BiPAP A30 & BiPAP A40
Original and Silver Series
Service & Technical Reference Manual

PHILIPS

RESPIRONICS

LIMITED WARRANTY

Respironics, Inc. warrants that the BiPAP A30 / BiPAP A40 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, including, but not limited to, circuits, tubing, leak devices, exhaust valves, filters and fuses, are not covered under this warranty. The warranty for repairs is 90 days for labor and one year on the part(s) that was replaced.

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:

1001 Murry Ridge Lane
Murrysville, Pennsylvania
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1-724-387-4000

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Revision History

Revision History

REVISION	RECORD OF REVISION	AUTHOR
00	*Initial Revision*	*T. Flowers*
01	*Added BiPAP A40 information*	*B. Martz*
03	• Section 7.0 - Added Silver Series non-Heated Tube Humidifier Bottom Housing P/N 1114891 • Section 7.0 - Added Silver Series Heated Tube Humidifier Heater Plate RP P/N 1099585 • Section 7.2.9 - Amended Kit Inclusions in table from “Bottom Housing (with Left Side Panel)” to “Bottom Housing” and removed inclusion of #6 X ¼” screw (x4) • Table Page 6-2 - Blower Box Bottom (includes Blower Box Mount) changed to Blower Box Bottom (includes Blower Box Seal) • Table Page 6-2 - Added BiPAP A40 Battery Module Cover RP and BiPAP SOH Keypad RP	*S. Waugaman*
04	• Version 4 not released. • Content added in version 4 released in version 5.	
05	• Added Heated Tube Humidifier Top Housing RP. • Added Warning Label Dom U.S. to Humidifier RP Kit Table • Corrected part descriptions for Left/Right Side Panels and Beauty Covers in RP Kit listing. • Added BiPAP SOH to Checkout Procedure.	*S. Waugaman*

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CHAPTER 1: INTRODUCTION

CHAPTER 2: WARNINGS, CAUTIONS, & NOTES

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CHAPTER 8: TESTING & CALIBRATION

CHAPTER 1: INTRODUCTION

CAUTION
U.S. federal law restricts this device to sale by or on the order of a physician.

1.0 PRODUCT OVERVIEW

The device augments patient breathing by supplying pressurized air through a patient circuit. It senses the patient's breathing effort by monitoring airflow in the patient circuit and adjusts its output to assist in inhalation and exhalation. This therapy is known as Bi-level ventilation. Bi-level ventilation provides a higher pressure, known as IPAP (Inspiratory Positive Airway Pressure), when you inhale, and a lower pressure, known as EPAP (Expiratory Positive Airway Pressure), when you exhale. The higher pressure makes it easier for you to inhale, and the lower pressure makes it easier for you to exhale. The device can also provide a single pressure level, known as CPAP (Continuous Positive Airway Pressure).

1.1 SERVICE NOTICE

The device is designed so that qualified Service Personnel can perform repair and testing procedures.

1.2 SERVICE TRAINING

Respironics offers service training for the device. Training includes complete disassembly of the device, troubleshooting sub-assemblies and components, and necessary safety testing. For more information, contact the Service Marketing department at:

E-mail: service.operations@respironics.com
Phone: (724) 755-8225
Fax: (724) 755-8230
Or your Philips Respironics regional service location

1.3 PRODUCT SUPPORT STATEMENT

For product support, please contact Respironics Customer Satisfaction.

U.S.A. and Canada	International
Phone:1-800-345-6443	**Phone: 1-724-387-4000**
Fax: 1-800-886-0245	**Fax: 1-724-387-5012**

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CHAPTER 2: WARNINGS, CAUTIONS, & NOTES

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 on the device. Please read this section carefully before servicing the device.

WARNING

Warnings indicate the possibility of injury to people.

CAUTION

Cautions indicate the possibility of damage to equipment.

NOTE

Notes are used to emphasize a characteristic or important consideration.

2.0 WARNINGS

WARNINGS

- *To avoid electrical shock, disconnect the electrical supply before servicing this device.*
- *Do not service this device in the presence of flammable mixtures, gases, anesthetics, or liquids.*
- *Electronic components used in this device are subject to damage from static electricity. Repairs made to this device must be performed only in an anti-static, Electrostatic Discharge (ESD) protected environment.*
- *To assure the safety of the service technician and the specified performance of the device, Respironics recommends that only technicians having prior training or experience servicing NIV devices perform any repairs or adjustments to the device.*
- *Do not immerse this device in water, solvents, or cleaning solutions.*
- *This device is not intended for life support.*
- *Do not use extension cords with this device.*
- *Do not service the device near a source of toxic or harmful vapors.*
- *Do not service this device if the room temperature is warmer than 35° C (95° F). If the device is used at room temperatures warmer than 35° C (95° F), the temperature of the airflow may exceed 41° C (106° F). This could cause irritation or injury to the patient's airway.*
- *Repairs and adjustments must be performed by authorized service personnel only. Unauthorized service could cause injury, invalidate the warranty, or result in costly damage.*
- *Inspect electrical cords and cables for damage or signs of wear. Replace if damaged.*
- *Pins of connectors identified with the ESD warning symbol should not be touched. Connections should not be made to these connectors unless ESD precautionary procedures are used. Precautionary procedures include methods to prevent build-up of electrostatic discharge (e.g., air conditioning, humidification, conductive floor coverings, non-synthetic clothing), discharging one's body to the frame of the equipment or system or to earth or a large metal object, and bonding oneself by means of a wrist strap to the equipment or system or to earth.*

2.1 CAUTIONS

CAUTIONS

- *Perform the Performance Verification at regular intervals. Refer to the Testing section of this manual for additional information.*
- *The device may only be operated at temperatures between 5° C (41° F) and 35° C (95° F).*
- *Do not place liquids on or near the device.*
- *If this device has been exposed to either very hot or very cold temperatures, allow it to adjust to room temperature before using or servicing it.*
- *A properly installed, undamaged reusable foam inlet filter is required for proper operation.*

2.2 NOTES

NOTE

Refer to the device's User Manual for additional Warnings, Cautions, Notes, and Operating Instructions.

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CHAPTER 3: SPECIFICATIONS & CLASSIFICATIONS

This chapter includes specifications and EMC compliance for the Philips Respironics BiPAP A30 / BiPAP A40 devices.

3.0 THERAPY DEVICE SPECIFICATIONS

Environmental

Operating Temperature: 5° to 35° C (41° to 95° F)

Storage Temperature: -20° to 60° C (-4° F to 140° F)

Relative Humidity (operating & storage): 15 to 95% (non-condensing)

Atmospheric Pressure: 101 to 77 kPa (0 - 2286 m / 0 - 7500 ft)

Physical

Dimensions: 22W x 18L x 11H cm (8.75” x 7.25” x 4.25”)

Weight (Device with power supply): Approximately 2 Kg (4.4 lbs)

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 10651-6: Lung ventilators for medical use -- Particular requirements for basic safety and essential performance -- Part 6: Home care ventilatory support devices
- ISO 10993-1 Biological evaluation of medical devices - Part 1: Evaluation and testing (Biocompatibility)
- RTCA/DO-160F section 21, category M; Emission of Radio Frequency Energy

Electrical

AC Voltage Source: 90-264 VAC, 47-63 Hz, 1.2 A

DC Power Consumption:

- 12 VDC, 5.0 A (External Battery)
- 24 VDC, 4.2 A (Power Supply)

Maximum power consumption of 100 WATT continuous.

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 and AC power supply): Drip Proof, IP22

Mode of Operation: Continuous

SD Card and SD Card Reader

Use only SD cards and SD card readers available from Philips Respironics, including the following:

- SanDisk Card Reader/Writer - SanDisk ImageMate - REF SDDR-99-A15

Control Accuracy

Parameter	Range	Accuracy
BiPAP SOH IPAP	4.0 to 35.0 cm H_2O	± 2.5 cm H_2O*
A30 IPAP	4.0 to 30.0 cm H_2O	± 2.5 cm H_2O*
A40 IPAP	4.0 to 40.0 cm H_2O	± 2.5 cm H_2O*
EPAP	4.0 to 25.0 cm H_2O	± 2.5 cm H_2O*
CPAP	4.0 to 20.0 cm H_2O	± 2.5 cm H_2O*
Breath Rate	0 to 40 BPM	Greater of ± 1 BPM or ± 10% of setting
Inspiration Time	0.5 to 3.0 seconds	± (10% of setting + 0.1 second)
Specifications listed are based on using a standard patient circuit (Philips Respironics 15 or 22 mm tubing; Whisper Swivel II). *Pressure measured at the patient connection port with or without the Humidifier (no patient flow, with Whisper Swivel II)		

Displayed Parameter Accuracy

Parameter	Range	Resolution	Range
Estimated Leak Rate	N/A	0.1 LPM	0 to 175 LPM
Exhaled Tidal Volume	Greater of ± 20 ml or ± 20% of reading	1 ml	0 to 2000 ml
Respiratory Rate	Greater of ±1 BPM or ±10% of reading	1 BPM	0 to 60 BPM
Exhaled Minute Ventilation	Calculation based on Exhaled Tidal Volume and Respiratory Rate	0.1 LPM	0 to 25 LPM
Estimated Patient Pressure	± 2.5 cm H_2O	0.1 cm H_2O	0 to 40 cm H_2O
I:E Ratio	Calculation based on Inspiratory time and Expiratory time	0.1	9.9:1 to 1:9.9
Notes: -Displayed parameter accuracies are based on ambient bench top conditions at an altitude of nominally 380 meters. All flow based parameters are expressed in volumetric flow. -Pressure measured at the patient connection port with or without the integrated heated humidifier (no patient flow).			

Noise

Minimum alarm sound level: 60 dB(A)

A30 Spontaneous Breathing During Power Failure Conditions

Patient Flow (LPM)	Expiratory Resistance* (cm H_2O)	Inspiratory Resistance* (cm H_2O)
30	<2.1	<2.3
60	<5.3	<5.4
* Includes Humidifier		

A40 Spontaneous Breathing During Power Failure Conditions

Patient Flow (LPM)	Expiratory Resistance* (cm H_2O)	Inspiratory Resistance* (cm H_2O)
30	<1.5	<1.5
60	<3.7	<4.1
* Includes Humidifier		

Disposal

Separate collection for electrical and electronic equipment per EC Directive 2002/96/EC. Dispose of this device in accordance with local regulations.

3.1 ELECTROMAGNETIC EMISSIONS

This device is intended for use in the electromagnetic environment specified below. Use, service, and testing of the device should be performed in such an environment.

GUIDANCE & MANUFACTURER'S DECLARATION - ELECTROMAGNETIC EMISSIONS		
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*	

3.2 ELECTROMAGNETIC IMMUNITY

This device is intended for use in the electromagnetic environment specified below. Use, service, and testing of the device should be performed in such an environment.

GUIDANCE & MANUFACTURER'S DECLARATION - ELECTROMAGNETIC IMMUNITY			
IMMUNITY TEST	**IEC 60601 TEST LEVEL**	**COMPLIANCE LEVEL**	**ELECTROMAGNETIC ENVIRONMENT-GUIDANCE**
Electrostatic Discharge (ESD) *IEC 61000-4-2*	*±6 kV contact* *±8 kV air*	*±6 kV contact* *±8 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 I/O lines*	*±2 kV for supply mains* *±1 kV for I/O 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 M ode*	*±1 kV differential mode* *±2 kV 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 AC mains voltage prior to application of the test level.			

GUIDANCE & MANUFACTURER'S DECLARATION - ELECTROMAGNETIC IMMUNITY			
IMMUNITY TEST	**IEC 60601 TEST LEVEL**	**COMPLIANCE**	**EMC ENVIRONMENT GUIDANCE**
			Portable and mobile RF communications 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:
Conducted RF IEC 61000-4-6	*3Vrms 150 kHz to 80 MHz outside ISM bonds[a]*	*3 Vrms*	$d = 1.2\sqrt{P}$ *150 kHz to 80 MHz*
			$d = 1.2\sqrt{P}$ *80 MHz to 800 MHz*
Radiated RF IEC 61000-4-3	*3 V/m 80 MHz to 2.5 GHz*	*10V/m 26 MHZ to 2.5 GHz*	$d = 2.3\sqrt{P}$ *800 MHz to 2.5 GHz* ***P*** *= maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and* ***d*** *= the recommended separation distance in meters (m).* *Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] 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 reorienting or relocating the device.

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

3.3 RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE & MOBILE RF COMMUNICATIONS AND THIS DEVICE

This device is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. Electromagnetic interference may be prevented by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this device as recommended in the table 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 (m)**			
	150 kHz to 80 MHz outside ISM Bands $d = 1.2\sqrt{P}$	*150 kHz to 80 MHz in ISM Bands* $d = 1.2\sqrt{P}$	*80 MHz to 800 MHz* $d = 1.2\sqrt{P}$	*800 MHz to 2.5GHz* $d = 2.3\sqrt{P}$
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 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 6.765 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 cause 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.

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CHAPTER 4: SETUP

This chapter provides an overview of the system setup including introductory information on the User and Provider modes and menus. Please refer to the device's User Manual for further information.

WARNING

- *Inspect the power cord often for any signs of damage. Replace a damaged power cord immediately.*
- *Do not use extension cords with this device.*
- *Be sure to route the power cord to the outlet in a way that will prevent the cord from being tripped over or interfered with by chairs or other furniture.*
- *This device is activated when the power cord is connected.*

CAUTION

If the device has been exposed to either very hot or very cold temperatures, allow it to adjust to room temperature (approximately two hours) before beginning setup.

NOTE

- *Please refer to the User Manual for additional information.*
- *If you are servicing the device with a Heated Humidifier, refer to the instructions included with the humidifier for details on how to supply power to the device and humidifier.*

4.0 SUPPLYING POWER TO THE DEVICE

The device can operate on either AC or DC power.

4.0.1 USING AC POWER

An AC power cord and power supply is included with the device.

1. Plug the socket end of the power cord into the power supply.
2. Plug the pronged end of the power cord into an electrical outlet that is not controlled by a wall switch.
3. Plug the power supply cord's connector into the power inlet on the back of the ventilator.
4. Ensure that all connections are secure.

5. An accessory clip can be used to secure the power cord to prevent accidental disconnection. Route the cord through the clip and secure the clip to the enclosure of the device using the supplied screw, as shown in Figure 4-1.

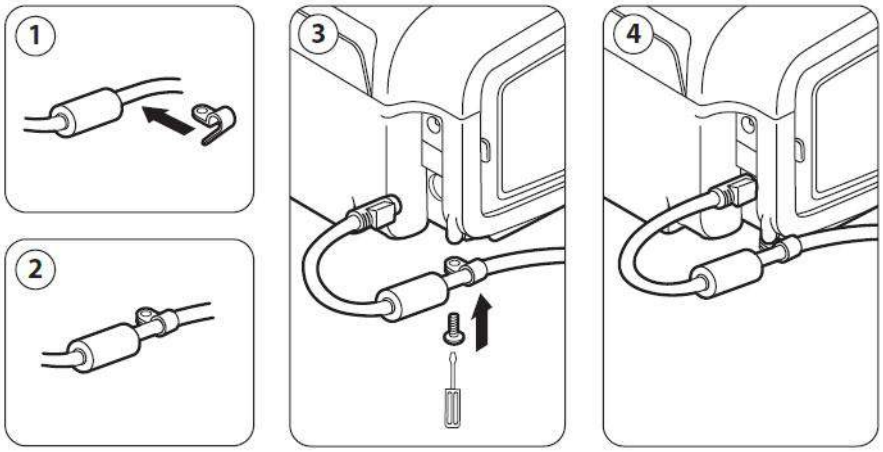

FIGURE 4-1: CONNECTING THE AC POWER SUPPLY TO THE DEVICE

NOTE

The devices have a locking-type power connector. To avoid damage to the connector, when disconnecting the power cord, pull the connector at its base, not the cord, to disengage the lock.

4.0.2 USING DC POWER

You can operate the ventilator using an external battery or Detachable Battery Pack (BiPAP A40 Only).

EXTERNAL BATTERY

The ventilator can operate from a 12 VDC lead acid battery using the Philips Respironics 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, age, and use profile, the capacity of the external battery as shown on the device display is only an estimate of the actual remaining capacity.

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

DETACHABLE BATTERY (BIPAP A40 ONLY)

Philips Respironics offers a detachable Lithium-Ion battery pack. You can connect the detachable battery to the device and recharge the battery using the Philips Respironics Detachable Battery Module. Refer to the instructions included with your Detachable Battery Pack and Detachable Battery Module for more information.

NOTE

The detachable battery pack will automatically recharge whenever it is connected to the therapy device and the device is running on AC Power.

4.1 DEVICE POWER SOURCE INDICATORS

There are two power source indicators on the device and the display screen. These indicators are described in detail below.

4.1.1 AC POWER INDICATORS

When AC power is applied to the device and the airflow is off, the green AC LED indicator on the Start/Stop button lights. When AC power is applied and the airflow is on, the white AC LED indicator on the Start/Stop button lights.

4.1.2 DC POWER INDICATORS

When DC power is applied to the device, battery symbols will appear on-screen to indicate the battery status. The shading in the battery icon indicates the power remaining in the battery. Refer to the Display Symbols table in Chapter 5 for information on each battery symbol.

BATTERY	SYMBOL	DEVICE
External Battery		*A30/A40*
Detachable Battery		*A40*

4.2 STARTING THE DEVICE

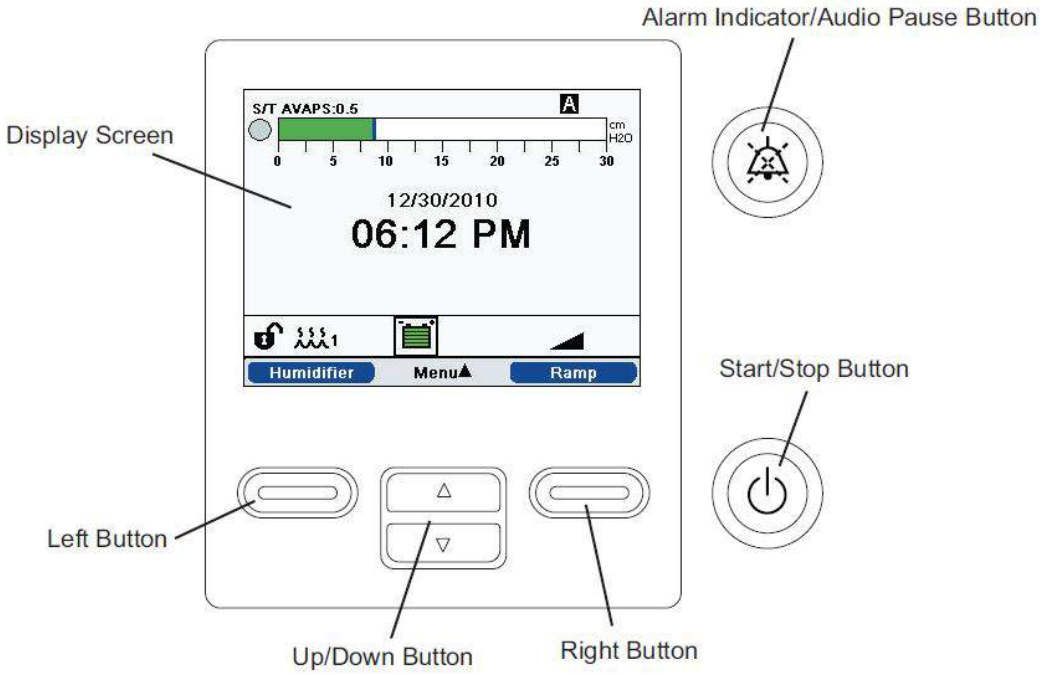

FIGURE 4-2: DISPLAY AND CONTROL PANEL

1. After supplying power to the device, press the *Start/Stop* button. The Startup screen appears momentarily, displaying the device name and software version.
2. The Standby screen then appears, shown in Figure 4-3. It displays the date and time, therapy mode, a patient accessory panel (if a patient accessory is attached), a status panel, and the soft key panel.

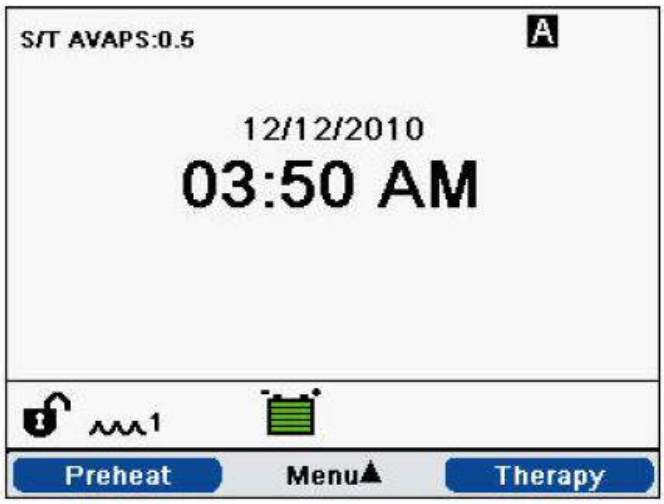

FIGURE 4-3: STANDBY SCREEN

3. You can perform the following actions from the Standby screen:
   a. If a humidifier is connected, you can activate the humidifier preheat function by pressing the Left (Preheat) key.

b. If an accessory module is attached, you can monitor the connection to any attached patient accessory.
c. Access the menu by selecting the Up (Menu) key.
d. Initiate therapy by selecting the Right (Therapy) key. Selecting this key starts the airflow and displays the Monitoring screen.

4.3 NAVIGATING THE MENU SCREENS

WARNING

There are two types of Menu Access - Full and Limited. Full Menu Access allows home care providers to alter all available settings. Accessing the Full Menu should not be revealed to patients.

When the device is in Limited Menu Access mode, use the following key sequence to enter Full Menu Access mode:

1. From the Standby or Monitor screen, press the Down button and the Alarm Indicator/Audio Pause button simultaneously for several seconds. This temporarily places the device in Full Menu Access mode.
2. If you perform this key sequence from the Monitor screen, the Main Menu appears. If you perform it from the Standby screen, the Setup screen appears.
3. An audible indicator sounds indicating you are now in Full Menu Access mode.
4. You can access the Options menu and permanently change the Menu Access setting to Full. Otherwise, the device will return to Limited mode once you exit the menu screens or if one minute passes without pressing any device buttons.

To navigate through all of the menu screens and settings:

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

4.4 ACCESSING THE SETUP SCREEN

1. There are two ways to access the Setup screen:
   - Select *Menu* from the Standby screen.
   - Perform the Provider Menu Access Key Sequence from the Standby screen.

2. You can access the device and therapy settings from this screen. The menu options vary based on your device setup. A sample screen is shown in Figure 4-4.

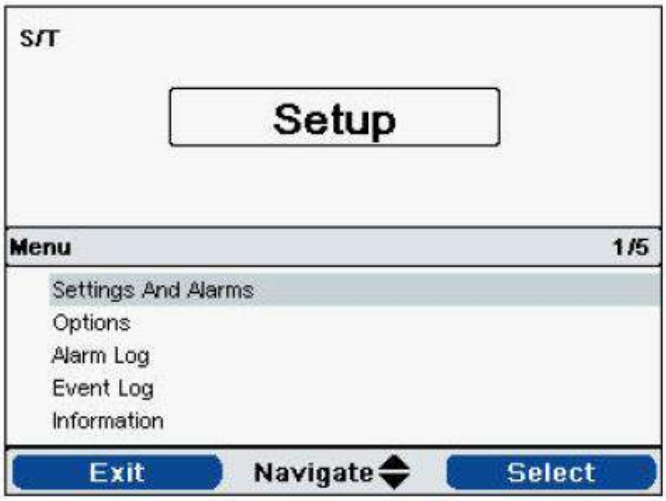

FIGURE 4-4: ACCESSING THE SETUP SCREEN

4.5 ACCESSING THE MONITOR SCREEN

The Monitor screen appears after you press the Therapy key on the Standby screen. There are two versions of this screen: Simple View and Detailed View. Samples of both screens are shown in Figure 4-5.

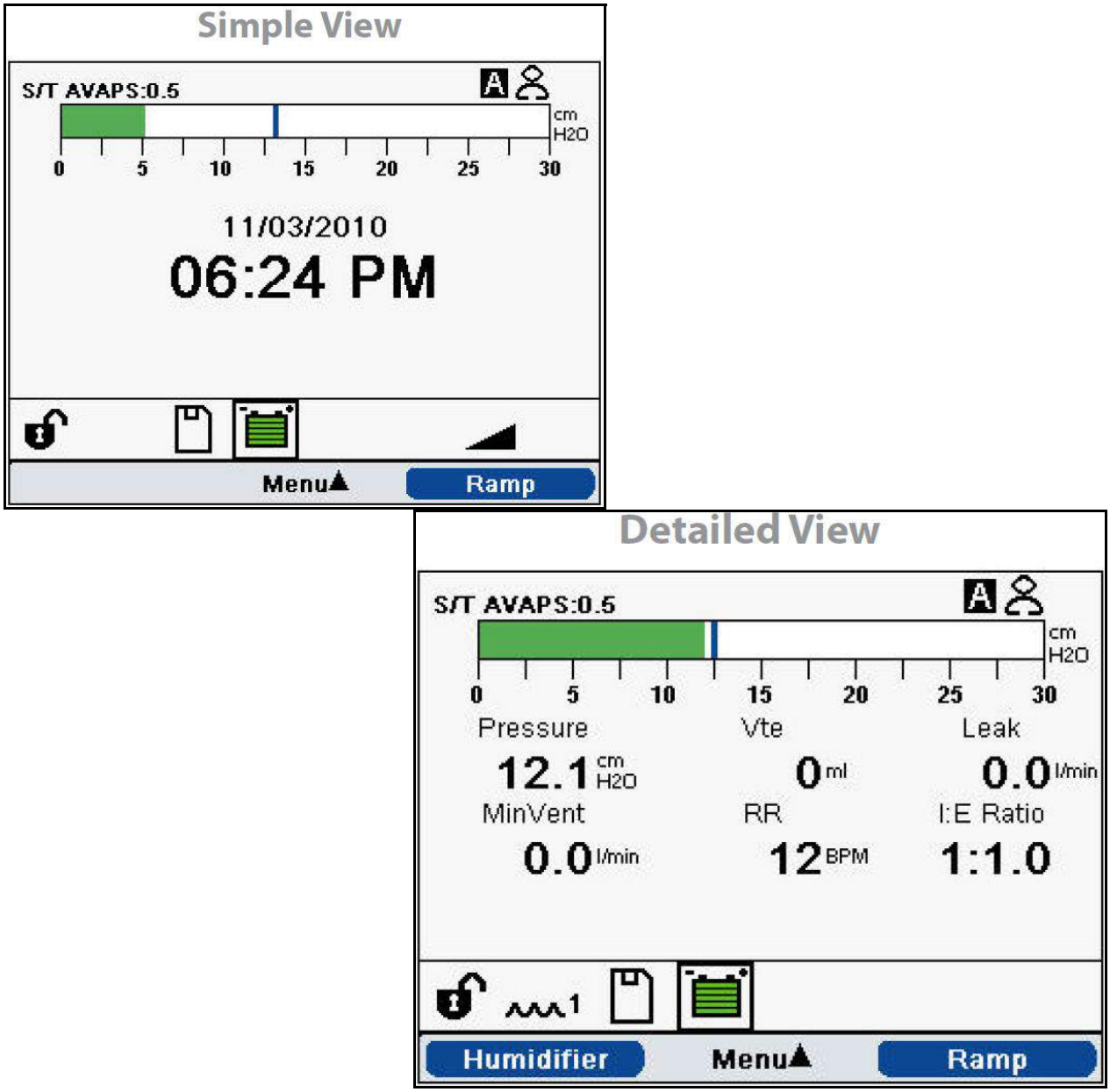

FIGURE 4-5: MONITOR SCREEN

The Monitor screen is divided into several panels, the Monitor panel, Date and Time panel, Patient Accessory panel (if attached), and the Status panel.

In Simple View, the Monitor screen displays the following:

1. Monitor Panel
   a. Therapy mode
   b. Flex or AVAPS (if enabled), display next to the therapy mode, along with the value setting

c. Patient breath indicator displays below the therapy mode
d. Peak pressure symbol appears on the graph according to the maximum Patient Pressure reached during each breath
e. A bar graph displays the current pressure level
f. If enabled, alarm status indicators for Audio Pause, Apnea, and Circuit Disconnect display in the upper right corner

2. The Date/Time panel shows the current date and time.
3. The Patient Accessory panel displays when an accessory is connected to the device. See the Accessories chapter for more information.
4. The Status panel displays certain symbols that indicate features being used, such as Ramp, as well as battery status.

In Detailed View, the same information is shown, except instead of displaying the Date and Time panel, the screen displays the following measured parameters:

- Patient Pressure
- Exhaled Tidal Volume
- Leak
- Minute Ventilation
- Respiratory Rate
- I:E Ratio

4.6 CHANGING DEVICE SETTINGS AND ALARMS

1. From the Main Menu screen, use the Up/Down key to highlight the Settings and Alarms item.
2. Press the Right key to select Settings and Alarms.

4.6.1 BiPAP A30 DEVICE SETTINGS

The BiPAP A30 device settings are listed below, along with the therapy modes in which they are available.

	THERAPY MODES					
THERAPY SETTING	**CPAP**	**S**	**S/T**	**T**	**PC**	**AVAPS -AE**
Mode	*X*	*X*	*X*	*X*	*X*	
AVAPS[3]		*X*[3]	*X*	*X*	*X*	
AVAPS Rate[1]		*X*[1]	*X*[1]	*X*[1]	*X*[1]	
Flex Lock[4]		*X*[4]				
Flex[4]		*X*[4]				
Tidal Volume[1]		*X*[1]	*X*[1]	*X*[1]	*X*[1]	
IPAP		*X*	*X*	*X*	*X*	
IPAP Max Pressure[1]		*X*[1]	*X*[1]	*X*[1]	*X*[1]	

	THERAPY MODES					
THERAPY SETTING	**CPAP**	**S**	**S/T**	**T**	**PC**	**AVAPS -AE**
IPAP Min Pressure[1]		*X*[1]	*X*[1]	*X*[1]	*X*[1]	
EPAP		*X*	*X*	*X*	*X*	
CPAP	*X*					
Breath Rate			*X*	*X*	*X*	
Inspiratory Time			*X*	*X*	*X*	
Maximum Pressure						*X*
Pressure Support Max						*X*
Pressure Support Min						*X*
EPAP Max Pressure						*X*
EPAP Min Pressure						*X*
Rise Time Lock[2]		*X*	*X*	*X*	*X*[2]	
Rise Time[2] [3]		*X*[3]	*X*	*X*	*X*[2]	
Ramp Length	*X*	*X*	*X*	*X*	*X*	
Ramp Start Pressure	*X*	*X*	*X*	*X*	*X*	
System One Humidification	*X*	*X*	*X*	*X*	*X*	
Humidifier	*X*	*X*	*X*	*X*	*X*	
Tubing Type Lock	*X*	*X*	*X*	*X*	*X*	
Tubing Type	*X*	*X*	*X*	*X*	*X*	
System One Resistance Lock	*X*	*X*	*X*	*X*	*X*	
System One Resistance	*X*	*X*	*X*	*X*	*X*	
Circuit Disconnect Alarm	*X*	*X*	*X*	*X*	*X*	
Apnea Alarm	*X*	*X*	*X*	*X*	*X*	
Low Tidal Volume Alarm[1]		*X*[1]	*X*[1]	*X*[1]	*X*[1]	
Low Minute Ventilation Alarm	*X*	*X*	*X*	*X*	*X*	
High Respiratory Rate Alarm	*X*	*X*	*X*	*X*	*X*	

	THERAPY MODES					
THERAPY SETTING	CPAP	S	S/T	T	PC	AVAPS -AE
1. Only available when AVAPS is enabled. 2. Not available when AVAPS is enabled. 3. Not available when Flex is enabled. 4. Flex is not available when AVAPS is enabled.						

NOTE

For additional information about the device's alarms, refer to the device's User Manual.

4.6.2 BiPAP A40 Device Settings

	THERAPY MODES					
THERAPY SETTING	CPAP	S	S/T	T	PC	AVAPS-AE
Trigger Type	X	X	X		X	X
Auto-Trak	X	X	X		X	X
Auto-Trak (Sensitive)	X	X	X		X	X
Flow Trigger	X	X	X		X	X
Flow Trigger Sensitivity	X	X	X		X	X
Flow Cycle Sensitivity	X	X	X			X
CPAP	X					
Flex Lock		X[3]				
Flex		X[3]				
AVAPS		X[2]	X	X	X	
AVAPS Rate		X[1]	X[1]	X[1]	X[1]	X
Tidal Volume		X[1]	X[1]	X[1]	X[1]	X
IPAP Max Pressure		X[1]	X[1]	X[1]	X[1]	
IPAP Min Pressure		X[1]	X[1]	X[1]	X[1]	
IPAP		X	X	X	X	

	THERAPY MODES					
THERAPY SETTING	**CPAP**	**S**	**S/T**	**T**	**PC**	**AVAPS-AE**
EPAP		*X*	*X*	*X*	*X*	
Breath Rate			*X*	*X*	*X*	*X*
Inspiratory Time			*X*	*X*	*X*	*X*[4]
Maximum Pressure						*X*
Pressure Support Max						*X*
Pressure Support Min						*X*
EPAP Max Pressure						*X*
EPAP Min Pressure						*X*
Rise Time Lock		*X*	*X*	*X*	*X*	*X*
Rise Time		*X*[2]	*X*	*X*	*X*	*X*
Ramp Start Pressure	*X*	*X*	*X*	*X*	*X*	
Low Tidal Volume		*X*[1]	*X*[1]	*X*[1]	*X*[1]	*X*

1. *Only available when AVAPS is enabled.*
2. *AVAPS and Rise Time are not available when FLEX is enabled.*
3. *Flex is not available when AVAPS is enabled.*
4. *Inspiratory time is only available in AVAPS-AE when the breath rate is set between 1 and 40 BPM.*

NOTE

For additional information about the device's alarms, refer to the device's User Manual.

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CHAPTER 5: TROUBLESHOOTING AND ERROR CODES

5.0 INTRODUCTION

This section provides instructions for viewing the devices' error log as well as a description of the error codes.

Install the *ANIV Toolbox* first to the default location. If you choose not to install to the default location, record the location of the installation directory. You will need the installation directory in the second part of ANIV Toolbox installation (LogDogg installation).

5.1 INSTALLING THE ANIV TOOLBOX SOFTWARE

The ANIV Toolbox will provide you with the necessary tools to view the device's error/event log. To download the software you must log onto my.respironics.com

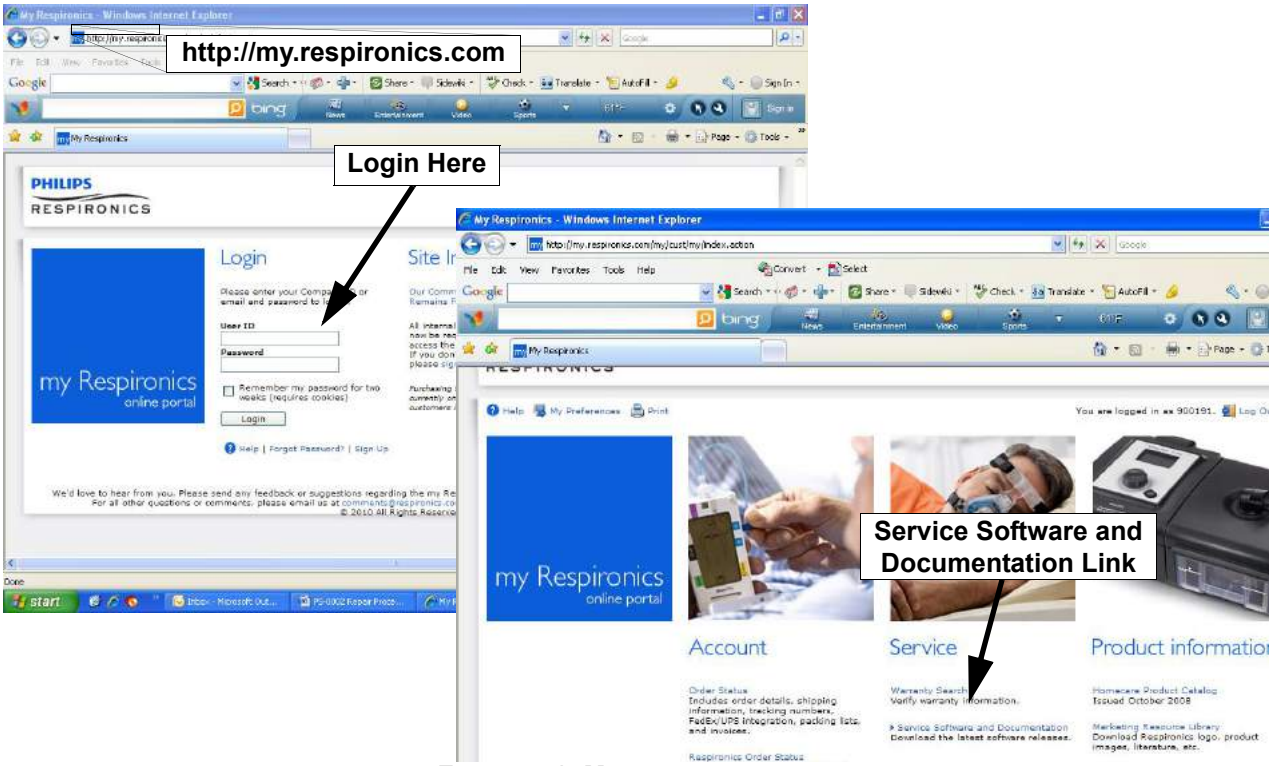


FIGURE 5-1: MY.RESPIRONICS.COM

Once you have opened the Service and Software Documentation page, click on the BiPAP A30/A40 Original Series or BiPAP A30/A40 Silver Series (depending on the device) link on the left side of the page. Click on the *Download* button adjacent to the software you wish to install and follow the on-screen prompts to install the software.

FIGURE 5-2: BIPAP A30/A40 SERVICE SOFTWARE LINK

5.1.1 ANIV TOOLBOX INSTALLATION PROCESS

1. Click on the Download button adjacent to the *ANIV Toolbox*.
2. Save the ANIV Toolbox Installer to your PC (default directory is recommended).

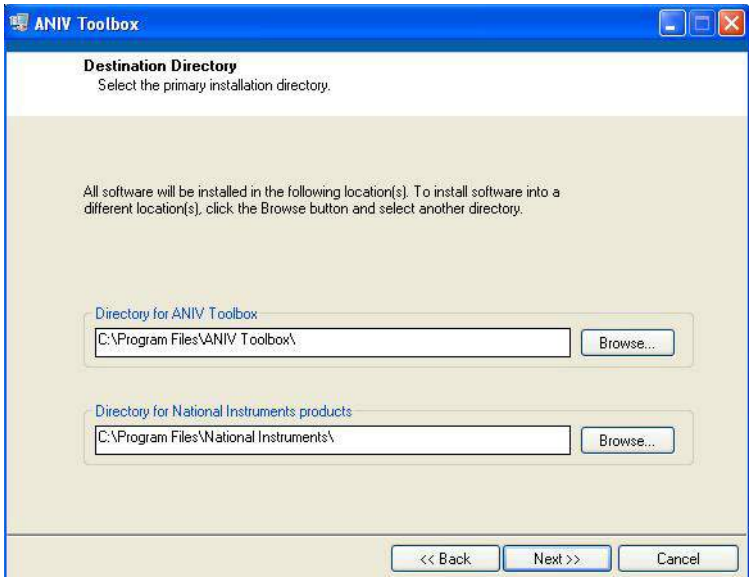


FIGURE 5-3: INSTALLATION LOCATION

FIGURE 5-4: LICENSE AGREEMENT (TWO LICENSE AGREEMENT WINDOWS WILL APPEAR)

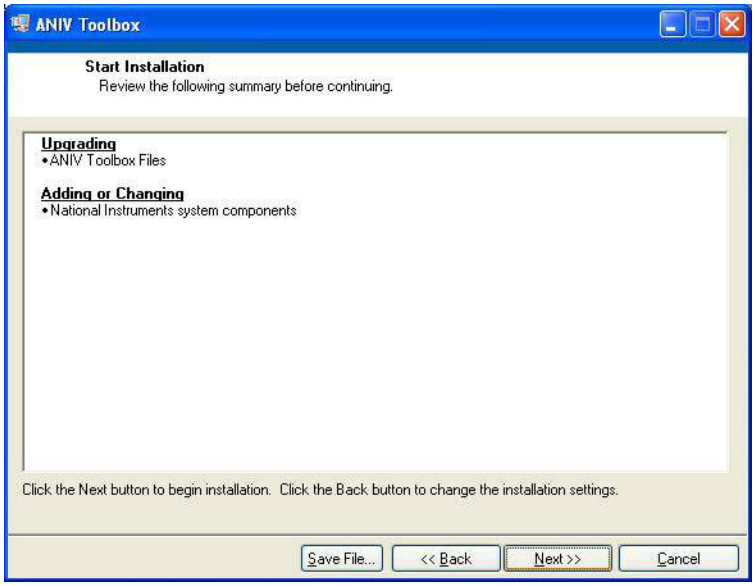


FIGURE 5-5: START INSTALLATION

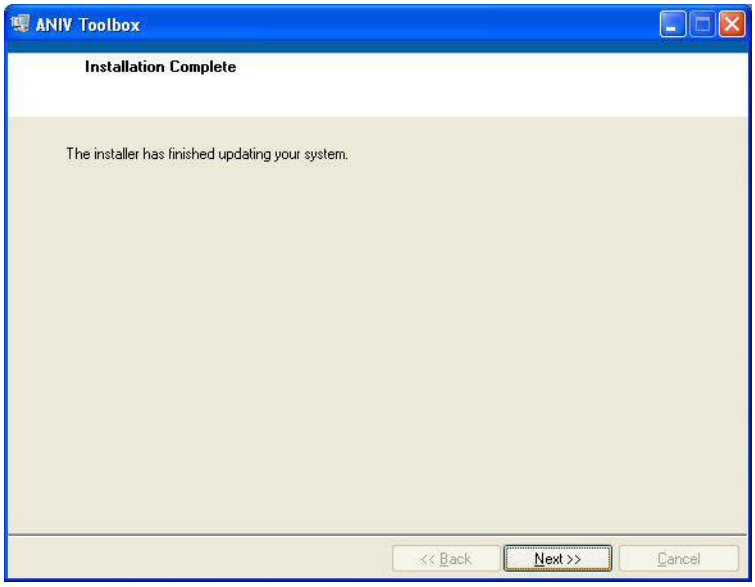


FIGURE 5-6: INSTALLATION COMPLETE

3. After you have installed the ANIV Toolbox, the LogDogg installer will begin automatically. Select the same directory that you installed the ANIV Toolbox when the following appears:

FIGURE 5-7: LOGDOGG INSTALL

If you selected the default location during ANIV Toolbox software installation, the LogDogg installation location should be as follows:

- For 32 Bit OS - C:\Program Files\ANIV Toolbox
- For 64 Bit OS - C:\Program Files (x86)\ANIV Toolbox

NOTE

To determine whether you have a 32 bit or 64 bit system, refer to section 32 Bit vs. 64 Bit OS Verification

Once you have installed the ANIV Toolbox, you will be prompted to restart the PC. Restart the PC prior to using the ANIV Toolbox.

NOTE

If installed on a Windows 7 OS, go to section Section 8.5.3 prior to using the ANIV Toolbox. If the application is not installed on a PC using Windows 7 OS, disregard this note.

5.2 READING THE DEVICE'S EVENT (ERROR) LOG

1. Install a blank SD Card in the device.
2. Press the Start/Stop button once.

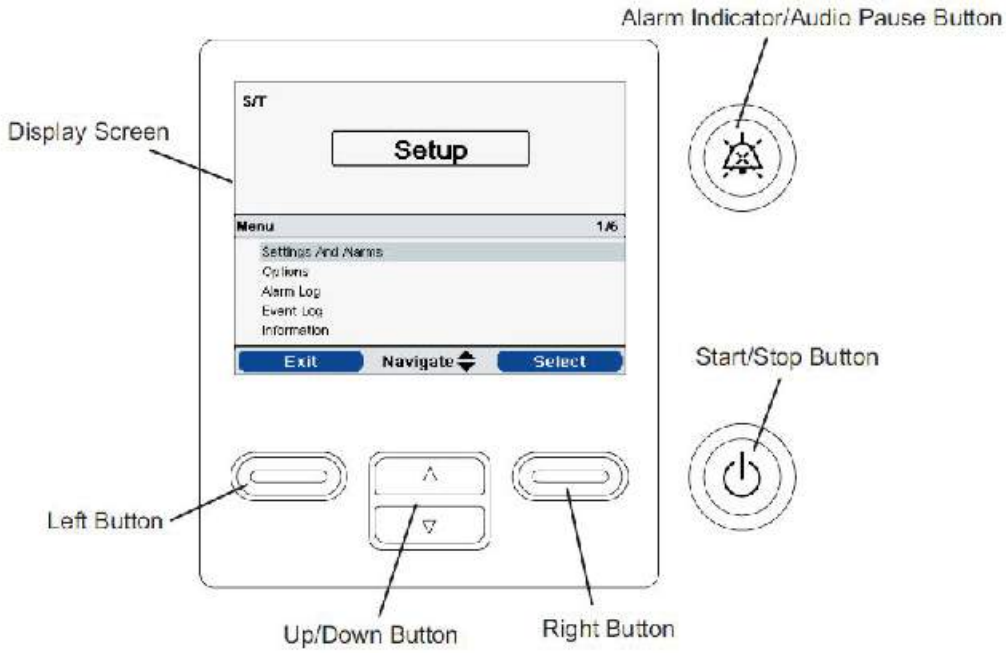


FIGURE 5-8: CONTROL PANEL

3. Simultaneously press and hold the Down, Right, and Alarm Indicator/Audio Pause buttons to access all settings.
4. Use the Down button to scroll to *Write Event Log to SD Card*.
5. Click on the Right User Button below *Select* on the LCD.
6. Wait for the *Writing Successful* message on the LCD.
7. Click on the User button below "OK".
8. Scroll to the "Safely Remove SD Card" option then select "OK".
9. Remove the SD card from the device and insert it into the PC.

10. Select Read Event Log from the *ANIV Toolbox* Software.

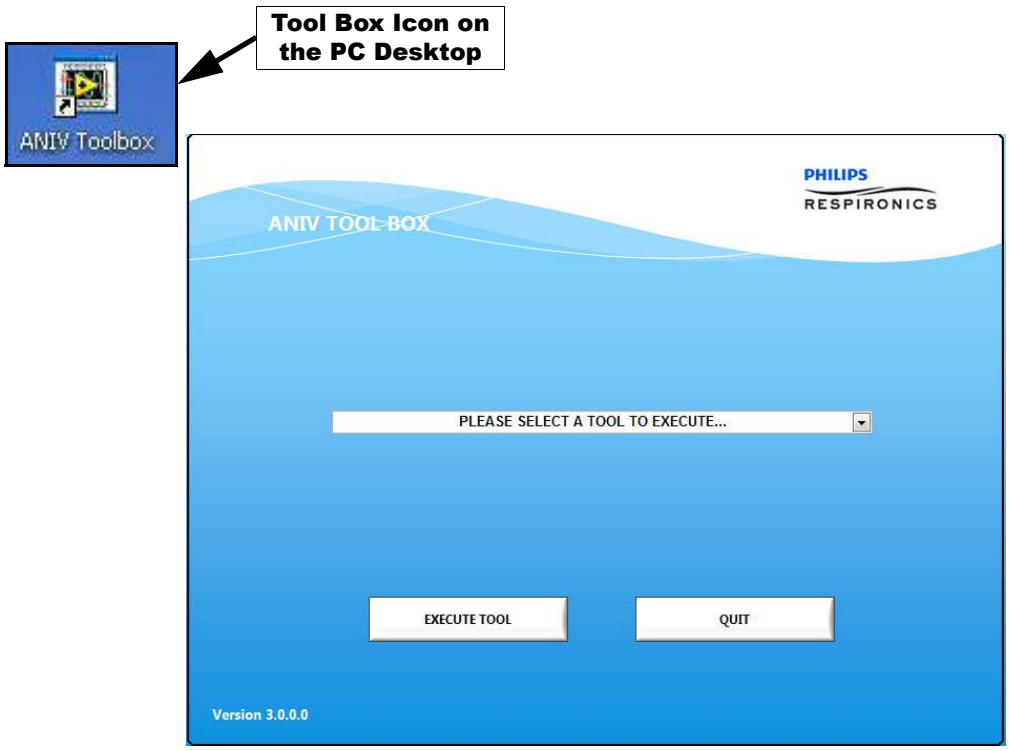


FIGURE 5-9: ANIV TOOLBOX

11. When the following screen appears, click on the *Browse* button.

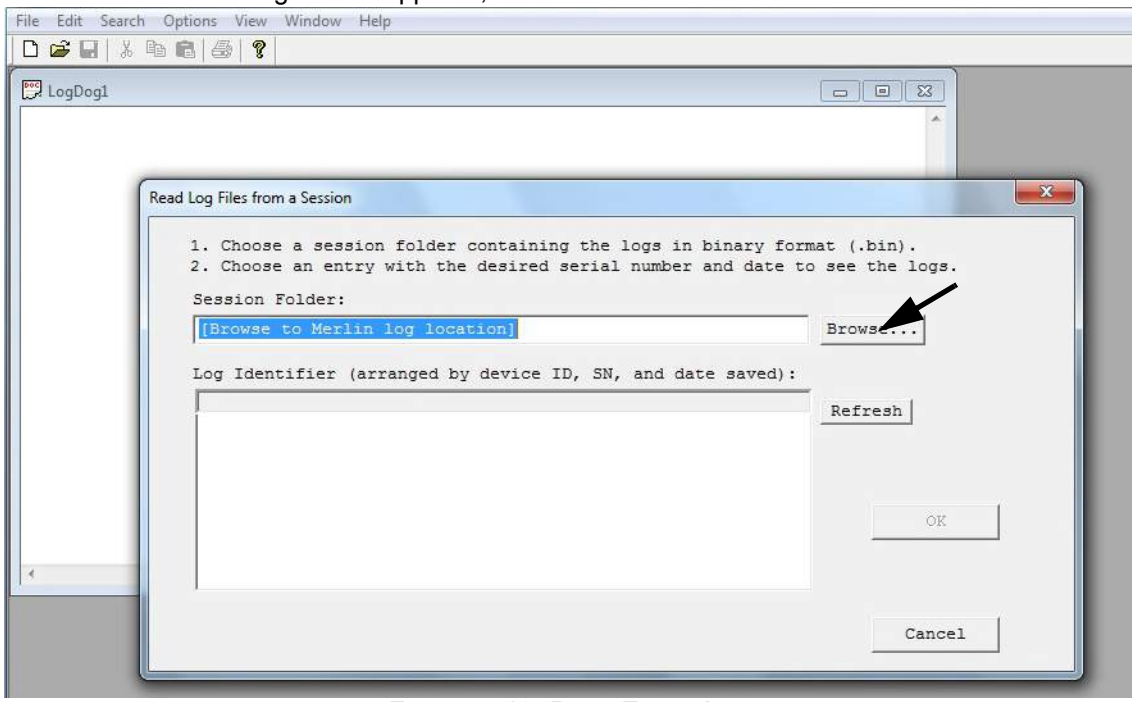


FIGURE 5-10: READ EVENT LOG

12. Navigate to the SD Card drive and select the *BiPAP-A* folder.

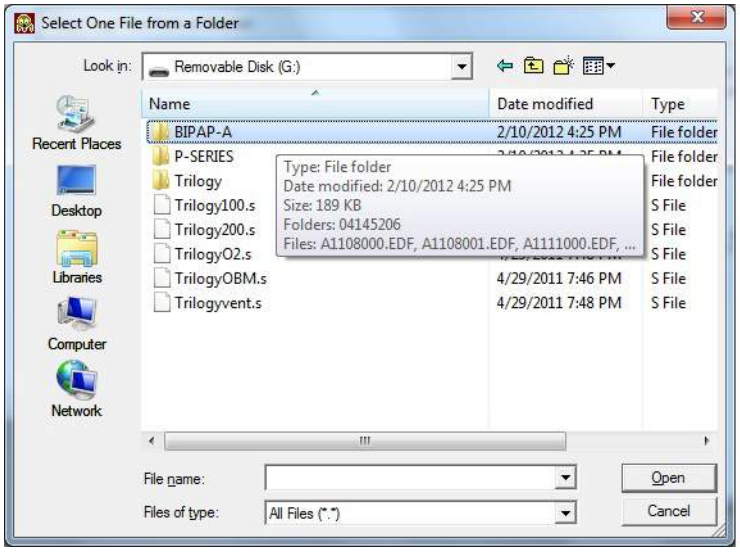


FIGURE 5-11: READ EVENT LOG

13. Select the folder that corresponds with the serial number of the device. Only the first eight (8) **numbers** that follow the letter prefix will be present.
14. Select the .N17 file.

NOTE

If more than one.N17 file is present, you did not insert a blank SD card in step 1 of this procedure. Insert a blank SD card into the device and repeat steps 2 through 12.

15. Click on the log file as shown in the following illustration, then click on the “OK” button.

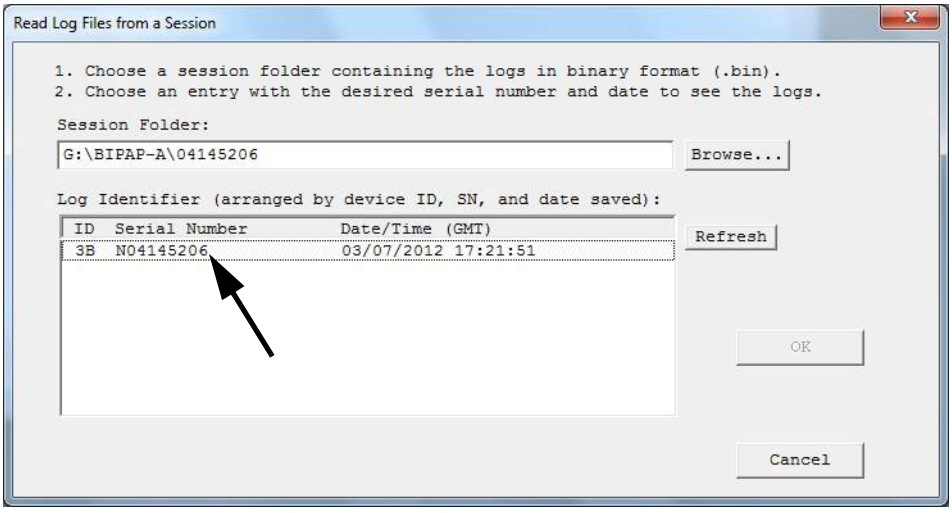
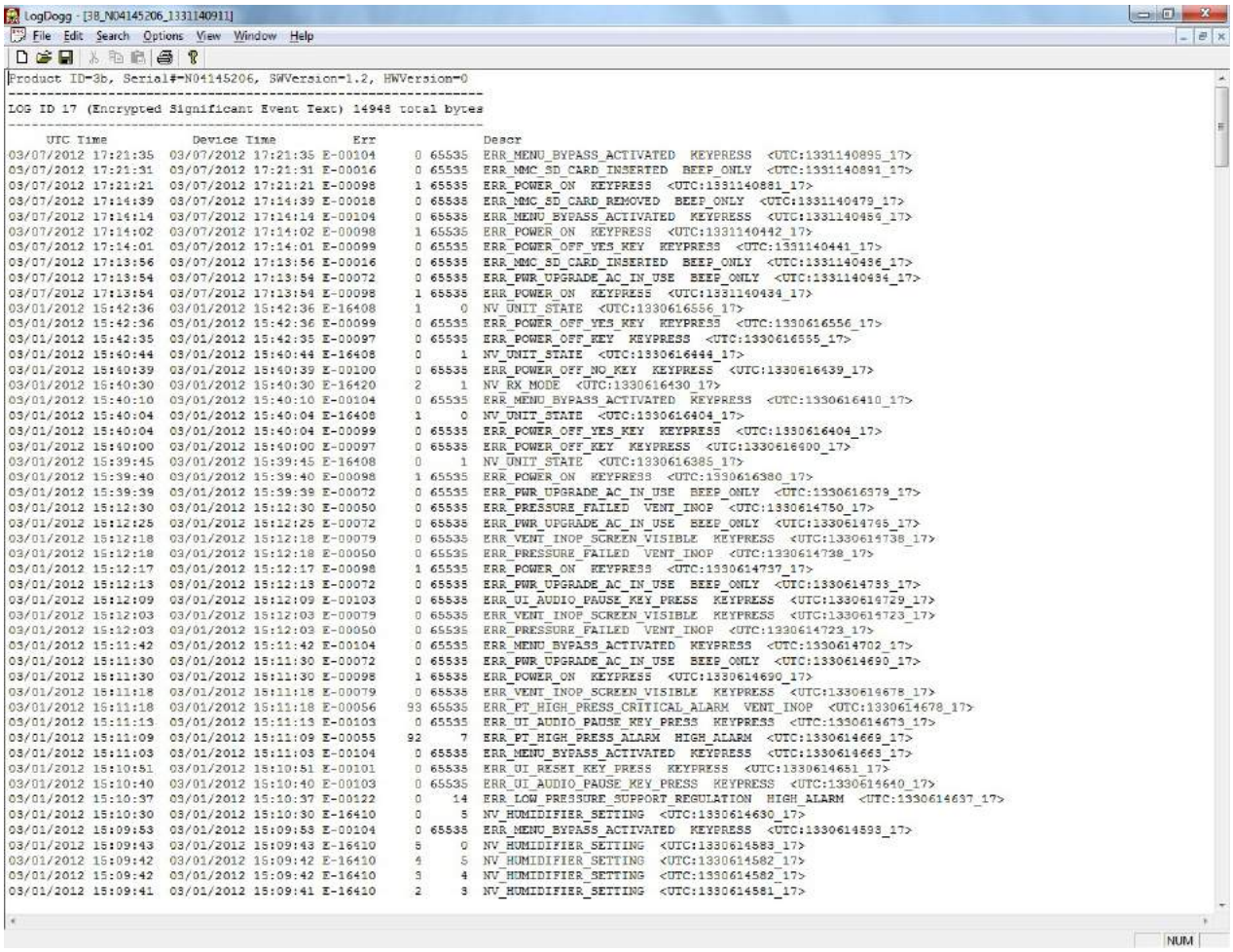


FIGURE 5-12: READ EVENT LOG

16. The Event Log will be displayed as follows:



LogDogg - [38_N04145206_1331140911]

File Edit Search Options View Window Help

```
Product ID=3b, Serial#=N04145206, SWVersion=1.2, HWVersion=0
-----------------------------------------------------------------
LOG ID 17 (Encrypted Significant Event Text) 14948 total bytes
-----------------------------------------------------------------
     UTC Time           Device Time          Err              Descr
03/07/2012 17:21:35  03/07/2012 17:21:35 E-00104     0 65535  ERR_MENU_BYPASS_ACTIVATED  KEYPRESS  <UTC:1331140895_17>
03/07/2012 17:21:31  03/07/2012 17:21:31 E-00016     0 65535  ERR_MMC_SD_CARD_INSERTED  BEEP_ONLY  <UTC:1331140891_17>
03/07/2012 17:21:21  03/07/2012 17:21:21 E-00098     1 65535  ERR_POWER_ON  KEYPRESS  <UTC:1331140881_17>
03/07/2012 17:14:39  03/07/2012 17:14:39 E-00018     0 65535  ERR_MMC_SD_CARD_REMOVED  BEEP_ONLY  <UTC:1331140479_17>
03/07/2012 17:14:14  03/07/2012 17:14:14 E-00104     0 65535  ERR_MENU_BYPASS_ACTIVATED  KEYPRESS  <UTC:1331140454_17>
03/07/2012 17:14:02  03/07/2012 17:14:02 E-00098     1 65535  ERR_POWER_ON  KEYPRESS  <UTC:1331140442_17>
03/07/2012 17:14:01  03/07/2012 17:14:01 E-00099     0 65535  ERR_POWER_OFF_YES_KEY  KEYPRESS  <UTC:1331140441_17>
03/07/2012 17:13:56  03/07/2012 17:13:56 E-00016     0 65535  ERR_MMC_SD_CARD_INSERTED  BEEP_ONLY  <UTC:1331140436_17>
03/07/2012 17:13:54  03/07/2012 17:13:54 E-00072     0 65535  ERR_PWR_UPGRADE_AC_IN_USE  BEEP_ONLY  <UTC:1331140434_17>
03/07/2012 17:13:54  03/07/2012 17:13:54 E-00098     1 65535  ERR_POWER_ON  KEYPRESS  <UTC:1331140434_17>
03/01/2012 15:42:36  03/01/2012 15:42:36 E-16408     1     0  NV_UNIT_STATE  <UTC:1330616556_17>
03/01/2012 15:42:36  03/01/2012 15:42:36 E-00099     0 65535  ERR_POWER_OFF_YES_KEY  KEYPRESS  <UTC:1330616556_17>
03/01/2012 15:42:35  03/01/2012 15:42:35 E-00097     0 65535  ERR_POWER_OFF_KEY  KEYPRESS  <UTC:1330616555_17>
03/01/2012 15:40:44  03/01/2012 15:40:44 E-16408     0     1  NV_UNIT_STATE  <UTC:1330616444_17>
03/01/2012 15:40:39  03/01/2012 15:40:39 E-00100     0 65535  ERR_POWER_OFF_NO_KEY  KEYPRESS  <UTC:1330616439_17>
03/01/2012 15:40:30  03/01/2012 15:40:30 E-16420     2     1  NV_RX_MODE  <UTC:1330616430_17>
03/01/2012 15:40:10  03/01/2012 15:40:10 E-00104     0 65535  ERR_MENU_BYPASS_ACTIVATED  KEYPRESS  <UTC:1330616410_17>
03/01/2012 15:40:04  03/01/2012 15:40:04 E-16408     1     0  NV_UNIT_STATE  <UTC:1330616404_17>
03/01/2012 15:40:04  03/01/2012 15:40:04 E-00099     0 65535  ERR_POWER_OFF_YES_KEY  KEYPRESS  <UTC:1330616404_17>
03/01/2012 15:40:00  03/01/2012 15:40:00 E-00097     0 65535  ERR_POWER_OFF_KEY  KEYPRESS  <UTC:1330616400_17>
03/01/2012 15:39:45  03/01/2012 15:39:45 E-16408     0     1  NV_UNIT_STATE  <UTC:1330616385_17>
03/01/2012 15:39:40  03/01/2012 15:39:40 E-00098     1 65535  ERR_POWER_ON  KEYPRESS  <UTC:1330616380_17>
03/01/2012 15:39:39  03/01/2012 15:39:39 E-00072     0 65535  ERR_PWR_UPGRADE_AC_IN_USE  BEEP_ONLY  <UTC:1330616379_17>
03/01/2012 15:12:30  03/01/2012 15:12:30 E-00050     0 65535  ERR_PRESSURE_FAILED  VENT_INOP  <UTC:1330614750_17>
03/01/2012 15:12:25  03/01/2012 15:12:25 E-00072     0 65535  ERR_PWR_UPGRADE_AC_IN_USE  BEEP_ONLY  <UTC:1330614745_17>
03/01/2012 15:12:18  03/01/2012 15:12:18 E-00079     0 65535  ERR_VENT_INOP_SCREEN_VISIBLE  KEYPRESS  <UTC:1330614738_17>
03/01/2012 15:12:18  03/01/2012 15:12:18 E-00050     0 65535  ERR_PRESSURE_FAILED  VENT_INOP  <UTC:1330614738_17>
03/01/2012 15:12:17  03/01/2012 15:12:17 E-00098     1 65535  ERR_POWER_ON  KEYPRESS  <UTC:1330614737_17>
03/01/2012 15:12:13  03/01/2012 15:12:13 E-00072     0 65535  ERR_PWR_UPGRADE_AC_IN_USE  BEEP_ONLY  <UTC:1330614733_17>
03/01/2012 15:12:09  03/01/2012 15:12:09 E-00103     0 65535  ERR_UI_AUDIO_PAUSE_KEY_PRESS  KEYPRESS  <UTC:1330614729_17>
03/01/2012 15:12:03  03/01/2012 15:12:03 E-00079     0 65535  ERR_VENT_INOP_SCREEN_VISIBLE  KEYPRESS  <UTC:1330614723_17>
03/01/2012 15:12:03  03/01/2012 15:12:03 E-00050     0 65535  ERR_PRESSURE_FAILED  VENT_INOP  <UTC:1330614723_17>
03/01/2012 15:11:42  03/01/2012 15:11:42 E-00104     0 65535  ERR_MENU_BYPASS_ACTIVATED  KEYPRESS  <UTC:1330614702_17>
03/01/2012 15:11:30  03/01/2012 15:11:30 E-00072     0 65535  ERR_PWR_UPGRADE_AC_IN_USE  BEEP_ONLY  <UTC:1330614690_17>
03/01/2012 15:11:30  03/01/2012 15:11:30 E-00098     1 65535  ERR_POWER_ON  KEYPRESS  <UTC:1330614690_17>
03/01/2012 15:11:18  03/01/2012 15:11:18 E-00079     0 65535  ERR_VENT_INOP_SCREEN_VISIBLE  KEYPRESS  <UTC:1330614678_17>
03/01/2012 15:11:18  03/01/2012 15:11:18 E-00056    93 65535  ERR_PT_HIGH_PRESS_CRITICAL_ALARM  VENT_INOP  <UTC:1330614678_17>
03/01/2012 15:11:13  03/01/2012 15:11:13 E-00103     0 65535  ERR_UI_AUDIO_PAUSE_KEY_PRESS  KEYPRESS  <UTC:1330614673_17>
03/01/2012 15:11:09  03/01/2012 15:11:09 E-00055    92     7  ERR_PT_HIGH_PRESS_ALARM  HIGH_ALARM  <UTC:1330614669_17>
03/01/2012 15:11:03  03/01/2012 15:11:03 E-00104     0 65535  ERR_MENU_BYPASS_ACTIVATED  KEYPRESS  <UTC:1330614663_17>
03/01/2012 15:10:51  03/01/2012 15:10:51 E-00101     0 65535  ERR_UI_RESET_KEY_PRESS  KEYPRESS  <UTC:1330614651_17>
03/01/2012 15:10:40  03/01/2012 15:10:40 E-00103     0 65535  ERR_UI_AUDIO_PAUSE_KEY_PRESS  KEYPRESS  <UTC:1330614640_17>
03/01/2012 15:10:37  03/01/2012 15:10:37 E-00122     0    14  ERR_LOW_PRESSURE_SUPPORT_REGULATION  HIGH_ALARM  <UTC:1330614637_17>
03/01/2012 15:10:30  03/01/2012 15:10:30 E-16410     0     5  NV_HUMIDIFIER_SETTING  <UTC:1330614630_17>
03/01/2012 15:09:53  03/01/2012 15:09:53 E-00104     0 65535  ERR_MENU_BYPASS_ACTIVATED  KEYPRESS  <UTC:1330614593_17>
03/01/2012 15:09:43  03/01/2012 15:09:43 E-16410     5     0  NV_HUMIDIFIER_SETTING  <UTC:1330614583_17>
03/01/2012 15:09:42  03/01/2012 15:09:42 E-16410     4     5  NV_HUMIDIFIER_SETTING  <UTC:1330614582_17>
03/01/2012 15:09:42  03/01/2012 15:09:42 E-16410     3     4  NV_HUMIDIFIER_SETTING  <UTC:1330614582_17>
03/01/2012 15:09:41  03/01/2012 15:09:41 E-16410     2     3  NV_HUMIDIFIER_SETTING  <UTC:1330614581_17>
```

NUM

FIGURE 5-13: EVENT LOG

17. Analyze the extracted error log file for events that caused device issues.

5.3 BiPAP A40 INITIAL BASE UNIT, BATTERY MODULE, OR DETACHABLE BATTERY DIAGNOSIS

This section describes the steps to take to determine if a suspected fault resides within the Base Unit, Battery Module, or Detachable Battery.

DEVICE ACTION	POSSIBLE CAUSE	CORRECTIVE ACTION
No Display Audible Alarm Sounding	1. Did battery deplete? Were there any low battery alarms before the device stopped working ? 2. Was battery removed from the battery module? 3. Was battery module disconnected from the ventilator? 4. It's possible that the battery stopped discharging due to battery overheating.1.Connect AC and if "Batt Discharge Stopped – Temp" info alarm is displayed, then allow battery to cool before using it. 5. It's possible that the battery failed. 6. Connect AC. If battery icon is displayed, and unit does not operate on battery when AC is disconnected and there are no messages displayed, then replace battery. If battery was replaced, and unit still does not operate on battery, then replace battery module. If battery and battery module was replaced, and unit still does not operate on battery, then replace unit. 7. Connect AC. If no battery icon is displayed, then proceed to next device action.	1. Connect AC and recharge battery 2. Reconnect Battery. 3. Reconnect Battery Module. 4. Connect AC and if "Batt Discharge Stopped – Temp" info alarm is displayed, then allow battery to cool before using it. 5. Connect AC and if "Replace Detachable Battery" medium priority (yellow) alarm is displayed, then replace battery. 6. Device requires service. 7. Proceed to next device action row.
Device running on AC Power and no Battery Icon on the display	1. Is "Det Batt is connected" information message displayed? 2. Is battery module connected and battery installed in battery module?	1. Reconnect battery module and/or reconnect battery 2. a) No - connect battery module and install battery. b) Yes - Replace battery. If battery icon still not displayed, then replace battery module. If battery icon still not displayed, then replace unit. c) If no messages, then replace battery. If battery icon still not displayed, then replace battery module. If battery icon still not displayed, then replace unit.

DEVICE ACTION	POSSIBLE CAUSE	CORRECTIVE ACTION
Device running on AC Power and the Detachable battery icon is red empty	1. Is charge icon displayed	1. a) Yes - normal operation so allow battery to charge b) No - if “Replace Detachable Battery” medium priority (yellow) alarm displayed, then replace Detachable battery. If “Replace Detachable Battery” is still displayed, then replace battery module. If “Replace Detachable Battery” is still displayed, then replace unit.

DEVICE ACTION	POSSIBLE CAUSE	CORRECTIVE ACTION
Battery icon does not have 5 green bars and there is no charging icon	1. Is AC Connected? 2. Is the "Battery Not Charging - Temp" message displayed? 3. Is the "Detach Battery Not Charging" message displayed?	1. No - connect AC. 2. a) The battery won't charge because it is too hot, so allow the battery to cool. b) If battery is cool and still not charging then replace the battery. If battery is still not charging, then replace the battery module. If the battery is still not charging, then return device for service. 3. a) If the humidifier is connected, then it's possible that the humidifier is hearing up and not allowing the battery to charge. After the humidifier has reached operating temperature, then the battery should start charging. If the battery is still not charging, then disconnect the humidifier and check if the battery is charging. If the battery is still not charging then replace the battery. If battery is still not charging, then replace the battery module. If the battery is still not charging, then return the device for service. b) Disconnect and reconnect the battery and battery module. If the battery is still not charging then replace the battery. If the battery is still not charging, then replace the battery module. If the battery is still not charging, then return the device for service.

DEVICE ACTION	POSSIBLE CAUSE	CORRECTIVE ACTION
"Replace Detachable Battery" information on the screen	1. Is the battery a Philips/Respironics Battery? 2. It's possible that the battery is past its life cycle. Check the last line of the information menu. Is the "Detach Battery Cycles" is greater than or qual to 500? 3. It's possible that the battery is past its useful life or there is a problem with the battery, battery module, or unit.	1. No - Replace the battery. 2. Yes - Replace the battery. 3. Replace the battery and if "Replace Detachable Battery" is still displayed then replace the battery module. If 'Replace Detachable Battery" is still displayed then return the device for service.
Battery Icon has had the lightning bolt for a long time but the number of green bars is not increasing	*No messages are displayed.*	*Replace the Battery*
Low Battery alarm sounds quicker than expected	*Operating time can decrease as the battery ages.*	*Replace the Battery*
Depleted Battery Alarm sounds quicker than expected	*Operating time can decrease as the battery ages.*	*Replace the Battery*
Device shuts down while running on battery a lot quicker than expected	*Operating time can decrease as the battery ages.*	*Replace the Battery*

5.4 DEVICE FIRMWARE ERROR CODES

The following table lists the error codes for the Philips Respironics A Series devices.

NOTE

With the exception of error code #65535, error codes greater than 10,000 are parameter change event codes and are for informational purposes only. These codes are not included in the error code table below.
Unless noted in the CODE column, all error codes are universal between A30/A40 Original Series and Silver Series.

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-0	*Program execution error*	*None (Log Only)*	*N/A*
E-1	*Program execution error*	*System Reboots*	*N/A*
E-2	*Corrupt software in flash*	*System Reboots*	• *Reinstall software* • *Replace PCA*
E-3	*Defective RAM chip*	*System Reboots*	*Replace PCA*
E-4	*Defective internal CPU SRAM*	*System Reboots*	*Replace PCA*
E-5	*Program Execution Error*	*System Reboots*	*N/A*
E-6	*IRQ stack is 75% filled*	*None (Log Only)*	*N/A*
E-7	*Program Execution Error*	*System Reboots*	*N/A*
E-8	*Thread stack is 75% filled*	*None (Log Only)*	*N/A*
E-9	*Program Execution Error*	*System Reboots*	• *Reinstall software* • *Replace PCA*
E-10	*Program Execution Error*	*System Reboots*	• *Reinstall software* • *Replace PCA*
E-11	*Program Execution Error*	*System Reboots*	• *Reinstall software* • *Replace PCA*
E-12	*Program Execution Error*	*System Reboots*	• *Reinstall software* • *Replace PCA*
E-13	*Program Execution Error*	*System Reboots*	• *Reinstall software* • *Replace PCA*
E-14	*Program Execution Error*	*System Reboots*	• *Reinstall software* • *Replace PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-15	• Parameter Settings corrupted • EEPROM Memory on PCA was just replaced	Ventilator Inoperative	Replace PCA
E-16	SD Card was inserted into the unit.	None (Log Only)	None – recorded for informational purposes to indicate that the SD card was placed into unit.
E-17	• Parameter Settings corrupted. • EEPROM on PCA was just replaced.	Ventilator Inoperative	Replace PCA
E-18	SD Card was removed from the unit.	None (Log Only)	None – recorded for informational purposes to indicate that the SD card was removed from the unit.
E-19	Program Execution Error	System Reboots	N/A
E-20 (Original Series)	Defective EEPROM. (For released software 2.3 and below)	Ventilator Inoperative	Replace PCA
E-20 (Original Series)	Defective EEPROM. (For released software 2.6 and Above)	None (Log Only)	Replace PCA
E-20 (Silver Series)	Defective EEPROM.	Ventilator Inoperative	Replace PCA
E-21	• Defective EEPROM. • Program Execution Error.	Ventilator Inoperative	Replace PCA
E-22	Unable to read a valid time from the RTC chip	None (Log Only)	Replace PCA
E-23	The time read from the RTC does not match time on Host CPU	None (Log Only)	Replace PCA
E-24	Faulty SD card	"Card Error" Informational Alarm	Use a different SD Card
E-25	Program Execution Error – BIST thread taking too long to execute	System Reboots	N/A

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-26	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	*"Card Error" Informational Alarm*	• *Use correct MMC/ SD card* • *Reformat MMC/SD card* • *Re-insert card* • *Replace PCA*
E-27	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	*"Card Error" Informational Alarm*	• *Use correct MMC/ SD card* • *Reformat MMC/SD card* • *Re-insert card* • *Replace PCA*
E-28	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	*"Card Error" Informational Alarm*	• *Use correct MMC/ SD card* • *Reformat MMC/SD card* • *Re-insert card* • *Replace PCA*
E-29	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	*"Card Error" Informational Alarm*	• *Use correct MMC/ SD card* • *Reformat MMC/SD card* • *Re-insert card* • *Replace PCA*
E-30	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	*"Card Error" Informational Alarm*	• *Use correct MMC/ SD card* • *Reformat MMC/SD card* • *Re-insert card* • *Replace PCA*
E-31	• *Foreign object inserted in card slot* • *Unformatted card* • *Card prematurely removed*	*"Card Error" Informational Alarm*	• *Use correct MMC/ SD card* • *Reformat MMC/SD card* • *Re-insert card* • *Replace PCA*
E-32	*Queue for Debug Log is full*	*System Reboots*	*N/A*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-33	*Key is providing reading that it has been held down for 2 minutes*	*"Keypad Stuck" Low Priority Alarm*	• *Check the keypad for stuck keys* • *Replace PCA*
E-34	*Write failure for the Debug Log*	*None (Log Only)*	*Replace PCA*
E-35	*Program Execution Error*	*None (Log Only)*	• *Reinstall software* • *Replace PCA*
E-36	*Watchdog test failed to reset the board.*	*Ventilator Inoperative*	*Replace PCA*
E-37	• *Unit is not reaching the requested pressure setting; The Patient Pressure delivered is less than the target pressure – 5cm.* • *Low pressure sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	*"Pressure Regulation" High Priority Alarm*	• *Check Device and Circuit setup if patient circuit is available.* • *Check the tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*
E-38	• *The measured Breath Rate is greater than or equal to the alarm setting.* • *False triggering* • *Alarm/setting mismatch* • *Spontaneous breathing above the alarm*	*"High Respiratory Rate" High Priority Alarm*	• *Check Device and Circuit setup.* • *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 alarm settings against the therapy settings.* • *Check the tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-39	• *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)*	*"Low Minute Ventilation" High Priority Alarm*	• *Check the tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*
E-40	*A recoverable MMC/SD card error.*	*None (Log Only)*	*None – recorded for informational purposes that a recoverable card error occurred.*
E-41	• *The leak in the system is too small.* • *Wrong circuit* • *Blocked tubes* • *Sensor problems*	*"Low Circuit Leak" High Priority Alarm*	• *Check the circuit tubing for pinched or blocked tubes if patient circuit available.* • *Check the tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*
E-42	• *Spontaneous breathing has not been detected within the alarm time.* • *High leak*	*"Apnea" High Priority Alarm*	• *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 tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-43	• *High flow condition has been detected.* • *High leak* • *Flow sensor problem*	*"Circuit Disconnect" High Priority Alarm*	• *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 tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*
E-44	*SW rebooted since it was initiated by the user*	*System Reboots*	*None – recorded for informational purposes to indicate that a reboot occurred.*
E-45	*3 reboots occurred within 24 hours.*	*Ventilator Inoperative*	• *Short term - press the Start/Stop key followed by the Right key to reset the machine.* • *Examine error log for reasons for reboots. Proceed accordingly*
E-46	*CPU cannot communicate with the flow sensor using I2C bus.*	*Ventilator Inoperative*	*Replace PCA*
E-47	*CPU cannot communicate with the pressure sensor using SPI bus.*	*Ventilator Inoperative*	*Replace PCA*
E-48	*CPU cannot communicate with the barometric pressure sensor using I2C bus*	*None (Log Only)*	*Replace PCA*
E-49	*CPU cannot communicate with the humidity and temperature sensor using I2C bus*	*None (Log Only)*	*Replace PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-50	*The difference between the blower pressure sensor reading and the outlet pressure sensor reading is 10 cmH2O or greater for 5 seconds.*	*Ventilator Inoperative*	• *Check for disconnected tube between blower pressure sensor and blower outlet.* • *Check pressure readings and replace either blower pressure or outlet pressure*
E-51	*Host CPU rebooted*	*None (Log Only)*	*None – recorded for informational purposes to indicate that a reboot occurred.*
E-52	*Host CPU rebooted using external reset pin*	*None (Log Only)*	*None – recorded for informational purposes to indicate that a reboot occurred.*
E-53	*Host CPU rebooted using software command*	*None (Log Only)*	*None – recorded for informational purposes to indicate that a reboot occurred.*
E-54	*The Host CPU generated a Reset when commanded to enter the CPU Standby mode or CPU Stop mode.*	*None (Log Only)*	*Replace PCA*
E-55	• *Unit is exceeding the requested pressure settings; The Patient Pressure delivered is greater than the target pressure + 5cm.* • *High pressure sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	*"Pressure Regulation" High Priority Alarm*	• *Check the tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*
E-56	• *Unit is exceeding the requested pressure settings for 10 seconds.* • *High pressure sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	*Ventilator Inoperative*	• *Check the tubing (inside and outside the device) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-57	• *AC was disconnected,* • *PCA fault,* • *Faulty AC-DC input connector,* • *AC Power Supply fault,* • *Power Cord fault,* • *A/D channel fault*	*"AC Power Disconnected" Medium Priority Alarm*	• *Verify AC connected* • *Replace AC power Supply* • *Replace PCA*
E-58	• *Lead Acid was disconnected,* • *DC Power Cable fault,* • *Faulty DC input connector,* • *DC Power Cable fuse is open,* • *PCA fault,* • *A/D channel fault*	*External Batt Disconnected" Informational Alarm*	• *Connect Lead Acid Battery* • *Verify DC Power Cable* • *Replace DC Power Cable fuse* • *Replace PCA*
E-59	*Low battery - Lead Acid has <= 20 Minutes run time remaining and it is last available power source.*	*"Low External Battery" Medium Priority Alarm*	• *Charge Lead Acid Battery* • *Replace Lead Acid Battery*
E-60	*Depleted battery - Lead Acid has <= 10 Minutes run time remaining and it is last available power source.*	*"Low External Battery" High Priority Alarm*	• *Charge Lead Acid Battery* • *Replace Lead Acid Battery*
E-61	*Unable to open the new software file on the card*	*Upgrade Failed Screen*	• *Reformat card and replace new software file on the card.* • *Re-insert card; retry upgrade*
E-62	• *Unable to read the new software file on the card* • *The new software file on the card is corrupt.*	*Upgrade Failed Screen*	• *Reformat card and replace new software file on the card.* • *Re-insert card; retry upgrade*
E-63	*The user tried to upgrade to an older version of software.*	*Upgrade Failed Screen*	• *Reformat card and replace new software file on the card.* • *Re-insert card; retry upgrade*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-64	*The user tried to upgrade to version of software that is not intended for the BiPAP A30/BiPAP A40.*	*Upgrade Failed Screen*	• *Reformat card and replace new software file on the card.* • *Re-insert card; retry upgrade*
E-65	*The new software file on the card is corrupt.*	*Upgrade Failed Screen*	• *Reformat card and replace new software file on the card.* • *Re-insert card; retry upgrade*
E-66	*User initiated the exit from the Vent Inop screen.*	*System Reboots*	*None – recorded for informational purposes to indicate that the User exited the Ventilator Inoperative screen.*
E-67	• *Last battery depleted* • *Battery is not connected AND* • *1 volt <= AC-DC Power supply <= 11 volts*	*Software stops Blower and Loss of All Power alarm sounds.*	• *Replace or charge the battery* • *Replace AC-DC Power Supply* • *Replace PCA*
E-68	*AC connected*	*None (Log Only)*	*None – recorded for informational purposes to indicate that AC power was applied to the device.*
E-69	*Lead Acid connected*	*None (Beep Only)*	*None – recorded for informational purposes to indicate that an external battery was attached to the device.*
E-70	*Program Execution Error – pointer not initialized properly*	*System Reboots*	*N/A*
E-71	*External Battery Depleted*	*"External Battery Depleted" Informational Alarm*	*None - recorded for informational purposes to indicate that External Battery is depleted.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-72	*Power source switched to AC power*	*None (Beep only)*	*None – recorded for informational purposes to indicate that AC power is in use on power up or power switched from a battery source to AC power.*
E-73	*Power source switched to External Battery*	*None (Beep only)*	*None – recorded for informational purposes to indicate that External Battery is in use on power up.*
E-74	*When the SD Card does not have enough memory available to write EDF Files.*	*"Card Error" Informational Alarm*	*None - recorded for informational purposes that logging data could not be written to the SD card because it was too small.*
E-75	*When the Card is detected as a write protected SD Card.*	*"Card Error" Informational Alarm"*	• *Check write protect switch on card.* • *Use new card.* • *Replace PCA.*
E-76	*Error in creating files/directories on the SD Card.*	*"Card Error" Informational Alarm"*	• *Use new card.* • *Replace PCA.*
E-77	• *The desired tidal volume cannot be delivered within the limits of the IPAP Min and Max settings.* • *High leak* • *Flow sensor problem*	*"Low Vte" High Priority Alarm*	• *Check the tubing (inside and outside the unit) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate.*
E-78	*A pulse oximeter was connected to the device with no SD Card inserted.*	*"Insert SD Card" Low Priority Alarm*	• *Reinsert MMC/SD Card* • *Reformat or Replace MMC/SD Card*
E-79	*Recorded to show that the Ventilator Inoperative screen was displayed to the User.*	*None (Log Only)*	*None – recorded for informational purposes to indicate that the Ventilator Inoperative Screen was displayed to the User.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-80	*Error while accessing MMC/SD card*	*None (Log Only)*	• *Reinsert MMC/SD Card* • *Reformat or Replace MMC/SD Card*
E-81	*Unit was turned on with Start/Stop key and power source was battery*	*"Start On Battery" Informational Message*	*None – recorded for informational purposes to indicate the unit was turned on with Start/Stop key with battery power.*
E-82	*Unit recovered from software power loss condition after power was applied.*	*None (Log Only)*	*None – recorded for informational purposes to indicate that power was applied to the unit after a software power loss and the unit recovered OR the Audio Pause key was pressed.*
E-83	*Generic informational debug message.*	*None (Log Only)*	*None – recorded for informational purposes for general debugging*
E-84	*The power fail voltage is outside its valid range of 4.775 to 5.675 for at least 10 seconds*	*Ventilator Inoperative*	*Replace PCA*
E-85	*Failure of the blower pressure sensor.*	*Ventilator Inoperative*	*Replace PCA*
E-86	*Failure of the outlet pressure sensor.*	*Ventilator Inoperative*	*Replace PCA*
E-87	*The Unit entered low-power Sleep Mode.*	*None (Log Only)*	*None – recorded for informational purposes to indicate that the Unit entered Sleep Mode.*
E-88	*This error indicates that the device cannot be operated after three restarts*	*Ventilator Inoperative*	*Replace motor or PCA*
E-89	*Motor bus voltage dropped under 16V.*	*None (Log Only)*	*Replace motor or PCA*
E-90	*Motor bus voltage rose above 38V.*	*None (Log Only)*	*Replace motor or PCA*
E-91	*Motor couldn't reach its speed setpoint on startup*	*None (Log Only)*	*Replace motor or PCA*
E-92	*State observer detected error in resolving rotor position*	*None (Log Only)*	*Replace motor or PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-93	*State observer detected error in resolving motor speed*	*None (Log only)*	*Replace motor or PCA*
E-94	*Program Execution Error*	*System Reboots*	*N/A*
E-95	*Program Execution Error*	*System Reboots*	*N/A*
E-96	*Unable to write to Event Log*	*None (Log only)*	*Replace PCA*
E-97	*Start/Stop key pressed to turn off the unit.*	*None (Log only)*	*None – recorded for informational purposes to indicate that the Start/ Stop key was pressed by the User.*
E-98	*Start/Stop key was pressed*	*None (Log only)*	*None – recorded for informational purposes to indicate the Start/Stop key was pressed by the User while the unit was off.*
E-99	*"Yes" key pressed in response to the Power Off screen, to turn off the unit.*	*None (Log only)*	*None – recorded for informational purposes to indicate that the Yes key was pressed by the User, causing the unit to stop providing therapy.*
E-100	*"No" key pressed in response to the Power Off screen, to turn off the unit.*	*None (Log only)*	*None – recorded for informational purposes to indicate that the No key was pressed by the User, causing the unit to continue providing therapy.*
E-101	*Reset key was pressed*	*None (Log only)*	*None – recorded for informational purposes to indicate that the Reset Key was pressed by the User.*
E-102	*Modify key was pressed*	*None (Log Only)*	*None – recorded for informational purposes to indicate that the Modify Key was pressed by the User.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-103	*Audio Pause key was pressed*	*None (Log Only)*	*None – recorded for informational purposes to indicate that the Audio Pause Key was pressed by the User.*
E-104	*Bypass User Mode key sequence pressed*	*None (Log Only)*	*None – recorded for informational purposes to indicate that the Bypass User Mode Key sequence was pressed by the User.*
E-105	*Info Alarm:* • *11 volt < AC-DC Power supply < 22 volts for 5 +/- 1 seconds, with or without battery connected.* *Software Power Fail:* • *1.0 volts < AC voltage <= 11.0 volts for 15 +/- 1 seconds, without battery connected.* • *PCA fault:* • *AC Power Supply fault* • *A/D channel fault*	*"Check AC Power Supply" Informational Message OR Software Power Fail*	• *Replace AC-DC Power Supply* • *Replace PCA*
E-106	• *AC-DC Power Supply > 28 volt* • *PCA fault* • *AC Power Supply fault* • *A/D channel fault*	*Ventilator Inoperative*	*Replace AC-DC Power Supply and replace PCA (possible damage to PCA components)*
E-107	*Program Execution Error*	*Ventilator Inoperative*	*N/A*
E-108	*RTOS queue is 90% full*	*None (Log Only)*	*None – recorded for informational purposes.*
E-109	*During run time motor speed dropped below 2200 RPM*	*None (Log Only)*	• *Replace Blower* • *Replace PCA*
E-110	*Error while accessing MMC/SD card*	*None (Log Only)*	• *Reinsert MMC/SD Card* • *Reformat or Replace MMC/SD Card*
E-111	*Blower pressure sensor supply voltage is outside of its valid range of4.75V to 5.25V*	*Ventilator Inoperative*	*Replace PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-112	*Coin cell voltage is outside of its valid range of 1.65 to 3.6V.*	*None (Log Only)*	*Replace PCA*
E-113	*Software detected that RTC registers resetted or got corrupted*	*None (Log Only)*	*Replace PCA*
E-114	*Software couldn't initialize LCD controller chip U24 SSD1963*	*None (Log Only)*	*Replace PCA*
E-115	*The software detected motor over-current condition on its break pin*	*None (Log Only)*	• *If error occurred while running on DC input, verify source, cabling and connections* • *Replace Blower* • *Replace PCA*
E-116	*The software detected that barometric sensor reading is outside its valid window of 24.5inHg to 35inHg three consecutive times*	*None (Log Only)*	*Replace PCA*
E-117	*The software detected that raw flow sensor reading is below 14928 counts for 10 seconds using up-down counter*	*Ventilator Inoperative*	*Replace PCA*
E-118	*The software detected that raw pressure sensor reading is outside its valid window of 225 to 16274 counts for 10 seconds using up-down counter*	*Ventilator Inoperative*	*Replace PCA*
E-119	*The software detected that raw blower pressure sensor reading is outside its valid window of 833 to 64640 counts for 10 seconds using up-down counter*	*Ventilator Inoperative*	*Replace PCA*
E-120	*The software detected that raw humidity sensor reading is outside its valid window of 2622 to 60820 counts for 10 seconds using up-down counter*	*None (Log Only)*	*Replace PCA*
E-121	*The software detected that raw humidity sensor temperature reading is outside its valid window of 6284 to 54470 counts for 10 seconds using up-down counter*	*None (Log Only)*	*Replace PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-122 (Original Series)	• *Unit is not reaching the requested pressure support, i.e. the difference between the requested pressure support and the measured patient pressure support is greater than half of the of the requested pressure support.* • *Low pressure sensor reading* • *Large amount of drift* • *Pinched/blocked tubing*	*"Pressure Regulation" High Priority Alarm*	• *Check Device and Circuit setup if patient circuit is available.* • *Check the tubing (inside and outside the unit) for leaks, kinks, or blockages.* • *Replace the PCA and recalibrate*
E-122 (Silver Series)	N/A	*N/A*	N/A
E-123	• *Software does not support newer/older revision of HW* • *Board revision resistors on PCA are setup incorrect*	*Ventilator Inoperative*	• *Reinstall software* • *Replace PCA*
E-124	*Motor state observer failed to converge and resolve the motor speed*	*None (Log Only)*	• *Replace Blower* • *Replace PCA*
E-125	*Product ID stored in Device Calibration Table is not recognized by software. The unrecognized Product ID is recorded as the optional text for reference.*	*Ventilator Inoperative*	• *Recalibrate* • *Replace PCA*
E-126	• *Unit not calibrated* • *Calibration Table corrupted*	*None (Log Only)*	• *Recalibrate* • *Replace PCA*
E-127	• *Unit not calibrated* • *Calibration Table corrupted*	*Ventilator Inoperative*	• *Recalibrate* • *Replace PCA*
E-128	• *Unit not calibrated* • *Calibration Table corrupted*	*None (Log Only)*	• *Recalibrate* • *Replace PCA*
E-129	*Engineering Use*	*None (Log Only)*	*None – recorded for informational purposes to indicate that the unit was calibrated.*
E-130	*Software error:* • *Bad table written by Production* • *Field Service Calibration Station*	*None (Log Only)*	• *Recalibrate* • *Replace PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-131	*Calibration was performed*	*None (Log Only)*	*None – recorded for informational purposes to indicate that a calibration was performed on this unit by either the Production or Field Service calibration station.*
E-132	*Queue for messages to the RASP command parser is full*	*System Reboots*	*This error should not occur. No service action is required. If the error is seen repeatedly, replace the PCA.*
E-133	*Queue for Event Log is full*	*System Reboots*	*This error should not occur. No service action is required. If the error is seen repeatedly, replace the PCA.*
E-134	*Queue for messages to the User Interface is full*	*None (Log Only)*	*This error should not occur. No service action is required. If the error is seen repeatedly, replace the PCA.*
E-135	*Queue for messages to the User Interface is within 10% of being full*	*None (Log Only)*	*This error should not occur. No service action is required. If the error is seen repeatedly, replace the PCA.*
E-136 (Original Series)	*The software detected persistent overcurrent condition on break input*	*None (Log Only)*	*Replace PCA*
E-136 (Silver Series)	*N/A*	*N/A*	*N/A*
E-137	*Software upgrade process started*	*None (Log Only)*	*None*
E-138	*Error in communication between humidity sensor and CPU.*	*None (Log Only)*	*None. Recorded for debug purpose.*
E-139	*N/A*	*Not Used*	*N/A*
E-140	*Unexpected high level of high-priority (e.g. interrupt) activity*	*System Reboots*	*None. Recorded for debug purposes.*
E-141	*Humidifier thermistor is shorted to ground*	*None (Log Only)*	*Replace humidifier*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-142	*Humidifier is disconnected while it was turned on or shorted to the power supply*	*None (Log Only)*	• *Replace humidifier* • *Replace PCA*
E-143	*Humidifier plate reached 95C which is close to blowing TCO*	*None (Log Only)*	*Replace PCA*
E-144	*Error in accessing files/directories on the SD Card.*	*None (Log Only)*	*Replace PCA*
E-145	*Error in creating files/directories on the SD Card.*	*None (Log Only)*	*Replace PCA*
E-146	*Error in verifying the flash drive format on device start up.*	*None (Log Only)*	*Replace PCA*
E-147	*LOG queue is full*	*None (Log Only)*	*This error should not occur. No service action is required. If the error is seen repeatedly, replace the PCA.*
E-148	*Error in creating the Encore directory structure on the SD Card.*	*"Card Error" Informational Message*	• *Use new card.* • *Replace PCA*
E-149	*Error in accessing files/directories on the SD Card.*	*"Card Error" Informational Message*	• *Use new card.* • *Replace PCA*
E-150	*Program Execution Error*	*None (Log Only)*	*This error should not occur. No service action is required. If the error is seen repeatedly, replace the PCA.*
E-151	*N/A*	*Not Used*	*N/A*
E-152	• *Incorrect wattage Power Supply connected,* • *Faulty AC-DC input connector,* • *AC Power Supply fault,* • *PCA fault,* • *A/D channel fault*	*"Check AC Power Supply" Informational Message*	• *Connect correct wattage Power Supply* • *Replace AC power Supply* • *Replace PCA*
E-153	*If usable Rx found on the SD Card for the device.*	*None (Log Only)*	*None – recorded for informational purposes to indicate that a valid prescription file was found on the SD card.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-154	*Rx from the SD Card is ready for user review.*	*Prescription review screen displayed at time of Rx Update*	*None – recorded for informational purposes that the prescription was read successfully from the SD card.*
E-155	*Failure to update the Rx due to the errors in the Rx Settings.*	*"Prescription Change Failed" dialogue box presented to user at time of Rx Update*	*None – recorded for informational purposes to indicate that the prescription had bad settings.*
E-156	*Rx update is complete.*	*"Prescription Change Complete" dialogue box presented to user at time of Rx Update*	*None – recorded for informational purposes to indicate that the prescription update was completed successfully.*
E-157	*Rx update is canceled by the user by either UI option or by pulling out of the card before Rx Update is complete.*	*"Prescription Change Canceled" dialogue box presented to user at time of Rx Update*	*None – recorded for informational purposes to indicate that the prescription update was not completed.*
E-158	*Failure to update the Rx due to the error in the file format or errors in reading the file.*	*"Prescription Change Failed" dialogue box presented to user at time of Rx Update*	*None – recorded for informational purposes to indicate that the prescription data on the card could not be read.*
E-159	*Rx version incorrect for the device.*	*"Prescription Change Failed" dialogue box presented to user at time of Rx Update*	*None – recorded for informational purposes to indicate that the version of the prescription data on the SD card was bad.*
E-160	*Rx file checksum is incorrect.*	*"Prescription Change Failed" dialogue box presented to user at time of Rx Update*	*None – recorded for informational purposes to indicate that the prescription on the SD card had a bad checksum.*
E-161	*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 then this gets generated.*	*Ventilator Inoperative*	*Replace PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-162	*Motor temperature reached 120C.*	*None (Log Only)*	*Replace Blower*
E-163	*When the device encounters errors while it is copying data from Serial Flash to the SD Card.*	*"Serial Flash to SD Card Error" Informational Message*	• *Use new card.* • *Replace PCA.*
E-164	*Error in opening files/directories on the SD Card.*	*"Card Error" Informational Message*	• *Use new card* • *Replace PCA*
E-165	*Error in write to files/directories on the SD Card.*	*"Card Error" Informational Message*	• *Use new card* • *Replace PCA*
E-166	*Generic informational debug message*	*None (Log only)*	*None – recorded for informational purposes to track the progress of copying data from Serial Flash to the SD Card.*
E-167	*Debug message indicating that RTC failed to enter initialization mode*	*None (Log only)*	*None*
E-168	*Debug message indicating that RTC failed to synchronize date and time register*	*None (Log only)*	*None*
E-169	*Debug message indicating that LCD became inactive probably due to the ESD event*	*None (Log only)*	*None*
E-170	*When a request to "Write Event Log to SD Card" occurs*	*None (Log only)*	*None – recorded for informational purposes to indicate that a request to write the Event Log to the SD Card has occurred.*
E-171	*When a request to "Write Event Log to SD Card" fails*	*None (Log only)*	*None – recorded for informational purposes to indicate that a request to write the Event Log to the SD Card has failed.*
E-172	*When a request to "Write Event Log to SD Card" completes*	*None (Log only)*	*None – recorded for informational purposes to indicate that a request to write the Event Log to the SD Card has completed.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-173	*When the SD Card is quickly inserted and ejected and sometimes when the SD Card is ejected with select "Safely Remove SD Card".*	*None (Log only)*	*None – recorded for informational purposes to record SD Card processing states*
E-174	*Humidifier circuitry has open TCO. Failure of Power FET Q12*	*None (Log only)*	• *Replace Humidifier.* • *Replace PCA if Humidifier is ok.*
E-175	*Motor didn't startup for 30 seconds*	*System Reboots*	• *Replace Blower* • *Replace PCA if problem persists*
E-176	*Program execution error, possible internal RAM or Flash failure*	*Vent Inop*	*Replace PCA*
E-177	• *Detachable Li Ion was disconnected* • *Li Lion battery connector fault*	*"Detach Batt Disconnected" Informational Alarm*	• *Verify Detachable Li Ion battery and battery module is properly connected* • *Verify Detachable Li Ion cable in unit and properly connected* • *Replace Li Ion battery* • *Replace Detachable battery module*
E-178	*Battery is not charging due to the humidifier control or battery failure or Batter module failure*	*Informational Alarm*	• *Replace Detachable Li Ion battery* • *Replace Detachable battery module*
E-179	*Battery is too hot to charge*	*"Battery Not Charging - Temp." Informational Alarm*	• *Replace Li Ion Battery* • *Replace Detachable Battery module*
E-180	• *Detachable Li Ion Battery Not Authentic* • *Fake battery* • *Detachable Li Ion fault*	*"Replace Detachable Battery" Informational Alarm*	• *Verify Detachable Li Ion cable in unit* • *Replace Detachable Li Ion battery* • *Replace Detachable battery module*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-181	*Corruption of battery gas gauge*	*"Replace Detachable Battery" Informational Alarm*	*Replace Detachable Li Ion battery*
E-182	*Depleted battery-Detachable Li Ion has <= 10 minutes run time remaining and it is last available power source.*	*"Low Detachable Battery" High Priority Alarm*	*Charge Detachable Battery*
E-183	*Detachable Li Ion was disconnected*	*None (Beep Only)*	*NA*
E- 184	• *Detachable Li Ion cycle count >=500 cycles* • *Detachable Li Ion end of life*	*"Replace Detachable Battery" Informational Alarm*	*Replace Detachable Li Ion battery*
E-185	• *Detachable Li Ion state of health <=50%* • *Full charge capacity (FCC) is <=50% of the design capacity* • *Detachable Li Ion FCC error* • *Detachable Li Ion fault* • *Detachable Li Ion end of life*	*"Replace Detachable Battery" Informational Alarm*	*Replace Detachable Li Ion battery*
E-186	• *Detachable Li-Ion Battery Permanent Failure.* • *Caused by: Voltage and Current conditions for shutdown are met AND another permanent failure occurred* • *Open Thermistor permanent failure* • *Discharge Safety Overcurrent permanent failure* • *Charge Safety-Overcurrent permanent failure* • *Periodic AFE Communications permanent failure* • *Permanent AFE Communications failure* • *Data flash Fault permanent failure* • *Discharge-FET-Failure permanent failure* • *Charge-FET-Failure permanent failure* • *Cell-Imbalance permanent failure* • *Discharge Safety Over temperature permanent failure*	*"Replace Detachable Battery" Medium Priority Alarm*	*Replace Detachable Li Ion battery*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-187	*Detachable Battery reported an Over Current Discharge or Short Circuit Discharge fault*	*"Replace Detachable Battery" Informational Alarm*	• *Check/Replace Detachable Li Ion cable in unit* • *Replace Detachable Li Ion battery* • *Replace Detachable Battery Module* • *Replace PCA*
E-188	• *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.*	*Log Only*	• *Charge Detachable Li Ion battery.*
E-189	• *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.*	*Log Only*	• *Charge Detachable Li Ion battery*
E-190	*Battery temperature is >= 60? during discharge. Battery recovers if temperature is less than 55? C.*	*"Batt Discharge Stopped-Temp" Informational Alarm*	• *Allow battery to cool to less than 55? and test that the battery will discharge* • *Replace battery if no discharge*
E-191	• *Detachable Li Ion cell voltage greater than 4.3 volts for greater than 2 sec.* • *Battery charge FET is turned off.* • *Battery charged too high. Battery recovers if cell voltage is less than 4.1 volts.*	*Log Only*	• *Replace Detachable Li Ion Battery* • *Replace Detachable Battery Module*
E-192	• *Detachable Li Ion battery Remaining Capacity is 1000 mAh greater than the Full Charge Capacity during charging.* • *Battery charged too high.* • *Battery recovers if discharged so that Capacity < 95%.*	*Log Only*	• *Replace Detachable Li Ion Battery* • *Replace Detachable Battery Module*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-193	• *Detachable Li Ion pack charge current greater than 4 Amps for greater than 2 sec.* • *Battery charge FET is turned off.* • *Battery charge current too high.* • *Battery recovers if charge current is less than 200 mA.*	*Log Only*	• *None – recorded for informational purposes only.*
E-194	• *Detachable Li Ion battery charge voltage exceeded 16.7 volts for greater than 2 sec.* • *Battery charge voltage too high.* • *Battery recovers if charge voltage is less than 16.4 volts.*	*Log Only*	• *None – recorded for informational purposes only.*
E-195	• *Detachable Li Ion pack voltage greater than 17.2 volts for greater than 5 sec.* • *Battery charge FET is turned off.* • *Battery charged too high.* • *Battery recovers if pack voltage is less than 16 volts.*	*Log Only*	• *None – recorded for informational purposes only.*
E-196	• *Detachable Li Ion battery charge current exceeded 20 Amps for greater than 366 used.* • *Battery charge current too high.* • *Battery recovers if charge current is less than 100 mA.*	*Log Only*	• *None – recorded for informational purposes only.*
E-197	• *Can't communicate with Charger chip* • *Detachable Li Ion fault*	*"Replace Detachable Battery" Medium Priority Alarm*	• *Replace Detachable Battery Module* • *Replace Detachable Battery*
E-198	• *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.* • *Detachable Li Ion battery fault*	*"Replace Detachable Battery" Medium Priority Alarm*	• *Replace Detachable Li Ion cable in unit* • *Replace Detachable Li Ion Battery* • *Replace Detachable Battery Module*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-199	• *Environmental conditions* • *Motor temperature exceeded 125° C or battery temperature reached 55° C*	*High Priority Alarm*	• *Verify no environmental conditions exist that caused High Temp issue* • *Replace Blower* • *Allow battery to cool to less than 55° C and test that the battery will discharge. Replace battery if no discharge*
E-200	*Low battery - Detachable Li Ion has <= 20 Minutes run time remaining and it is last available power source.*	*"Low Detachable Battery" Medium Priority Alarm*	• *Charge Detachable Li Ion battery*
E-201	*Clear Patient Data is Requested*	*Info Alarm*	*None*
E-202	*Clear Patient Data failed due to bad SD Card or PCA*	*Info Alarm*	• *Replace SD Card* • *Replace PCA*
E-203	*Clear patient data is completed*	*Info Alarm*	*None*
E-204	*This is debug error code for MMC SD driver that records general SD card information (e.g. Manufacture, capacity, etc.) as well as number of failed write/read retries.*	*Log Only*	*None*
E-205	*The charger has failed in trying to wake-up charge the battery after ~210 seconds.*	*"Replace Detachable Battery" Medium Priority Alarm*	*Test Battery Module by using another battery. If error still reported then replace the battery module; if error not reported then replace Detachable Li Ion Battery*
E-206	*PIC processor or associated circuitry failure*	*Vent Inop*	*Replace PCA*
E-207 (Original Series)	*Outlet Pressure Sensor is reading less than 0.75cm for 3 seconds* *NOTE- this error processing is not active in Cal Mode*	*"Pressure Regulation" High Priority Alarm*	• *Check the tubing (inside and outside the unit) for leaks.* • *Check the manifold between the Sensors on PCA and Flow sensor Assy* • *Replace the PCA and recalibrate.*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-207 (Silver Series)	*N/A*	*N/A*	N/A
E-208 (Original Series)	*Firmware Version 2.3 and before - Program execution error* *Firmware Version greater than 2.3 - N/A*	*System Reboot* *N/A*	*None*
E-208 (Silver Series)	*This alarm is generated if the Blower Pressure is >= cmH2O for >= 3 sec.*	*VENT_INOP*	*Replace PCA*
E-209 (Original Series)	*N/A*	*N/A*	*N/A*
E-209 (Silver Series)	*Ventilator did not enter sleep state within ten seconds after sleep command was executed*	*None (Log Only)*	*None*
E-210 (Original Series)	*N/A*	*N/A*	*N/A*
E-210 (Silver Series)	*Power management thread called before the first call to measure*	*None (Log Only)*	*None*
E-211 (Original Series)	*N/A*	*N/A*	*N/A*
E-211 (Silver Series)	*Heated Tube Thermistor is shorted.*	*None (Log Only)*	*Replace PCA*
E-212 (Original Series)	*N/A*	*N/A*	*N/A*
E-212 (Silver Series)	*Heated Tube Thermistor is open*	*None (Log Only)*	*Replace PCA*
E-213 (Original Series)	*N/A*	*N/A*	*N/A*
E-213 (Silver Series)	*Li Ion Battery Fuse Open*	*Medium Priority Alarm*	*Replace Li Ion Battery*
E214	*Defective EEPROM*	*System Reboots*	*Replace PCA*

CODE	PROBABLE CAUSE	VISUAL INDICATION	ACTION
E-999 (Original Series)	*Program Execution Error*	*None (Log Only)*	*None*
999 (Silver Series)	*A write to the Event Log did not complete successfully*	*System Reboot*	*None*
E-65535	*A write to the Event Log did not complete successfully.*	*None (Log Only)*	*None*

5.5 FSA TEST STATION ERROR CODES

This section contains the common errors associated with the various FSA Test Station processes.

ERROR CODES 5100 TO 5999 SYSTEM DEFINED ERRORS

CODE	PROBABLE CAUSE	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

ERROR CODES 6000 TO 6999 RASP/COMMUNICATION ERRORS

CODE	PROBABLE CAUSE	CORRECTIVE ACTION
6001	No reply received. Communication protocol violation	Check all connections with equipment and unit and RETEST Unit
6002	Message not accepted or interface not supported.	Check all connections with equipment and unit and RETEST Unit
6003	Timeout: no message available or incomplete message.	Check serial cable and power to the unit.

ERROR CODES 7103 TO 7110 TSI COMMUNICATION ERRORS

CODE	PROBABLE CAUSE	CORRECTIVE ACTION
7104	TSI 4000 Series: could not complete Read operation	*Reboot PC and power cycle the TSI 4000*
7105	TSI 4000 Series: Init command must be run before using others driver's commands.	*Reboot PC and power cycle the TSI 4000*
7106	TSI 4000 Series: there is no command acknowledge returned	*Reboot PC and power cycle the TSI 4000*
7107	TSI 4000 Series: device returned an internal error	*Reboot PC and power cycle the TSI 4000*
7108	TSI 4000 Series: device returned invalid measurements	*Reboot PC and power cycle the TSI 4000*

ERROR CODES 9001 TO 9050 FSA TEST STATION ERRORS

CODE	PROBABLE CAUSE	CORRECTIVE ACTION
9001	Zero reference flow is out of the allowable limits.	Make sure that all of the hoses are connected/disconnected as instructed
9002	Unknown A30/40 Cal table ID.	Verify unit SN/MN Label to the UUT.
9003	The RASP device ID was found to be invalid when creating the Device table.	Verify unit SN/MN Label to the UUT.
9004	Time out occurred because the flow setpoint was not achieved in the allowed time frame during flow calibration or flow verification.	Check the tubing connections and verify that there are no air leaks
9005	Time out occurred because the pressure setpoint was not achieved in the allowed time frame during pressure calibration, pressure verification or max pressure test.	Check the tubing connections and verify that there are no air leaks
9006	UUT pressure or flow is not stable	Check the tubing connections and verify that there are no air leaks
9007	Time out occurred because the RPM setpoint was not achieved in the allowed time frame.	Check the tubing connections and verify that there are no air leaks
9008	UUT blower failed to start within expected time.	Check the tubing connections and verify that there are no air leaks
9009	Minimum flow required for this test was not achieved.	Check the tubing connections and verify that there are no air leaks

CODE	PROBABLE CAUSE	CORRECTIVE ACTION
9010	The S/N prefix is invalid for this Device ID.	Verify unit SN/MN Label to the UUT.
9011	The S/N CRC does not match the calculated one.	Verify unit SN/MN Label to the UUT.
9012	The S/N length is invalid.	Verify unit SN/MN Label to the UUT.
9013	An unknown or no power source was detected.	Verify all applicable Power Sources and the Serial interface are properly connected to the UUT & test setup
9014	The model number from barcode was not found in the models lookup table.	Verify unit SN/MN Label to the UUT.

CHAPTER 6: REPAIR & REPLACEMENT

This Chapter illustrates the names and locations of the replaceable components in the BiPAP A30 & BiPAP A40 devices. If repair or replacement procedures are performed, the device must be run-in for a minimum of one (1) hour, and tested to verify its proper operation. Refer to Chapter 8 for Testing Procedures.

6.1 REPLACEMENT PART (RP) KITS

WARNING

To prevent electrical shock, disconnect the electrical supply before attempting to make any repairs to these devices.

CAUTION

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.

The following Repair Part Kits are for use with the Original Series A30/A40 device.

Description	*Kit Number*
Blower Assembly	*1094694*
Flow Path Cover	*1093957*
Base Cable (6-pin)	*1093953*
Inlet Foam (includes all three pieces of Foam)	*1093959*
Main PCA	*1115581*
PCA Support (Blower Standoffs) with Screws, qty. 3	*1093955*
Power Cable Assembly	*1093952*
Top Cover	*1094688 (BiPAP A30)* *1094689 (BiPAP A30-S)* *1106951 (BiPAP A40)*
Valve Assembly	*1094692*
Valve Tubing	*1093954*
Right Side Panel Assembly	*1093949*

The following Repair Part Kits are for use with the Original and Silver Series A30/A40 devices.

Description	***Kit Number***
Accessory Port Cover, A Series	*1099059*
Blower Box Bottom (includes Blower Box Seal)	*1093956*
Blower Box Top Assembly	*1094695*
Blower Box Mount	*1099044*
Bottom Enclosure	*1093960*
Flow Manifold	*1064751*
Keypad	*1093948*
BiPAP A30 Left Side Panel	*1093951*
BiPAP A40 Left Side Panel	*1101899*
Power Connector Bracket	*1093958*
Power Supply	*1081167*
Pressure Tubing	*1093965*
BiPAP A30/40 Right Side Beauty Cover	*1093950*
BiPAP A40 Left Side Beauty Cover	*1101900*
Warning Label	*1093962*
BiPAP A40 Battery Module Cover	*1106952*

The following Repair Part Kits are for use with the Silver Series A30/A40 device.

Description	*Kit Number*
Six Pin Harness	*1114063*
Main PCA	*1114064*
Blower Kit	*1114065*
A40 Top Cover	*1114066*
A30 Top Cover	*1114067*
A30-S Top Cover	*1114068*
BiPAP SOH Top Cover	*1117844*
PCA Support	*1114070*
Outlet Flow Path	*1114071*
Heated Hose, Right Side Assy	*1114072*
Flow Path Cover	*1114073*
Power Cable Harness	*1114074*
Inlet Foam Kit	*1114075*
Blower Box Seal	*1114076*
BiPAP SOH Keypad	*1119924*
BiPAP SOH UI Panel	*1116473*
A30 UI Panel	*1117841*
A40 UI Panel	*1117842*
A30-S UI Panel	*1117843*

6.2 BASE UNIT PRELIMINARY CHECKOUT

Prior to performing repair and replacement procedures on the device:

1. Visually inspect the outside of the device for physical damage and broken or missing parts.
2. Apply power to the device and verify the buttons are properly back-lit and the LCD is working.
3. Install a 1/4” Test orifice on the device’s outlet port.
4. Turn on the device and verify proper operation. Listen to the device for noisy operation or loose components.
5. View the device’s error/event/alarm log. Refer to Chapter 5.
6. Perform repairs to the device as necessary.

6.3 REPLACEMENT INSTRUCTIONS

6.3.1 REPLACING THE ACCESSORY PORT COVER, A SERIES

Included in Kit	*Tools Required*	*Part Number(s)*
Accessory Port Cover, A Series	*Small flat blade screwdriver*	*1099059*

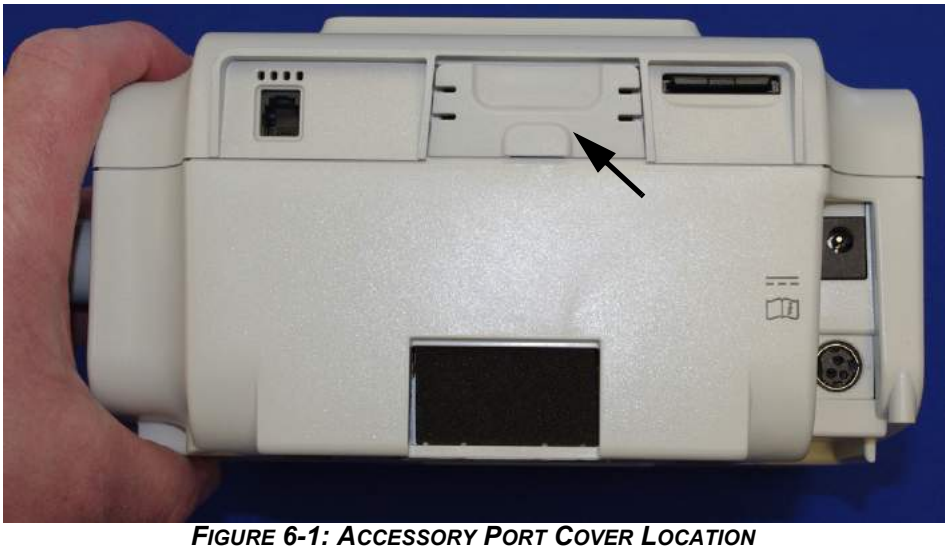


FIGURE 6-1: ACCESSORY PORT COVER LOCATION

TO REMOVE THE ACCESSORY PORT COVER, A SERIES:

- Use a flat screwdriver and gently pry the Accessory Port Cover away from the device.

TO INSTALL THE ACCESSORY PORT COVER, A SERIES:

- Snap the SD Card Slot Cover into place on the back of the device.

6.3.2 REPLACING THE RIGHT SIDE COVER

Included in Kit	*Tools Required*	*Part Number(s)*
Right Side Cover	*None*	*1093949* *1114072*

NOTE

The Right Side Cover is used when there is no Humidifier present.

TO REMOVE THE RIGHT SIDE COVER

1. Push the locking tab on the end of the Right Side Cover towards the device's Outlet Port.
2. Lift the Cover away from the device.

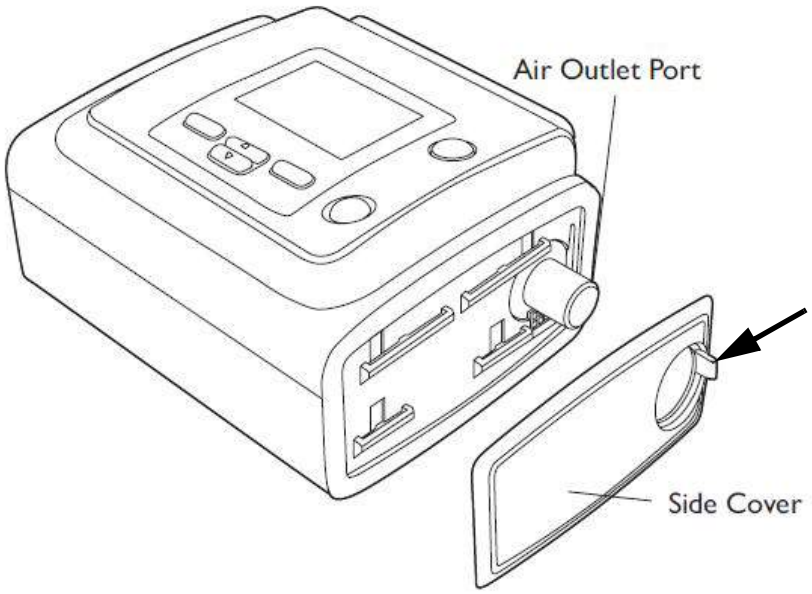


FIGURE 6-2: RIGHT SIDE COVER LOCKING TAB

TO REMOVE THE RIGHT SIDE COVER

1. Insert the Right Side Cover, support tabs at the front of the device first, into it's mounting location.
2. Press the Right Side Cover fully into place. Verify that the locking tab snaps and secures the cover.

6.3.3 REPLACING THE USER INTERFACE PANEL

Included in Kit	*Tools Required*	*Part Number(s)*
User Interface Panel	*N/A*	*1116473 / 1117841* *1117842 / 1117843*

TO REMOVE THE USER INTERFACE PANEL

1. Gently peel back the User Interface Panel from the Top Cover

2. Remove any residual adhesive from the Top Cover.

TO INSTALL THE USER INTERFACE PANEL

1. Remove the protective backing from the new User Interface Panel
2. Install the User Interface Panel to the Top Cover ensuring the Panel fits within the recessed area.

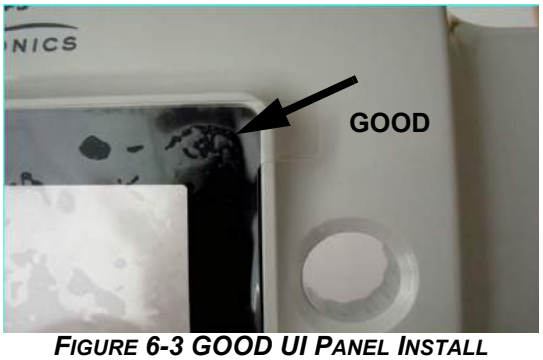


FIGURE 6-3 GOOD UI PANEL INSTALL

FIGURE 6-4 BAD UI PANEL INSTALL

6.3.4 REPLACING THE TOP COVER

Included in Kit	*Tools Required*	*Part Number(s)*
Top Cover	*T15 Torx screwdriver*	1094688 / 1094689 1106951 / 1114066 1114067 / 1114070

FIGURE 6-5: TOP COVER

TO REMOVE THE TOP COVER

1. Place the device on a protected work surface and carefully turn it over to expose its bottom.
2. Remove the SD Card if one is installed.
3. Using a Torx T15 screwdriver, remove the four (4) screws that secure the Top Cover to the Bottom Enclosure. Refer to Figure 6-6.
4. While securely holding the device together, carefully return it to its upright position.
5. Lift the Top Cover away from the Bottom Enclosure. The SD Card Slot Cover is loosely installed in the Top Cover.
6. The Keypad has a tendency to remain in the Top Cover. If necessary, remove the Keypad from the Top Cover and maintain it for installation in the replacement Top Cover.

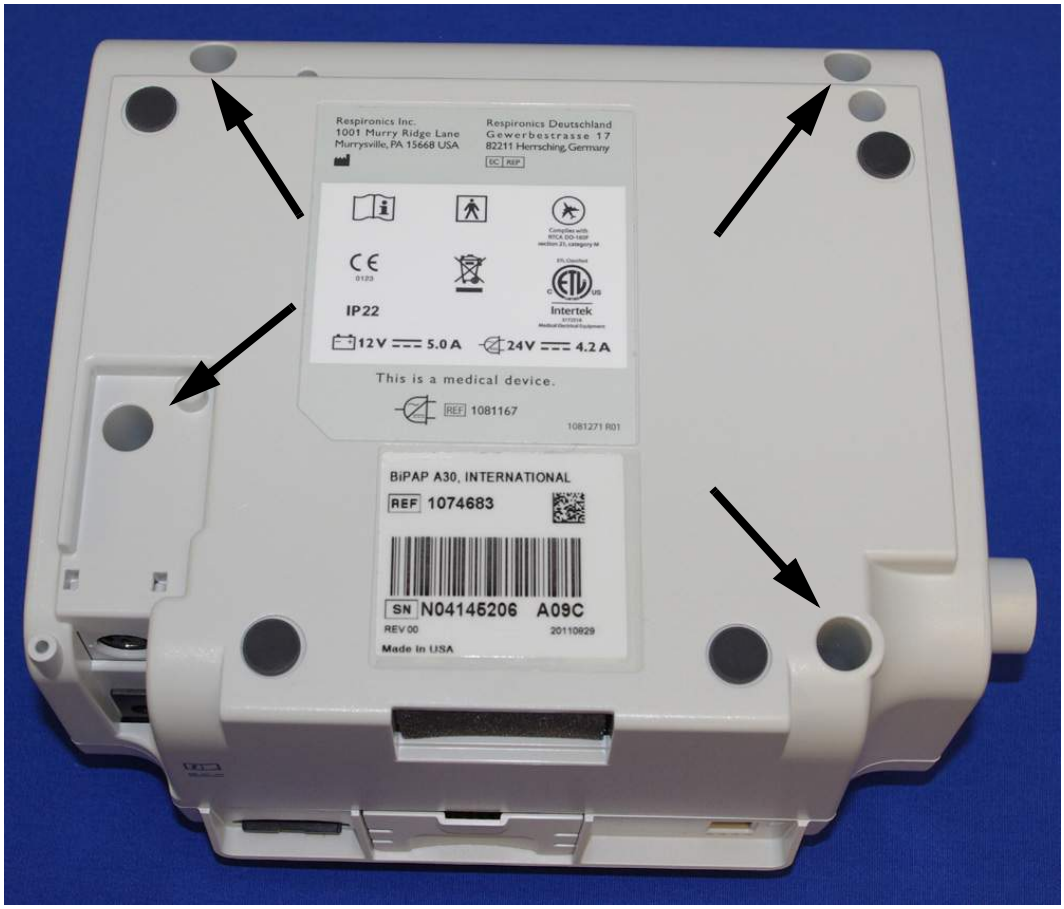


FIGURE 6-6: SCREW LOCATION

NOTE

The Accessory Module Port Cover is loosely installed in the Top Cover. Use care when removing the Top Cover so as not to lose the Accessory Module Port Cover.

To install the Top Cover:

1. Place the Top Cover onto the Bottom Enclosure.
2. Hold the device together and turn it over to expose its bottom.
3. Secure the Top Cover to the Bottom Enclosure using the four (4) #6-19 X 9/16” screws. Torque screws to 13 in-lbs.
4. Assemble the remainder of the device as instructed in previous sections.

6.3.5 REPLACING THE KEYPAD

Included in Kit	*Tools Required*	*Part Number(s)*
Keypad	*T15 Torx screwdriver*	*1093948* *1119924*

FIGURE 6-7: KEYPAD

To remove the Keypad:

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Remove the Keypad from the Top Cover.

To install the Keypad:

1. Place the Keypad in the Top Cover.

CAUTION
Damage to the PCA may occur if the Keypad is not properly aligned and installed.

2. Assemble the remainder of the device as instructed in previous sections.

6.3.6 REPLACING THE LEFT SIDE PANEL

Included in Kit	*Tools Required*	*Part Number(s)*
End Panel	*T15 Torx screwdriver*	*1093951* *1101899*

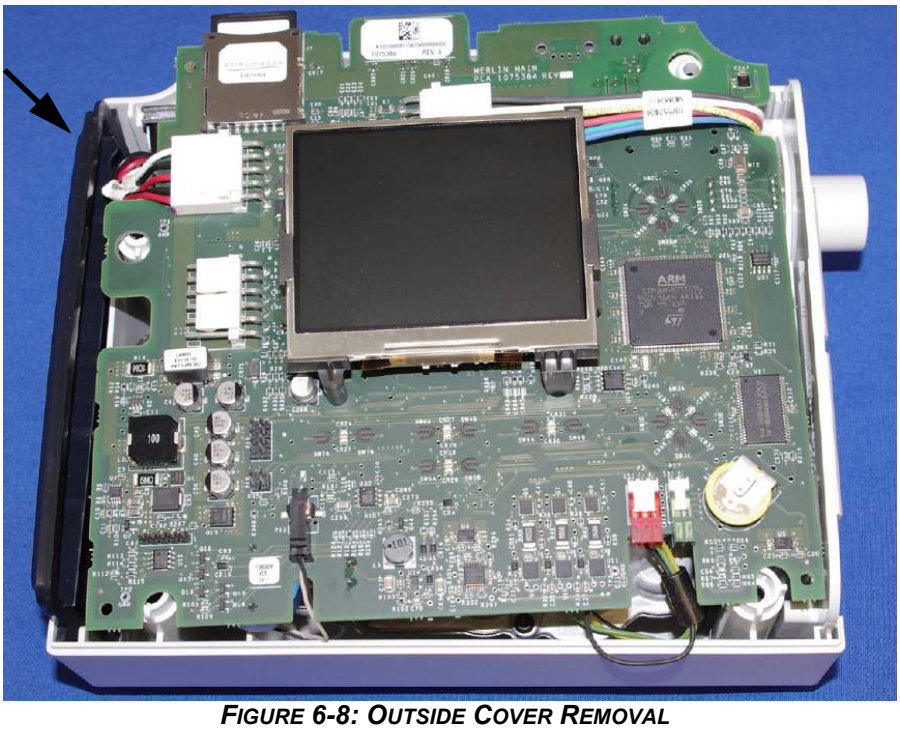
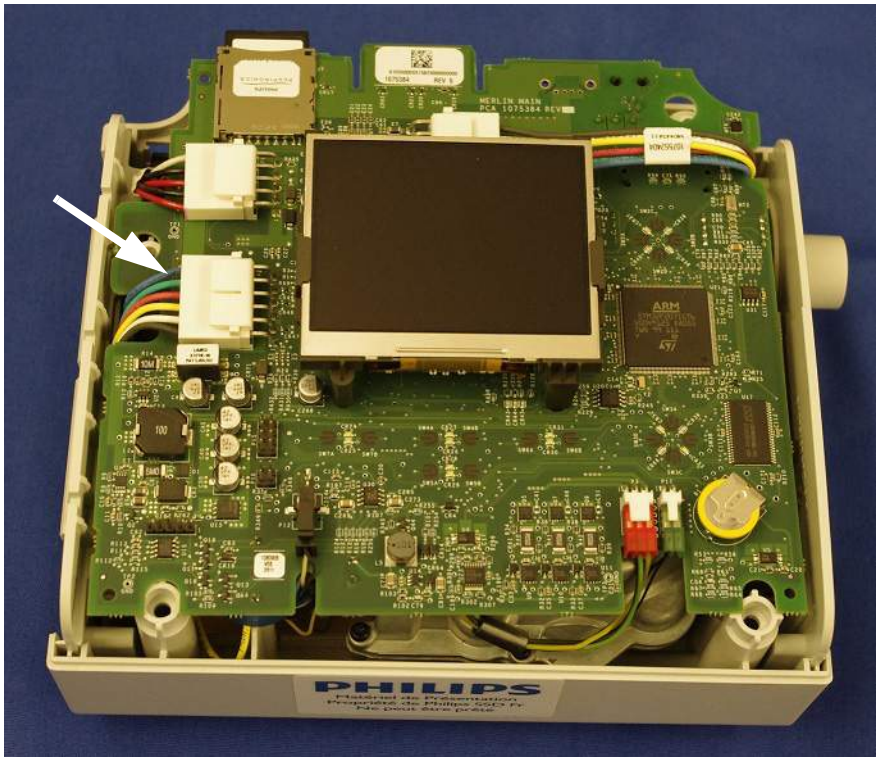


FIGURE 6-8: OUTSIDE COVER REMOVAL

To remove the Left Side Panel:

1. Remove the Top Cover. Refer to Replacing the Top Cover. For BiPAP A30 devices proceed to step 3.

2. For BiPAP A40 devices remove the 6 pin connector from location P2 on the Main PCA.



3. Slide the Left Side Panel out of the Bottom Enclosure.

To Install the Left Side Panel:

1. Slide the Outside Cover into the Bottom Enclosure. For BiPAP A30 devices proceed to step three.
2. For BiPAP A40 devices, connect the six pin connector to location P2 on the Main PCA.
3. Assemble the remainder of the device as instructed in previous sections.

6.3.7 REPLACING THE MAIN PCA

Included in Kit	Tools Required	Part Number(s)
Main PCA	T15 Torx screwdriver	1115581 1114064

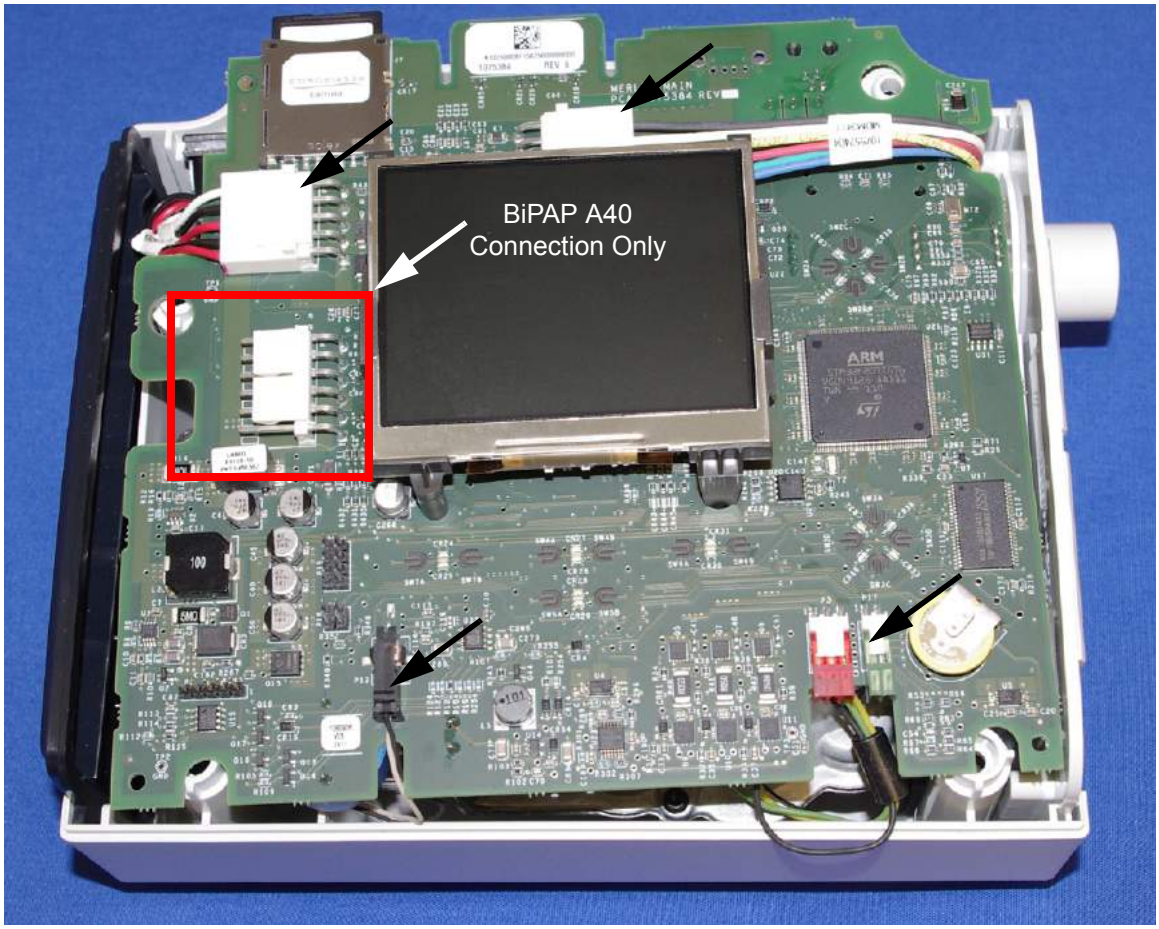


FIGURE 6-9: MAIN PCA

To remove the Main PCA:

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Disconnect the wiring harnesses from the Main PCA. The wiring harnesses are indicated by the arrows in Figure 6-9. The Black Arrows represent connection for both the BiPAP A30 and BiPAP A40 devices and the white arrow showing an additional connection on the BiPAP A40 devices.

CAUTION

A piece of Tubing is connected to the PCA. Tilt the PCA to access the connection of the Tubing before fully lifting the PCA out of the Bottom Enclosure.

3. Disconnect the Tubing from the underside of the PCA. Refer to Figure 6-9.
4. Lift the PCA out of the Bottom Enclosure.

To Install the Main PCA:

1. Place the PCA in the Bottom Enclosure. Be sure that the Flow and Pressure Sensors properly align with the Flow Manifold.

CAUTION

The PCA's Flow and Pressure Sensors must be in proper alignment with the Flow Manifold. Otherwise, the device will not operate properly.

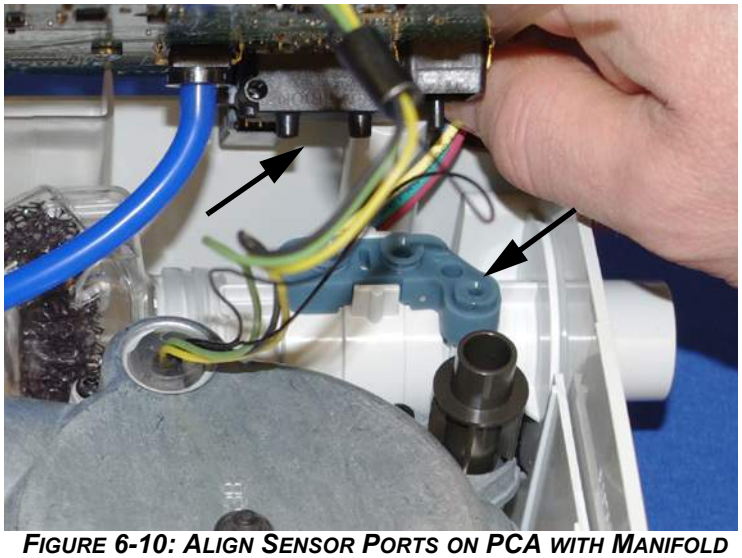


FIGURE 6-10: ALIGN SENSOR PORTS ON PCA WITH MANIFOLD

2. Connect the blue Pressure Tubing to the Main PCA.
3. Connect the wiring harnesses to the PCA.

CAUTION

When seating the PCA, be sure the ferrite on the Blower Wiring Harness is seated against the device's Right Side Panel.

4. Assemble the remainder of the device as instructed in previous sections.

CAUTION

During installation of internal components, be sure all tubing connections are secure, not pinched, folded under, etc. to ensure proper operation of the device.

NOTE

Once you have removed the PCA, the components referred to in Replacing the Blower, Blower Box, and/or PCA Supports through Replacing the Right Panel Assembly can be removed in any order.

6.3.8 REPLACING THE BLOWER, BLOWER BOX, AND/OR PCA SUPPORTS

Included in Blower Kit	Tools Required	Part Number(s)
Blower Blower Mount (x3)	T10 Torx screwdriver T15 Torx screwdriver	1114065 1094694

Included in the two (2) Blower Box Kits	Tools Required
Blower Box Top includes: • Blower Box Top • Blower Cap Bumper • #4-40 x 1/2" screws (x6) Blower Box Bottom includes: • Blower Box Bottom • Blower Box Seal	T10 Torx screwdriver T15 Torx screwdriver

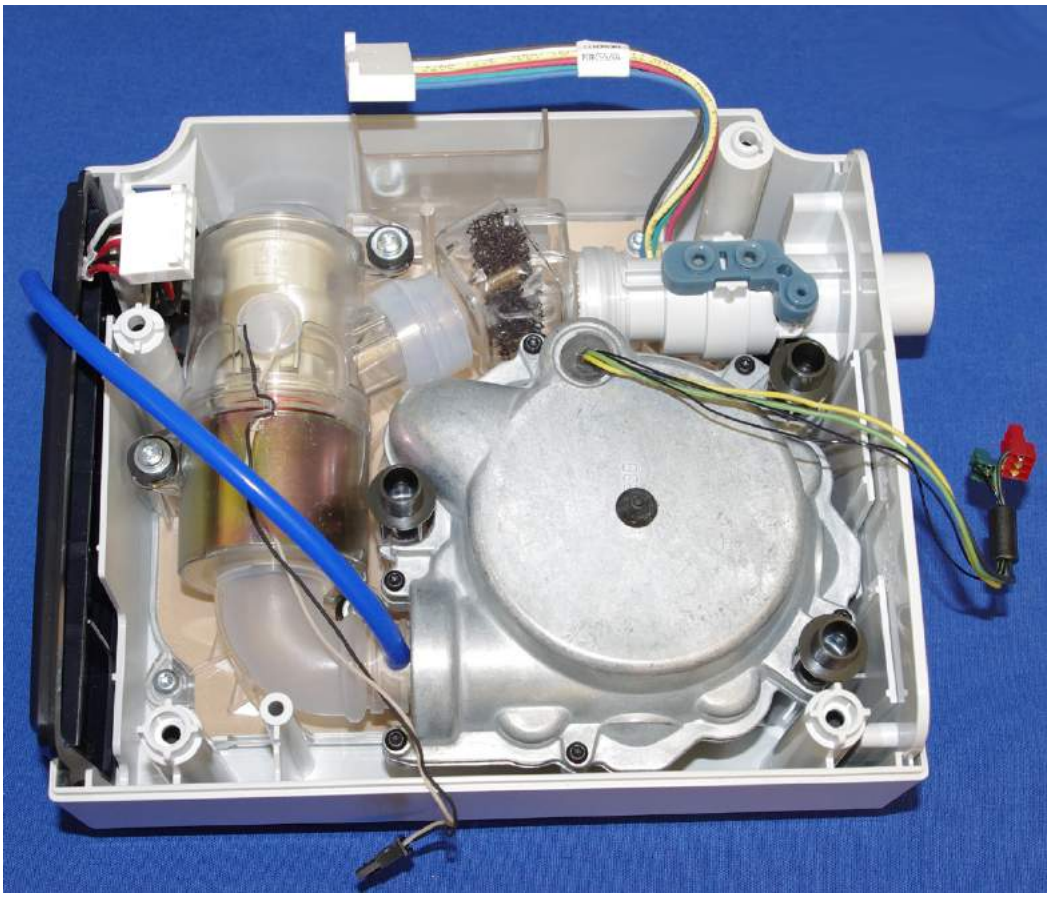


FIGURE 6-11: BLOWER REMOVAL

To remove the Blower Box

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Remove the Main PCA. Refer to Replacing the Main PCA.
3. Using a T15 Torx screwdriver, remove the three screws that secure the PCA Supports to the Bottom Enclosure.
4. Disconnect the Valve Inlet Elbow from the Blower Outlet. (Original Series ONLY)
5. Using caution so as not to damage the Blower Box Mount (see caution box below), lift the Blower Box out of the Bottom Enclosure. Note that the Blower Box Seal is located between the Blower Inlet (located on the Bottom of the Blower Box) and the Foam Inlet Cover.

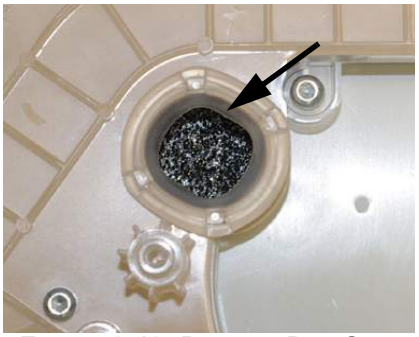
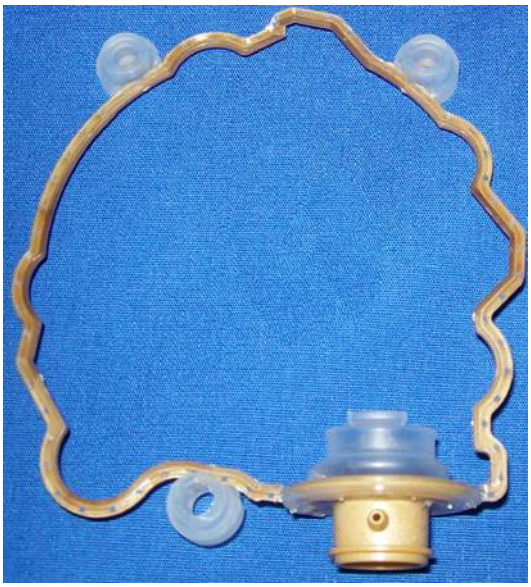


FIGURE 6-12: BLOWER BOX SEAL

CAUTION

Three grommets protrude from inside the Blower Box (zinc casting) and are located in the PCA Support cutouts. Use caution when lifting the Blower Box (with Blower) out of the Bottom Enclosure so as not to cause damage. These grommets are part of the Blower Box Mount, as shown here (RP Kit #1099044).



6. Using a T10 Torx screwdriver, remove the six (6) screws that secure the Blower Box Top to the Blower Box Bottom.

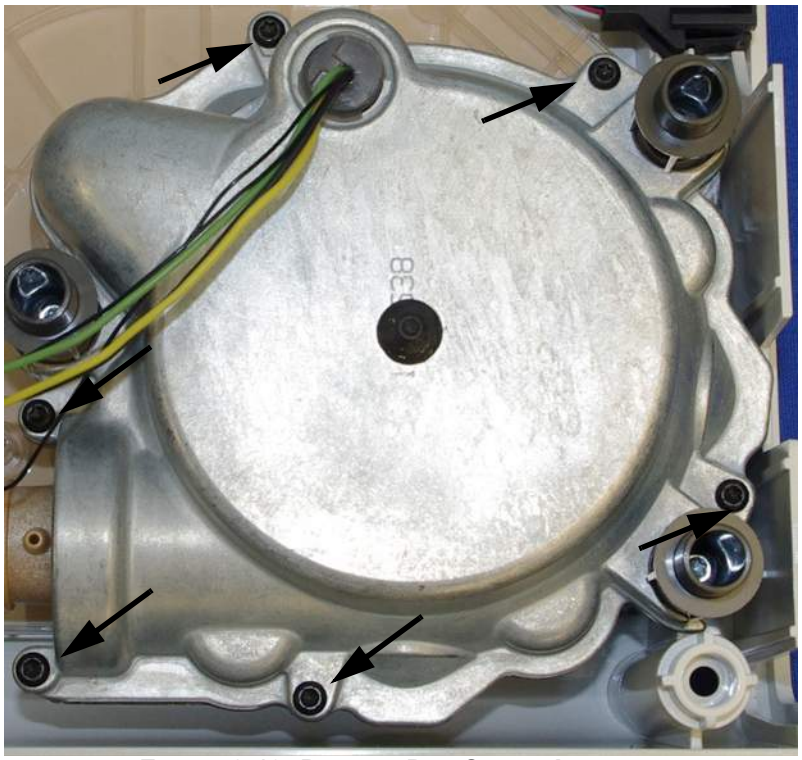


FIGURE 6-13: BLOWER BOX SCREW LOCATION

7. Lift the Blower Assembly out of the Blower Box.

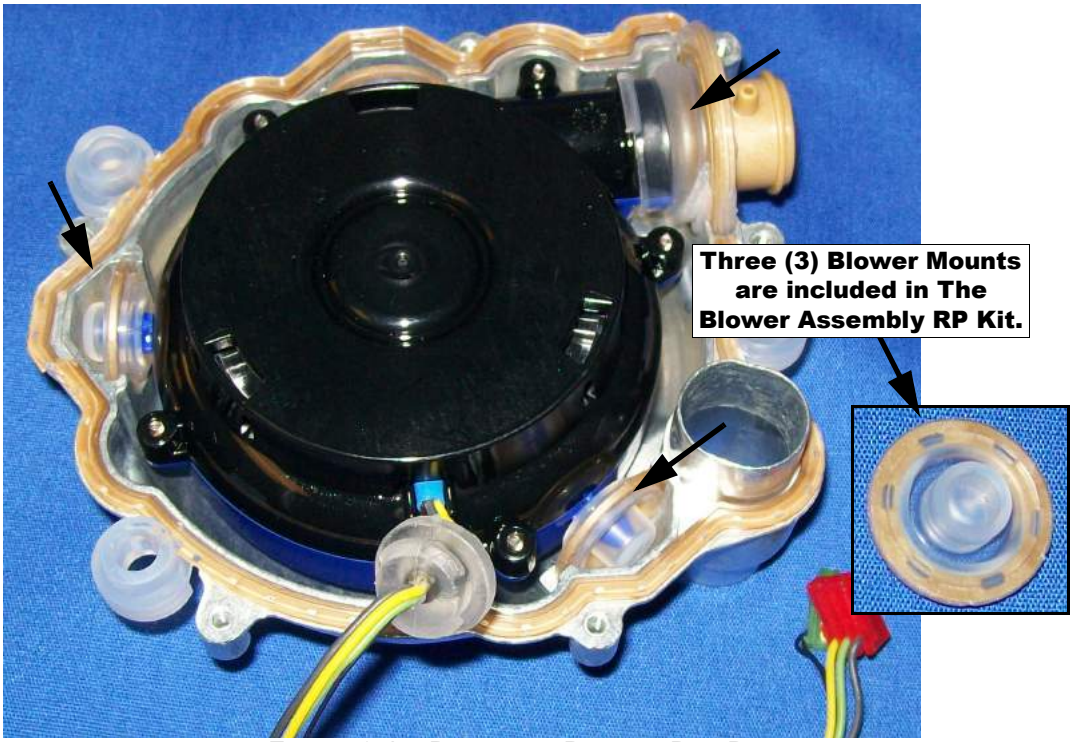


FIGURE 6-14: BLOWER IN BLOWER BOX BOTTOM

To install the Blower Assembly:

1. Place the Blower Assembly with Blower Mounts into the Blower Box Bottom as shown previously in Figure 6-14.Verify that the Blower Mounts and Blower Box Mounts are correctly seated in the Blower Box Bottom.
2. Route the Blower Wiring Harness through the cutout in the Blower Box Top and situate the grommet appropriately.

FIGURE 6-15: PROPER SEATING OF GROMMET

3. Secure the Blower Box Top to the Blower Box Bottom using the six (6) #4-40 x 1/2” screws. Torque screws to 7 in.-lbs.
4. Verify that the Blower Box Seal is installed in the Bottom Enclosure as shown previous in Figure 6-12.
5. Align the Blower Box Bottom Inlet Port with the Blower Box Seal and place the Blower Box w/ Blower Assembly into the Bottom Enclosure.
6. Verify that the Blower Box Mount protruding grommets are aligned with the standoffs in the Bottom Enclosure as shown in

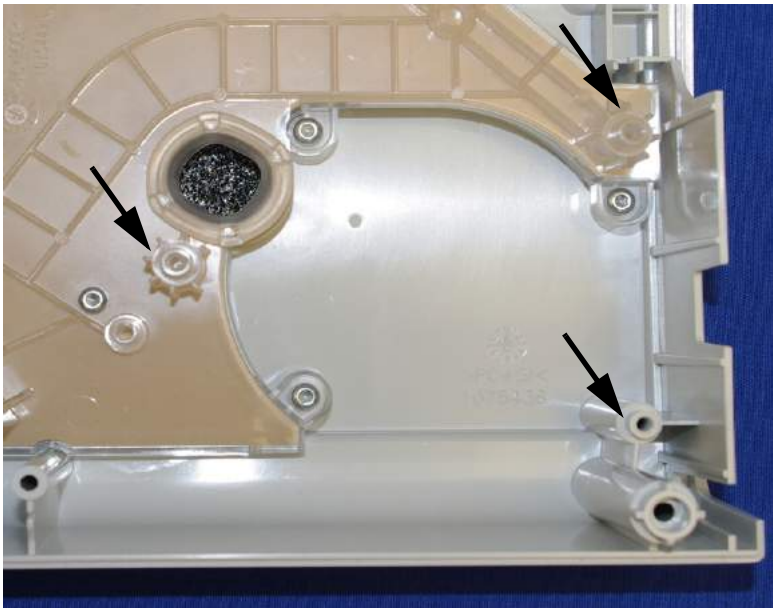


FIGURE 6-16: BLOWER BOX MOUNTING LOCATION

7. Secure the Blower Box w/Blower Assembly to the Bottom Enclosure using the three PCA Supports. Torque the PCA Support Screws to 9 in.-lbs.
8. Assemble the remainder of the device as instructed in previous sections.

6.3.9 REPLACING THE VALVE ASSEMBLY

This procedure applies only to the Original Series device Model Numbers:

Included in Kit	*Tools Required*	*Part Number(s)*
• *Valve Assembly* • *6-19 x 3/8# screws ((x3)* • *Flat Washers (x3)* • *Grommets (x3)*	• *T15 Torx screwdriver*	*1094694*

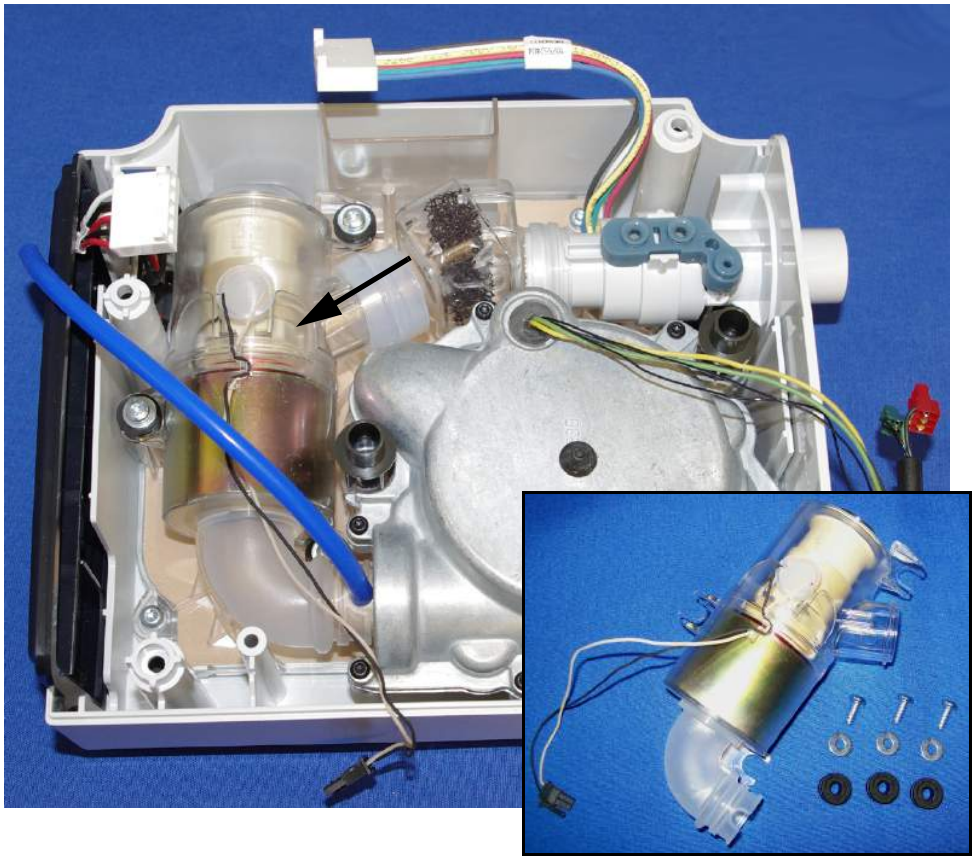


FIGURE 6-17: VALVE ASSEMBLY

To remove the Valve Assembly:

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Remove the Main PCA. Refer to Replacing the Main PCA.
3. Remove the three (3) screws that secure the Valve Assembly to the Bottom Enclosure.
4. Lift the Valve Assembly out of the Bottom Enclosure.

To install the Valve Assembly:

1. Places the Valve Assembly grommets into the Valve Assembly slots.

CAUTION

When installing the Valve Assembly, use a blunt, non-conductive probing tool to prod the silicone pieces and ensure good connections.

2. Secure the Valve to the Foam Path Cover (installed in the Bottom Enclosure) as shown in Figure 6-18. Torque the screws to 5 in.-lbs.

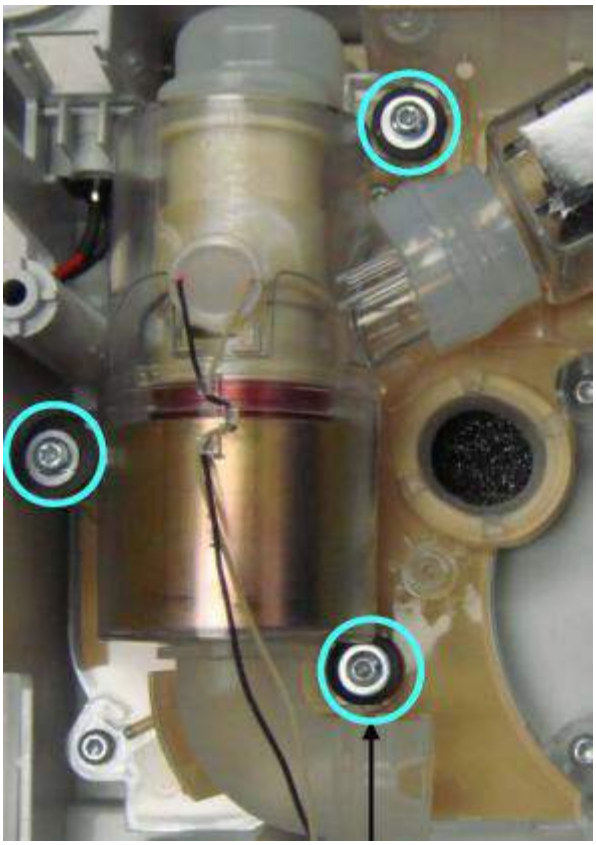


FIGURE 6-18: VALVE INSTALLATION

CAUTION

Be sure all tubing connections are secure, not pinched, folded under, etc. to ensure proper operation of the device.

3. Assemble the remainder of the device as instructed in previous sections.

6.3.10 REPLACING THE OUTLET FLOW PATH

Included in Kit	*Tools Required*	*Part Number(s)*
• *Flow Path Outlet* • *6-19 x 3/8# screws (x2)* • *Flat Washers (x3)3*	• *T15 Torx screwdriver*	*1114071*

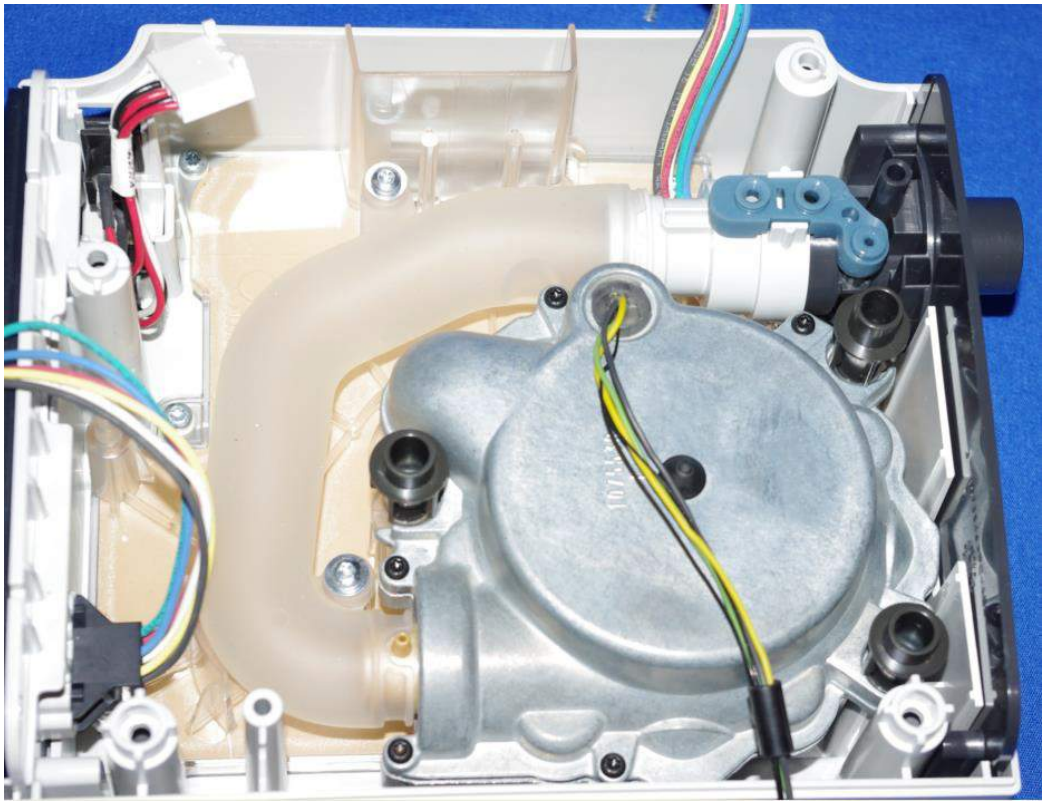


FIGURE 6-19 OUTLET FLOW PATH

To remove the Outlet Flow Path:

1. Remove the Top Cover. Refer to Section 6.2.3.
2. Remove the Main PCA. Refer to Section 6.2.6.
3. Remove the two (2) screws that secure the Outlet Flow Path to the Bottom Enclosure.
4. Lift the Outlet Flow Path out of the Bottom Enclosure.

To install the Outlet Flow Path:

1. Place the Outlet Flow Path on the Valveless Flow Path Cover.
2. Secure the Outlet Flow Path to the Valveless Flow Path Cover (installed in the Bottom Enclosure).
3. Assemble the remainder of the device as instructed in previous sections

6.3.11 REPLACING THE FLOW MANIFOLD

Included in Kit	*Tools Required*	*Part Number(s)*
• *Flow Manifold*	• *T15 Torx screwdriver*	*1064751*

To remove the Flow Manifold:

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Remove the Main PCA. Refer to Replacing the Main PCA.
3. Lift the Flow Manifold off of the Right Side Assembly.

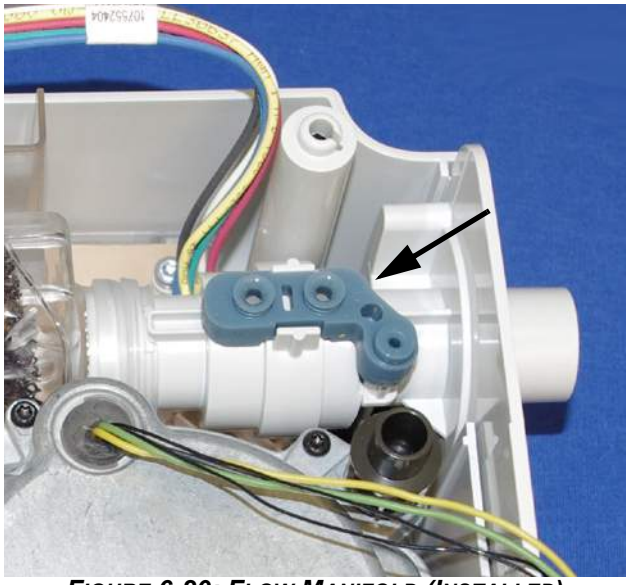


FIGURE 6-20: FLOW MANIFOLD (INSTALLED)

To install the Flow Manifold:

1. Place the Flow Manifold onto the Right Side Assembly as shown in Figure 6-20. Be sure that the manifold is properly aligned with the ports on the Right Panel Assembly.
2. Assemble the remainder of the device as instructed in previous sections.

6.3.12 REPLACING THE RIGHT PANEL ASSEMBLY

Included in Kit	*Tools Required*	*Part Number(s)*
• *Right Side Assembly*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*	*1114072* *1093949*

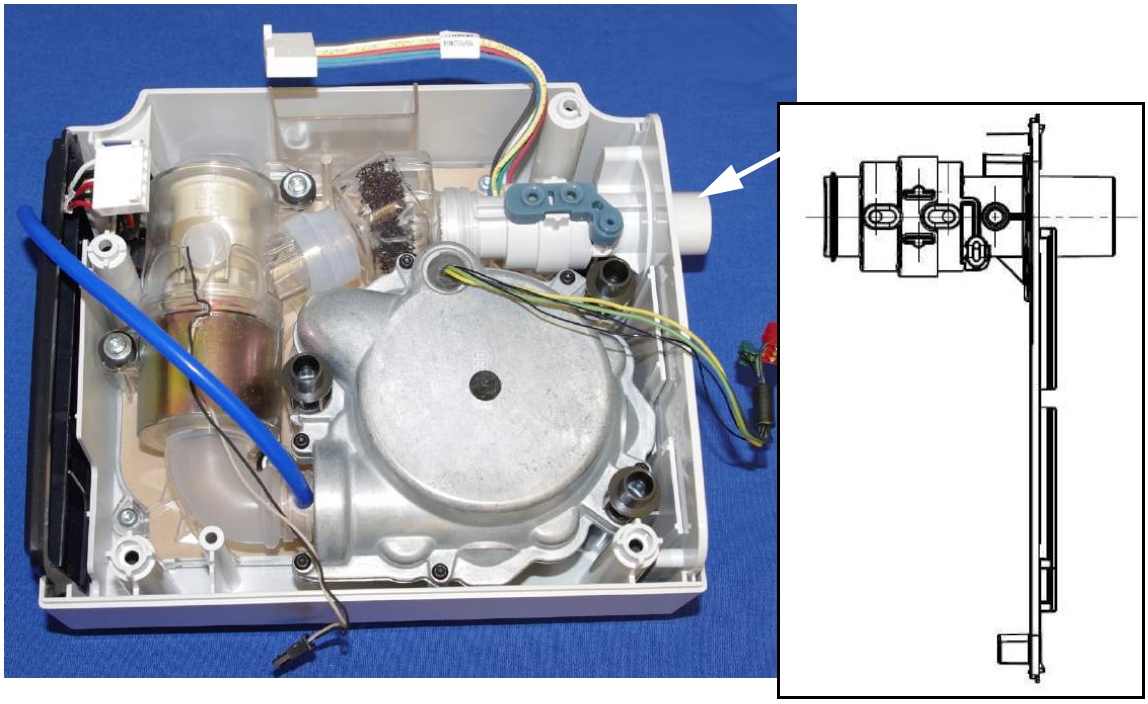


FIGURE 6-21: RIGHT PANEL ASSEMBLY

To remove the Right Panel Assembly:

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Remove the Main PCA. Refer to Replacing the Main PCA.
3. Remove the Flow Manifold. Refer to Replacing the Valve Assembly.
4. Lift the Right Panel Assembly out of the Bottom Enclosure.

To install the Right Panel Assembly:

1. Slide the Right Panel Assembly into the Bottom Enclosure.
2. Place the Flow Manifold onto the Right Panel Assembly as shown previously.
3. Assemble the remainder of the device as instructed in previous sections.

6.3.13 REPLACING THE BASE CABLE (6 PIN)

Included in Kit	*Tools Required*	*Part Number(s)*
• *Base Cable (6 pin)*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*	*1114063* *1093953*

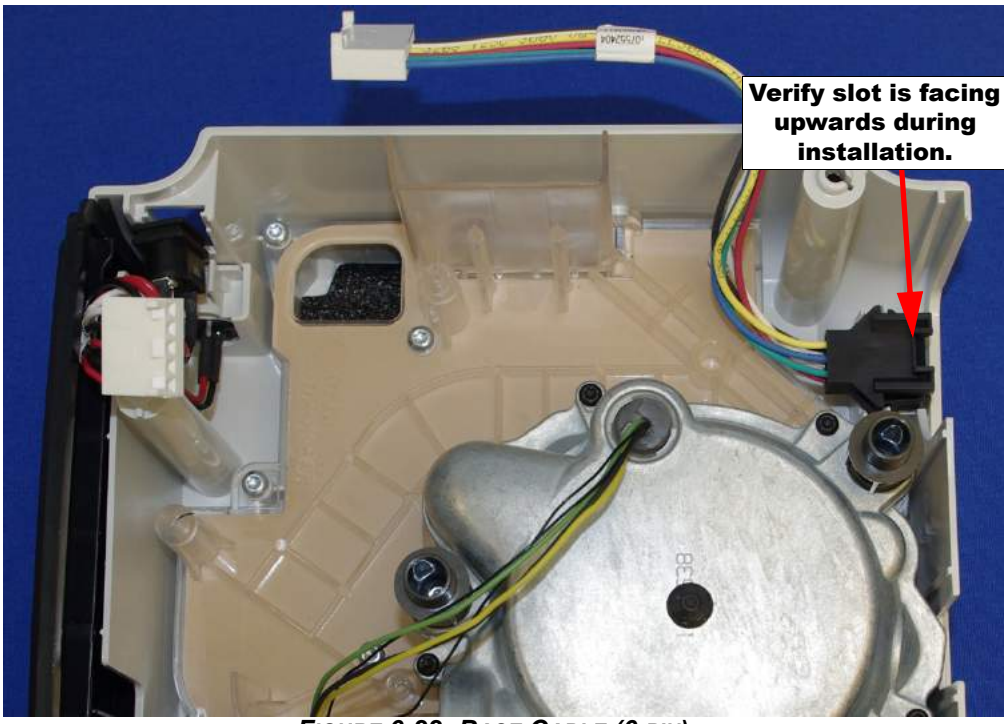


FIGURE 6-22: BASE CABLE (6 PIN)

To remove the Base Cable (6 pin):

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Remove the Main PCA. Refer to Replacing the Main PCA.
3. Remove the Right Panel Assembly. Refer to Replacing the Right Panel Assembly.

To install the Base Cable (6 pin):

1. Place the Base Cable (6 pin) into the Bottom Enclosure. Be sure the Base Cable (6 pin) is properly seated in its mounting location.
2. Assemble the remainder of the device as instructed in previous sections.

6.3.14 REPLACING THE POWER CABLE ASSEMBLY AND/OR POWER CONNECTOR BRACKET

Included in Kit	Tools Required	Part Number(s)
• Power Cable Assembly	• T15 Torx screwdriver	1114074 1093952

Included in Kit	Tools Required	Part Number(s)
• Power Connector Bracket	• T15 Torx screwdriver	1093958

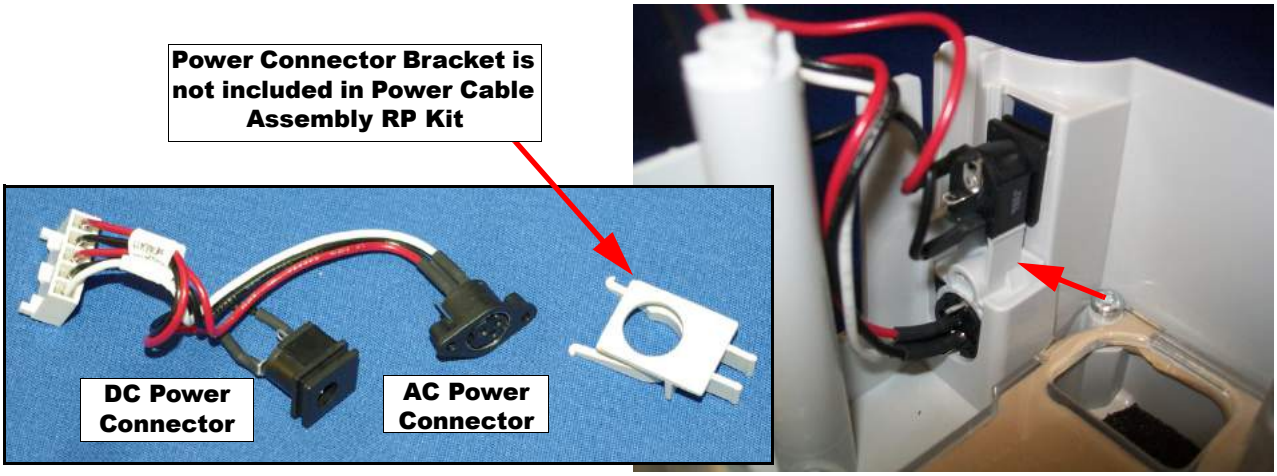


FIGURE 6-23: POWER CABLE ASSEMBLY AND POWER CONNECTOR BRACKET

To remove the Power Cable Assembly:

1. Remove the Top Cover. Refer to Replacing the Top Cover.
2. Remove the Main PCA. Refer to Replacing the Main PCA.
3. Slide the DC Power Connector upwards and out of the Bottom Enclosure.
4. Squeeze the upper clips on the Power Connector Bracket to free the AC Connector from the Bottom Enclosure and remove the Power Cable Assembly.

NOTE

If necessary, remove other components as necessary (e.g., Valve Assembly) to gain better access to the Power Cable Assembly

5. Remove the Power Connector from the Power Cable Assembly.

To install the Power Cable Assembly:

CAUTION
The Power Cable Assembly wires are shipped unbent. It is necessary to properly bend the wires so the wires so that the Assembly is properly seated and the device is assembled properly. ***Do Not*** *overly bend or twist the wires so as to cause damage to the wires.*

1. Install the Power Connector Bracket onto the AC Connector portion of the Power Cable Assembly.
2. Place the AC Power Connector into its mounting location in the Bottom Enclosure. Be sure that it snaps into place.
3. Slide the DC Power Connector into its mounting location in the Bottom Enclosure.
4. Assemble the remainder of the device as instructed in previous sections.

6.3.15 REPLACING THE FLOW PATH COVER AND/OR AIR PATH FOAM

This procedure applies only to the following Silver Series device Model Numbers:

Included in Kit	*Tools Required*	*Part Number(s)*
• *Flow Path Cover* • *6-19 x 9/16 Screws (x9)*	• *T8 Torx screwdriver* • *T15 Torx screwdriver*	1093957 / 1114073 1093959 / 1114075

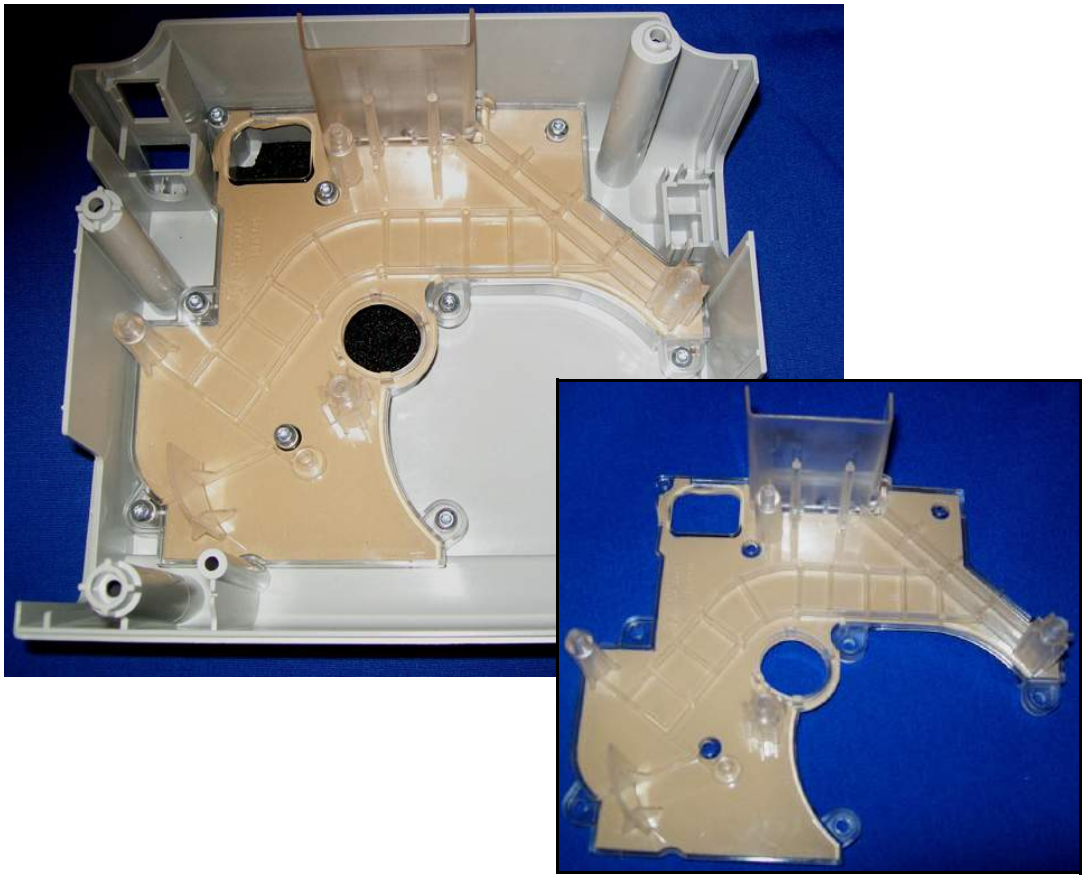


FIGURE 6-24: FLOW PATH COVER

TO REMOVE THE FLOW PATH COVER:

1. Remove the Top Cover, Main PCA, Blower Assembly in Blower Box, and Valve Assembly as per previous sections.
2. Remove any additional components impeding access to the Flow Path Cover (e.g., Grommets, Seals, Wiring Harnesses, etc.
3. Remove the nine (9) screws that secure the Flow Path Cover and lift it out of the Bottom Enclosure.

4. Lift the Flow Path Cover out of the Bottom Enclosure.

NOTE
Observe the placement of the Sound Abatement Foam in the Bottom Enclosure.

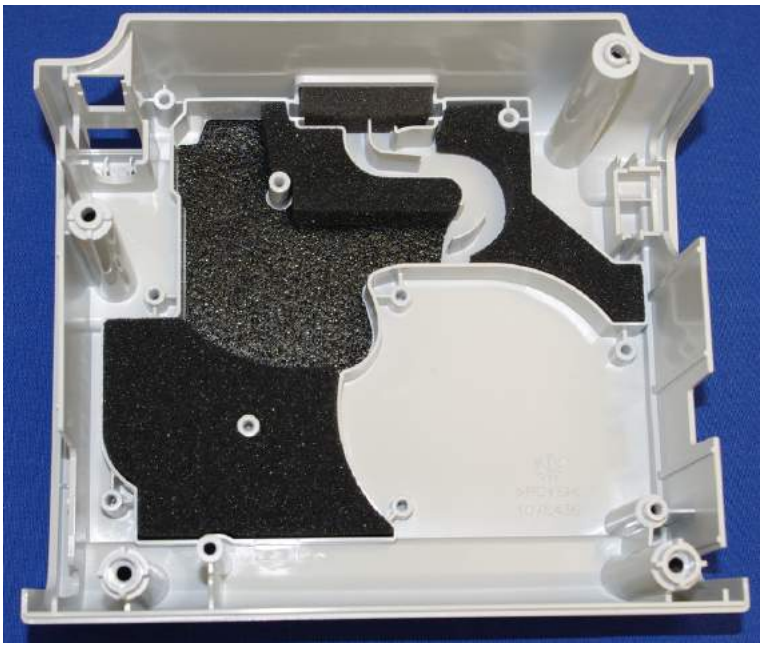


FIGURE 6-25: AIR FOAM PLACEMENT

TO INSTALL THE FLOW PATH COVER:

1. Place the Foam in the Bottom Enclosure as shown in Figure 6-24.
2. Assemble the remainder of the device as instructed in previous sections.

6.3.16 REPLACING THE BOTTOM ENCLOSURE

Included in Kit	Tools Required	Part Number(s)
• Bottom Enclosure • Warning Label	• T8 Torx screwdriver • T15 Torx screwdriver	1093960

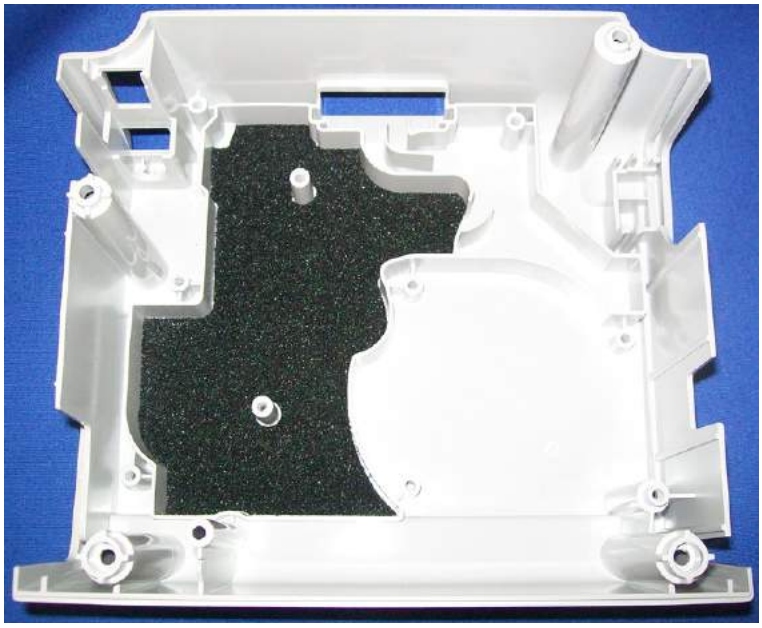


FIGURE 6-26: BOTTOM ENCLOSURE

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CHAPTER 7: HUMIDIFIER REPAIR AND REPLACEMENT

This section illustrates the names and locations of the replaceable components in the System One Humidifier.

WARNING

To prevent electrical shock, disconnect the Humidifier from the NIV device before attempting to make any repairs.

CAUTION

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.

7.0 HUMIDIFIER REPLACEMENT PART (RP) KITS

RP KIT NAME	ORIGINAL SERIES PART NUMBER	SILVER SERIES NON-HEATED TUBE PART NUMBER	SILVER SERIES HEATED TUBE PART NUMBER
Dry Box Assembly	*1064803*	*1064803*	*1064803*
Dry Box Seal (included w/ Inlet Seal)	*1064804*	*1064804*	*1064804*
Flip Lid Assembly	*1093865*	*1093865*	*1114892*
Heater Plate	*1093867*	*1093867*	*1099585*
Heater Plate Spring	*1064807*	*1064807*	*1064807*
Humidifier Bottom Housing	*1093866*	*1114891*	*1114891*
Humidifier Lower Base	*1094687*	*1094687*	*1114890*
Humidifier Top Housing	*1093966*	*1093966*	*1121288*
Outside Cover	*1064808*	*1064808*	*1064808*
Slider Docking Latch	*1064797*	*1064797*	*1064797*
Warning Label Int'l	*1093964*	*1093964*	*1093964*
Warning Label Dom U.S.	*1093963*	*1093963*	*1093963*
Water Chamber (Dom. U.S.)	*1063785*	*1063785*	*1063785*
Torx Screwdriver Kit	*1040889*	*1040889*	*1040889*

7.1 HUMIDIFIER PRELIMINARY CHECKOUT

Prior to performing repair and replacement procedures on the device:

1. Visually inspect the outside of the device for physical damage and broken or missing parts.
2. Connect the Humidifier to the NIV device and verify that the Heater Plate works (i.e., does it get warm?)
3. Perform repairs to the device as necessary.

7.2 REPLACEMENT INSTRUCTIONS

Refer to the following sections for information on repairing the BiPAP A30/BiPAP A40 Humidifier.

7.2.1 REPLACING THE WATER CHAMBER ASSEMBLY

Included in Kit	*Tools Required*	*Part Number(s)*
• *Tank Assembly*	*None*	• *1063785* • *1066737*

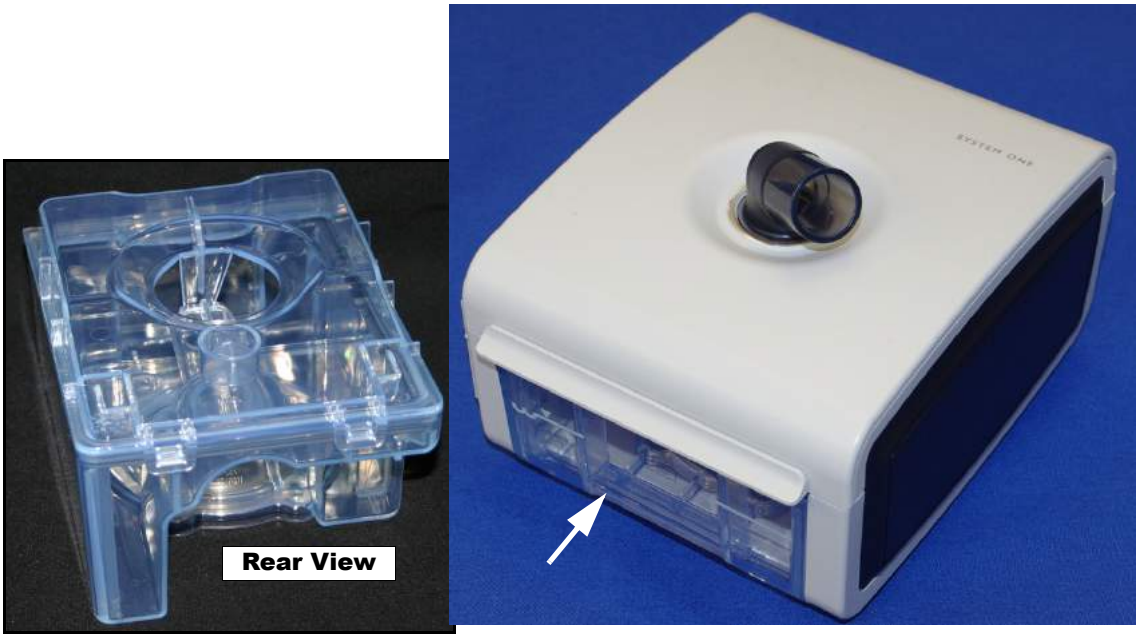

FIGURE 7-1: WATER CHAMBER ASSEMBLY

To remove the Water Chamber Assembly:

1. Gently squeeze the latch on the Flip Lid Assembly to release it and lift the Flip Lid Assembly.
2. Pull the Water Chamber Assembly out of the Humidifier.

To Install the Water Chamber Assembly:

1. With the Flip Lid Assembly in the up position, push the Water Chamber Assembly into the Humidifier.
2. Be sure the Water Chamber assembly is fully seated with the Dry Box Seal.
3. Close the Flip Lid Assembly.

7.2.2 REPLACING THE TANK TOP SEAL

Included in Kit	*Tools Required*	*Part Number(s)*
• *Tank Top Seal*	*None*	• *1064798*

FIGURE 7-2: TANK TOP SEAL

TO REMOVE THE TANK TOP SEAL:

1. Remove the Humidifier Tank Assembly. Refer to Replacing the Water Chamber Assembly.
2. Remove the Tank Top Seal from the Flip Lid Assembly.

TO INSTALL THE TANK TOP SEAL:

1. Lift the Flip Lid Assembly.
2. Press the Tank Top Seal onto the Patient Outlet Swivel Clip.

7.2.3 REPLACING THE DRY BOX SEAL

Included in Kit	*Tools Required*	*Part Number(s)*
• *Dry Box Seal* • *Inlet Seal*	*None*	• *1064803*

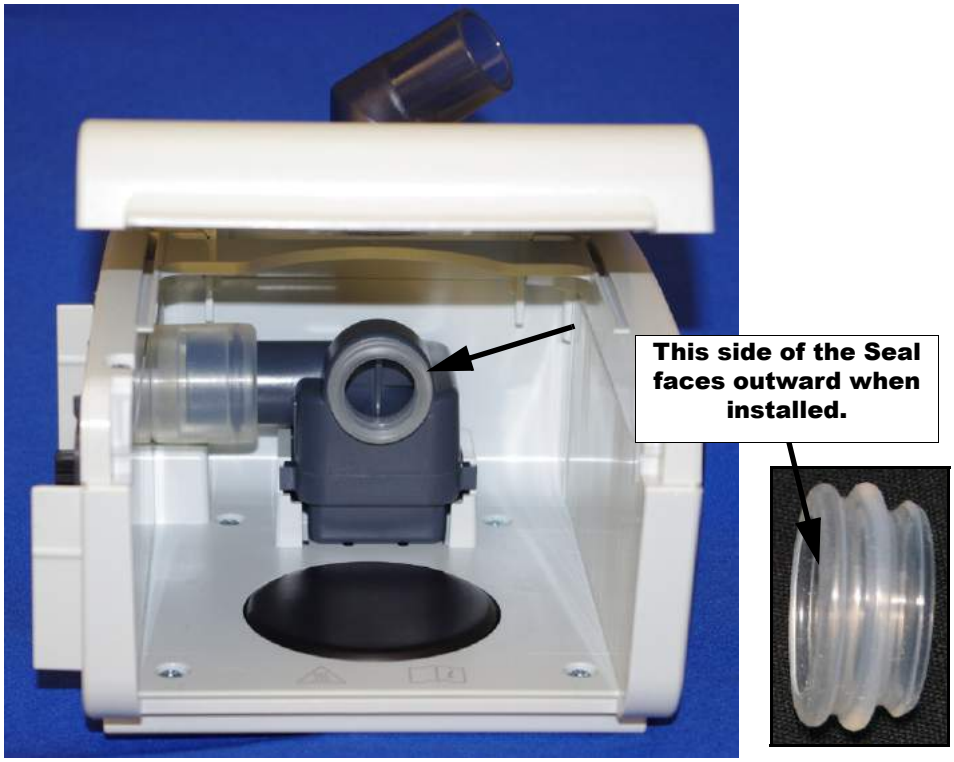

FIGURE 7-3: DRY BOX SEAL

TO REMOVE THE DRY BOX SEAL:

1. Remove the Humidifier Tank Assembly. Refer to Replacing the Water Chamber Assembly.
2. Remove the Dry Box Seal.

TO INSTALL THE DRY BOX SEAL:

1. Insert the narrow side of the Dry Box Seal into the Dry Box Assembly.
2. Verify that the Dry Box Seal is fully Seated in the Dry Box Assembly.

7.2.4 REPLACING THE DRY BOX ASSEMBLY/HUMIDIFIER INLET SEAL

Included in Kit	*Tools Required*	*Part Number(s)*
• *Dry Box Assembly* • *Inlet Seal* • *Dry Box Seal*	*Flathead Screwdriver*	• *1064804*

FIGURE 7-4: BLOWER CAP

TO REMOVE THE DRY BOX ASSEMBLY/HUMIDIFIER INLET SEAL:

1. Remove the Water Chamber Assembly. Refer to Section 7.2.1.
2. Insert a flat blade screwdriver into the hole located on the back of the Humidifier and lightly press inward to release the Dry Box Assembly. Refer to Figure 7-5.

CAUTION

Do not press firmly on the screwdriver as damage to the Humidifier may occur.

3. Remove the Dry Box Assembly with Inlet Seal.

4. Remove the Inlet Seal from the Dry Box Assembly.

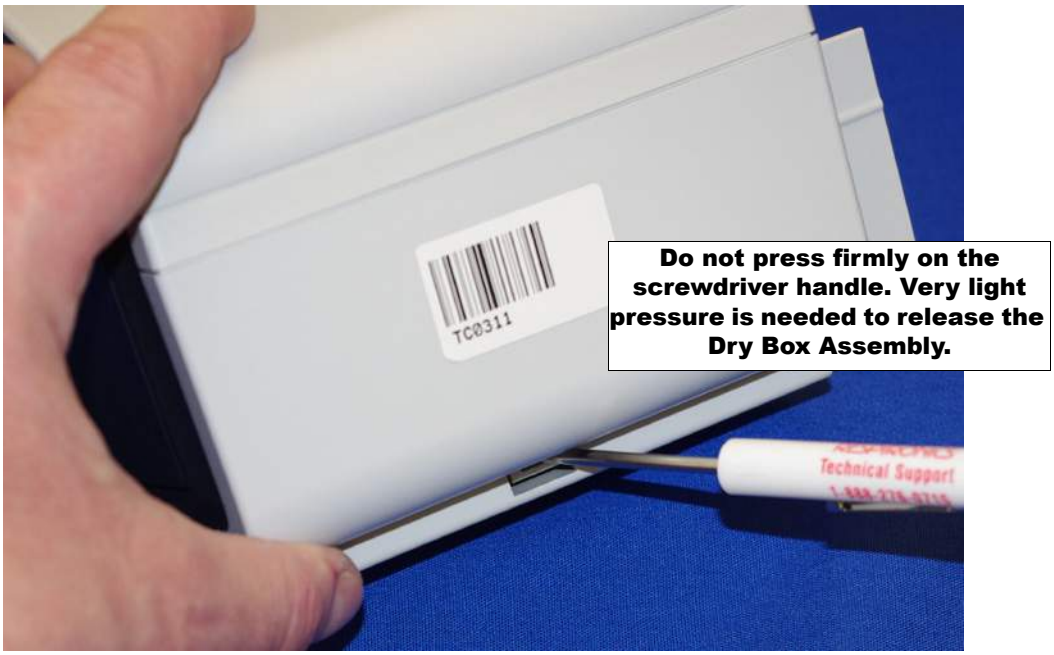

FIGURE 7-5: DRY BOX SEAL REMOVAL

TO INSTALL THE DRY BOX ASSEMBLY/HUMIDIFIER INLET SEAL:

1. Install The Inlet Seal onto the Dry Box Assembly if necessary.
2. Slide the Dry Box Assembly with Inlet Seal into its mounting location in the Humidifier Bottom Housing. Verify that the Dry Box Assembly with Inlet Seal are secured and do not fall out of the Housing.

7.2.5 REPLACING THE FLIP LID ASSEMBLY NON-HEATED TUBE

Included in Kit	Tools Required	Part Number(s)
• Flip Lid Assembly • Tank Top Seal	None	• 1093865

FIGURE 7-6: FLIP LID ASSEMBLY

TO REMOVE THE FLIP LID ASSEMBLY:

1. Remove the Water Chamber Assembly. Refer to Replacing the Water Chamber Assembly.
2. Using a screwdriver or similar probing tool, push in on the latches that secure the Flip Lid Assembly to the Humidifier Top Housing. Refer to Figure 7-7.

FIGURE 7-7: FLIP LID ASSEMBLY REMOVAL

3. Continue to bend the Flip Lid Assembly completely backwards until it is completely removed.

TO INSTALL THE FLIP LID ASSEMBLY:

1. Install the Flip Lid Assembly Heated Tube guides into the base.
2. Continue to hinge forward until the latches are secured.

7.2.6 REPLACING THE FLIP LID ASSEMBLY HEATED TUBE

Included in Kit	*Tools Required*	*Part Number(s)*
• *Flip Lid Assembly* • *Tank Top Seal*	*None*	• *1114892*

TO REMOVE THE FLIP LID ASSEMBLY HEATED TUBE:

1. Remove the Water Chamber Assembly. Refer to Replacing the Water Chamber Assembly.
2. Using a screwdriver or similar probing tool, push in on the latches that secure the Flip Lid Assembly to the Humidifier Top Housing. Refer to Figure 7-7.
3. Continue to bend the Flip Lid Assembly completely backwards until it is completely removed.
4. Remove the wire harness from the base. Refer to Figure 7-8.

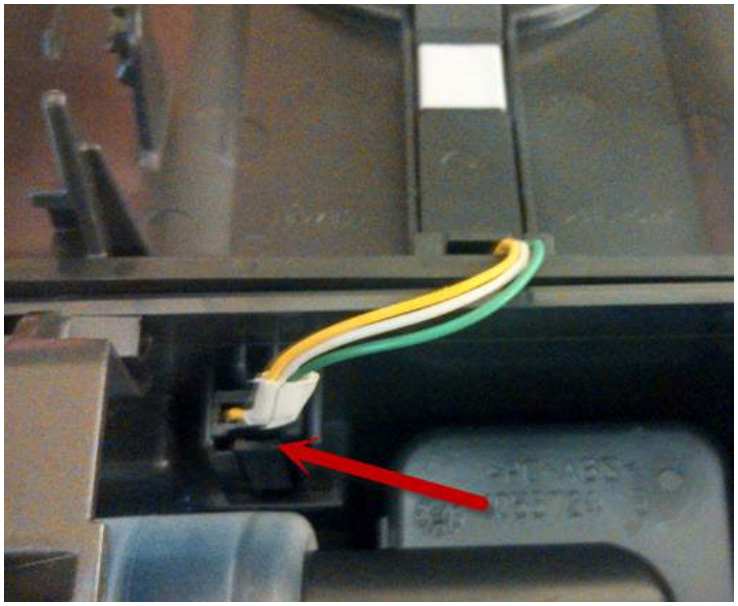

FIGURE 7-8 FLIP LID ASSEMBLY WIRE HARNESS REMOVAL

TO INSTALL THE FLIP LID ASSEMBLY HEATED TUBE:

1. Connect the Flip Lid Assembly Heated Tube wire harness to the base. Refer to Figure 7-8.
2. Install the Flip Lid Assembly Heated Tube guides into the base.
3. Continue to hinge forward until the latches are secured.

7.2.7 REPLACING THE HUMIDIFIER TOP HOUSING

Included in Kit	Tools Required	Part Number(s)
• Top Housing • #4 X 1/2" screw (x4)	T8 Torx Screwdriver	• 1093966

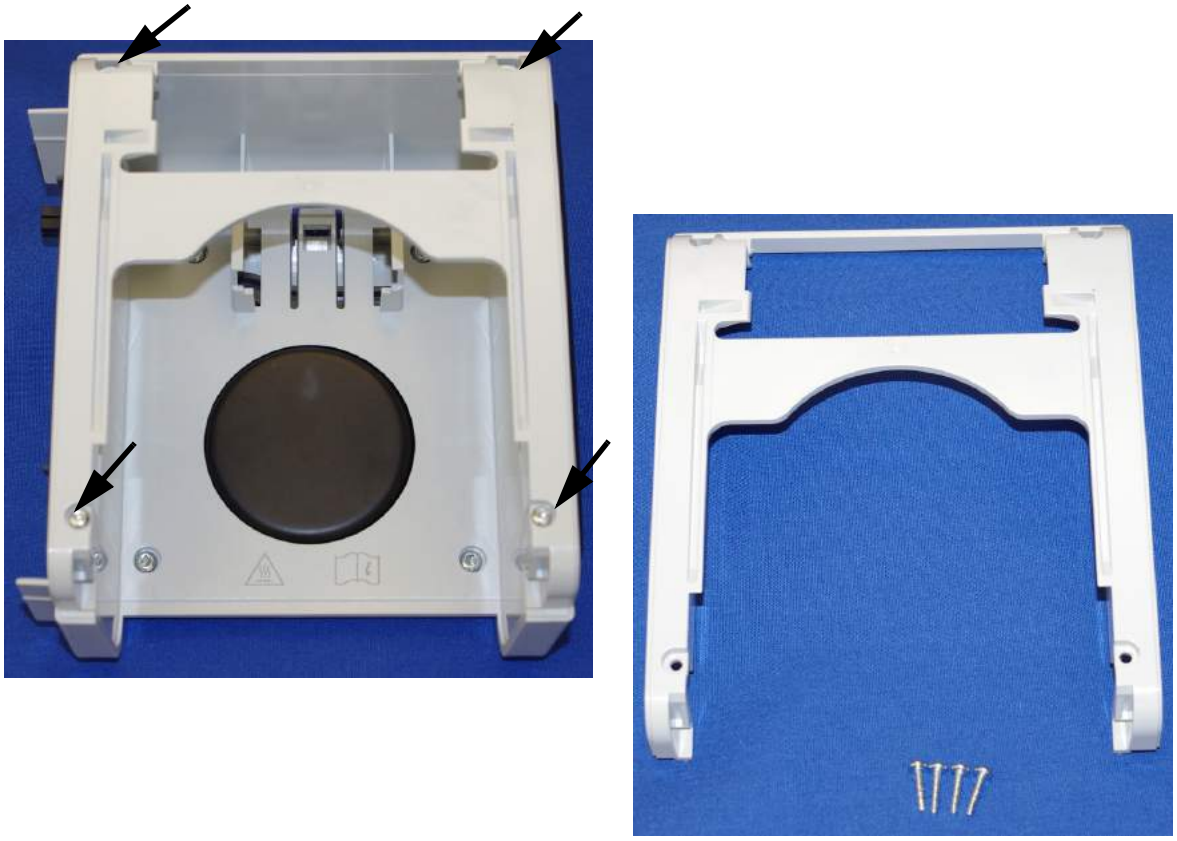

FIGURE 7-9: HUMIDIFIER TOP HOUSING

TO REMOVE THE HUMIDIFIER TOP HOUSING:

1. Remove the Water Chamber Assembly. Refer to Section 7.2.1.
2. Using a T8 Torx screwdriver, remove the four #4 x 1/2" screws that secure the Top Housing to the Humidifier Bottom Housing.
3. Lift the Top Housing off of the Bottom Housing.

TO INSTALL THE HUMIDIFIER TOP HOUSING:

1. Place the Top Housing onto the Bottom Housing.
2. Secure the Top Housing to the Bottom Housing using the four #4 x 1/2" screws.

7.2.8 REPLACING THE HUMIDIFIER OUTSIDE COVER

Included in Kit	*Tools Required*	*Part Number(s)*
• *Outside Cover*	*T8 Torx Screwdriver*	• *1064808*

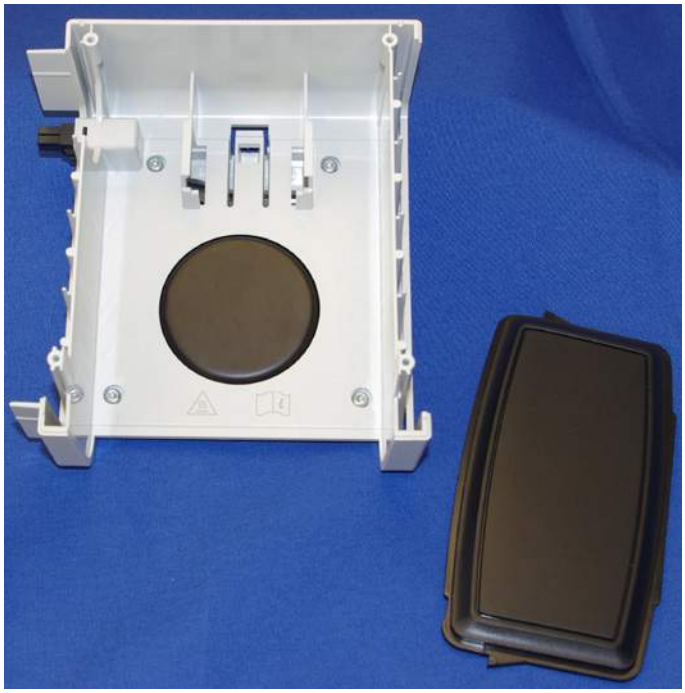

FIGURE 7-10: OUTSIDE COVER

TO REMOVE THE HUMIDIFIER TOP HOUSING:

1. Remove the Water Chamber Assembly. Refer to Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Replacing the Flip Lid Assembly Non-Heated Tube.
3. Remove the Top Housing. Refer to Replacing the Humidifier Top Housing.
4. Slide the Outside Cover out of the Bottom Housing.

TO INSTALL THE OUTSIDE COVER:

- Slide the Outside Cover into the Bottom Housing.

7.2.9 REPLACING THE HUMIDIFIER BOTTOM HOUSING

Included in Kit	*Tools Required*	*Part Number(s)*
• *Bottom Housing*	• *T8 Torx Screwdriver* • *T15 Torx Screwdriver*	• *1064808*

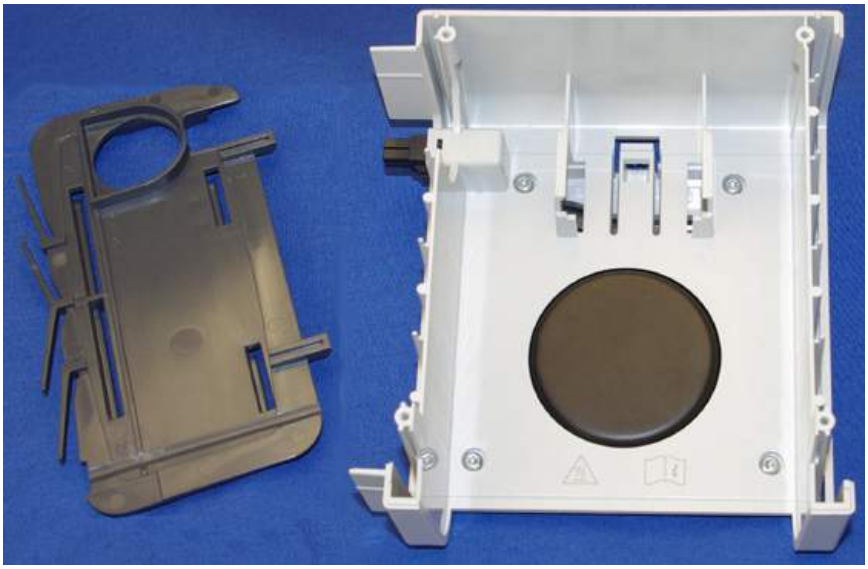

FIGURE 7-11: HUMIDIFIER BOTTOM HOUSING (HEATER PLATE SHOWN HERE, BUT IS NOT INCLUDED IN KIT)

TO REMOVE THE HUMIDIFIER BOTTOM HOUSING:

1. Remove the Water Chamber Assembly. Refer to Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Replacing the Flip Lid Assembly Non-Heated Tube.
3. Remove the Dry Box Assembly with Inlet Seal. Refer to Replacing the Dry Box Assembly/Humidifier Inlet Seal.
4. Remove the Top Housing. Refer to Replacing the Humidifier Top Housing.
5. Remove the Outside Cover. Refer to Replacing the Humidifier Outside Cover.
6. Remove the Left Side Panel.
7. Using a T15 Torx screwdriver, remove the four #6 x 1/4” screws that secure the Bottom Housing to the Lower Base Assembly.

TO INSTALL THE HUMIDIFIER BOTTOM HOUSING:

1. Place the Bottom Housing onto the Lower Base Assembly.

CAUTION

Route the Heater Plate wiring harness so as not to cause damage during installation of the Humidifier Bottom Housing.

2. Verify that the Heater Plate Wiring Harness is properly routed in the Lower Base Assembly and not at risk of being pinched or damaged.
3. Using the four #6 x 1/4” screws, secure the Bottom Housing to the Lower Base Assembly. Torque screws to 5 in.-lbs.

7.2.10 REPLACING THE HEATER PLATE ASSEMBLY

Included in Kit	*Tools Required*	*Part Number(s)*
• *Bottom Housing (with Left Side Panel)* • *#6 X 1/4" screw (x4)*	• *T8 Torx Screwdriver* • *T15 Torx Screwdriver*	• *1093867*

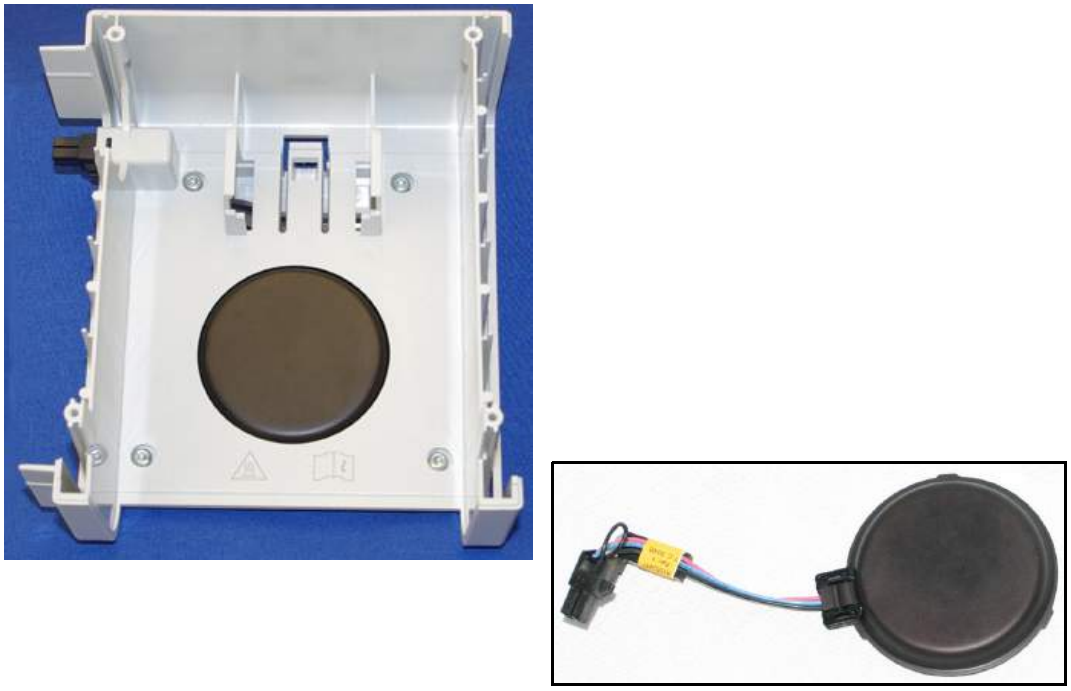

FIGURE 7-12: HEATER PLATE ASSEMBLY

To remove the Heater Plate Assembly:

1. Remove the Water Chamber Assembly. Refer to Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Replacing the Flip Lid Assembly Non-Heated Tube.
3. Remove the Dry Box Assembly with Inlet Seal. Refer to Replacing the Dry Box Assembly/Humidifier Inlet Seal.
4. Remove the Top Housing. Refer to Replacing the Humidifier Top Housing.
5. Remove the Outside Cover. Refer to Replacing the Humidifier Outside Cover.
6. Remove the Humidifier Bottom Housing. Refer to Replacing the Humidifier Bottom Housing.
7. Remove the Heater Plate Assembly.

To install the Heater Plate Assembly:

1. Place the Heater Plate Assembly into the Humidifier Lower Base as shown in Figure 7-13. Be sure that the Heater Plate Spring is properly seated under the Heater Plate.

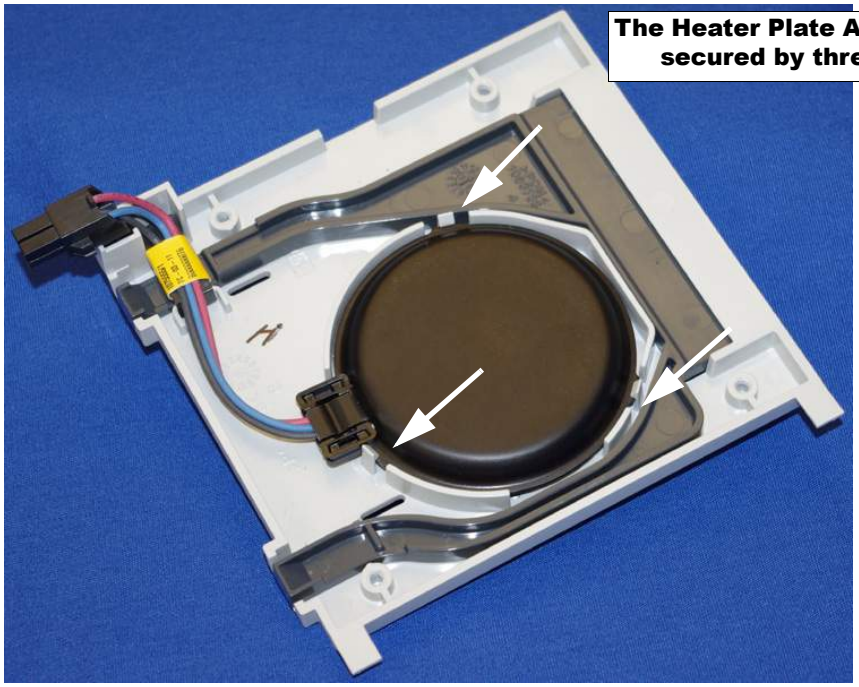

FIGURE 7-13: HEATER PLATE INSTALLATION

2. Secure the Bottom Housing to the Lower Base using the four #6 x 1/4” screws and assemble the remainder of the device as necessary.

7.2.11 REPLACING THE SLIDER DOCKING LATCH

Included in Kit	*Tools Required*	*Part Number(s)*
• *Bottom Housing (with Left Side Panel)* • *#6 X 1/4" screw (x4)*	• *T8 Torx Screwdriver* • *T15 Torx Screwdriver*	• *1093866*

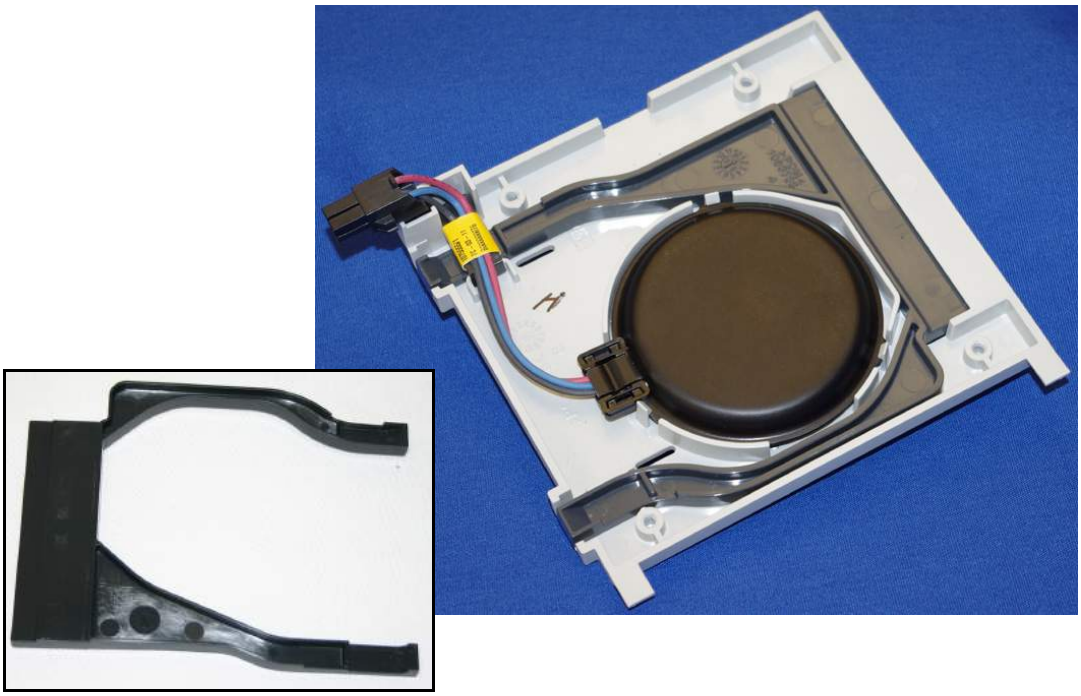

FIGURE 7-14: HEATER PLATE ASSEMBLY

To remove the Slider Docking Latch:

1. Remove the Water Chamber Assembly. Refer to Section 7.2.1.
2. Remove the Flip Lid Assembly. Refer to Replacing the Flip Lid Assembly Non-Heated Tube.
3. Remove the Dry Box Assembly with Inlet Seal. Refer to Replacing the Dry Box Assembly/Humidifier Inlet Seal.
4. Remove the Top Housing. Refer to Replacing the Humidifier Top Housing.
5. Remove the Outside Cover. Refer to Replacing the Humidifier Outside Cover.
6. Remove the Humidifier Bottom Housing. Refer to Replacing the Humidifier Bottom Housing.
7. Remove the Heater Plate Assembly.

To install the Slider Docking Latch:

1. Slide the Slider Docking Latch into slot in through the top of the Humidifier Base Housing as shown in Figure 7-15.

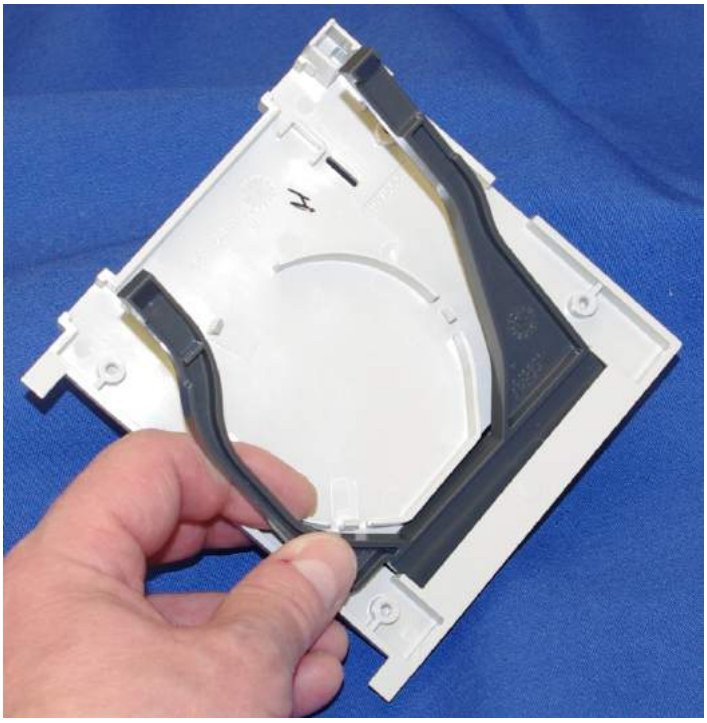

FIGURE 7-15: SLIDER DOCKING LATCH INSTALLATION

2. Assemble the remainder of the Humidifier as necessary.

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CHAPTER 8: TESTING & CALIBRATION

8.0 SECTION OVERVIEW

This section provides the necessary performance testing and final testing procedure for the BiPAP A30 & BiPAP A40 devices. Final Testing is necessary when a repair has been made to the device. However, this test may be conducted to determine that the device is functioning properly between patient usage or whenever desired.

8.1 PREVENTIVE MAINTENANCE

There is no Preventive Maintenance required for this device.

8.2 CLEANING

WARNING

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

CAUTION

Do not immerse the device in liquid or allow any liquid to enter the enclosure, inlet filter, or any opening.

1. Unplug the device, and wipe the outside of it with a cloth slightly dampened with water and a mild detergent. Let the device dry completely before plugging in the power cord.
2. Inspect the device and all circuit parts for damage after cleaning. Replace any damaged parts.
3. Allow the device to dry completely before plugging in the power cord.

8.2.1 CLEANING AND DISINFECTION FOR MULTIPLE USERS

WARNING

If you are using the device on multiple users, discard the bacteria filter each time the device is used on a different person.

When using the device on multiple users, complete the following steps to clean and disinfect the device before each new user.

1. Unplug the device before disinfecting.
2. Disinfect the outside of the device only. Use a cloth with one of the following cleaning agents to clean the exterior of the device:
   - Hydrogen Peroxide, 3%
   - 91% Isopropyl Alcohol
   - Vinegar, 5% acidity

- Water
- Chlorine bleach, household, 5.25% sodium hypochlorite, 1 to 5 part reduction with water.

3. Allow the device to dry completely before plugging in the power cord.

8.2.2 CLEANING AND REPLACING THE FILTERS

CAUTION

Operating the device with a dirty filter may keep the system from working properly and may damage the device.

Under normal usage, you should clean the gray foam filter at least once every two weeks and replace it with a new one every six months. The white ultra-fine filter is disposable and should be replaced after 30 nights of use or sooner if it appears dirty. DO NOT clean the ultra-fine filter.

CAUTION

Dirty inlet filters may cause high operating temperatures that may affect device performance. Regularly examine the inlet filters as needed for integrity and cleanliness.

1. Disconnect the device from the power source.
2. Remove the filter(s) from the enclosure by gently squeezing the filter in the center and pulling it away from the device.
3. Examine the filter(s) 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, replace it. Only Respironics-supplied filters should be used as replacement filters.
5. If the white ultra-fine filter is dirty or torn, replace it.
6. Reinstall the filters, inserting the white ultra-fine filter first if applicable.

CAUTION

Never install a wet filter into the device. You must ensure sufficient drying time for the cleaned filter.

8.2.3 CLEANING THE REUSABLE TUBING

Disconnect the flexible tubing from the device. Gently wash the tubing in a solution of warm water and a mild detergent. Rinse thoroughly and allow the tubing to air dry. The patient tubing should be cleaned daily.

8.2.4 CLEANING THE HUMIDIFIER TANK

NOTE

Hand washing The Humidifier Tank can be performed daily.

WARNING

- *Empty and clean the Humidifier Tank daily to prevent mold and bacteria growth.*
- *Allow the water in the Humidifier Tank to cool to room temperature before removing the chamber from the humidifier.*

1. Turn the therapy device off and allow approximately 15 minutes for the heater plate and water to cool.
2. Disconnect the Patient Tubing from the device.
3. Remove the Humidifier Tank Assembly. Empty any remaining water.
4. Separate the Humidifier Tank Lid from the Humidifier Tank Base. Refer to Figure 8-1.

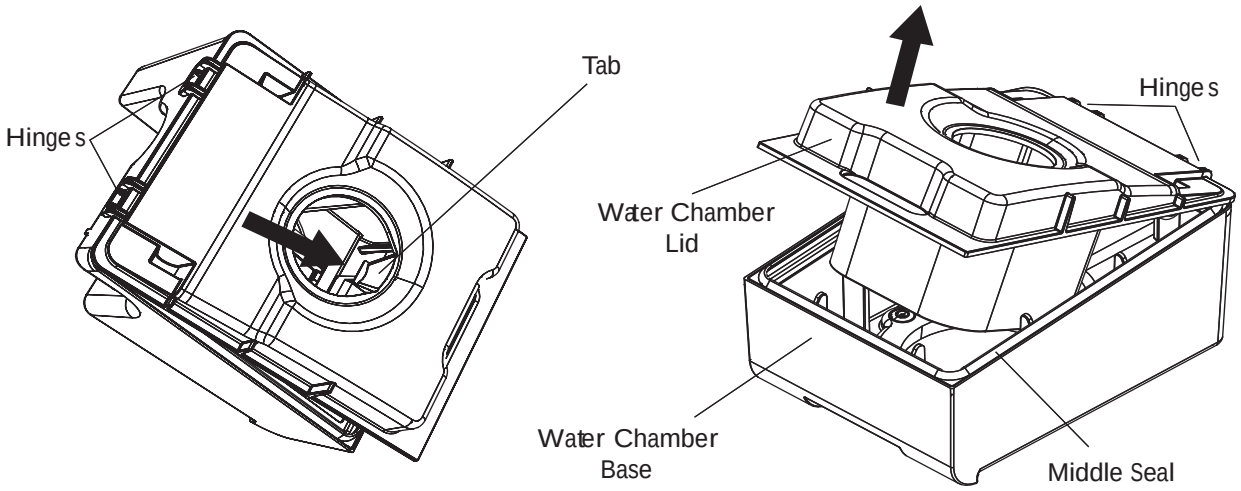


FIGURE 8-1: SEPARATING THE HUMIDIFIER TANK LID FROM THE TANK BASE

5. Wash the Humidifier Tank Lid and Tank Base by hand in a solution of warm water and mild dish-washing soap.
6. Inspect all parts for damage prior to reassembly.
7. Reassemble the Humidifier Tank.
8. Fill the Humidifier Tank to the fill line. Inspect the Humidifier Tank for any leaks or damage. Replace the entire Humidifier Tank Assembly if damaged.

8.3 SYSTEM CHECKOUT PROCEDURE

This test procedure may be performed prior to connecting the device to a patient or in between patient usage. The tests should be performed as described in order to verify proper operation of the device.

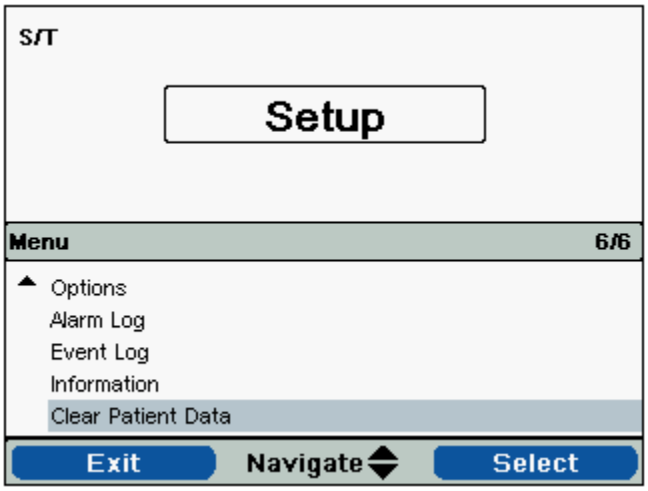
8.3.1 CLEARING PATIENT DATA

To eliminate patient confidentiality concerns and to remove previous patient therapy settings, the Clear Patient Data function removes all patient-stored data.

Clear Patient Data

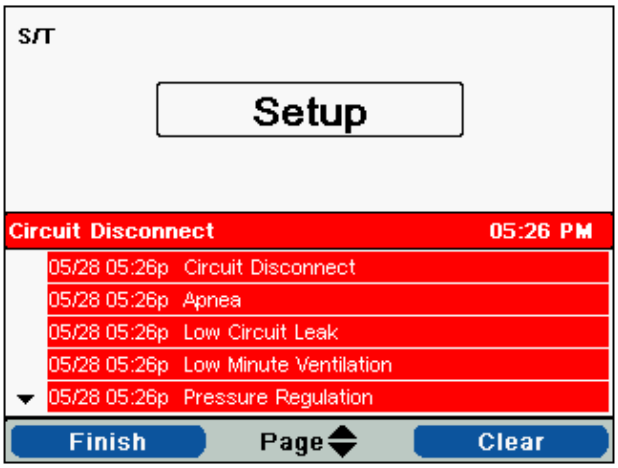
This option appears on the Setup screen when the airflow is off and the device is in Standby.

It allows you to clear all patient data and visual alarms stored in the device memory and the device SD Card, if inserted. It also clears the Modem SD Card data.



Clear Alarm Log

This option appears on the alarm log screen, when the airflow is off and the device is in Standby. It allows you to clear all displayed alarms and the device SD Card, if inserted. It also clears the Modem SD Card data. Press the button associated with the Clear function, and confirm the action by selecting “Yes.”



NOTE

Clearing the alarm logs will not clear the device internal event log.

8.3.2 GATHER DEVICE INFORMATION

1. If applicable, note or copy the patient's therapy settings before testing begins.

NOTE

When testing is complete and before patient use, an authorized individual should adjust the device to the patient's therapy settings.

2. If applicable, connect the device to a humidifier. Ensure that a clean or new gray foam filter is installed in the device.
3. Record the serial number and model number on the data sheet.
4. Record the model name on the data sheet.
5. Connect AC power.
6. Power ON the device and record the firmware version on the data sheet.
7. Record the blower hours of the device on the data sheet.

8.3.3 SYSTEM VERIFICATION EQUIPMENT REQUIRED

WARNING

If the device fails to perform within the stated specifications, have the system serviced by an authorized Philips Respironics service facility.

Use the following instructions to ensure that the device is functioning properly. The following equipment is required to verify the pressure:

- Philips Respironics recommended:
  - Philips Respironics Whisper Swivel II (P/N 332113)
  - Philips Respironics O2 Enrichment Final Assembly (P/N 312710)
  - 0.25 inch orifice (P/N 332353)
  - End cap, stopper, or equivalent (source locally)
  - Philips Respironics flexible tubing (P/N 622038)
  - Pressure tubing as needed
  - Foam filter (P/N 1035443 – single pack)
  - Philips Respironics Digital Manometer (P/N 302227) or equivalent
    - Minimum Specifications
      - 0 - 30 cm H2O (or higher)
      - ±0.3 cm H2O accuracy (or better)
      - ±0.1 cm H2O resolution (or better)

NOTE

The device automatically compensates for pressure drops associated with a 6-foot (1.83 m) smooth bore tube. Additional pressure drops will occur when restrictive elements such as a bacteria filter or Pass-over humidifier are added to the patient circuit. Always use a manometer to verify patient mask pressure.

8.3.4 HEATED HUMIDIFIER PERFORMANCE CONFIRMATION

Humidifier preheat mode can be used to determine if the System One Heated Humidifier is working properly. The following steps should be followed to confirm the performance of the System One Heated Humidifier.

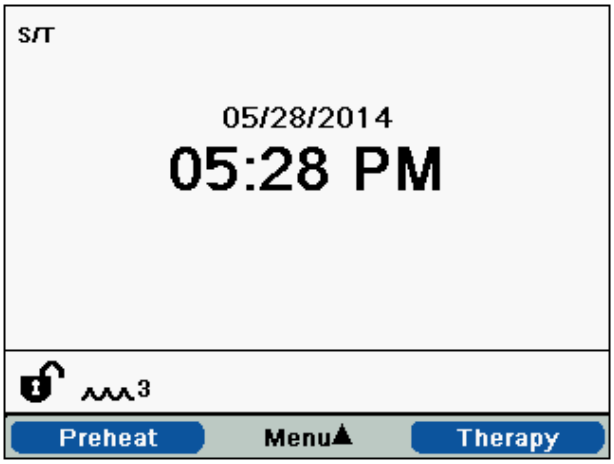
WARNING

It is important to follow the exact steps below when performing this test in order to avoid injury. Read all steps first, before performing this test.

WARNING

Do not place your hand directly on the heater plate at any time as it could result in an injury.

1. While the ventilator and humidifier are not running, place your hand above the heater plate (without touching it) to assess the temperature of the heater plate when the humidifier is off for later comparison.
2. Disconnect the patient tubing (if attached) and remove the water chamber.
3. Verify that the humidification is enabled and set to 1.
4. In order to activate the preheat mode, the blower must be “off” and a humidifier must be attached. From the device’s Standby screen, press the Select button under the Preheat setting. The device will now be in preheat mode and the humidifier icon will illuminate during this time with the setting number 1.



5. Allow the device to run in preheat mode for 30 seconds.
6. Place your hand above the heater plate (without touching it) to confirm an increase in heater plate temperature.

WARNING

Do not place your hand directly on the heater plate at any time as it could result in an injury.

7. Press the “Therapy” button to enter therapy and end preheat mode.
8. Press the power button and select Standby to end therapy.
9. Record the results on the data sheet.

8.3.5 SYSTEM VERIFICATION TEST

1. Connect the patient tubing to the Base Unit /Humidifier outlet port. Refer to Figure 8-2.

FIGURE 8-2

2. Connect the Whisper Swivel II to the end of the patient tubing. Refer to Figure 8-3.
3. Place the O2 Enrichment Attachment on the end of the Whisper Swivel II. Refer to Figure 8-3.
4. Place the end cap on the end of the O2 Enrichment attachment. Refer to Figure 8-3.

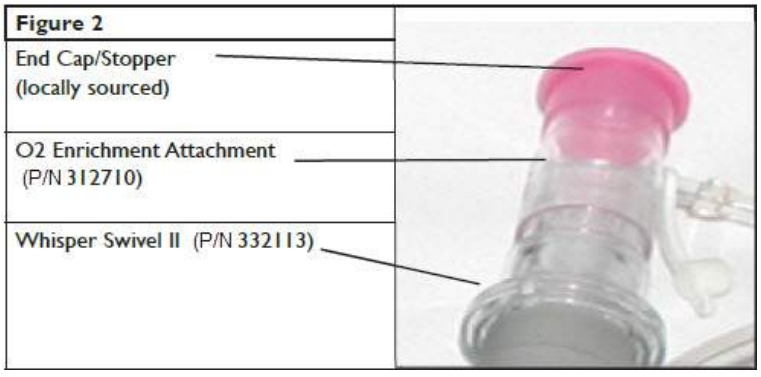


FIGURE 8-3

5. Connect a Digital Manometer to the pressure pick-off on the O2 Enrichment attachment.
6. Enter the device's Settings and Alarms section. (Refer to user manual Chapter 5, "Viewing and Changing Settings" (Setup), if necessary.)
7. Set the device to CPAP Mode and the pressure value to 4 cm H2O.
   - For BIPAP SOH, set the device to:
     - AVAPS-AE Mode
     - AVAPS Rate to 0.5
     - Tidal Volume to 200 ml

- Maximum Pressure to 6 cm H2O
- Pressure Support Max to 2 cmH2O
- Pressure Support Min to 2 cm H2O
- EPAP Max Pressure to 4 cm H2O
- EPAP Min Pressure to 4 cm H2O
- BPM to 0
- Rise Time to 1

a. Exit the Setup menu, activate CPAP Mode (*BiPAP SOH is AVAPS-AE*), and then apply therapy.

b. Record the manometer reading on the test data sheet.

8. Enter the device's Settings and Alarm Menu and set the CPAP pressure value to 20 cm H2O (*BiPAP SOH, set the IPAP and EPAP AVAPS AE pressure to 20 cm H2O*). Record the manometer value on the test data sheet.
9. Set the device to S mode and set the IPAP pressure to 10 cm H2O and EPAP pressure to 5 cm H2O. (*BiPAP SOH, set to AVAPS AE mode. Set the IPAP pressure to 10 cm H2O and EPAP pressure to 5 cm H2O. Lower BPM (Breath Per Minute) to Very Low (4)(No Trigger)*)
   a. Remove the end cap.
   b. Fit 0.25 inch orifice, (P/N 332353)
   c. Exit setup and activate S mode. (*BiPAP SOH to AVAPS AE mode*)
   d. Enter therapy.
10. Occlude and then open the outlet repeatedly to verify that the device triggers and cycles between IPAP and EPAP modes on the display screen and the manometer. Record the results on the test data sheet.
11. Set the device to S/T mode (*BiPAP SOH see bulleted items below*) and set the IPAP pressure to 10 cm H2O, the EPAP pressure to 5 cm H2O, BPM to 10, Inspiration time (Ti) to 2.0, and Rise Time to 2. Exit setup, activate S/T mode, and apply therapy.
    - BiPAP SOH set the device to:
      - AVAPS AE mode
      - AVAPS Rate to 0.5
      - Tidal Volume to 300 ml
      - Maximum Pressure to 10 cm H2O
      - Pressure Support Max to 5 cm H2O
      - Pressure Support Min to 5 cm H2O
      - EPAP Max Pressure to 5 cm H2O
      - EPAP Min Pressure to 5 cm H2O
      - BPM to 40
      - Rise Time to 1
12. Visually verify that the device switches between IPAP and EPAP modes on the display screen and record the results on the test data sheet.

Apnea Alarm Test

13. Set the Apnea Alarm setting = 10 seconds.
14. Exit to the Monitoring screen.

15. Simulate breathing by alternately occluding and opening the outlet port; then occlude the outlet port.
16. Verify that the Apnea alarm occurs in approximately 10 seconds.
17. Press the “Reset” button to clear the alarm.
18. Set the Apnea Alarm setting to 0 (Off).
19. Record the Apnea alarm test result on the data sheet.

Circuit Disconnect Alarm Test

20. Set the Circuit Disconnect Alarm = 15 seconds.
21. Exit to the Monitoring screen.
22. Connect a standard circuit with Whisper Swivel II and an end cap.
23. Simulate breathing by alternately occluding and opening the outlet port.
24. Remove the end cap.
25. Verify that the Circuit Disconnect Alarm occurs in approximately 15 seconds.
26. Press the “Reset” button to clear the alarm.
27. Set the Circuit Disconnect Alarm to Off.
28. Record the Circuit Disconnect Alarm test result on the data sheet.

Low Minute Ventilation Alarm Test

29. Simulate 6 breaths by alternately occluding and opening the outlet port for 2 seconds each.
30. Set the Low Minute Ventilation Alarm setting = 10.0 LPM.
31. Simulate 1 or 2 breaths by occluding and opening the outlet port.
32. Verify that the Low Minute Ventilation alarm occurs.
33. Set the Low Minute Ventilation Alarm setting to 0.0 (Off).
34. Record the Low Minute Ventilation alarm test result on the data sheet.

Loss of Input Power Alarm Test on AC Power (Base and Humidifier ONLY)

35. While the device is still operating, disconnect the power cord from the device.
36. Verify that a Loss of Input Power alarm sounds.
37. Record the Loss of Input Power Alarm test result on the data sheet.

Loss of Input Power Alarm Test - BiPAP A40 (with Detachable Battery)

38. Secure the Detachable Battery Module to the device. Ensure an adequately charged battery is used.
39. Power on the device and select any therapy mode. Disconnect the power cord from the device.
40. The device will switch over to battery operation. The display shows “AC Power Disconnected” and a tone sounds. Select Reset. A black box will appear around the battery indicator to show the ventilator is running on battery power. Record the test results on the data sheet.
41. Power the device off. Testing is complete.

BiPAP A Series System Checkout Data Sheet

SECTION 8.3.2	DEVICE INFORMATION
	Notification # (if applicable)
Step 3	*Model # / Serial #*
Step 4	*Model name*
Step 6	*Device firmware revision*
Step 7	*Blower hours*

SECTION 8.3.4	HUMIDIFIER	RESULT (CIRCLE)
Step 9	*Humidification test: Heater plate operation*	*Pass / Fail*

SECTION 8.3.5	SYSTEM VERIFICATION	RESULT TOLERANCE	RESULT (CIRCLE)
Step 7b	*CPAP @ 4 cmH_2O* *BiPAP SOH AVAPS AE @ 4 cmH_2O*	*[ ] ± 1 cmH_2O* *[ ] ± 1 cmH_2O*	*Pass / Fail*
Step 8	*CPAP @ 20 cmH_2O* *BIPAP SOH AVAPS AE @ 20 cmH_2O*	*[ ] ± 2 cmH_2O* *[ ] ± 2 cmH_2O*	*Pass / Fail*
Step 10	*S Mode trigger performance*		*Pass / Fail*
Step 12	*S/T Mode – machine delivered breath*		*Pass / Fail*
Step 19	*Apnea*		*Pass / Fail*
Step 28	*Circuit or disconnect*		*Pass / Fail*
Step 34	*Low minute ventilation*		*Pass / Fail*
Step 37	*Loss of input power on AC Power*		*Pass / Fail*
Step 40	*Loss of Input power Alarm Test - BiPAP A40 Battery Test*		*Pass / Fail*

NOTE
If the device does not pass all tests, then perform all necessary repairs and re-test per the service manual requirement.

Tested by: _____ Date: _____

Signature: _____

Calibration and testing requires the use of custom software. Before proceeding, log on to http://my.respironics.com.

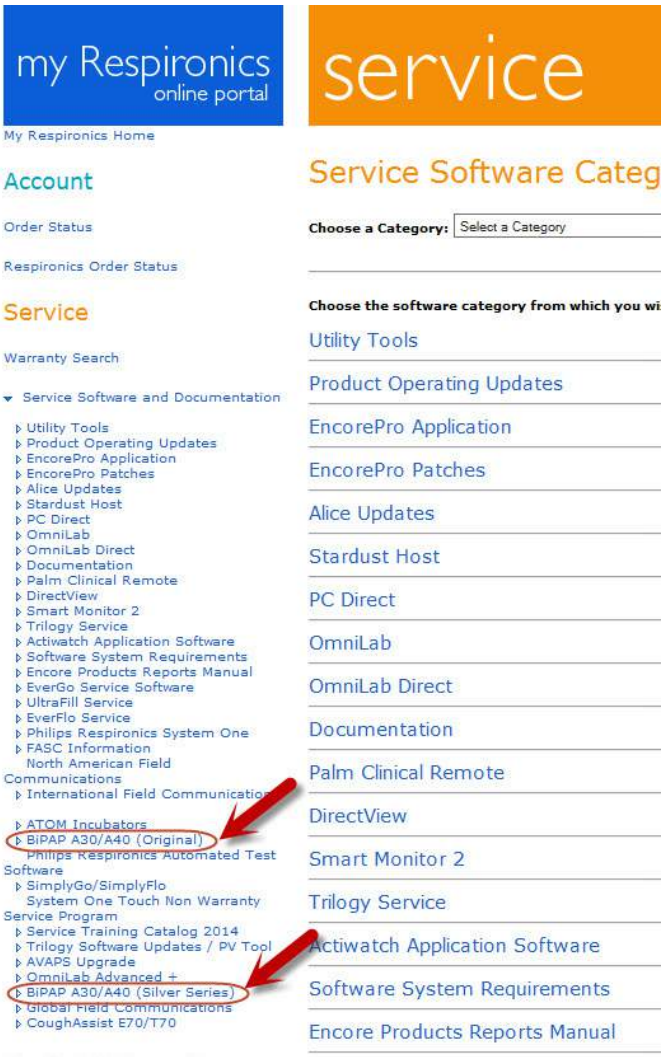


FIGURE 8-1: SOFTWARE LOCATION ON MY.RESPIRONICS.COM

NOTE
UUT = Unit Under Test (i.e., the device you are testing).

8.4 REQUIRED EQUIPMENT

- Windows-compatible PC running Windows XP or 7 Operating System with:
  - CD-ROM Drive,
  - at least two (2) RS-232 serial/com ports, and

- at least one (1) USB port.

NOTE

- *If you have less than two serial com ports, you must use a 4-port USB to RS-232 switch*
- *(PRI Part Number 1113089).*
- *Be sure to install the drivers for the 4-port USB to RS-232 switch.*

- Digital Manometer (part #302227, or equivalent) with Pressure Tubing
- One (1) O_2 Enrichment Attachment (part #312710)
- One (1) 1/4” Test Adapter (part #332353)

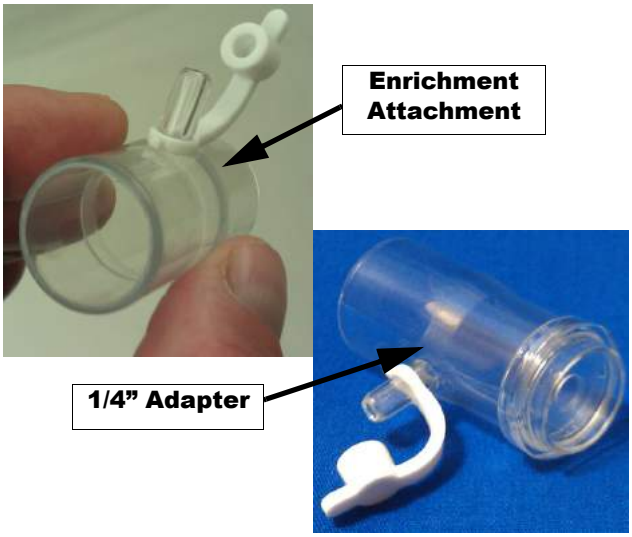


FIGURE 8-2: ENRICHMENT ATTACHMENT AND 1/4” ADAPTER

- End Cap (not available from Respironics), or similar part (i.e., CapLugs EC-14).

- Two(2) in-line Bacterial Filters (part #1046860)

FIGURE 8-3: IN-LINE BACTERIA FILTER

- Reusable Flexible Tubing, Grey 22mm - 6FT (part #622038)
- Reusable Flexible Tubing 22mm-18IN (part # 1008198)
- Service Flow Valve (part # 1037985)
- TSI Mass Flowmeter model 4040 (available through Philips Respironics [part #1071679] - Includes a power adapter and a communication cable).

FIGURE 8-4: FLOW METER

- Custom software (download from: **http://my.respironics.com**)
- Two (2) PR System One SleepLink Module Kits (part #1074113) - Kit includes a DB9F-DB9M Cable and adapter.

FIGURE 8-5: SLEEPLINK MODULE (DB9F-DB9M CABLE NOT SHOWN)

- *KeySpan Adapter (part #1022895)

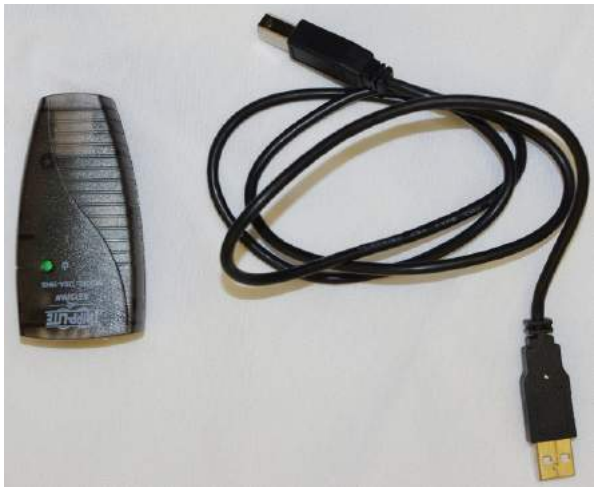


FIGURE 8-6: KEYSPAN ADAPTER WITH CABLE

- Digital multi-meter
- Nurse Call cable (part #1080249)

FIGURE 8-7; DIGITAL MULTIMETER WITH NURSE CALL CABLE

- A30/A40- (Original or Silver Series) Humidifier compatible with the device being tested
  - part #1076544 for Original Series
  - part #1111552 for Silver Series
- Barcode Scanner with 2D scanning capabilities (optional)
- Printer
- One of the following therapy devices for negative flow
  - BiPAP A30 (*Original or Silver Series*)
  - BiPAP A40 (*Original or Silver Series*)

- PR System One REMstar Plus C-Flex
- PR System One REMstar Pro C-Flex+
- PR System One REMstar Auto A-Flex
- PR System One BiPAP Pro Bi-Flex
- PR System One BiPAP Auto Bi-Flex
- BiPAP S/T (System One platform)
- BiPAP AVAPS (System One platform)

* If you have two serial/com ports on your PC, you can use the KeySpan USB to Serial adapter as the 3rd serial/com port. Otherwise, you will need a USB to RS-232 four (4) port switch (National Instruments USB-232/4 recommended [PRI P/N *1113089*). If using a 4-port switch, the KeySpan adapter is not necessary.

8.5 DOWNLOADING AND INSTALLING THE TEST SOFTWARE

8.5.1 32 BIT VS. 64 BIT OS VERIFICATION

Do the following to determine your Operating System (32 Bit or 64 Bit). Refer to Figure 8-8.

1. Click on the Windows *Start* button.
2. Right-click on *My Computer.*
3. Click on *Properties.*
4. Go to the *General* tab.

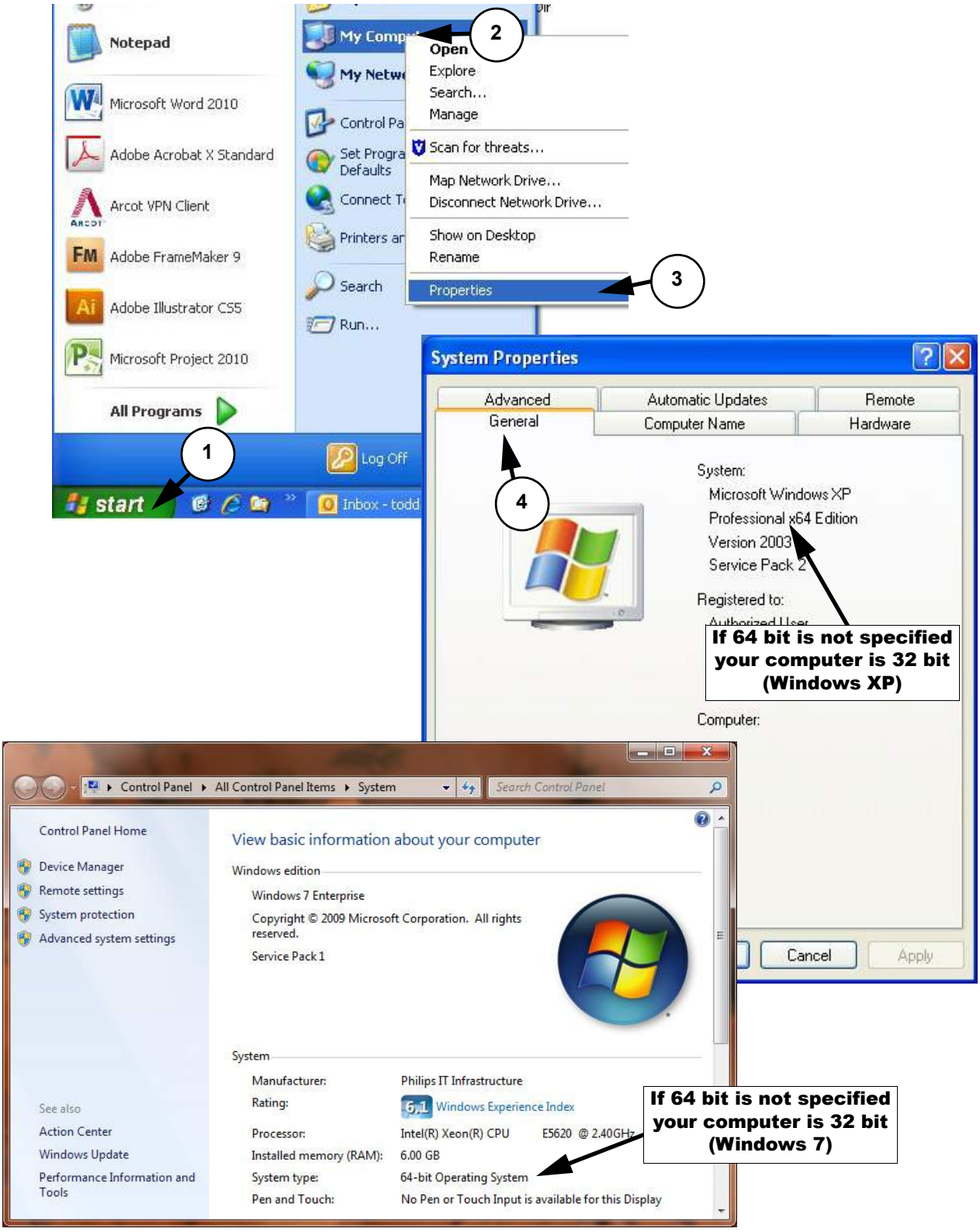


FIGURE 8-8: DETERMINING OPERATING SYSTEM BIT CONFIGURATION

8.5.2 DOWNLOADING THE PHILIPS TS ENGINE AND FIELD SERVICE APPLICATION (FSA)

Philips TS Engine Installation

1. Log onto **http://my.respironics.com** and locate the software.
2. Based on the OS bit configuration determined in Section 8.2.1, click on the Download button adjacent to the appropriate Philips TS Engine installer (32 bit or 64 bit) for your PC.

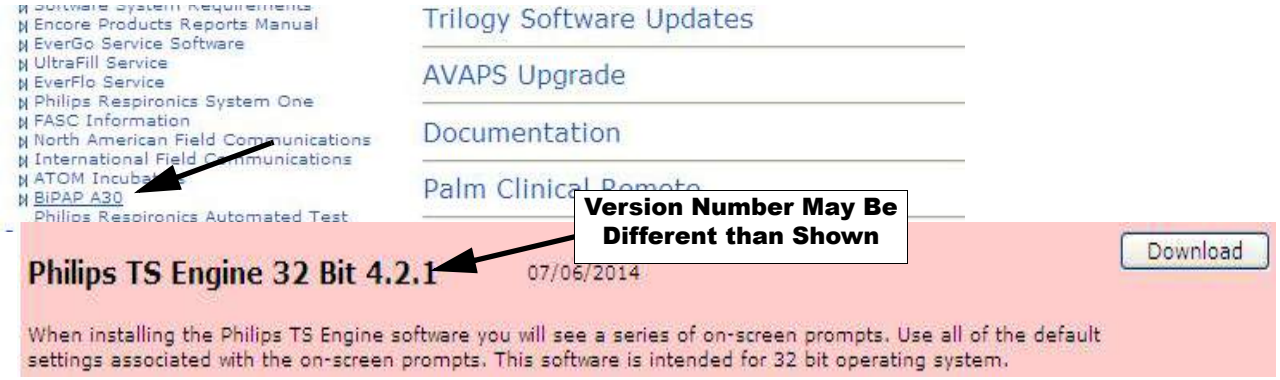


FIGURE 8-9: PHILIPS TS ENGINE DOWNLOAD

3. Choose *Run* or *Save* based on whether or not you are installing on one PC or multiple PCs.
4. Follow the prompts to complete the installation.
5. When *Philips TS Engine* installation is complete, you will be prompted to restart the PC. Restart the PC prior to beginning the *FSA* software installation.

FSA Software Installation (Field Service Application [FSA])

1. Log onto **http://my.respironics.com** and locate the software.

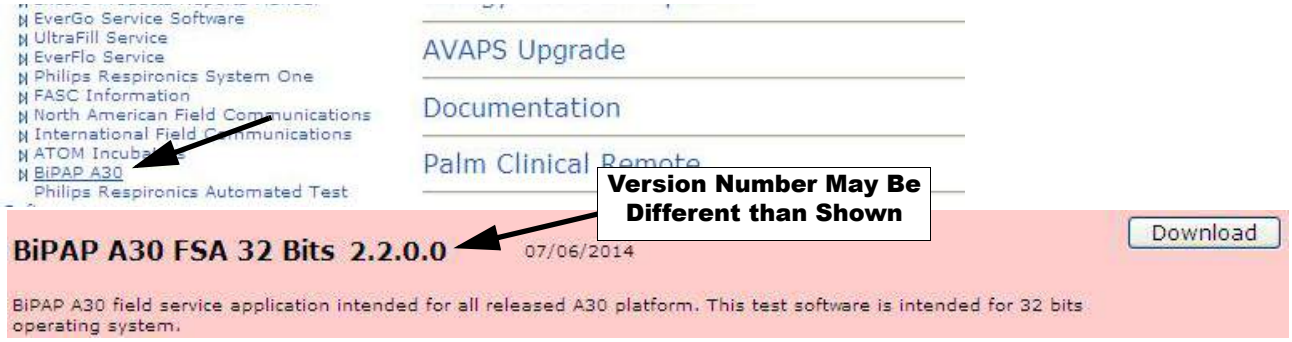


FIGURE 8-10: FSA DOWNLOAD

2. Based on the OS bit configuration determined in Section 8.2.1, click on the Download button adjacent to the appropriate FSA installer (32 bit or 64 bit) for your PC.
3. Choose Run or Save based on whether or not you are installing on one PC or multiple PCs.
4. Follow the prompts to complete the installation.
5. If installed on a Windows 7 OS, proceed to section Section 8.5.3. If ***not*** using Windows 7 OS, proceed to Section 8.6.

8.5.3 COMPATIBILITY SETTINGS FOR WINDOWS 7 USERS

If you have installed the FSA software and Toolbox onto a PC that is running Windows 7 OS, you must run the applications as an administrator. To set the applications with administrator privileges, perform the following.

1. Right-click on the application's desktop icon.
2. Select *Properties*.

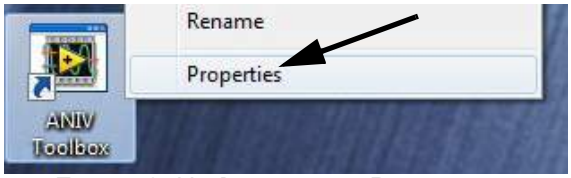


FIGURE 8-11: APPLICATION PROPERTIES

3. Click on the *Compatibility* tab. Refer to Figure 8-12.
4. Click on the *Change Settings for all users* button. A new window will appear. Refer to Figure 8-12.
5. Check the box next to *Run this program as an administrator option*. Refer to Figure 8-12.
6. Click on the *Apply* button. Refer to Figure 8-12.
7. Click on the *OK* button to close the window. Refer to Figure 8-12.

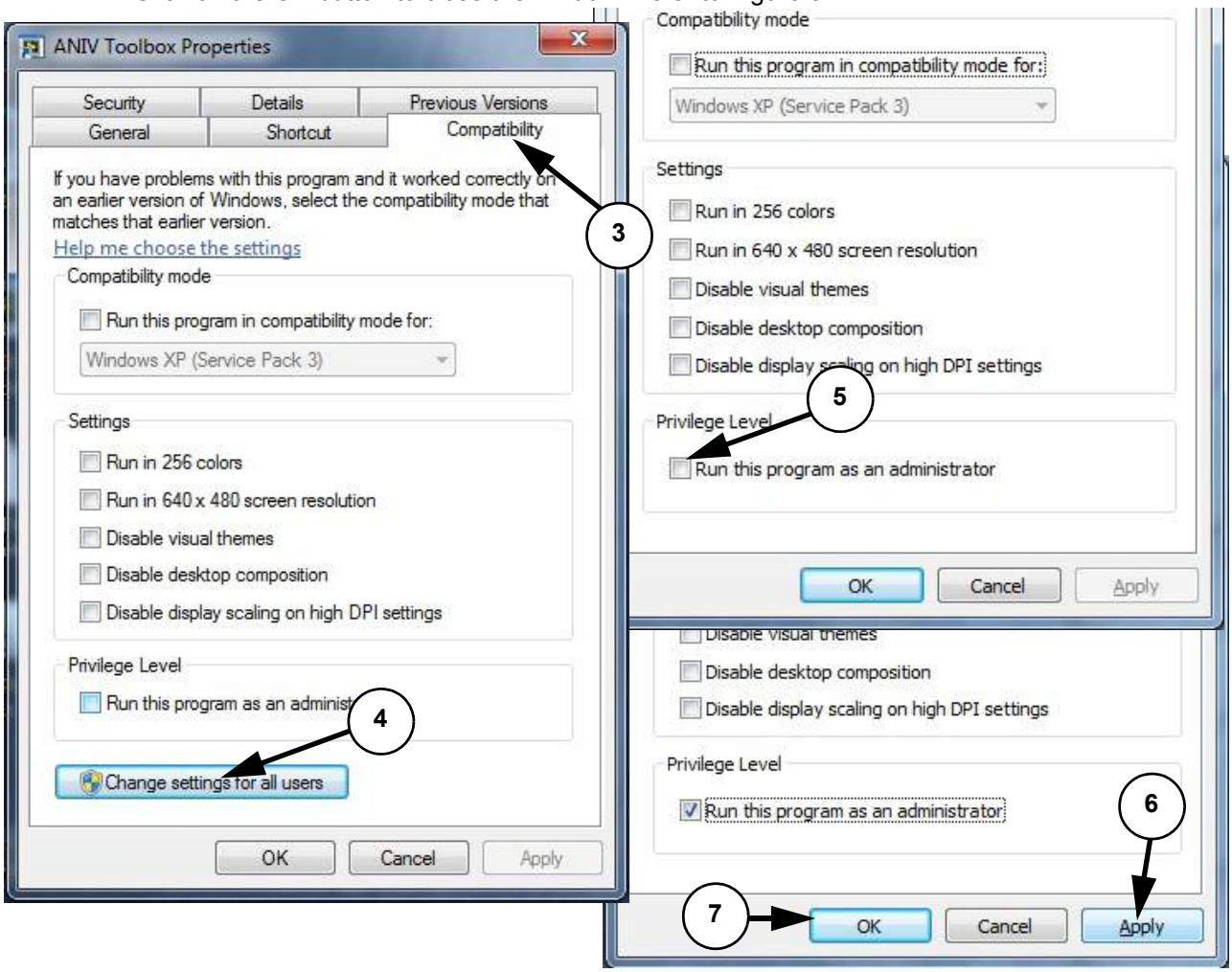


FIGURE 8-12: COMPATIBILITY TAB

8.6 HARDWARE SETUP

Set up your equipment according the diagram below and proceed to the Qualification Procedure (Section 8.7).

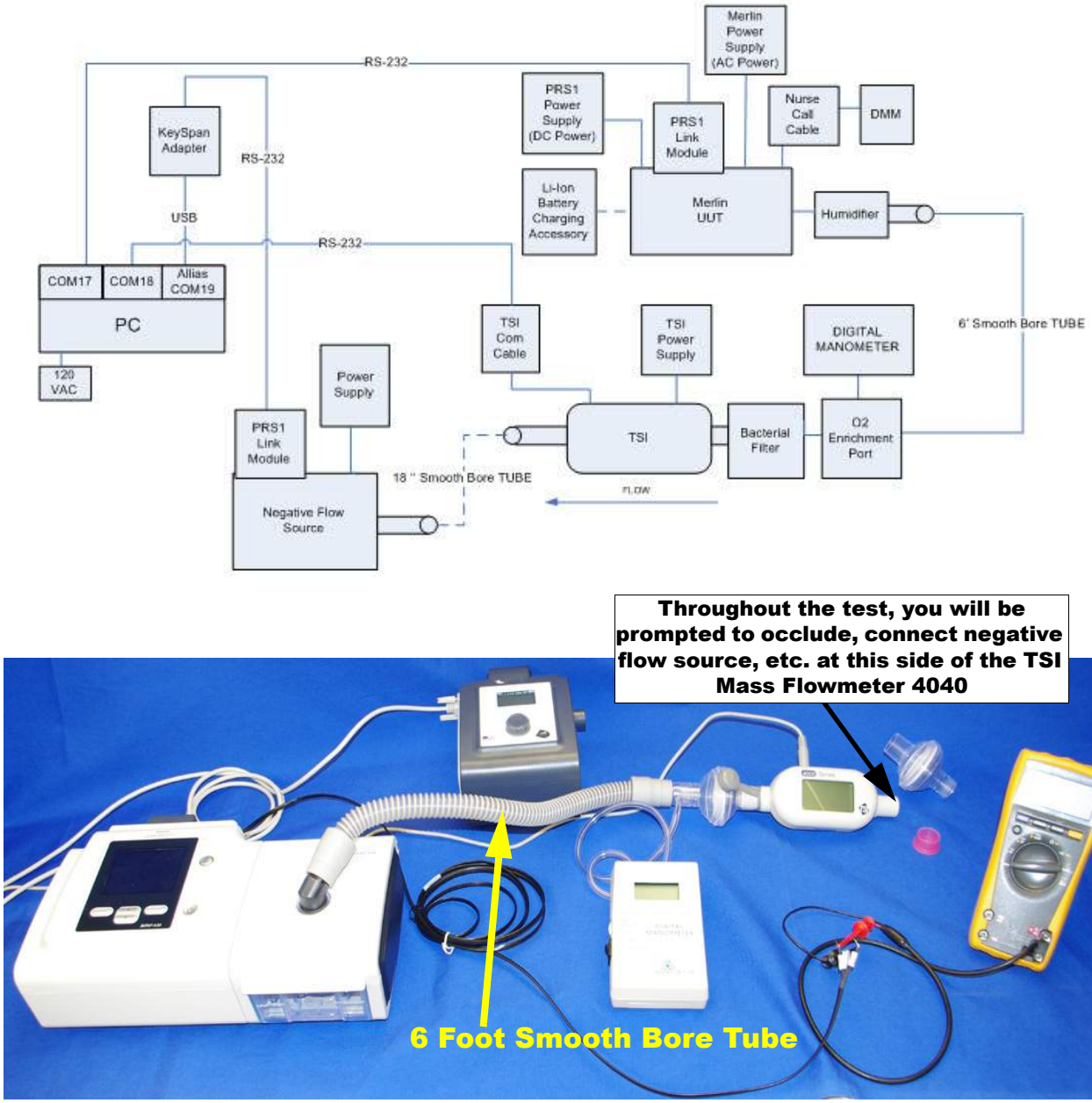


FIGURE 8-13: HARDWARE SETUP

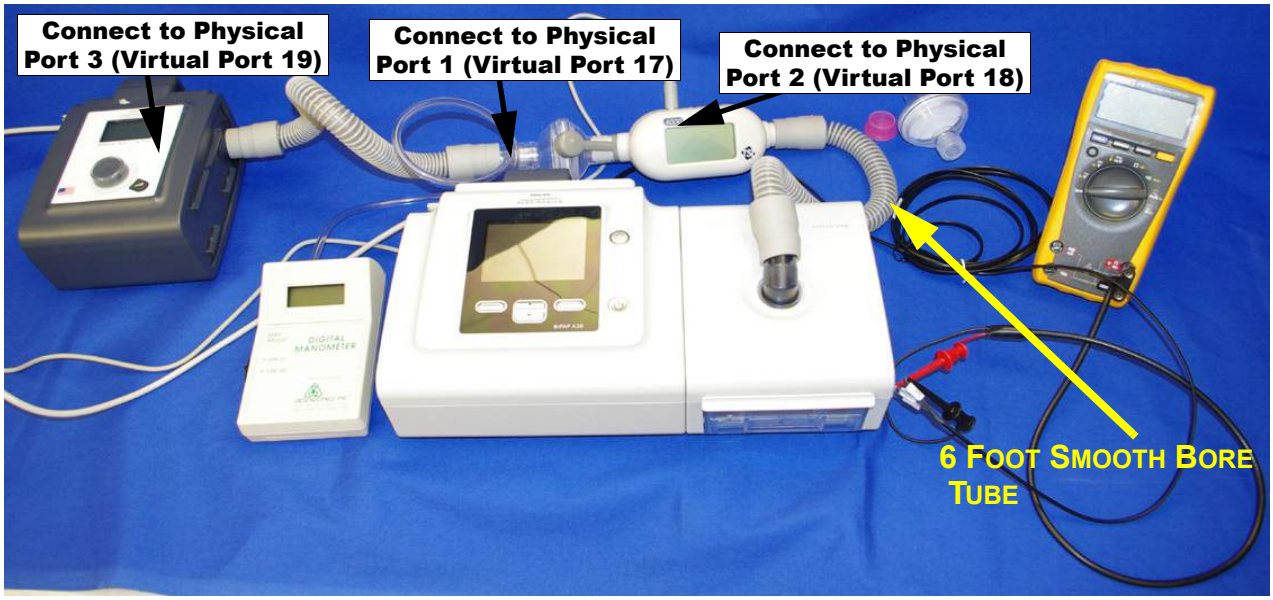


FIGURE 8-14: TESTING SETUP AND CONFIGURATIONS

8.6.1 COM PORT CONFIGURATION

COM port setup **must be performed** as follows (refer to Figure 8-15):

1. Connect the device being tested to the physical port 1 on your PC or switch.
2. Connect the TSI Mass Flowmeter 4040 to the physical port 2 on your PC or switch.
3. Connect the negative flow device to the physical port 3 on your PC (USB adapter) or switch.
4. Using Windows device manager, configure the ports as follows Refer to Figure 8-15:
   - Configure Port 1 to COM17 (device being tested)
   - Configure Port 2 to COM18 (TSI Mass Flowmeter 4040)
   - Configure Port 3 to COM19 (negative flow device)

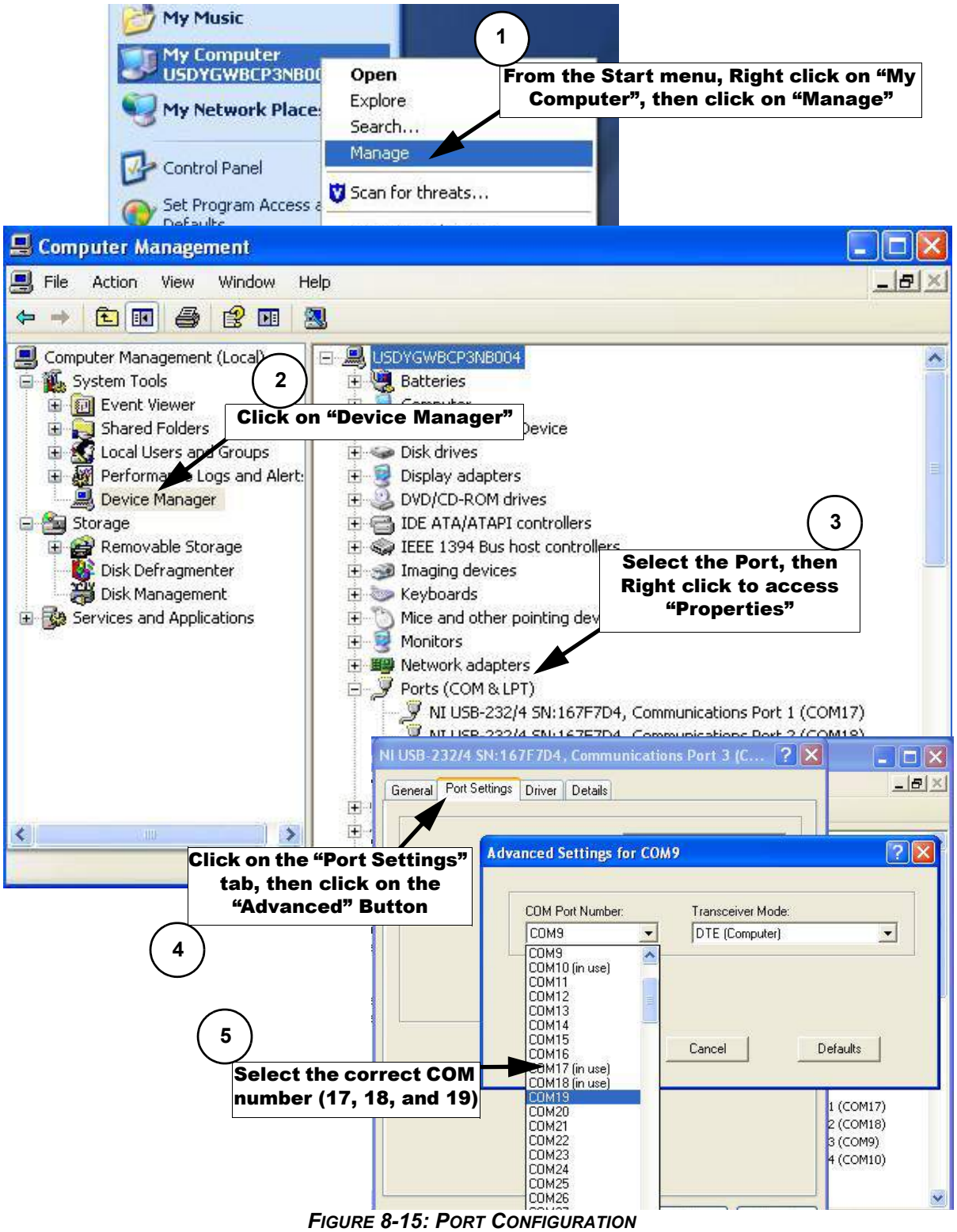


FIGURE 8-15: PORT CONFIGURATION

8.7 QUALIFICATION PROCEDURE

This qualification procedure must be completed prior to testing repaired devices. The FSA test equipment must pass the qualification procedure on a “known good” unit before being used for testing. The qualification procedure will determine if the test station hardware has been setup correctly and is functioning properly. The qualification procedure must be performed upon initial setup of the test station or whenever any test equipment has been replaced (e.g., hardware components, PC, etc.) To conduct the qualification procedure, perform the following:

1. Verify that all of the necessary equipment specified in Equipment list has been obtained (refer to Section 8.4).
2. Connect all the equipment as per the post station block diagram Refer to Figure 8-13.
3. On the test PC, assign the correct COM port numbers for each port. Refer to Section 8.6
   a. Device being tested-COM17
   b. TSI Flow meter-COM18
   c. Negative Flow Source-COM19
4. Click on the *ANIV Post Test* icon located on the PC’s desktop to launch the FSA software.

FIGURE 8-16: FSA DESKTOP ICON

5. Log in as a *Technician*.

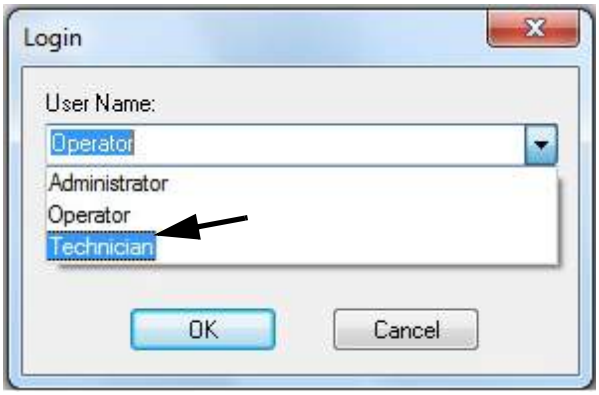


FIGURE 8-17: LOGIN WINDOW

6. Run the following individual tests (refer to Section 8.9 for running individual tests).
   - Verify UUT Neg. Flow
   - Verify Pressure
7. Print the report and verify that the overall test status is a PASS.

Only the successful completion of ALL of the Qualification Procedure’s steps will result in an overall PASS status for the Qualification Procedure. After the qualification procedure test passes, you may begin testing repaired devices.

8.8 TESTING A DEVICE

You must run-in the device after performing repairs and prior to testing. The first three steps below explain how to run-in the device:

1. Connect a 1/4” test adapter to the Outlet Coupler of the device.
2. Enter the Provider Setup Mode and set the device to operate in S/T Mode.
3. Disable alarms.
4. Set the device’s IPAP to 12 cm H_2O and the EPAP to 4 cm H_2O.
5. Turn on the device’s Blower and allow it to run-in for a minimum of one (1) hour.
6. After the device has been run-in, click on the *ANIV Post Test* icon located on the PC’s desktop to launch the FSA.

FIGURE 8-18: FSA DESKTOP ICON

7. Select *Operator* from the User Name drop-down menu, then click the OK button.

FIGURE 8-19: LOGIN WINDOW

8. Click on the *Test UUTs* button located at the bottom of the screen.

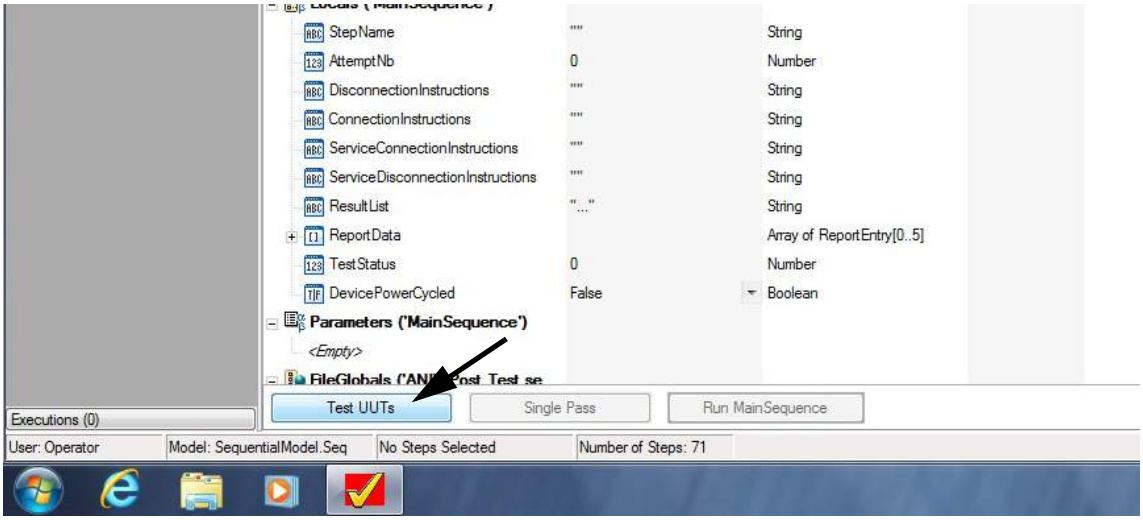


FIGURE 8-20: TEST UUTS BUTTON

9. When prompted, enter or scan the device's model number and serial number into the appropriate fields. The serial number and model number label appears on the bottom of the device.

NOTE

Scanning the 2D bar code will automatically populate the serial and model number fields. Refer to Figure 8-21

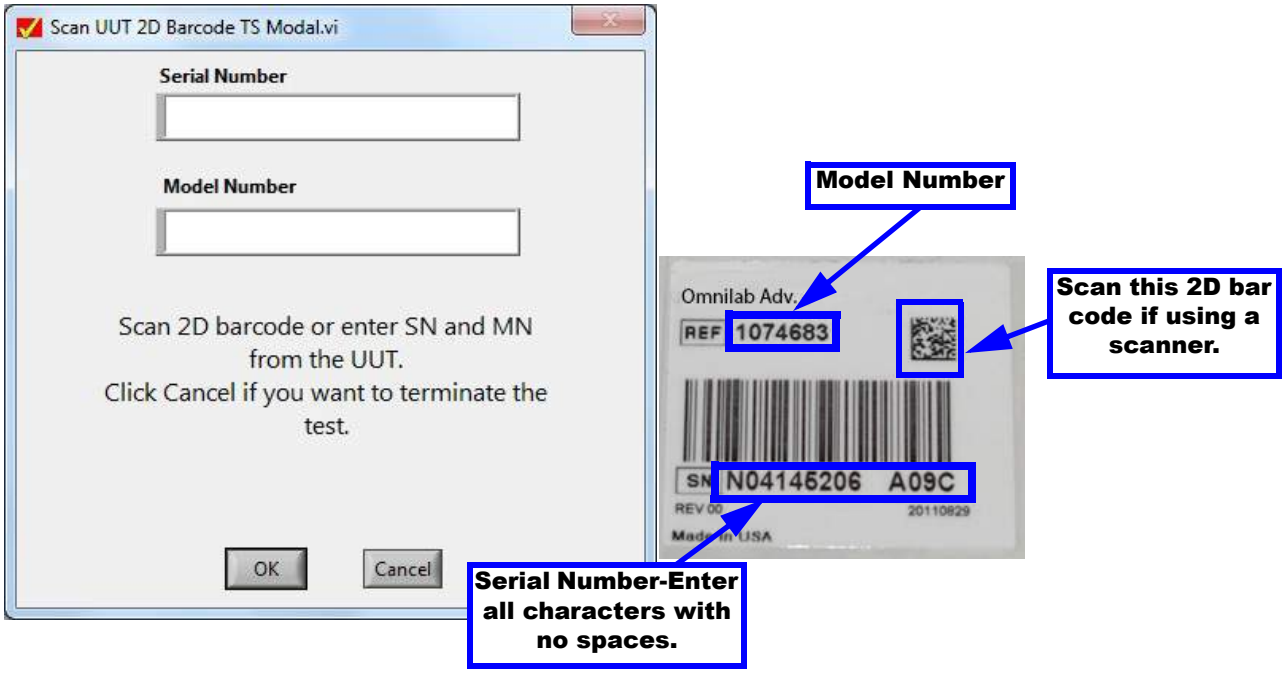


FIGURE 8-21: ENTER SERIAL NUMBER AND MODEL NUMBER

10. The FSA will guide you through the entire testing process. Follow the on-screen prompts to complete the testing.
11. When prompted to adjust pressure settings to specific values, use the buttons on the left of the display window to increase or decrease the pressure by 1.0 cm H_2O (rough tune) and the buttons on

the right to increase or decrease the pressure by 0.1 cm H_2O (fine tune). Refer to the following illustration for additional information.

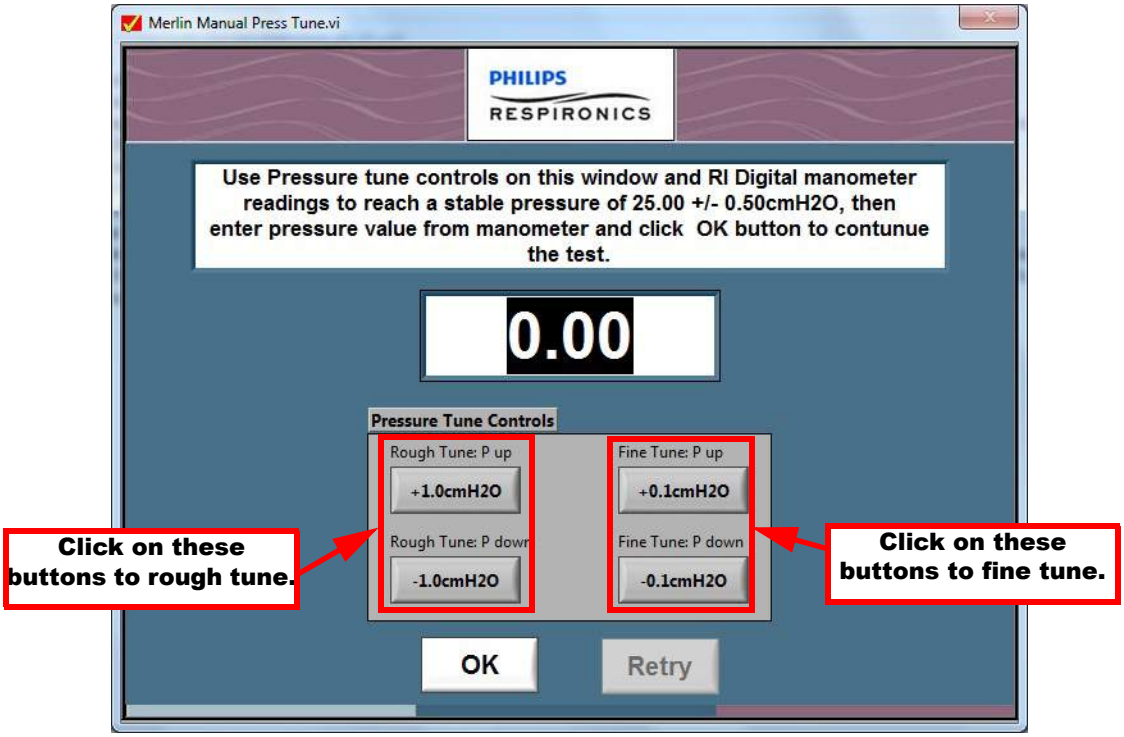


FIGURE 8-22: SETTING ADJUSTMENT WINDOW

12. Once you have completed the test, a status banner will display either *Pass*, *Fail*, or *Error*.
13. If the device fails, check all connections, equipment, and configurations and re-test the device.
14. If the device fails again, perform necessary repairs and retest.
15. Once testing is complete, a report will be printed. You can maintain the printout for your records. If you are running individual tests in Troubleshooting mode, you will be asked if you would like a printout of the test results.

8.9 RUNNING INDIVIDUAL TESTS

To run individual test, perform the following:

1. Click on the *ANIV Post Test* icon located on the PC's desktop to launch the FSA software.

FIGURE 8-23: FSA DESKTOP ICON

2. Log in as a *Technician*. No password is required

FIGURE 8-24: LOGIN WINDOW

NOTE

Individual tests can only be performed when you are logged in as a Technician.

3. When the FSA main window appears, select the test(s) you desire to run by holding down the CTRL key on the test PC keyboard and clicking them as shown.
4. Right-click on the highlighted item. If you have selected more than one, right-click on any of them.
5. Point your mouse to *Run Selected Steps Using*, then click on *Single Pass*. Refer to Figure 8-25.

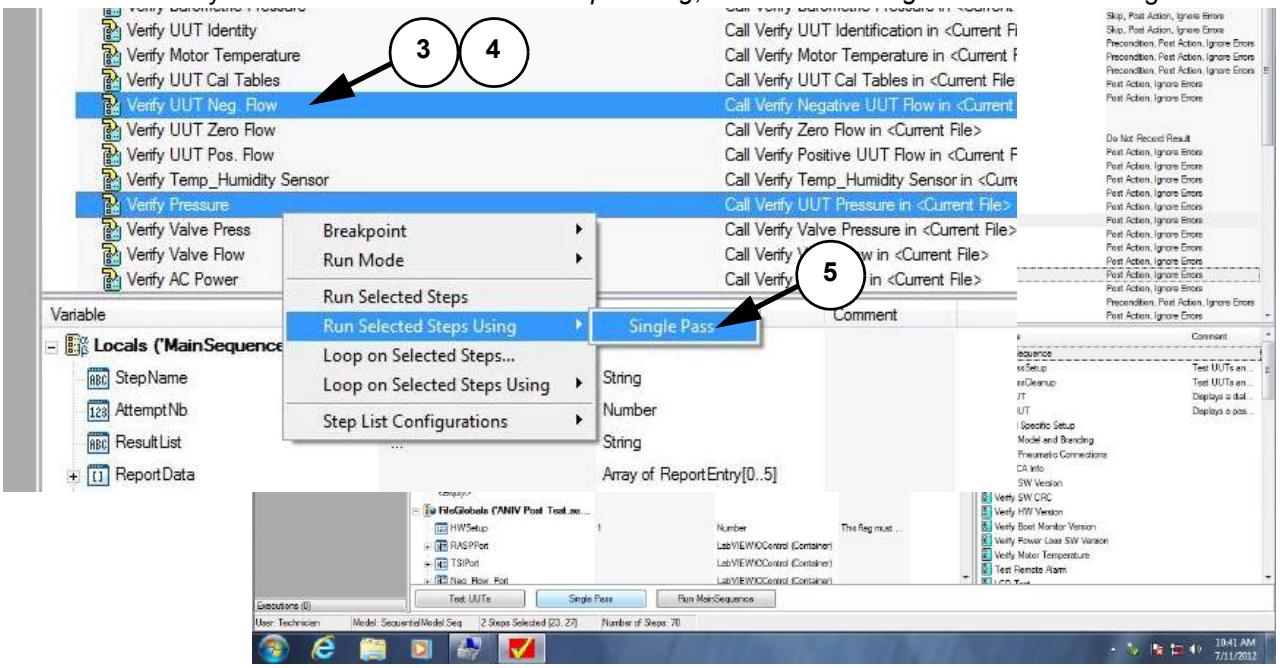


FIGURE 8-25: SELECTING INDIVIDUAL TESTS

NOTE

Individual tests ***can not*** *be run by clicking on the* Single Pass *button located at the bottom of the FSA application window. Clicking on this button will invoke the entire testing process one time.*

8.10 USING THE TOOLBOX APPLICATION

The Toolbox application allows you to:

- Read Error Log,
- Read Serial Number and Model Number,
- Calibrate the Real-time Clock,
- Set Machine Hours, and
- Set session ID.

The following sections provide a description of the tools.

8.10.1 READ ERROR LOG

Refer to Chapter 5 for information on reading the device's error log.

8.10.2 READ SERIAL NUMBER AND MODEL NUMBER

When you execute the Read Serial Number and Model Number tool, the device's serial number and model number will be displayed as shown in the following illustration.

FIGURE 8-26: READ SERIAL NUMBER MODEL NUMBER TOOL

8.10.3 CALIBRATE THE REAL-TIME CLOCK

To verify the device's current real-time clock is within acceptable limits, click on the VERIFY RT CLOCK button. If the real-time clock verification fails, click on the SET RT CLOCK button to reset the device's Real-time Clock.

FIGURE 8-27: REAL-TIME CLOCK TOOL

8.10.4 SET MACHINE HOURS

It is recommended that when a new PCA is installed in the device, the machine hours be set to the number of hours stored in the device when it was received for service.

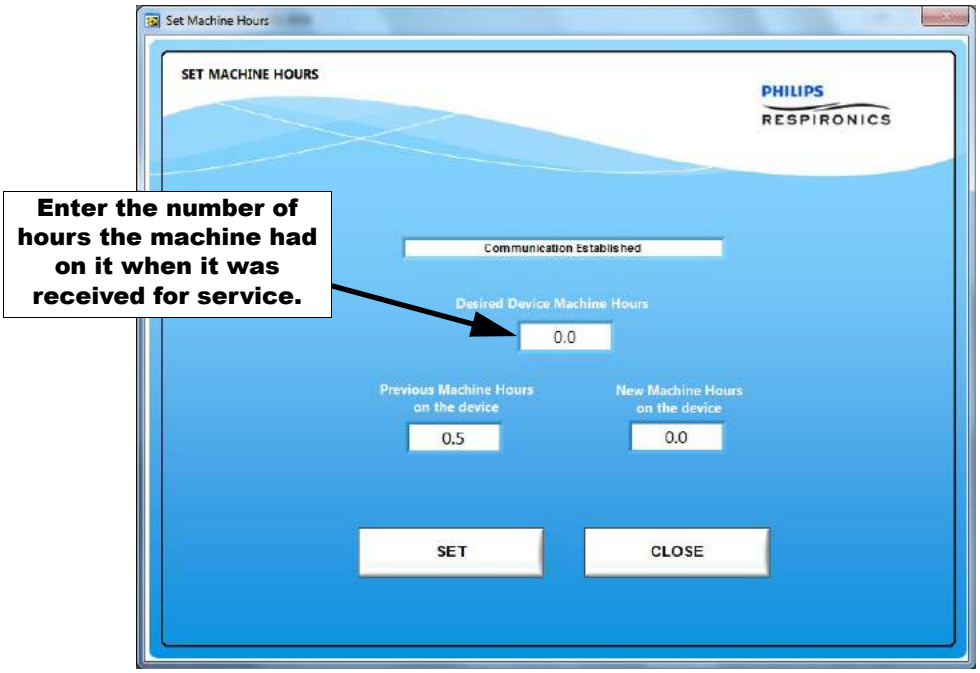


FIGURE 8-28: SET MACHINE HOURS

8.10.5 SET SESSION ID

It is recommended that when a new PCA is installed in the device, the Session ID be set. Using the *Set Session ID* helps to prevent overwriting existing patient data. When you execute the Set Session ID tool, you will be prompted to enter the manufacturing date of the device. The manufacturing date is located on the Serial Number label on the bottom of the device.

FIGURE 8-29: MANUFACTURING DATE ON THE BOTTOM OF THE DEVICE

CHAPTER 9: DEVICE SOFTWARE UPGRADING

9.0 SECTION OVERVIEW

This section provides instructions for upgrading the device's Operating Software and Boot Monitor Software.

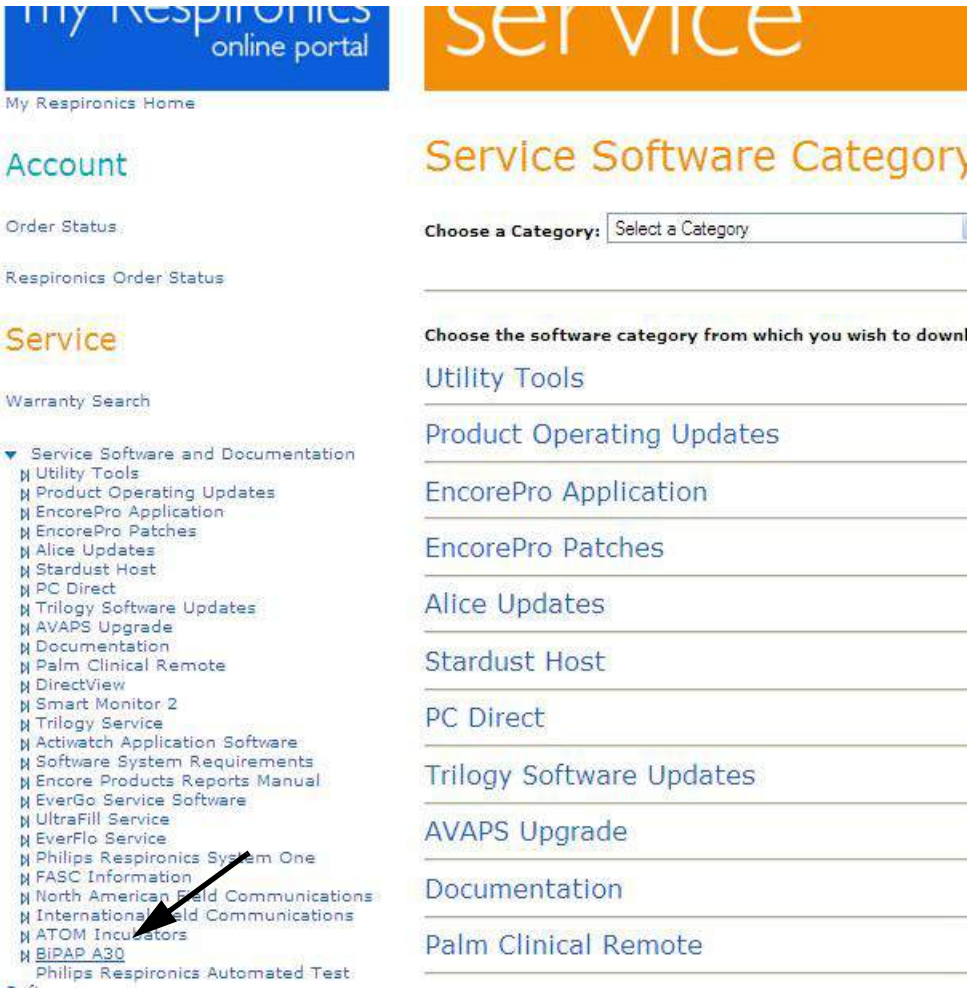


FIGURE 9-1: SOFTWARE LOCATION ON MY.RESPIRONICS.COM

NOTE
UUT = Unit Under Test (i.e., the device you are testing).

9.1 REQUIRED EQUIPMENT

- Windows-compatible personal computer running Windows XP or 7 with:
  - CD-ROM Drive,
  - One (1) RS-232 serial/com ports, and
  - at least one (1) USB port

- SD Card drive or adapter that connects to a PC

- One (1) PR System One SleepLink Module Kits (part #1074113) - Kit includes a DB9F-DB9M Cable and adapter.

FIGURE 9-2: SLEEPLINK MODULE (DB9F-DB9M CABLE NOT SHOWN)

- KeySpan Adapter (part #1022895)

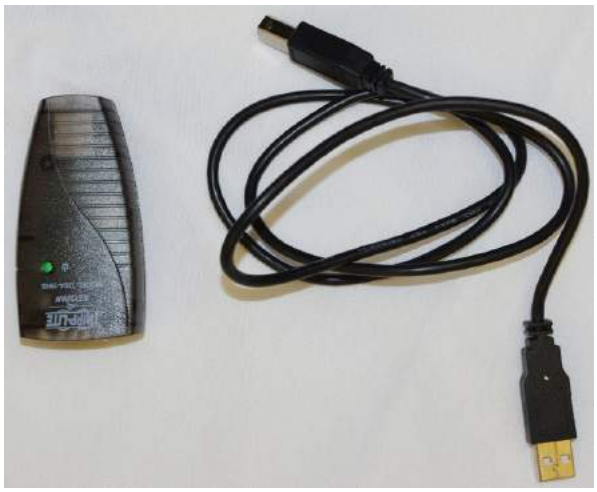


FIGURE 9-3: KEYSPAN ADAPTER WITH CABLE

9.2 UPGRADING THE SOFTWARE AND DEVICE BOOT MONITOR

9.2.1 UPGRADING THE DEVICE'S SOFTWARE

Log onto http://my.respironics.com and download the latest version of software. Navigate to the *BiPAP A30/ BiPAP A40* page, then click on the *Download* button adjacent to the software you wish to download.

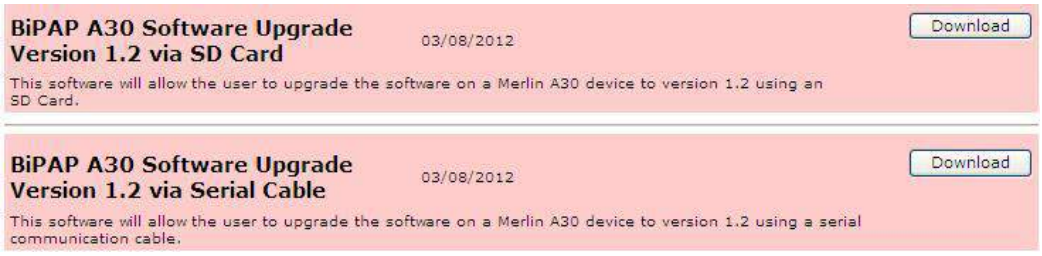


FIGURE 9-4: DEVICE SOFTWARE ON MY.RESPIRONICS.COM

The software can be installed onto the device by connecting the device to a PC via the Link Module and Cable (PR part #1074113) or via an SD Card.

To upgrade the device via an SD Card:

1. Click on the *Download* button next to the Software Upgrade Version X.X via SD card (where X.X is the latest version available; 1.2 at the time of release of this service manual).
2. Follow the prompts on the PC to complete the download.
3. Install the SD card into the device.
4. The device will ask you to confirm the software upgrade.
5. Follow the prompts on the device's LCD to complete the upgrade.

To upgrade the device via a serial cable and Accessory Module:

1. Connect the Accessory Module with Cable between the device and a PC that has internet access.
2. Click on the *Download* button next to the Software Upgrade Version X.X via Serial Cable (where X.X is the latest version available; 1.2 at the time of release of this service manual).
3. Follow the prompts on the PC to complete the download.
4. The upgrade wizard will walk you through the upgrade process. Follow the prompts on the PC to complete the upgrade.

9.2.2 UPGRADING THE DEVICE'S BOOT MONITOR

It is recommended that the Boot Monitor upgrade be performed when you have a device that experiences issues upon device startup (e.g., continuous audible alarming, etc.) When executing the *Upgrade Device Boot Software Version*, be sure not to interrupt the upgrade process as damage to the device will occur.

Downloading the ANIV Boot Monitor Upgrade Tool

9.2.3 ANIV BOOT MONITOR UPGRADE INSTALLATION PROCESS

1. Log into my.respironics.com and click on the *Download* button adjacent to the *ANIV Boot Monitor Upgrade*.

FIGURE 9-5: BOOT MONITOR UPGRADE TOOL ON MY.RESPIRONICS.COM

2. Save the *ANIV Boot Monitor Upgrade Tool* installer to your PC (default location is recommended).
3. Locate the *BiPAPA30_Boot_Monitor_Upgrade_Tool.exe* on your computer and double click on it to begin the installation.

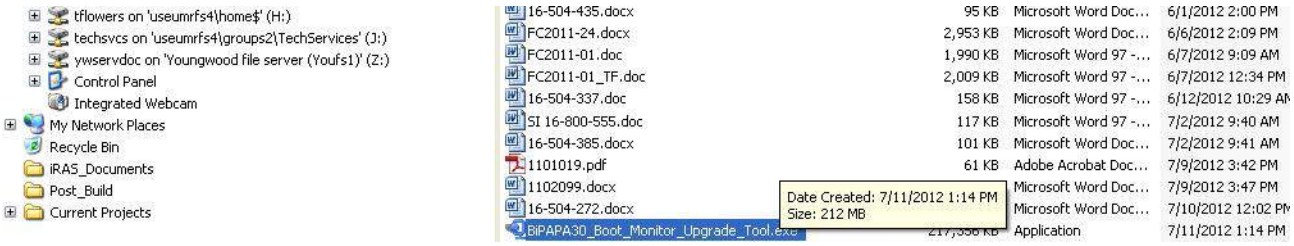


FIGURE 9-6: BOOT MONITOR UPGRADE TOOL IN EXPLORER

4. When you double-click on the *BiPAPA30_Boot_Monitor_Upgrade_Tool.exe*, a new window will open. Click on the *Unzip* button to unzip the files
5. The self extractor will begin to unzip the necessary files.

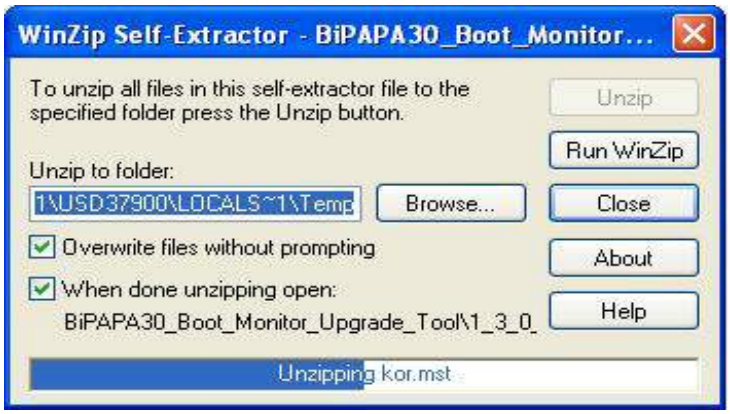


FIGURE 9-7: BOOT MONITOR UPGRADE TOOL SELF EXTRACTOR

6. Once you have extracted the files, click on the license agreements (there are two of them).

7. Click on the *Next* button when the following window appears. The installation will then begin.

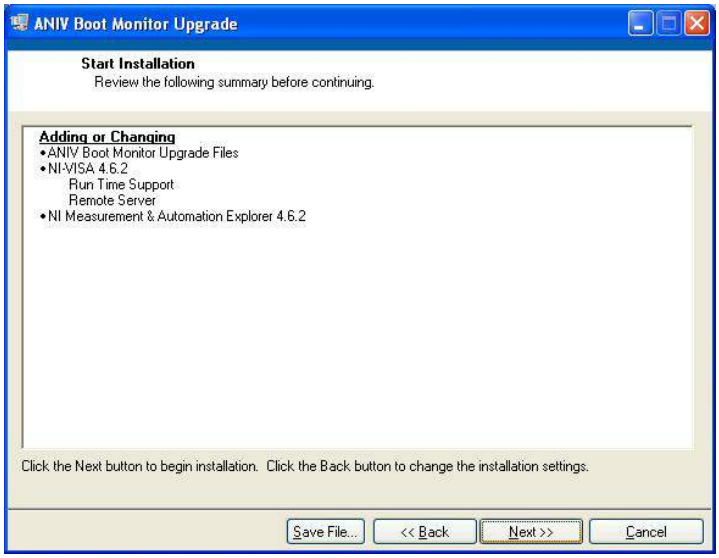


FIGURE 9-8: BOOT MONITOR UPGRADE TOOL INSTALLATION

8. Click on the *Finish* button when the installation is complete. Once you have installed the *Boot Monitor Upgrade* tool, you will be prompted to restart the PC. Restart the PC prior to using the *Boot Monitor Upgrade* tool.

NOTE

If installed on a Windows 7 OS, go to section Section 8.5.3 prior to using the Boot Monitor Upgrade Tool. If the application is not installed on a PC using Windows 7 OS, disregard this note.

9. Configure, if necessary, the PC's COM port that will be used by the *Boot Monitor Upgrade* tool to COM1. Refer to Section 8.6.1 for instructions on configuring COM ports.

CAUTIONS

- *The Boot Monitor Upgrade Tool must be connected to a native COM Port or the KeySpan adapter (PR #1022895). Do not use a multiple-port USB to RS-232 switch for this tool.*
- *The use of inappropriate hardware could result in the interruption of the upgrade process, which in turn will render the device inoperable.*

10. Connect the SleepLink Module with cable (PR part #1074113) to the back of the device
11. Click on the desktop icon to invoke the *Boot Monitor Upgrade* tool.

FIGURE 9-9: BOOT MONITOR DESKTOP ICON

12. If you wish to proceed with upgrading the device's boot monitor, click on the UPGRADE BOOT MONITOR SOFTWARE button as shown in Figure 9-10.

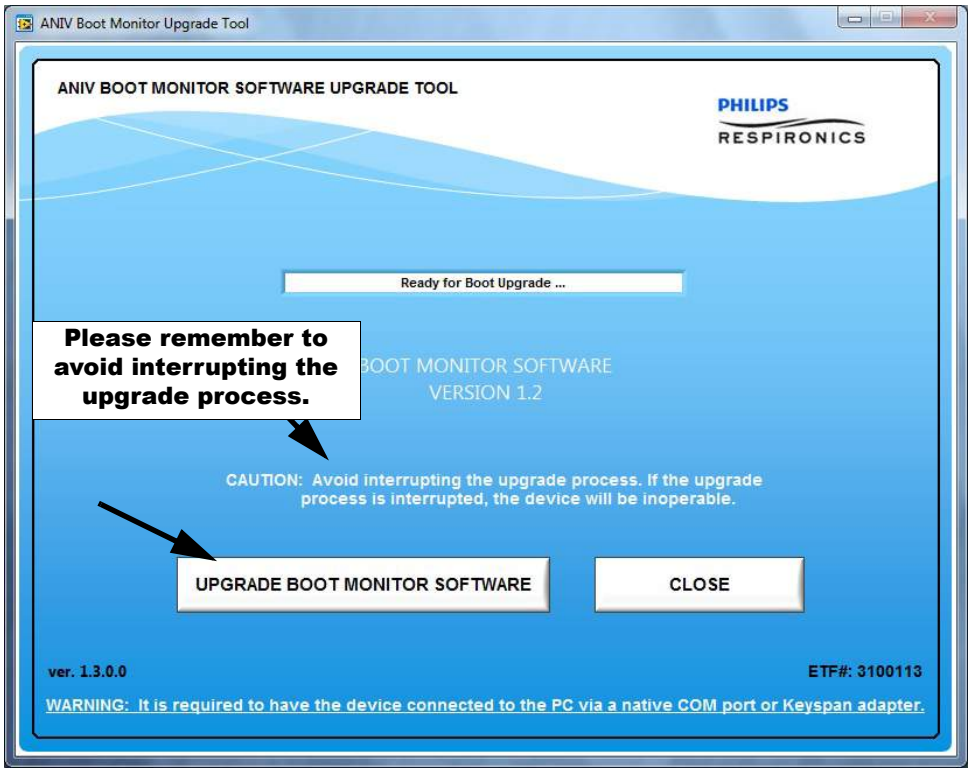


FIGURE 9-10: BOOT MONITOR UPGRADE TOOL

CAUTION

Once you confirm the selection to upgrade, avoid interrupting the boot monitor version upgrade process. If the upgrade process is interrupted, the device will become inoperable.

13. After you click on the UPGRADE BOOT MONITOR SOFTWARE button, you will be asked to confirm, as shown in Figure 9-11. Click on the UPGRADE button to upgrade the device's boot monitor software.

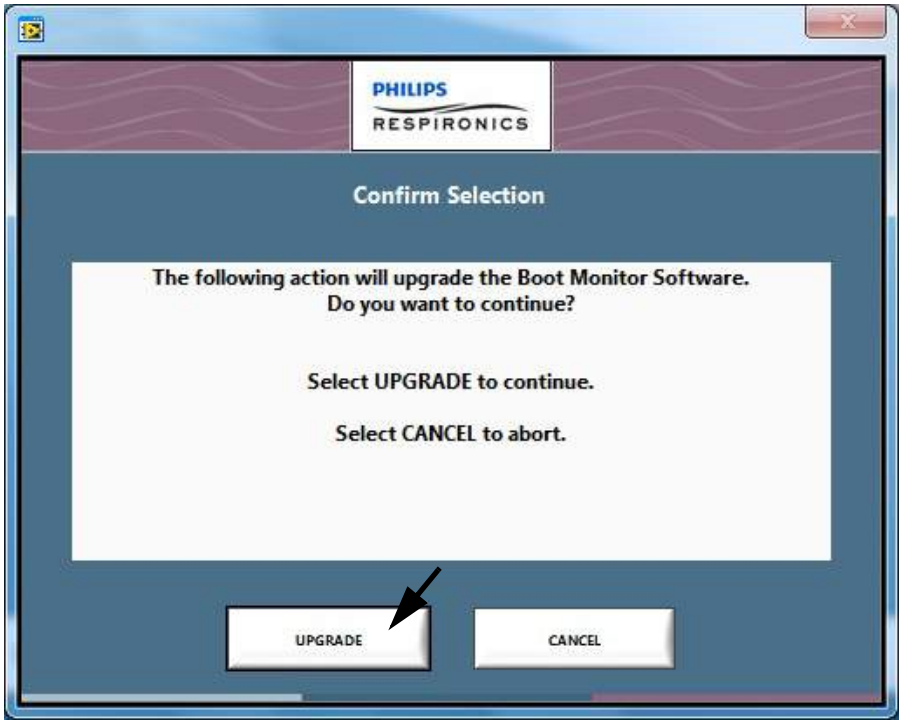


FIGURE 9-11: CONFIRM BOOT MONITOR UPGRADE

14. If the upgrade was successful, you will get a *Success* message with the new version of the boot monitor software. If the device already has the latest boot monitor version, you will get a message saying you already have the latest software. If the upgrade fails, you will receive an unsuccessful upgrade message, at which point you may re-try the upgrade, or exit the tool.

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CHAPTER 10: SCHEMATICS

10.0 PROPRIETARY STATEMENT

Schematics are supplied in direct support of the sale and purchase of this product.

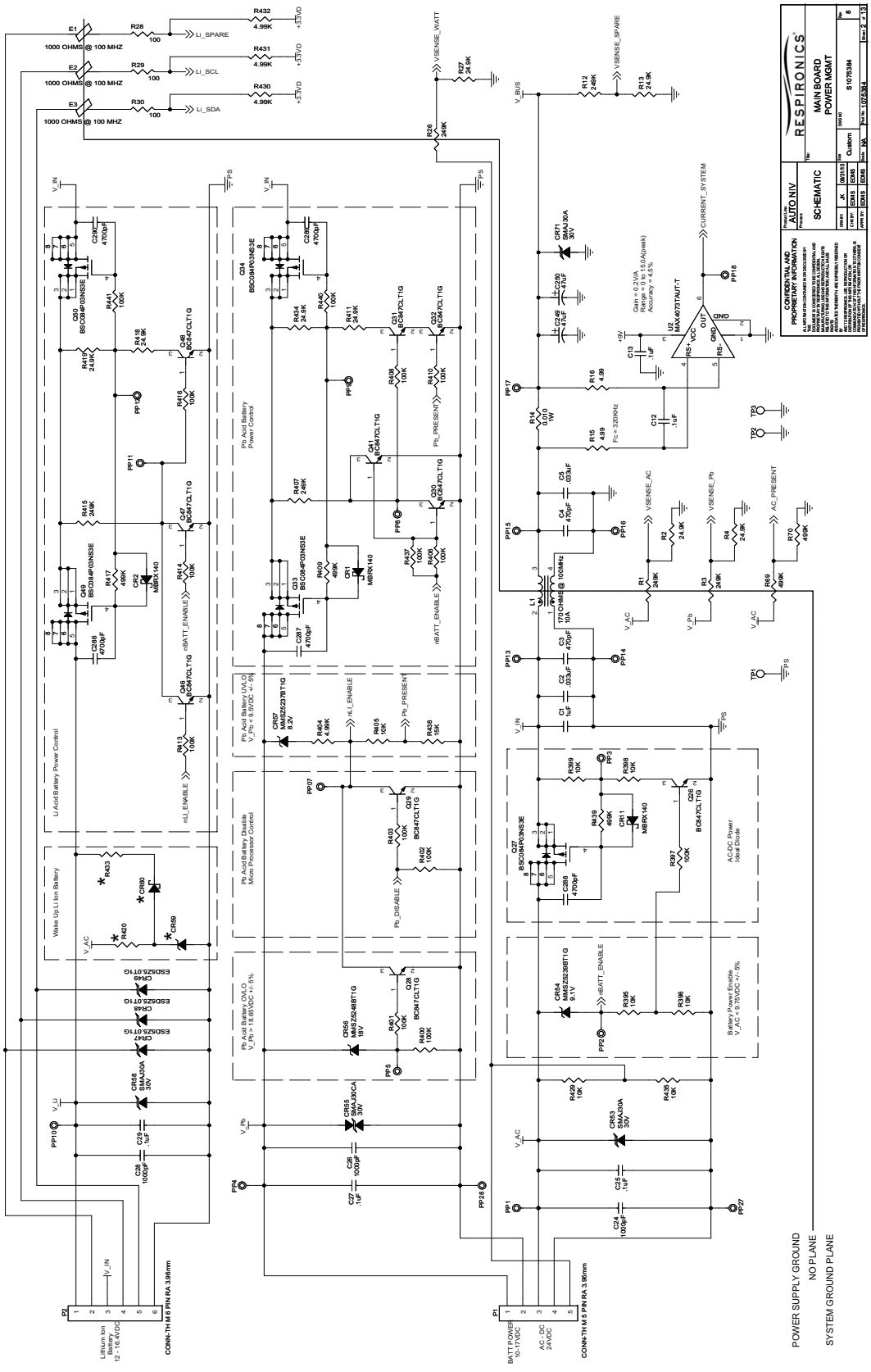
The Schematics are proprietary and confidential. Do not copy the schematics or disclose them to third parties beyond the purpose for which they are intended.

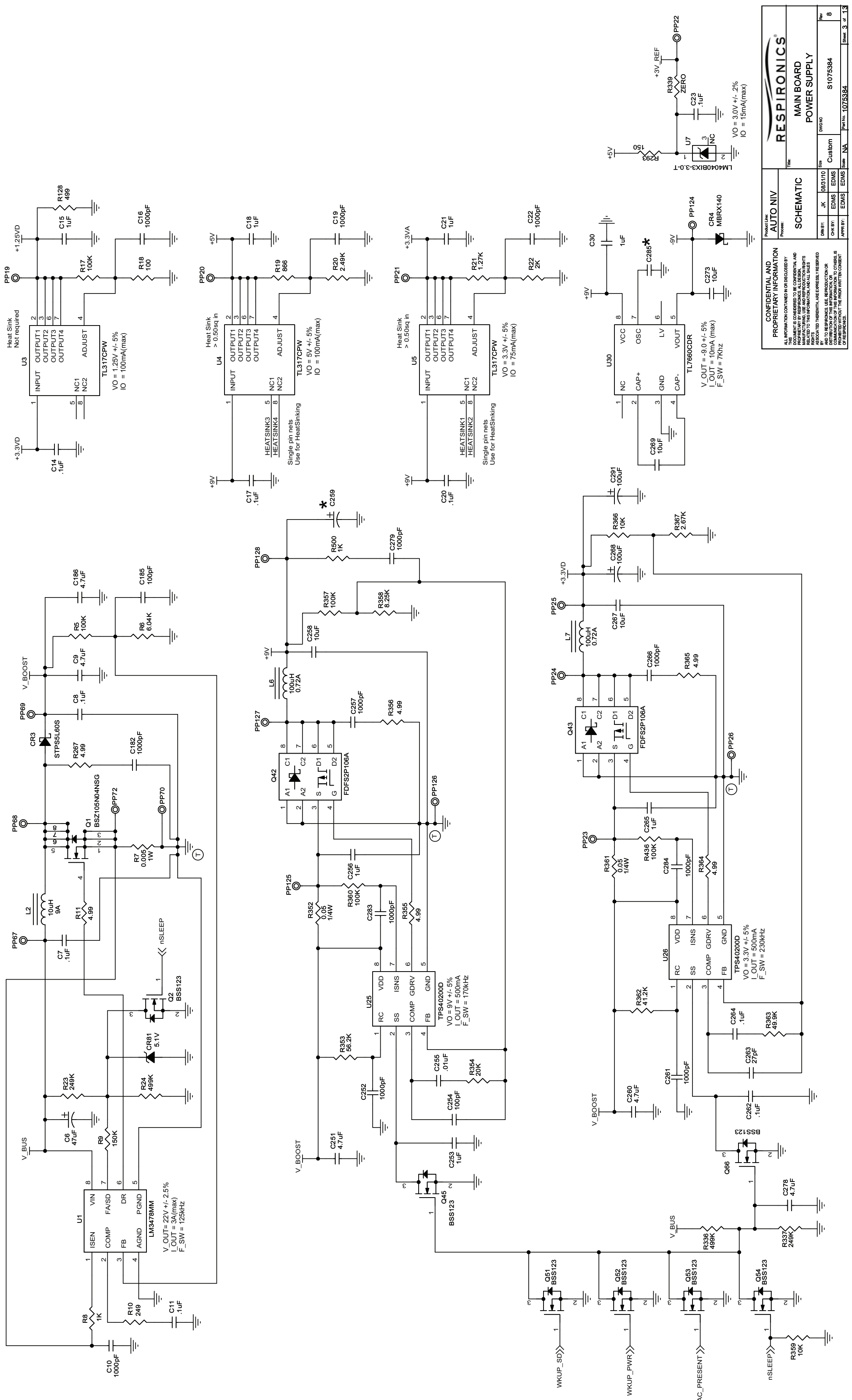
The schematics are intended to satisfy administrative requirements only. They are not intended to be used for component level testing and repair. Any changes of components could effect the reliability of the device, prohibit lot tracking of electronic components, and void warranties. Repairs and testing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

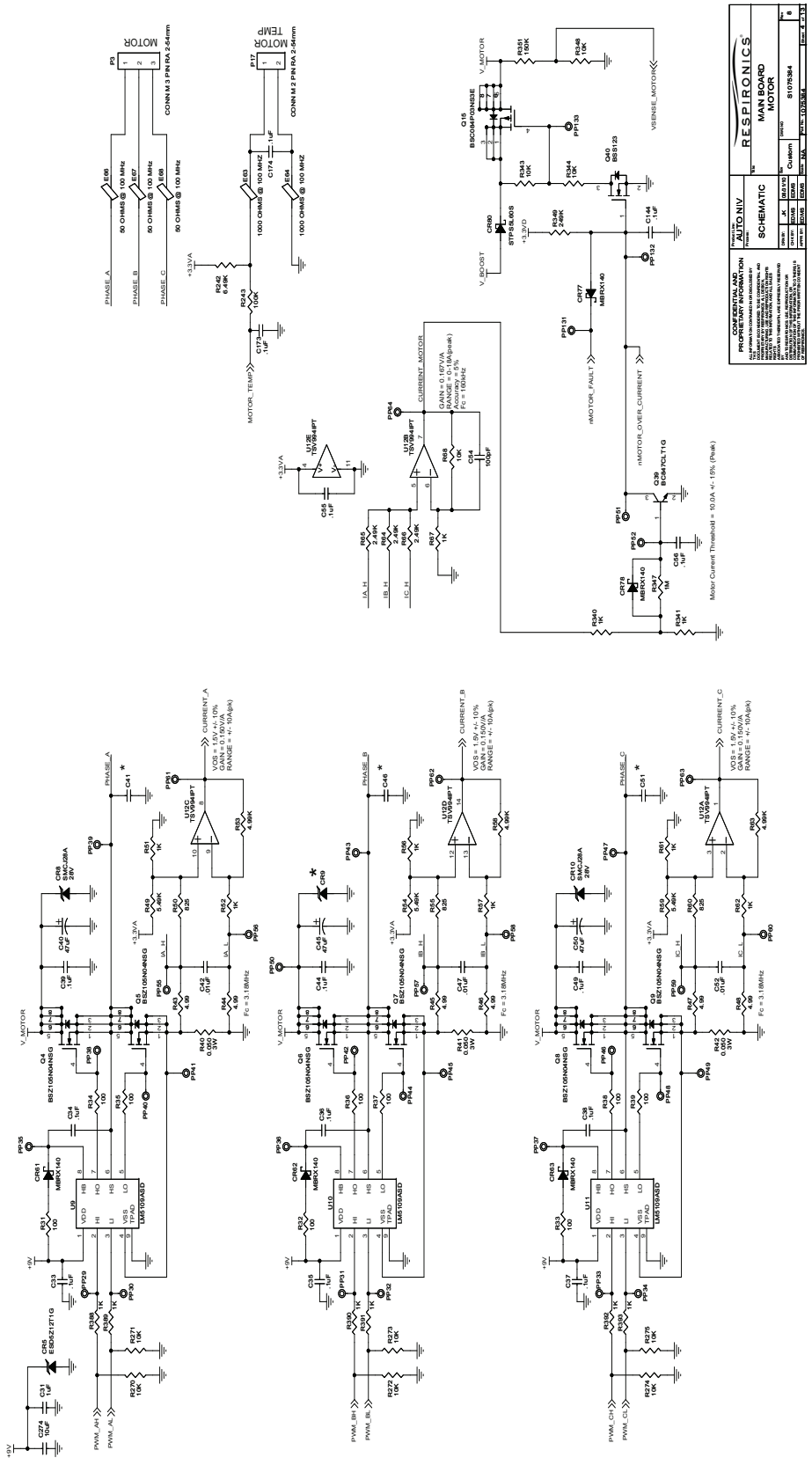
The schematics are of the revision level in effect at the time this manual was last revised. New revisions may or may not be distributed in the future.

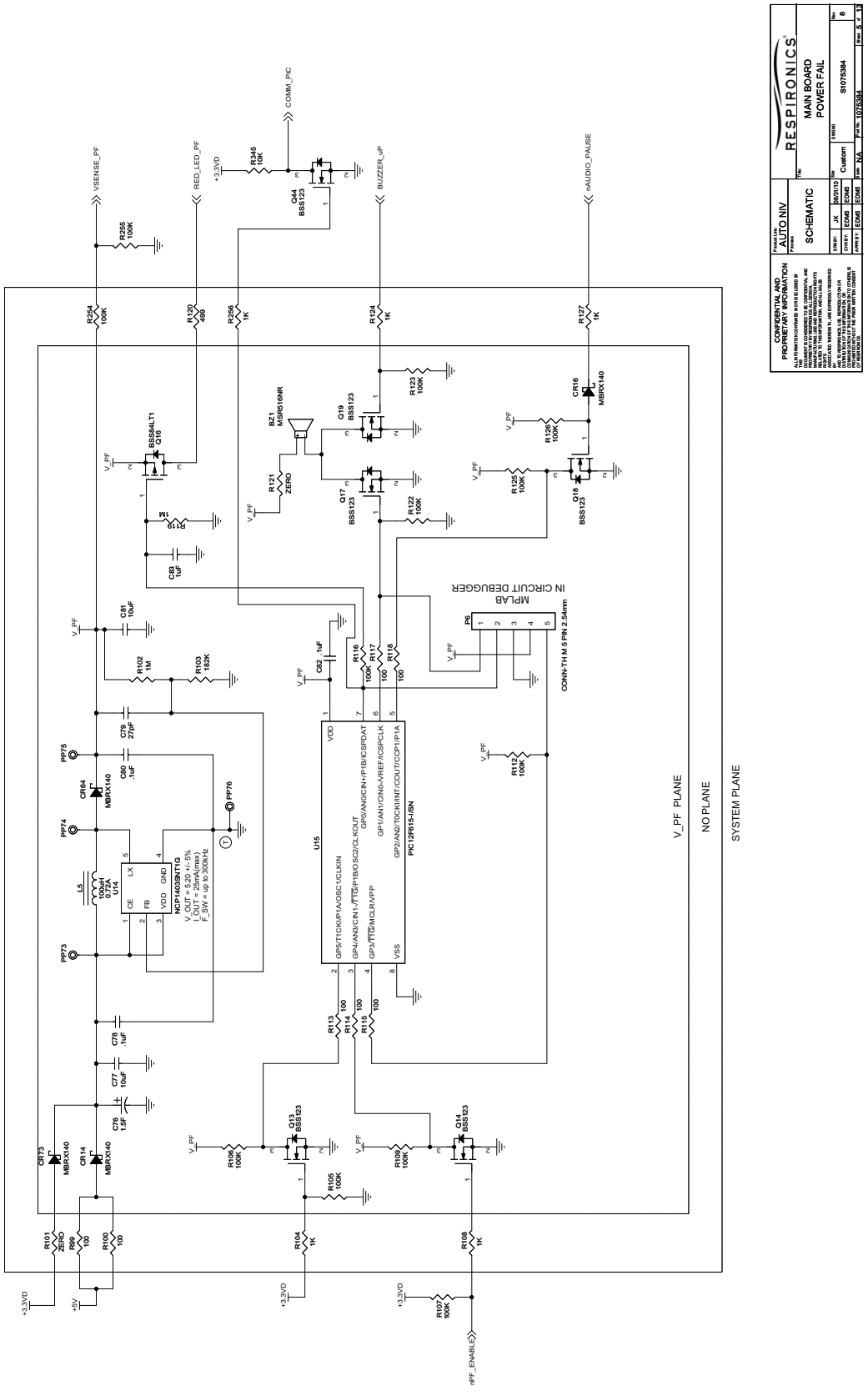
NOTE

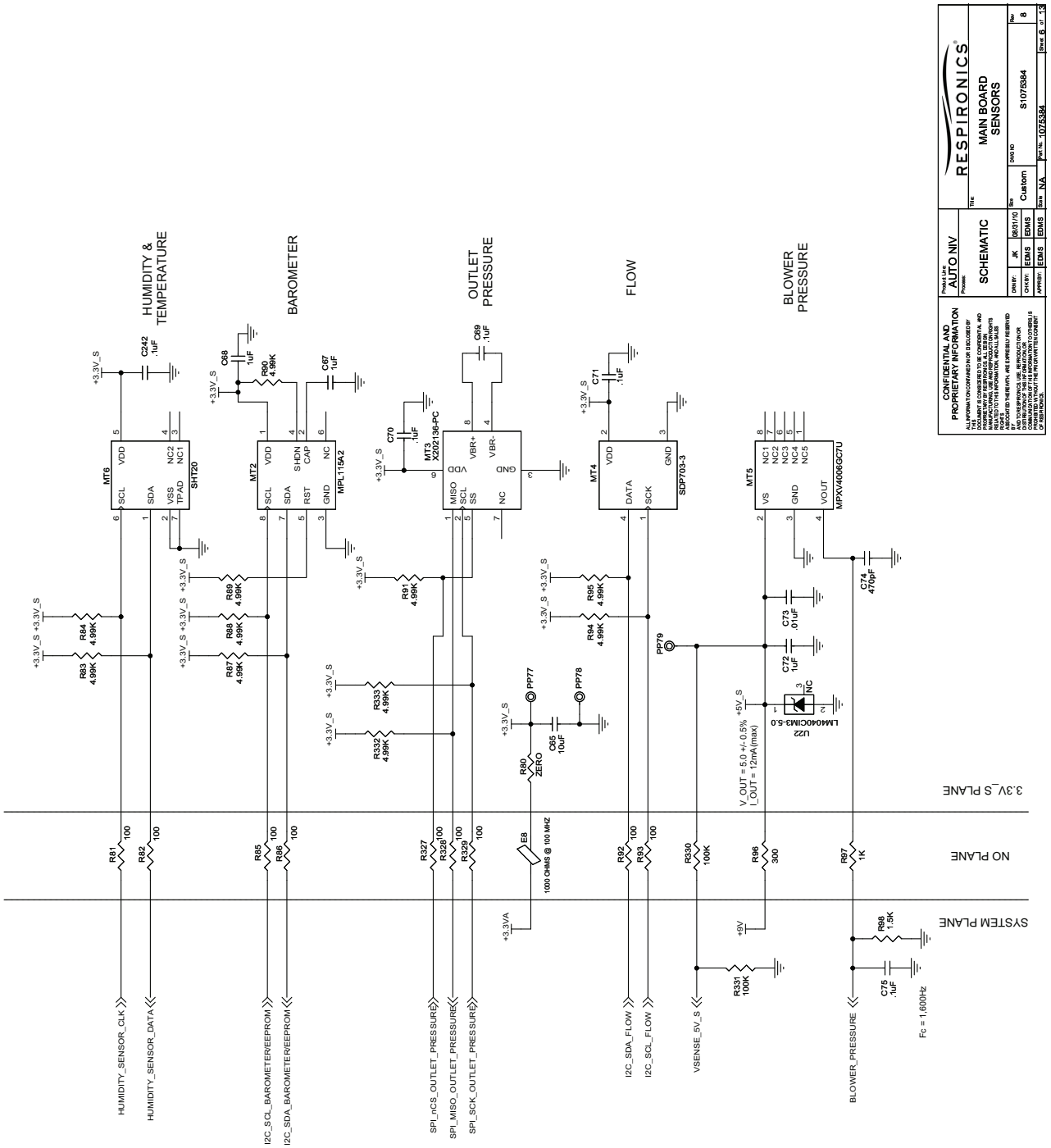
The following schematics begin with page 2 of 13. Page 1 is not published because it does not include any service-related information. Page 1 is reserved for internal engineering revision history and tracking notes.

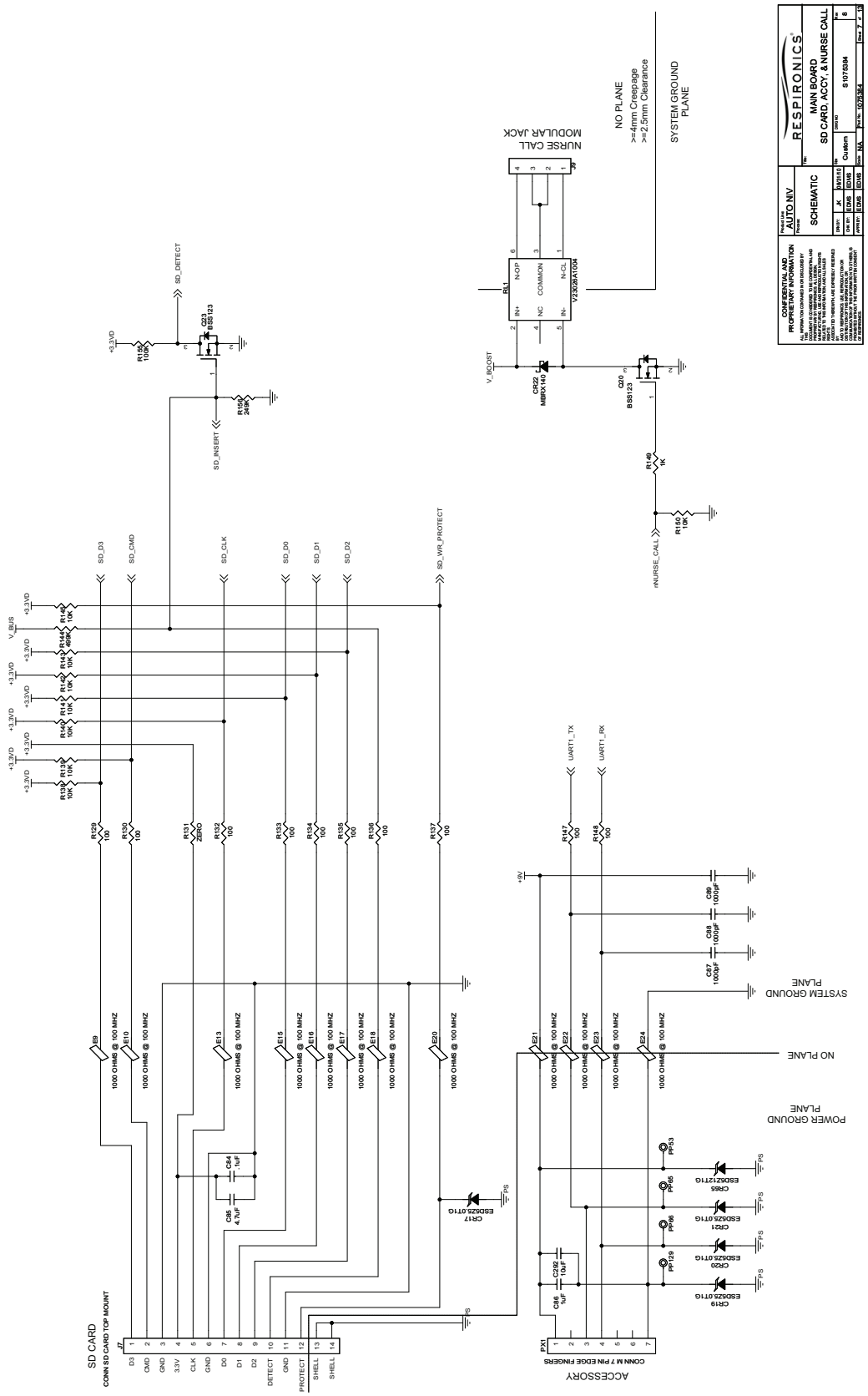

SCHEMATIC
MAIN BOARD POWER MGMT
RESPIRONICS
CONFIDENTIAL AND PROPRIETARY INFORMATION
Li Acid Battery Power Control
Wake Up Li Ion Battery
Pb Acid Battery Power Control
Pb Acid Battery Micro Processor Control
Pb Acid Battery OVLO V_Pb > 18.65VDC +/-5%
Pb Acid Battery UVLO V_Pb < 8.97VDC +/-5%
Battery Power Enable V_AC < 9.75VDC +/-5%
AC-DC Power Ideal Diode
Lithium Ion Battery 12 - 16.4VDC
AC_DC 24VDC
BATT POWER 10-17VDC
CONN-TH M 6 PIN RA 3.96mm
CONN-TH M 5 PIN RA 3.96mm
POWER SUPPLY GROUND
NO PLANE
SYSTEM GROUND PLANE

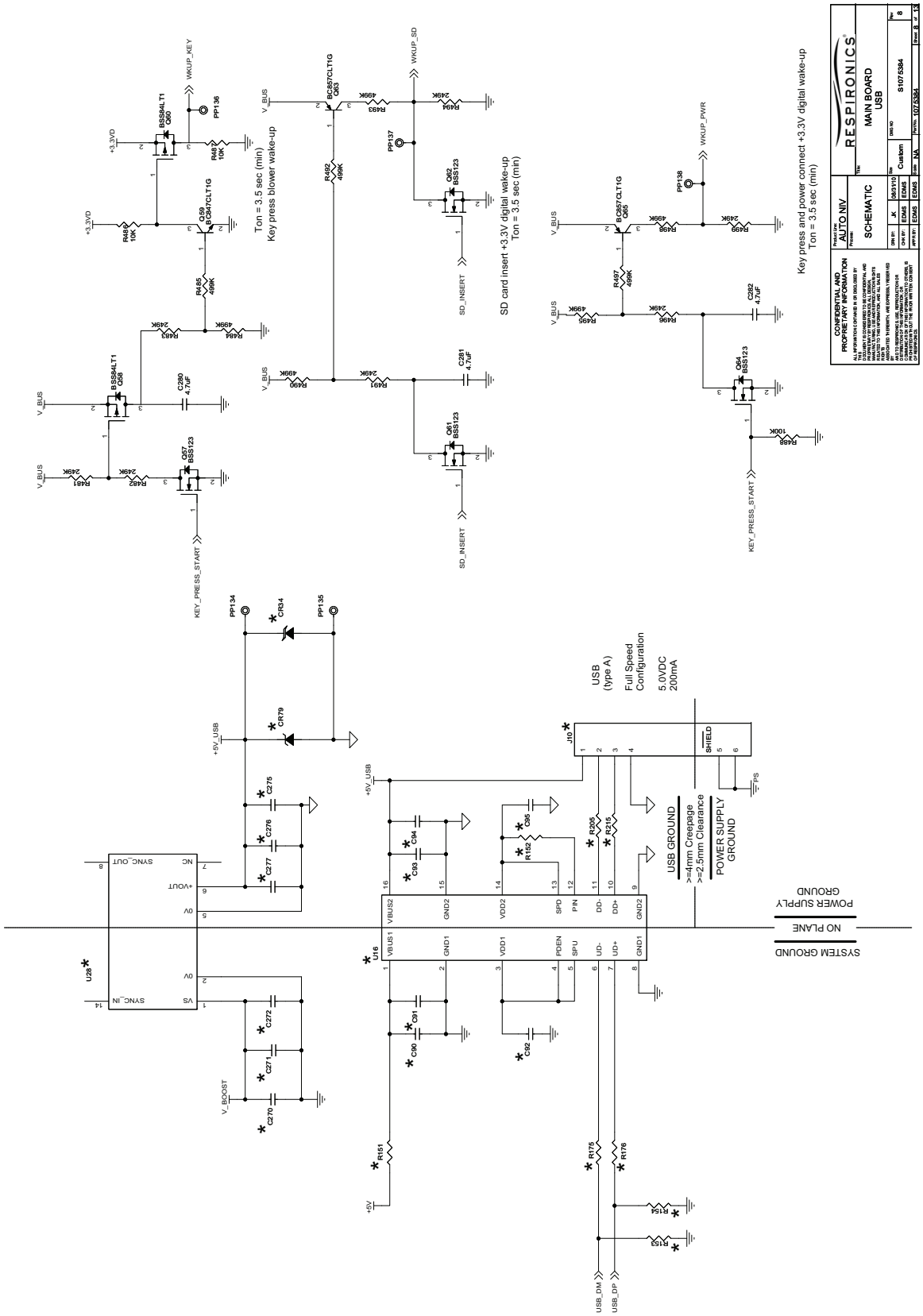

RESPIRONICS
MAIN BOARD
POWER SUPPLY
SCHEMATIC
AUTO NIV
CONFIDENTIAL AND PROPRIETARY INFORMATION

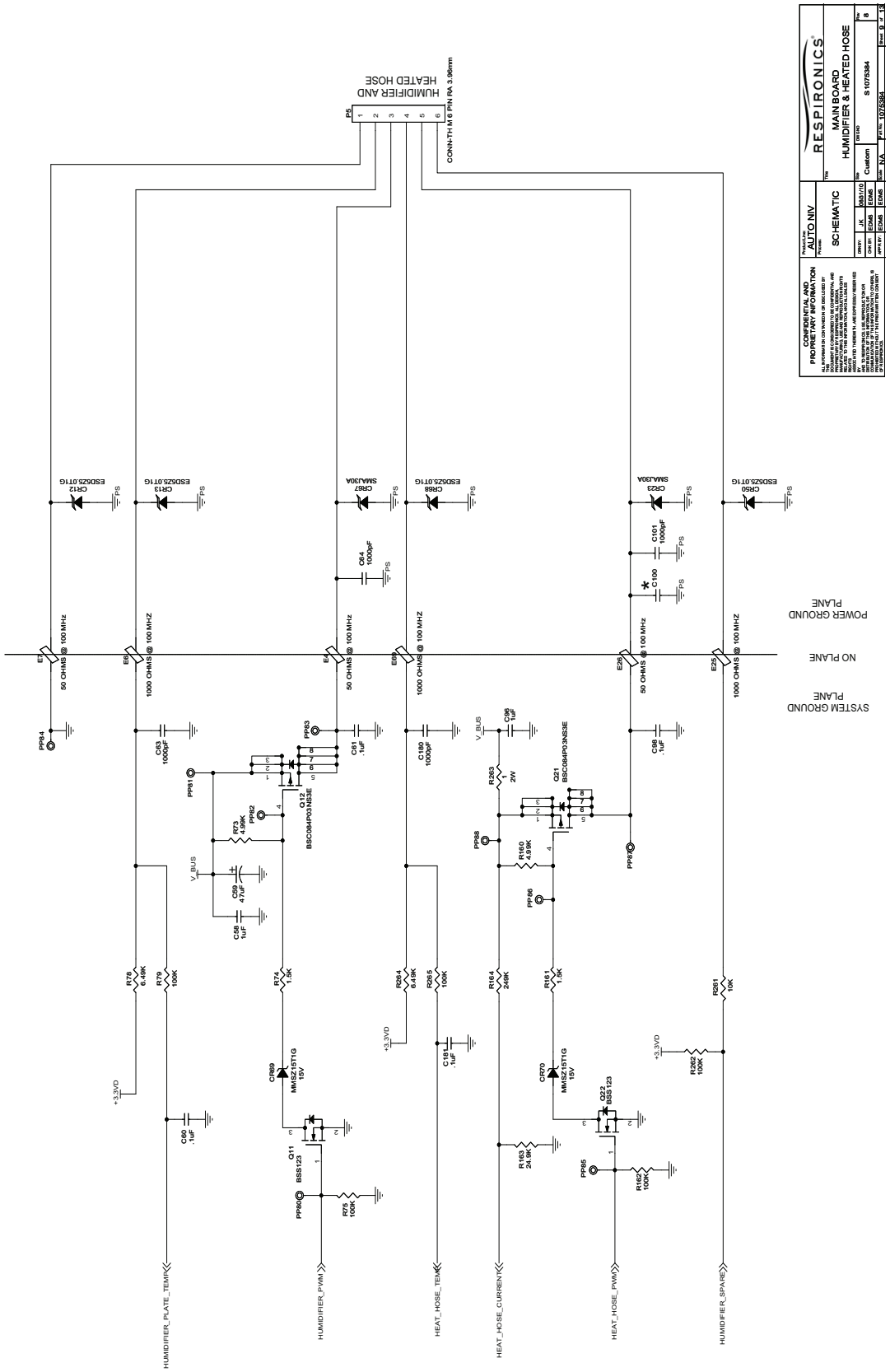

MOTOR
CONN M 3 PIN RA 2.54mm
MOTOR TEMP
CONN M 2 PIN RA 2.54mm
PHASE_A
PHASE_B
PHASE_C
50 OHMS @ 100 MHz
1000 OHMS @ 100 MHz
MOTOR_TEMP
CURRENT_MOTOR
GAIN = 0.167V/A
RANGE = 0-15A(peak)
ACCURACY = 5%
Fc = 160kHz
V_MOTOR
V_BOOST
VSENSE_MOTOR
nMOTOR_FAULT
nMOTOR_OVER_CURRENT
Motor Current Threshold = 10.0A +/- 15% (Peak)
RESPIRONICS
MAIN BOARD
MOTOR
SCHEMATIC
CONFIDENTIAL AND
PROPRIETARY INFORMATION
CURRENT_A
CURRENT_B
CURRENT_C
VGS = 1.5V +/- 10%
GAIN = 0.167V/A
RANGE = +/- 10A(pk)
PWM_AH
PWM_AL
PWM_BH
PWM_BL
PWM_CH
PWM_CL

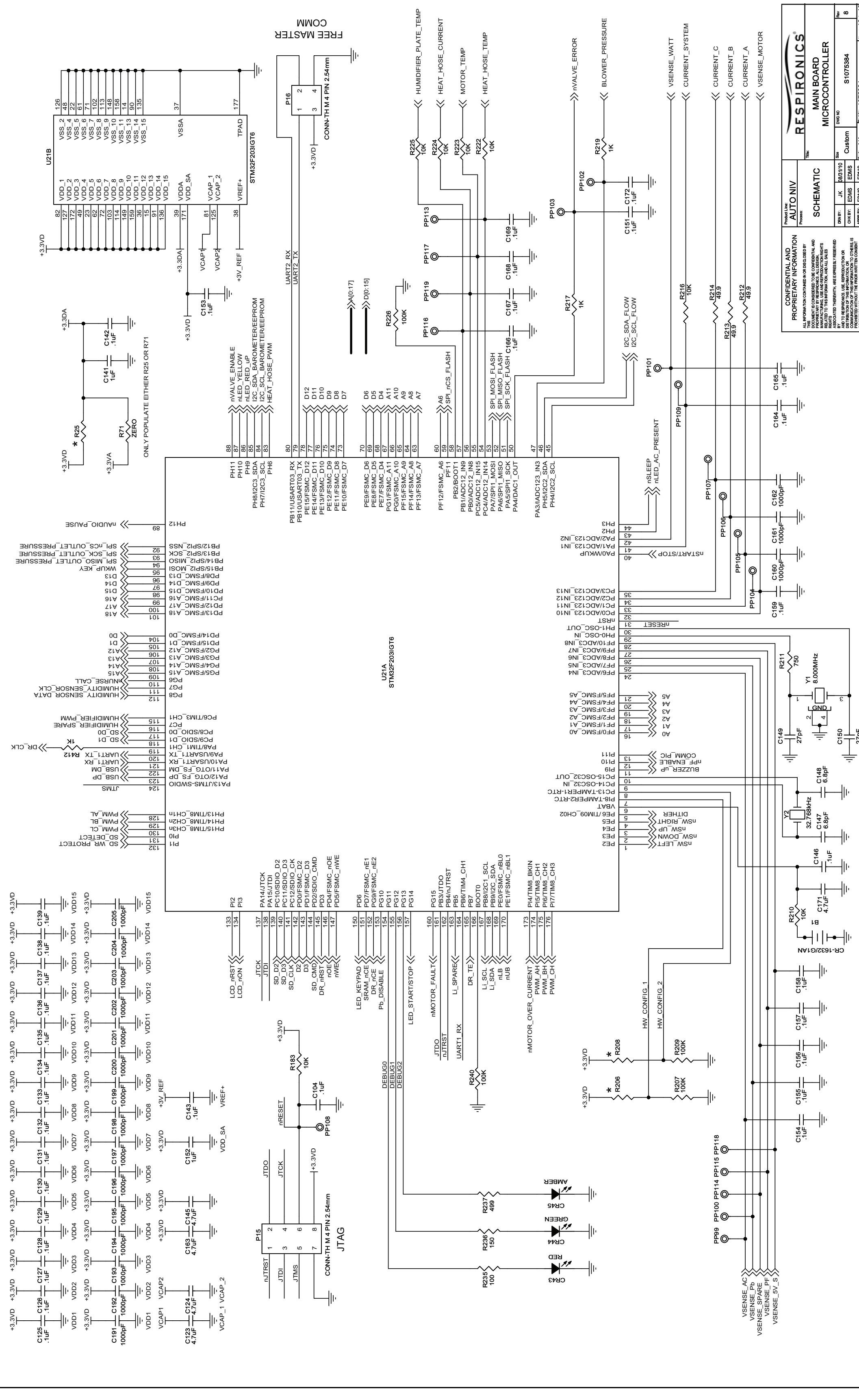

SCHEMATIC
MAIN BOARD
POWER FAIL
RESPIRONICS
Custom
S1075384
V_PF PLANE
NO PLANE
SYSTEM PLANE
IN CIRCUIT DEBUGGER
MPLAB
CONN-TH M 5 PIN 2.54mm
PIC12F615-I/SN
NCP1403SNT1G
MBRX140
MSR516NR
BSS84LT1
BSS123
VSENSE_PF
RED_LED_PF
COMM_PIC
BUZZER_uP
nAUDIO_PAUSE
+3.3VD
+5V
nPF_ENABLE

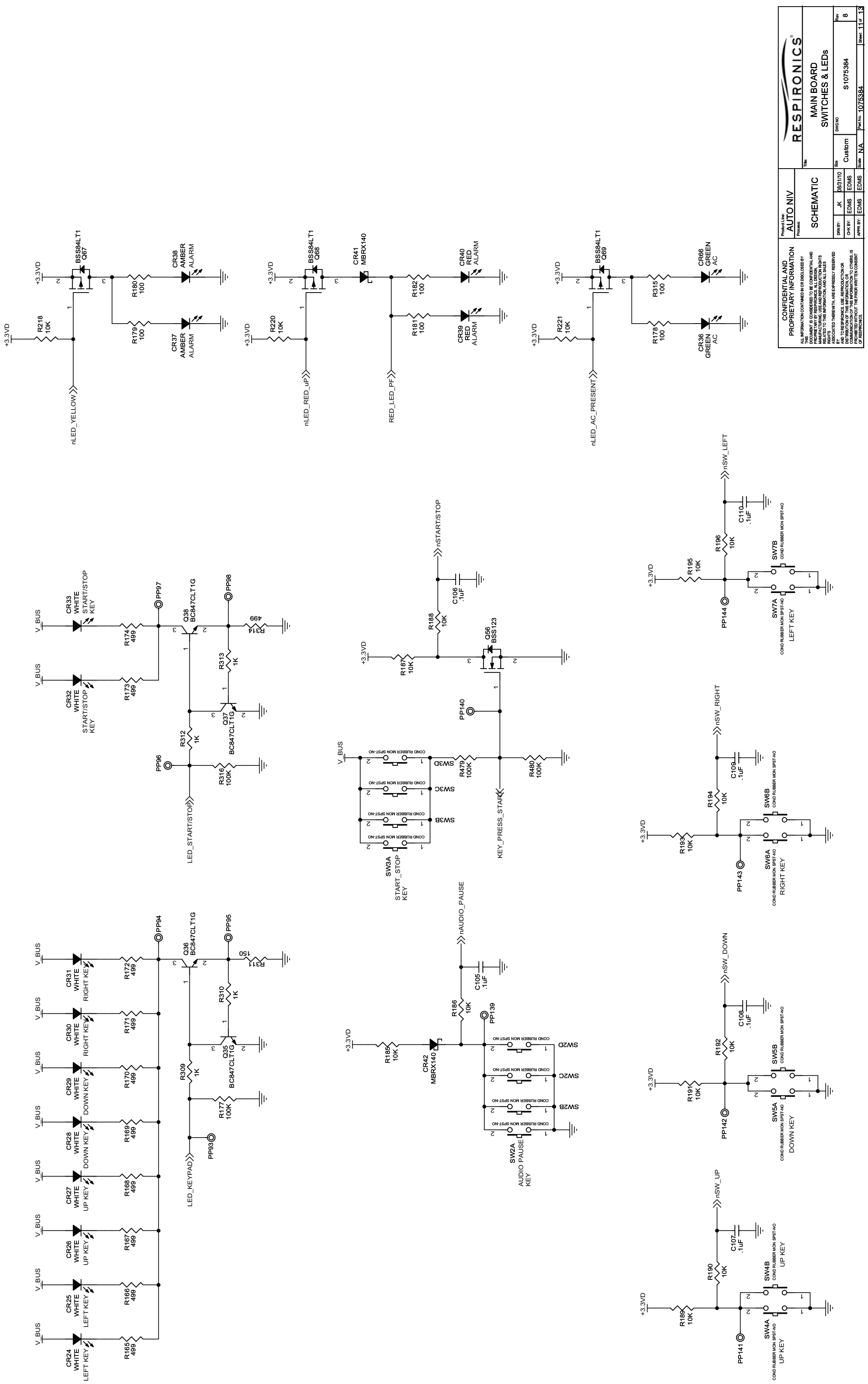

HUMIDITY & TEMPERATURE
BAROMETER
OUTLET PRESSURE
FLOW
BLOWER PRESSURE
SYSTEM PLANE
NO PLANE
3.3V_S PLANE
HUMIDITY_SENSOR_CLK
HUMIDITY_SENSOR_DATA
I2C_SCL_BAROMETER/EEPROM
I2C_SDA_BAROMETER/EEPROM
SPI_nCS_OUTLET_PRESSURE
SPI_MISO_OUTLET_PRESSURE
SPI_SCK_OUTLET_PRESSURE
I2C_SDA_FLOW
I2C_SCL_FLOW
VSENSE_5V_S
BLOWER_PRESSURE
Fc = 1,600Hz
V_OUT = 5.0 +/- 0.5%
I_OUT = 12mA(max)
1000 OHMS @ 100 MHZ
RESPIRONICS
MAIN BOARD SENSORS
SCHEMATIC
AUTO NIV
S1075384
CONFIDENTIAL AND PROPRIETARY INFORMATION

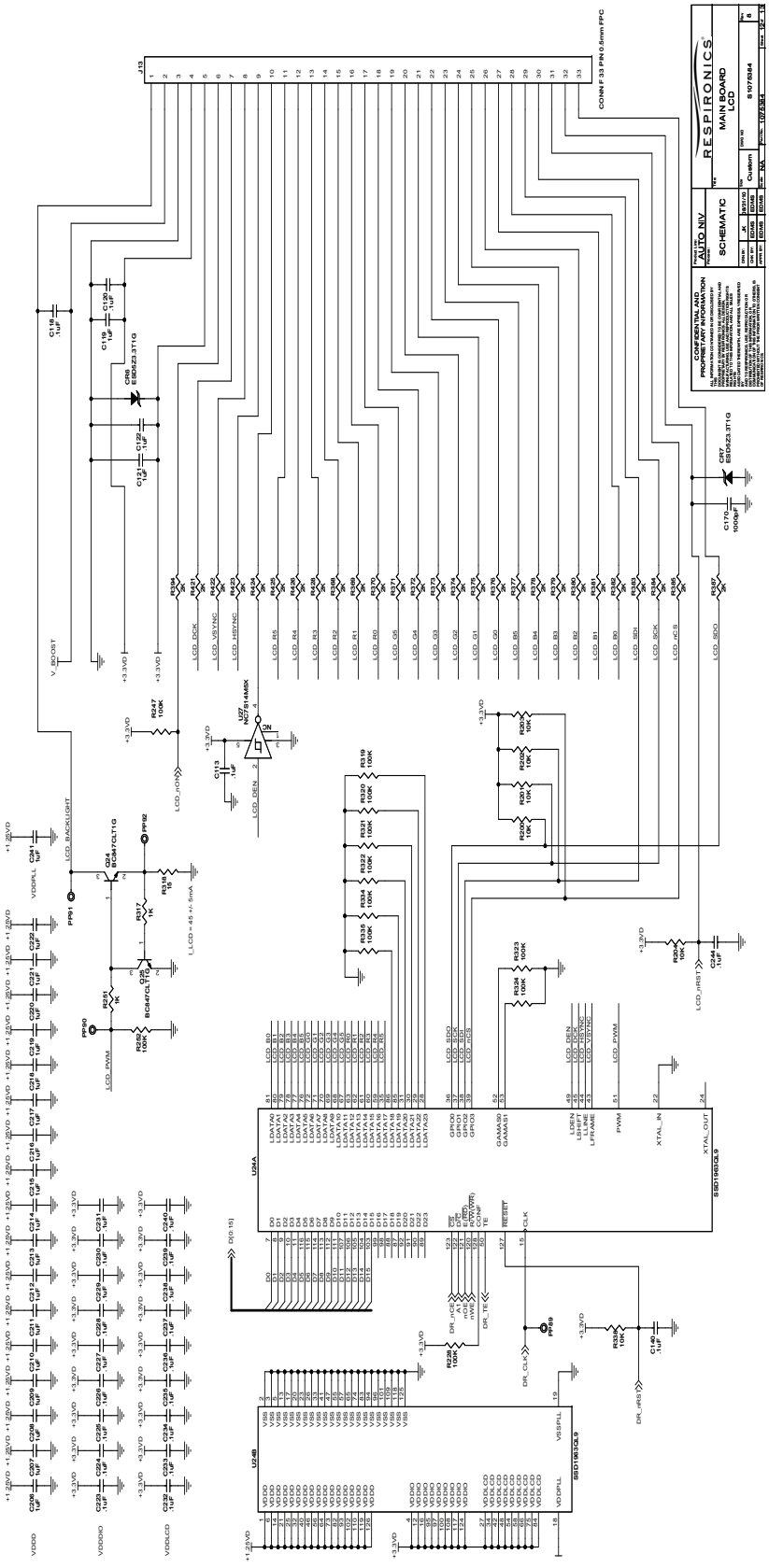

SD CARD
CONN SD CARD TOP MOUNT
ACCESSORY
CONN M 7 PIN EDGE FINGERS
NURSE CALL MODULAR JACK
SCHEMATIC
MAIN BOARD
SD CARD, ACCY, & NURSE CALL
RESPIRONICS
AUTO NIV
SYSTEM GROUND PLANE
NO PLANE
POWER GROUND PLANE
NO PLANE >=4mm Creepage >=2.5mm Clearance

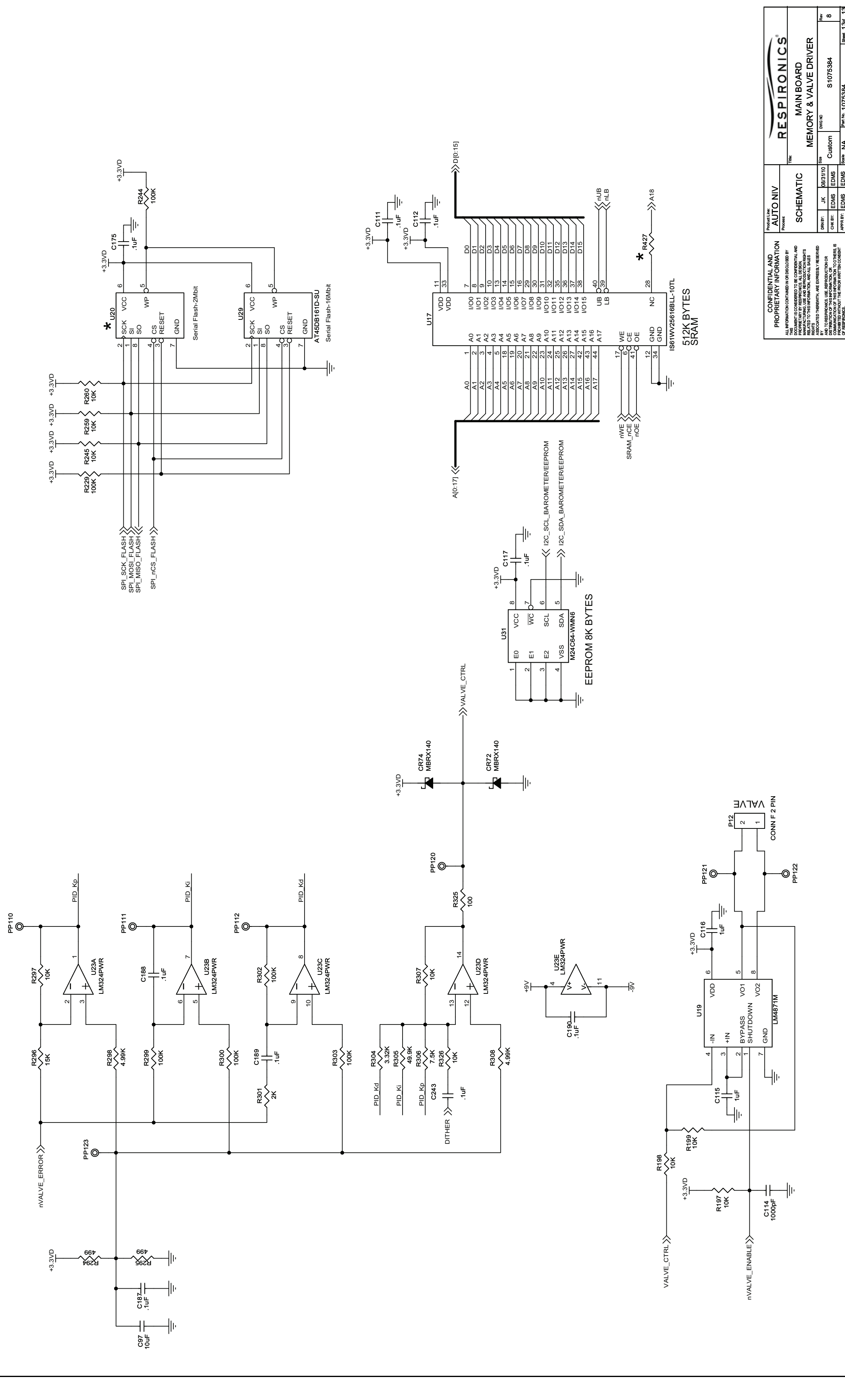

RESPIRONICS
MAIN BOARD
USB
SCHEMATIC
AUTO NIV
CONFIDENTIAL AND PROPRIETARY INFORMATION
Ton = 3.5 sec (min)
Key press blower wake-up
SD card insert +3.3V digital wake-up
Ton = 3.5 sec (min)
Key press and power connect +3.3V digital wake-up
Ton = 3.5 sec (min)
USB (type A)
Full Speed Configuration
5.0VDC 200mA
USB GROUND
>=4mm Creepage
>=2.5mm Clearance
POWER SUPPLY GROUND
SYSTEM GROUND
NO PLANE
POWER SUPPLY GROUND
V_BUS
+3.3VD
+5V_USB
+5V
V_BOOST
WKUP_KEY
WKUP_SD
WKUP_PWR
SD_INSERT
KEY_PRESS_START
USB_DM
USB_DP


HUMIDIFIER AND HEATED HOSE
CONN-TH M 6 PIN RA 3.96mm
P5
SYSTEM GROUND PLANE
NO PLANE
POWER GROUND PLANE
ESD5Z5.0T1G
SMAJ30A
50 OHMS @ 100 MHz
1000 OHMS @ 100 MHz
HUMIDIFIER_PLATE_TEMP
HUMIDIFIER_PWM
HEAT_HOSE_TEMP
HEAT_HOSE_CURRENT
HEAT_HOSE_PWM
HUMIDIFIER_SPARE
+3.3VD
V_BUS
BSC084P03NS3E
MMSZ15T1G
BSS123
CONFIDENTIAL AND PROPRIETARY INFORMATION
RESPIRONICS
MAIN BOARD
HUMIDIFIER & HEATED HOSE
SCHEMATIC
AUTO NIV
S1075384


RESPIRONICS
MAIN BOARD
MICROCONTROLLER
S1075384
AUTO NIV
SCHEMATIC
CONFIDENTIAL AND PROPRIETARY INFORMATION
FREE MASTER COMM
JTAG
U21A
U21B
STM32F203IGT6
ONLY POPULATE EITHER R25 OR R71


CONFIDENTIAL AND
PROPRIETARY INFORMATION
AUTO NIV
SCHEMATIC
RESPIRONICS
MAIN BOARD
SWITCHES & LEDs
Custom
S1075384


RESPIRONICS
MAIN BOARD
LCD
SCHEMATIC
CONFIDENTIAL AND PROPRIETARY INFORMATION
CONNF 33 PIN 0.5mm FPC
SSD1963GL9
LCD_BACKLIGHT
LCD_PWM
LCD_nRST
XTAL_IN
XTAL_OUT


RESPIRONICS
MAIN BOARD
MEMORY & VALVE DRIVER
SCHEMATIC
AUTO NIV
CONFIDENTIAL AND PROPRIETARY INFORMATION
512K BYTES
SRAM
EEPROM 8K BYTES
VALVE

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