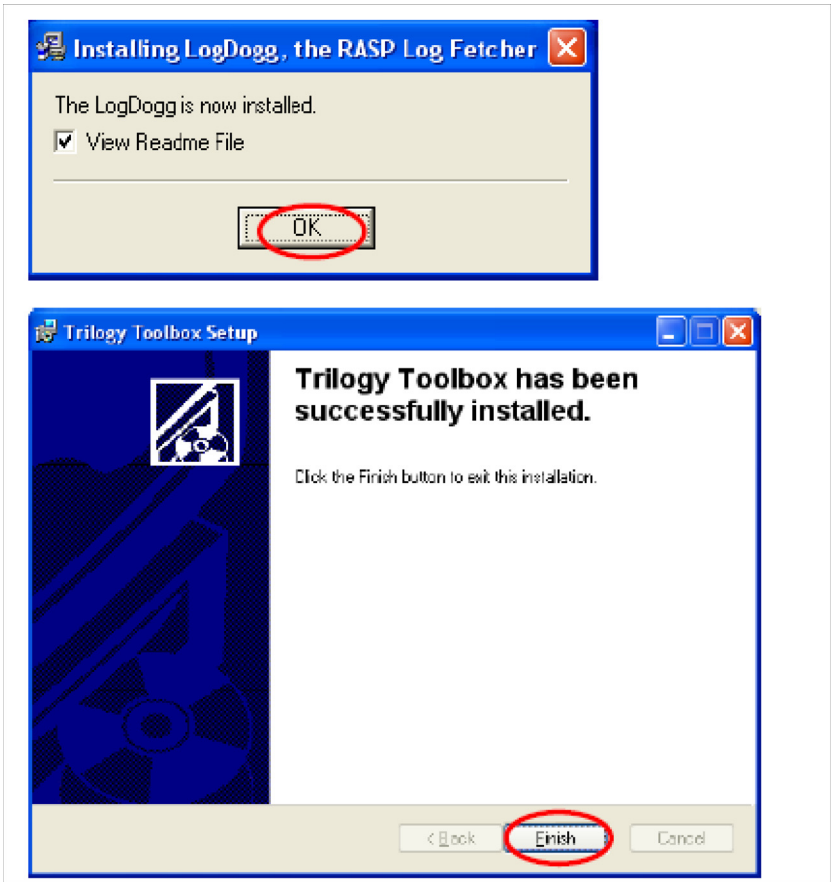
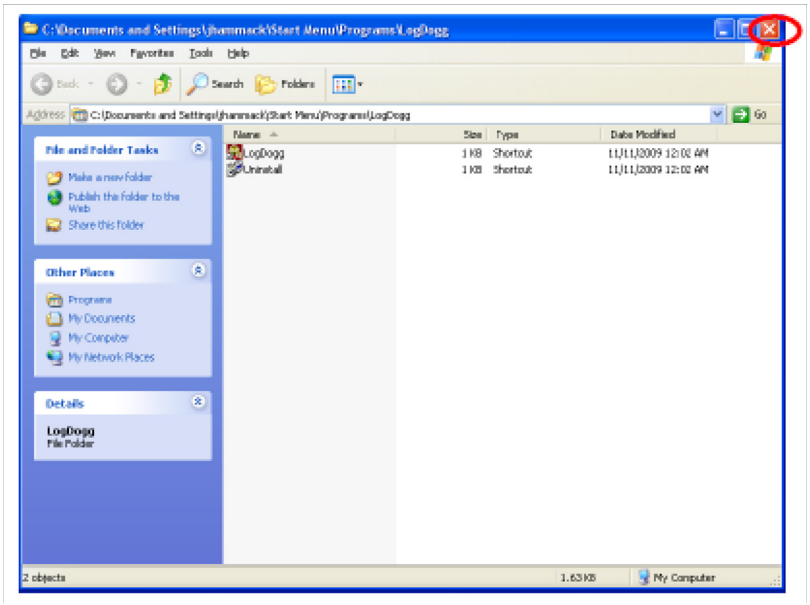
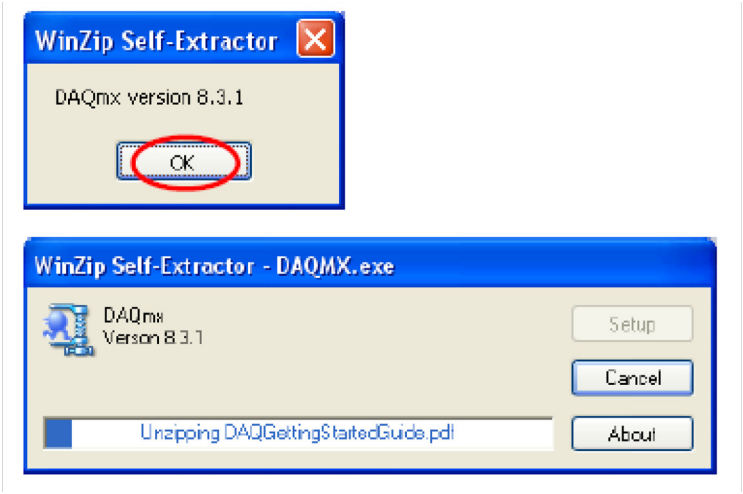


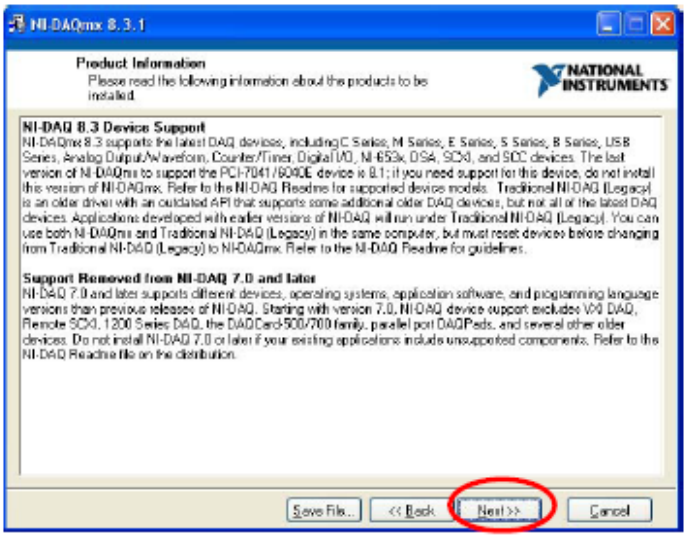


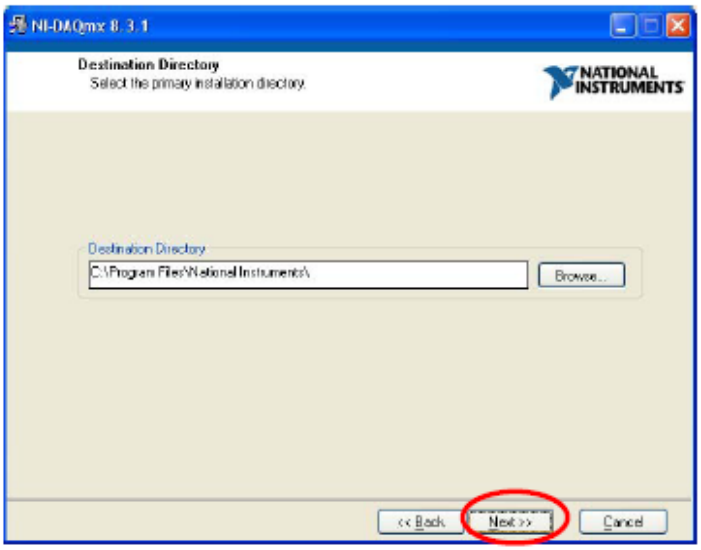
19. You do not need to restart your computer after the installation of the TBA.

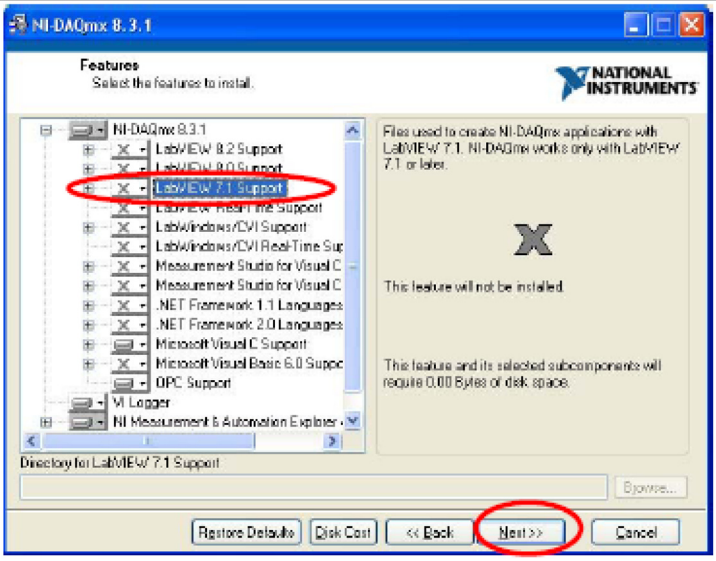
20. After the TBA is installed you will have to enter the C:\Program Files\Trilogy Toolbox folder of your computer, right click with the mouse the “Trilogy Toolbox.exe” file, select “Send To” and then Select “Desktop (As a Shortcut)” to place the TBA Icon on your desktop.

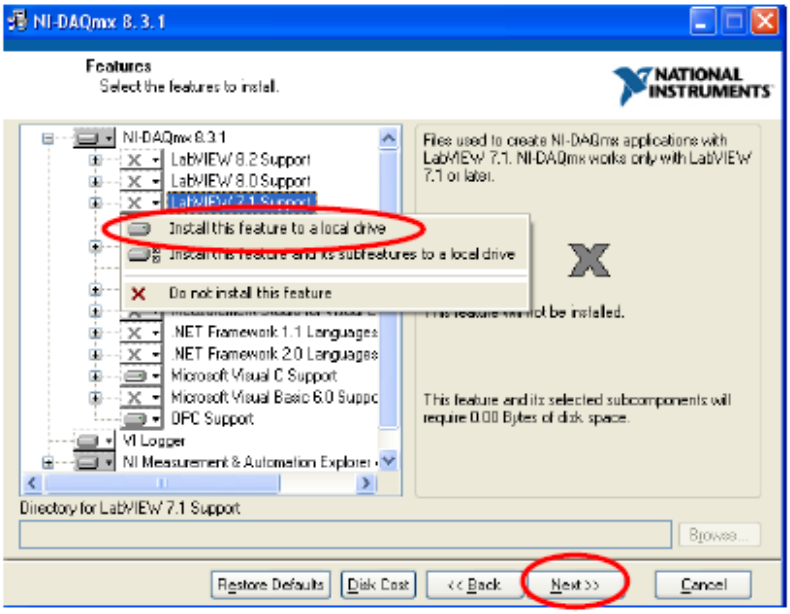
21. Next from the folder, select the DAQ for installation by double clicking with the mouse the “DAQMX.exe” file.
22. Follow the prompts and select the options highlighted by the RED Circles.

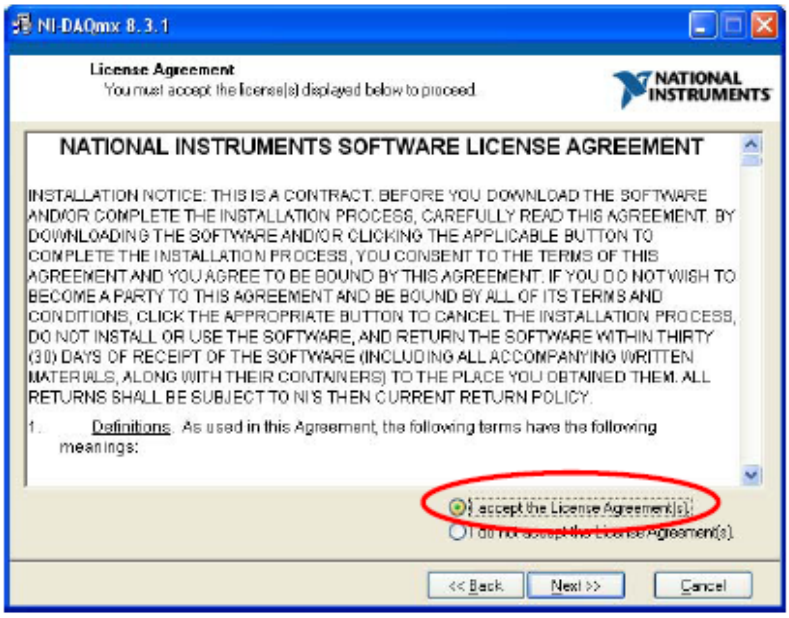


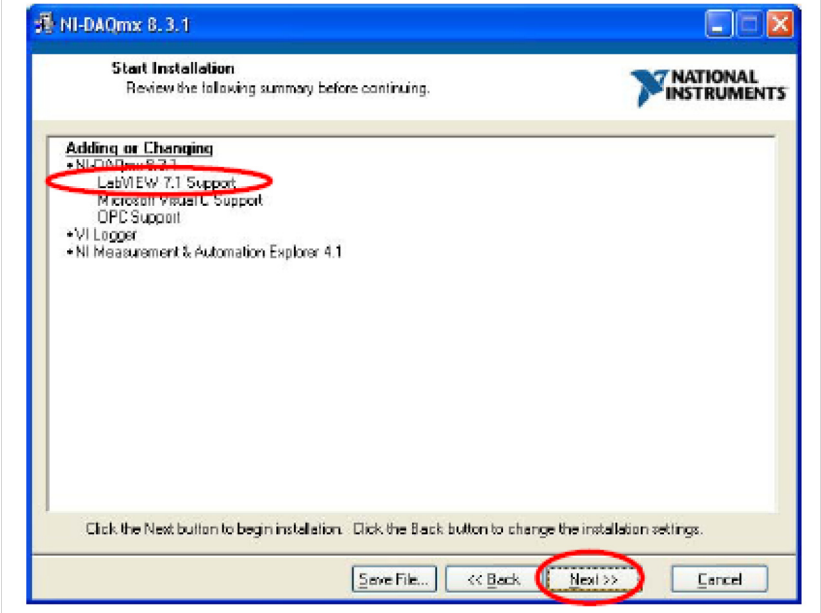

NI-DAQmx 8.3.1
Product Information
Please read the following information about the products to be installed.
NATIONAL INSTRUMENTS
NI-DAQ 8.3 Device Support
NI-DAQmx 8.3 supports the latest DAQ devices, including C Series, M Series, E Series, S Series, B Series, USB Series, Analog Output/Waveform, Counter/Timer, Digital I/O, NI-653x, DSA, SCXI, and SCC devices. The last version of NI-DAQmx to support the PCI-7041/6040E device is 8.1; if you need support for this device, do not install this version of NI-DAQmx. Refer to the NI-DAQ Readme for supported device models. Traditional NI-DAQ (Legacy) is an older driver with an outdated API that supports some additional older DAQ devices, but not all of the latest DAQ devices. Applications developed with earlier versions of NI-DAQ will run under Traditional NI-DAQ (Legacy). You can use both NI-DAQmx and Traditional NI-DAQ (Legacy) in the same computer, but must reset devices before changing from Traditional NI-DAQ (Legacy) to NI-DAQmx. Refer to the NI-DAQ Readme for guidelines.
Support Removed from NI-DAQ 7.0 and later
NI-DAQ 7.0 and later supports different devices, operating systems, application software, and programming language versions than previous releases of NI-DAQ. Starting with version 7.0, NI-DAQ device support excludes VXI DAQ, Remote SCXI, 1200 Series DAQ, the DAQCard-500/700 family, parallel port DAQPads, and several other older devices. Do not install NI-DAQ 7.0 or later if your existing applications include unsupported components. Refer to the NI-DAQ Readme file on the distribution.
Save File...
<< Back
Next >>
Cancel

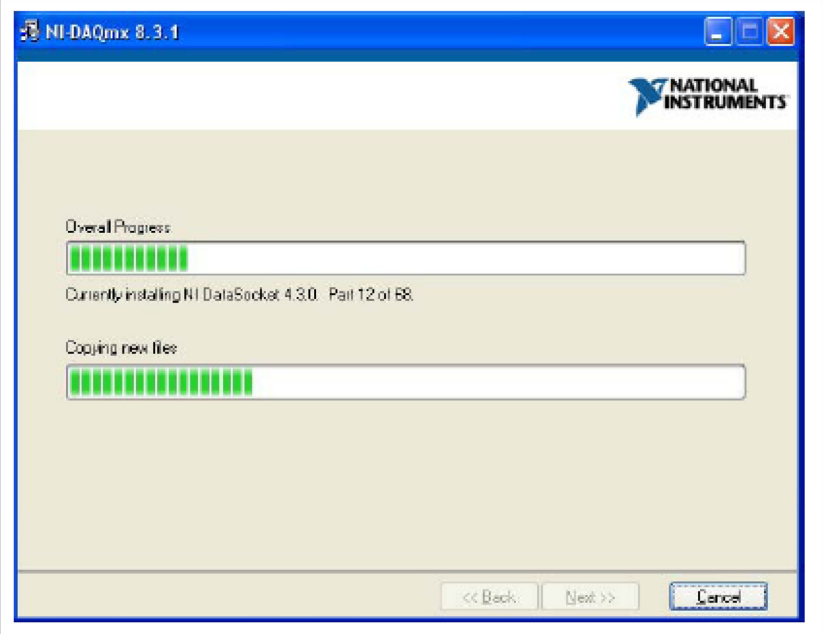

NI-DAQmx 8.3.1
Destination Directory
Select the primary installation directory.
NATIONAL INSTRUMENTS
Destination Directory
C:\Program Files\National Instruments\
Browse...
<< Back
Next >>
Cancel

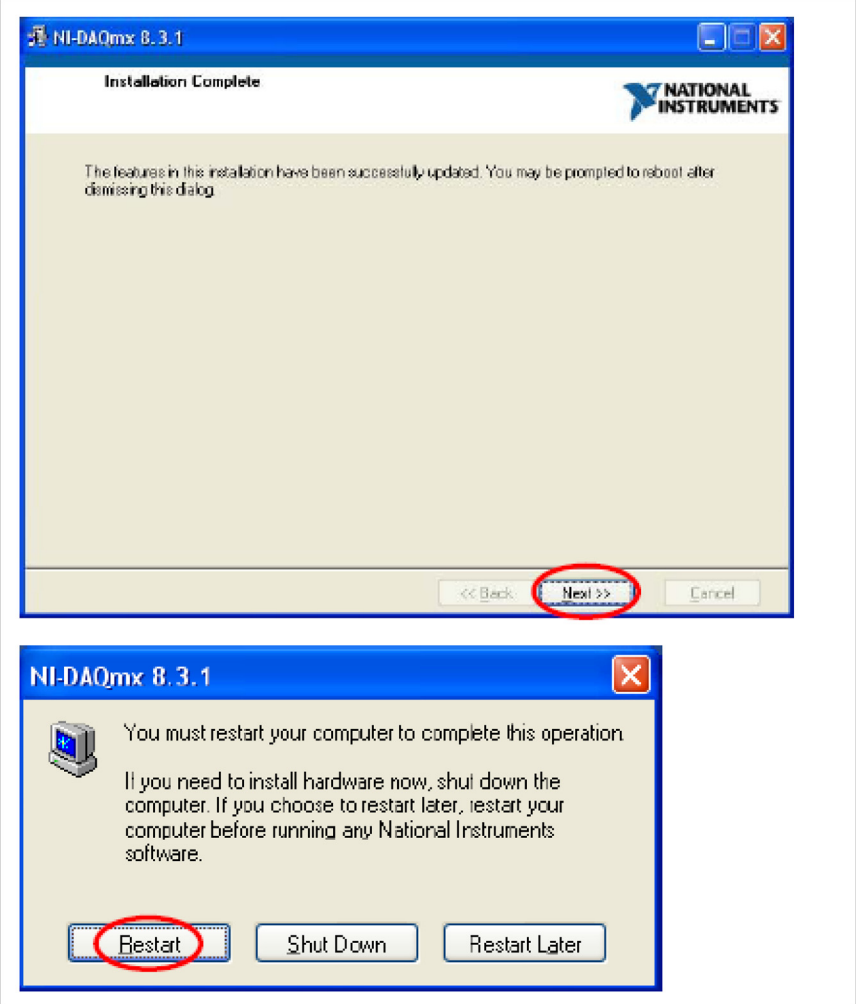

NI-DAQmx 8.3.1
Features
Select the features to install.
NATIONAL INSTRUMENTS
NI-DAQmx 8.3.1
LabVIEW 8.2 Support
LabVIEW 8.0 Support
LabVIEW 7.1 Support
LabWindows/CVI Support
LabWindows/CVI Real-Time Sup
Measurement Studio for Visual C
Measurement Studio for Visual C
.NET Framework 1.1 Languages
.NET Framework 2.0 Languages
Microsoft Visual C Support
Microsoft Visual Basic 6.0 Suppc
OPC Support
VI Logger
NI Measurement & Automation Explorer
Files used to create NI-DAQmx applications with LabVIEW 7.1. NI-DAQmx works only with LabVIEW 7.1 or later.
This feature will not be installed.
This feature and its selected subcomponents will require 0.00 Bytes of disk space.
Directory for LabVIEW 7.1 Support
Browse...
Restore Defaults
Disk Cost
<< Back
Next >>
Cancel


NI-DAQmx 8.3.1
Features
Select the features to install.
NATIONAL INSTRUMENTS
NI-DAQmx 8.3.1
LabVIEW 8.2 Support
LabVIEW 8.0 Support
Install this feature to a local drive
Install this feature and its subfeatures to a local drive
Do not install this feature
.NET Framework 1.1 Languages
.NET Framework 2.0 Languages
Microsoft Visual C Support
Microsoft Visual Basic 6.0 Suppc
OPC Support
VI Logger
NI Measurement & Automation Explorer
Files used to create NI-DAQmx applications with LabVIEW 7.1. NI-DAQmx works only with LabVIEW 7.1 or later.
This feature and its selected subcomponents will require 0.00 Bytes of disk space.
Directory for LabVIEW 7.1 Support
Browse...
Restore Defaults
Disk Cost
<< Back
Next >>
Cancel


NI-DAQmx 8.3.1
License Agreement
You must accept the license(s) displayed below to proceed.
NATIONAL INSTRUMENTS
NATIONAL INSTRUMENTS SOFTWARE LICENSE AGREEMENT
INSTALLATION NOTICE: THIS IS A CONTRACT. BEFORE YOU DOWNLOAD THE SOFTWARE AND/OR COMPLETE THE INSTALLATION PROCESS, CAREFULLY READ THIS AGREEMENT. BY DOWNLOADING THE SOFTWARE AND/OR CLICKING THE APPLICABLE BUTTON TO COMPLETE THE INSTALLATION PROCESS, YOU CONSENT TO THE TERMS OF THIS AGREEMENT AND YOU AGREE TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT WISH TO BECOME A PARTY TO THIS AGREEMENT AND BE BOUND BY ALL OF ITS TERMS AND CONDITIONS, CLICK THE APPROPRIATE BUTTON TO CANCEL THE INSTALLATION PROCESS, DO NOT INSTALL OR USE THE SOFTWARE, AND RETURN THE SOFTWARE WITHIN THIRTY (30) DAYS OF RECEIPT OF THE SOFTWARE (INCLUDING ALL ACCOMPANYING WRITTEN MATERIALS, ALONG WITH THEIR CONTAINERS) TO THE PLACE YOU OBTAINED THEM. ALL RETURNS SHALL BE SUBJECT TO NI'S THEN CURRENT RETURN POLICY.
1. Definitions. As used in this Agreement, the following terms have the following meanings:
I accept the License Agreement(s).
I do not accept the License Agreement(s).
<< Back
Next >>
Cancel


NI-DAQmx 8.3.1
Start Installation
Review the following summary before continuing.
NATIONAL INSTRUMENTS
Adding or Changing
LabVIEW 7.1 Support
Microsoft Visual C Support
OPC Support
VI Logger
NI Measurement & Automation Explorer 4.1
Click the Next button to begin installation. Click the Back button to change the installation settings.
Save File...
<< Back
Next >>
Cancel

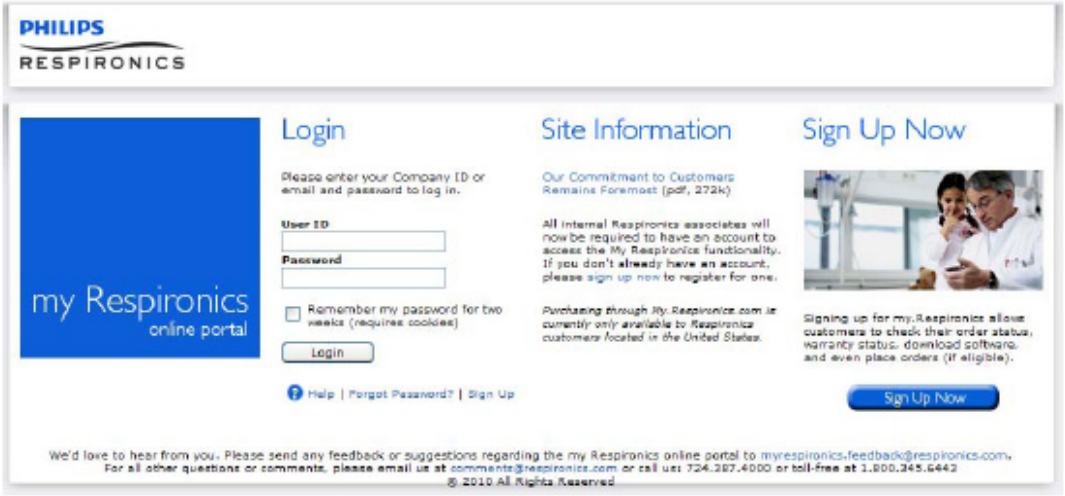

NI-DAQmx 8.3.1
NATIONAL INSTRUMENTS
Overall Progress:
Currently installing NI DataSocket 4.3.0. Part 12 of 68.
Copying new files:
<< Back
Next >>
Cancel



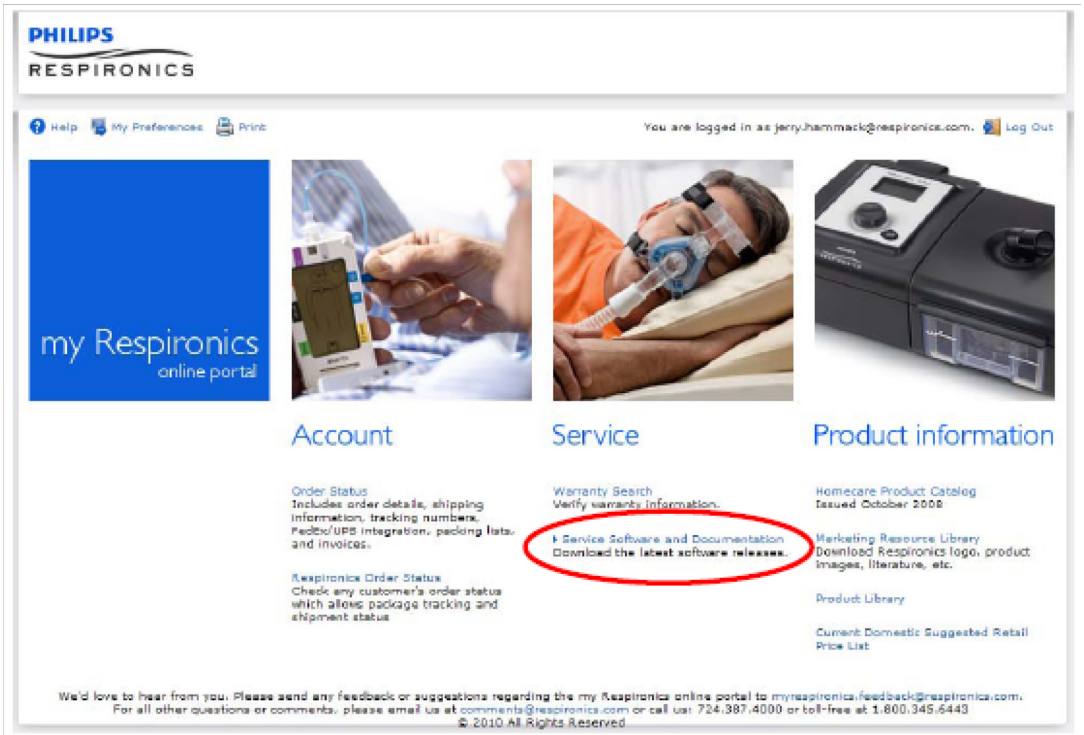
23. You must restart your computer after the DAQ has been installed.
24. After the restart of your computer has completed, the Trilogy test applications will be ready for use.

10.8 PERFORMING FIRMWARE UPGRADES

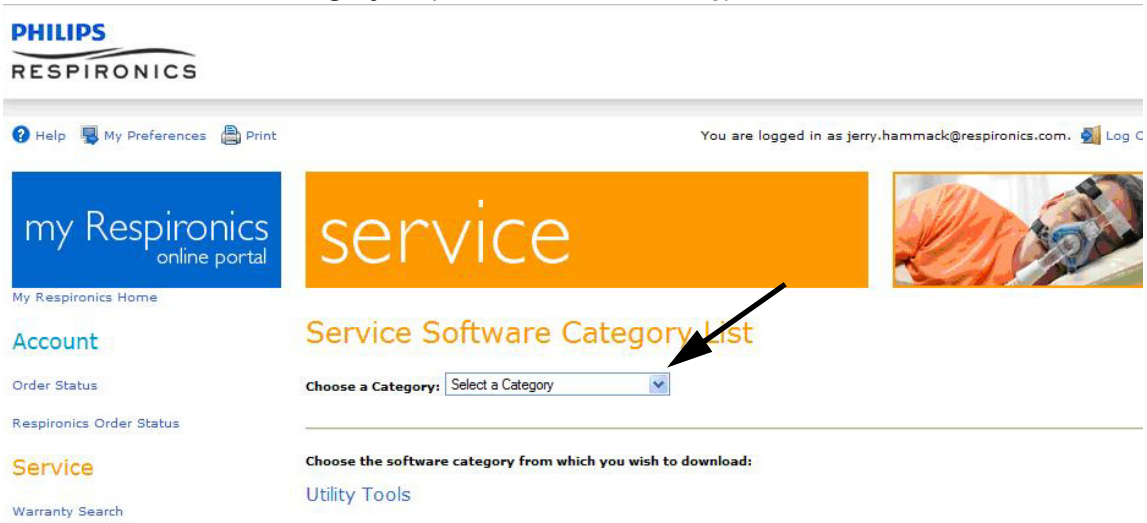
1. Connect the SD Card Reader (Respironics Part Number: 1047300) to the PC.
2. Insert the Trilogy SD Card into the SD Card Reader.
3. Log onto ***http://my.respironics.com***.



4. If you have an account with my.respironics.com, enter your User ID and Password. If you do not, then you must create an account. You will need your company account information in order to establish the account.
5. Click the Login button if you have an account, otherwise click the Sign Up Now button.



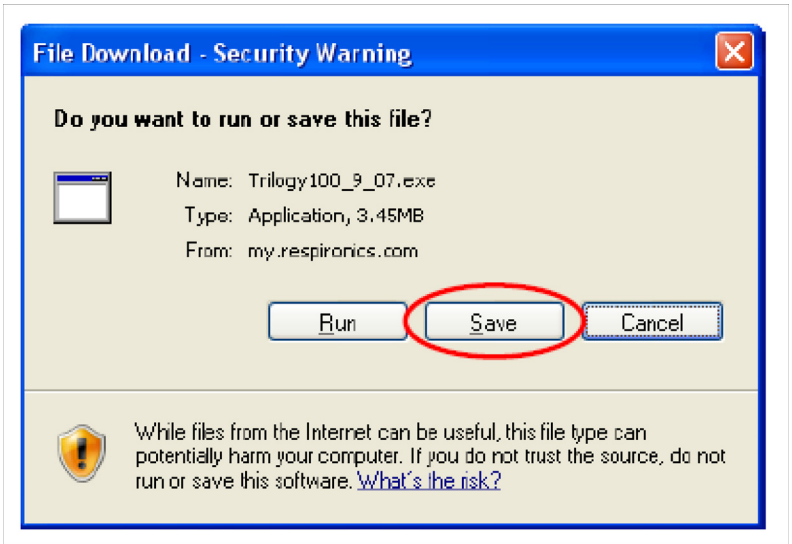
6. Once you have entered your account information and signed in, you can access the Service Software and Documentation page. Select the appropriate option from above.
7. In the ***Choose a Category*** drop down box, select *Trilogy*.



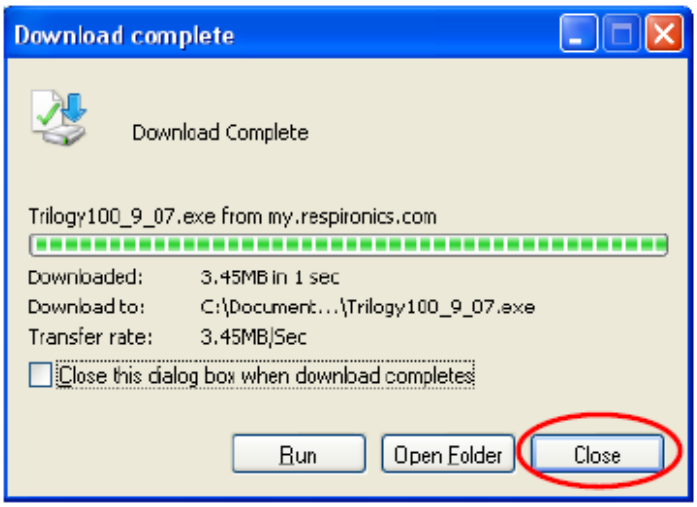
8. Click the Download button to download the software update to the SD Card.

9. Select the Yes button to download the new software.

10. Select the Save prompt.

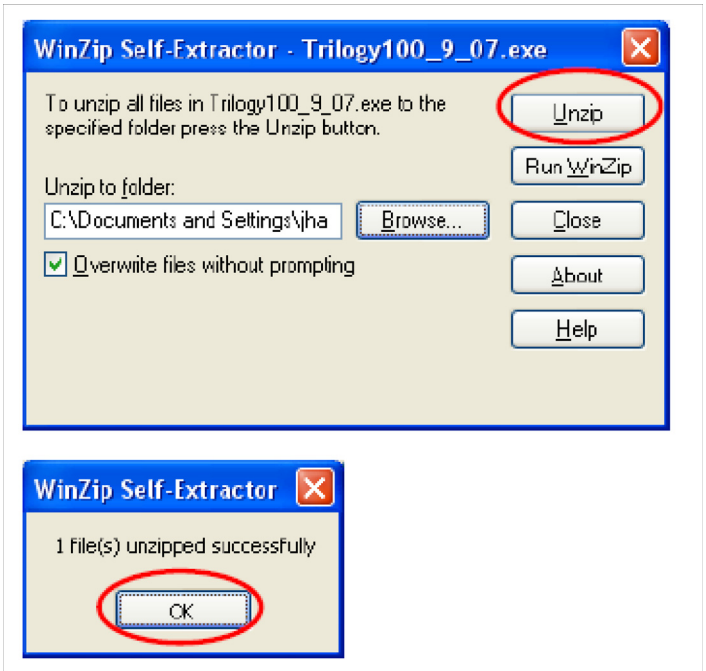


11. Save to the drive that has the SD Card.
12. Select the Close prompt.

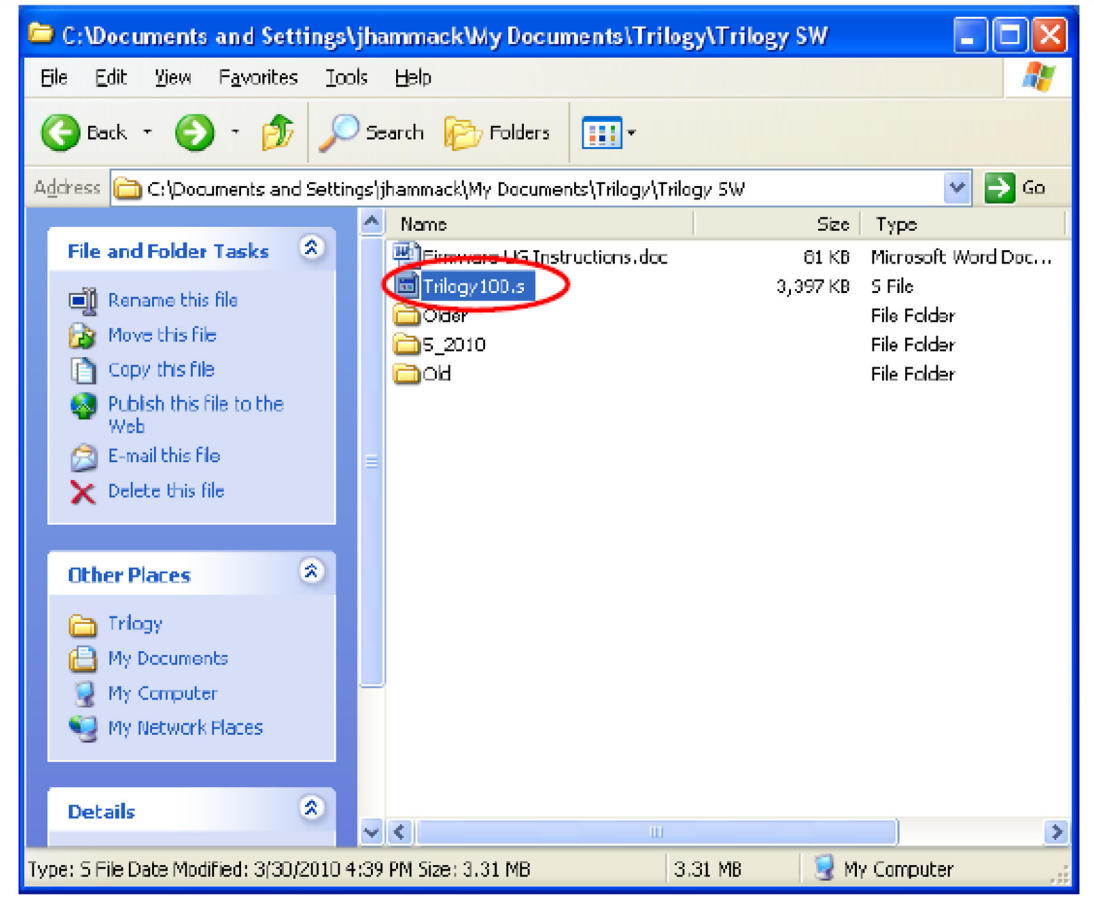


13. Open the file that the software was saved to.

14. You will see a .exe file. Double click on this and then unzip it.



15. Save it to the SD card again. In addition to the .exe file, there will now also be a .s file. This is the file that the Trilogy needs to upgrade to the new software.



16. Remove the SD Card from the SD Card Reader and insert it into the Trilogy Device while in therapy off mode.

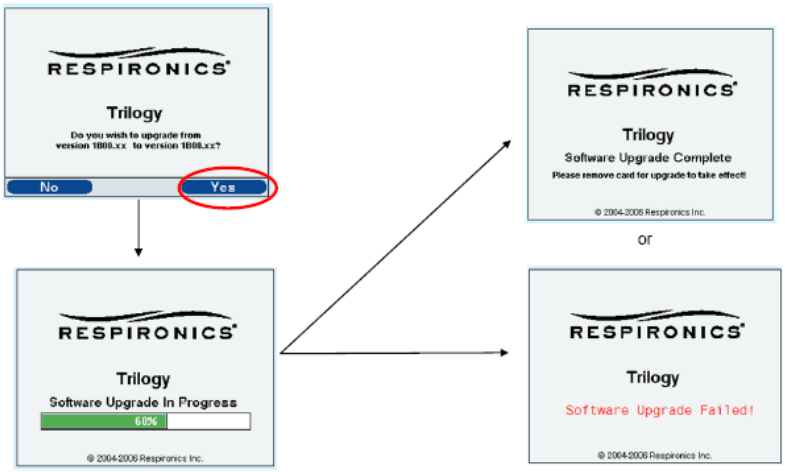
WARNING

Upgrading the Trilogy firmware will reset the device prescription and alarm settings to factory defaults. If you are upgrading this device for use on the same patient, ensure you record all prescription and alarm settings prior to upgrading the Trilogy device. Refer to the Trilogy Clinical Manual for details.

17. A prompt will then appear on your Trilogy User Interface asking you if you would like to upgrade the Operating Software.
18. Select the YES button and follow the on-screen prompts to complete the Firmware installation.

19. The firmware upgrade will reset your Ventilator with the factory default settings.

Software Upgrade Sequence



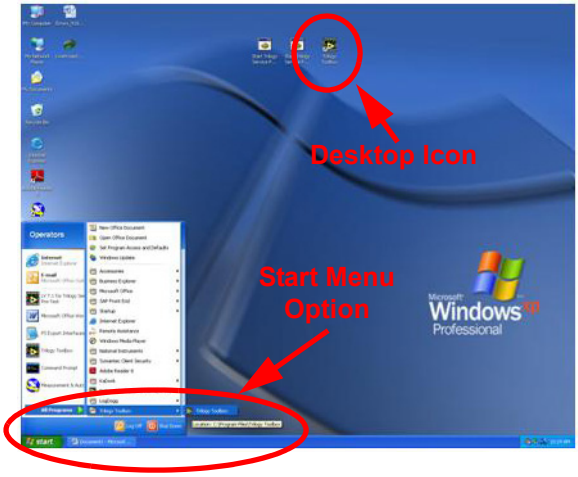
WARNING

Prior to placing the Ventilator with a patient, you must set the device with the proper prescription and alarm settings.

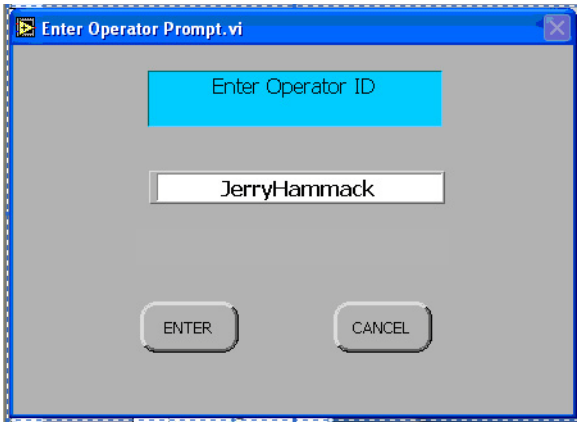
10.9 USING THE TRILOGY TOOLBOX

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

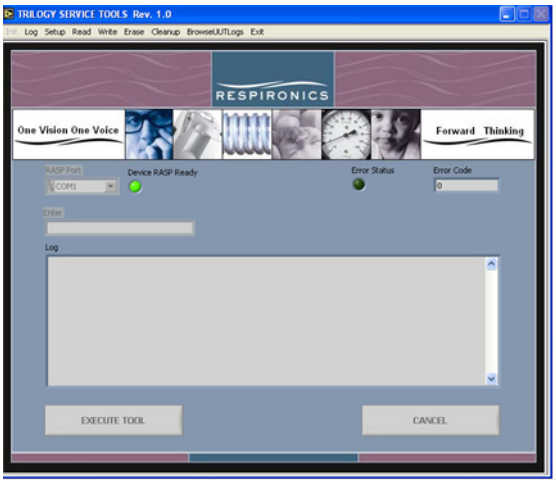
1. To access the Trilogy Toolbox, either select the icon from the desktop if you have created one, or select “START --> ALL PROGRAMS -->TRILOGY TOOLBOX -->TRILOGY TOOLBOX”.



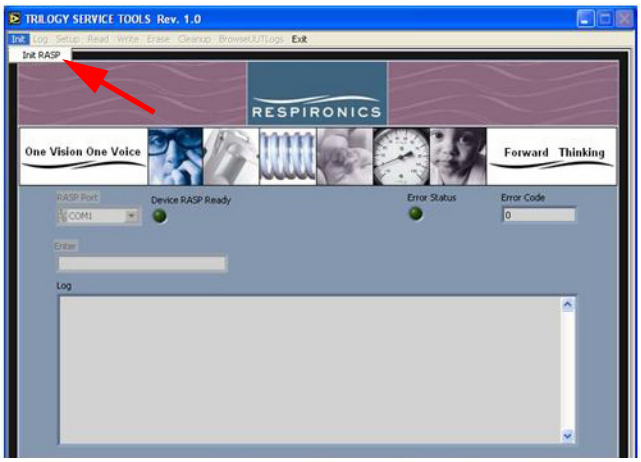
2. You will then be prompted to enter your operator ID.



3. The initial screen of the Trilogy Toolbox will now appear. The RASP communications will occur automatically upon launching the program.



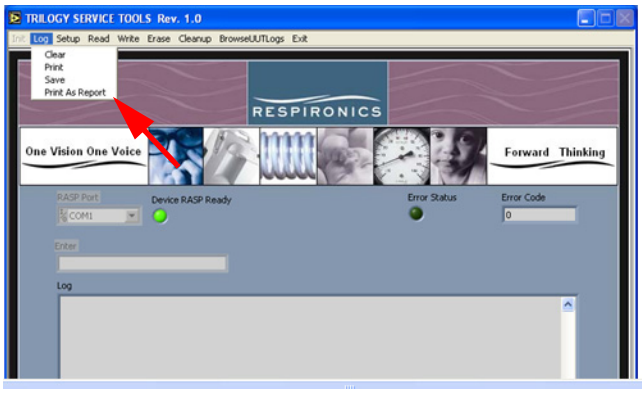
4. If RASP communication is not successful, or if you disconnect the UUT (Unit Under Test) and connect a new device, select the “Init>Init RASP” from the Menu bar, and then select the “Execute Tool” button.



10.9.1 TOOLBOX MENU OPTIONS AND DESCRIPTIONS

LOG MENU

The Log Menu allows you to select what you would like to do with the information displayed on the Trilogy Toolbox screen. Once the Trilogy Toolbox is exited, the information displayed on the screen is erased.



a. ***Clear –*** Clear the information currently displayed on the Toolbox Screen.

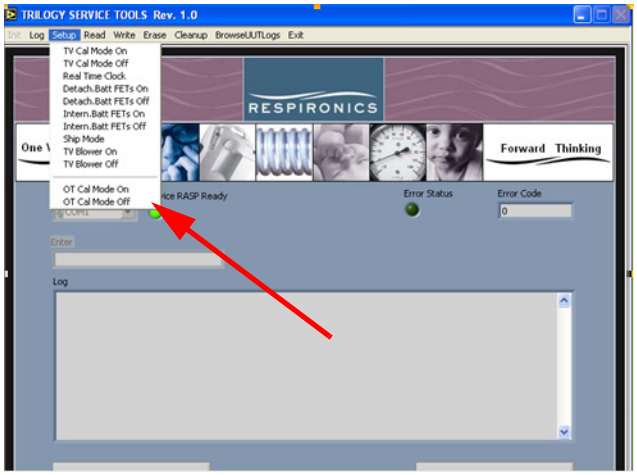
b. ***Print –*** Print the information currently displayed on the Toolbox Screen.

c. ***Save –*** Save the information currently displayed on the Toolbox Screen to a ".txt" file in a folder of your choice for archiving and/or viewing at a later time.

d. ***Print As Report –*** Print the information currently displayed on the Toolbox Screen in a more formal format which can include comments and Date – Time information.

SETUP MENU

The Setup Menu provides tools for manipulating the conditions of the Unit Under Test (UUT). These tools can aid in the troubleshooting of the Trilogy Device by turning on/off certain components as well as changing certain settings.



a. ***TV Cal Mode On/Off –*** In certain situations the UUT can become stuck in the on or off condition and the need arises to change that condition. This option will allow that change; from an on to an off state and vice versa.

b. ***Real Time Clock –*** Sets the Real Time Clock (RTC) of the UUT to the time of the PC performing the testing.

c. ***Detach. Batt FETs On/Off –*** In certain instances it may be necessary to change the status of the FET's controlling the Detachable Battery status. You may need to turn on or off the FET's to update or clear the current status. These two options allow you this ability.

d. ***Intern. Batt FET's On/Off –*** In certain instances it may be necessary to change the status of the FET's controlling the Internal Battery status. You may need to turn on or off the FET's to update or clear the current status. These two options allow you this ability.

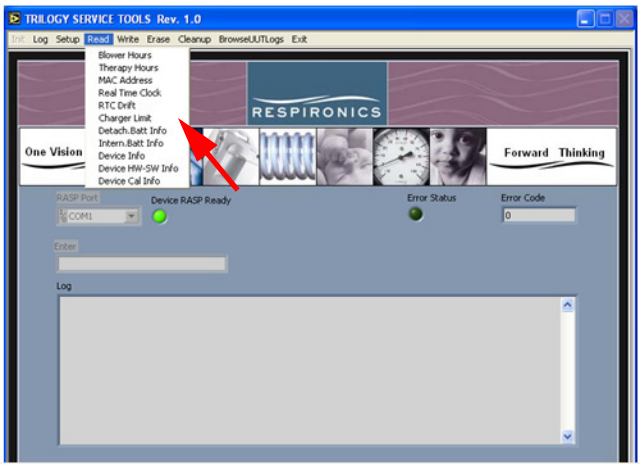
e. ***Ship Mode –*** This setting puts the UUT in a condition normally used after testing and prior to shipment. It disables the Internal Battery power. For Service, this mode allows the unit to be opened, repaired and put back together without the need of first disconnecting and lastly reconnecting the Internal Battery. Once placed into Ship Mode, AC Power must be reapplied in order to return to normal operation.

f. ***TV Blower On/Off –*** Turns the UUT Blower on or off. Can be used for troubleshooting UUT blower functions.

g. ***OT Cal Mode On/Off –*** Not Used at this time.

READ MENU

The Read Menu allows the reading of various forms of information necessary in the servicing of the UUT. There is no manipulation of the data in these selections, the information will be read from the UUT and displayed on the screen.



a. ***Blower Hours –*** Reads and displays the UUT blower hours.

b. ***Therapy Hours –*** Reads and displays the UUT therapy hours.

c. ***MAC Address –*** Media Access Control, is a unique identifier number assigned to the UUT.

d. ***Real Time Clock –*** Reads the Time stored in the RTC of the UUT.

e. ***Charger Limit –*** Reads the Charger limit table and displays data, normally set to 65 for testing.

f. ***Detach Batt Info –*** Provides information concerning the detachable battery, such as capacity levels, voltage, current, Temperature, SH, Cycle Count, SF, Max error, Serial Number and Ship Mode Status.

g. ***Intern. Batt Info –*** Provides information concerning the internal battery, such as capacity levels, voltage, current, Temperature, SH, Cycle Count, SF, Max error, Serial Number and Ship Mode Status.

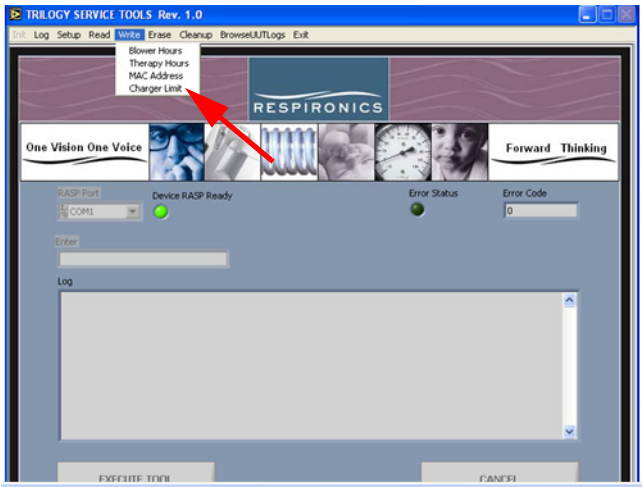
h. ***Device Info –*** Provides Serial Number, Model Number and UUT Name.

i. ***Device HW-SW Info –*** Provides info on the Hardware revision, Software revision, CPLD and Boot revision of the UUT.

j. ***Device Cal Info –*** Provides the date of the last calibration along with several table statuses.

WRITE MENU

The Write Menu provides the ability to write data to the UUT using the Trilogy Toolbox. When selecting one of the options, the information to be written to the UUT will be entered in the “Enter” block on the screen, and the task will be completed by selecting the “Execute Tool” button.



a. ***Blower Hours –*** Enter blower hours for a UUT which has had the main PCA replaced and a recording of the pre-existing blower hours is in place. This will allow accurate tracking of total blower hours on each UUT.

b. ***Therapy Hours –*** Enter therapy hours for a UUT which has had the main PCA replaced and a recording of the pre-existing therapy hours is in place. This will allow accurate tracking of total therapy hours on each UUT. For units requiring only the 10k hour/24 month verification, therapy hours are required to complete the Post test portion of the FSA. Add greater than 2 hours using this option in order to complete the testing.

c. ***MAC Address –*** Enter a new MAC Address for the UUT if required for operation on user network.

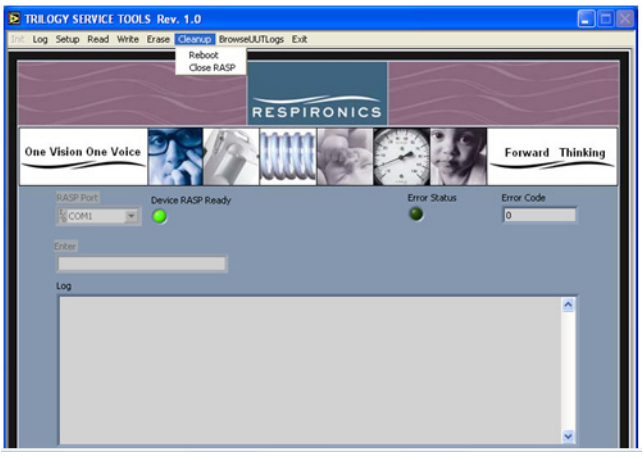
d. ***Charger Limit –*** Enter new limit for Charger Table. Settings used will either be 45%, 65% or 100% depending on calibration action required.

ERASE MENU

This Menu option has no functionality at this time. The functions of this menu are performed by the test software at the beginning of every test. .

CLEANUP MENU

After some options have been performed it may be necessary to turn off and restart the UUT before performing additional tasks. The Cleanup section of the Toolbox provides this functionality.



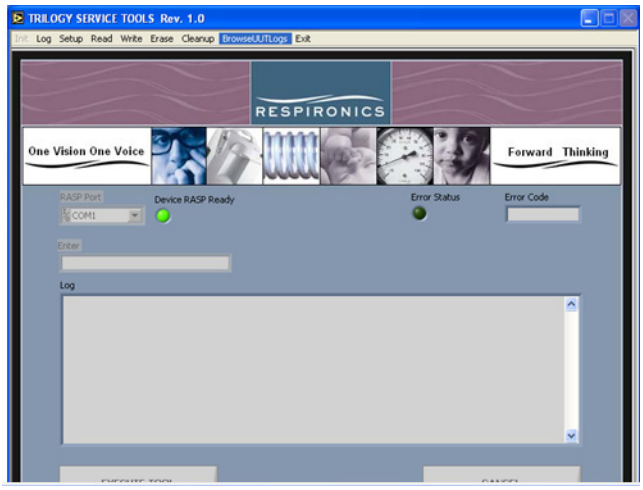
a. ***Reboot –*** Will reboot (shut down and restart) the UUT.

b. ***Close RASP –*** This will close the communications lines and stop all RASP communications. This can be used when stopping testing on one UUT and starting testing on another UUT.

BROWSEUUTLOGS MENU

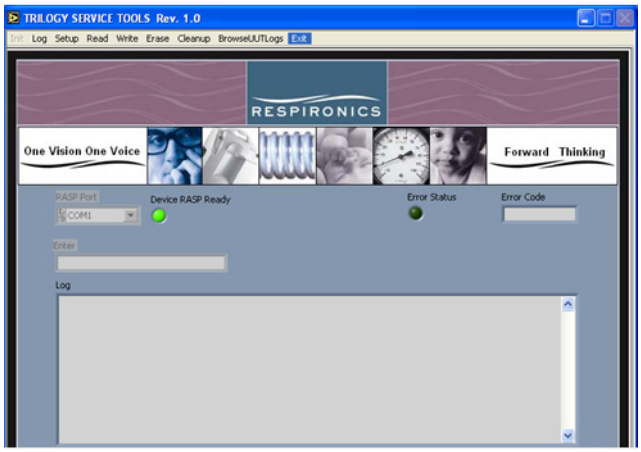
This Menu function allows you to view the saved Encrypted Significant Event Log files from the UUT's. This is the only way to view the ".BIN" files that are copied to the SD Card when select Write Event Log To SD Card

from the UUT Setup Menu. Specific instructions for downloading and viewing the Event Log ".BIN" files is located in chapter 6.



EXIT MENU

The Exit Menu exits the Trilogy Toolbox program. You will be prompted to ensure you wish to exit the program and informed that the Toolbox Log Data will be lost once you exit. If you wish to save the log in soft copy or hard copy, please return to the Log Menu and select Save or either of the Print options.



10.10 TRILOGY FIELD SERVICE APPLICATION

NOTE

Prior to performing any of the testing sections, please allow equipment a warm-up period of no less than 10 minutes for stabilization. Perform self-cal on the RI Manometer and Druck DPI-150 if necessary.

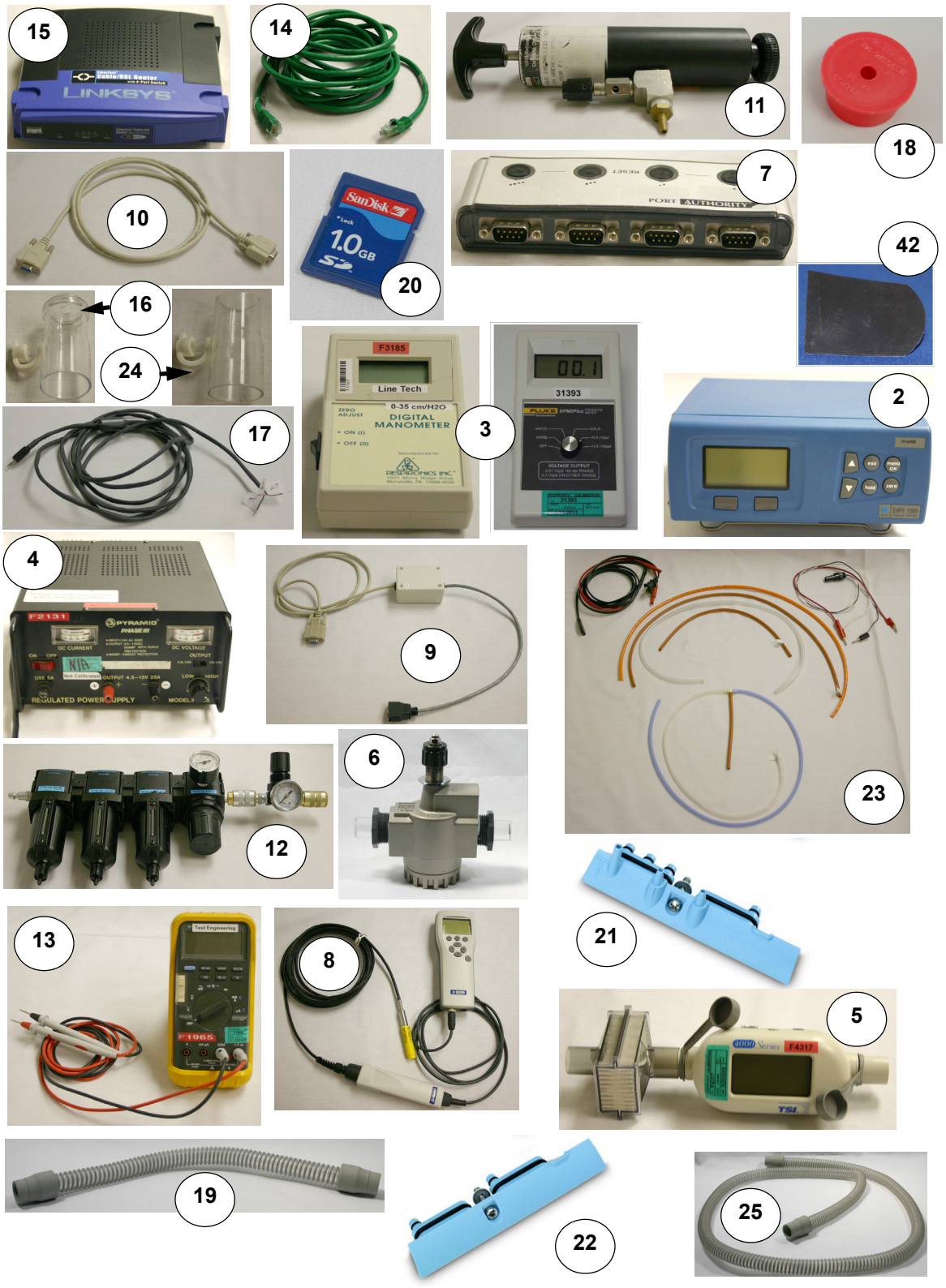
*If **ONLY** the AC Connector has been replaced the Performance Verification Tool detailed in the Maintenance Section of this manual may be used in place of the Field Service Application.*

This application must be performed after repair of a Trilogy Ventilator or during routine maintenance as specified in the Maintenance Section of this Service Manual.

10.10.1 EQUIPMENT REQUIRED

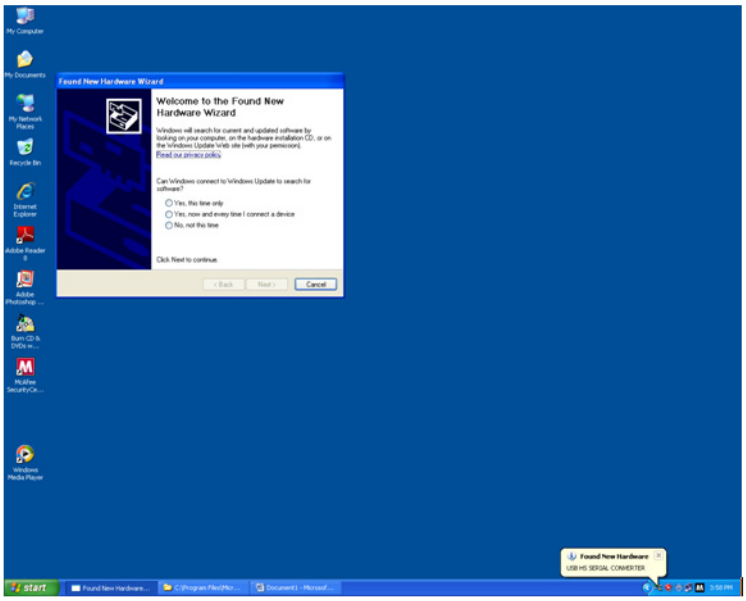
1. PC System with 1 Serial Port and at least 6 USB Ports with Windows XP installed
2. Differential Pressure Indicator (Required only for Trilogy 200, Trilogy O_2, & Trilogy 202)
3. Digital Manometer (0-70 PSI Pressure Meter for Trilogy 100 & Trilogy 200 / 0-100 PSI Pressure Meter for Trilogy O_2 & Trilogy 202)
4. External Power Supply Capable of providing 15 VDC and 24 Amps or Deep Cycle Marine Battery 12V
5. TSI Model 4040 Flow Meter
6. Flow Control Valve
7. USB to Serial Converter
8. Temperature and RH Meter
9. Trilogy to PC Data Cable (Quantity of 2 for Auto Flow testing)
10. Serial RS-232 Cables (Quantity 3)
11. Merriam Pressure Pump w/ Vernier (Required only for Trilogy 200, Trilogy O_2, & Trilogy 202)
12. Air Filtration and Regulation Assembly
13. Digital Multimeter capable of providing True RMS Measurements
14. Ethernet CAT 5 or 6 Cable
15. Linksys Network Switch Minimum 2 port
16. Test Orifice, .25” ID
17. Trilogy Nurse Call Adapter Cable
18. Outlet Port Cap (Quantity 2)
19. Smoothbore Tubing, 18” (Quantity 2)
20. SD Card
21. Exhalation Porting Block, Universal
22. Exhalation Porting Block, Passive
23. Trilogy Test Hardware Kit
24. O_2 Vent Ports (Quantity 4)
25. Smoothbore Tubing, 6 ft.
26. Brass Barb Fitting Male for 1” hose ID and 3/4” Pipe
27. Reducing Hex Coupler 3/4” to 1/2” Female to Female

28. Reducing Hex Nipple 1/2” to 1/4” Male to Male
29. Quick Connect Female 1/4” (Quantity 2)
30. Quick Connect Male 1/4” (Quantity 2)
31. Quick Connect Coupler 1/4” (Quantity 2)
32. TL930 Banana Plug Patch Cords (Quantity 2)
33. Prestolok Plus™ Push-to-Connect Fitting 1/4”
34. Silicone Port Clamp (Quantity 2)
35. Tubing 1/8 ID to 3/32 ID Reducer (Quantity 2)
36. Male NPT Hose Barb (Required only for Trilogy O_2 & Trilogy 202)
37. 3-Way Tee (Required only for Trilogy O_2 & Trilogy 202)
38. Male Nipple 1/8” (Required only for Trilogy O_2 & Trilogy 202)
39. Wing Nut, Oxygen Green (Required only for Trilogy O_2 & Trilogy 202)
40. Green Hose 96” (Required only for Trilogy O_2 & Trilogy 202)
41. Precision Pressure Regulator (Fairchild 10212)(Required only for manual testing of Trilogy 200, Trilogy O_2, & Trilogy 202)
42. CAPlugs O_2 Inlet Air Cap (Required only for Trilogy O_2 & Trilogy 202)


15
LINKSYS
14
11
18
10
SanDisk
1.0GB
20
7
PORT AUTHORITY
42
16
24
F3185
Line Tech
0-35 cm/H2O
DIGITAL MANOMETER
3
31393
2
17
4
F2131
PYRAMID
REGULATED POWER SUPPLY
9
23
6
12
21
13
F1965
8
5
4000 Series F4317
TSI
19
22
25

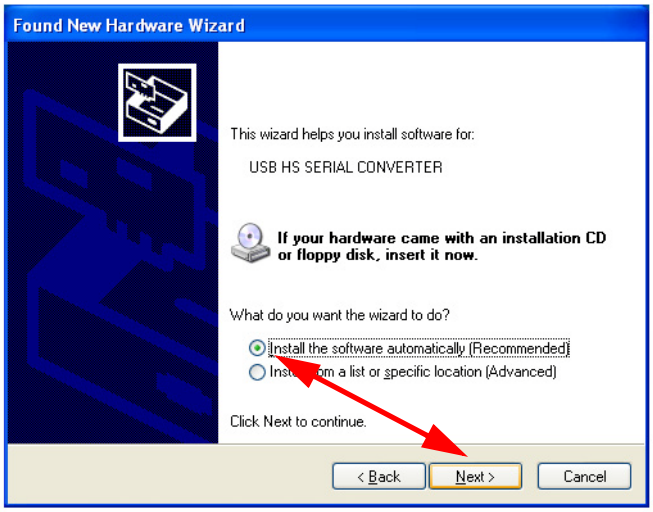
10.10.2 EQUIPMENT SETUP

1. Connect the 9-pin connector of Trilogy to PC Data Cable to the Serial Port of the PC. Connect the other end of the Trilogy to PC Data Cable to the back of the Trilogy Device serial port.
2. Connect one end of the USB to any open USB port of the PC. Connect the other end of the USB to the USB to Serial Converter. The “New Hardware Wizard” will start and an indicator will pop-up on the desktop screen.

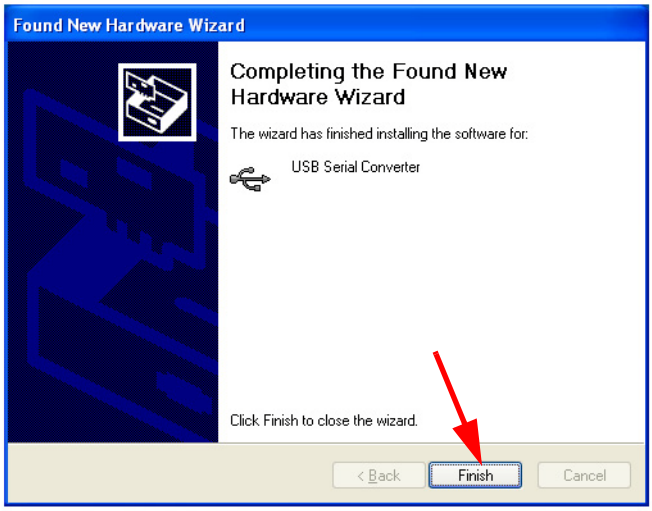


3. Insert the CD, that came with the USB to Serial Converter, into the Computer’s CD or DVD drive and follow the on screen prompts.
4. Select the “No, Not this time” choice, then click “Next”.

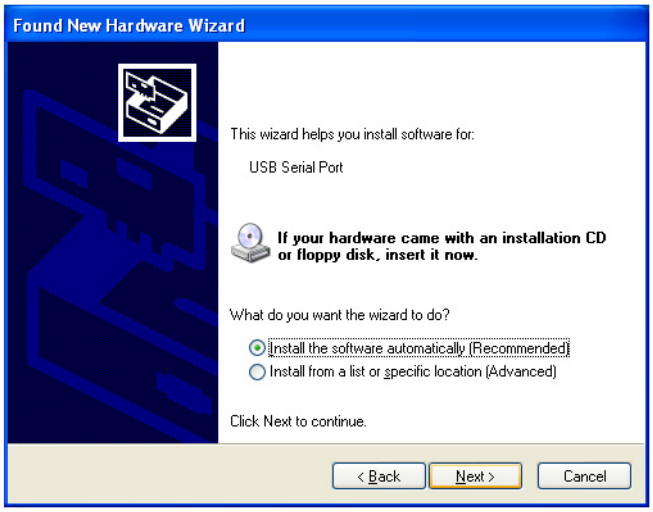
5. Select the “Install the software automatically (Recommended) choice, then click “Next”.



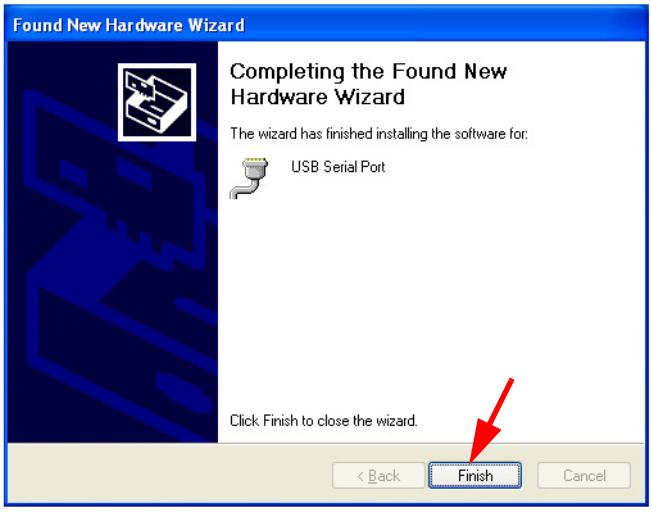
6. Click the “Finish” button.



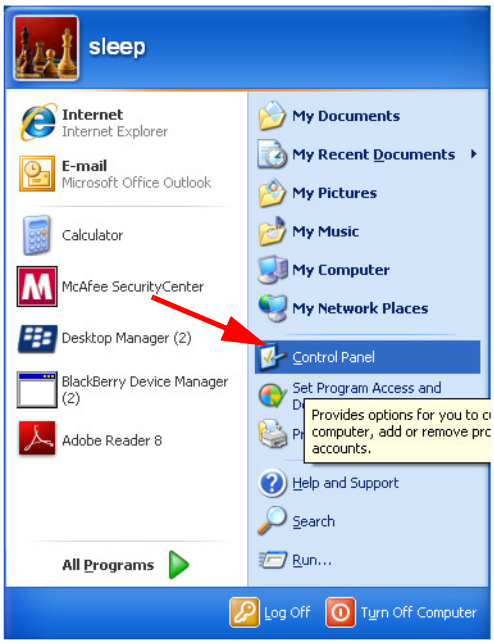
7. The next installation will be for the USB Serial Port. Select the “Install the software automatically (Recommended)” choice then click “Next”.



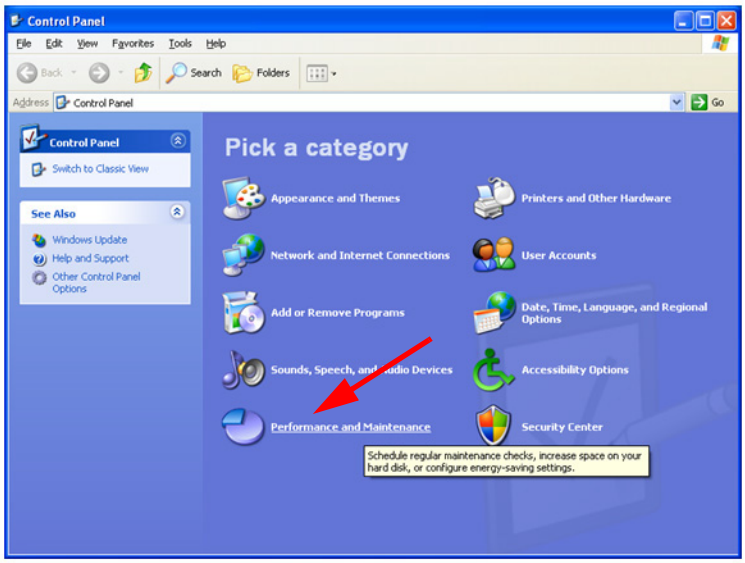
8. The wizard will search for the USB Serial Ports. Once the wizard locates the ports the wizard is complete. Click the “Finish”.



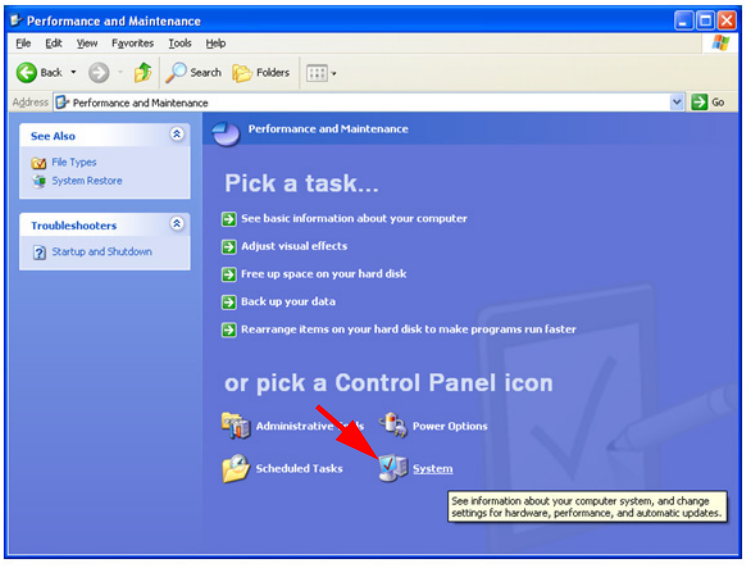
9. Click the “Start” button on the computer’s desktop and then select the “Control Panel” option.



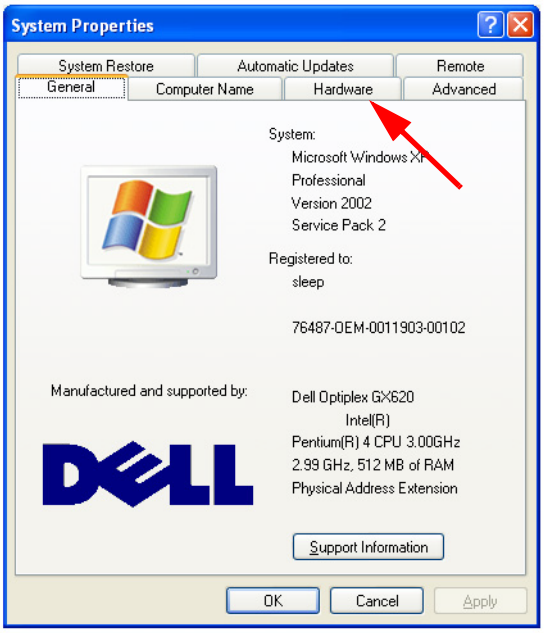
10. Click the “Performance and Maintenance” option.



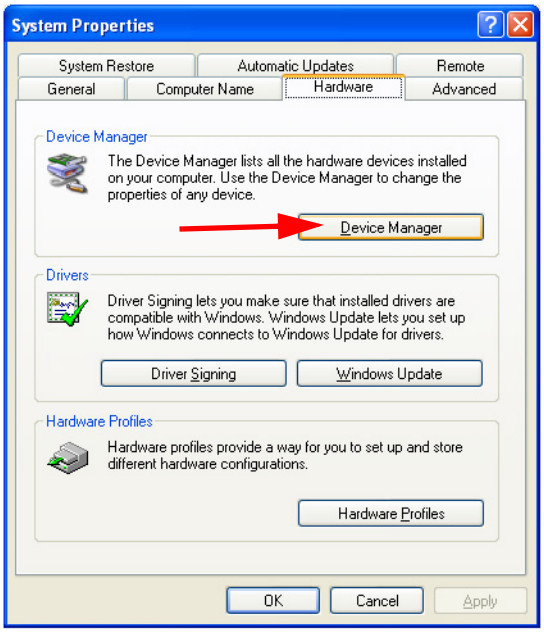
11. Click the “System” option.



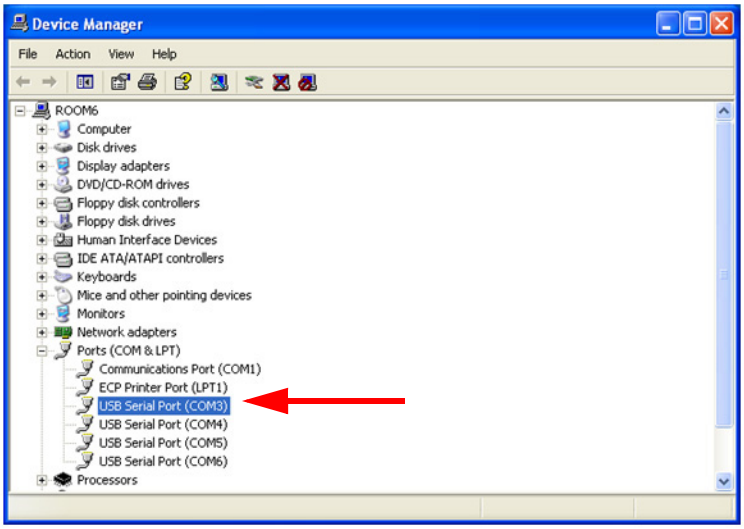
12. Click the “Hardware” tab.



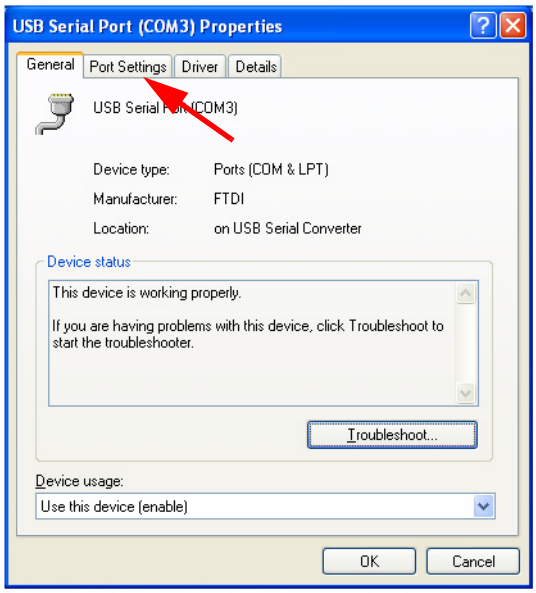
13. Click the “Device Manager” button.



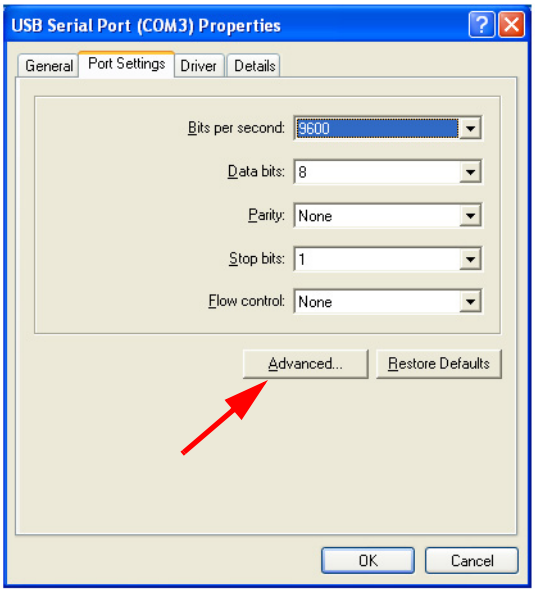
14. Double-click the very first Port (Usually COM3).



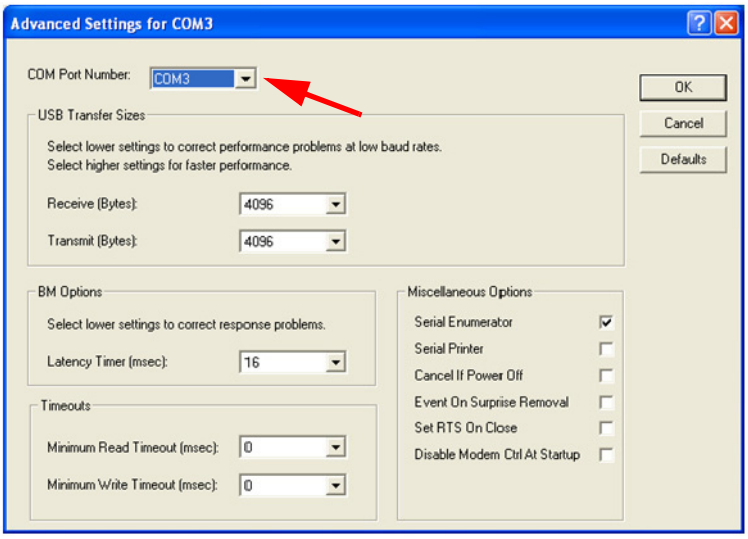
15. Click the “Port Settings” tab.



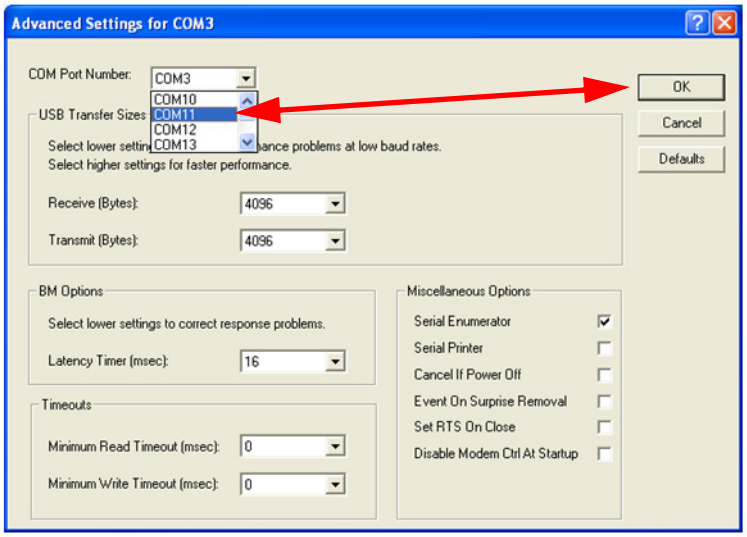
16. Click the “Advanced” button.



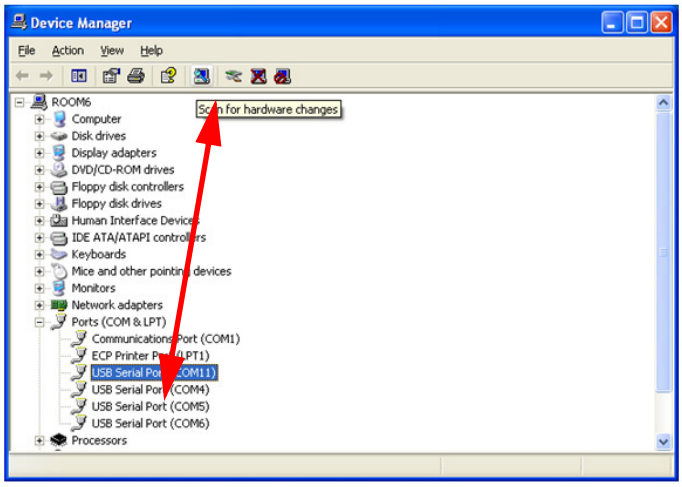
17. Click the down arrow in the “COM Port Number” field.



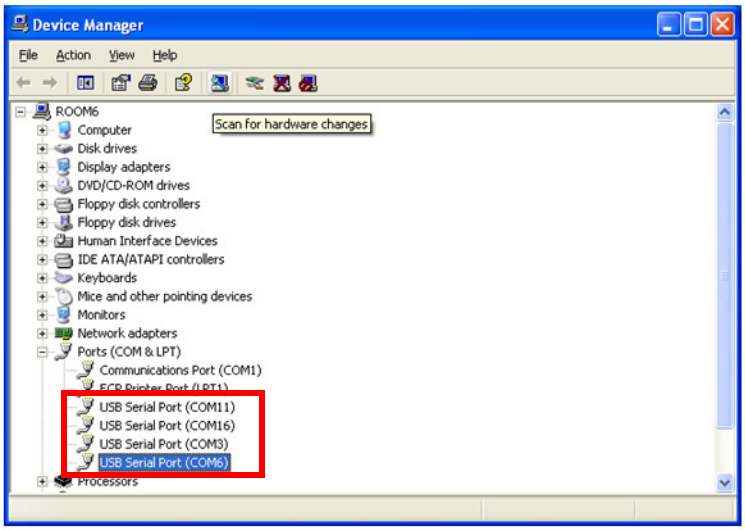
18. Select the “COM11” option and then select the “OK” button.



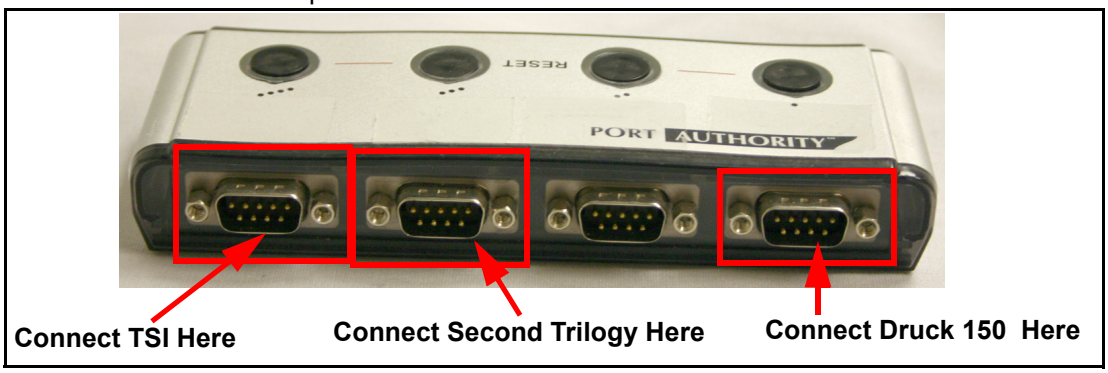
19. Select the “Scan for hardware changes” button in the menu bar. The first COM port should change from the original value to COM11.



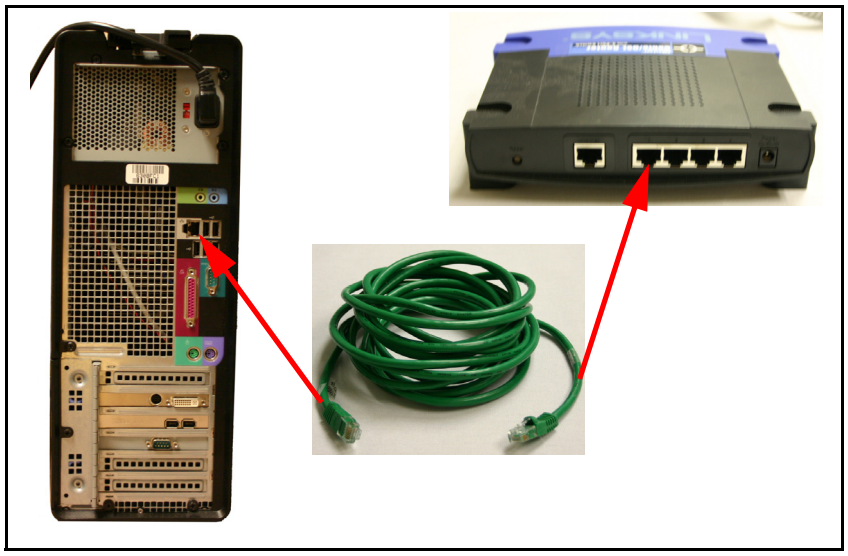
20. Following the steps above, change the next three COM port values to COM16, COM3, and COM6.



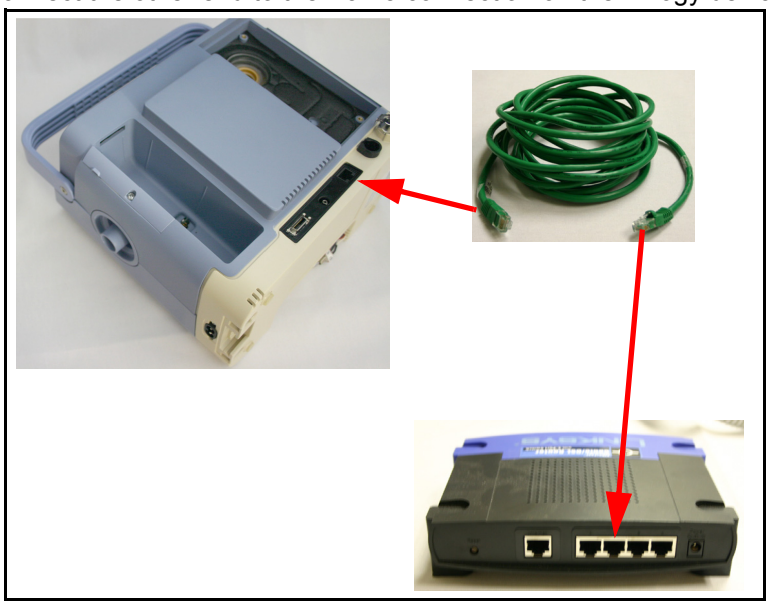
21. Once the last COM port has been changed, you can close out of the program. Your USB to Serial Converter is now setup and ready for use with the Trilogy test hardware. The TSI device will connect to the COM11 port, the Second Trilogy will connect to COM16 port, and the Druck 150 will connect to the COM6 port.



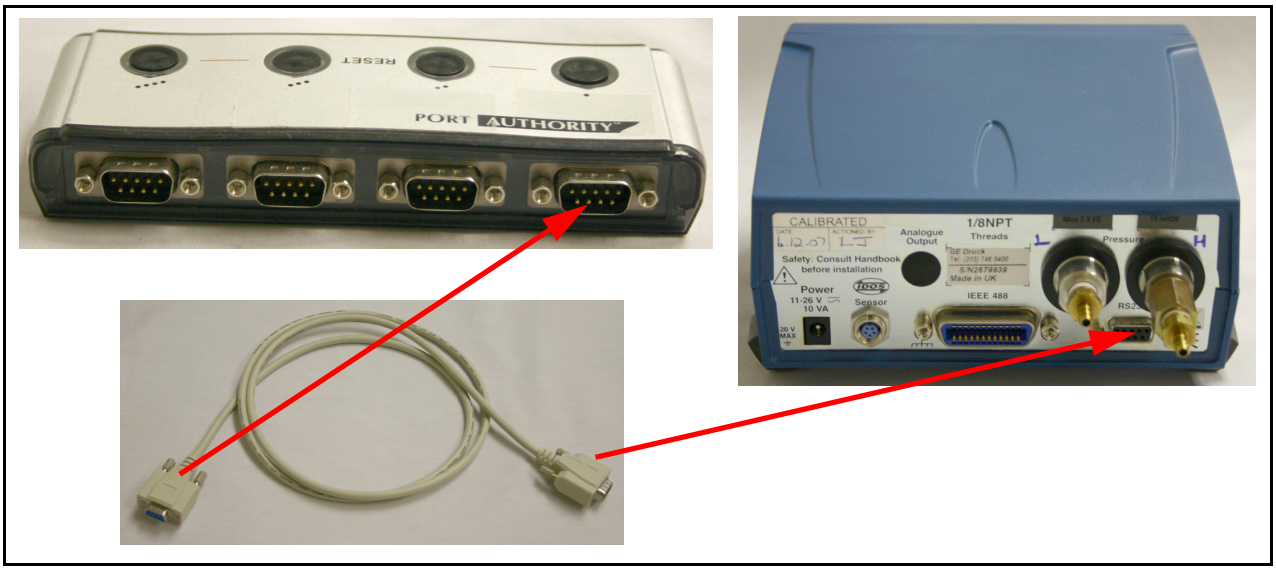
22. Connect one end of the Ethernet CAT 5 or 6 Cable to the RJ-45 connection of the PC. Connect the other end of one of the Ethernet CAT 5 or 6 Cable to open RJ-45 connection of the Network Switch.



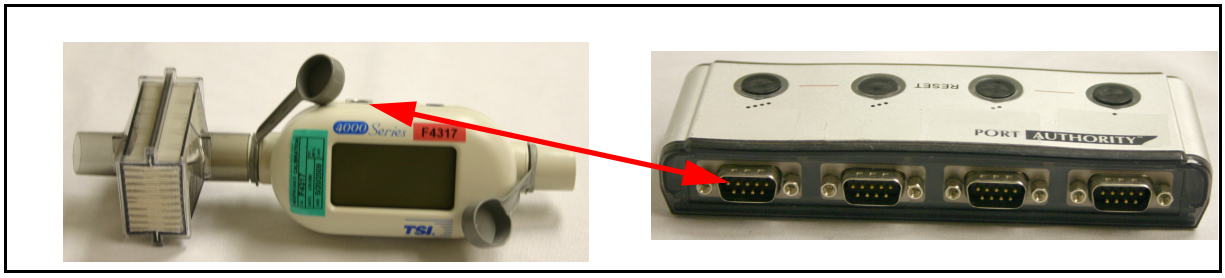
23. Connect one end of another Ethernet CAT 5 or 6 Cable to an open RJ-45 connection of Network Switch. Connect the other end to the RJ-45 connection on the Trilogy device.



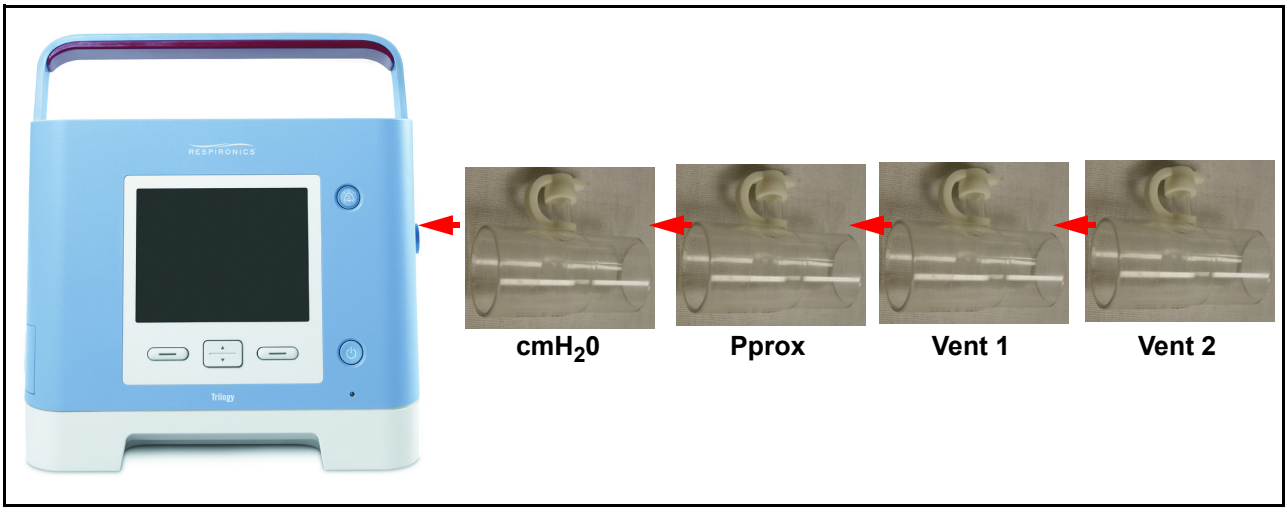
24. Connect the Keyboard, Mouse, Monitor, and Power connections to the PC.
25. Connect one end of Serial RS-232 Cable to connector set as COM 6 on the USB to Serial Converter. Connect the other end of Serial RS-232 Cable to the serial connection on the back of the Differential Pressure Indicator.



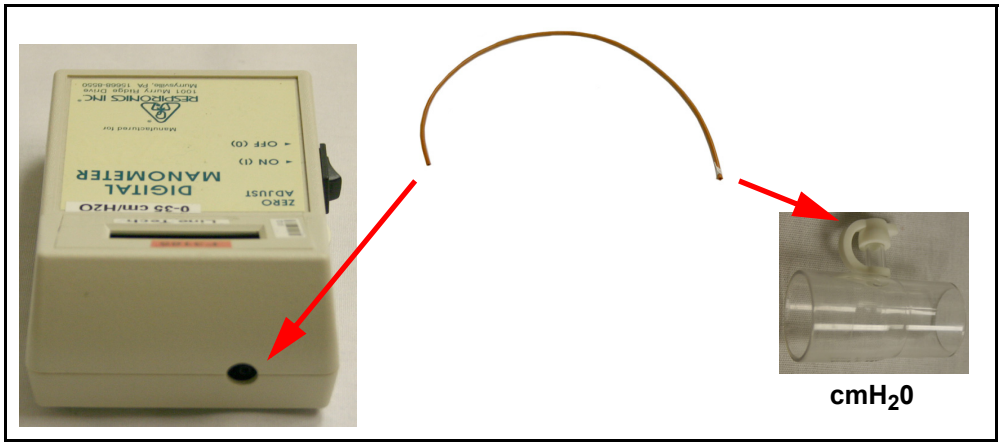
26. Connect the 9-pin serial connection of the TSI Model 4040 to COM 11 on the USB to Serial Converter. Connect the DIN connector of the TSI Model 4040 Flow Meter to the opening on the TSI Model 4040 Flow Meter.



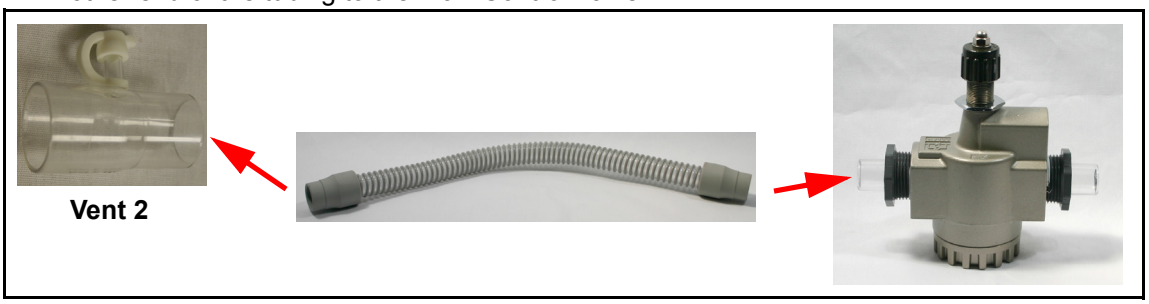
27. Connect the Stereo Jack end of Trilogy Nurse Call Adapter Cable to the back of the Trilogy device.
28. Connect four Test Orifices together and attach to the Trilogy outlet. Mark the Test Orifices with cmH_2O, Pprox, Vent 1, and Vent 2, in order from the Trilogy.



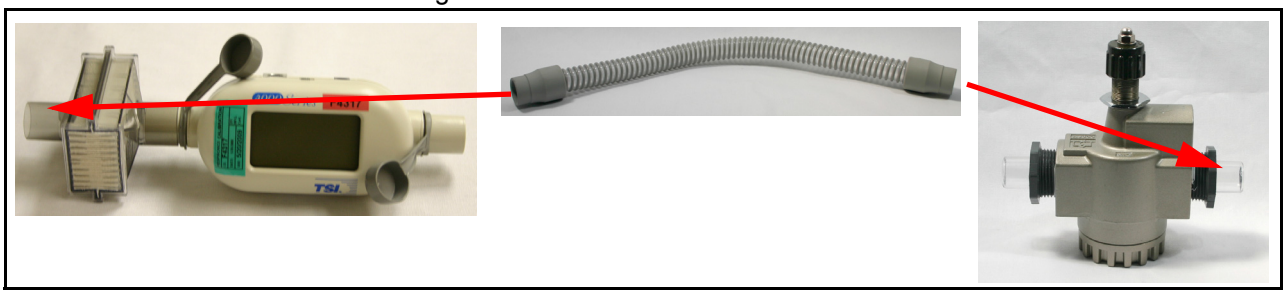
29. Connect the tubing from the Digital Manometer to the port of cmH_2O Test Orifice.



30. Connect one end of Smoothbore Tubing 18” to the end of the Vent 2 Test Orifice. Connect the other end of the tubing to the Flow Control Valve.

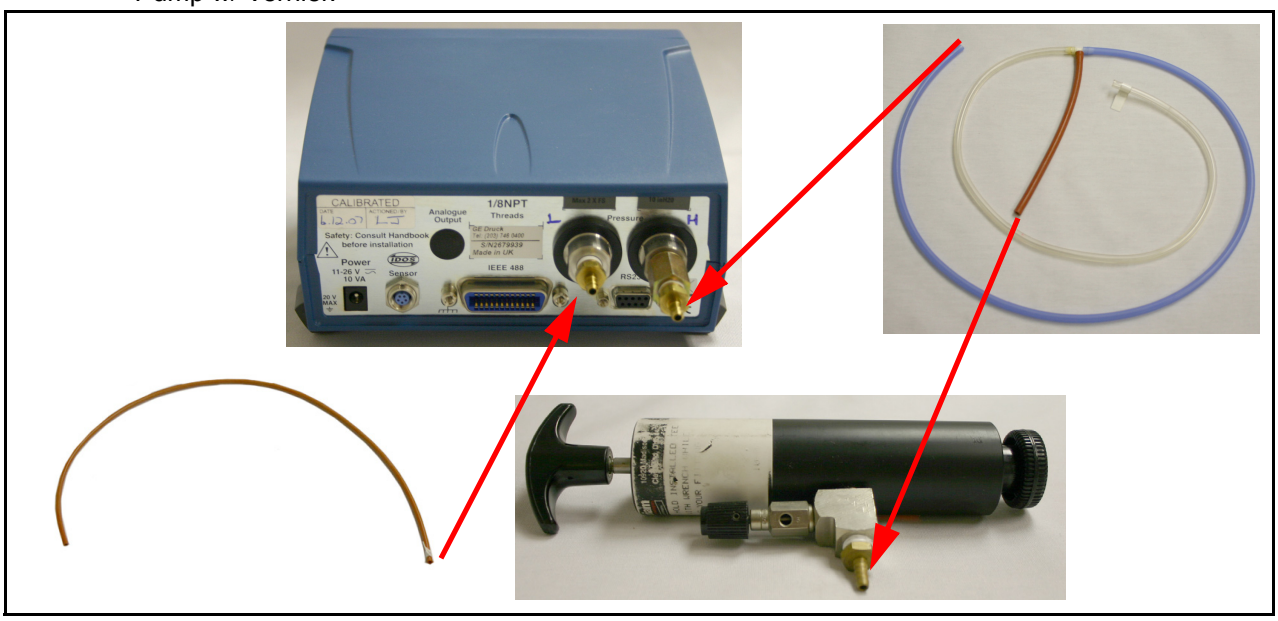


31. Connect one end of Smoothbore Tubing 18” to the other end of the Flow Control Valve. Connect the other end of the tubing to the inlet of TSI Model 4040 Flow Meter.



32. Connect the Modified DC to Trilogy power cable between the External Power Supply or Deep Cycle Marine Battery 12V and DC connector on the back of the Trilogy device.

33. Connect two long pieces of tubing to the back ports of the Differential Pressure Indicator, one each on the Low and High connectors. These will be the Reference and High tubing from the Differential Pressure Indicator. Connect the other end of “T” tubing to outlet port of the Merriam Pressure Pump w/ Vernier.



34. If using shop air for negative flow, connect the Air Filtration and Regulation Assembly to the Shop Air Supply. Assemble the Air Filtration and Regulation assembly by performing the following:
    a. Using the mounting hardware provided with the filters, follow the instructions for connecting the Particulate and Coalescing filter together. Starting from the left, place the F18-02-SL00 first, then the M18-02-CL00, then the M18-02-DL00, and finally the R18-02-F0G0.
    b. Attach a Quick Connect 1/4” (male connector) to the open end on the left of the Filtration System.
    c. Attach the Quick Connect Coupler 1/4” to the R18-02-F0G0.
    d. Attach a Quick Connect 1/4” (male connector) to the 384-02C Watts Regulator then attach the R18-02-F0G0 to the 384-02C Watts Regulator.
    e. Connect the Quick Connect Coupler to the open end of the Watts Regulator.
    f. The Watts Regulator control handle should be facing up and gauge should be facing frontward.
    g. Connect the Quick Connect 1/4” (female connector) to the Prestolok Plus fitting and attach tubing 532255 (22”) from the Trilogy Test Hardware Kit.
    h. Connect the Brass Barb fitting (male) to the Reducing Coupler, then to the Reducing Nipple and finally to the Quick Connect 1/4” (female connector). This will then connect as an assembly to the Smoothbore Tubing.

NOTE

The use of Teflon tape for all fitting connections is recommended.

35. Connect all AC power cords for the devices to an AC outlet.
36. Prepare the Trilogy Nurse Call Adapter Cable(1045290) by finding the open end of the cable, with three exposed wires, colored red, black, and brown.

37. Mark the Red wire with reference to Tip.
38. Mark the Black wire with reference to Ring.
39. Mark the Brown wire with reference to Sleeve.
40. Zero the Differential Pressure Indicator by pressing the “ZERO” button and following the directions on the screen.

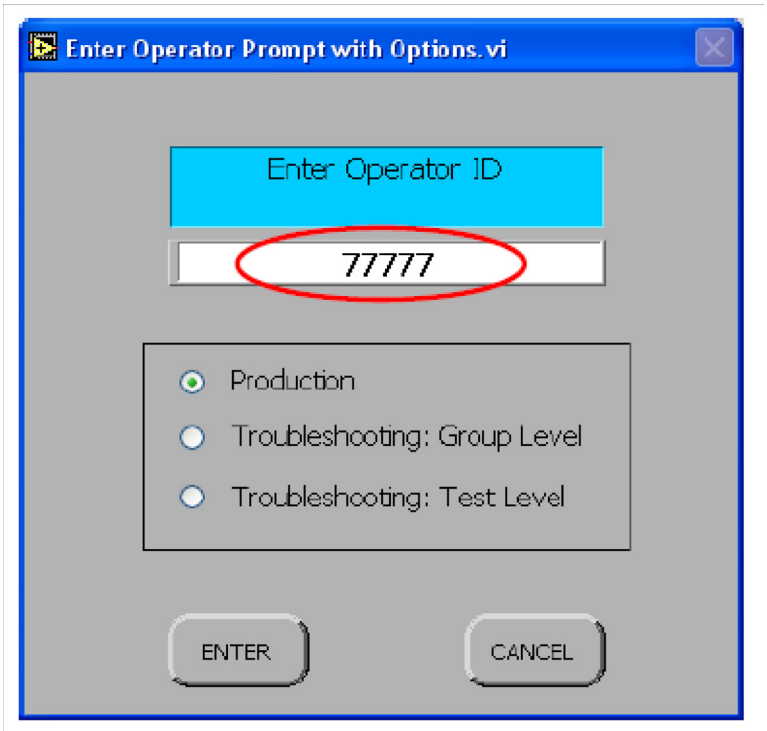
10.10.3 TRILOGY PRE-TEST PROCEDURE

CAUTION

When testing a Trilogy O_2 or Trilogy 202 device, during the Oxygen Blending Module (OBM) condition check (Step 11) it checks for OBM leaks. The software prompts to read from the Respironics digital manometer (which leak setting is 25 +/- 0.5 cmH_2O). It should not be confused with the pressure indicator used for the OBM intake. Effects of this could be to damage the sensor board.

1. Once you have installed the software, open the Auto Flow or Manual Flow Pre-Test software from the shortcut on you desktop, double click the icon to open.

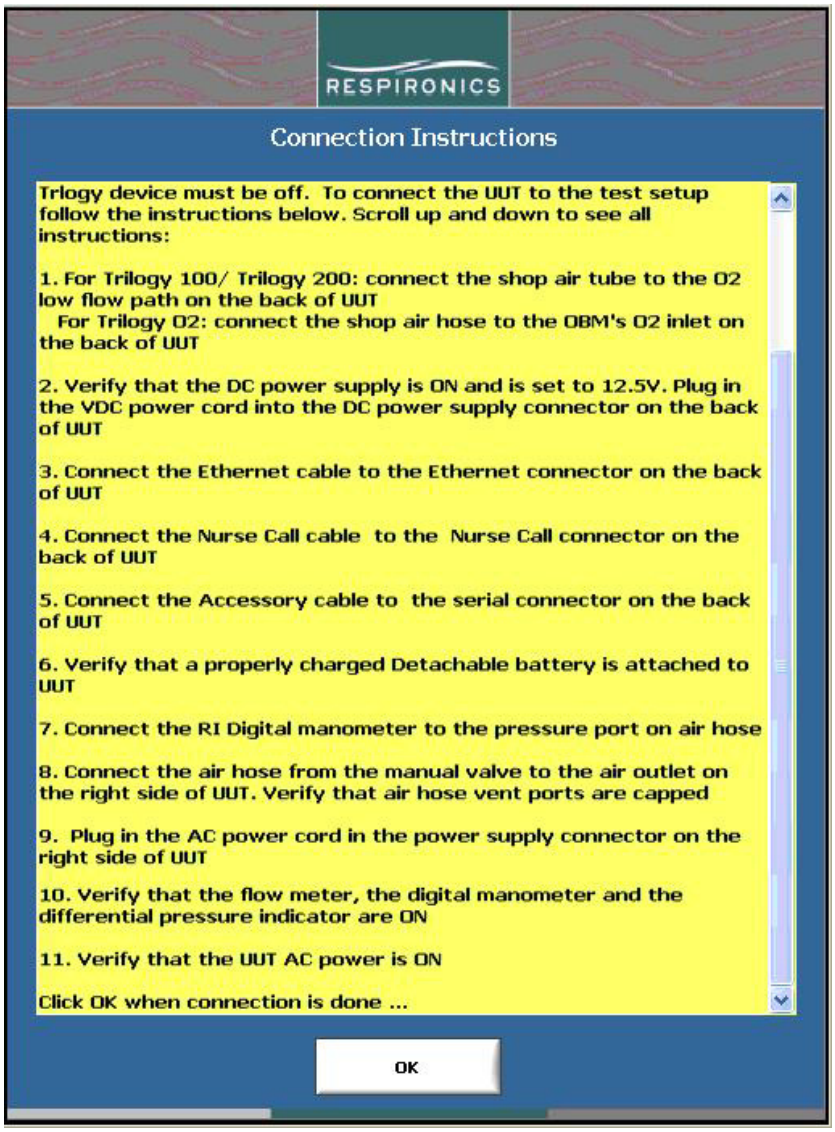
2. Enter your operator ID and click the button next to Production. Then, click the enter button.



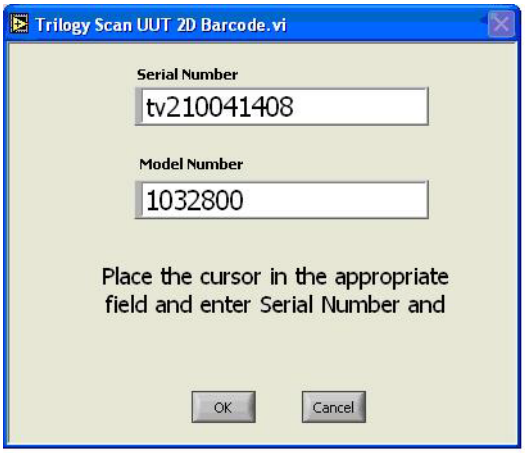
NOTE

There are 3 modes the FSA can be operated in:
1. Production Mode – This will complete all steps of the test software, whether in Pre Test or Post Test, in continuous run mode. It will not ask for the individual steps to be selected, or stop in between Groups or Tests. Must be used for Post Test of unit before return to customer.
2. Group Level – This will allow the technician to complete Group level testing. In Pre Test you can select any of the groups from 0010 to 0040 or 0060. In Post Test you can select any of the groups, 0010, 0030, 0040 or 0060. Should only be used for troubleshooting errors.
3. Test Level – This will allow the technician to complete the Test level testing. In Pre or Post Test individual steps will provide a lower level of troubleshooting by allowing the operation in single steps. Should only be used for troubleshooting errors.

3. Follow the steps on the screen shot below.



4. Enter the Serial Number and Model Number of the Device.

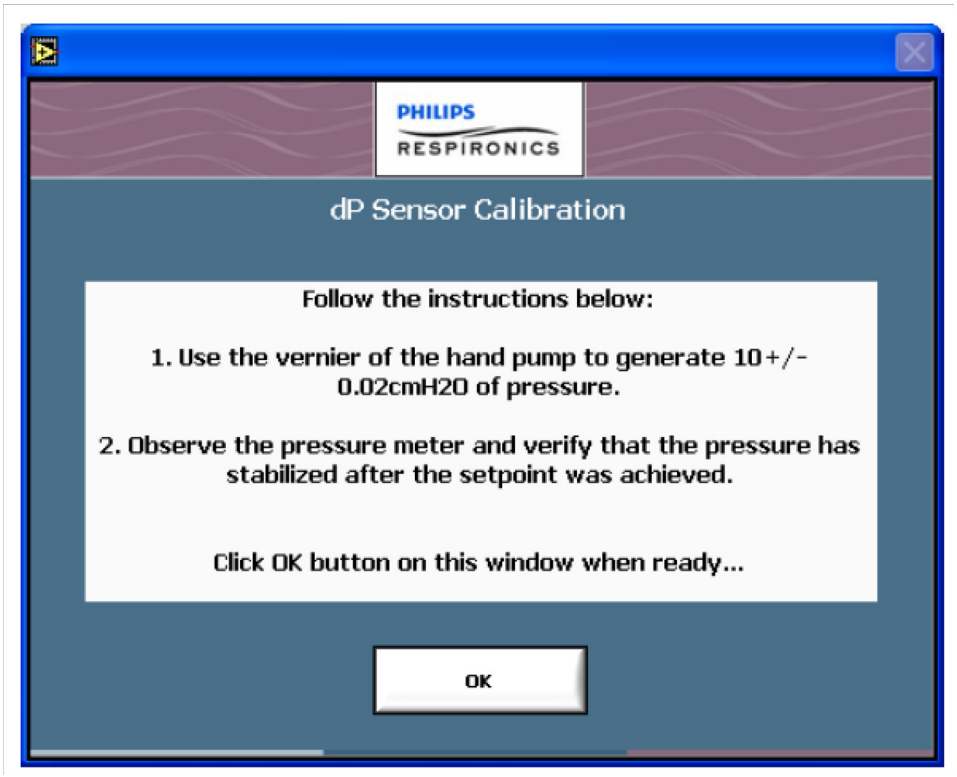


NOTE

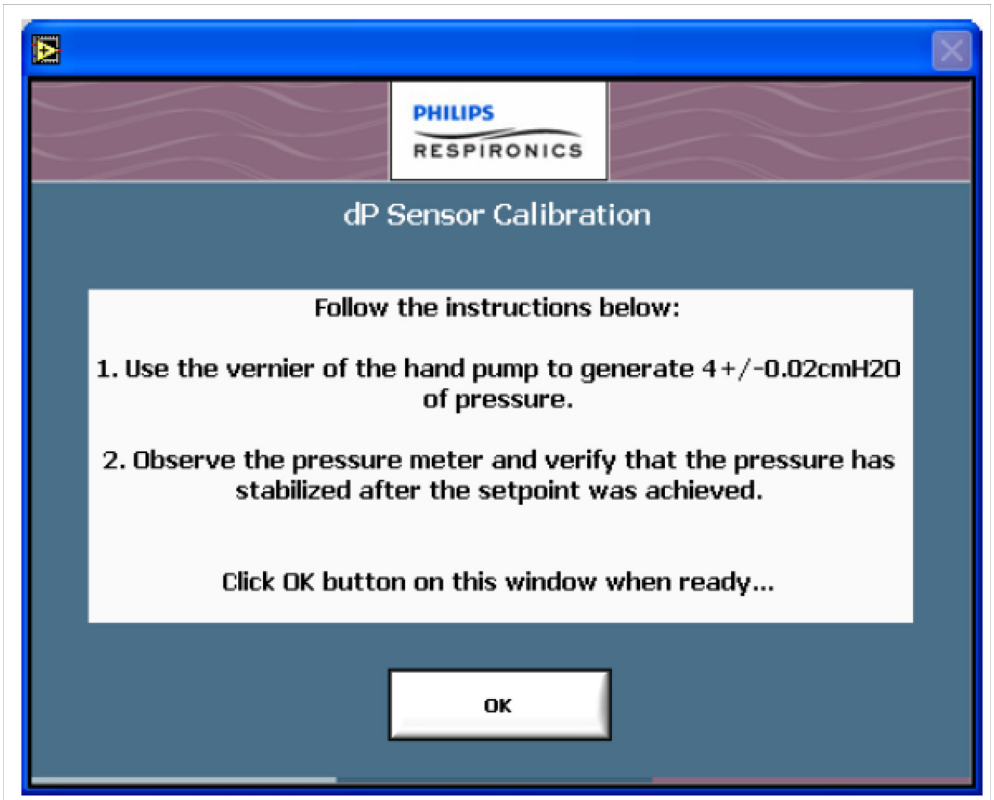
Indicative of typical Trilogy Serial and Model Numbers.
TV1 = Trilogy 100
TV2 = Trilogy 200
TV0 = Trilogy O2
After TV1, TV2 or TV0 next 6 numbers indicate date of unit build (YYMMDD), example would be – 100526 to indicate the unit was built 2010, May 26. Final 3 digits of Serial number indicate the unit build number for the day it was built, example would be 025, indicating the 25th unit built on the given date.

5. Follow the rest of the on-screen prompts to continue with the test.

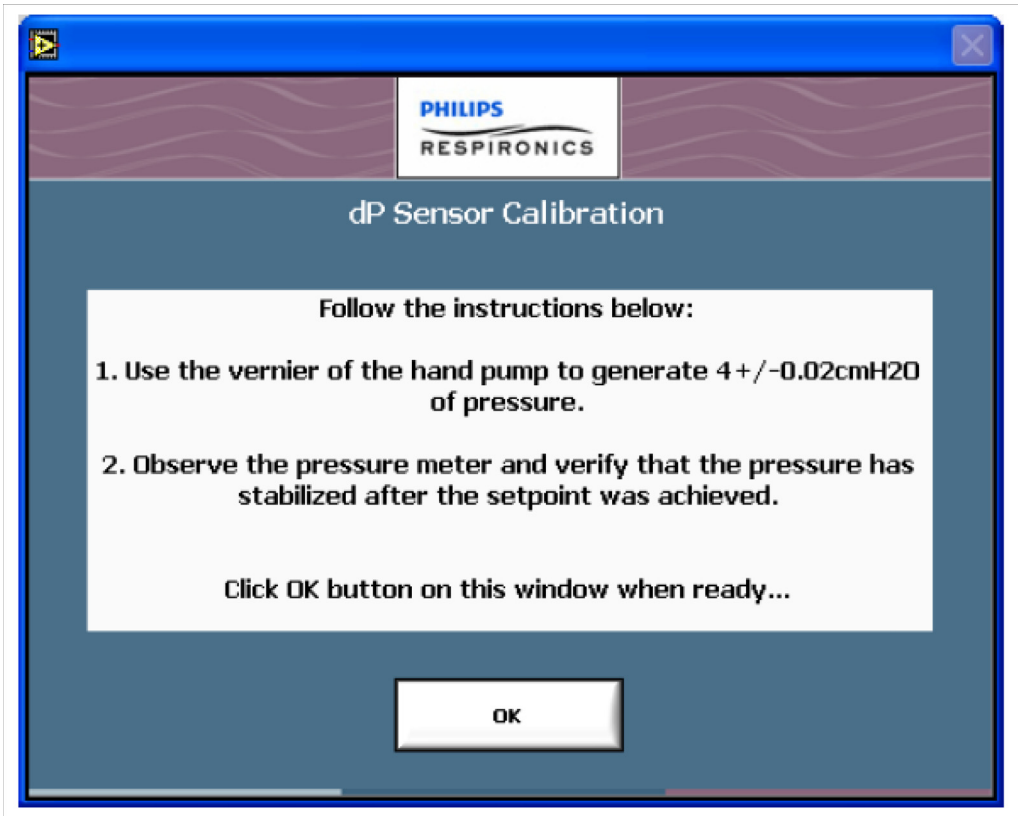
6. When the on-screen prompt below appears, press the relief on the hand pump to release existing pressure after connecting the hand pump tubing, then proceed with on-screen action **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



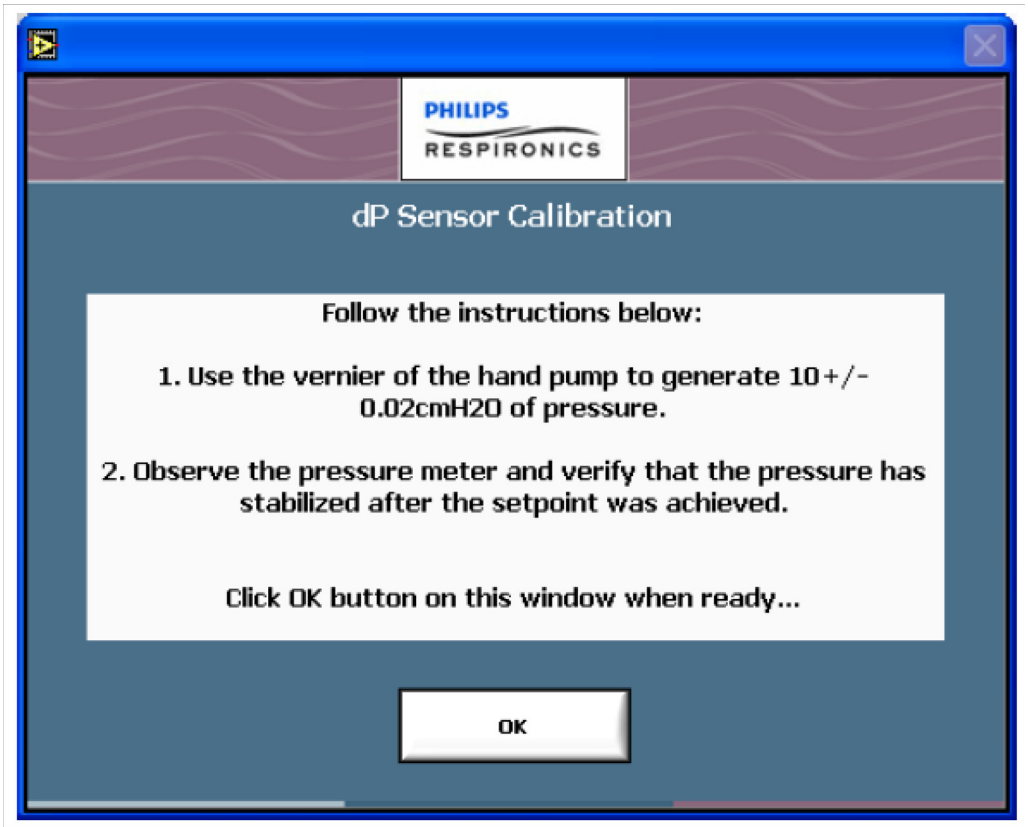
7. Press the relief on the hand pump to release the existing pressure before generating pressure. Continue with the on-screen prompts **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



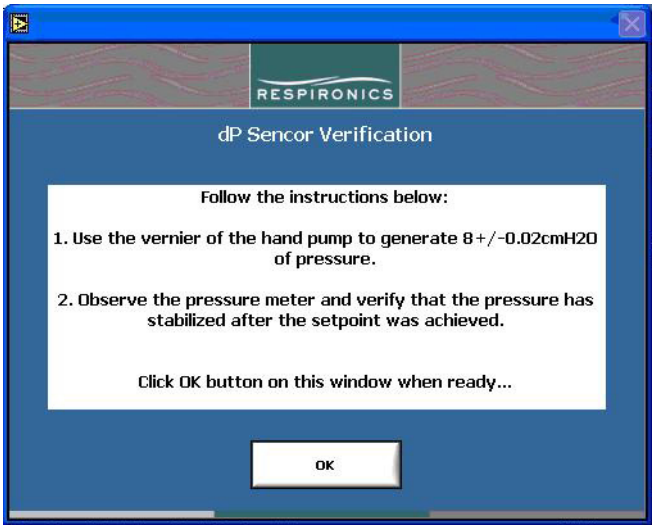
8. When the on-screen prompt below appears, press the relief on the hand pump to release existing pressure after connecting the hand pump tubing, then proceed with on-screen action **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



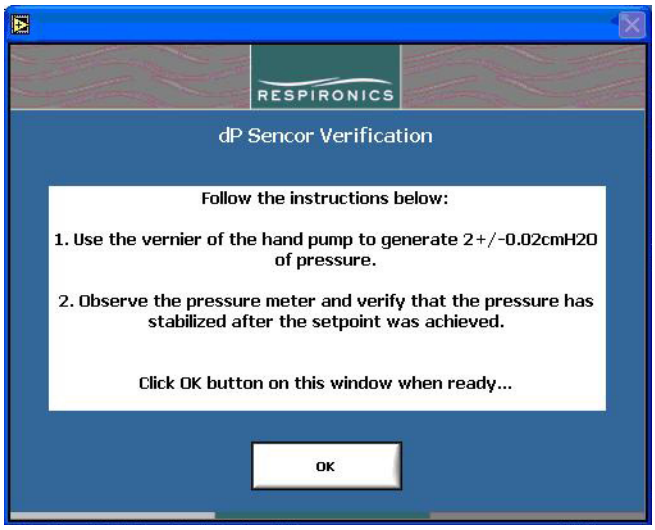
9. Press the relief on the hand pump to release the existing pressure before generating pressure. Continue with the on-screen prompts **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



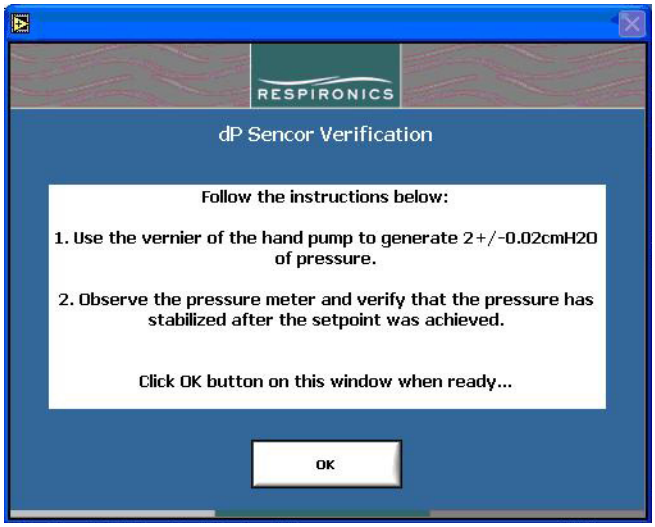
10. When the on-screen prompt below appears, press the relief on the hand pump to release existing pressure after connecting the hand pump tubing, then proceed with on-screen action **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



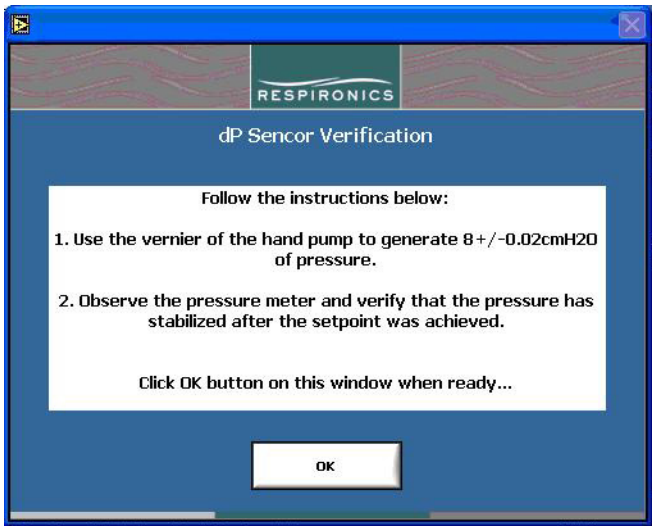
11. Press the relief on the hand pump to release the existing pressure before generating pressure. Continue with the on-screen prompts **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only).**



12. When the on-screen prompt below appears, press the relief on the hand pump to release existing pressure after connecting the hand pump tubing, then proceed with on-screen action **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



13. Press the relief on the hand pump to release the existing pressure before generating pressure **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



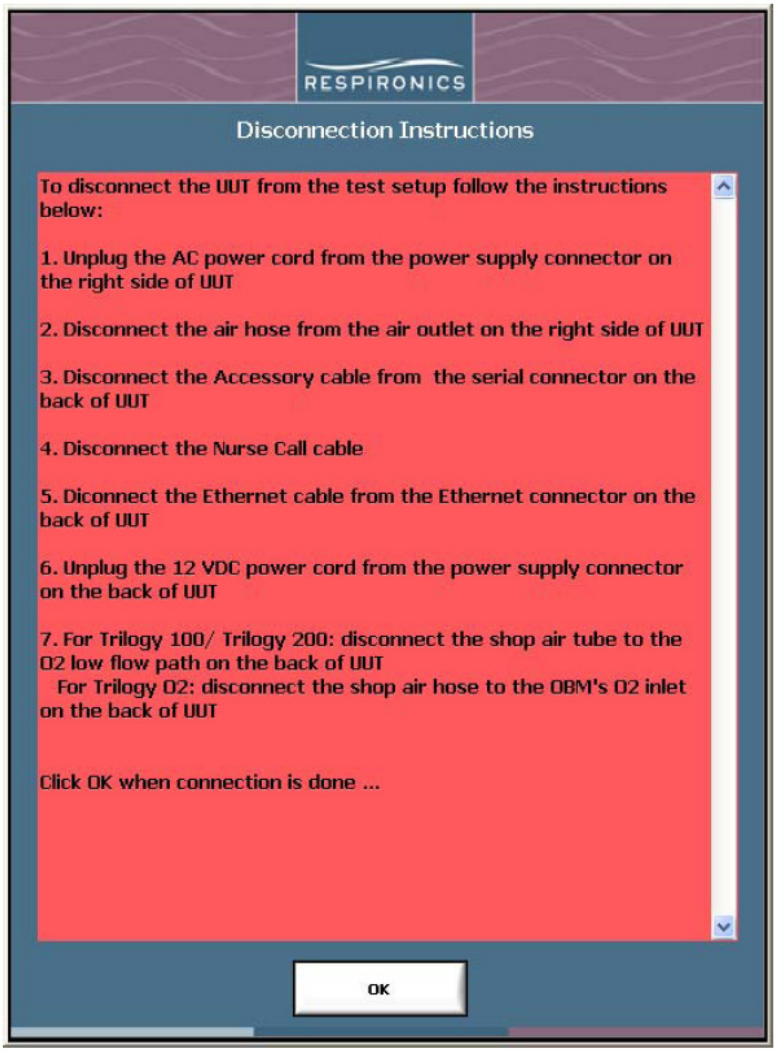
14. Continue following the on-screen prompts to complete the test. Once the test is complete and the device has passed, the following window will appear.

NOTE

If the device does not pass, perform repairs as necessary and retest the device.

15. Print the test report and keep for the records.

16. Disconnect the device per the on screen instructions and proceed to device Run-in.



10.10.4 TRILOGY RUN-IN

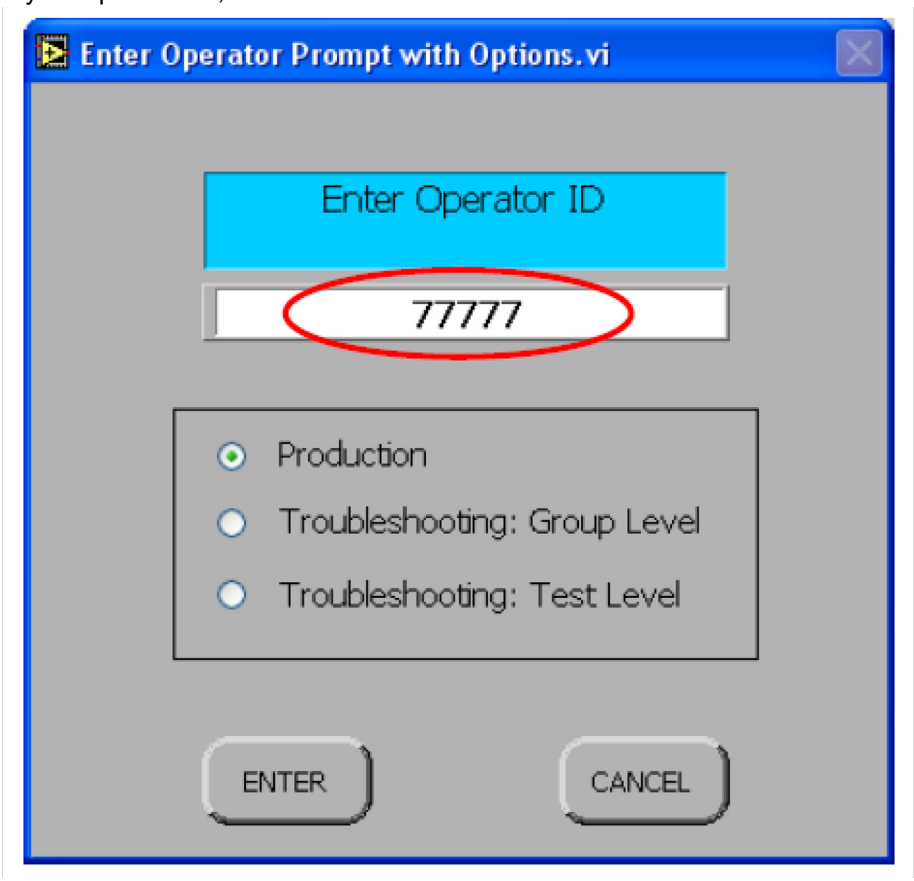
The Trilogy device should be plugged into AC and be run-in a minimum of two (2) hours after Pre-test has been performed. The Trilogy device should be connected to the ActivePAP configuration for run-in.

10.10.5 TRILOGY POST-TEST PROCEDURE

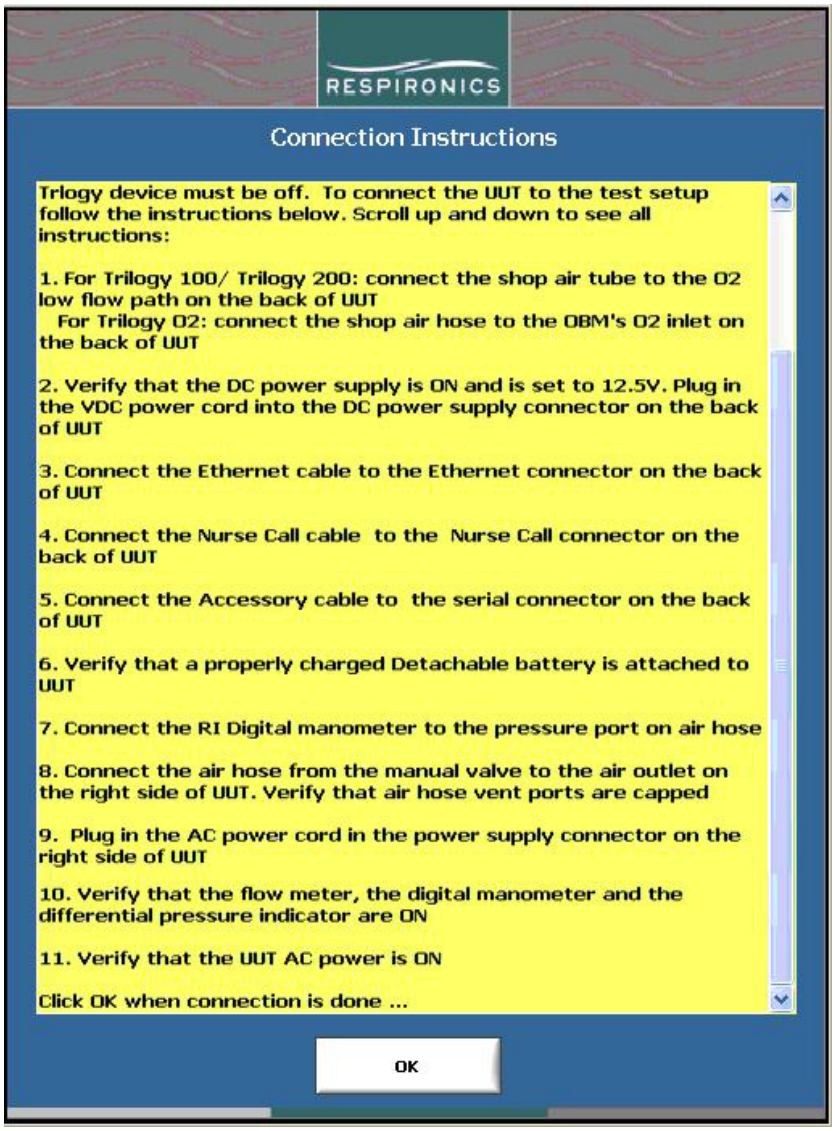
CAUTION

When testing a Trilogy O_2 device, during the Oxygen Blending Module (OBM) condition check (Step 11) it checks for OBM leaks. The software prompts to read from the Respironics digital manometer (which leak setting is 25 +/- 0.5 cmH_2O). It should not be confused with the pressure indicator used for the OBM intake. Effects of this could be to damage the sensor board.

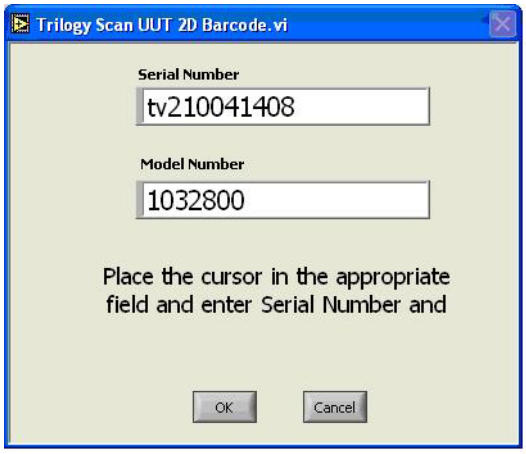
1. Once you have installed the software, open the Auto Flow or Manual Flow Post-Test software from the shortcut on you desktop, double click the icon to open. You may run the Post-Test independently of the Pre-Test for Preventative Maintenance testing.
2. Enter your operator ID, click the Production radio button and click “ENTER”.



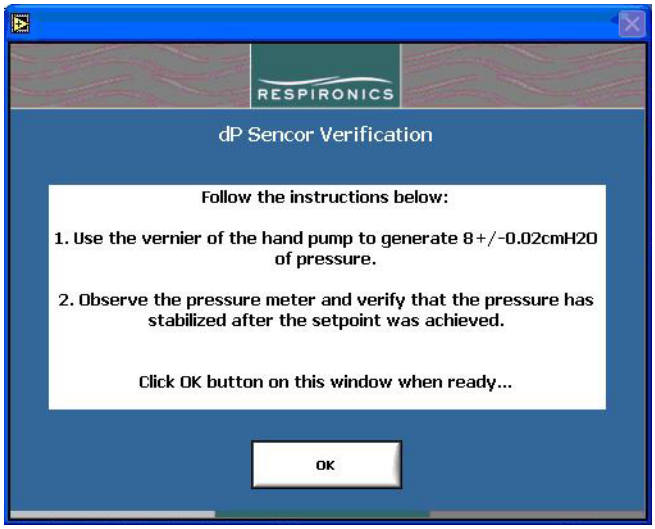
3. Follow the on-screen steps shown below.



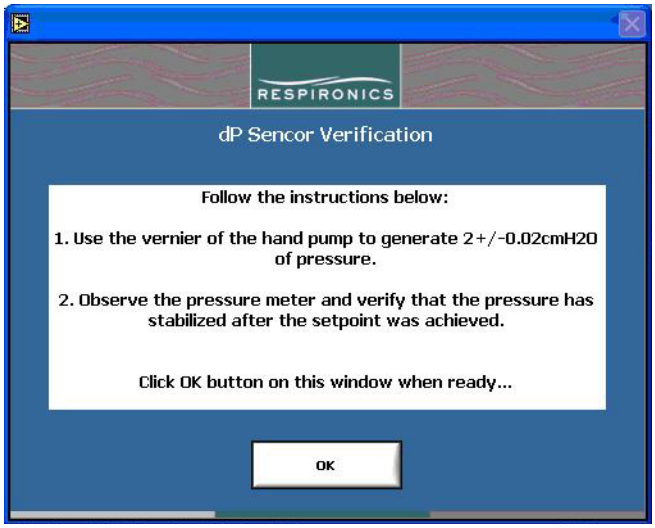
4. Enter the Serial Number and model number of the Device.



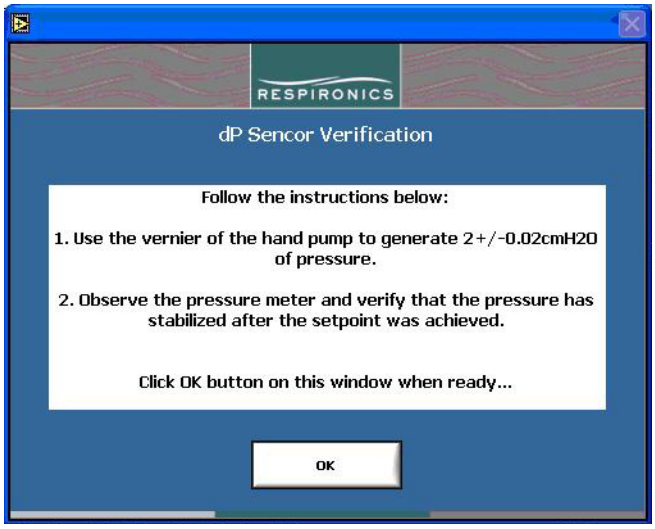
5. Follow the rest of the on-screen prompts to continue with the test.
6. When the on-screen prompt below appears, press the relief on the hand pump to release existing pressure after connecting the hand pump tubing, then proceed with on-screen action **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



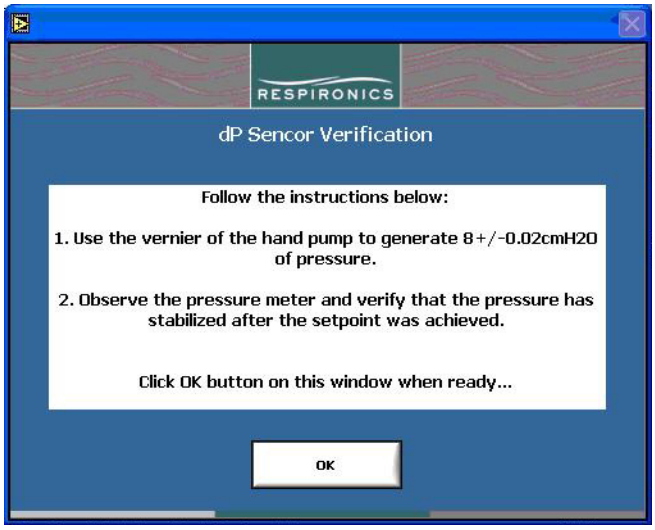
7. Press the relief on the hand pump to release the existing pressure before generating pressure. Continue with the on-screen prompts **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.



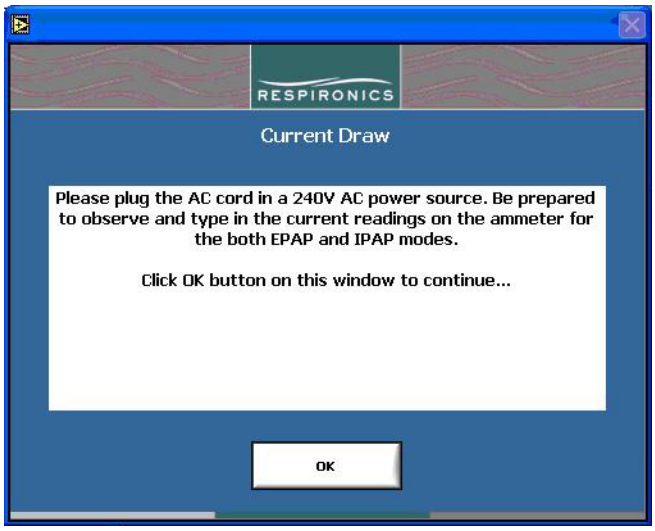
8. When the on-screen prompt below appears, press the relief on the hand pump to release existing pressure after connecting the hand pump tubing, then proceed with on-screen action **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.

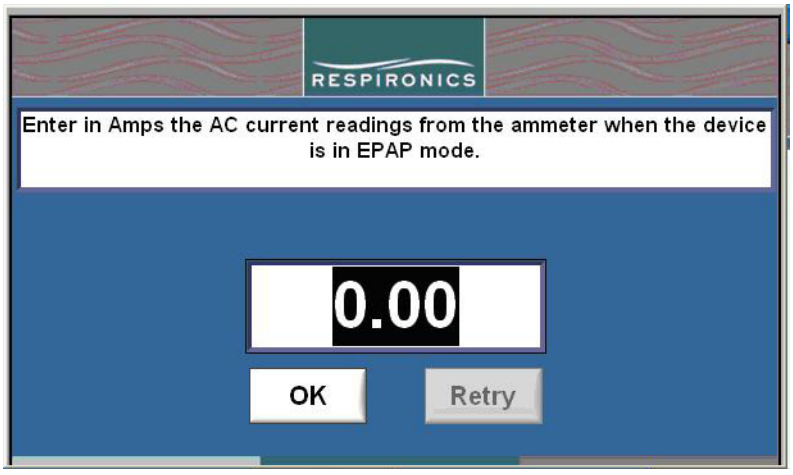


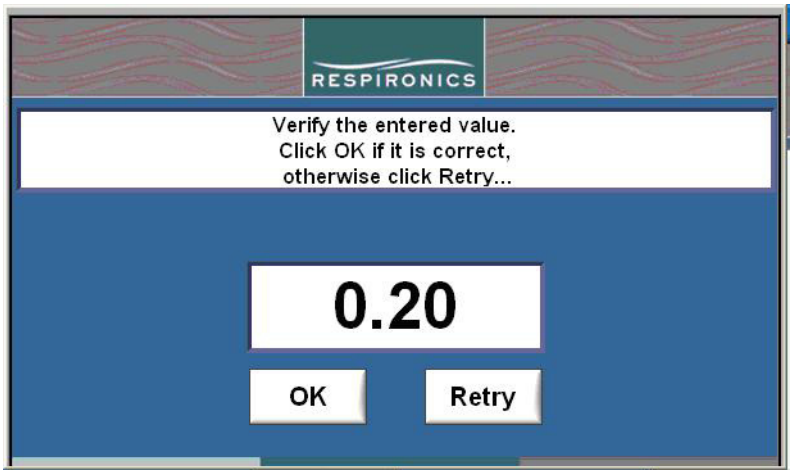
9. Press the relief on the hand pump to release the existing pressure before generating pressure. Continue with the on-screen prompts **(For Trilogy 200, Trilogy O_2, & Trilogy 202 Only)**.

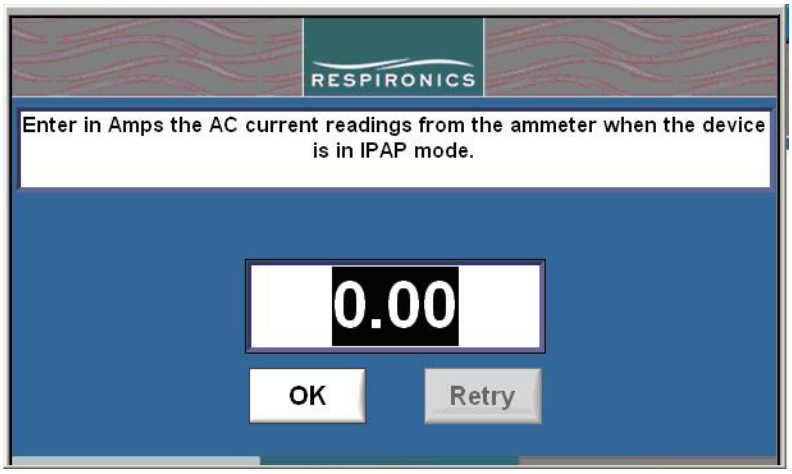


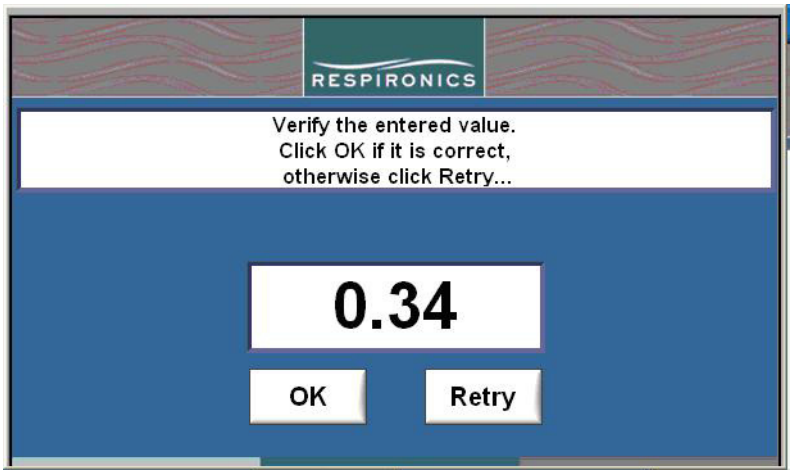
10. Follow the on-screen prompts.









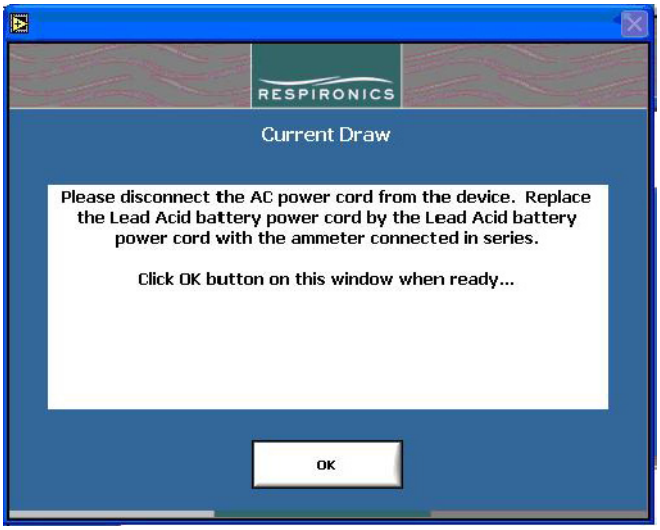


IMPORTANT NOTE

In the next steps, you will be asked to remove the 240 VAC and connect a meter into the DC cable to measure the DC Current. Please follow the steps below carefully otherwise an E280 error will be logged in the Error Log and will result in the test failing.

11. Remove 240 VAC, observe the AC Disconnected info message on the Trilogy Display.
12. After the AC Disconnected message is received, press the reset button on Trilogy Device. Observe the Lead Acid icon is green and a black box is around the green Lead Acid icon.
13. Break the connection in the DC cable, and WAIT for the info message of Lead Acid Disconnected on the Trilogy Display.
14. Connect the Meter in series with the DC Cable. Press reset on the Trilogy Device and observe that the Lead Acid icon is green, and a black box is around the green Lead Acid icon.

15. Measure the Lead Acid current as prompted.

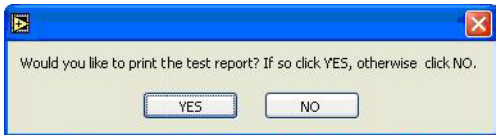


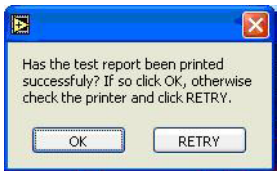
16. Continue following the on-screen prompts to complete the test. Once the test is complete and the device has passed, the following window will appear.

NOTE

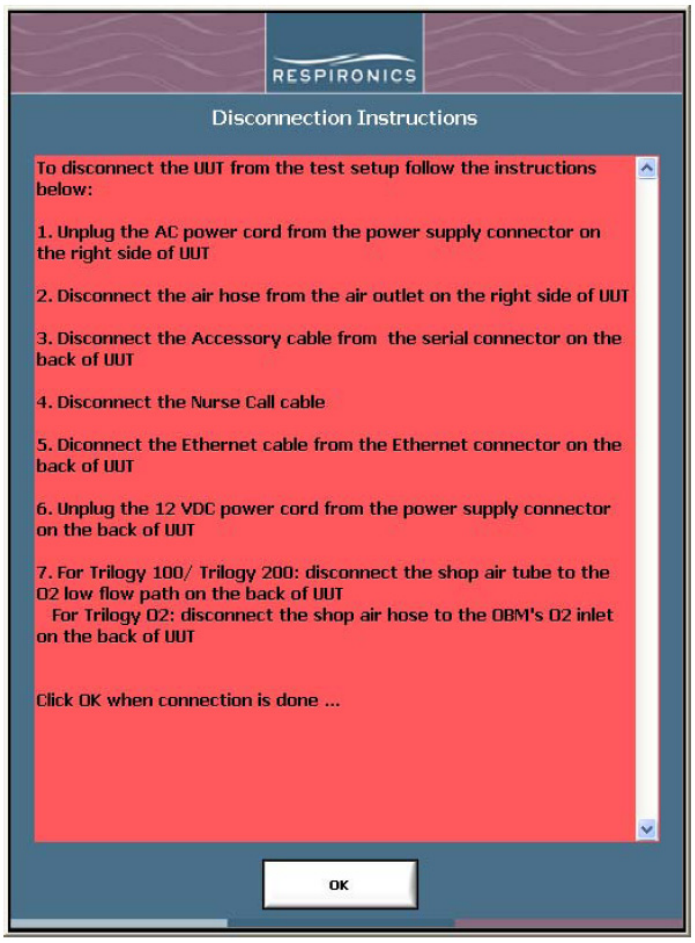
If the device does not pass, perform repairs as necessary and retest the device.

17. Print the test report (non-production mode only). The test report will print automatically when in production mode.





18. Disconnect the device per the screen shot below.



19. Using ink, sign and date the printed test report and keep for the records.

NOTE

When setting up the device for the first time or after a calibration, apply AC power to the ventilator before turning on the blower. Attempting to use the ventilator without first applying AC power, such as installing a detachable battery pack and starting the blower, will cause the internal battery to be displayed in red as an empty battery. When in this state, the internal battery will not be usable until AC power is applied.

10.11 SAFETY TEST (OPTIONAL)

This test is an optional test to be performed at intervals approved by the repair facility.

1. Plug the Trilogy device into a calibrate Safety Analyzer.
2. Measure and record the Normal Pole, No Earth, L2 enclosure leakage current. The value must be less than 100 microamps to pass.
3. Measure and record the Reverse Pole, No Earth, L2 enclosure leakage current. The value must be less than 100 microamps to pass.
4. Measure and record the Reverse Pole, No Earth, No L2 enclosure leakage current. The value must be less than 300 microamps to pass.
5. Measure and record the Normal Pole, No Earth, No L2 enclosure leakage current. The value must be less than 300 microcamps amps.

10.11.1 Safety Test Data Sheet

Serial Number	Model Number	Normal Pole, No Earth, L2 <100 microamps	Reverse Pole, No Earth, L2 <100 microamps	Reverse Pole, No Earth, No L2 <300 microamps	Normal Pole, No Earth, No L2 <300 microamps	Pass/Fail
Testing is in accordance to UL 60601-1 Safety Standards for medical devices.						
Tested By: (Print)			**Tested By: (Signature)**		**Date:**	

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CHAPTER 11: TOOLS AND EQUIPMENT

11.0 CHAPTER OVERVIEW

This chapter details the necessary hand tools and supplies for troubleshooting, testing, and repairing the Trilogy Ventilator.

11.1 COMMON HAND TOOLS

- Antistatic, Electro-Static Discharge (ESD)-protected work station - minimum requirement is a grounded mat and wrist strap
- #1 Phillips Head Screwdriver
- #2 Phillips Head Screwdriver
- Straight Slot Screwdriver
- Torque Drivers
  - 4 in-lbs.
  - 6 in-lbs.
  - 8 in-lbs.
  - 10 in-lbs.
  - 12 in-lbs.
- Hex Wrench - 1/8”
- 3/4”, 5/8”, & 1/4” open end wrenches
- Needle Nose pliers
- Side Cutters
- Wire tie gun

11.2 EQUIPMENT

- PC System with 1 Serial Port and at least 6 USB Ports available with Windows XP installed on the computer (Respironics Part Number: 1071683)
- Monitor Capable of displaying 1280 x 1024 (Respironics Part Number: 1075945)
- Printer - USB/Ethernet (Dell 2130cn) (Respironics Part Number:1071684)
- Differential Pressure Indicator (Refer to Acceptable Test Equipment) **(Trilogy 200, Trilogy O_2, & Trilogy 202 Only) (**(Respironics Part Number: 1071613)
- Respironics Digital Manometer 0-70 cmH_2O **(Trilogy 100 & Trilogy 200 Only)** (Respironics Part Number: 302227)
- Digital Manometer 0-100 PSI (Refer to Acceptable Test Equipment) **(Trilogy O_2 & Trilogy 202 Only) (**(Respironics Part Number: 1071620)
- DC Power Supply (Refer to Acceptable Test Equipment) or Deep Cycle Marine Battery 12/24 V (Respironics Part Number: 1071678)
- TSI Model 4040 Flow Meter (Respironics Part Number: 1071679)
- Flow Control Valve (Respironics Part Number: 1037985)

- 10212 Precision Pressure Regulator (Fairchild 10212) (Respironics Part Number: 1076027)
- USB to Serial Converter (Cables to Go Port Authority Model# 26479, or equivalent, must be externally powered) (Respironics Part Number: 1071680)
- Temperature and RH Meter (Refer to Acceptable Test Equipment) ((Respironics Part Number: 1071682)
- Trilogy Device to PC Data Cable (Respironics Part Number: 1046972) (Quantity 2)
- Trilogy to DC Power Supply Cable (Respironics Part Number: 1047295)
- RP - Current Draw Test Cable (Respironics Part Number: 1042993) (Quantity 2)
- Serial RS-232 Cables (Quantity of 2 minimum) (Respironics Part Number: 1071687)
- Merriam Pressure Pump w/ Vernier (Respironics Part Number: F98589) **(Trilogy 200 & O_2 Only)**
- Air Regulator 0-100 PSI (Wilkerson R18-02-F0G0) (Respironics Part Number: 1071690)
- Air Regulator 0-125 PSI; Max 300 PSIG Inlet (Watts Fluid Air; Model R384-02C) (Respironics Part Number: 1071689)
- Digital Multimeter (Refer to Acceptable Test Equipment) (Quantity 2) (Respironics Part Number: 1071681)
- Particulate Filter (Wilkerson F18-02-SL00 or equivalent) (Respironics Part Number: 1071691)
- Coalescing Filter (Wilkerson M18-02-CL00 or equivalent) (Respironics Part Number: 1071692)
- Coalescing Filter (Wilkerson M18-02-DL00 or equivalent) (Respironics Part Number: 1071693)
- Joiner Kit for Filters/regulator (Wilkerson GPA-96-603, MSC 94575529 or equivalent) (Quantity 3) (Respironics Part Number: 1071694)
- Brass Hose Barb Fitting; 1/8” HB x 1/8” NPT Male (MSC 01045277 or equivalent) (Quantity 3) (Respironics Part Number: 1071695)
- Ethernet CAT 5 or 6 Cable (Quantity 2) (Respironics Part Number: 1071685)
- Network Switch minimum 2-port (Respironics Part Number: 1071686)
- Test Orifice, .25” ID (Respironics Part Number: 332353)
- Outlet Port (Respironics Part Number: 312710) (Quantity 4)
- Trilogy Nurse Call Adapter Cable (Respironics Part Number: 1045290)
- Smoothbore Tubing, 18” (Respironics Part Number: 1008198) (Quantity 2)
- Smoothbore Tubing, 6 ft. (Respironics Part Number: 622038)
- SD Card for loading Trilogy software (Respironics Part Number: 1051801)
- SD Card Reader (Respironics Part Number: 1047300)
- Exhalation Porting Block, Universal (Respironics Part Number: 1040370)
- Exhalation Porting Block, Passive (Respironics Part Number: 1040372)
- Whisper Swivel II (Respironics Part Number: 332113)
- Test Lung (Respironics Part Number: 1021671)
- Trilogy Test Hardware Kit (Respironics Part Number: 1060747)
- Brass Barb Fitting Male for 1” hose ID and 3/4” Pipe (MSC - 5346K69 or equivalent) (Respironics Part Number: 1071696)

- Reducing Hex Coupler 3/4” to 1/2” Female to Female (MSC - 50785K187 or equivalent) (Respironics Part Number: 1071697)
- Reducing Hex Nipple 1/2” to 1/4” Male to Male (MSC - 5485K36 or equivalent) (Respironics Part Number: 1071698)
- Quick Connect Female 1/4” (MSC - 84930064 or equivalent) (Quantity 2) (Respironics Part Number: 1071699)
- Quick Connect Male 1/4” (MSC - 84930189 or equivalent) (Quantity 2) (Respironics Part Number: 1071700)
- Quick Connect Coupler 1/4” (MSC - 84930890 or equivalent) (Quantity 2) (Respironics Part Number: 1071701)
- TL930 Banana Plug Patch Cords (MSC - 65244121 or equivalent) (Quantity 2) (Respironics Part Number: 1071688)
- Prestolok Plus™ Push-to-Connect Fitting 1/4”; Thread Size: 1/4”; Thread Type: NPTF; Connection Type: Male NPT (MSC - 84426139 or equivalent) (Quantity 2) (Respironics Part Number: 1071702)
- Cap Plug (www.caplugs.com EC-14 or equivalent) (Respironics Part Number: 1070135)
- Male NPT Hose Barb 1/8” (Bay Corp Part Number: MPT-22 or equivalent) (Quantity 2) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071703)
- 3-Way Tee 1/8” (Bay Corp Part Number T-2 or equivalent) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071704)
- Male Nipple 1/8” with a length of 1 “ (Bay Corp Part Number 1243-1 or equivalent) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071705)
- Wing Nut, Oxygen Green (Bay Corp Part Number 1244MN or equivalent) **(Trilogy O_2 & Trilogy 202 Only)** (Respironics Part Number: 1071706)
- Green Hose 3’ (Respironics Part Number: 1071707) **(Trilogy O_2 & Trilogy 202 Only)**
- Port Cap, Silicone, .125 (Respironics Part Number: 1070259)
- Tubing 1/8 ID to 3/32 Reducer (Respironics Part Number: 35203)
- O_2 Inlet Test Cap (Respironics Part Number: 1075946)
- Trilogy 100 device for negative flow (Respironics Part Number: 1054260)
- Trilogy 200 device for negative flow (Respironics Part Number: 1040005)

11.3 SUPPLIES

- Cleaning Cloth
- Mild Detergent

11.4 ACCEPTABLE TEST EQUIPMENT

DIGITAL MULTIMETER

Specifications

- 3 1/2” digital readout
- Must be able to measure AC/DC Current, True RMS

Acceptable Options

- Fluke 87-5 or better model
- Any commercially available digital multimeter that meets the above specifications.

DC POWER SUPPLY

Specifications

- 0-15 V,
- 0-25 A Regulated Power Supply
- 100-240V input

Acceptable Options

- ExTech Instruments 382290
- Any commercially available External Power Supply that meets the above specifications.

DIFFERENTIAL PRESSURE INDICATOR

Specifications

- Pressure Range: 10 in H_2O
- Precision: $\pm$ 0.03% of reading F.S. combined non-linearity, hysteresis, repeatability and temperature effects over 18° to 28° C
- Engineering Pressure Units: 24 plus Altitude in feet or meters
- Pressure Connection: 1/8 in NPT Female
- Communication: RS-232 Standard
- AC/DC Power Adaptor 90 to 264 VAC input options

Acceptable Options

- Druck DPI 150
- Any commercially available Differential Pressure Indicator that meets the above specifications.

TEMPERATURE AND RH METER

Specifications

- Humidity $\pm$ 3%; Temperature $\pm$ 2° F ($\pm$ 1° C)

Acceptable Options

- B&K Precision Model 720
- Any commercially available Temperature and RH Meter that meets the above specifications.

CHAPTER 12: SCHEMATICS

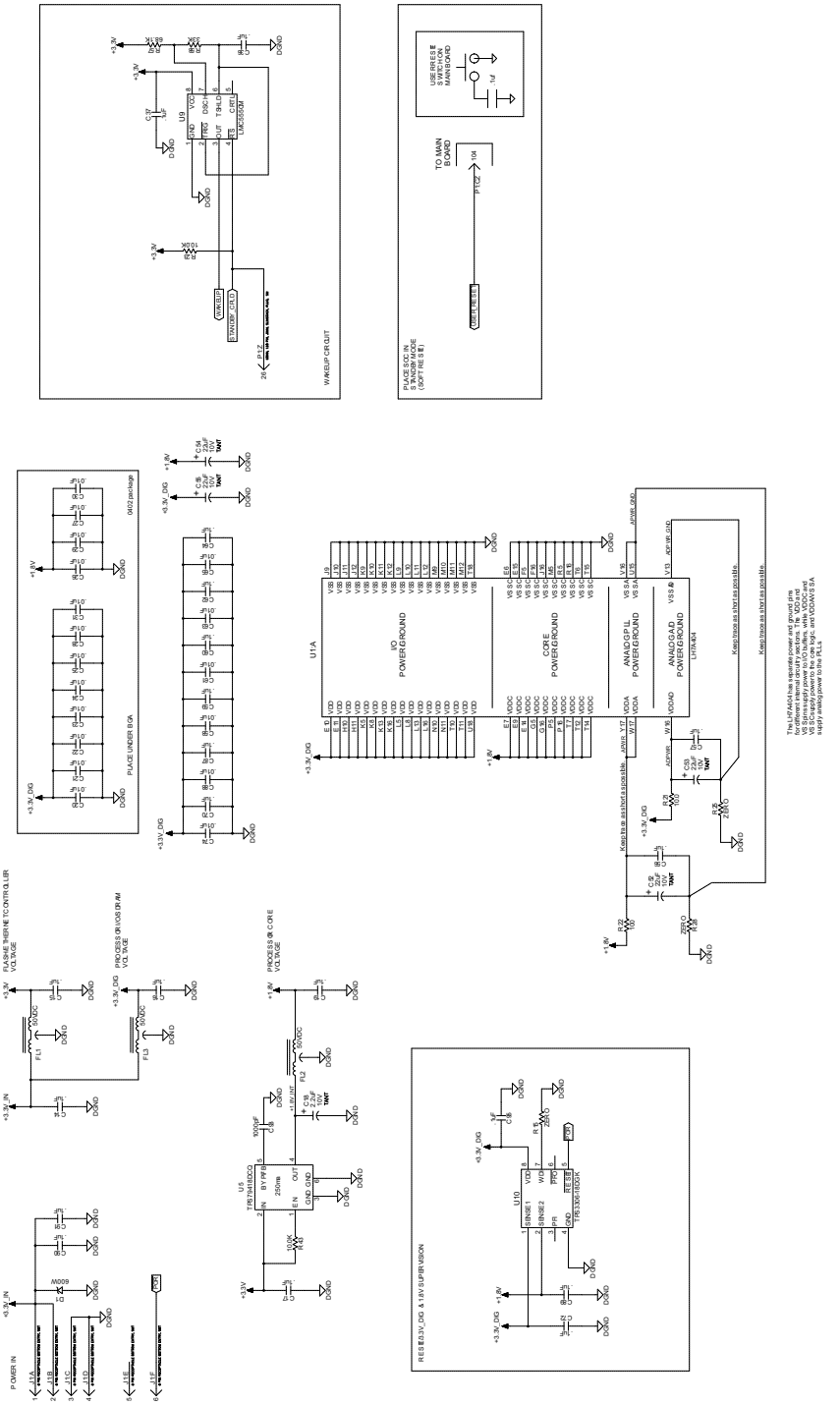
12.0 SCHEMATICS STATEMENT

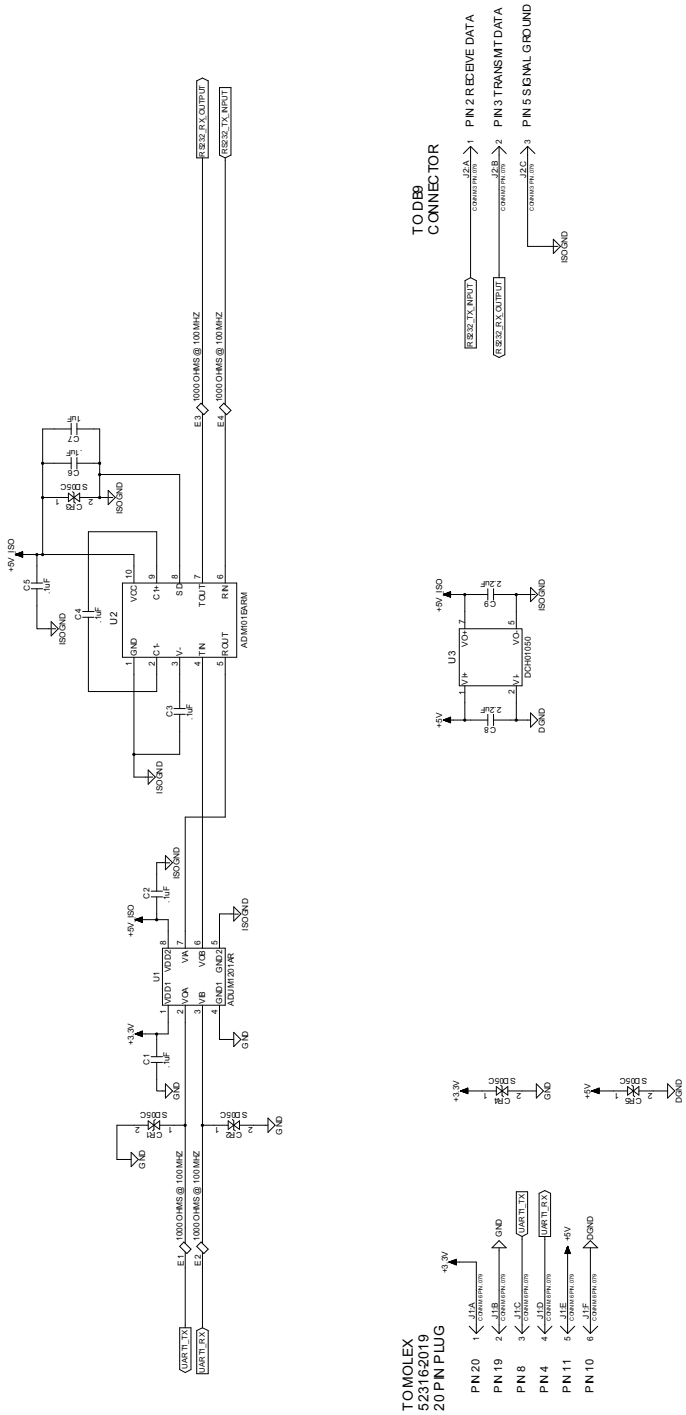
Schematics are supplied with this manual in direct support of the sale and purchase of this product.

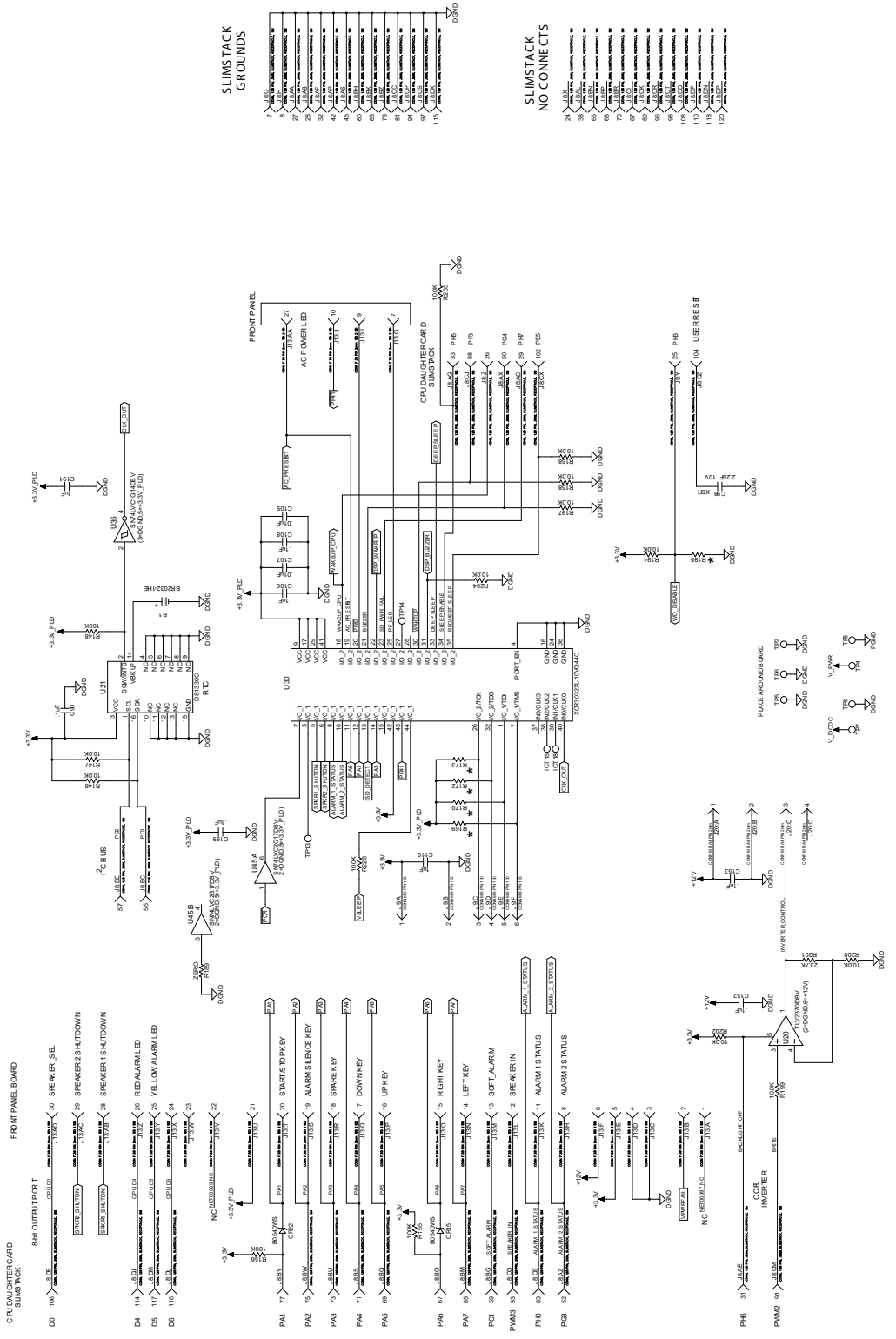
The schematics are proprietary and confidential. Do not copy the schematics or disclose them to third parties beyond the purpose for which they are intended. Patents are pending.

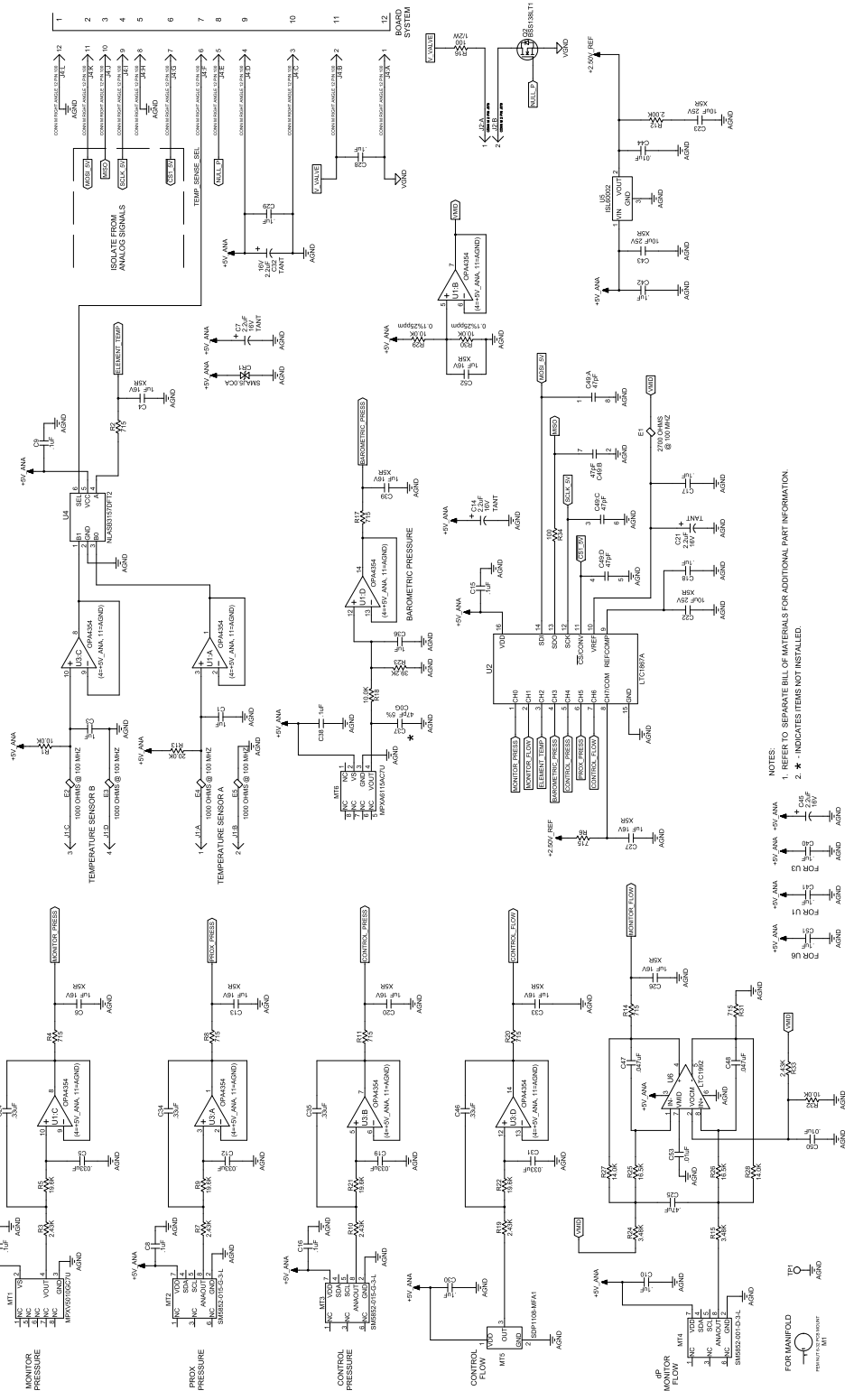
The schematics are intended to satisfy administrative requirements only. They are not intended to be used for component level testing and repair. Any changes of components could effect the reliability of the device, prohibit lot tracking of electronic components, and void warranties. Repairs and testing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

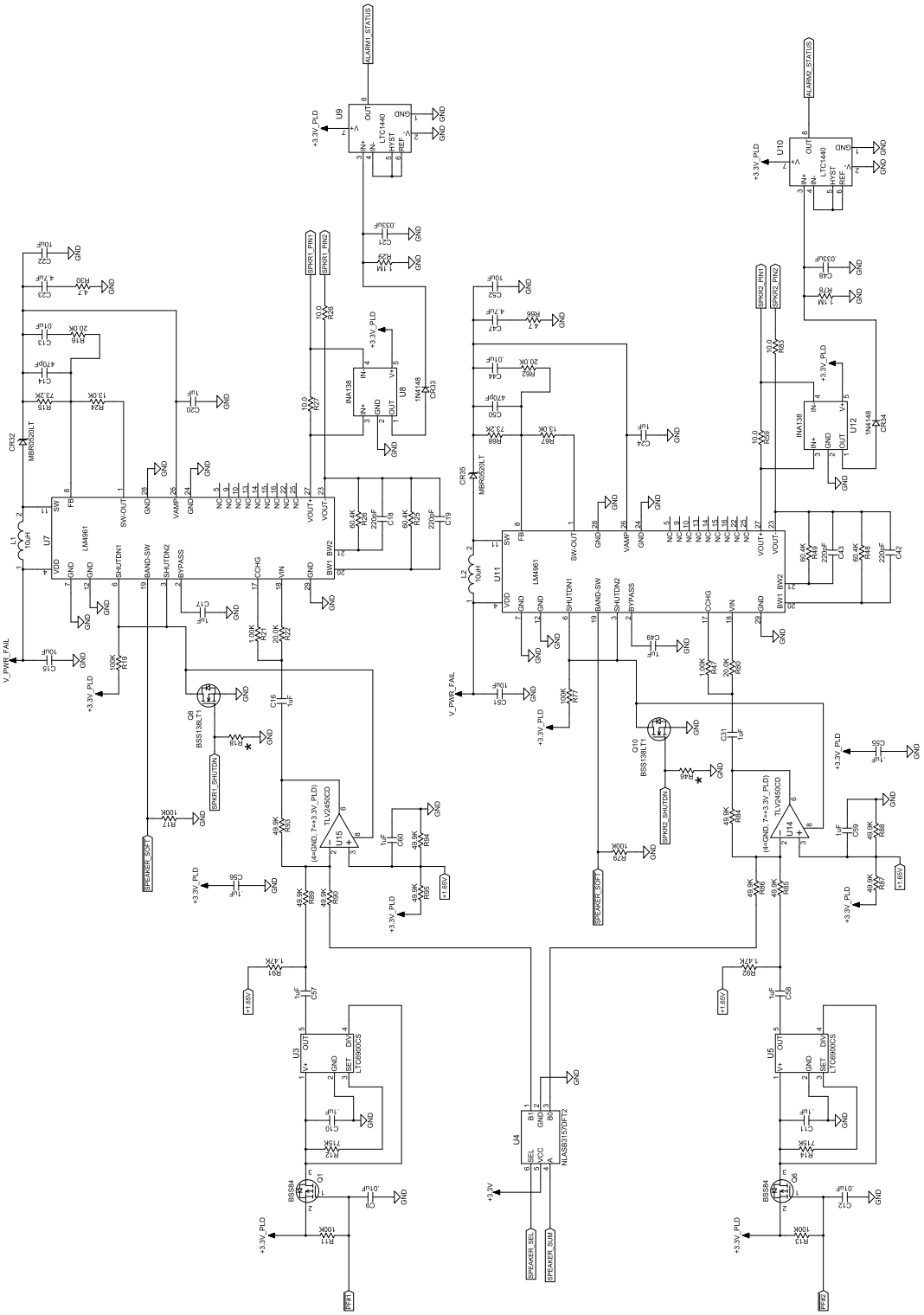
The schematics are of the revision level in effect at the time this manual was last revised. New revisions may or may not be distributed in the future.

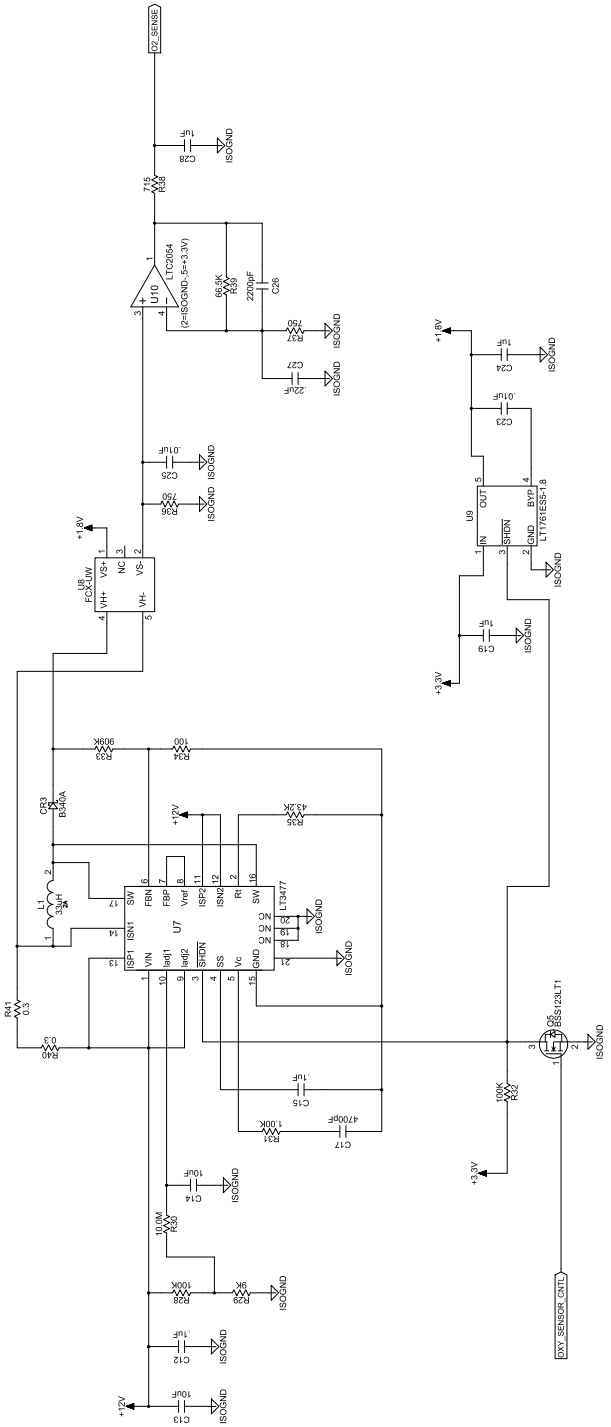


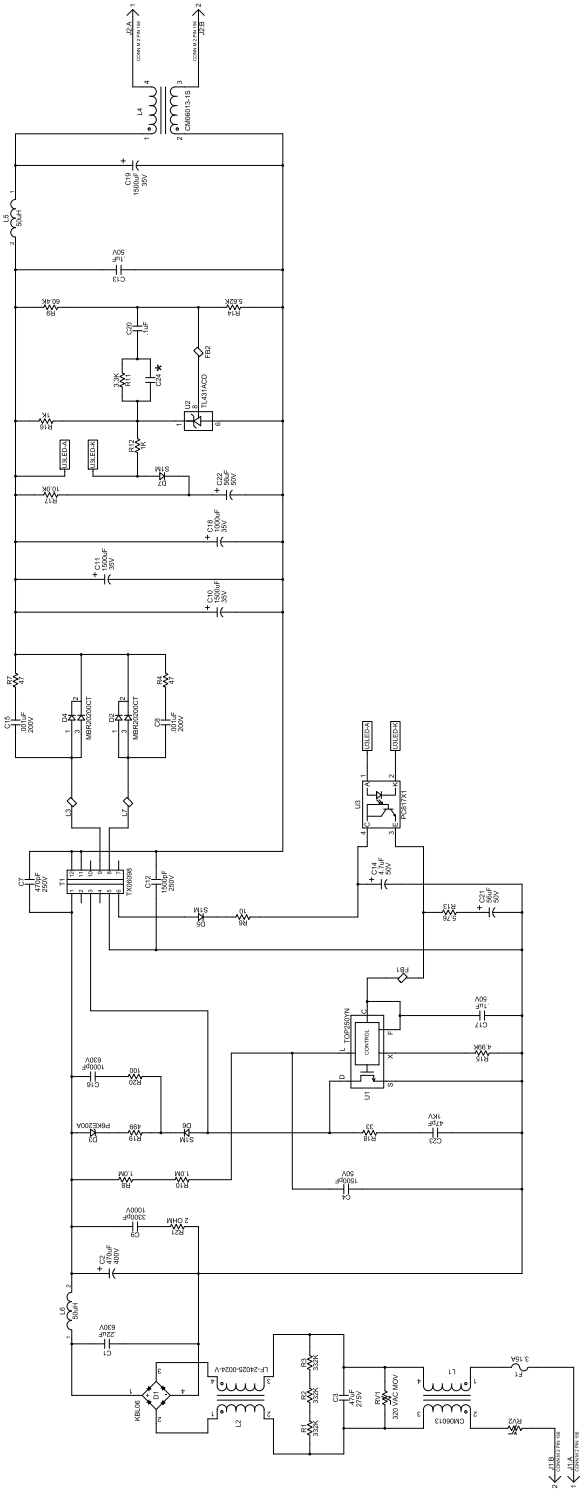

TO DB9
CONNECTOR
PIN 2 RECEIVE DATA
PIN 3 TRANSMIT DATA
PIN 5 SIGNAL GROUND
RS232_TX_INPUT
RS232_RX_OUTPUT
ISOGND
+5V_ISO
U2
ADM3015ARM
U1
ADUM1201AR
U3
DCH01050
+5V
DGND
+3.3V
GND
UART_TX
UART_RX
TOMOLEX
523162019
20 PIN PLUG
PIN 20
PIN 19
PIN 8
PIN 4
PIN 11
PIN 10

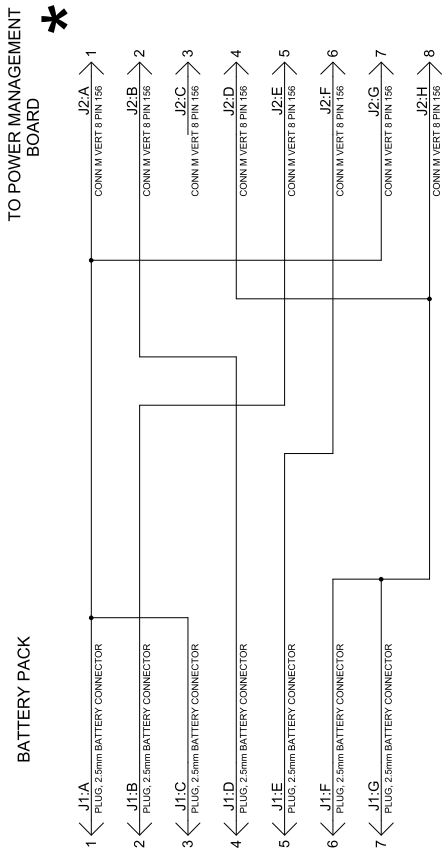

SLIMSTACK GROUNDS
SLIMSTACK NO CONNECTS
FRONT PANEL
AC POWER LED
CPU DAUGHTER CARD SLIMSTACK
USER RESET
PLACE AROUND BOARD
FRONT PANEL BOARD
8-bit OUTPUT PORT
CPU DAUGHTER CARD SLIMSTACK
CCFL INVERTER

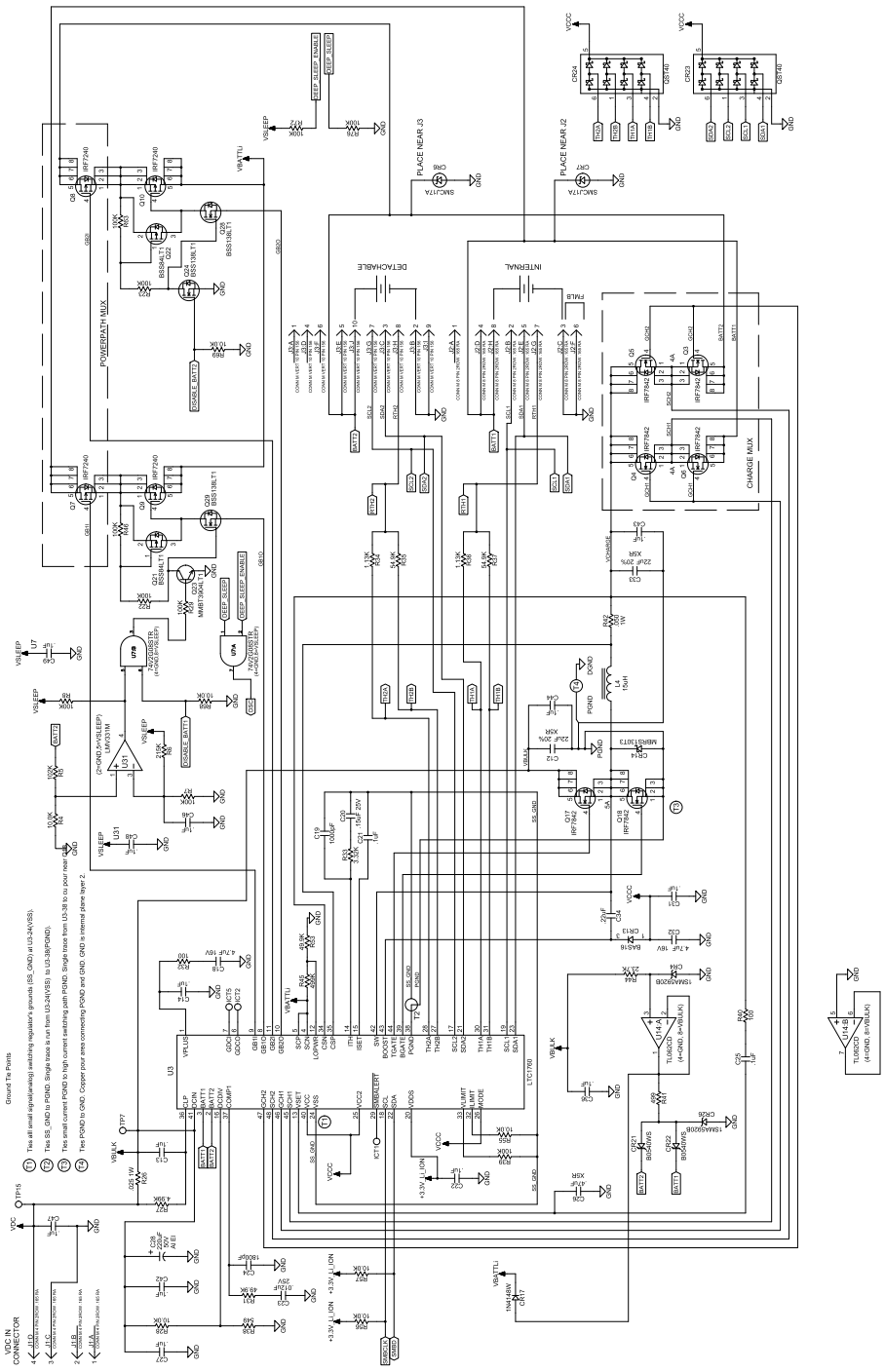

BOARD SYSTEM
ISOLATE FROM ANALOG SIGNALS
TEMP SENSE SEL
BAROMETRIC PRESSURE
TEMPERATURE SENSOR B
TEMPERATURE SENSOR A
MONITOR PRESSURE
PROX PRESSURE
CONTROL PRESSURE
CONTROL FLOW
dP MONITOR FLOW
FOR MANIFOLD
NOTES:
1. REFER TO SEPARATE BILL OF MATERIALS FOR ADDITIONAL PART INFORMATION.
2. ★ INDICATES ITEMS NOT INSTALLED.


ALARM1_STATUS
ALARM2_STATUS
SPKR1_PIN1
SPKR1_PIN2
SPKR2_PIN1
SPKR2_PIN2
SPKR1_SHUTDN
SPKR2_SHUTDN
SPEAKER_SOFT
SPEAKER_SEL
SPEAKER_SUM
V_PWR_FAIL
+3.3V_PLD
+1.65V
+3.3V
LM4961
LTC1440
INA138
1N4148
MBR0520LT
BSS138LT1
TLV2450CD
LTC6900CS
NLASB3157DFT2
BSS84
PFW1
PFW2


O2_SENSE
C28
1uF
ISOGND
475
R38
U10
LTC2054
(2=ISOGND-.5=+3.3V)
66.5K
R39
2200pF
C26
750
R37
C27
22uF
C25
.01uF
750
R36
+1.8V
U8
FCX-UW
VS+
NC
VS-
VH+
VH-
909K
R33
100
R34
CR3
B340A
+12V
43.2K
R35
L1
33uH
SW
FBN
FBP
Vref
ISP2
ISN2
RI
SW
LT3477
ISP1
ISN1
VIN
Iadj1
Iadj2
SHDN
SS
Vc
GND
R41
0.3
R40
.1uF
C15
1.00K
R31
4700pF
C17
10uF
C14
10.0M
R30
100K
R28
9K
R29
.1uF
C12
10uF
C13
+1.8V
C24
1uF
.01uF
C23
U9
LT1761ES5-1.8
IN
SHDN
GND
OUT
BYP
1uF
C19
+3.3V
100K
R32
Q6
BSS123LT1
+3.3V
DXY_SENSOR_CNTL




TO POWER MANAGEMENT BOARD
*
J2:A
J2:B
J2:C
J2:D
J2:E
J2:F
J2:G
J2:H
CONN M VERT 8 PIN 156
1
2
3
4
5
6
7
8
BATTERY PACK
J1:A
J1:B
J1:C
J1:D
J1:E
J1:F
J1:G
PLUG, 2.5mm BATTERY CONNECTOR



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