MYNAH℠

ASCII Printer Driver
Programmable Serial Interface Card
Series 2

USER MANUAL

Rev. P1.55

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1 INTRODUCTION

1.1 Scope

This document is the User Manual for the ASCII Printer 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 Series 2 Programmable Serial Interface Card (PSIC). The reader should be familiar with EPM's DeltaV PSIC and connected serial printers or logging devices.

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the ASCII Printer Driver (P1.55) firmware. For Series 1 Cards, use driver revision p1.0.

1.2 Document Format

This document is organized as follows:

Table 1

Introduction	Describes the scope and purpose of this document.
Theory of Operation	Provides a general functional overview of the ASCII Printer Driver.
Downloading Firmware	Describes downloading procedures for the ASCII Printer Driver firmware on to the DeltaV PSIC.
Configuration Information	Describes procedures and guidelines for configuring the DeltaV PSIC.
Operational Check	Provides tips and assistance to ensure PSIC is properly setup and configured.
DeltaV–Field Device Electrical Interface	Describes the electrical interface between DeltaV and the printer/logging device. Also describes the cable pin assignments for RS-232 and RS-422/485 communications.
Technical Support	Describes who to call if you need assistance.
Example	Describes how to configure a device with input and output datasets.

1.3 System Specifications

The following table lists the minimum system requirements for the ASCII Printer Driver:

Table 2

Firmware	ASCII Printer Driver Firmware (P1.55)
Protocol Compatibility	None – Data is sent out in raw ASCII as described below.
Software Requirements	DeltaV System Software (Release 6.3.2 or later) installed on a hardware-appropriate Windows NT workstation configured as a ProfessionalPlus for DeltaV
Minimum DeltaV Hardware Requirements	FRSI DeltaV Serial Interface Series 2, Hardware PN: 12P2506X022 FRSI DeltaV M3, M5, MD or Series 2 MD Controller, Power Supply and 2 wide controller carrier FRSI 8 wide I/O card carrier

2 THEORY OF OPERATION

The Programmable Serial Interface Card (PSIC) has 2 ports which can be configured for RS-232, RS-422/RS-485 Half Duplex or RS-422/RS-485 Full Duplex communications with external devices. For communications with ASCII devices, any mode may be used. The ASCII driver will utilize only port 1. Port 2 will be configured, but it will not be connected to any external device. The datasets of both port 1 and 2 will be considered as a single database of text lines. This is described in detail below.

Under each port, there exist 16 datasets. Dataset 1 of port 1 will be a special control dataset configured as 16-bit integers. To trigger reports, the driver will use values in this dataset. All other datasets will be configured as a string with a length of 100 characters. Each dataset will represent a 100-character line of text, which can be manipulated in DeltaV.

Note: all 16 datasets in each port must be configured, even if they are not all used.

The DeltaV Serial Card Driver functionality will be as follows.

1. The I/O driver will be flashed into the PSIC.

2. The I/O driver will run in Master mode only and be responsible for output of ASCII text strings through Port 1.

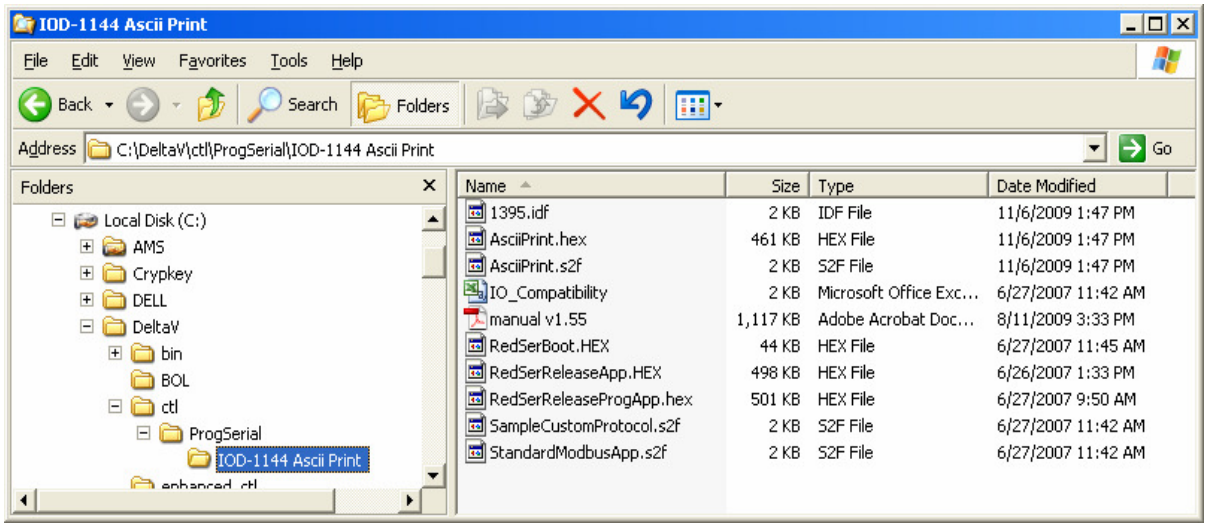
3. The I/O driver will generate outputs when a value changes in the control dataset, or based on time of day as configured in the control dataset.

3 Downloading the firmware

The driver software distribution comprises 15 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

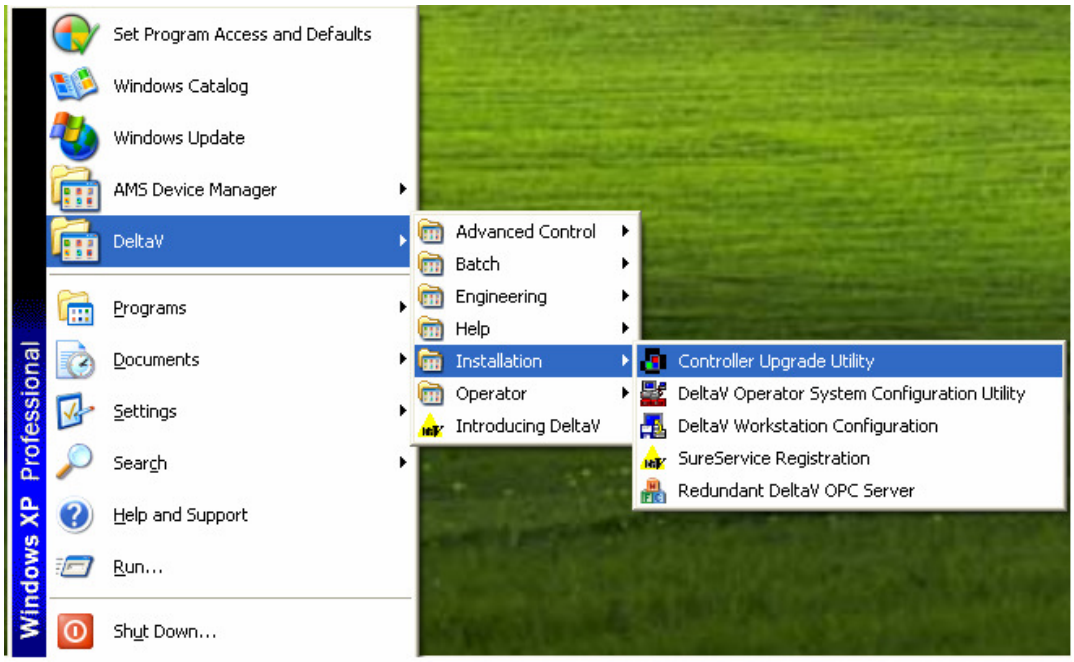
\DeltaV\ctl\ProgSerial\IOD-1144 Ascii Print

Note that you will have to create the \IOD-1144 Ascii Print subdirectory. The following files will be copied:

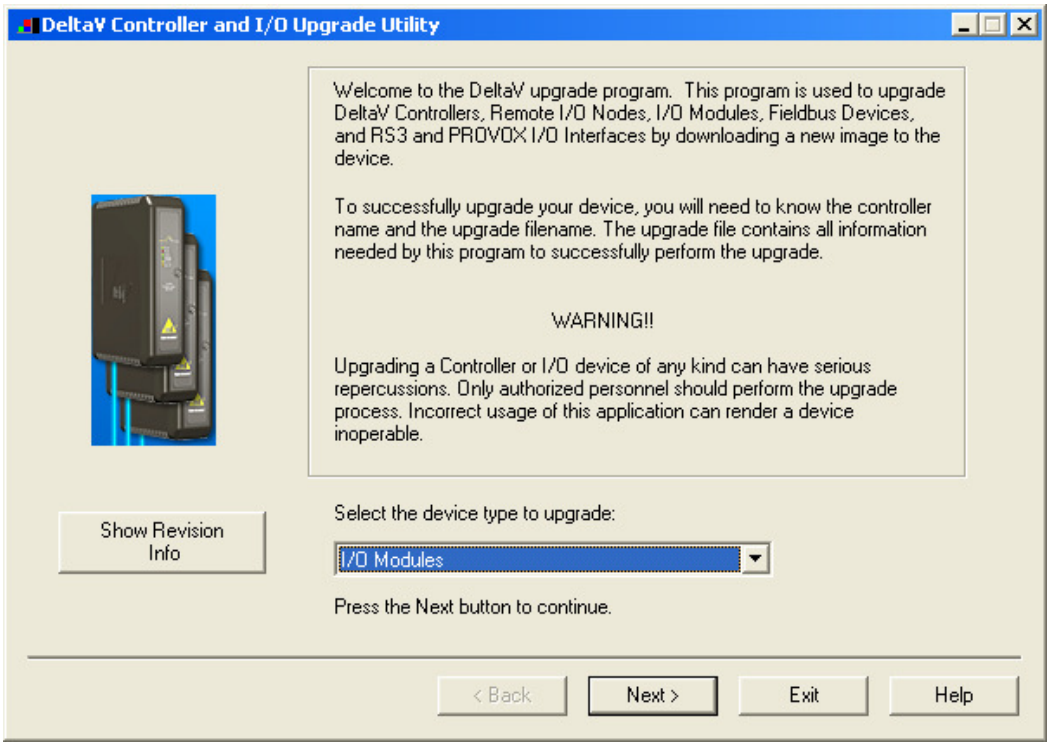


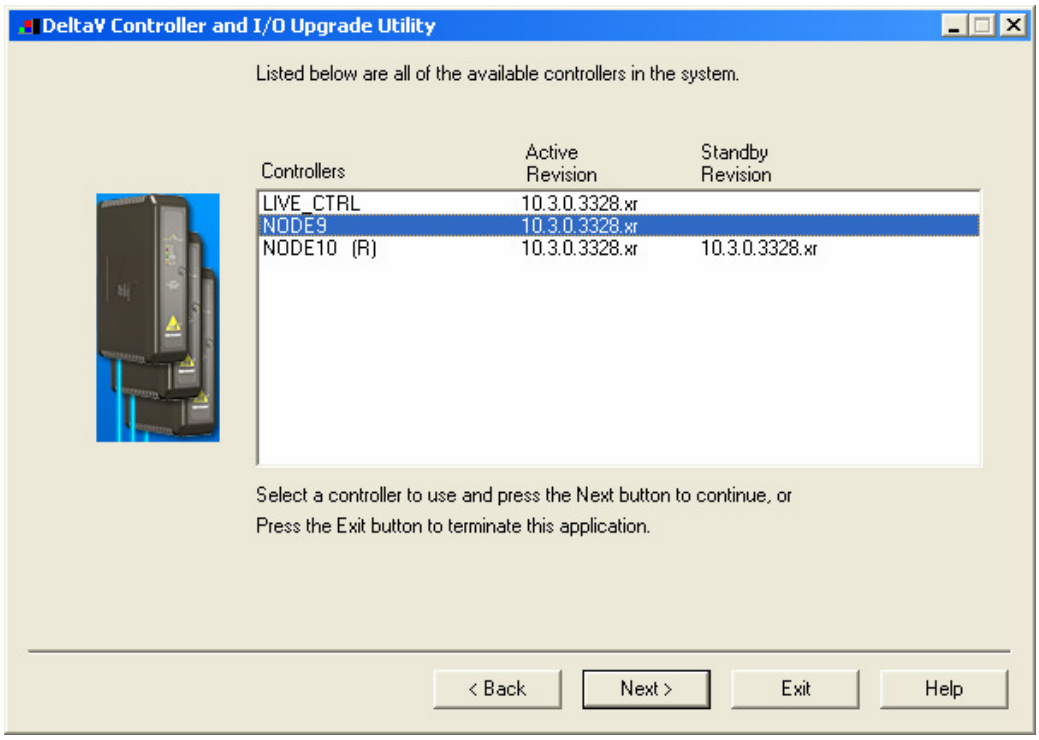
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:

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.

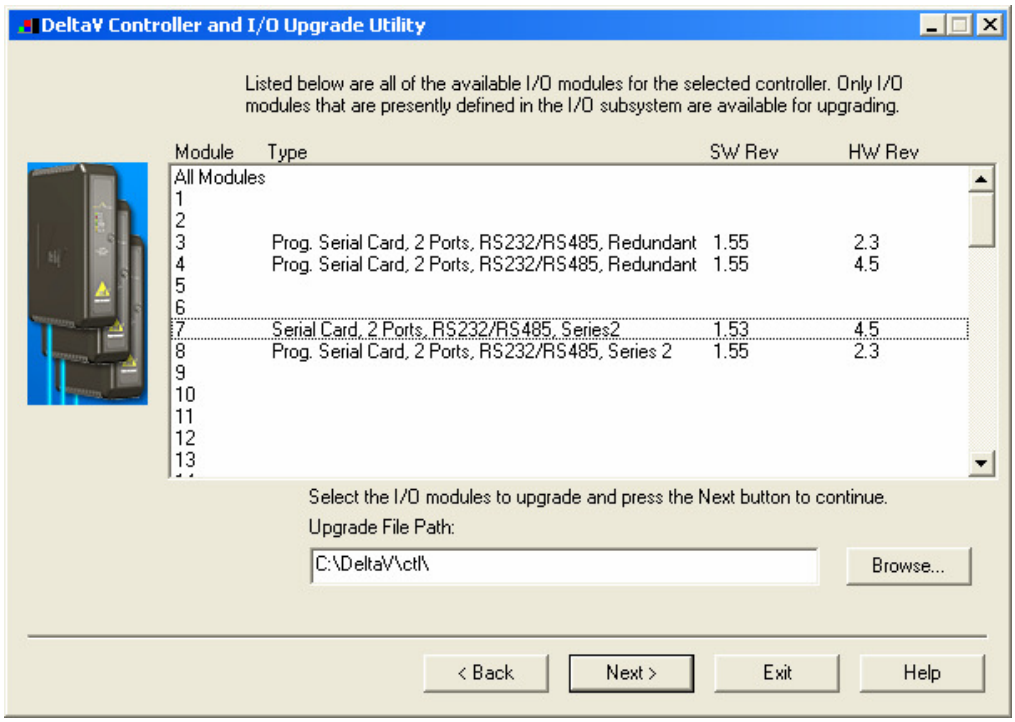




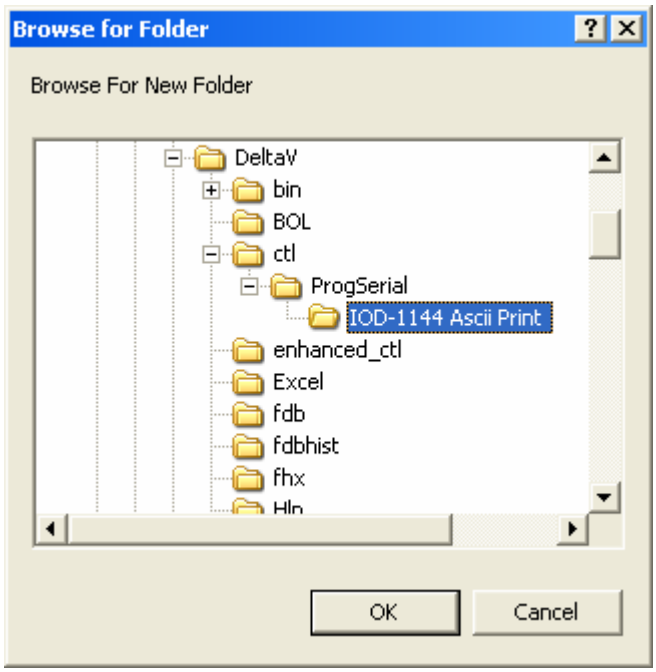
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

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.

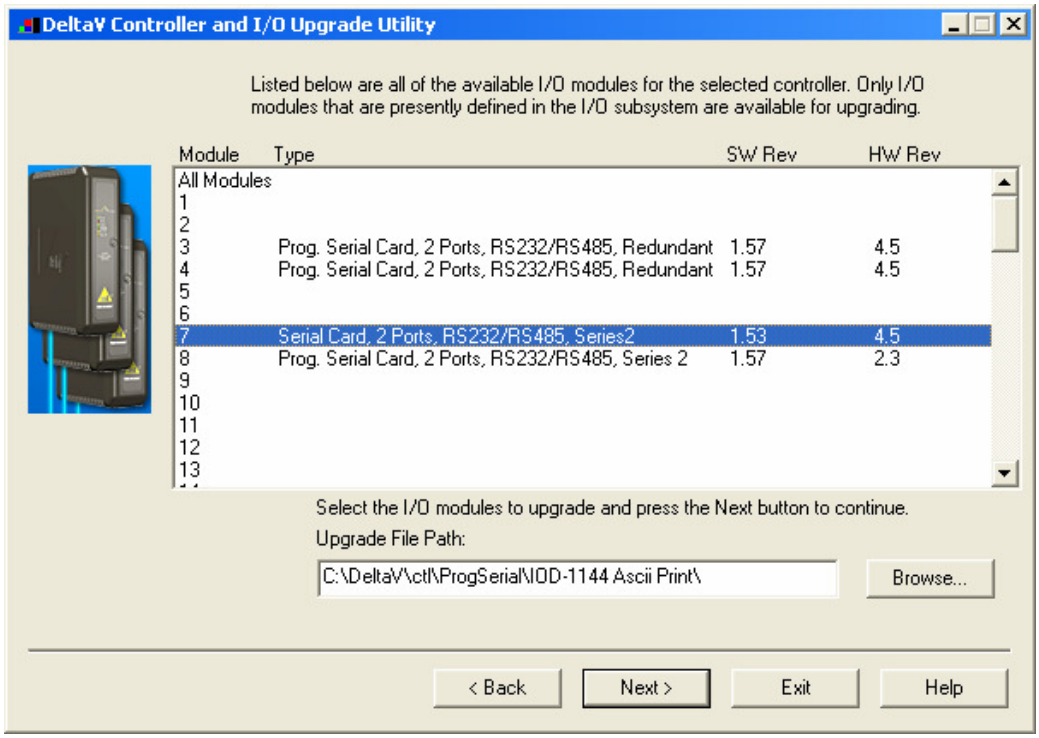
Note: The first time a standard Serial card is upgraded to the Ascii Print Driver, the dialog will be as shown below. When upgrading an existing Programmable Serial Card, skip Steps 5 and 6, and go to Step 7.



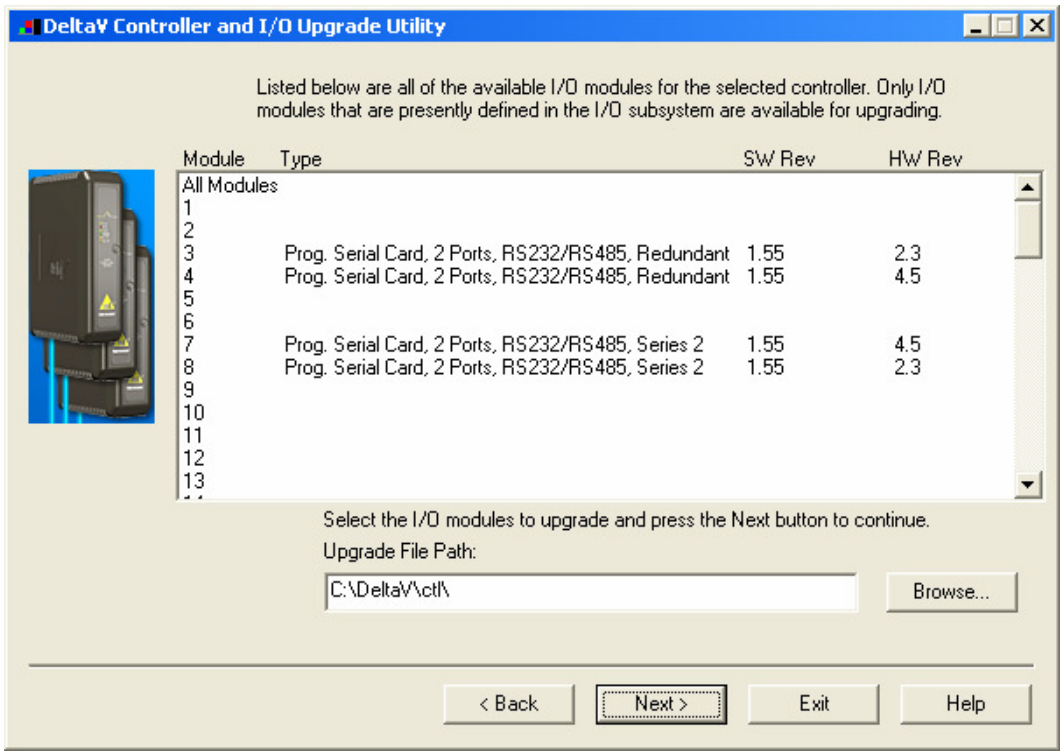
5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.



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.



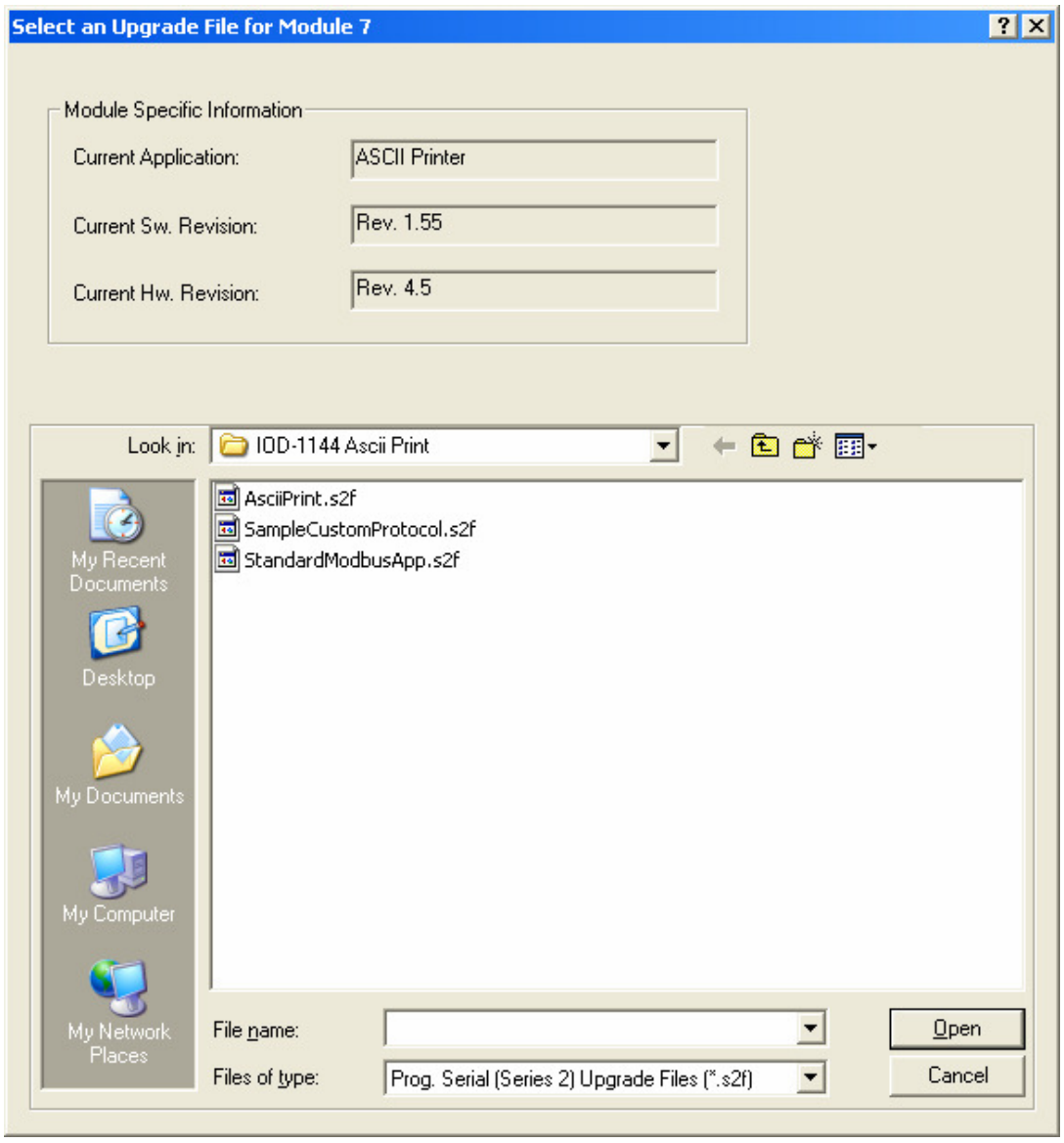
For example, we will select I/O Module 7. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

\DeltaV\ctl\ProgSerial\IOD-1144 Ascii Print.

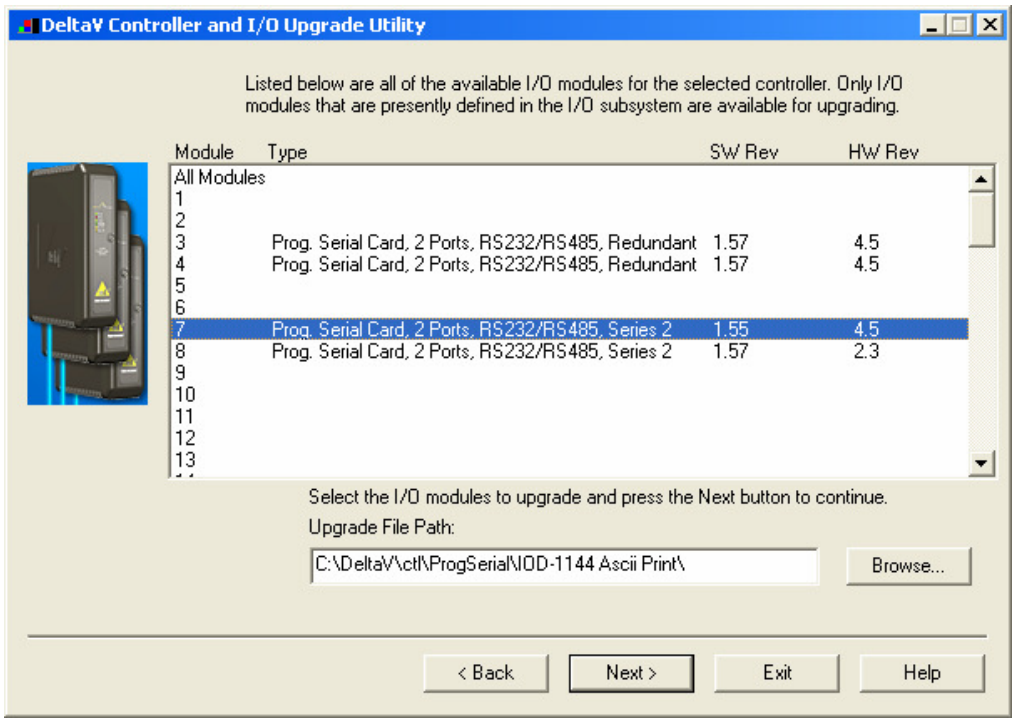
Once you are in the specified directory, you will need to select the following file:

AsciiPrint.S2F

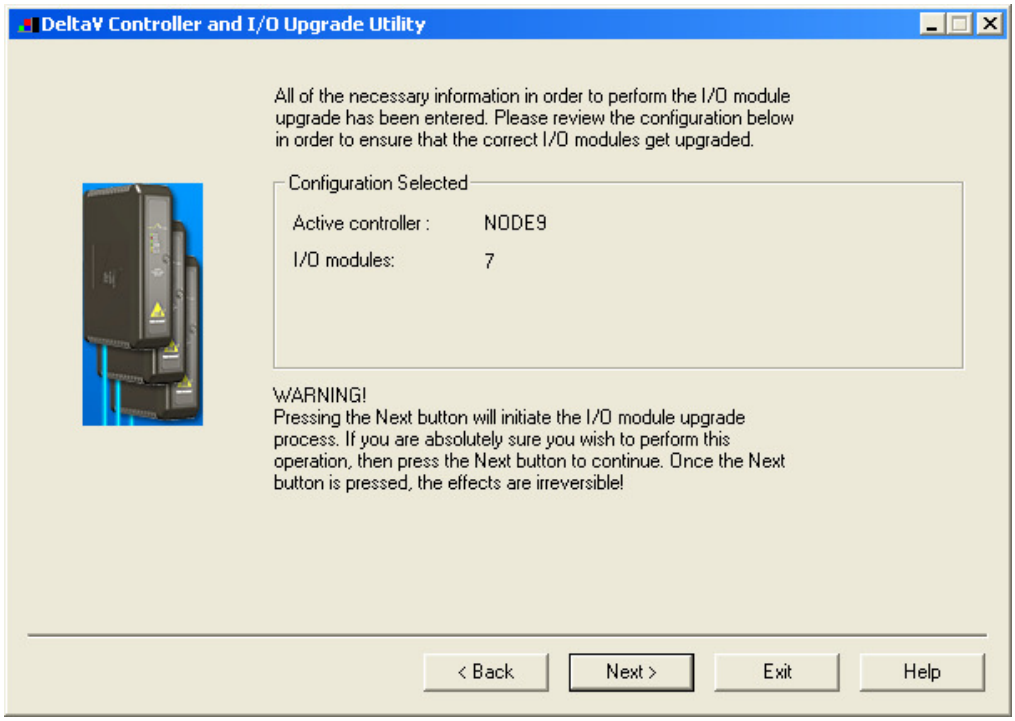
This is shown in the following dialog.



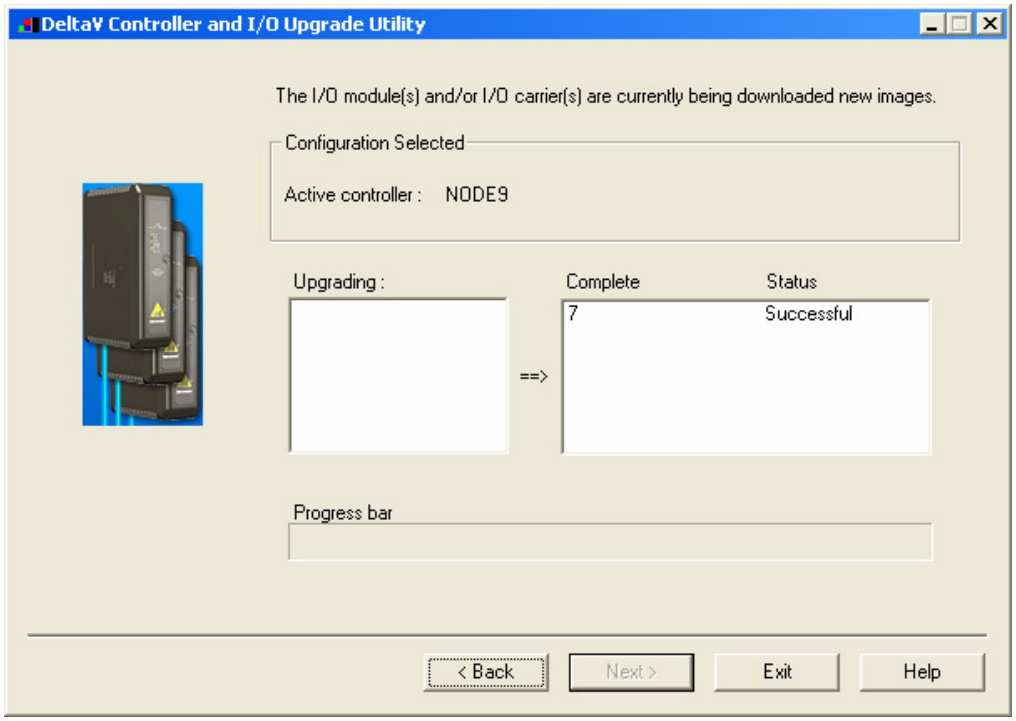
8. After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:



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



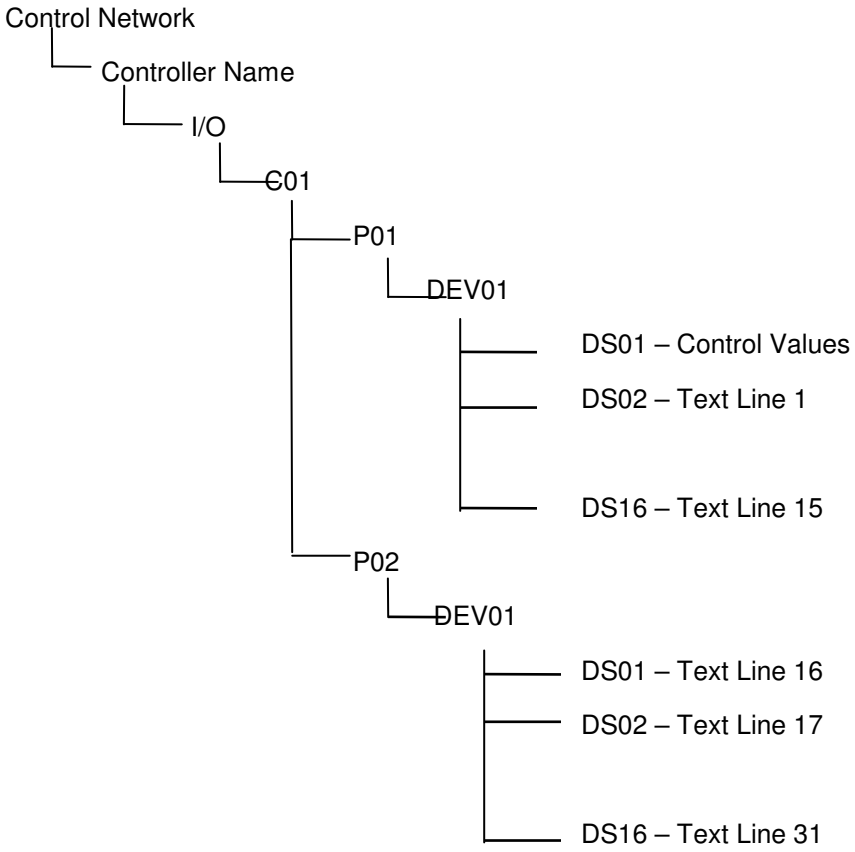
10. Click Next and the I/O Module upgrade process will begin. After completion, you will receive the following dialog, indicating success.



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

4 CONFIGURATION INFORMATION

For this application, a fixed configuration format is proposed. The DeltaV Explorer view of a configuration containing a Serial Card will be as follows, where C1 has a card type of Serial Card, P01 and P02 are the ports on the card, DEVXX are pseudo devices attached to the ports, and DSXX are configured Datasets for each device:



Specifically, each port PXX will be configured with up to 1 device, e.g., DEV01. Each device will be configured with 16 datasets, DS01 – DS16. A dataset will always contain data string being sent out. With the exception of Port1, Dataset 1, each dataset will be configured as a string of 100 values.

The following table describes the configuration:

Table 3

Port	Devices	Dataset	Mode	Type and Length	Description
P01					
	DEV01				
		DS01	Output	16-bit Integer 10	Control Dataset
		DS02	Output	String* 100	Text Line 1
		DS16	Output	String 100	Text Line 15
P02					
	DEV01				
		DS01	Output	String 100	Text Line 16
		DS16	Output	String 100	Text Line 31

*See section 4.3.3

The registers of the control dataset will be configured and used as follows:

Table 4

Register	Value	Description
R1 Print Mode	Default 0 1	A Value of 0 indicates On Demand output of text lines when R2 changes to a non-zero value. A Value of 1 indicates Timed output of text lines. The time is configured in R5, R6 and R7.
R2	Default 0	When this value changes to non-zero, the text lines will be sent out. The value will then be set back to 0.
R3	Default 0	Indicates first line of output. For example, the default value of 0 indicates line 1. This number can be configured or dynamically changed to be between 0-31.
R4	Default 0	Indicates the number of lines to output, starting with the first line (R3). Total number of lines output is always less than or equal to 31.
R5	Default 0	This is the scheduled hour (0-23) when the driver will send outputs.
R6	Default 0	This is the scheduled minute (0-59) when the driver will send outputs.
R7	Default 0	This is the scheduled second (0-59) when the driver will send outputs.
R8	Default 0	Hours (0-23) of current system time.
R9	Default 0	Minutes (0-59) of current system time.
R10	Default 0	Seconds (0-59) of current system time.

Special Data Values for each dataset will be used to control output properties of that text line. This is described below:

Table 5

Special Data Value	Value	Description
1	255 0 X	Output form feed character prior to outputting text line. No line feed prior to text line output. X is a non-zero number (1-25) indicating the number of line feeds prior to text output.
2	0 X	No Tabs prior to text line output. X is a non-zero number (1-25) indicating the number of Tabs prior to text output.
3	0 X	No special character output. X is an ASCII character (e.g., 61 is the equal sign character), which will be sent out after the text line. This can be used to underline the text line.
4	0 X	No Carriage Return/Line Feed is output after the line. Indicates the number (1-25) of Carriage Return and Line Feeds output after the line.
5		Not used.

4.1 Port Configuration

First, enable the port. Then click on the Advanced Tab and select Master. Slave mode is not supported. Specify the retry count, message timeout value in milliseconds, and message delay time. In most cases, you can leave these at their default values. Next, click on the Communications Tab and specify the Port type. The Port type will be RS-232, RS-422/485 Half Duplex (2 wire), or RS-422/485 Full Duplex (4 wire). In general, RS-232 will be used for most printer/logging devices. Lastly, select the Baud rate, Parity, Data bits and Stop bits parameters; these must match the external device settings.

4.2 Device Configuration

Specify devices, as shown above. There will be one device under each port.

4.3 Dataset Configuration

Datasets contain the actual string data being printed.

4.3.1 Data Direction:

The Data Direction for dataset should always be defined as output.

4.3.2 Output Mode:

Output mode and Readback items are not used. These should be left as default.

4.3.3 DeltaV Data Type:

All datasets will be configured as type String. If other data types are configured, then each register will be interpreted as a single character. A register value of 0 (NUL) will indicate the end of buffer. This is useful when ASCII control codes need to be transmitted. For example, if the dataset is configured as a String, then it will have only one register with an ASCII value like “This is a string”. In this example, the driver will transmit the following:

This is a string

If the dataset is configured as 8 bit Integer registers, then each register is considered a single character. For example, R1=1, R2=2, R3=72, R4=69, R5=76, R6=76, R7=79, R8=3, and R9=4. In this example, the driver will transmit the following:

<SOH><STX>HELLO<ETX><EOT>

4.3.4 DeviceDataType

All Device Data Type values will be configured as 0.

4.3.5 Data Start Address and Number of Values

The Start Address for each dataset should be configured as shown below:

Table 6

Port	Dataset #	Start Address	Number Of Values	Type
1	1	0	10	16-bit Integer
1	2	0	100	*String
1	3	100	100	String
1	4	200	100	String
1	5	300	100	String
1	16	1400	100	String
2	1	0	100	String
2	2	100	100	String
2	16	1500	100	String

*See section 4.3.3

4.3.6 Special Data 1-5

Under the Special data tab, configure the data values as described in Table 5 above.

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 ASCII Print 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	1.11 (or later)
SwRev	Software Revision	2.3 (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 being written out. An example module is shipped with the distribution. This module shows methods for writing text to the datasets and also how to handle time.

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.

- 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.

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 DeltaV–Field Device Electrical Interface

The electrical interface between DeltaV and field devices conforms to the RS-232 and RS-422/485 standards.

Each PSIC has 2 ports, which function independently. The distance between the serial card and the field device can be as much as 5000 feet, per the RS-422/485 standard. When using RS-232, the distance is limited to 50 feet. Section 6.1 shows the pin assignments for the PSIC serial terminal block.

6.1 Pin Assignments for DeltaV PSIC

RS-232 Standard

Terminal Number	Signal Description
1	Port 1 - Isolated Ground (GND)
2	Unused
3	Port 1 – Transmit Data (TxD)
4	Unused
5	Port 1 – Receive Data (RxD)
6	Unused
7	Port 1 – Data Terminal Ready (DTR)
8	Port 1 – Data Set Ready (DSR)
9	Port 2 - Isolated Ground (GND)
10	Unused
11	Port 2 – Transmit Data (TxD)
12	Unused
13	Port 2 – Receive Data (RxD)
14	Unused
15	Port 2 – Data Terminal Ready (DTR)
16	Port 1 – Data Set Ready (DSR)

RS-422/485 Half Duplex Standard

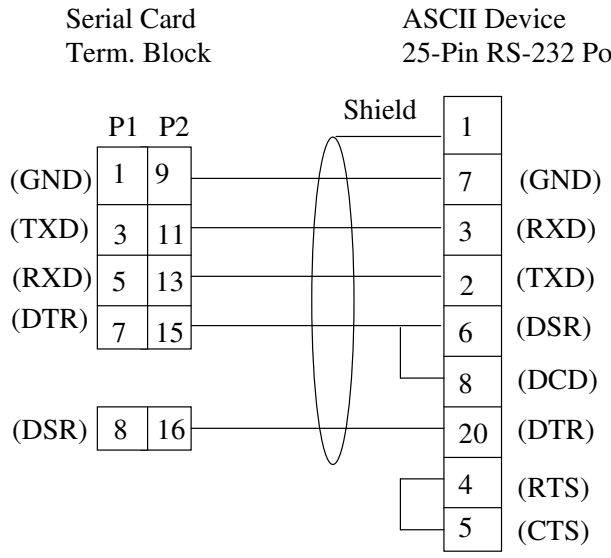
Terminal Number	Signal Description
1	Port 1 - Isolated Ground (GND)
2	Port 1 - Data +
3	Unused
4	Port 1 - Data -
5	Unused
6	Unused
7	Unused
8	Unused
9	Port 2 - Isolated Ground (GND)
10	Port 2 – Data +
11	Unused
12	Port 2 - Data -
13	Unused
14	Unused
15	Unused
16	Unused

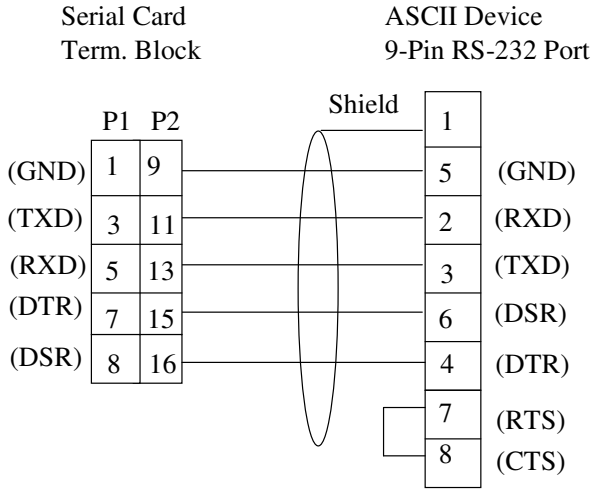
RS-422/485 Full Duplex Standard

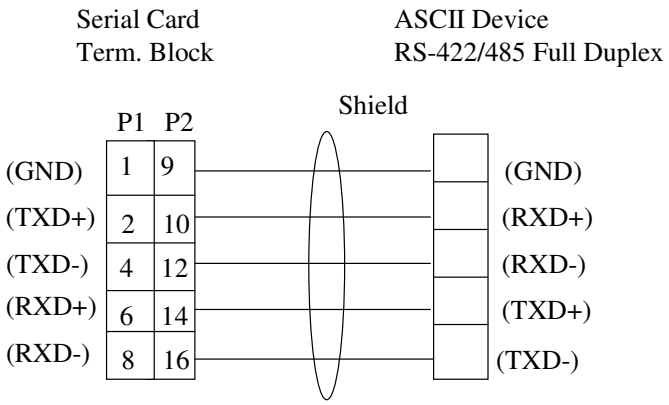
Terminal Number	Signal Description
1	Port 1 - Isolated Ground (GND)
2	Port 1 – TxD +
3	Unused
4	Port 1 – TxD -
5	Unused
6	Port 1 – RxD +
7	Unused
8	Port 1 – RxD -
9	Port 2 - Isolated Ground (GND)
10	Port 2 – TxD +
11	Unused
12	Port 2 – TxD -
13	Unused
14	Port 2 – RxD +
15	Unused
16	Port 2 – RxD -

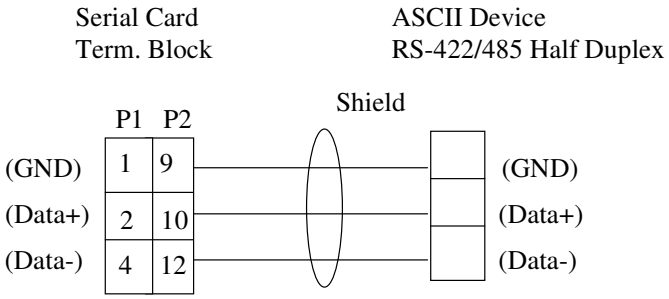
6.2 Wiring Connections

In general, the figure below shows the connections between the Field Device and the PSIC termination block. In some cases, RxD and TxD signals need to be swapped to create a NULL cable. This can be done easily at the PSIC termination block.






Serial Card
Term. Block
ASCII Device
RS-422/485 Full Duplex
Shield
P1 P2
(GND) 1 9 (GND)
(TXD+) 2 10 (RXD+)
(TXD-) 4 12 (RXD-)
(RXD+) 6 14 (TXD+)
(RXD-) 8 16 (TXD-)


Serial Card
Term. Block
ASCII Device
RS-422/485 Half Duplex
Shield
P1 P2
(GND) 1 9 (GND)
(Data+) 2 10 (Data+)
(Data-) 4 12 (Data-)

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 address is:

support@mynah.com

Thank you for using DeltaV.