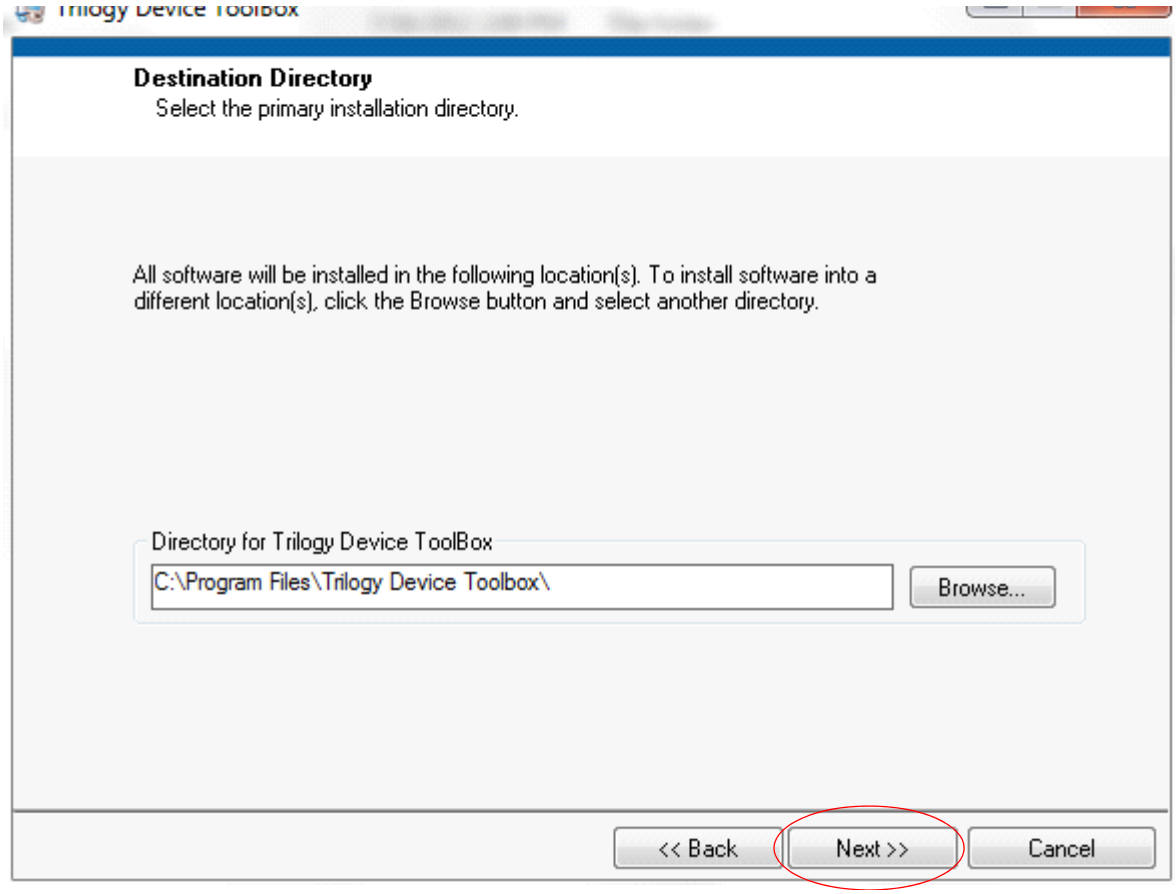
16. There are also two ways to perform the testing:
    - Manual Flow Testing - Allows you to use Shop Air or Compressed Air as the negative flow source.
    - Automatic Flow Testing - Allows you to use a second Trilogy device (any model of Trilogy can be used) as a negative flow source.
17. Next from the download location, select the Toolbox for installation by double clicking with the mouse the folder below.

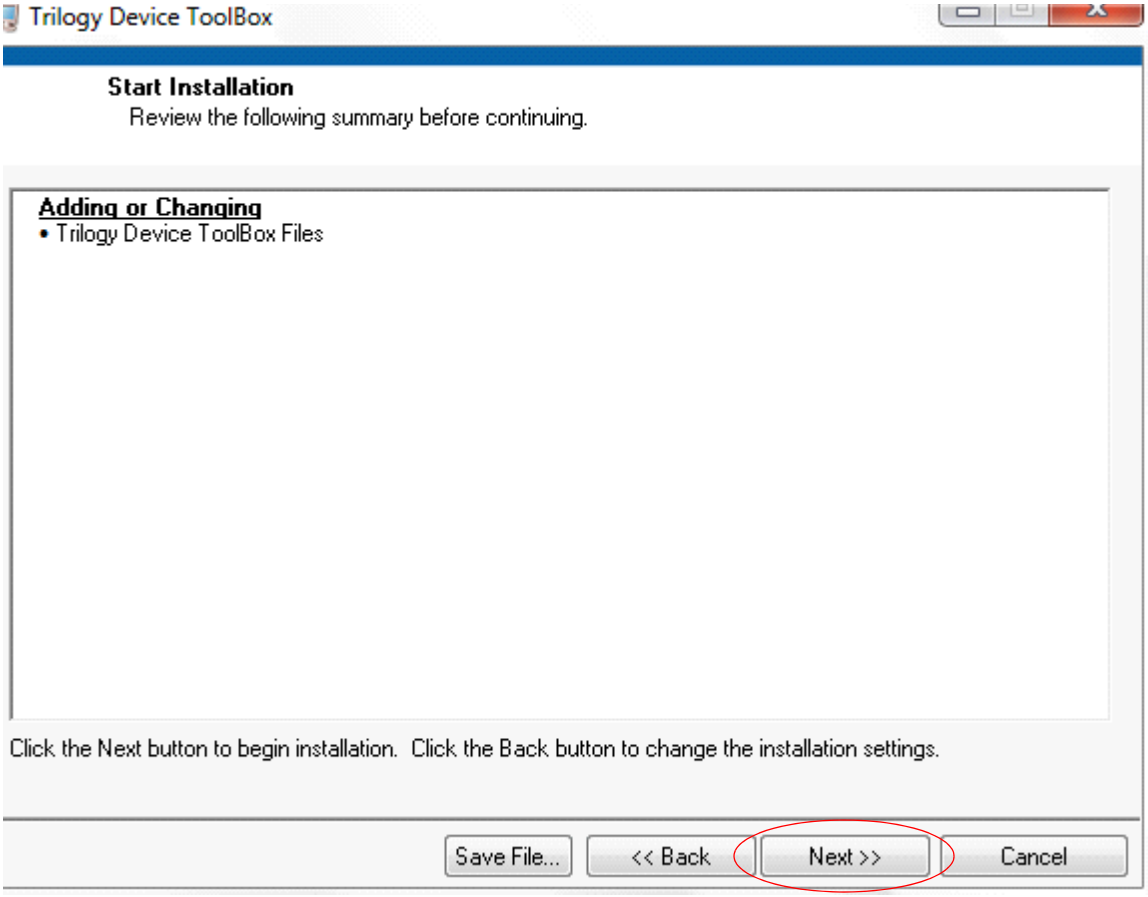


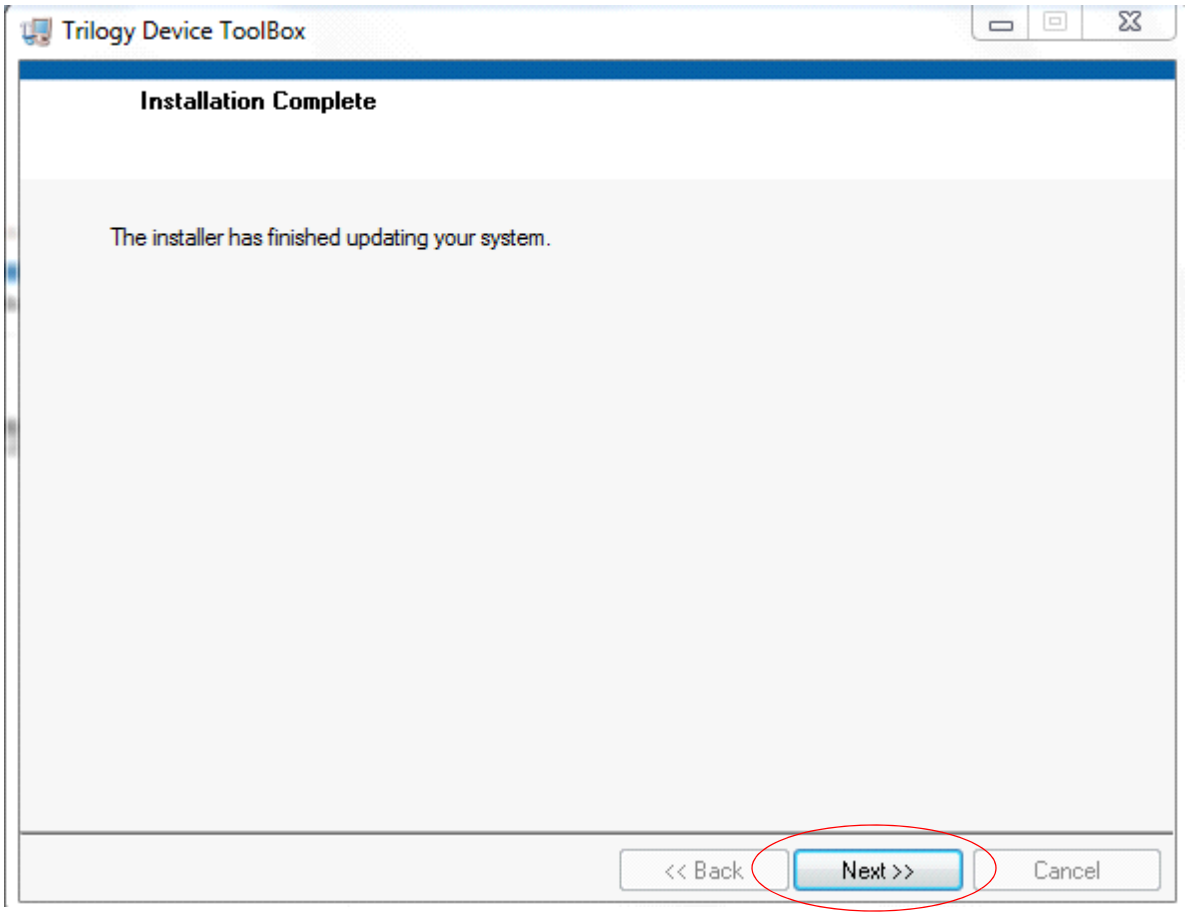
18. Follow the prompts and select the options highlighted by the RED Circles. Acceppt all default locations except for Step 19.






Trilogy Device ToolBox
Destination Directory
Select the primary installation directory.
All software will be installed in the following location(s). To install software into a different location(s), click the Browse button and select another directory.
Directory for Trilogy Device ToolBox
C:\Program Files\Trilogy Device Toolbox\
Browse...
<< Back
Next >>
Cancel


Trilogy Device ToolBox
Start Installation
Review the following summary before continuing.
Adding or Changing
• Trilogy Device ToolBox Files
Click the Next button to begin installation. Click the Back button to change the installation settings.
Save File...
<< Back
Next >>
Cancel



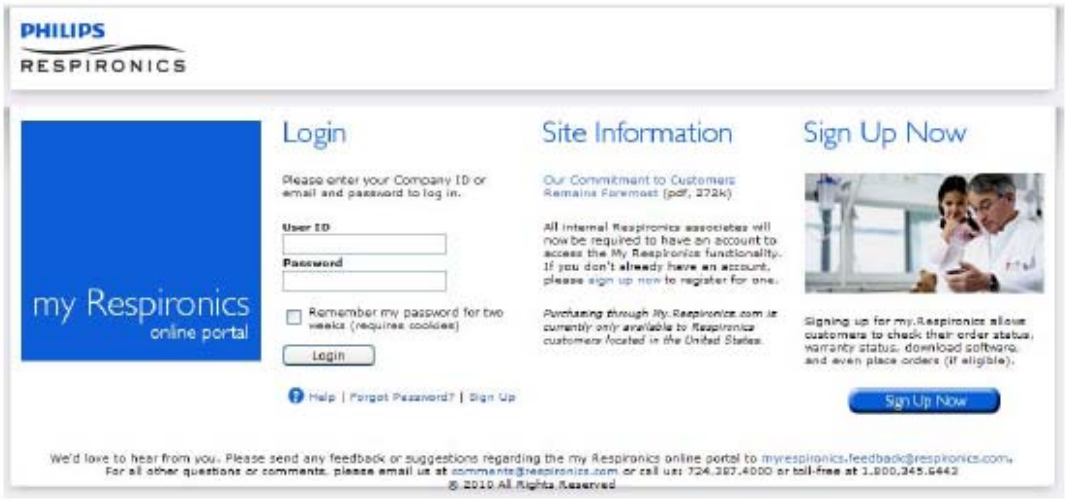
19. You do not need to restart your computer after the installation of the TBA.

NOTE
If the ToolBox is not installed to the default location, the LogDogg installation path will have to be changed inside the toolbox folder.

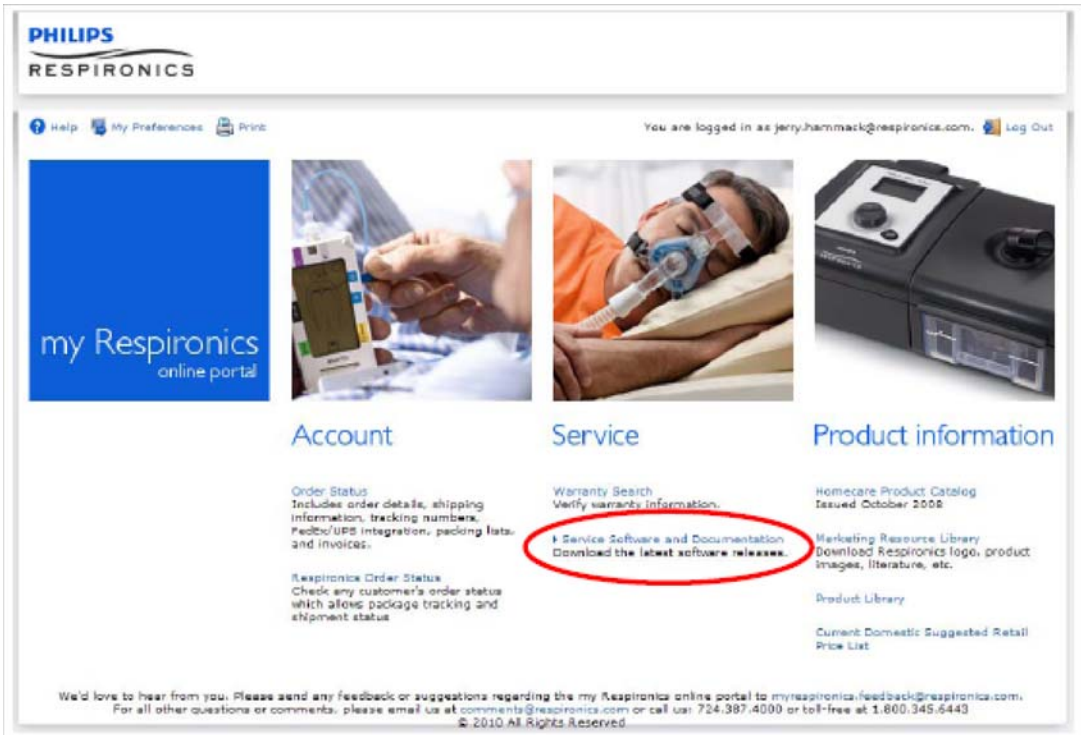
20. After the TBA is installed you will have to enter the C:\Program Files\Trilogy Toolbox folder of your computer, right click with the mouse the “Trilogy Toolbox.exe” file, select “Send To” and then Select “Desktop (As a Shortcut)” to place the TBA Icon on your desktop.

10.8 PERFORMING FIRMWARE UPGRADES

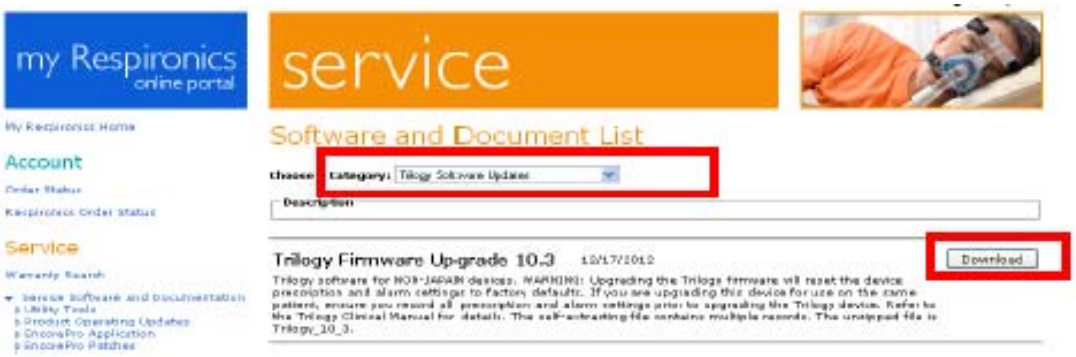
1. Connect the SD Card Reader (Respironics Part Number: 1047300) to the PC.
2. Insert the Trilogy SD Card into the SD Card Reader.
3. Log onto ***http://my.respironics.com***.



4. If you have an account with my.respironics.com, enter your User ID and Password. If you do not, then you must create an account. You will need your company account information in order to establish the account.
5. Click the Login button if you have an account, otherwise click the Sign Up Now button.

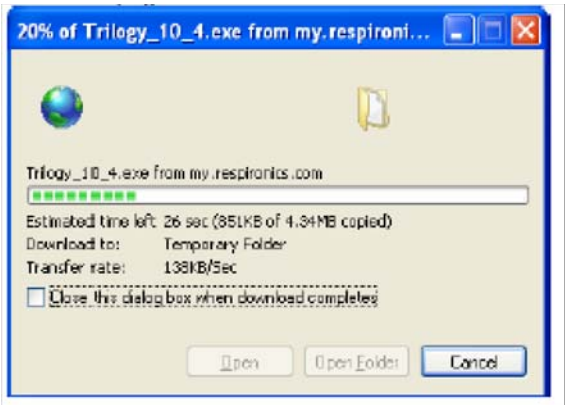


6. Once you have entered your account information and signed in, you can access the Service Software and Documentation page. Select the appropriate option from above.
7. In the ***Choose a Category*** drop down box, select *Trilogy Software Updates or Trilogy Service*

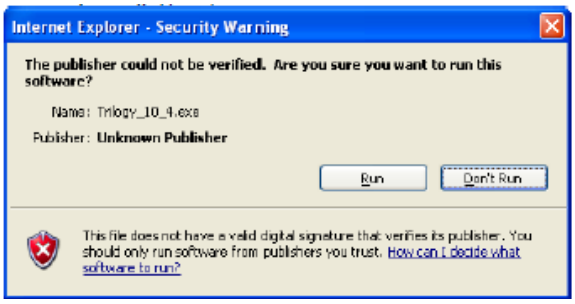


8. When ready, select the Download button next to the correct version of the Trilogy Firmware Upgrade and then click “Run” to start the installer.

9. You will see this progress box.

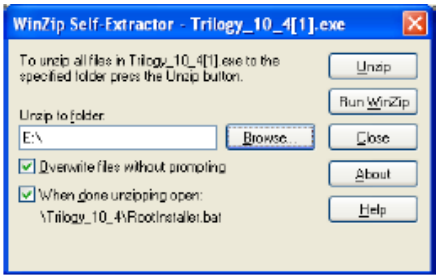


10. If a security warning appears, click “Run”.

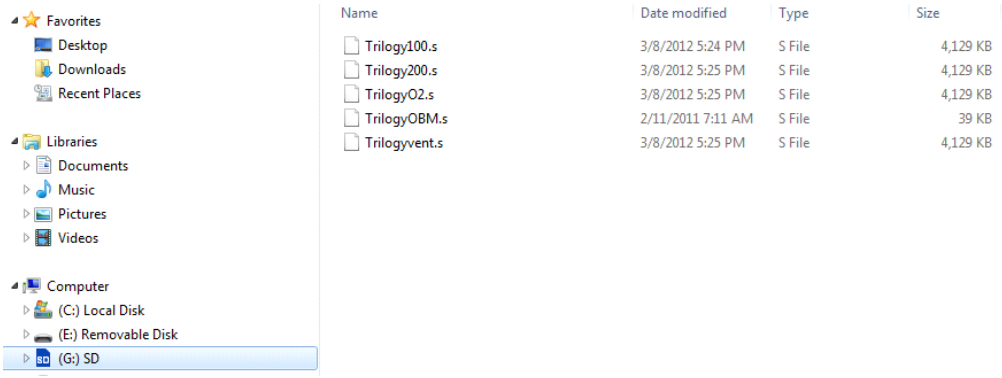


11. Once the self-extractor starts, you will see this warning dialog. Click OK to continue.

12. When this dialog appears, use the Browse button and navigate to the DS card. In this example, the SD card is in “E:/”. Then click “Unzip”.



13. When the Unzipping is complete, a short DOS script will also run automatically.
14. The SD card will then contain the files shown on the screen below.



15. Remove the SD Card from the SD Card Reader and insert it into the Trilogy Device while in standby with the blower off.

NOTE

If the Trilogy device is in sleep mode, turn the device on and then off again to put it into standby.

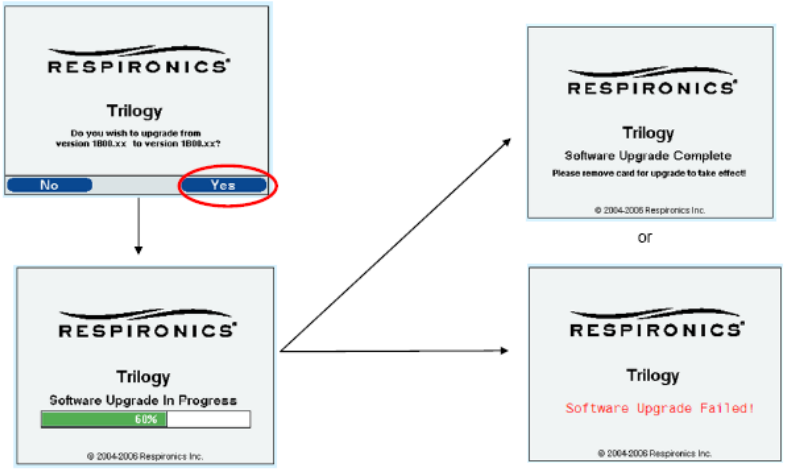
16. A prompt will then appear on your Trilogy User Interface asking you if you would like to upgrade the Operating Software.

WARNING

Upgrading the Trilogy firmware will reset the device prescription and alarm settings to factory defaults. If you are upgrading this device for use on the same patient, ensure you record all prescription and alarm settings prior to upgrading the Trilogy device. Refer to the Trilogy Clinical Manual for details.

17. Select the YES button and follow the on-screen prompts to complete the Firmware installation.
18. The firmware upgrade will reset your Ventilator with the factory default settings.

Software Upgrade Sequence



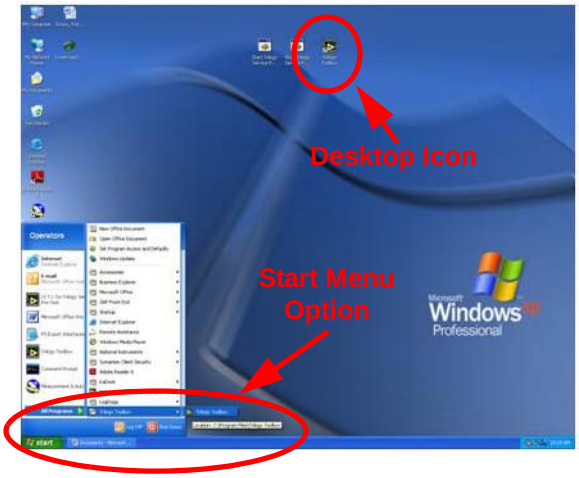
WARNING

Prior to placing the Ventilator with a patient, you must set the device with the proper prescription and alarm settings.

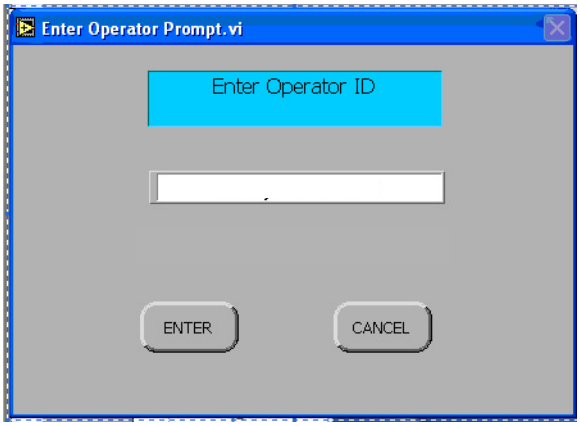
10.9 USING THE TRILOGY TOOLBOX

This section describes how to access the Trilogy Toolbox after it is installed on your PC along with detailing the Menus and Options that the Trilogy Toolbox offers.

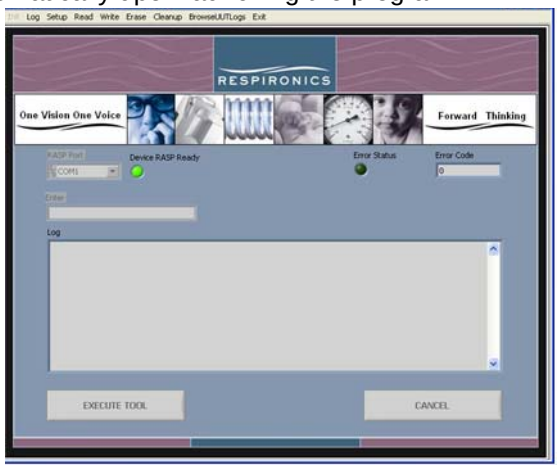
1. To access the Trilogy Toolbox, either select the icon from the desktop if you have created one, or select “START --> ALL PROGRAMS -->TRILOGY TOOLBOX -->TRILOGY TOOLBOX”.



2. You will then be prompted to enter your operator ID.



3. The main screen of the Trilogy Toolbox will now appear. The communication with the device will be established automatically upon launching the program.

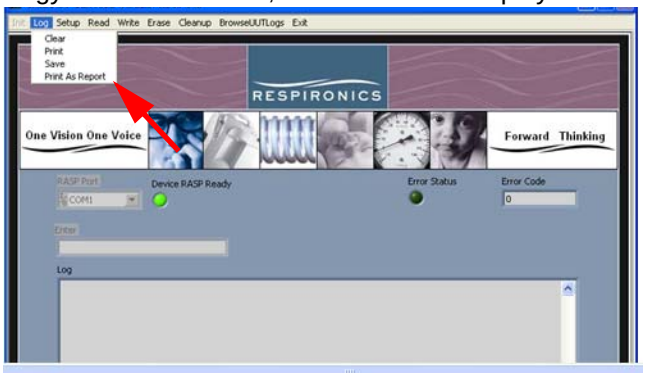


4. If establishing communication with the device is not successful, or if you disconnect the UUT (Unit Under Test) and connect a new device, select the “Init>Init RASP” from the Menu bar, and then select the “Execute Tool” button.

10.9.1 TOOLBOX MENU OPTIONS AND DESCRIPTIONS

LOG MENU

The Log Menu allows you to select what you would like to do with the information displayed on the Trilogy Toolbox screen. Once the Trilogy Toolbox is exited, the information displayed on the screen is erased.



a. ***Clear –*** Clear the information currently displayed on the Toolbox Screen.

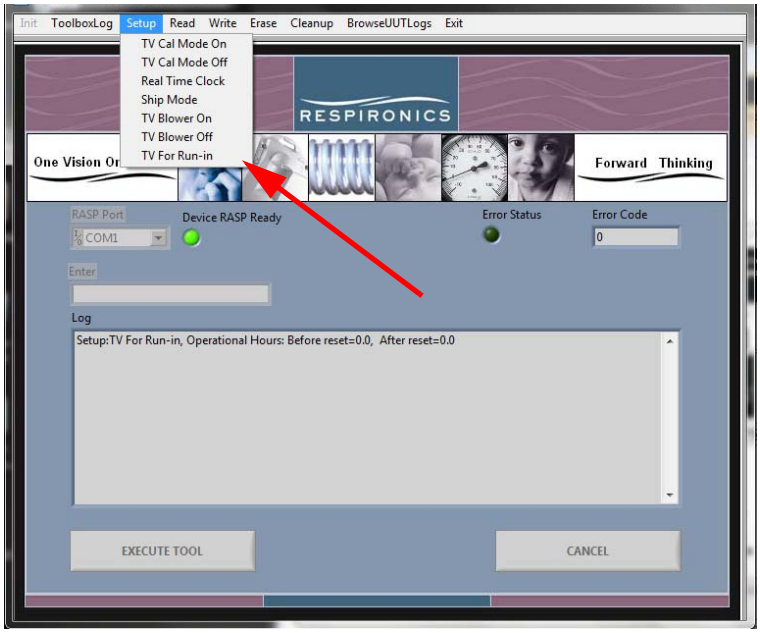
b. ***Print –*** Print the information currently displayed on the Toolbox Screen.

c. ***Save –*** Save the information currently displayed on the Toolbox Screen to a ".txt" file in a folder of your choice for archiving and/or viewing at a later time.

d. ***Print As Report –*** Print the information currently displayed on the Toolbox Screen in a more formal format which can include comments and Date – Time information.

SETUP MENU

The Setup Menu provides tools for manipulating the conditions of the Unit Under Test (UUT). These tools can aid in the troubleshooting of the Trilogy Device by turning on/off certain components as well as changing certain settings.



a. ***TV Cal Mode On/Off –*** In certain scenarios there might be a need to take the device out of or put the device in Cal Mde. Here, Cal Mode can be turned On and Off.

b. ***Real Time Clock –*** Sets the Real Time Clock (RTC) of the UUT to the time of the PC performing the testing.

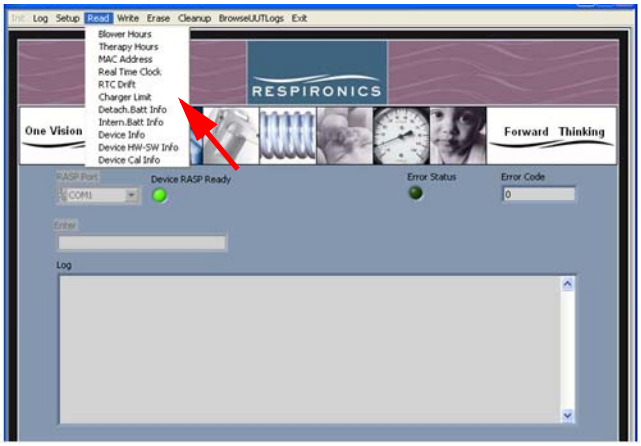
c. ***Ship Mode –*** This setting puts the UUT in a condition normally used after testing and prior to shipment. It disables the Internal Battery power. For Service, this mode allows the unit to be opened, repaired and put back together without the need of first disconnecting and lastly reconnecting the Internal Battery. Once placed into Ship Mode, AC Power must be reapplied in order to return to normal operation.

d. ***TV Blower On/Off –*** Turns the UUT Blower on or off. Can be used for troubleshooting UUT blower functions.

e. ***TV For Run-in–*** Sets the device to the proper settings for the two hour run-in.

READ MENU

The Read Menu allows the reading of various forms of information necessary in the servicing of the UUT. There is no manipulation of the data in these selections, the information will be read from the UUT and displayed on the screen.



a. ***Blower Hours –*** Reads and displays the UUT blower hours.

b. ***Therapy Hours –*** Reads and displays the UUT therapy hours.

c. ***MAC Address –*** Media Access Control, is a unique identifier number assigned to the UUT.

d. ***Real Time Clock –*** Reads the Time stored in the RTC of the UUT.

e. ***Charger Limit –*** Reads the Charger limit table and displays data, normally set to 65 for testing.

f. ***Detach Batt Info –*** Provides information concerning the detachable battery, such as capacity levels, voltage, current, Temperature, SH, Cycle Count, SF, Max error, Serial Number and Ship Mode Status.

g. ***Intern. Batt Info –*** Provides information concerning the internal battery, such as capacity levels, voltage, current, Temperature, SH, Cycle Count, SF, Max error, Serial Number and Ship Mode Status.

h. ***Device Info –*** Provides Serial Number, Model Number and UUT Name.

i. ***Device HW-SW Info –*** Provides info on the Hardware revision, Software revision, CPLD and Boot revision of the UUT.

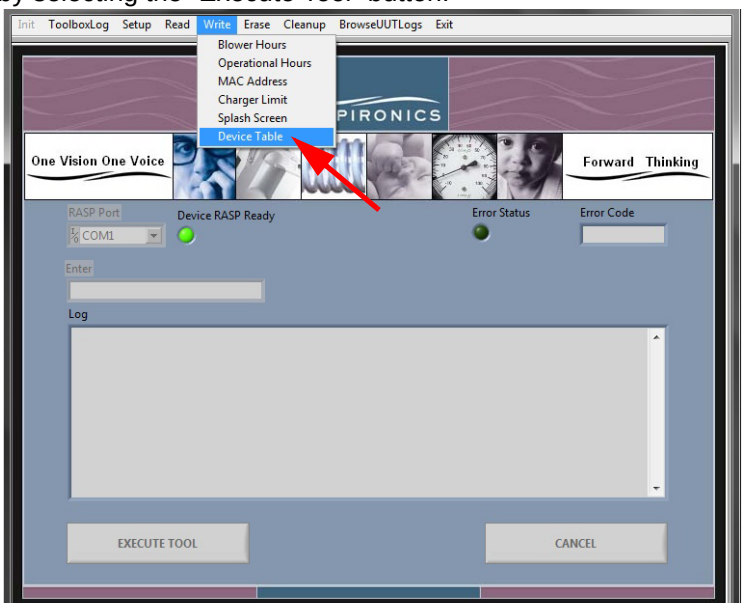
j. ***Device Cal Info –*** Provides the date of the last calibration along with several table statuses.

WRITE MENU

NOTE

Indicative of typical Trilogy Serial and Model Numbers.
TV1 = Trilogy 100
TV2 = Trilogy 200
TV0 = Trilogy O2
After TV1, TV2 or TV0 next 6 numbers indicate date of unit build (YYMMDD), example would be – 100526 to indicate the unit was built 2010, May 26. Final 3 digits of Serial number indicate the unit build number for the day it was built, example would be 025, indicating the 25th unit built on the given date.

The Write Menu provides the ability to write data to the UUT using the Trilogy Toolbox. When selecting one of the options, the information to be written to the UUT will be entered in the "Enter" block on the screen, and the task will be completed by selecting the "Execute Tool" button.



a. ***Blower Hours –*** Enter blower hours for a UUT which has had the main PCA replaced and a recording of the pre-existing blower hours is in place. This will allow accurate tracking of total blower hours on each UUT.

b. ***Therapy Hours –*** Restore previous therapy hours on a UUT which has had the System PCA replaced.

c. ***MAC Address –*** Enter a new MAC Address for the UUT if required for operation on user network.

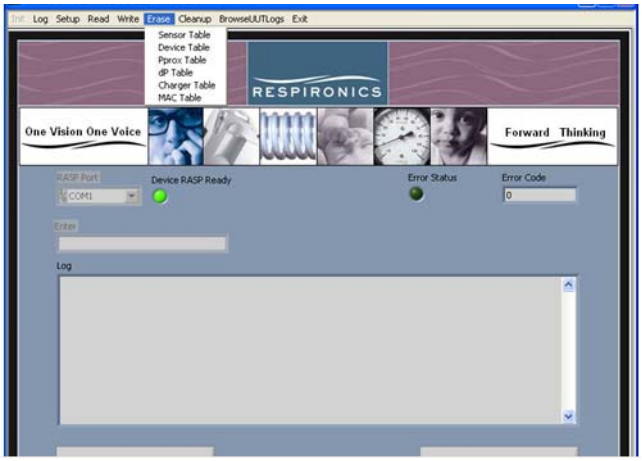
d. ***Charger Limit –*** Enter new limit for Charger Table. Settings used will either be 45%, 65% or 100% depending on calibration action required.

e. **Splash Screen** – Allows you to write your own spalsh screen to be displayed on the Display Panel.

f. **Device Table** – Allows you to set write the serial number and model number to the System PCA upon replacement. Can also be used to change the model number on the device.

ERASE MENU

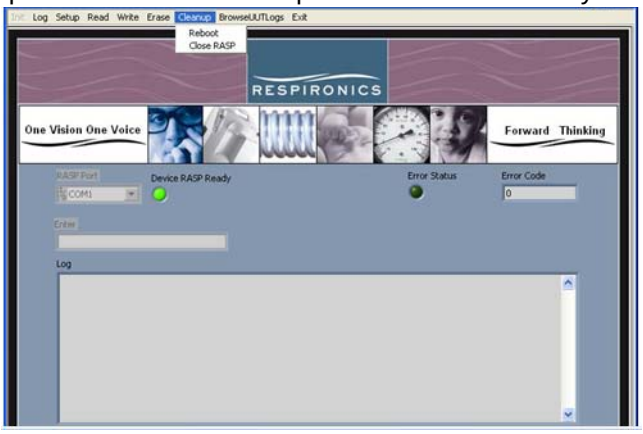
This Menu option provides the user the ability to erase the model number and serial number to the device table.



a. ***Sensor Table –*** *Erase the sensor table after replacemnt of Sensor PCA and before FSA Testing.*
b. ***Device Table –*** Erase serial number and model number on the System PCA.
c. ***Pprox Table –*** No functionality at this time.
d. ***dP Table –*** No functionality at this time.
e. **Charger Table –** No functionality at this time
f. **MAC Table –** No functionality at this time

CLEANUP MENU

After some options have been performed it may be necessary to turn off and restart the UUT before performing additional tasks. The Cleanup section of the Toolbox provides this functionality.



a. ***Reboot –*** Will reboot (shut down and restart) the UUT.
b. ***Close RASP –*** This will close the communication port between the device and the UUT.

BROWSEUUTLOGS MENU

This Menu function allows you to view the saved Encrypted Significant Event Log files from the UUT's. This is the only way to view the ".BIN" files that are copied to the SD Card when select Write Event Log To SD Card from the UUT Setup Menu. Specific instructions for downloading and viewing the Event Log ".BIN" files are located in chapter 6.

EXIT MENU

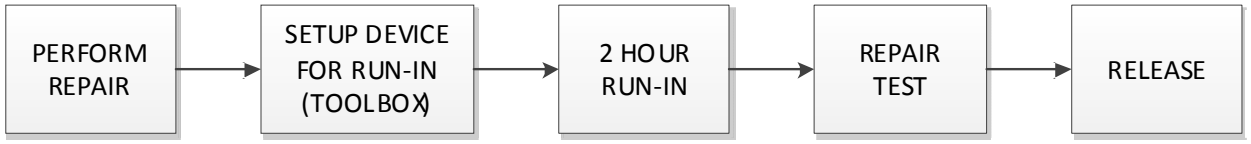
The Exit Menu exits the Trilogy Toolbox program. You will be prompted to ensure you wish to exit the program and informed that the Toolbox Log Data will be lost once you exit. If you wish to save the log a soft copy or a hard copy, please return to the Log Menu and select Save or either of the Print options.

10.10 TRILOGY FIELD SERVICE APPLICATION

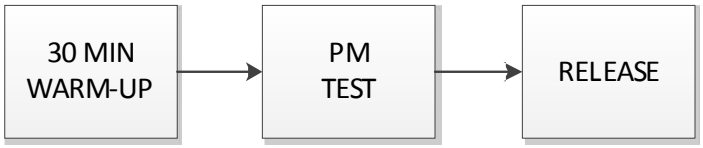
NOTES
Prior to performing any of the testing sections, please allow test equipment a warm-up period of no less than 10 minutes for stabilization. Perform self-cal on the RI Manometer and DPI if necessary. *If **ONLY** the AC Connector has been replaced or 10,000 hour/24 month PM has been performed the Performance Verification Tool detailed in the Maintenance Section of this manual may be used in place of the Field Service Application PM Test.* *If 17.5K Blower PM has been performed the Field Service Application Repair Test must be completed.* *If the System PCA has been replaced the Device Table must be set using the Trilogy Tool Box Application prior to performing the Field Service Application Repair Test.*

The Trilogy FSA contains two options. A Repair Test must be performed after a repair of a Trilogy Ventilator and a PM Test may be performed during routine maintenance as specified in the Maintenance Section of this Service Manual.

10.10.1 REPAIR TEST USAGE FLOW



10.10.2 PM TEST USAGE FLOW



10.10.3 EQUIPMENT REQUIRED

1. PC System with 1 Serial Port and at least 6 available USB Ports with either Windows XP (SP3), or Windows 7 32/64 bit installed. (Philips Respironics Part Number: 1071683 [desktop] or 1024624 [laptop])
2. Differential Pressure Indicator (Required only for Trilogy 200, Trilogy O_2, & Trilogy 202) (Philips Respironics Part Number: 1071613)

3. Digital Manometer (0-70 PSI Pressure Meter for Trilogy 100 & Trilogy 200 / 0-100 PSI Pressure Meter for Trilogy O_2 & Trilogy 202) (Philips Respironics Part Number: 1071620)

4. External Power Supply Capable of providing 15 VDC and 24 Amps or Deep Cycle Marine Battery 12V (Philips Respironics Part Number: 1071678)

5. TSI Model 4040 Flow Meter (Philips Respironics Part Number: 1071679)

6. Flow Control Valve (Philips Respironics Part Number: 1037985)

7. USB to Serial Converter (Philips Respironics Part Number: 1071680)

8. Temperature and RH Meter (Philips Respironics Part Number: 1071682)

9. Trilogy to PC Data Cable (Quantity of 2 for Auto Flow testing) (Philips Respironics Part Number: 1046972)

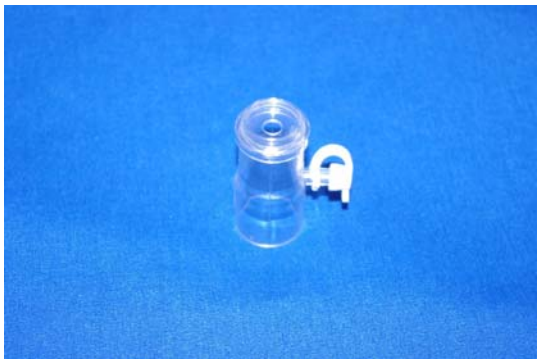
10. Serial RS-232 Cable (Philips Respironics Part Number: 1071687)

11. Merriam Pressure Pump w/ Vernier (Required only for Trilogy 200, Trilogy O_2, & Trilogy 202) (Philips Respironics Part Number: F98589)

12. Air Filtration and Regulation Assembly (Philips Respironics Part Numbers: 1071691, 1071693, 1071694, 1071697, 1071699, 1071701, 1071689, 1071692, 1071695, 1071696, 1071698, 1071700, 1071702, 1076027, 1071704)

13. Digital Multimeter capable of providing True RMS Measurements (Philips Respironics Part Number: 1071681)

14. 1/4” ID Test Orafice (Philips Respironics Part Number: 332353)



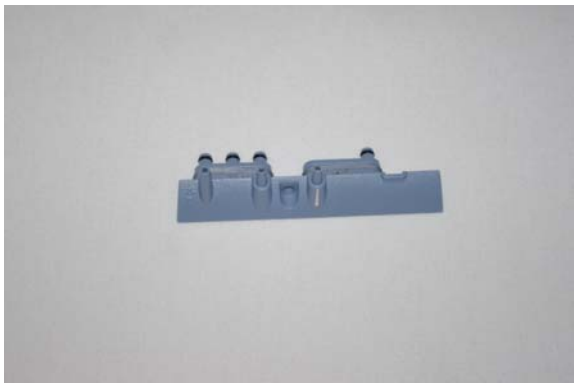
15. Trilogy Nurse Call Adapter Cable (Philips Respironics Part Number: 1045290 [2.5mm Nurse Call Connection] or 1080249 [RJ9 Nurse Call Connection])

16. Outlet Port Cap (Quantity 2)

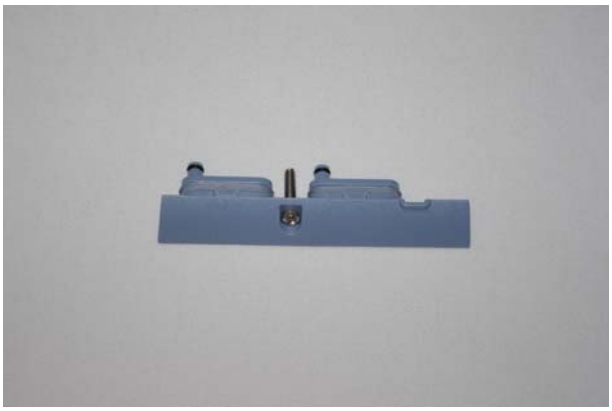
17. Smoothbore Tubing, 18” (Quantity 2) (Philips Respironics Part Number: 1008198)

18. SD Card (Philips Respironics Part Number: 1051801)

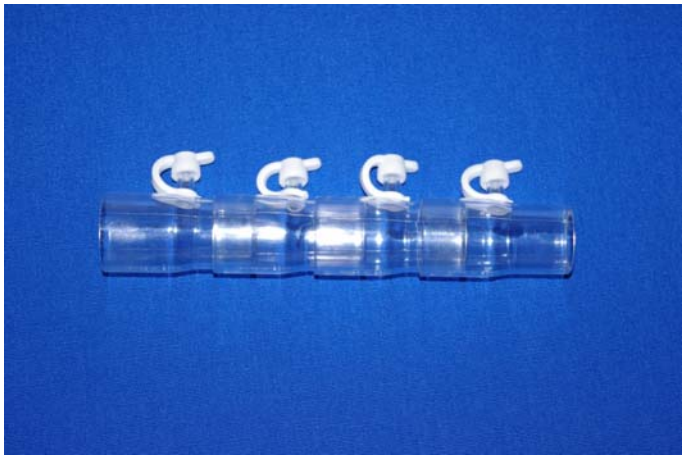
19. Exhalation Porting Block, Universal (Philips Respironics Part Number: 1040370)



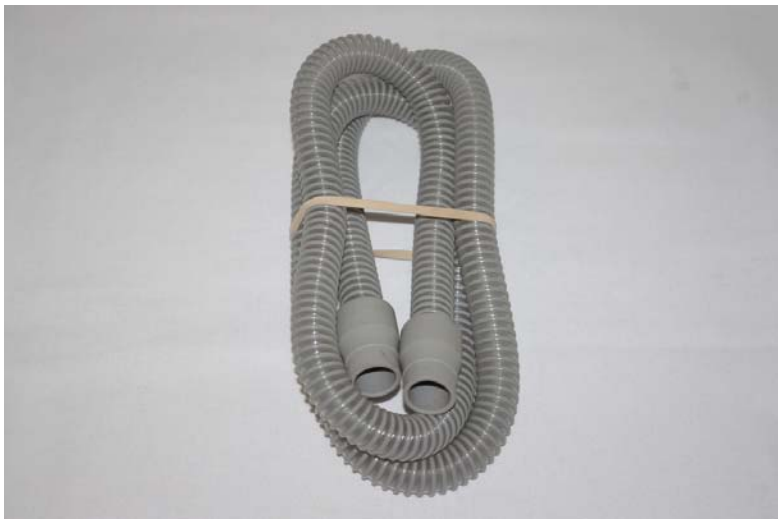
20. Exhalation Porting Block, Passive (Philips Respironics Part Number: 1040372)



21. Trilogy Test Hardware Kit (Philips Respironics Part Number: 1060747)
22. O_2 Enrichment Ports (Quantity 4) (Philips Respironics Part Number: 312710)



23. Smoothbore Tubing, 6 ft. (Philips Respironics Part Number: 622038)



24. Green Hose 96” (Required only for Trilogy O_2 & Trilogy 202) (Philips Respironics Part Number: F27324)

25. CAPlugs O_2 Inlet Air Cap (Required only for Trilogy O_2 & Trilogy 202) (Philips Respironics Part Number: 1075946)

10.10.4 TRILOGY RUN-IN

NOTE
Run-in is only required prior to Field Service Application Repair Testing. A 30 minute warm up is reequired prior to performing the Field Service Application PM Test.

The Trilogy device should be plugged into AC and be run-in a minimum of two (2) hours.

1. Open the Trilogy TBA.
2. Connect the Trilogy device to the PC using the Trilogy Data Cable.
3. Click on the Setup Drop Down Menu and Select TV For Run-In.
4. Disconnect the Trilogy Data Cable and add a 1/4” ID Test Orafice on the Trilogy Outlet.
5. Connect the device to AC Power and press the Trilogy On/Off Button to start the device.
6. Let device Run for a minimum of 2 hours.
7. After device has been Run-in, perform the Field Service Application Repair Test.

10.10.5 EQUIPMENT SETUP

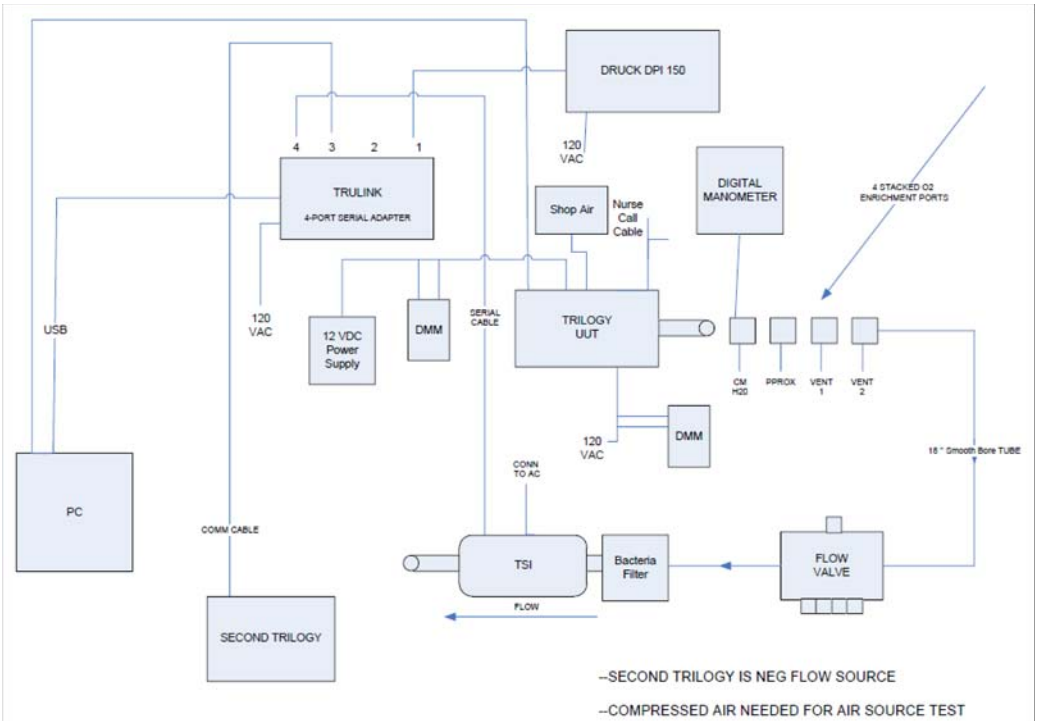


FIGURE 10-2: TRILOGY 200/202/TO$_2$ FSA SET-UP BLOCK DIAGRAM

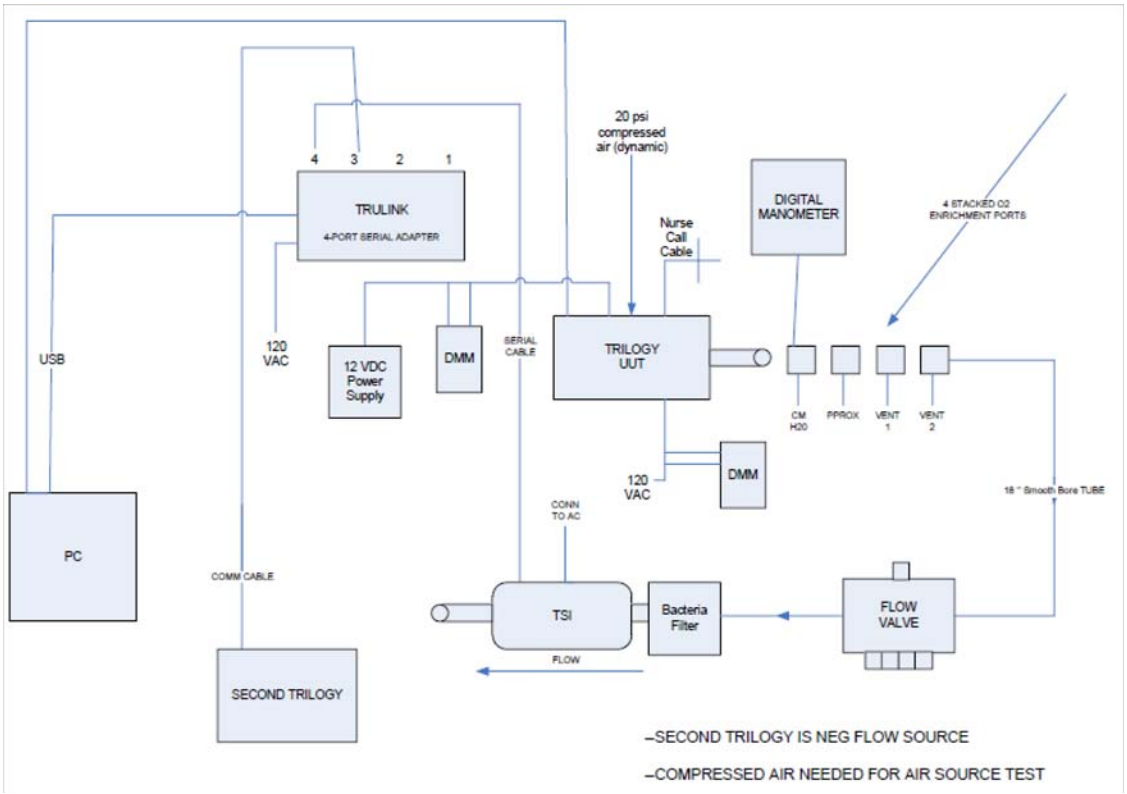
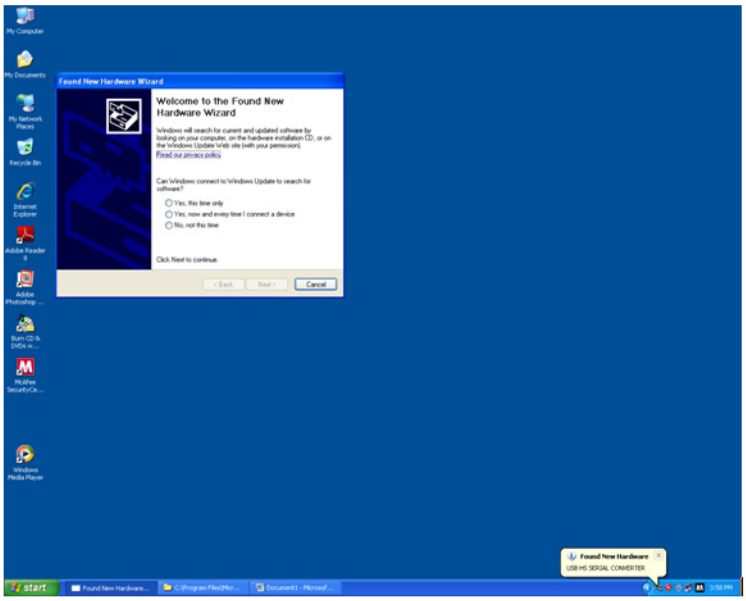


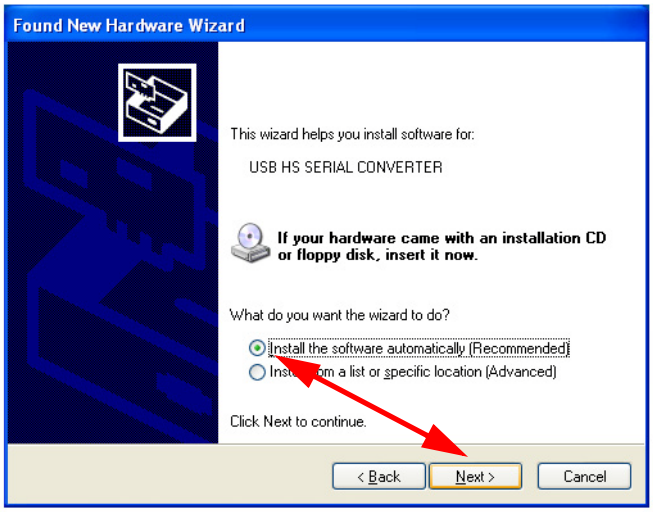
FIGURE 10-3: TRILOGY 100 FSA SET-UP BLOCK DIAGRAM

1. Connect the Trilogy to PC Data Cable to the Serial Port of the PC. Connect the other end of the Trilogy to PC Data Cable (9 pin) to the back of the Trilogy Device serial port.
2. Connect one end of the USB to any open USB port of the PC. Connect the other end of the USB to the USB to Serial Converter. The “New Hardware Wizard” will start and an indicator will pop-up on the desktop screen.

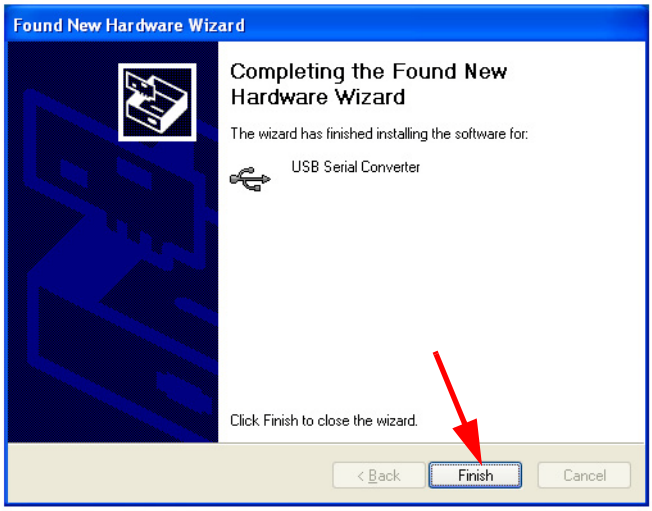


3. Insert the CD, that came with the USB to Serial Converter, into the Computer’s CD or DVD drive and follow the on screen prompts.
4. Select the “No, Not this time” choice, then click “Next”.

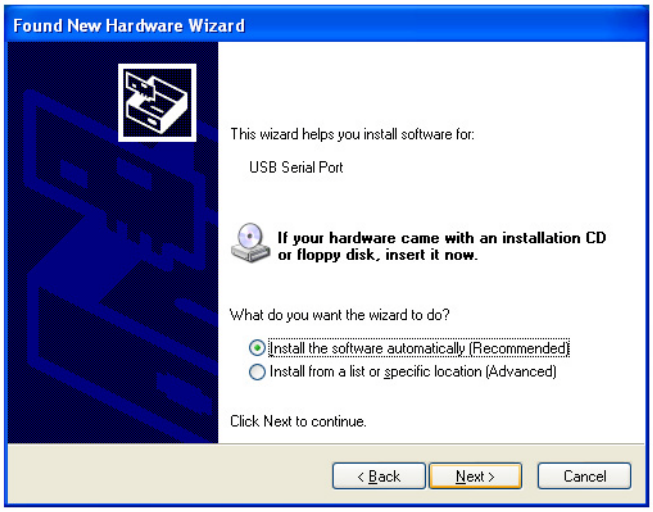
5. Select the “Install the software automatically (Recommended) choice, then click “Next”.



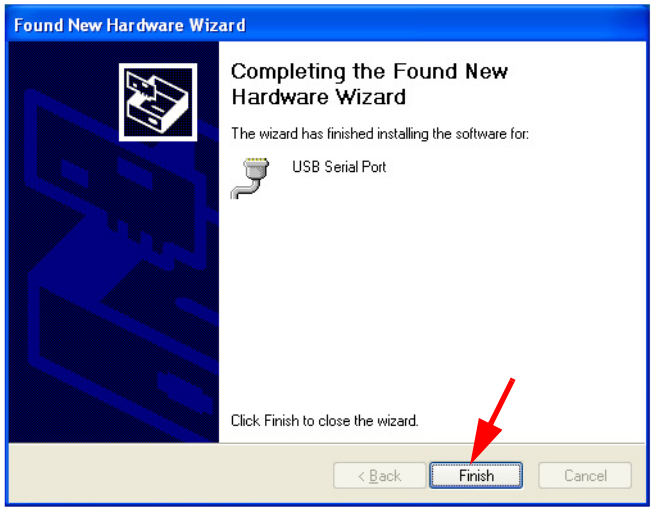
6. Click the “Finish” button.



7. The next installation will be for the USB Serial Port. Select the “Install the software automatically (Recommended)” choice then click “Next”.

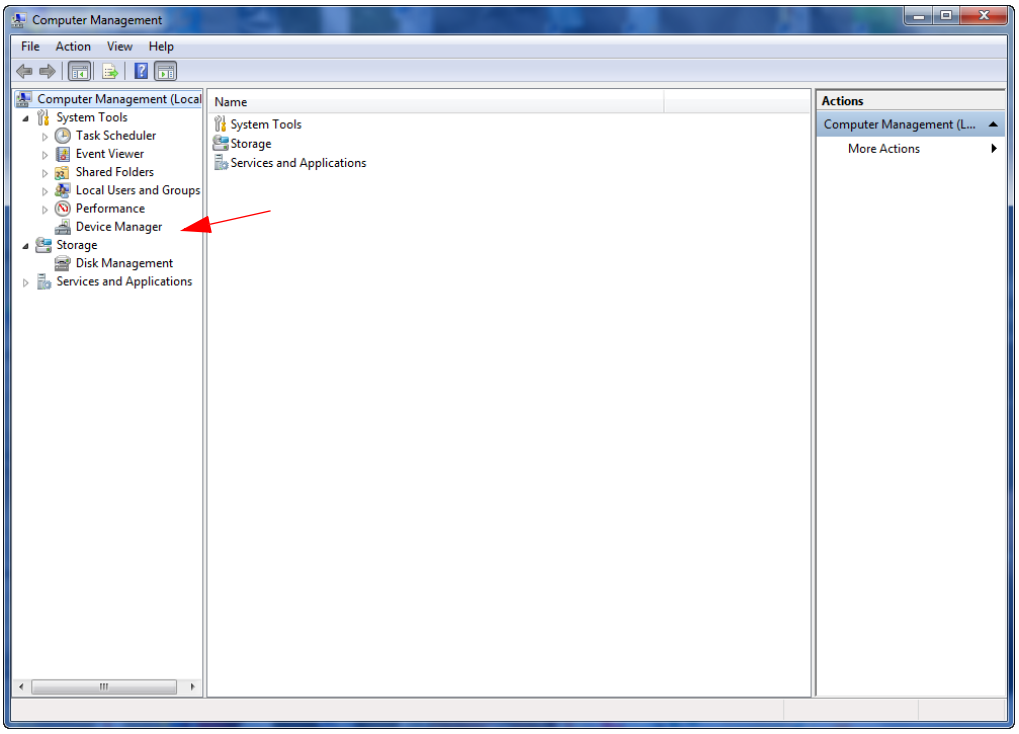


8. The wizard will search for the USB Serial Ports. Once the wizard locates the ports, the installation is complete. Click “Finish”.

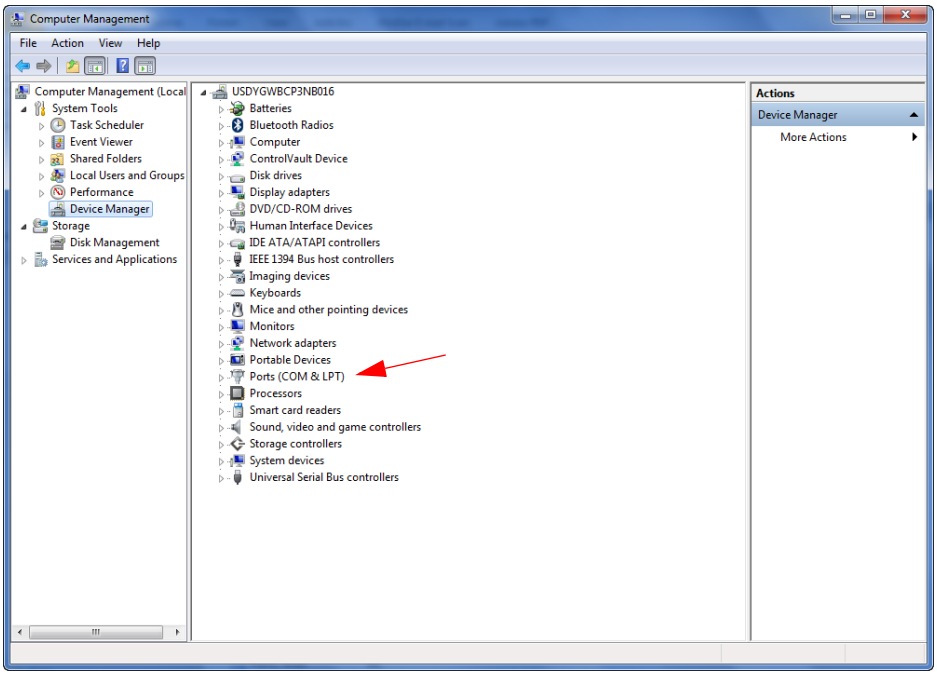


9. Connect the Serial Adapter to the PC via the USB cable.
10. From the Start menu, Right click on “My Computer”, then click on manage.

11. Click on “Device Manager”.

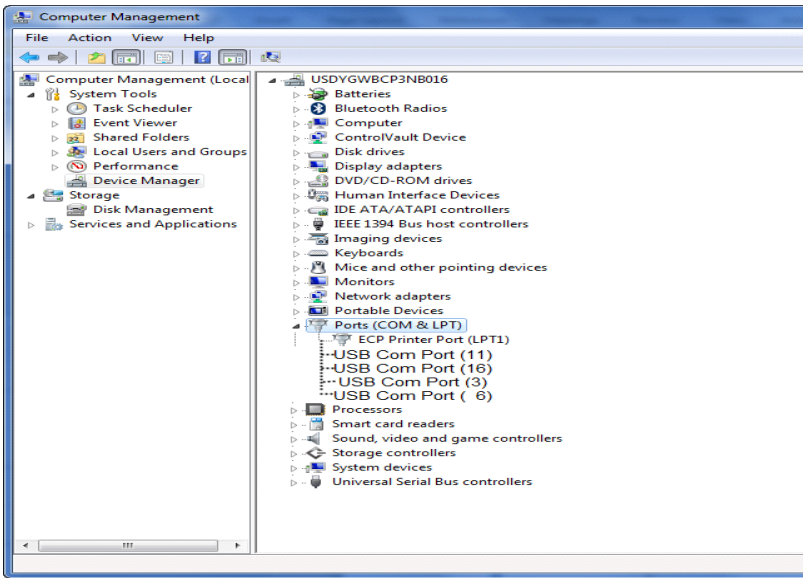


12. Select the Port, then right click to access “Properties”.

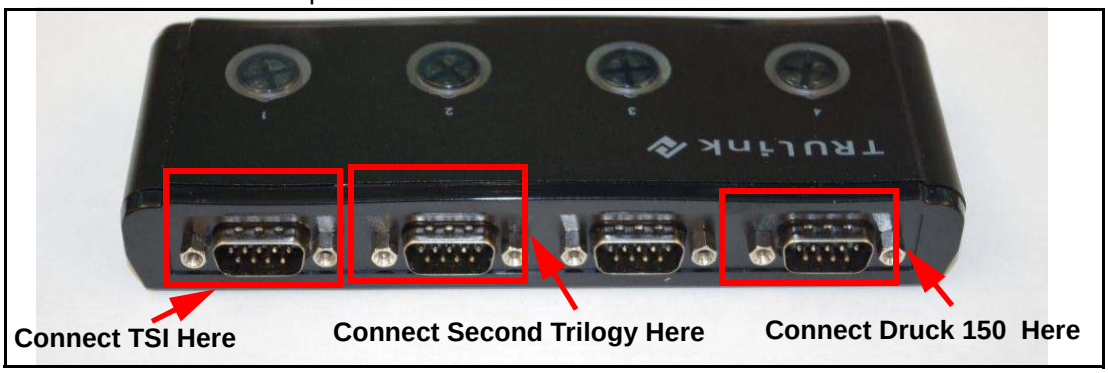


13. Click on the “Port Settings” tab, then click on the “Advanced” button.

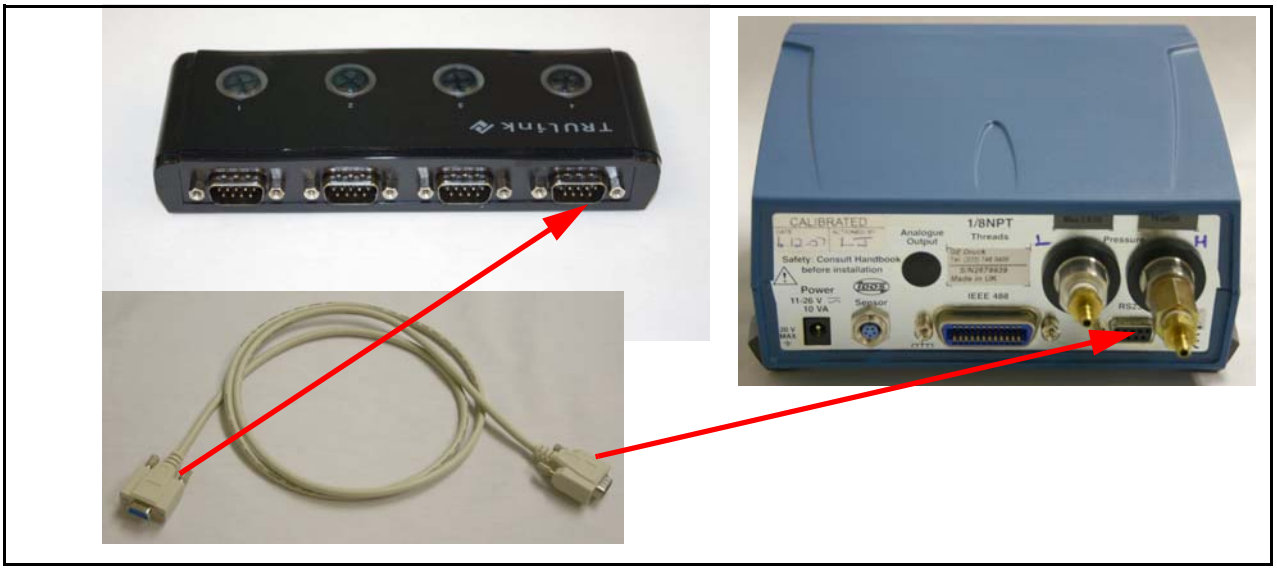
14. Select the correct COM Number (11,16, 3, 6).



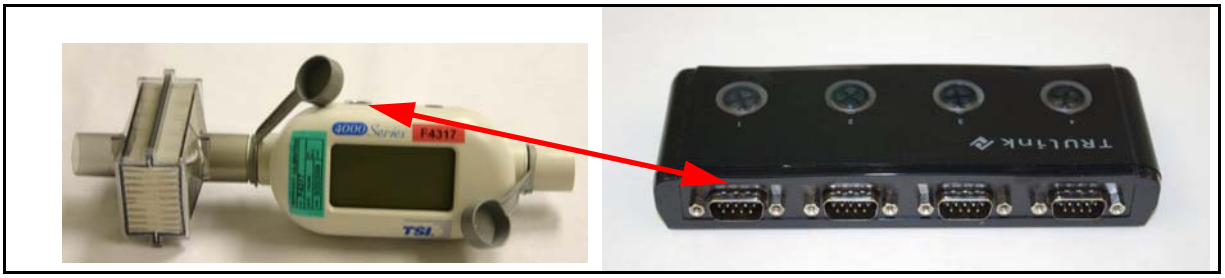
15. Once the last COM port has been changed, you can close out of the program. Your USB to Serial Converter is now setup and ready for use with the Trilogy test hardware. The TSI device will connect to the COM11 port, the Second Trilogy will connect to COM16 port, and the Druck 150 will connect to the COM6 port.



16. Connect the Keyboard, Mouse, Monitor, and Power connections to the PC.
17. Connect one end of Serial RS-232 Cable to connector set as COM 6 on the USB to Serial Converter. Connect the other end of Serial RS-232 Cable to the serial connection on the back of the Differential Pressure Indicator.

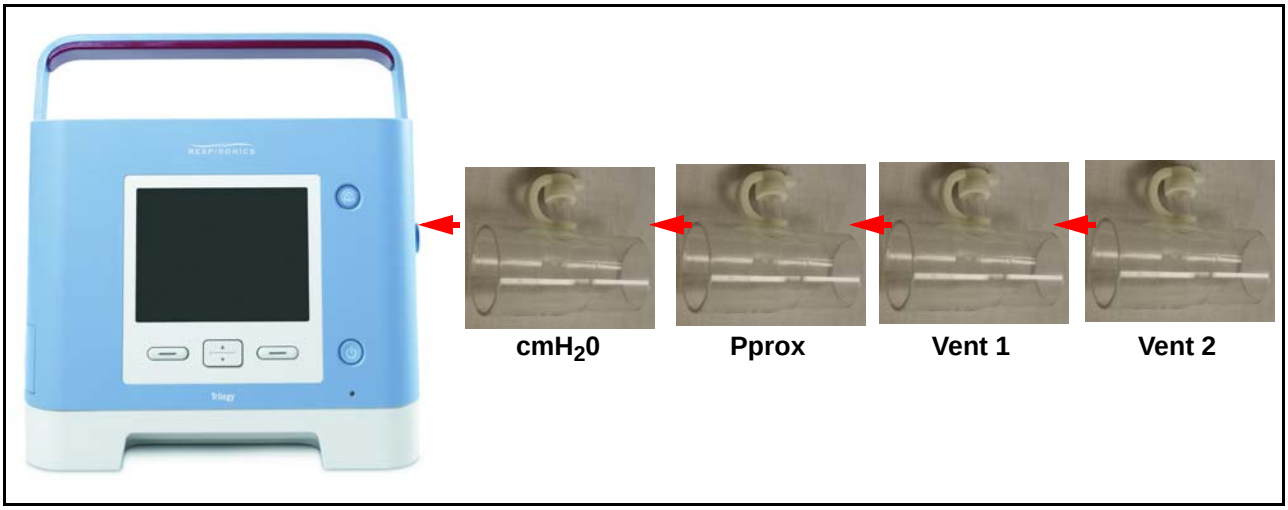


18. Connect the 9-pin serial connection of the TSI Model 4040 to COM 11 on the USB to Serial Converter. Connect the DIN connector of the TSI Model 4040 Flow Meter to the opening on the TSI Model 4040 Flow Meter.

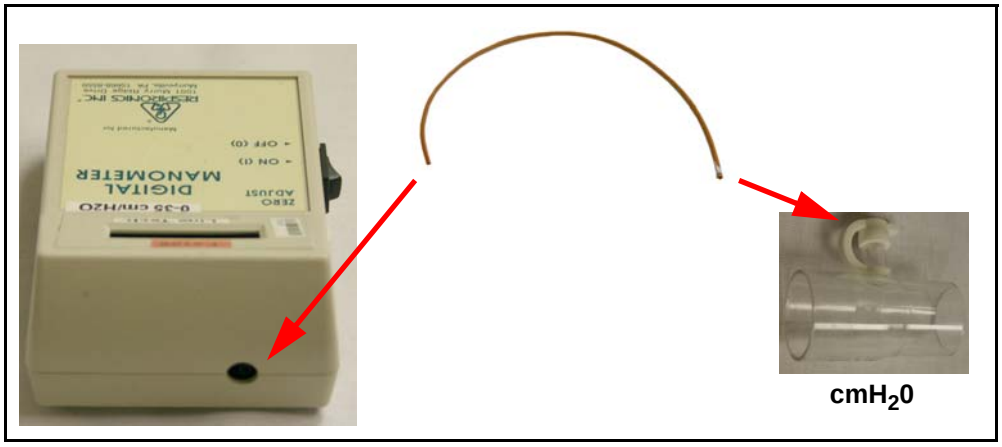


19. Connect the Stereo Jack or RJ9 end of Trilogy Nurse Call Adapter Cable to the back of the Trilogy device.

20. Connect four O_2 enrichment ports together and attach to the Trilogy outlet. Mark the Test Orifices with cmH_2O, Pprox, Vent 1, and Vent 2, in order from the Trilogy.

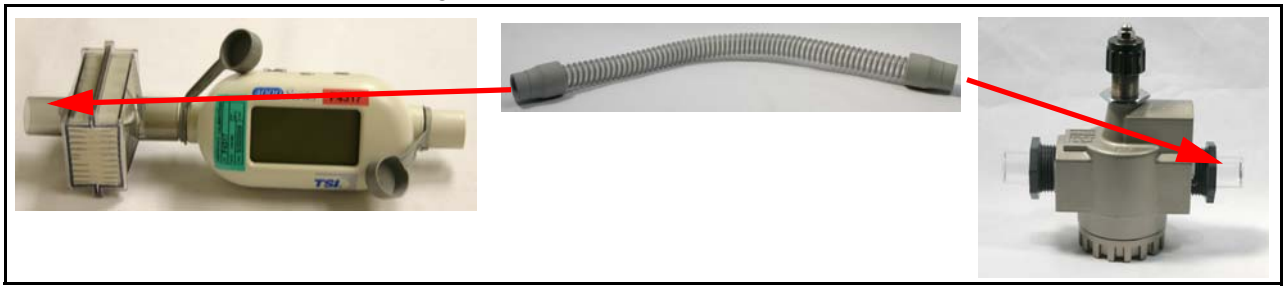


21. Connect the tubing from the Digital Manometer to the port of cmH_2O Enrichment Port.



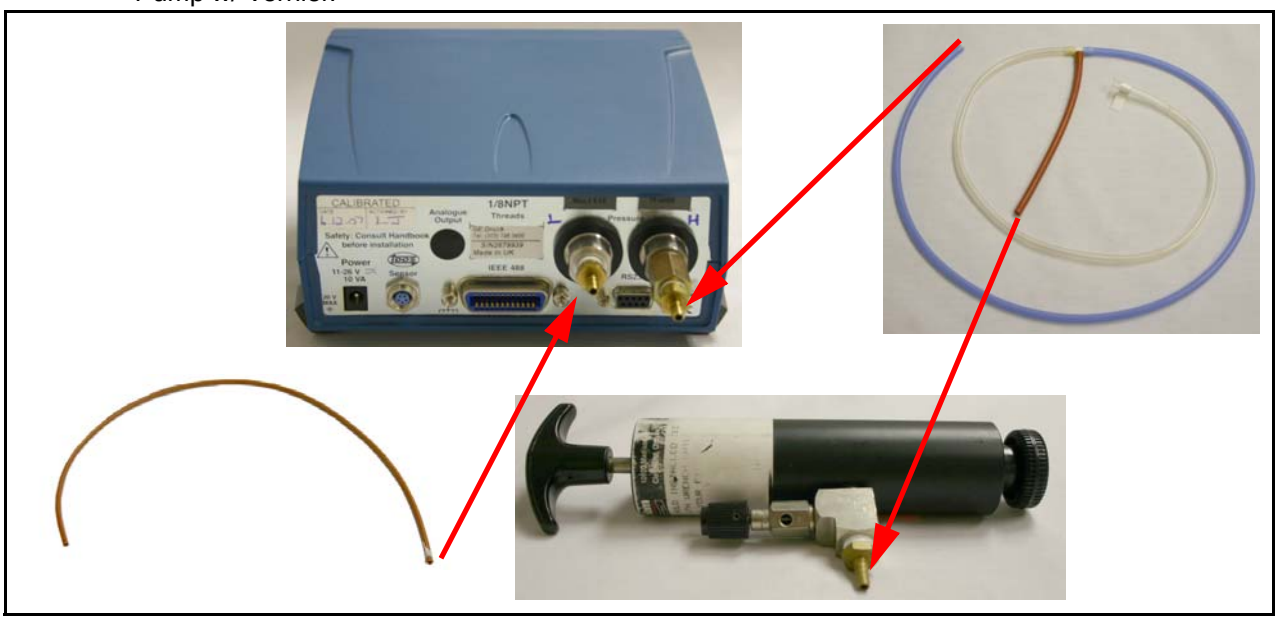
22. Connect one end of Smoothbore Tubing 18" to the end of the Vent 2 Enrichment Port. Connect the other end of the tubing to the Flow Control Valve.

23. Connect one end of Smoothbore Tubing 18” to the other end of the Flow Control Valve. Connect the other end of the tubing to the inlet of TSI Model 4040 Flow Meter.



24. Connect the Modified DC to Trilogy power cable between the External Power Supply or Deep Cycle Marine Battery 12V and DC connector on the back of the Trilogy device.

25. Connect two long pieces of tubing to the back ports of the Differential Pressure Indicator, one each on the Low and High connectors. These will be the Reference and High tubing from the Differential Pressure Indicator. Connect the other end of “T” tubing to outlet port of the Merriam Pressure Pump w/ Vernier.



26. If using shop air for negative flow, connect the Air Filtration and Regulation Assembly to the Shop Air Supply. Assemble the Air Filtration and Regulation assembly by performing the following:
    a. Using the mounting hardware provided with the filters, follow the instructions for connecting the Particulate and Coalescing filter together. Starting from the left, place the F18-02-SL00 first, then the M18-02-CL00, then the M18-02-DL00, and finally the R18-02-F0G0.
    b. Attach a Quick Connect 1/4” (male connector) to the open end on the left of the Filtration System.
    c. Attach the Quick Connect Coupler 1/4” to the R18-02-F0G0.
    d. Attach a Quick Connect 1/4” (male connector) to the 384-02C Watts Regulator then attach the R18-02-F0G0 to the 384-02C Watts Regulator.
    e. Connect the Quick Connect Coupler to the open end of the Watts Regulator.
    f. The Watts Regulator control handle should be facing up and gauge should be facing frontward.
    g. Connect the Quick Connect 1/4” (female connector) to the Prestolok Plus fitting and attach tubing 532255 (22”) from the Trilogy Test Hardware Kit.
    h. Connect the Brass Barb fitting (male) to the Reducing Coupler, then to the Reducing Nipple and finally to the Quick Connect 1/4” (female connector). This will then connect as an assembly to the Smoothbore Tubing.

NOTE

The use of Teflon tape for all fitting connections is recommended.

27. Connect all AC power cords for the devices to an AC outlet.
28. Prepare the Trilogy Nurse Call Adapter Cable(1045290) by finding the open end of the cable, with three exposed wires, colored red, black, and brown.

29. Mark the Red wire with reference to Tip.
30. Mark the Black wire with reference to Ring.
31. Mark the Brown wire with reference to Sleeve.
32. Connect Power to DPI-150.
33. Press ‘Menu/OK’ Button.
34. Using ‘Up/Down Arrow’, scroll to and select ‘Set-up’ option.
35. Select ‘User’.
36. Select ‘Resolution’.
37. Using ‘Up/Down Arrows’ highlight (Checkmark) 5 digits.
38. Press ‘Menu/OK’ button.
39. Press ‘ESC’ button 2 times.
40. Select ‘Units’.
41. Using ‘Up/Down Arrows’ highlight (Checkmark) ONLY ‘cmH2O’.
42. Ensure all other Check Boxes are clear.
43. Press ‘ESC’ 3 times.
44. Using ‘Up/Down Arrows’, scroll to and select ‘Supervisor’ option.
45. Using ‘Up/Down Arrows’ & ‘Left/Right Arrows’ Enter PIN (From page ‘i’ of Druck User Manual).
46. Select ‘Change PIN’.
47. Using ‘Up/Down Arrows’ & ‘Left/Right Arrows’ change PIN to ‘0000’.
48. Press ‘Menu/OK’ button.
49. Press ‘ESC’ button.
50. Using ‘Up/Down Arrows’ select ‘Communications’.
51. Select ‘RS232’.
52. Select ‘Left Arrow’ to enter ‘Settings’.
53. Select ‘Custom’
54. Select ‘Settings’.
55. Select ‘Baud Rate’, Select 19200, Press ‘ESC’.
56. Select ‘Parity’, Select ‘None’, Press ‘ESC’
57. Select ‘Handshake’, Select ‘None’, Press ‘ESC’ 4 times.
58. Select ‘Left Arrow (Settings)’ on Display.
59. Select ‘Range’, Select ’25 mbarg’, Press ‘ESC’.
60. Select ‘Units’, Select ‘cmH2O’, Press ‘ESC’.
61. Select Filter, Ensure ‘Box’ is checked, Select ‘Settings’.
62. Time Const. = 3.0s.
63. Band = 00.500% fs.
64. Press ‘ESC’.
65. Ensure that ‘tare’, ‘%’, and ‘peak’ are all ‘UNCHECKED’.
66. Press ‘ESC’ until Display is returned to normal display.
67. Ensure Straight-through Serial cable is connected to RS232 connector on back of DPI-150.

68. Zero the Differential Pressure Indicator by pressing the “ZERO” button and following the directions on the screen.

10.10.6 TRILOGY REPAIR TEST PROCEDURE

CAUTION

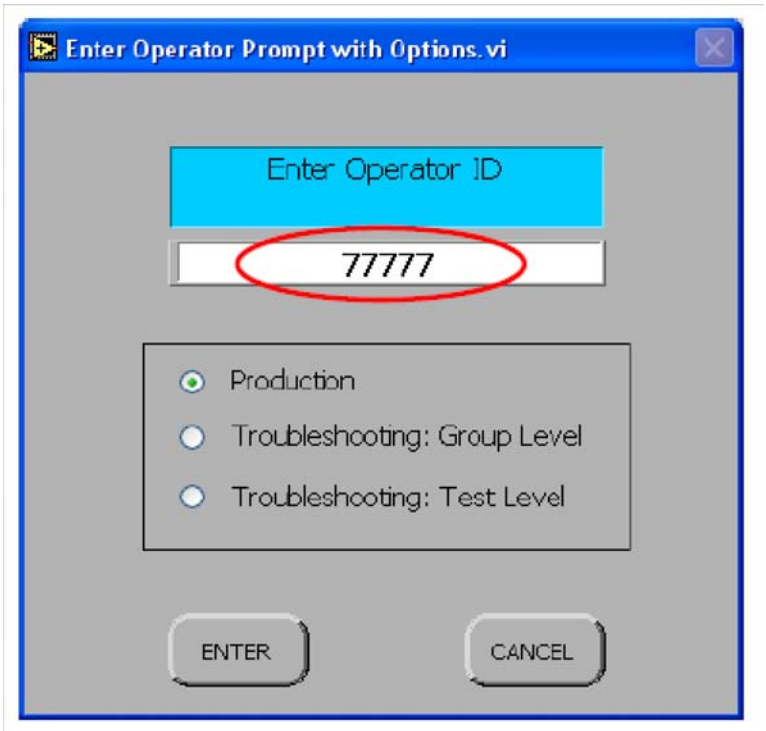
When testing a Trilogy O_2 or Trilogy 202 device, during the Oxygen Blending Module (OBM) condition check (Step 11) it checks for OBM leaks. The software prompts to read from the Respironics digital manometer (which leak setting is 25 +/- 0.5 cmH_2O). It should not be confused with the pressure indicator used for the OBM intake. Reading from the wrong meter could damage the Sensor PCA.

IMPORTANT NOTE

If the System PCA has been replaced the Device Table must be set using the Trilogy Tool Box Application prior to performing the Field Service Application Repair Test.

1. Once you have installed the software, open the Repair Test Auto Flow or Manual Flow application from the shortcut on the desktop. Double click the icon to open.

2. Enter your operator ID and click the button next to Production. Then, click the enter button.



NOTE

There are 3 modes the FSA can be operated in:
1. Production Mode – This will complete all steps of the test software in continuous run mode. It will not ask for the individual steps to be selected, or stop in between Groups or Tests. Must be used before return to customer.
2. Group Level – This will allow the technician to complete Group level testing. In Group Level Testing you can select any group to test. Should only be used for troubleshooting errors.
3. Test Level – This will allow the technician to complete the Test level testing. Individual steps will provide a lower level of troubleshooting by allowing the operation in single steps. Should only be used for troubleshooting errors.

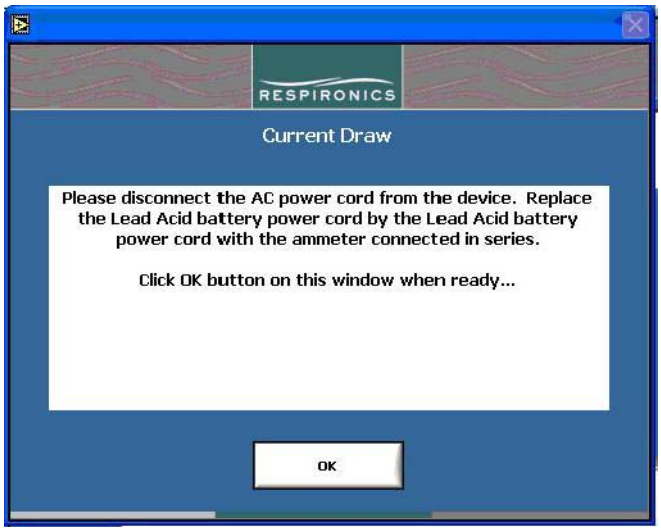
3. Continue with the Repair Test and follow the on-screen prompts.
4. Follow the on-screen prompts to continue with the test.

IMPORTANT NOTE

Please follow the steps below carefully otherwise an E280 error will be logged in the Error Log and will result in the test failing.

5. Remove 240 VAC, observe the AC Disconnected info message on the Trilogy Display.
6. After the AC Disconnected message is received, press the reset button on Trilogy Device. Observe the Lead Acid icon is green and a black box is around the green Lead Acid icon.

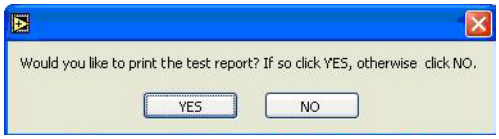
7. Break the connection in the DC cable, and WAIT for the info message of Lead Acid Disconnected on the Trilogy Display.
8. Connect the Meter in series with the DC Cable. Press reset on the Trilogy Device and observe that the Lead Acid icon is green, and a black box is around the green Lead Acid icon.
9. Measure the Lead Acid current as prompted.

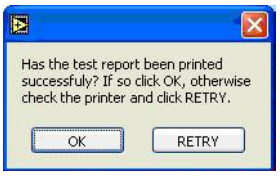


10. Continue following the on-screen prompts to complete the test. Once the test is complete and the device has passed, the following window will appear.

NOTE
If the device does not pass, perform repairs as necessary and retest the device.

11. Print the test report (non-production mode only). The test report will print automatically when in production mode. Printing the test report is optional in non-production mode.





12. Disconnect the device from the test setup.
13. Using ink, sign and date the printed test report and keep for the records.

NOTE

When setting up the device for the first time or after a calibration, apply AC power to the ventilator before turning on the blower. Attempting to use the ventilator without first applying AC power, such as installing a detachable battery pack and starting the blower, will cause the internal battery to be displayed in red as an empty battery. When in this state, the internal battery will not be usable until AC power is applied.

Trilogy devices should be returned to the customer in the same configuration as which they arrived. For example, if the device is received with the Active w/P AP porting block, and without a Detachable Battery the device should be returned with the Active w/ PAP porting block installed and without a Detachable Battery.

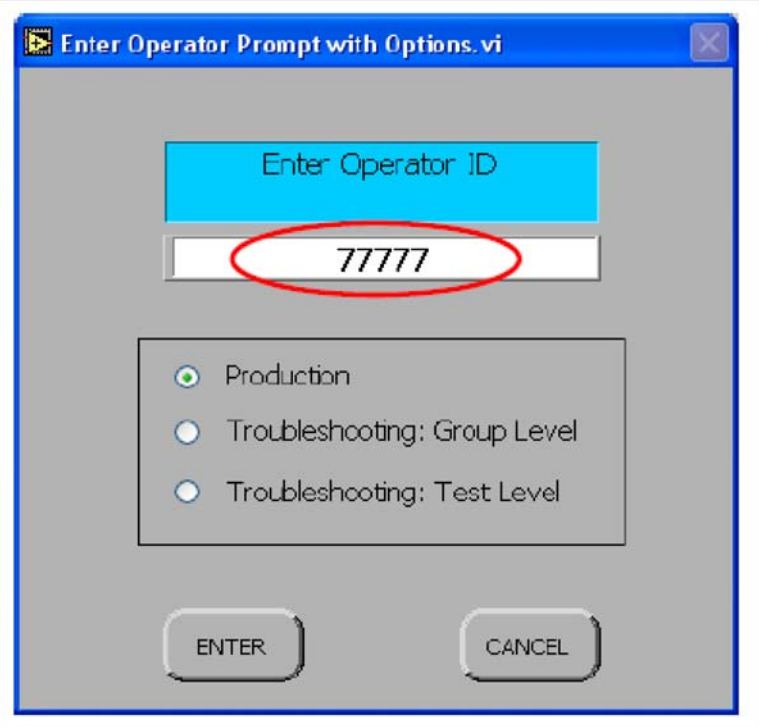
10.10.7 PM TEST

CAUTION

When testing a Trilogy O_2 or Trilogy 202 device, during the Oxygen Blending Module (OBM) condition check (Step 11) it checks for OBM leaks. The software prompts to read from the Respironics digital manometer (which leak setting is 25 +/- 0.5 cmH_2O). It should not be confused with the pressure indicator used for the OBM intake. Readings from the wron meter could damage the Sensor PCA.

1. Once you have installed the software, open the PM Test Auto Flow or Manual Flow application from the shortcut on the desktop. Double click the icon to open.

2. Enter your operator ID and click the button next to Production. Then click the enter button.



NOTE

There are 3 modes the FSA can be operated in:
1. Production Mode – This will complete all steps of the test software in continuous run mode. It will not ask for the individual steps to be selected, or stop in between Groups or Tests. Must be used before return to customer.
2. Group Level – This will allow the technician to complete Group level testing. In Group Level Testing you can select any group to test. Should only be used for troubleshooting errors.
3. Test Level – This will allow the technician to complete the Test level testing. Individual steps will provide a lower level of troubleshooting by allowing the operation in single steps. Should only be used for troubleshooting errors.

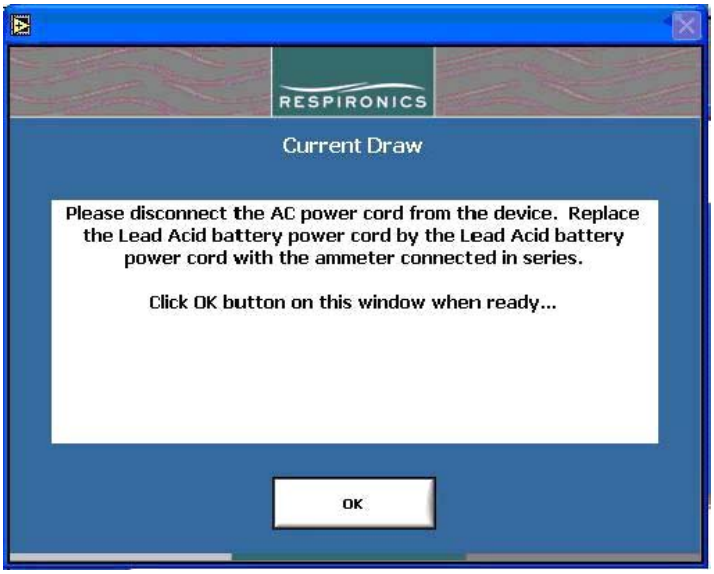
3. Continue with the PM Test and follow the on-screen prompts.

IMPORTANT NOTE

Please follow the steps below carefully otherwise an E280 error will be logged in the Error Log and will result in the test failing.

4. Remove 240 VAC, observe the AC Disconnected info message on the Trilogy Display.
5. After the AC Disconnected message is received, press the reset button on Trilogy Device.
6. Observe the Lead Acid icon is green and a black box is around the green Lead Acid icon.

7. Break the connection in the DC cable, and WAIT for the info message of Lead Acid Disconnected on the Trilogy Display.
8. Connect the Meter in series with the DC Cable. Press reset on the Trilogy Device and observe that the Lead Acid icon is green, and a black box is around the green Lead Acid icon.
9. Measure the Lead Acid current as prompted.

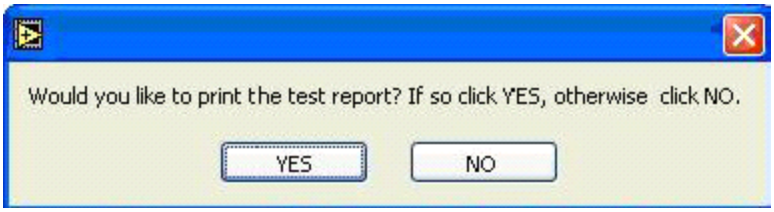


10. Continue following the on-screen prompts to complete the test. Once the test is complete and the device has passed, the following window will appear.

NOTE

If the device does not pass, perform repairs as necessary and retest the device using the Repair Test Procedure.

11. Print the test report (non-production mode only). The test report will print automatically when in production mode. Printing the test report is optional in non production mode.



12. Disconnect the device from the test setup.
13. Using ink, sign and date the printed test report and keep for the records.

NOTE

.When setting up the device for the first time or after a calibration, apply AC power to the ventilator before turning on the blower. Attempting to use the ventilator without first applying AC power, such as installing a detachable battery pack and starting the blower, will cause the internal battery to be displayed in red as an empty battery. When in this state, the internal battery will not be usable until AC power is applied.

Trilogy devices should be returned to the customer in the same configuration as which they arrived. For example, if the device is received with the Active w/PAP porting block, and without a Detachable Battery the device should be returned with the Active w/ PAP porting block installed and without a Detachable Battery.

10.11 SAFETY TEST (OPTIONAL)

This test is an optional test to be performed at intervals approved by the repair facility.

1. Plug the Trilogy device into a calibrate Safety Analyzer.
2. Measure and record the Normal Pole, No Earth, L2 enclosure leakage current. The value must be less than 100 microamps to pass.
3. Measure and record the Reverse Pole, No Earth, L2 enclosure leakage current. The value must be less than 100 microamps to pass.
4. Measure and record the Reverse Pole, No Earth, No L2 enclosure leakage current. The value must be less than 300 microamps to pass.
5. Measure and record the Normal Pole, No Earth, No L2 enclosure leakage current. The value must be less than 300 microcamps amps.

10.11.1SAFETY TEST DATA SHEET

SERIAL NUMBER	MODEL NUMBER	NORMAL POLE, NO EARTH, L2 <100 MICROAMPS	REVERSE POLE, NO EARTH, L2 <100 MICROAMPS	REVERSE POLE, NO EARTH, NO L2 <300 MICROAMPS	NORMAL POLE, NO EARTH, NO L2 <300 MICROAMPS	PASS/FAIL
Testing is in accordance to UL 60601-1 Safety Standards for medical devices.						
TESTED BY: (PRINT)			**TESTED BY: (SIGNATURE)**		**DATE:**	

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CHAPTER 11: TOOLS AND EQUIPMENT

11.0 CHAPTER OVERVIEW

This chapter details the necessary hand tools and supplies for troubleshooting, testing, and repairing the Trilogy Ventilator.

11.1 COMMON HAND TOOLS

- Antistatic, Electro-Static Discharge (ESD)-protected work station - minimum requirement is a grounded mat and wrist strap
- #1 Phillips Head Screwdriver
- #2 Phillips Head Screwdriver
- Straight Slot Screwdriver
- Torque Drivers
  - 4 in-lbs.
  - 6 in-lbs.
  - 8 in-lbs.
  - 10 in-lbs.
  - 12 in-lbs.
- Hex Wrench - 1/8”
- 3/4”, 5/8”, & 1/4” open end wrenches
- Needle Nose pliers
- Side Cutters
- Wire tie gun

11.2 EQUIPMENT

- PC System with 1 Serial Port and at least 6 USB Ports available with Windows XP installed on the computer (Respironics Part Number: 1071683)
- Monitor Capable of displaying 1280 x 1024 (Respironics Part Number: 1075945)
- Printer - USB/Ethernet (Dell 2130cn) (Respironics Part Number:1071684)
- Differential Pressure Indicator (Refer to Acceptable Test Equipment) **(Trilogy 200, Trilogy O_2, & Trilogy 202 Only) (**(Respironics Part Number: 1071613)
- Respironics Digital Manometer 0-70 cmH_2O **(Trilogy 100 & Trilogy 200 Only)** (Respironics Part Number: 302227)
- Digital Manometer 0-100 PSI (Refer to Acceptable Test Equipment) **(Trilogy O_2 & Trilogy 202 Only) (**(Respironics Part Number: 1071620)
- DC Power Supply (Refer to Acceptable Test Equipment) or Deep Cycle Marine Battery 12/24 V (Respironics Part Number: 1071678)
- TSI Model 4040 Flow Meter (Respironics Part Number: 1071679)
- Flow Control Valve (Respironics Part Number: 1037985)

- 10212 Precision Pressure Regulator (Fairchild 10212) (Respironics Part Number: 1076027)
- USB to Serial Converter (Cables to Go Port Authority Model# 26479, or equivalent, must be externally powered) (Respironics Part Number: 1071680)
- Temperature and RH Meter (Refer to Acceptable Test Equipment) ((Respironics Part Number: 1071682)
- Trilogy Device to PC Data Cable (Respironics Part Number: 1046972) (Quantity 2)
- Trilogy to DC Power Supply Cable (Respironics Part Number: 1047295)
- RP - Current Draw Test Cable (Respironics Part Number: 1042993) (Quantity 2)
- Serial RS-232 Cables (Quantity of 2 minimum) (Respironics Part Number: 1071687)
- Merriam Pressure Pump w/ Vernier (Respironics Part Number: F98589) **(Trilogy 200 & O_2 Only)**
- Air Regulator 0-100 PSI (Wilkerson R18-02-F0G0) (Respironics Part Number: 1071690)
- Air Regulator 0-125 PSI; Max 300 PSIG Inlet (Watts Fluid Air; Model R384-02C) (Respironics Part Number: 1071689)
- Digital Multimeter (Refer to Acceptable Test Equipment) (Quantity 2) (Respironics Part Number: 1071681)
- Particulate Filter (Wilkerson F18-02-SL00 or equivalent) (Respironics Part Number: 1071691)
- Coalescing Filter (Wilkerson M18-02-CL00 or equivalent) (Respironics Part Number: 1071692)
- Coalescing Filter (Wilkerson M18-02-DL00 or equivalent) (Respironics Part Number: 1071693)
- Joiner Kit for Filters/regulator (Wilkerson GPA-96-603, MSC 94575529 or equivalent) (Quantity 3) (Respironics Part Number: 1071694)
- Brass Hose Barb Fitting; 1/8” HB x 1/8” NPT Male (MSC 01045277 or equivalent) (Quantity 3) (Respironics Part Number: 1071695)
- Ethernet CAT 5 or 6 Cable (Quantity 2) (Respironics Part Number: 1071685)
- Network Switch minimum 2-port (Respironics Part Number: 1071686)
- Test Orifice, .25” ID (Respironics Part Number: 332353)
- Outlet Port (Respironics Part Number: 312710) (Quantity 4)
- Trilogy Nurse Call Adapter Cable (Respironics Part Number: 1045290)
- Smoothbore Tubing, 18” (Respironics Part Number: 1008198) (Quantity 2)
- Smoothbore Tubing, 6 ft. (Respironics Part Number: 622038)
- SD Card for loading Trilogy software (Respironics Part Number: 1051801)
- SD Card Reader (Respironics Part Number: 1047300)
- Exhalation Porting Block, Universal (Respironics Part Number: 1040370)
- Exhalation Porting Block, Passive (Respironics Part Number: 1040372)
- Whisper Swivel II (Respironics Part Number: 332113)
- Test Lung (Respironics Part Number: 1021671)
- Trilogy Test Hardware Kit (Respironics Part Number: 1060747)
- Brass Barb Fitting Male for 1” hose ID and 3/4” Pipe (MSC - 5346K69 or equivalent) (Respironics Part Number: 1071696)

- Reducing Hex Coupler 3/4” to 1/2” Female to Female (MSC - 50785K187 or equivalent) (Respironics Part Number: 1071697)
- Reducing Hex Nipple 1/2” to 1/4” Male to Male (MSC - 5485K36 or equivalent) (Respironics Part Number: 1071698)
- Quick Connect Female 1/4” (MSC - 84930064 or equivalent) (Quantity 2) (Respironics Part Number: 1071699)
- Quick Connect Male 1/4” (MSC - 84930189 or equivalent) (Quantity 2) (Respironics Part Number: 1071700)
- Quick Connect Coupler 1/4” (MSC - 84930890 or equivalent) (Quantity 2) (Respironics Part Number: 1071701)
- TL930 Banana Plug Patch Cords (MSC - 65244121 or equivalent) (Quantity 2) (Respironics Part Number: 1071688)
- Prestolok Plus™ Push-to-Connect Fitting 1/4”; Thread Size: 1/4”; Thread Type: NPTF; Connection Type: Male NPT (MSC - 84426139 or equivalent) (Quantity 2) (Respironics Part Number: 1071702)
- Cap Plug (www.caplugs.com EC-14 or equivalent) (Respironics Part Number: 1070135)
- Male NPT Hose Barb 1/8” (Bay Corp Part Number: MPT-22 or equivalent) (Quantity 2) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071703)
- 3-Way Tee 1/8” (Bay Corp Part Number T-2 or equivalent) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071704)
- Male Nipple 1/8” with a length of 1 “ (Bay Corp Part Number 1243-1 or equivalent) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071705)
- Wing Nut, Oxygen Green (Bay Corp Part Number 1244MN or equivalent) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071706)
- Green Hose 3’ (Respironics Part Number: 1071707) **(Trilogy O_2 & Trilogy 202 Only)**
- Port Cap, Silicone, .125 (Respironics Part Number: 1070259)
- Tubing 1/8 ID to 3/32 Reducer (Respironics Part Number: 35203)
- O_2 Inlet Test Cap (Respironics Part Number: 1075946)
- Trilogy 100 device for negative flow (Respironics Part Number: 1054260)
- Trilogy 200 device for negative flow (Respironics Part Number: 1040005)

11.3 SUPPLIES

- Cleaning Cloth
- Mild Detergent

11.4 ACCEPTABLE TEST EQUIPMENT

DIGITAL MULTIMETER

Specifications

- 3 1/2” digital readout
- Must be able to measure AC/DC Current, True RMS

Acceptable Options

- Fluke 87-5 or better model
- Any commercially available digital multimeter that meets the above specifications.

DC POWER SUPPLY

Specifications

- 0-15 V,
- 0-25 A Regulated Power Supply
- 100-240V input

Acceptable Options

- ExTech Instruments 382290
- Any commercially available External Power Supply that meets the above specifications.

DIFFERENTIAL PRESSURE INDICATOR

Specifications

- Pressure Range: 10 in H_2O
- Precision: $\pm$ 0.03% of reading F.S. combined non-linearity, hysteresis, repeatability and temperature effects over 18° to 28° C
- Engineering Pressure Units: 24 plus Altitude in feet or meters
- Pressure Connection: 1/8 in NPT Female
- Communication: RS-232 Standard
- AC/DC Power Adaptor 90 to 264 VAC input options

Acceptable Options

- Druck DPI 150
- Any commercially available Differential Pressure Indicator that meets the above specifications.

TEMPERATURE AND RH METER

Specifications

- Humidity $\pm$ 3%; Temperature $\pm$ 2° F ($\pm$ 1° C)

Acceptable Options

- B&K Precision Model 720
- Any commercially available Temperature and RH Meter that meets the above specifications.

CHAPTER 12: SCHEMATICS

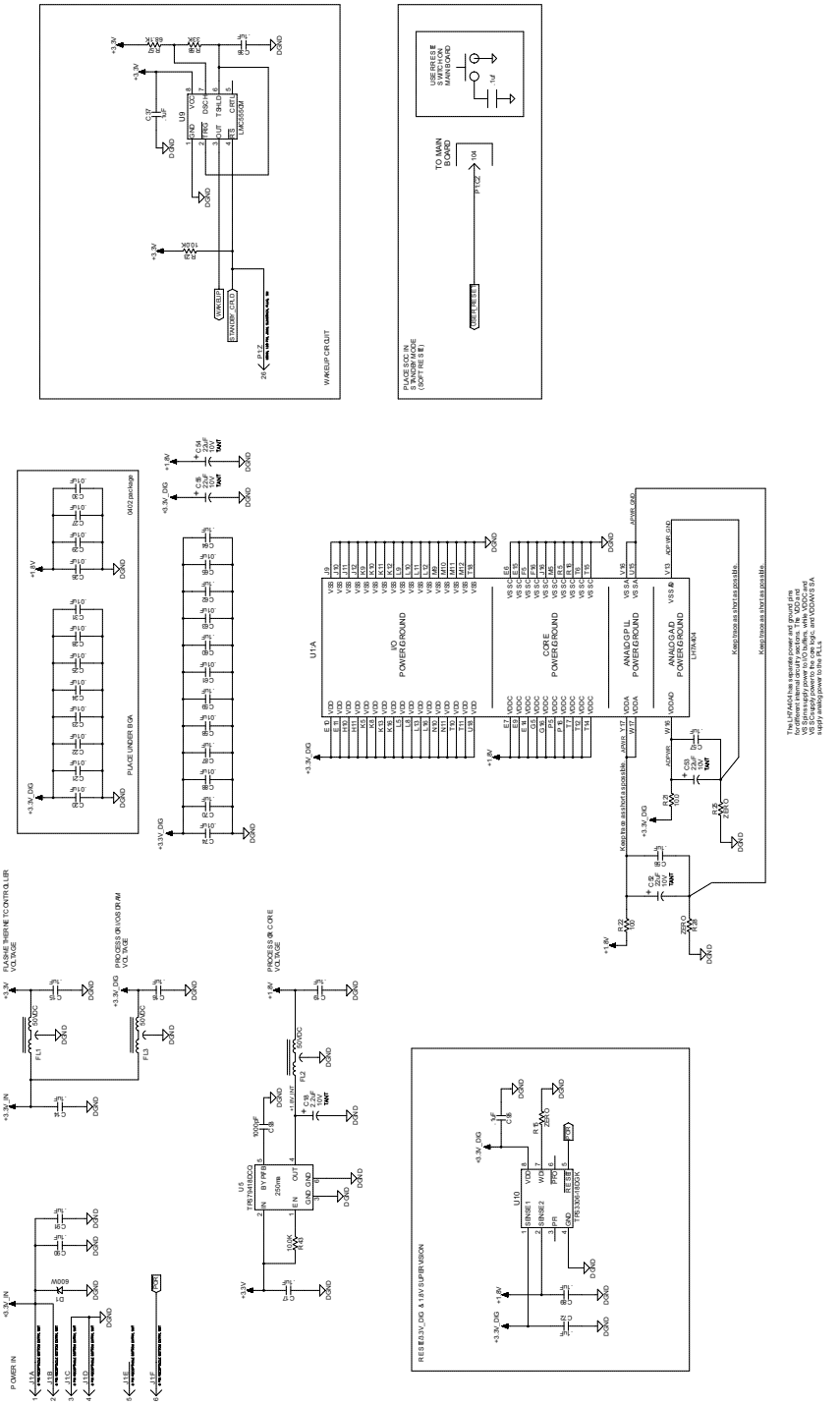
12.0 SCHEMATICS STATEMENT

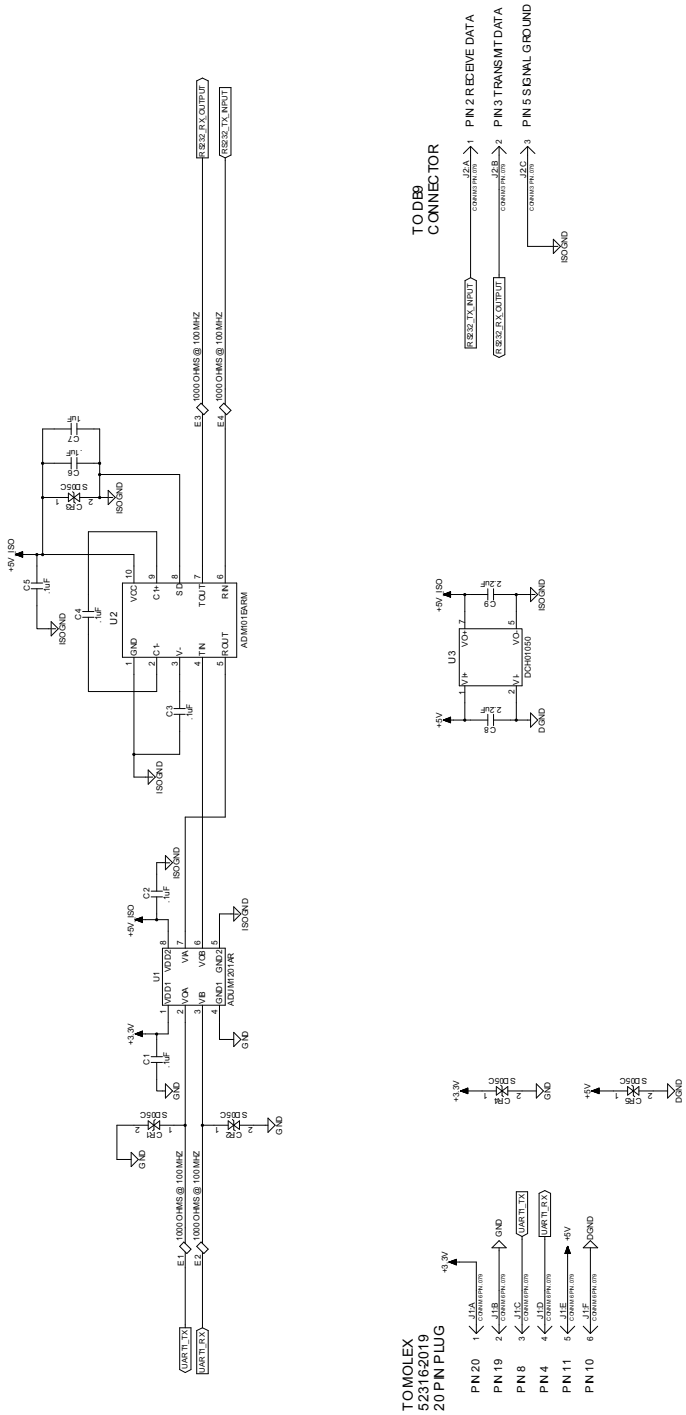
Schematics are supplied with this manual in direct support of the sale and purchase of this product.

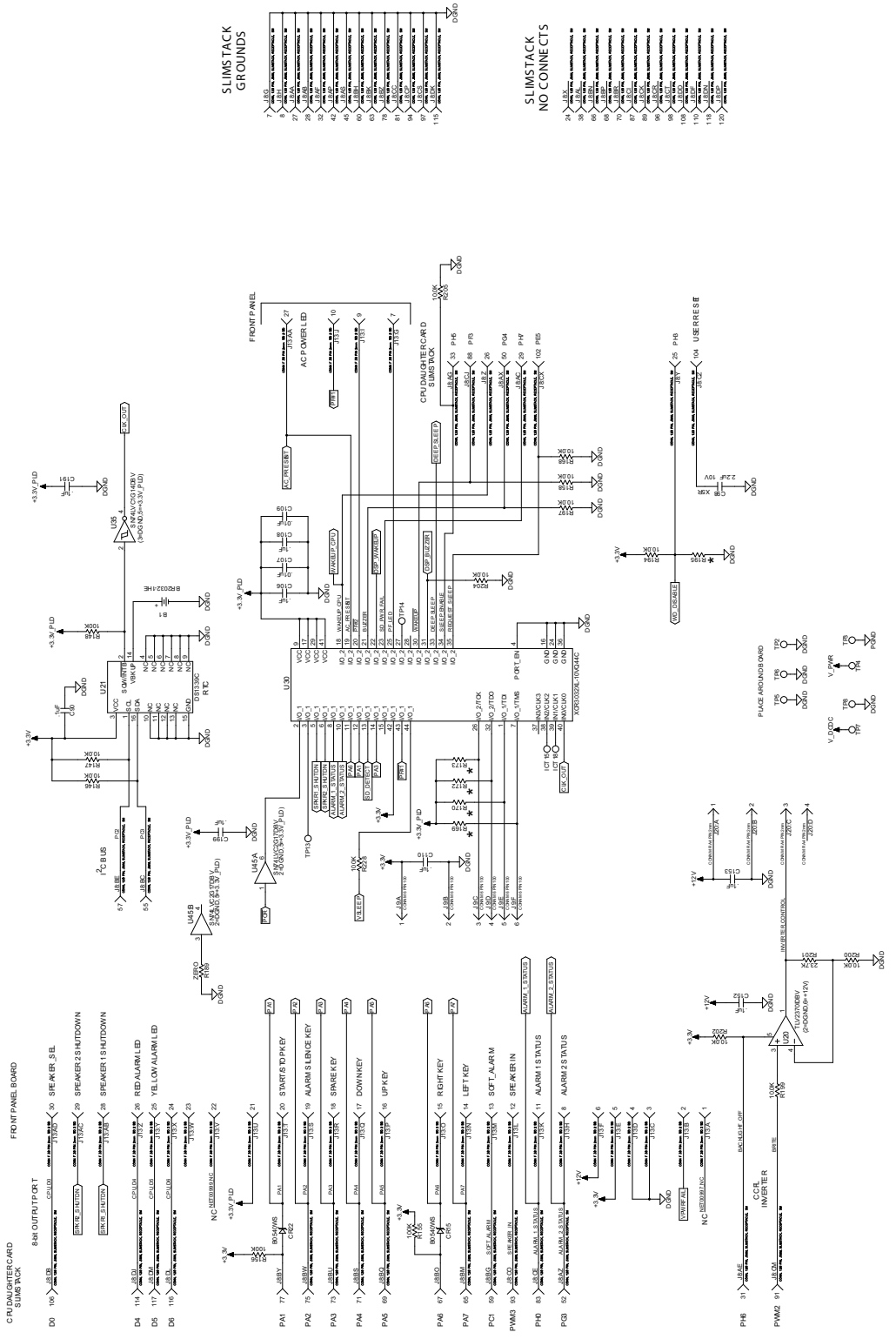
The schematics are proprietary and confidential. Do not copy the schematics or disclose them to third parties beyond the purpose for which they are intended. Patents are pending.

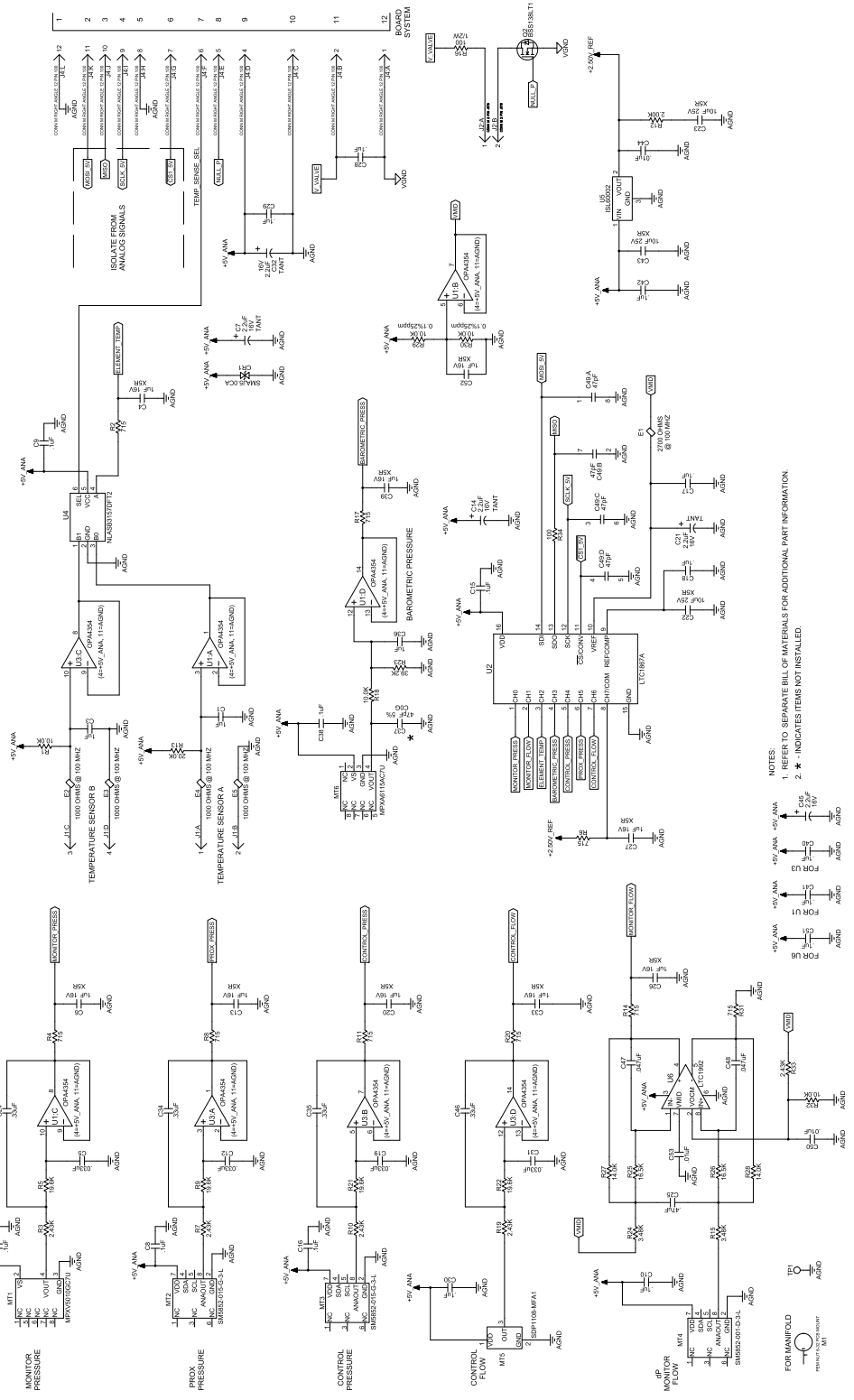
The schematics are intended to satisfy administrative requirements only. They are not intended to be used for component level testing and repair. Any changes of components could effect the reliability of the device, prohibit lot tracking of electronic components, and void warranties. Repairs and testing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

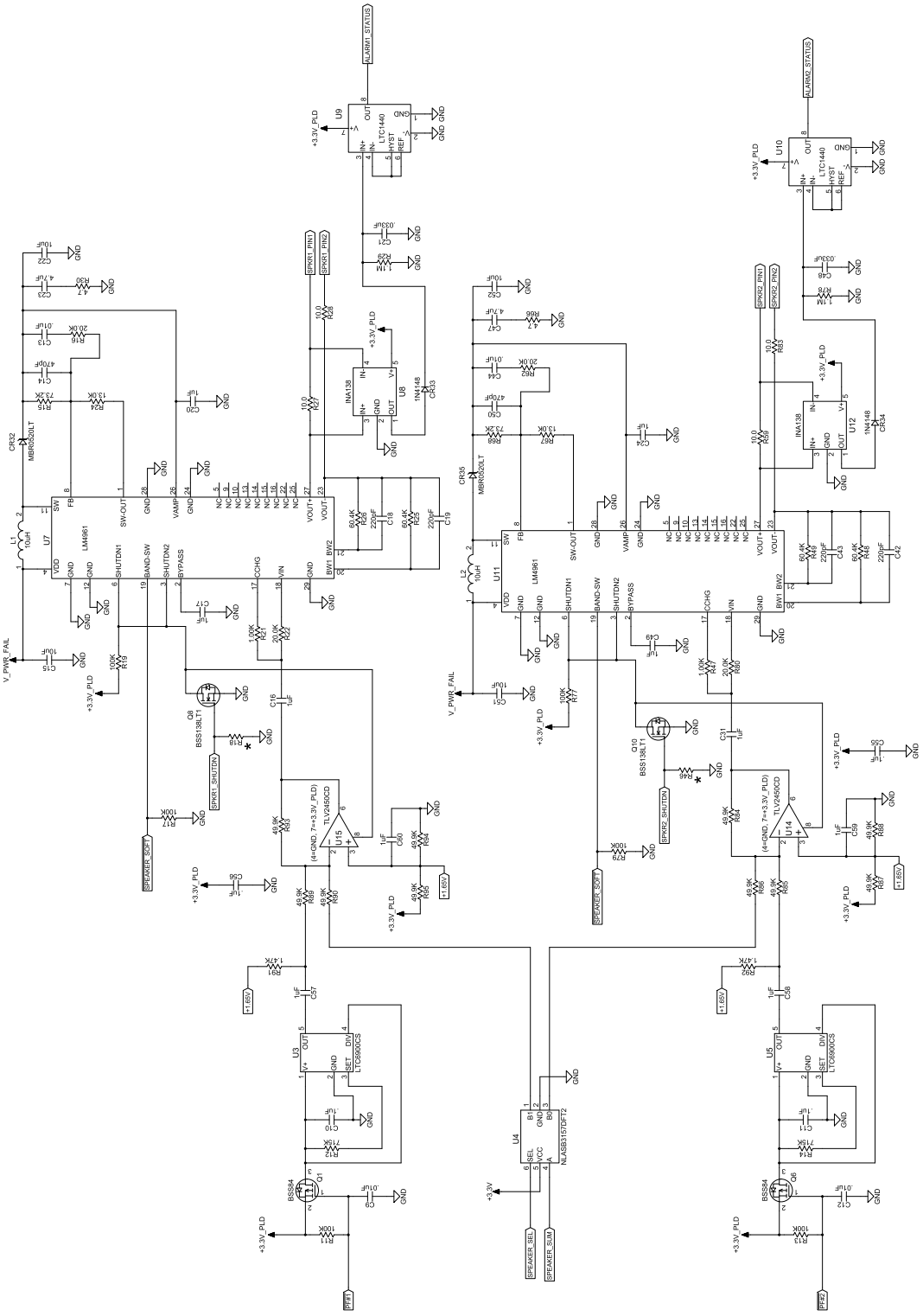
The schematics are of the revision level in effect at the time this manual was last revised. New revisions may or may not be distributed in the future.

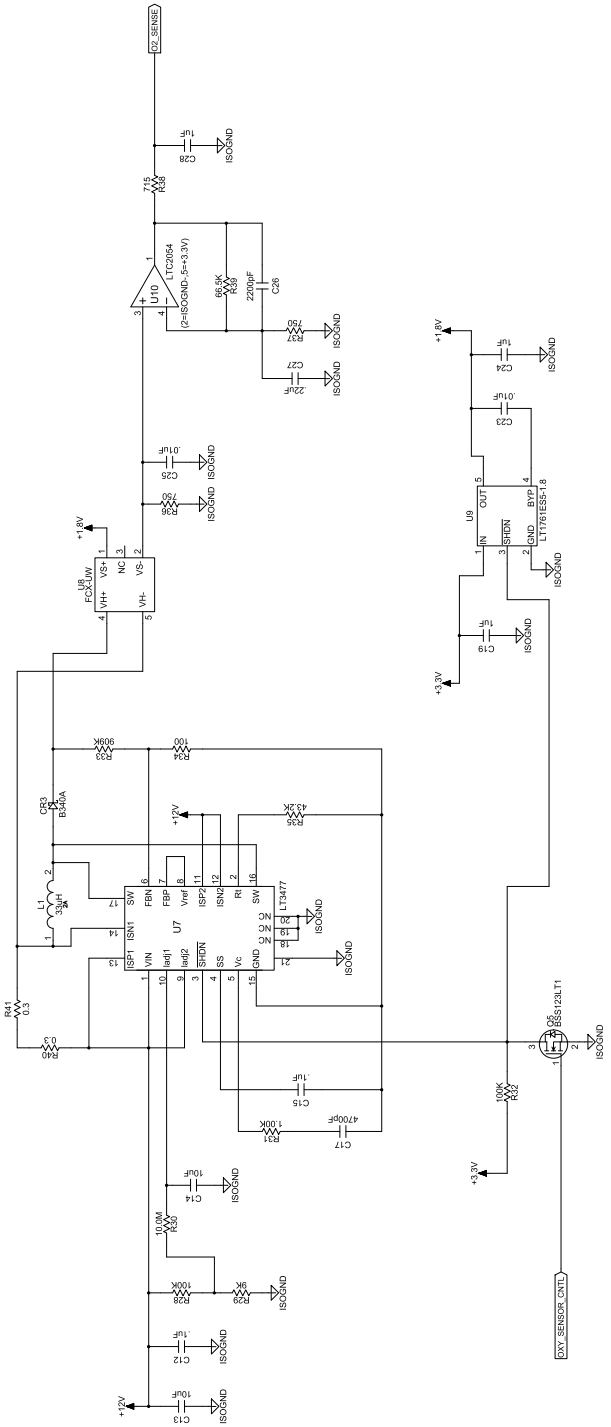


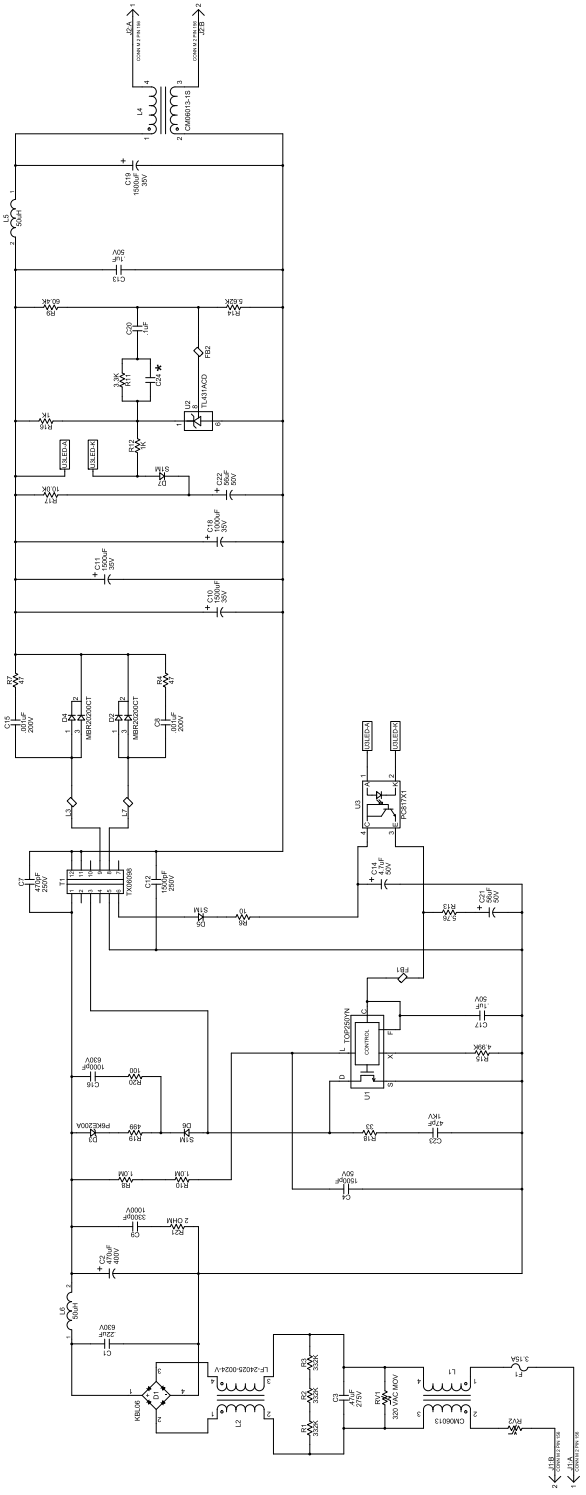

TO DB9
CONNECTOR
PIN 2 RECEIVE DATA
PIN 3 TRANSMIT DATA
PIN 5 SIGNAL GROUND
RS232_TX_INPUT
RS232_RX_OUTPUT
ISOGND
+5V_ISO
+3.3V
+5V
DGND
GND
U1
ADUM1201AR
U2
ADM3015ARM
U3
DCH01050
1000 OHMS @ 100 MHZ
UART_TX
UART_RX
TOMOLEX
523162019
20 PIN PLUG
PIN 20
PIN 19
PIN 8
PIN 4
PIN 11
PIN 10

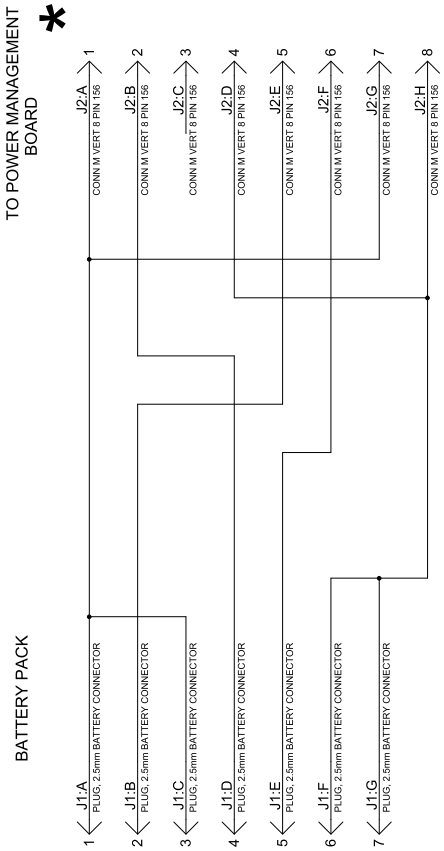


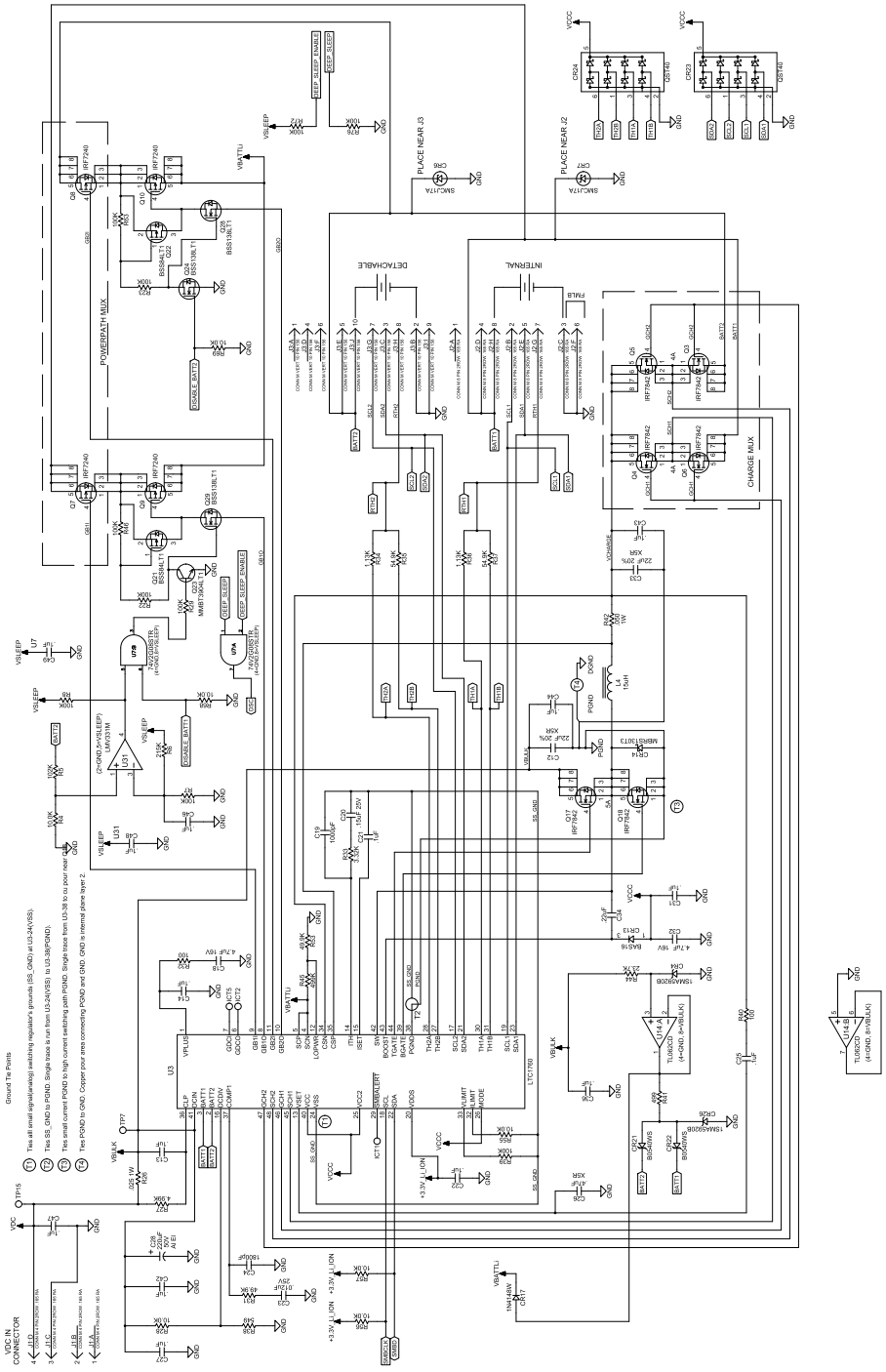

BOARD SYSTEM
ISOLATE FROM ANALOG SIGNALS
TEMP SENSE SEL
MISO_5V
MOSI_5V
SCLK_5V
A_VALVE
NULL_5V
VGND
+5V_ANA
AGND
+2.50V_REF
ELEMENT_TEMP
BAROMETRIC_PRESS
MONITOR_PRESS
PROX_PRESS
CONTROL_PRESS
MONITOR_FLOW
CONTROL_FLOW
TEMPERATURE SENSOR B
TEMPERATURE SENSOR A
BAROMETRIC PRESSURE
MONITOR PRESSURE
PROX PRESSURE
CONTROL PRESSURE
CONTROL FLOW
dP MONITOR FLOW
FOR MANIFOLD
NOTES:
1. REFER TO SEPARATE BILL OF MATERIALS FOR ADDITIONAL PART INFORMATION.
2. ★ INDICATES ITEMS NOT INSTALLED.


ALARM1_STATUS
ALARM2_STATUS
SPKR1_PIN1
SPKR1_PIN2
SPKR2_PIN1
SPKR2_PIN2
V_PWR_FAIL
SPKR1_SHUTDN
SPKR2_SHUTDN
SPEAKER_SOFT
SPEAKER_SEL
SPEAKER_SUM
PPR1
PPR2
+3.3V_PLD
+1.65V
+3.3V
GND
U3
U5
U7
U8
U9
U10
U11
U12
U14
U15
U4
Q1
Q6
Q8
Q10
LM4861
LTC1440
LTC6900CS5
TLV2450CD
INA138
NLAS8157DFT2
BSS84
BSS138LT1
MBR0520LT
1N4148


O2_SENSE
C28
1uF
ISOGND
R75
43K
U10
LTC2054
(2=ISOGND-.5=+3.3V)
66.5K
R39
2200pF
C26
R37
750
C27
22uF
R36
750
C25
.01uF
+1.8V
U8
FCX-UW
VS+
NC
VS-
VH+
VH-
R33
909K
R34
100
CR3
B340A
+12V
R35
43.2K
L1
33uH
U7
LT3477
SW
FBN
FBP
Vref
ISP2
ISN2
RI
SW
ISP1
ISN1
VIN
Iadj1
Iadj2
SHDN
SS
Vc
GND
R41
V3
R40
0.3
C15
.1uF
R31
1.00K
4700pF
C17
C14
10uF
R30
10.0M
R28
100K
R29
9K
C12
.1uF
C13
10uF
U9
LT1761ES5-1.8
IN
SHDN
OUT
BYP
GND
C24
1uF
C23
.01uF
C19
1uF
+3.3V
Q6
DSS123LT1
100K
R32
DXY_SENSOR_CNTL




TO POWER MANAGEMENT BOARD
*
J2:A
J2:B
J2:C
J2:D
J2:E
J2:F
J2:G
J2:H
CONN M VERT 8 PIN 156
1
2
3
4
5
6
7
8
BATTERY PACK
J1:A
J1:B
J1:C
J1:D
J1:E
J1:F
J1:G
PLUG, 2.5mm BATTERY CONNECTOR



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82211 Herrsching, Germany

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