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## **Programmable Serial Interface Card Driver Thermo Forma Incubator 3110**

### **USER MANUAL**

**Rev. P1.55**

**May 2010**

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# 1 INTRODUCTION

## 1.1 Scope

This document is the User Manual for the Thermo Forma Incubator 3110 serial communication driver firmware for the Emerson Process Management (EPM) DeltaV Control System; it provides information required to install, configure, and maintain the driver firmware on the DeltaV Programmable Serial Interface Card (PSIC). The reader should be familiar with EPM's DeltaV PSIC and connected 3110 incubators.

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the 3110 Driver firmware.

## 1.2 Document Format

This document is organized as follows:

<b>Introduction</b>	Describes the scope and purpose of this document.
<b>Theory of Operation</b>	Provides a general functional overview of the 3110 Driver.
<b>Flashing Firmware</b>	Describes flashing procedures for the 3110 Driver firmware on to the DeltaV PSIC.
<b>Configuration Information</b>	Describes procedures and guidelines for configuring the DeltaV PSIC.
<b>Operational Check</b>	Provides tips and assistance to ensure PSIC is properly setup and configured.
<b>DeltaV–Field Device Electrical Interface</b>	Describes the electrical interface between DeltaV PSIC and the 3110 Device. Also describes the cable pin assignments for RS-422/485 communications.
<b>Technical Support</b>	Describes who to call if you need assistance.



**1.3 System Specifications**

The following table lists the minimum system requirements for the 3110 Driver:

**Table 1: System Specifications**

<b>Firmware</b>	3110 Driver Firmware v1.55 or later
<b>Protocol Compatibility</b>	Communications with the 3110 are based on the following document:  3110 W/J Incubator RS485 Communications Protocol
<b>Software Requirements</b>	DeltaV System Software (Release 4.2 or later) installed on a hardware-appropriate Windows workstation configured as a ProfessionalPlus for DeltaV  Serial Interface Port License (VE4102) if required.
<b>Minimum DeltaV Hardware Requirements</b>	DeltaV Series 2 Serial Module, Hardware Rev 1.1r or later  DeltaV M3, M5, M5+, MD, MD Plus or MX Controller, Power Supply and 8 wide controller carrier
<b>Other Optional Hardware</b>	N/A



## 2 THEORY OF OPERATION

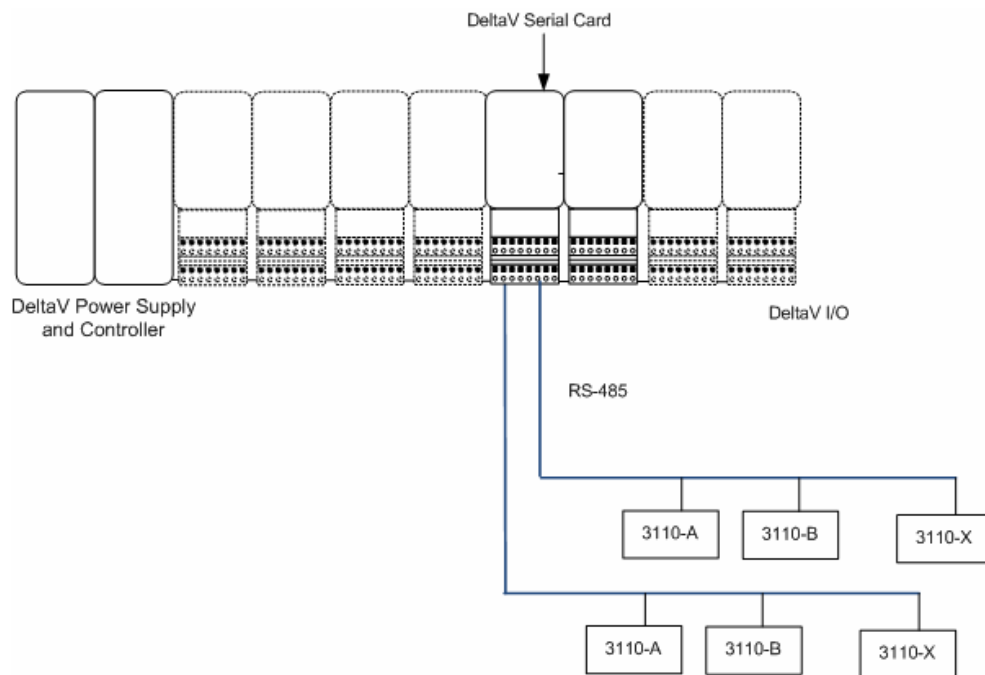
DeltaV comprises an I/O sub-system, in which the PSIC is one type of card. The purpose of the PSIC is to serially integrate third-party devices, allowing data to be read into and written out from DeltaV. Each PSIC has 2 communication ports that can be configured as Master or Slave, using RS-232, RS-485 (Half Duplex), or RS-422 (Full Duplex). Various communications parameters, such as baud rate, are configurable

The PSIC driver functions only in Master mode, while the 3110 functions as the communications Slave. On power-up, the PSIC driver receives its configuration from the DeltaV Controller. The driver then continuously polls the 3110 on a 5 second basis. The data is retrieved from the 3110 responses and reported up to the DeltaV Controller in dataset registers.

The 3110 Incubator communicates using RS485 (Half Duplex) only. Furthermore, each incubator has a unique address A-X, allowing multiple incubators to be multi-dropped from the same serial port in the PSIC. The driver capacity is limited to a maximum of 16 incubators per port, where Device Address 1 in DeltaV corresponds to Incubator A, Device Address 2 is Incubator B, etc.

Each incubator is assigned a single dataset. The incubator supplies 5 values which are read and stored in the dataset registers. These values are: Temperature, CO2, RH, O2 and Alarm.

The physical architecture will be as follows:





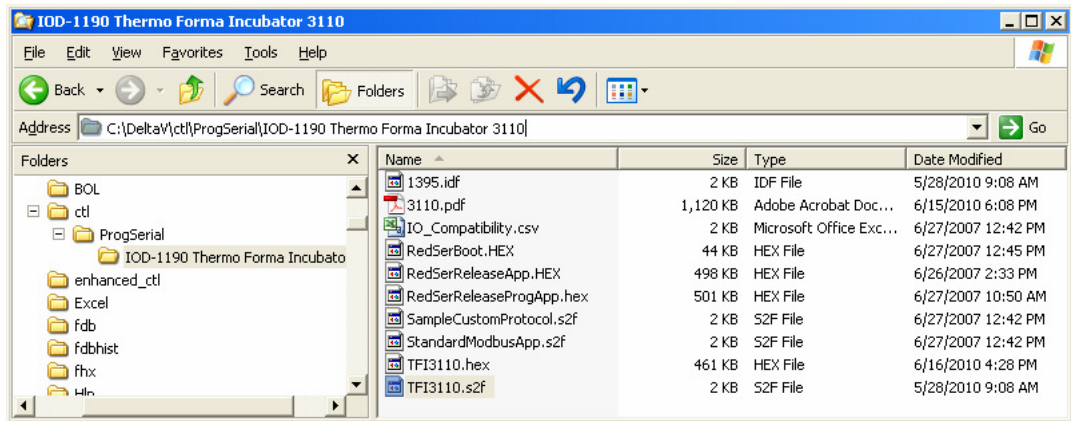
### 3 Flashing the firmware

The driver software distribution contains 10 files. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

**\DeltaV\ctl\ProgSerial\IOD-1190 Thermo Forma Incubator 3110**

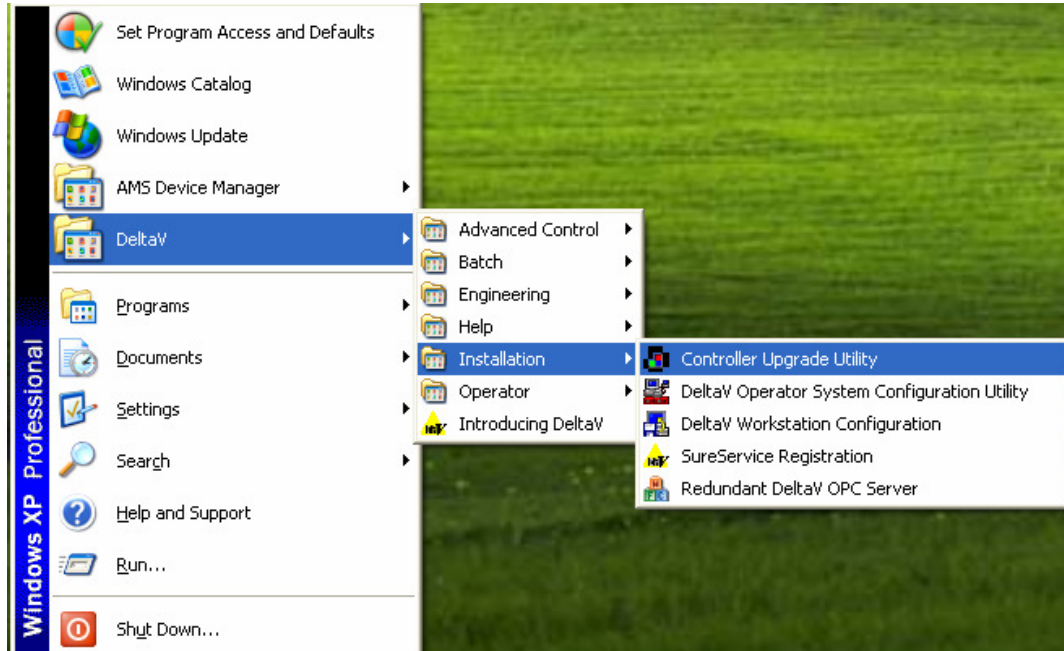
Note that you will have to create this subdirectory. The following shows a completed copy operation:

After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:

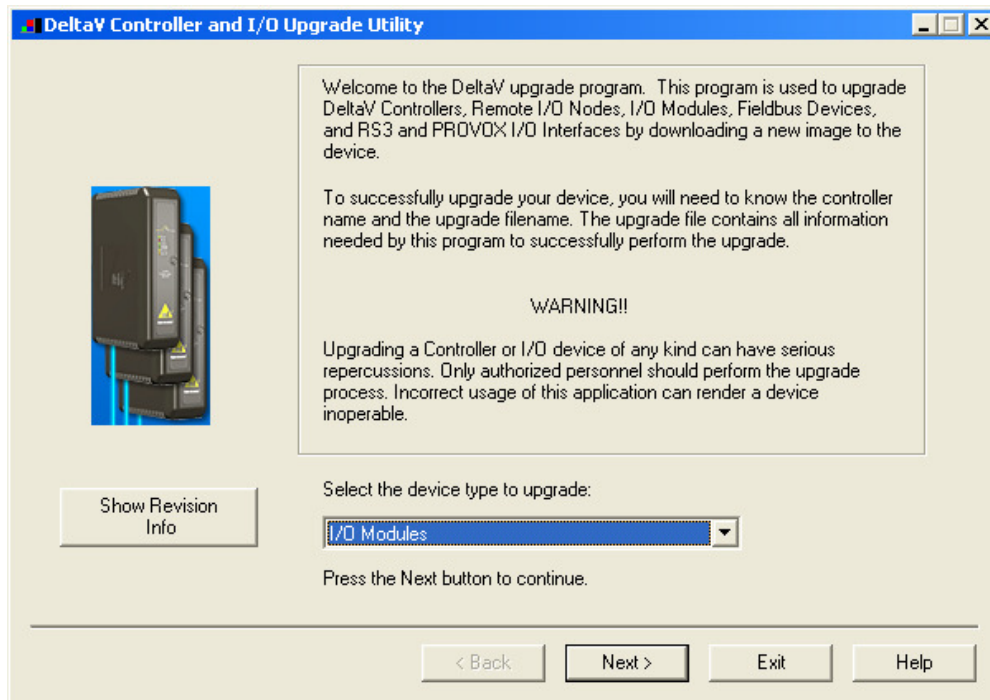


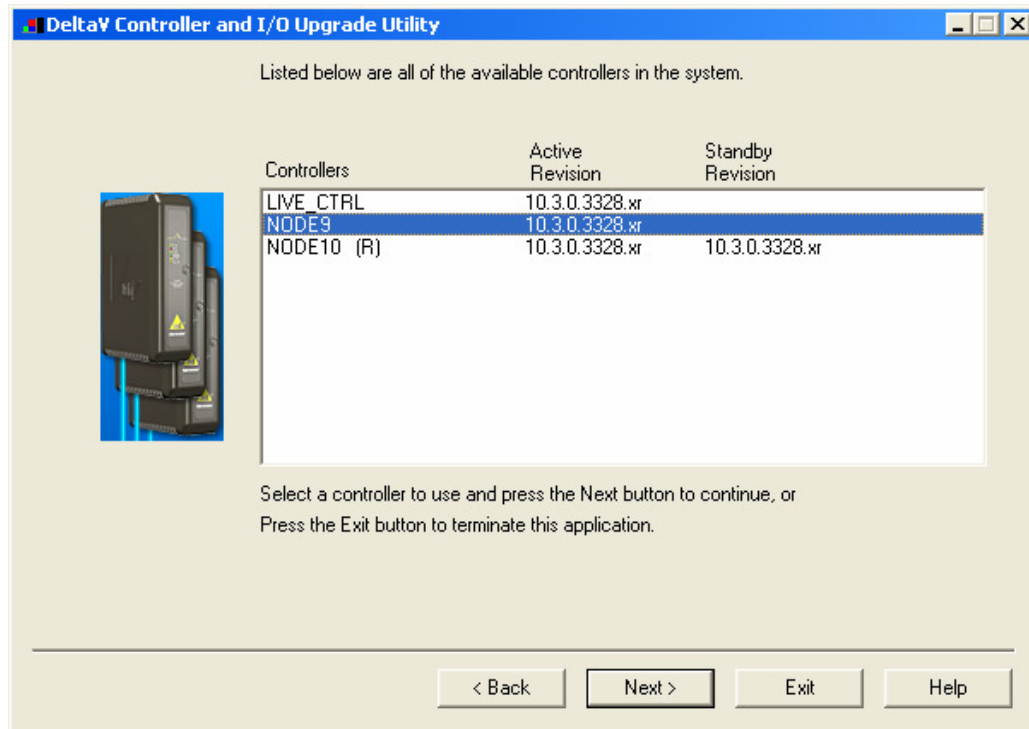


1. Click on the Start button and select DeltaV-> Installation-> Controller Upgrade Utility as shown below, and the following dialog will appear:



2. Click on the Upgrade I/O Modules radio button, and then click Next.

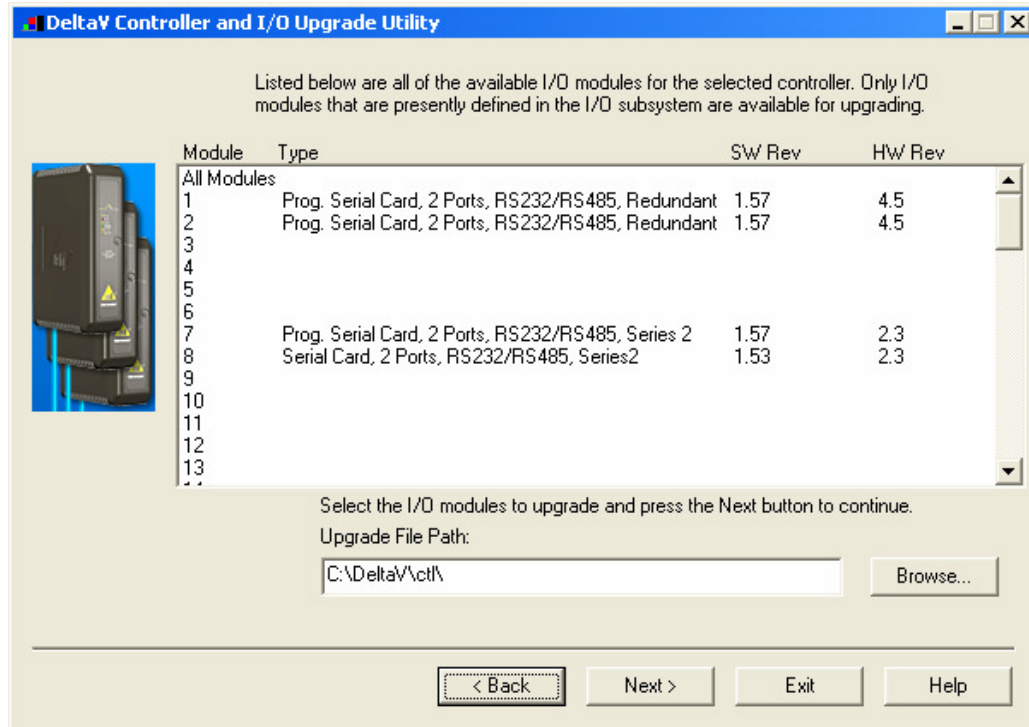




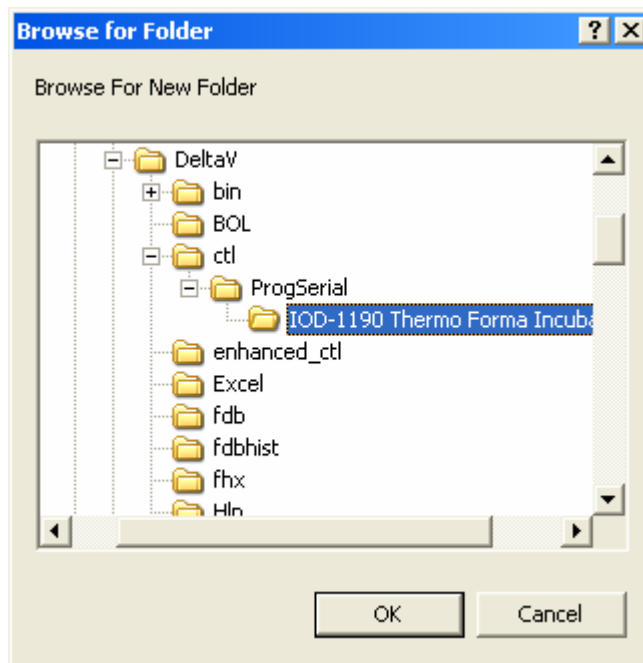
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

4. The following dialog will appear, listing all the I/O modules in your selected Controller. The shown list of I/O modules is an example only. Your list will be different.

**Note: The first time a standard Serial card is upgraded to the 3110 Driver, the dialog will be as shown below (card 8). When upgrading an existing Programmable Serial Card, skip Steps 5 and 6, and go to Step 7.**

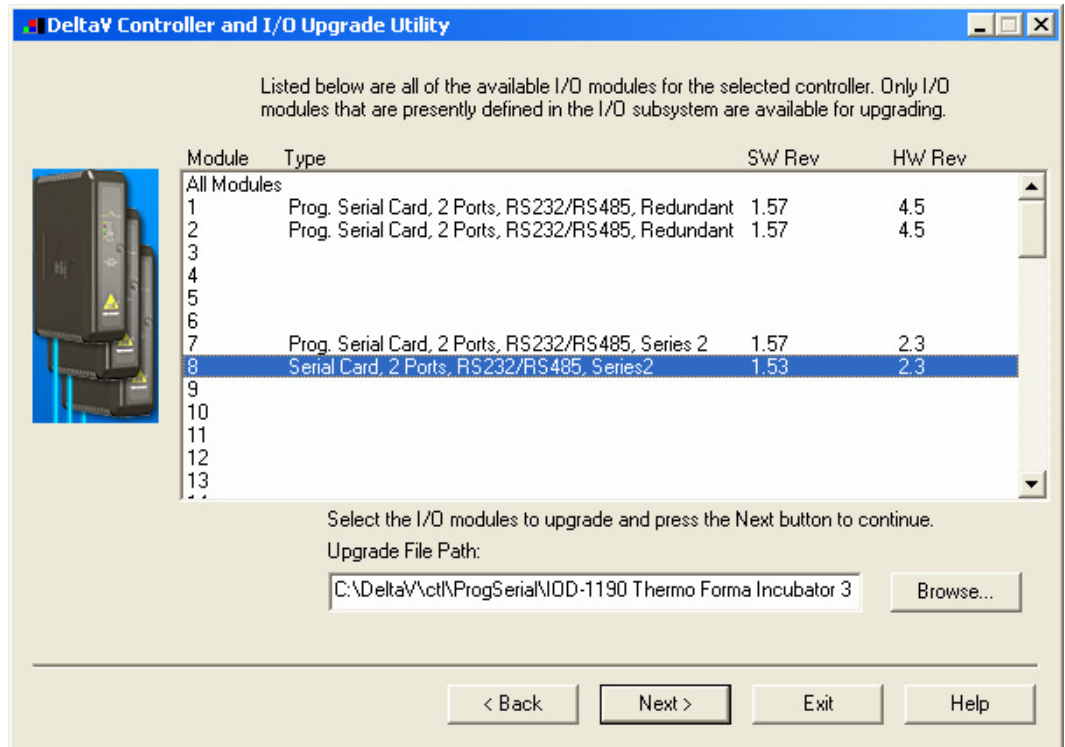


5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.



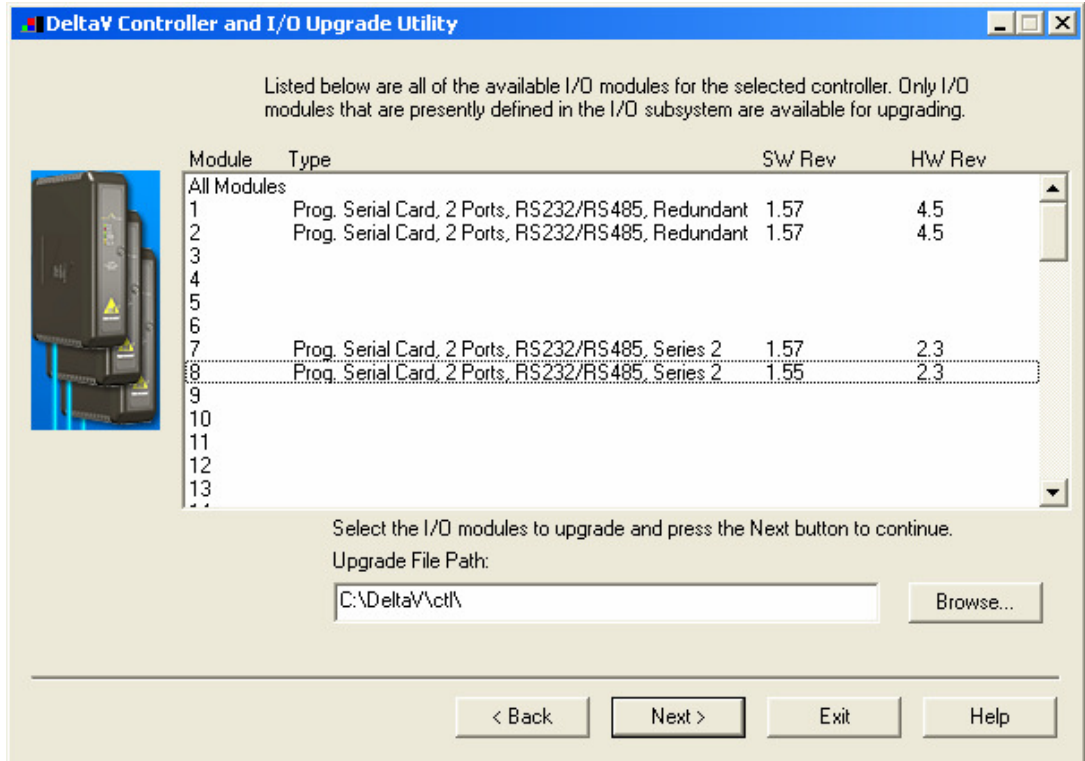


6. Select the I/O module again as shown below and then click Next. Go to Step 9.





7. If you are upgrading an existing Programmable Serial Card, the dialog will be as shown below. From this dialog, select the Programmable Serial Card I/O Module in the list.



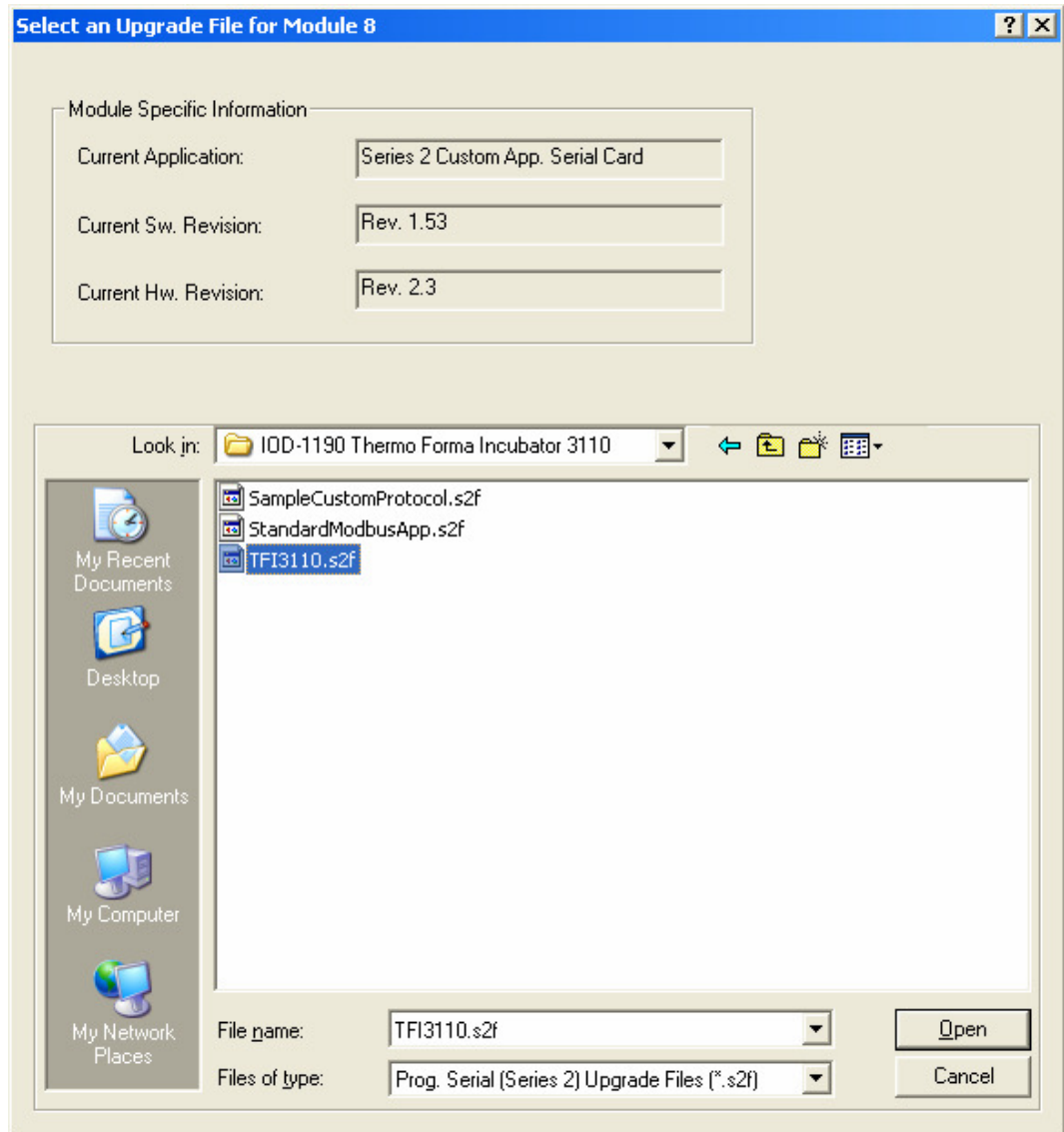
For example, we will select I/O Module 8. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

**\\DeltaVctl\ProgSerial\IOD-1190 Thermo Forma Incubator 3110**

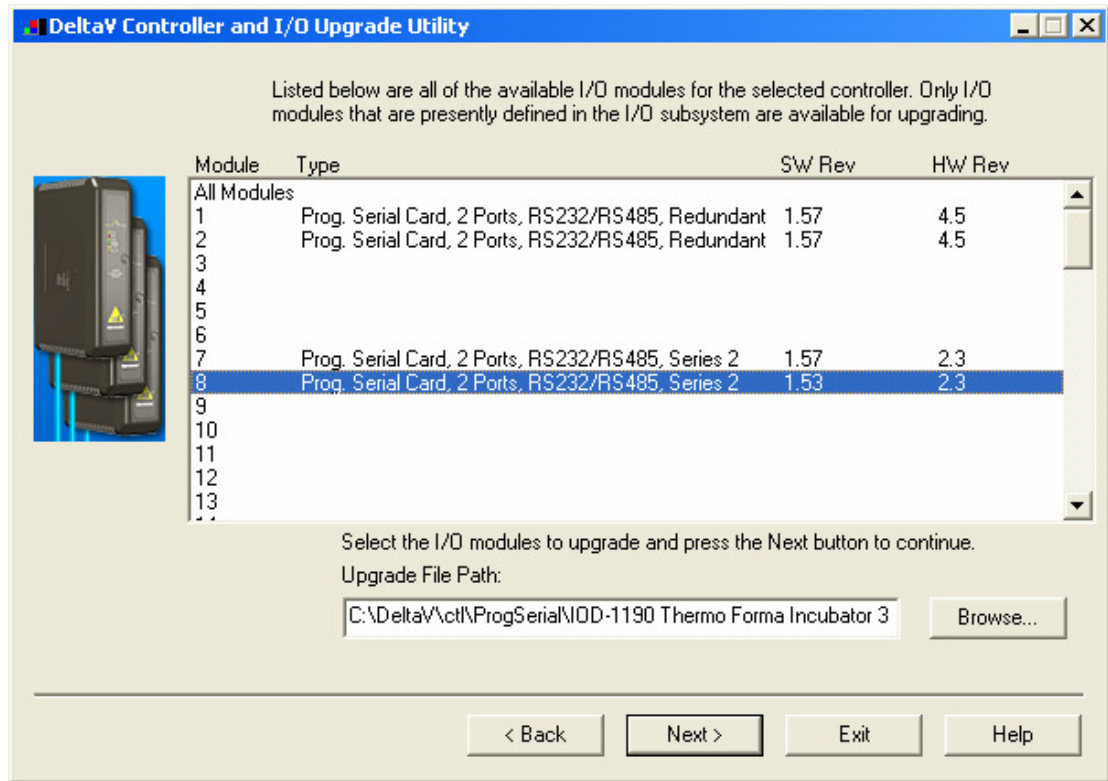
Once you are in the specified directory, you will need to select the following file:

**TFI3110.S2F**

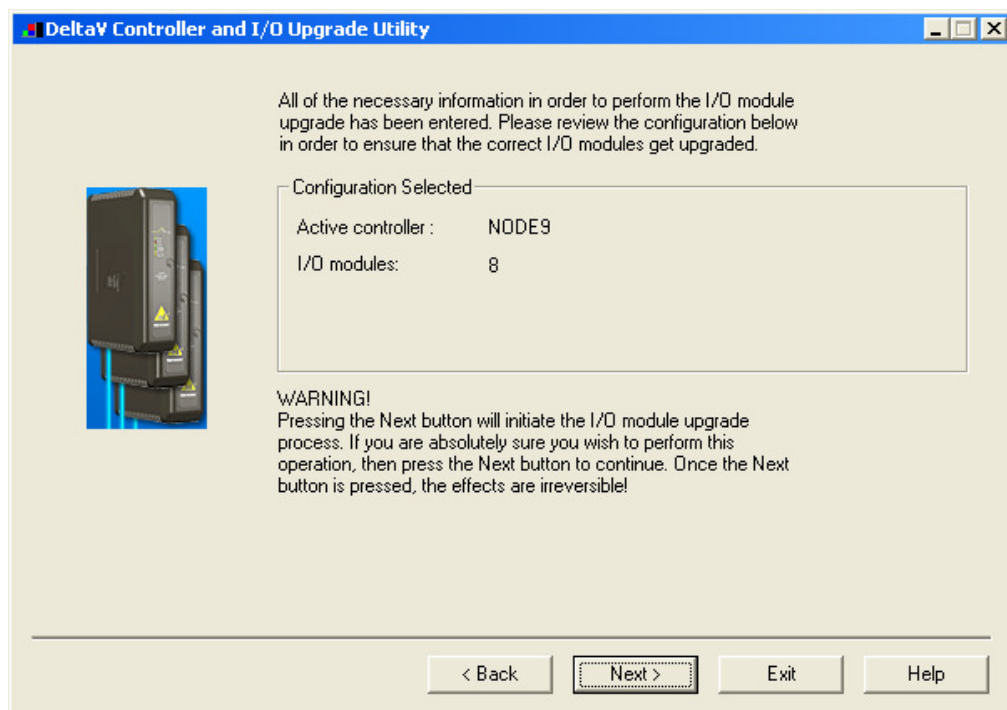
This is shown in the following dialog.



8. After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:

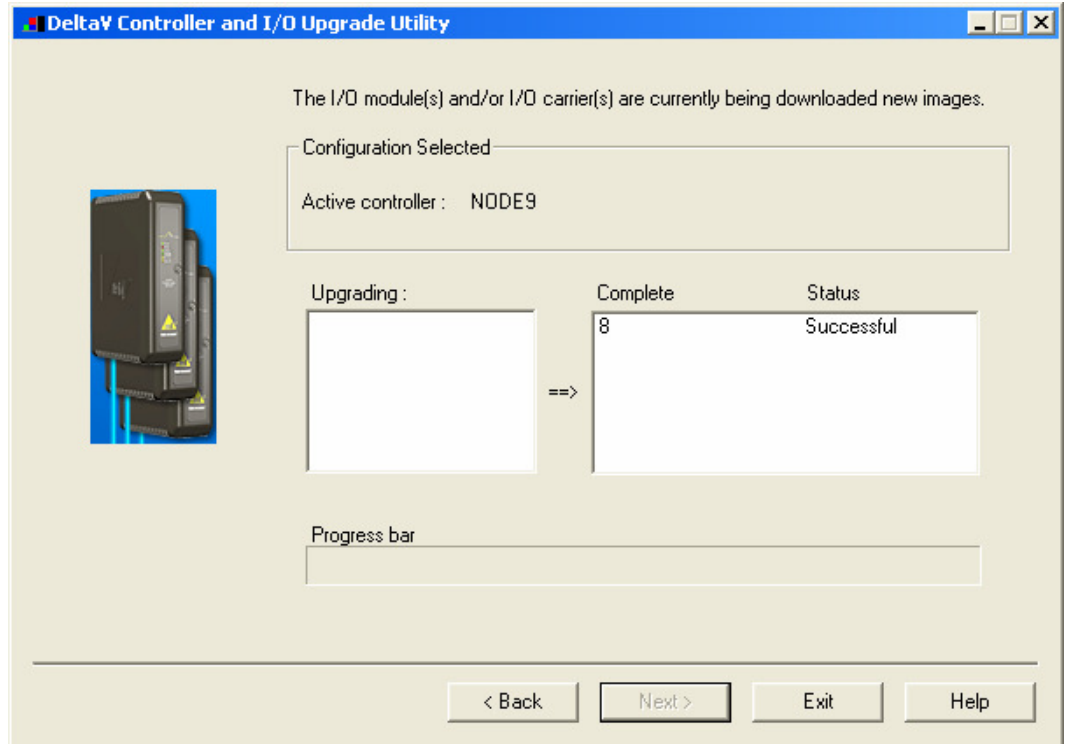


9. In this dialog, Click Next again. You will get the following dialog, confirming the Controller and I/O Module to program.





10. Click Next and the I/O Module upgrade process will begin. After completion, you will receive the following dialog, indicating success.



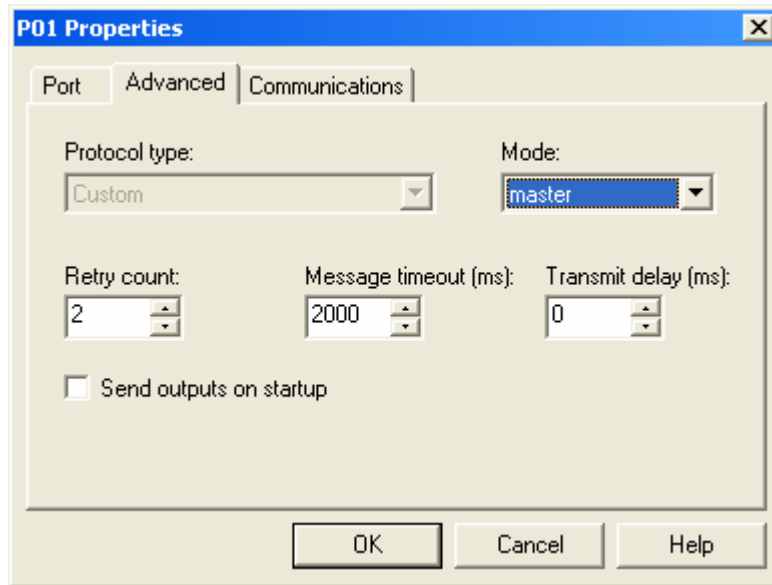
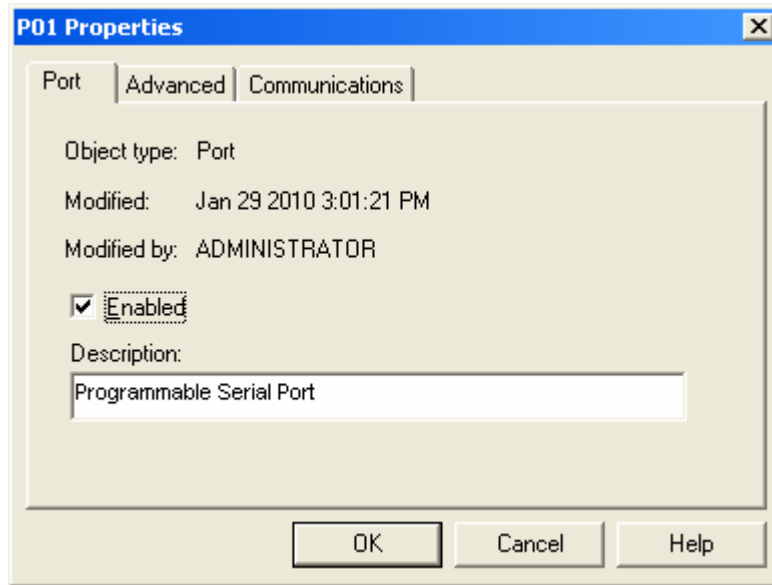
11. This completes the I/O Module upgrade process.

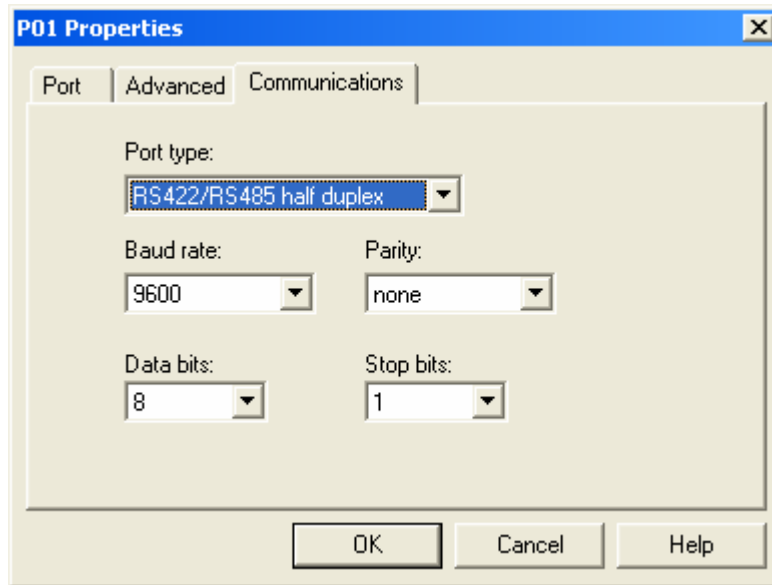


## 4 CONFIGURATION INFORMATION

### 4.1 Port Configuration

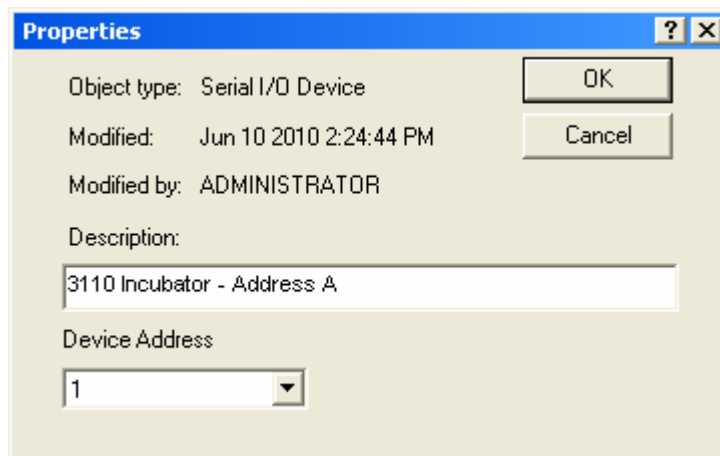
First, enable the port. Then click on the Advanced Tab and select Master. Next, click on the Communications Tab and specify the Port type. The Port type will be RS-422/485 Half Duplex (2 wire). Lastly, select the Baud rate, Parity, Data bits and Stop bits parameters; these must match the 3110. The following screen shots show the configuration:





## 4.2 Device Configuration

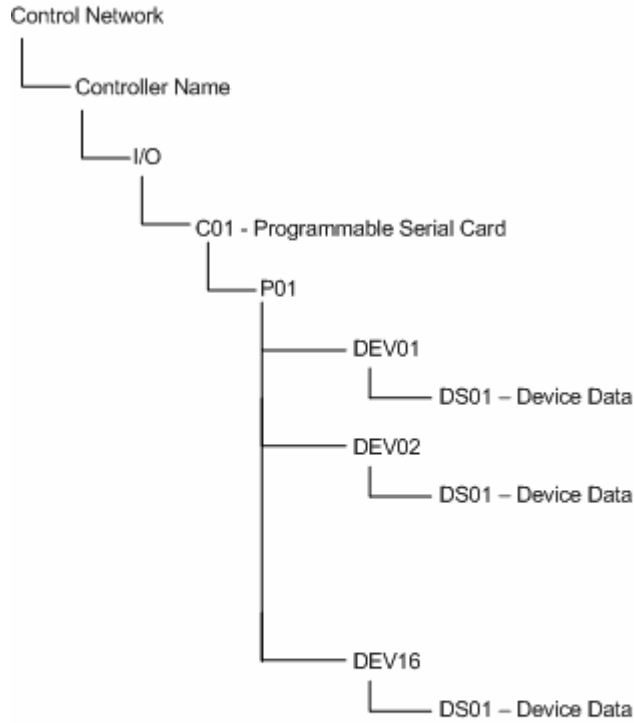
Specify a device corresponding to each connected 3110 Incubator. The device address must match the incubator address. Incubator addresses are given as letters A-X. Consequently, device address 1 is considered A, device address 2 is considered B, etc. A maximum of 16 Incubators may be configured under a single PSIC port.





### 4.3 Dataset Configuration

A fixed dataset architecture is used to receive the data, where each configured device is assigned a single dataset.





**4.3.1 Dataset Configuration:**

Configure the dataset as follows:

<b>Direction</b>	Input
<b>DeltaV Data Type</b>	Floating Point w/status
<b>Device Data Type</b>	0
<b>Start Address</b>	0
<b>Number of Values</b>	5
<b>Special Data 1</b>	0
<b>Special Data 2</b>	0
<b>Special Data 3</b>	0
<b>Special Data 4</b>	0
<b>Special Data 5</b>	0

The data values read from the 3110 Incubator are stored in this dataset as follows:

<b>Register Number</b>	<b>Value</b>
R1	Temperature
R2	CO2
R3	RH
R4	O2
R5	Alarm; 0=No Alarm; 1=Alarm



## **5 Operational Check**

### **5.1 Scope**

The following sections provide some assistance to ensure the interface is working properly.

### **5.2 Verify Hardware and Software Version Number**

The user can verify that the 3110 driver has been installed using the DeltaV Diagnostics tool. The Diagnostics tool will show the Hardware Revision No. (HwRev) and the Software Revision No. (SwRev).

To begin the DeltaV Diagnostic tool select Start-> DeltaV-> Operator-> Diagnostics. In the Diagnostics tool expand the Controller, I/O and then double click on the Programmable Serial Interface Card that has the driver installed.

The following information will be displayed:

:	:	:
HwRev	Hardware Revision	1.1 (or later)
SwRev	Software Revision	P1.55 (or later)

### **5.3 Verify Configuration**

- Verify port configuration: The serial port must be enabled. User needs to make sure communication settings such as baud rate, parity, and number of data bits match the field device settings.
- Verify dataset configuration: The datasets configured must be as shown above.

### **5.4 Verify I/O Communication With Control Studio**

User can create I/O modules in the control studio to verify correct values are read from the PSIC. For AI and DI data, the values should be changed in the field device and verified that the new data are correctly reported in DeltaV. Similarly, verify that the AO and DO data is being written correctly from DeltaV to the field device.

### **5.5 Using Diagnostics**

- Verify PSIC communication: Select the PSIC on Diagnostics and press the right mouse button. Select Display Real -Time Statistics from the drop down menu. If the Programmable Serial Interface Card is functioning then the user will see the Valid Responses counter and the Async and/or Sync Transactions counters incrementing. There will not be any error counting up.
- Verify port statistics: Select the Port on the Programmable Serial Interface Card and press the right mouse button. Then select Display Port Statistics form the drop down menu. Verify that the port communications statistics are being displayed properly and are counting as expected for the protocol's functionality.



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- Verify dataset values: Select a dataset and press the right mouse button. Select View Dataset Registers from the Drop down window. Verify that the dataset values are displayed as expected.
- Verify that there are no errors at the dataset level.

## **5.6 LED Indication**

The Yellow LED for the port should be on solid when all communications on that port are valid. The Yellow LED should be blinking if there is some valid communications and some communications with errors on that port. The Yellow LED should be OFF if there are no valid communications on that port.

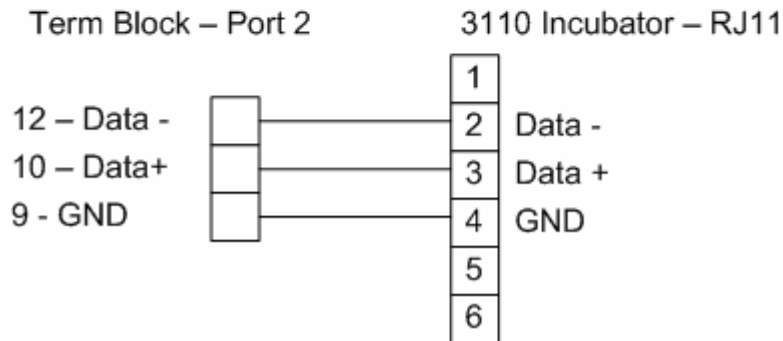
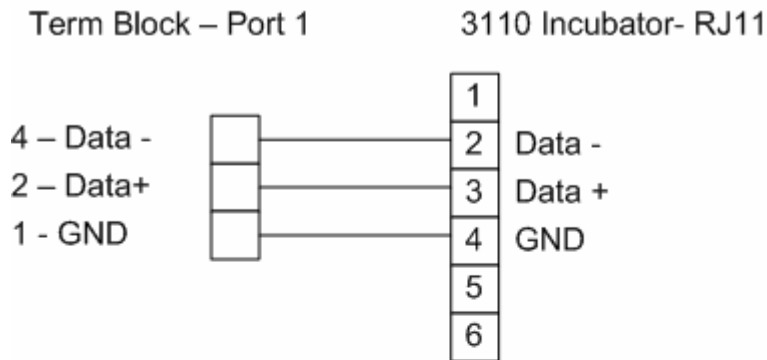


## 6 Connecting DeltaV PSIC to the 3110

The electrical interface between DeltaV and the 3110 Incubator conforms to the RS-422/485 standards. The 3110 uses a RJ-11 connector with the following pinout.

Pin Number	Color	Description
1	White	Unused
2	Black	Data -
3	Red	Data +
4	Green	Ground
5	Yellow	Unused
6	Blue	Unused

The following diagram shows the cable connected to the DeltaV PSIC.





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## **7 Technical Support**

For technical support or to report a defect, please give MYNAH Technologies a call at (636) 681-1555. If a defect is discovered, please document it in as much detail as possible and then fax your report to us at (636) 681-1660.

You can also send us your questions via e-mail. Our addresses are:

[support@mynah.com](mailto:support@mynah.com)

Thank you for using DeltaV.