Julabo/IKA I/O Driver
Programmable Serial Interface Card

USER MANUAL

Rev. P1.2

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1 INTRODUCTION

1.1 Scope

This document is the User Manual for the Julabo and IKA I/O 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 and field devices (supporting the Julabo and/or IKA protocol) connected to the PSIC.

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the Julabo/IKA I/O Driver (P1.2) firmware.

1.2 Document Format

This document is organized as follows:

Introduction	Describes the scope and purpose of this document.
Theory of Operation	Provides a general functional overview of the Julabo/IKA I/O Driver.
Downloading Firmware	Describes downloading procedures for the Julabo/IKA I/O 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 Field Device. Also describes the pin assignments for RS-232 communications.
Technical Support	Describes who to call if you need assistance.
Example	Example configuration for a Serial Card and referencing modules is included in the distribution.

1.3 System Specifications

The following table lists the minimum system requirements for the Julabo/IKA I/O Driver:

Table 1: System Specifications

Firmware	Julabo/IKA I/O Driver Firmware (P1.2)
Protocol Compatibility	Julabo Protocol is based on publication 1.953.1221BU2, dated 02/01. IKA protocol is based on publication EUROST0795EU.
Software Requirements	DeltaV System Software (Release 4.2 or later) installed on a hardware-appropriate Windows NT workstation configured as a ProfessionalPlus for DeltaV Serial Interface Port License (VE4102)
Minimum DeltaV Hardware Requirements	DeltaV Series 1 Serial Module, Hardware Rev 1.1r DeltaV M3, M5, M5+ or MD Controller, Power Supply and 8 wide controller carrier

2 THEORY OF OPERATION

As part of the serial interface port license, a standard Modbus protocol is installed on the DeltaV PSIC prior to customization. The PSIC needs to be flash upgraded from the Modbus protocol to the Julabo/IKA I/O firmware before operation.

The Programmable Serial Interface Card (PSIC) supports RS-232, RS-422/RS-485 Half Duplex and RS-422/RS-485 Full Duplex communications with external devices. For communications with Julabo/IKA devices, only RS-232 can be utilized. The electrical connection and communication settings must be configured properly to ensure accurate communication between the PSIC and field devices. These are described in Section 4.1.

The primary functions of the driver are listed below:

- Performs data and message handling between DeltaV and field devices.
- The driver runs in Master mode only. It sends read/write commands to the field device, checks validity of responses received, and updates the corresponding DeltaV PSIC registers.

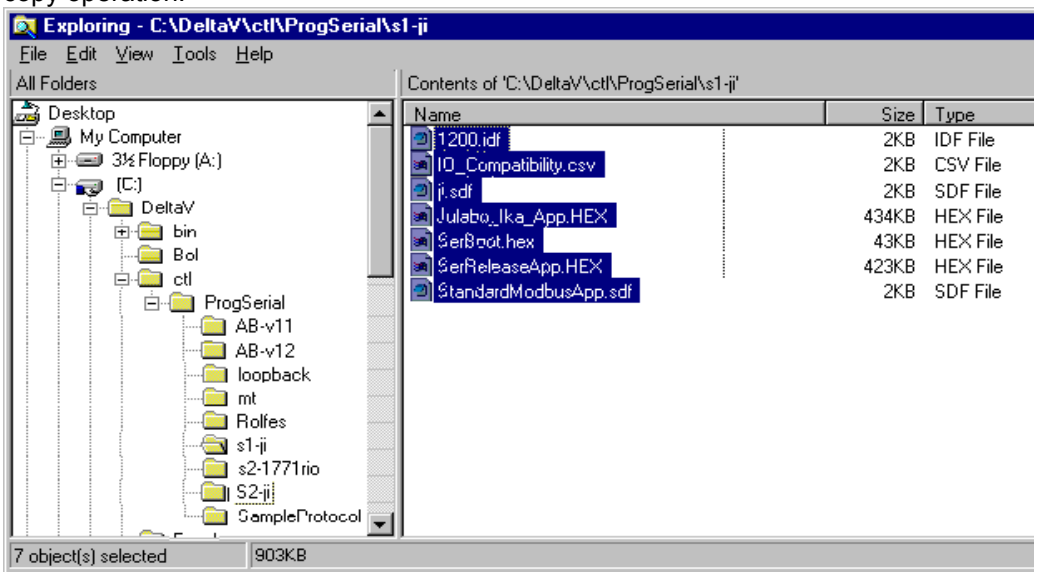
Each PSIC, when loaded with the Julabo/IKA I/O Driver, is capable of communicating with field devices over one or both of its two ports, depending upon your application. Specifically, both ports can be configured for Julabo, IKA, or one of each.

3 Downloading the firmware

The driver software distribution comprises 7 files, distributed on a 3.5” diskette. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

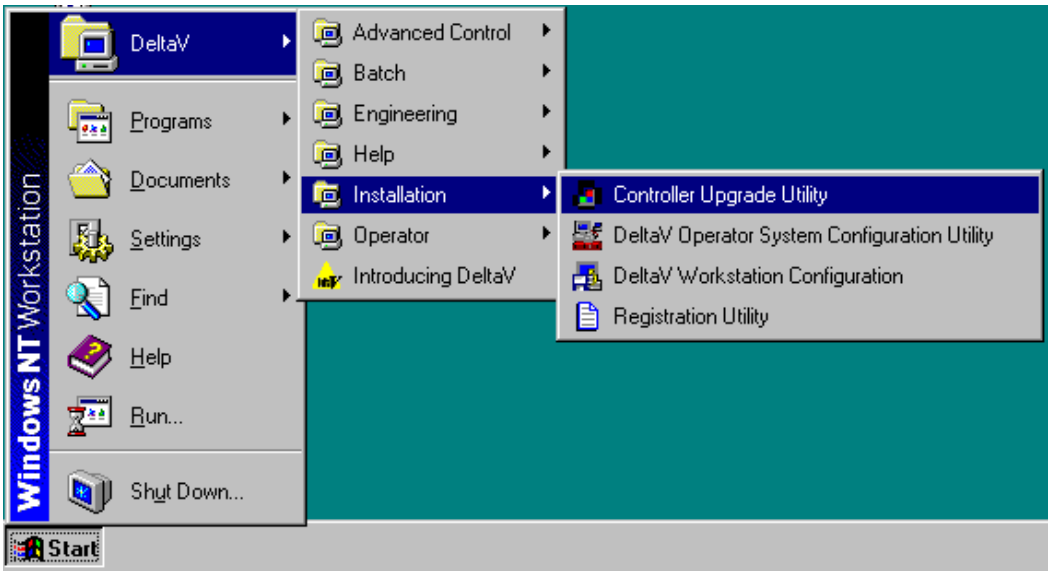
\DeltaV\ctl\ProgSerial\S1-JI

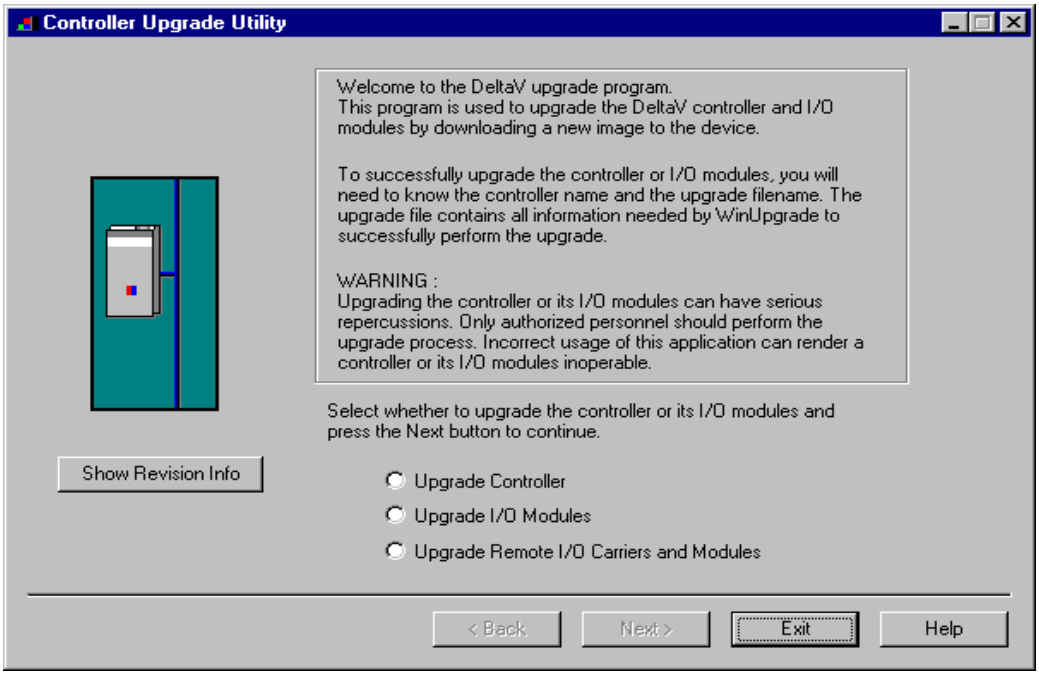
Note that you will have to create the \S1-JI subdirectory. The following shows a completed copy operation:



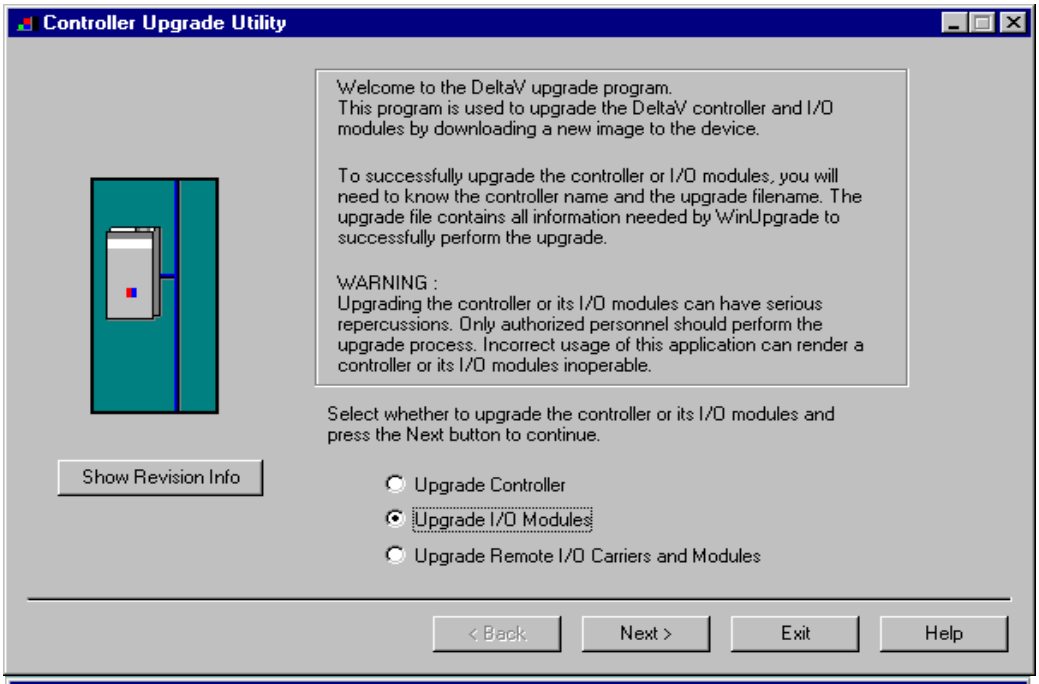
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:

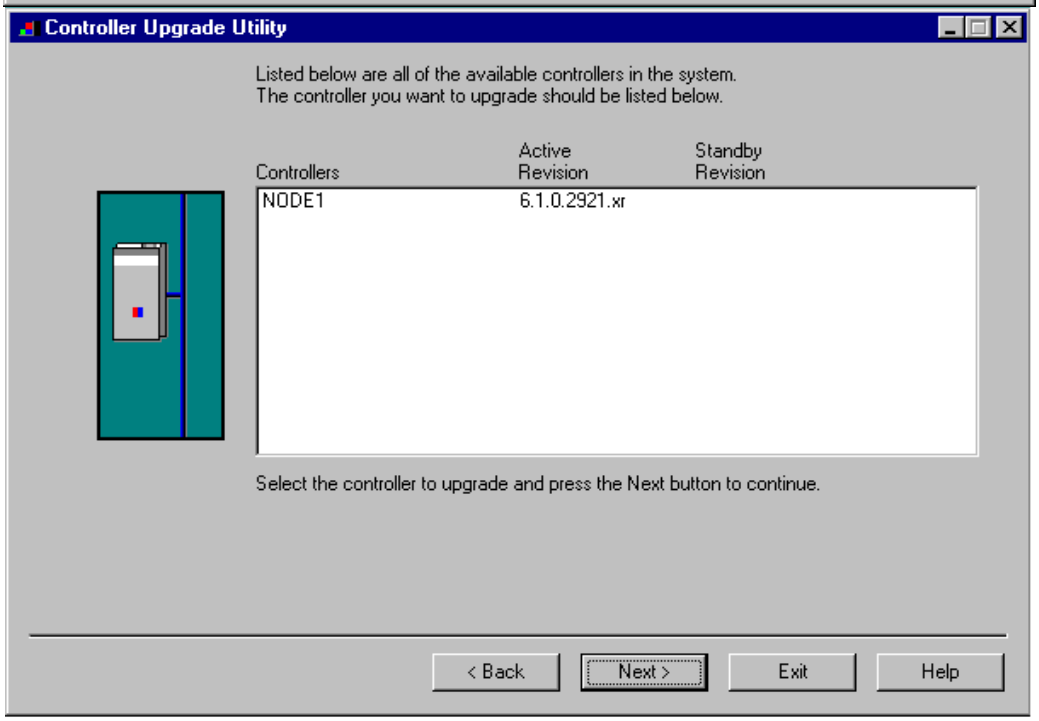
1. Click on the Start button and select DeltaV-> Installation-> Controller Upgrade Utility as shown below, and the following dialog will appear:





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

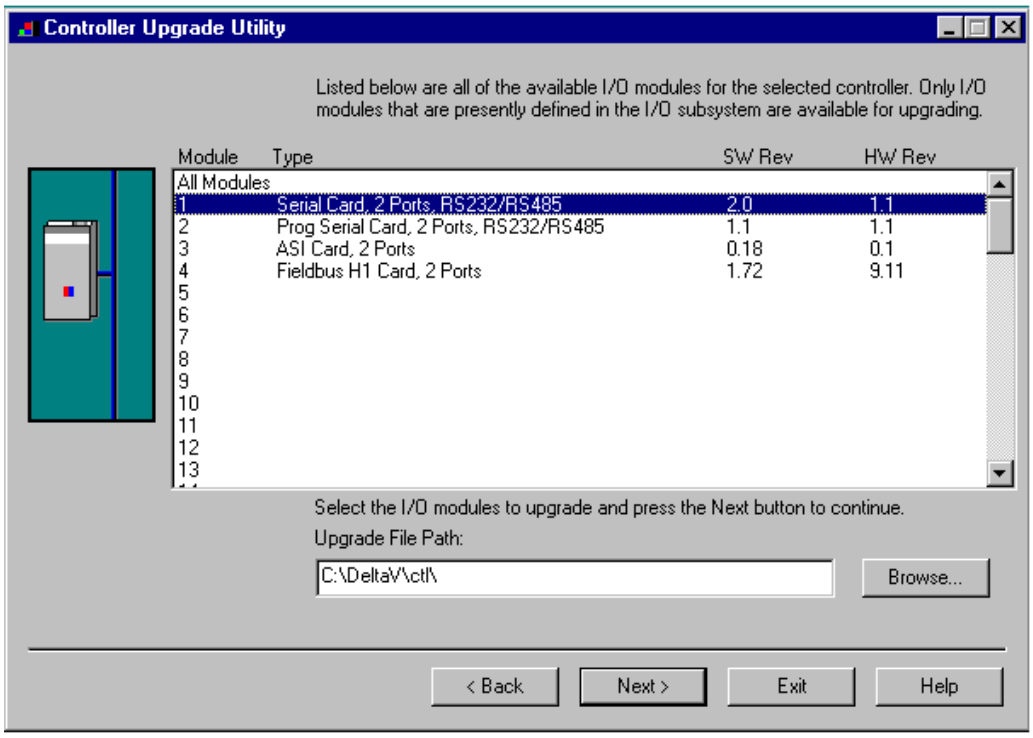




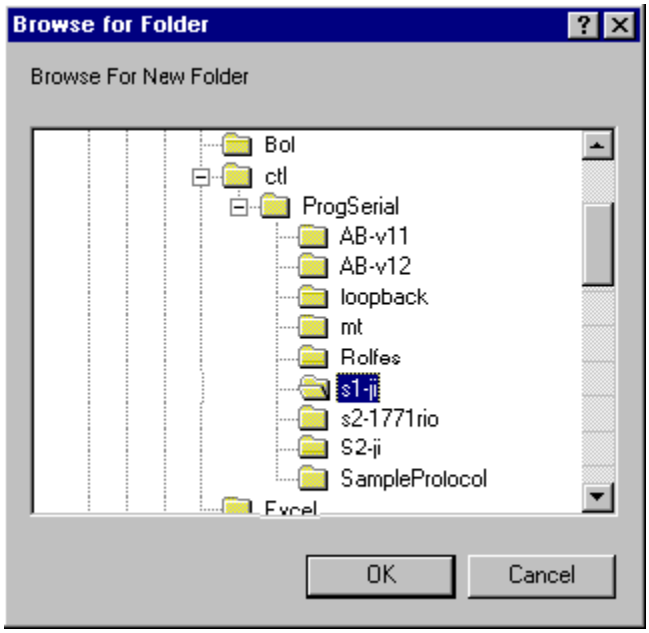
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

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.

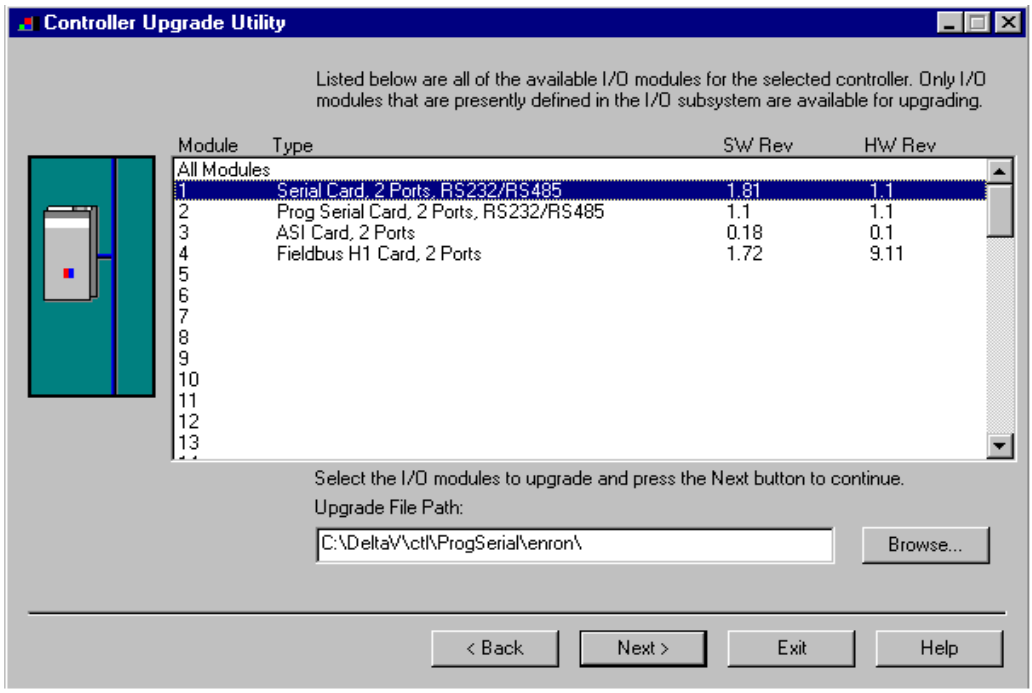
Note: The first time a standard Serial card is upgraded to the Julabo/IKA I/O Driver, the dialog will be as shown below. When upgrading an existing Programmable Serial Card, skip Steps 4, 5 and 6, and go to Step 7.



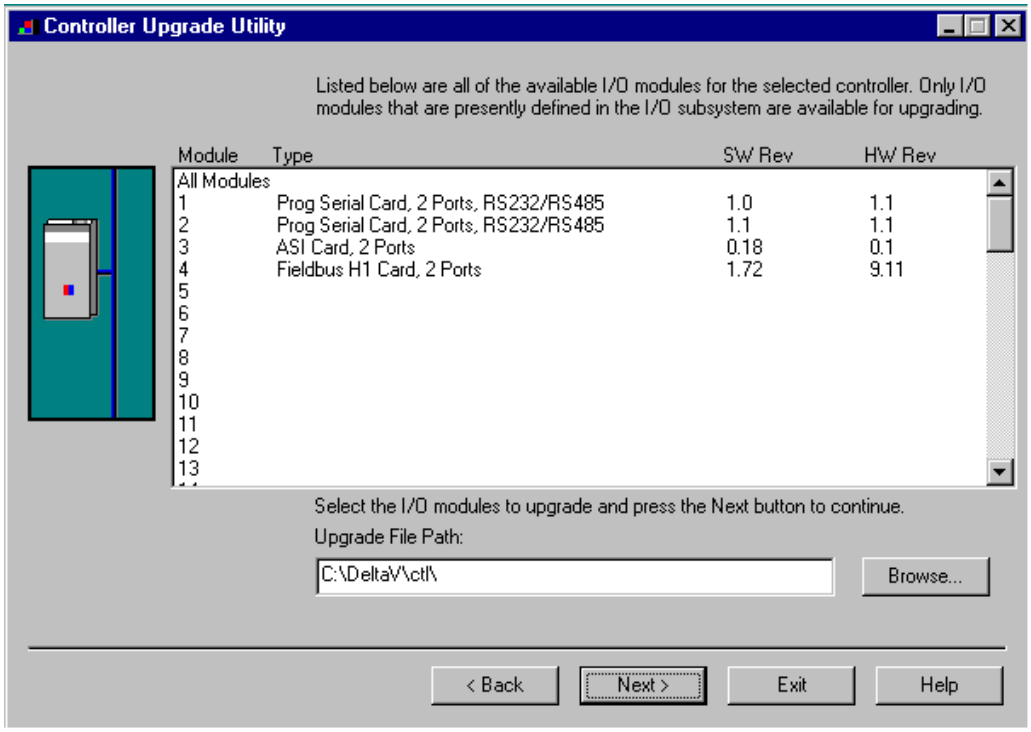
5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.



6. The 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.



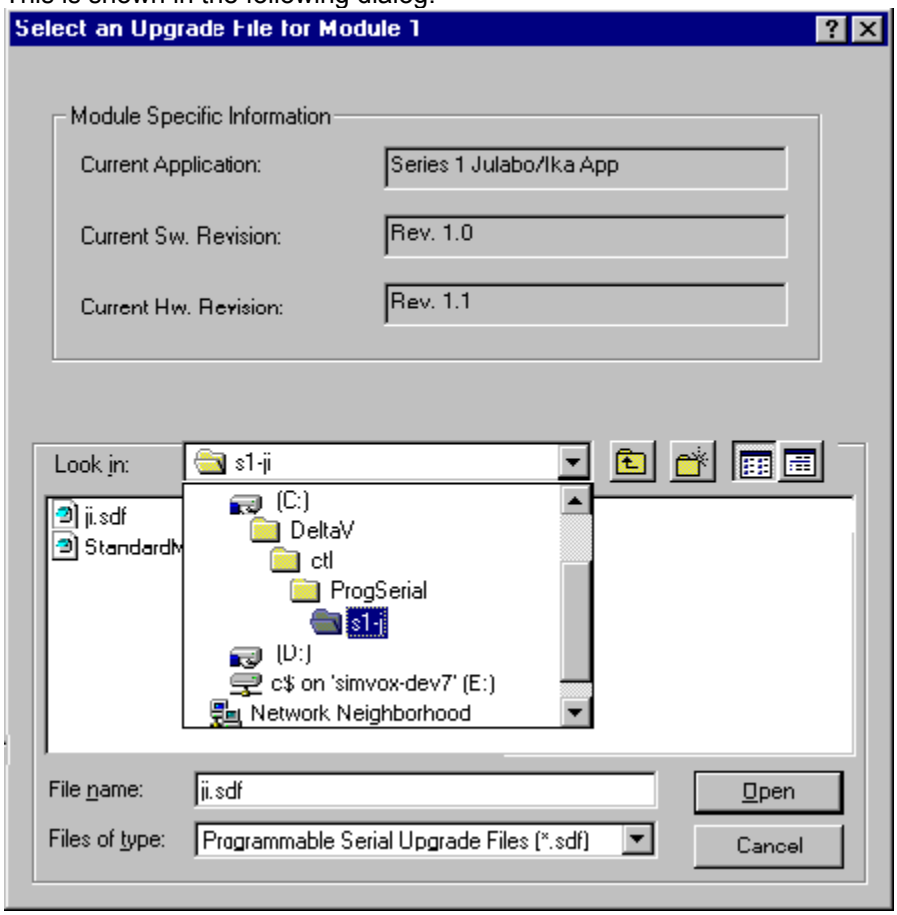
For example, we will select I/O Module 1. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

\DeltaV\ctl\ProgSerial\S1-JI.

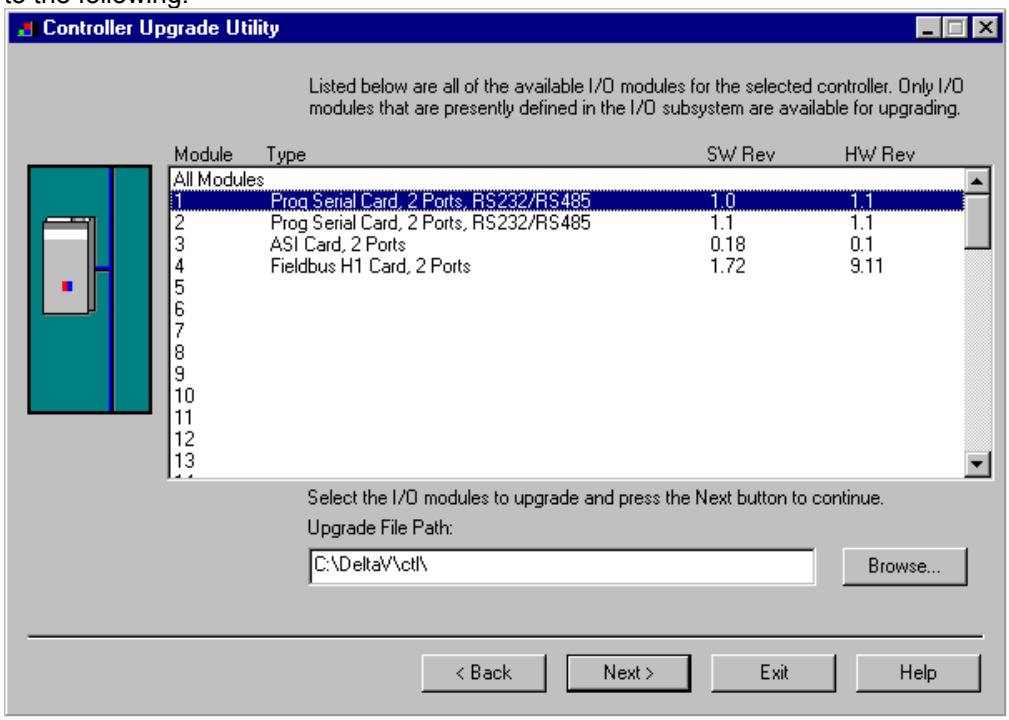
Once you are in the specified directory, you will need to select the following file:

JI.SDF

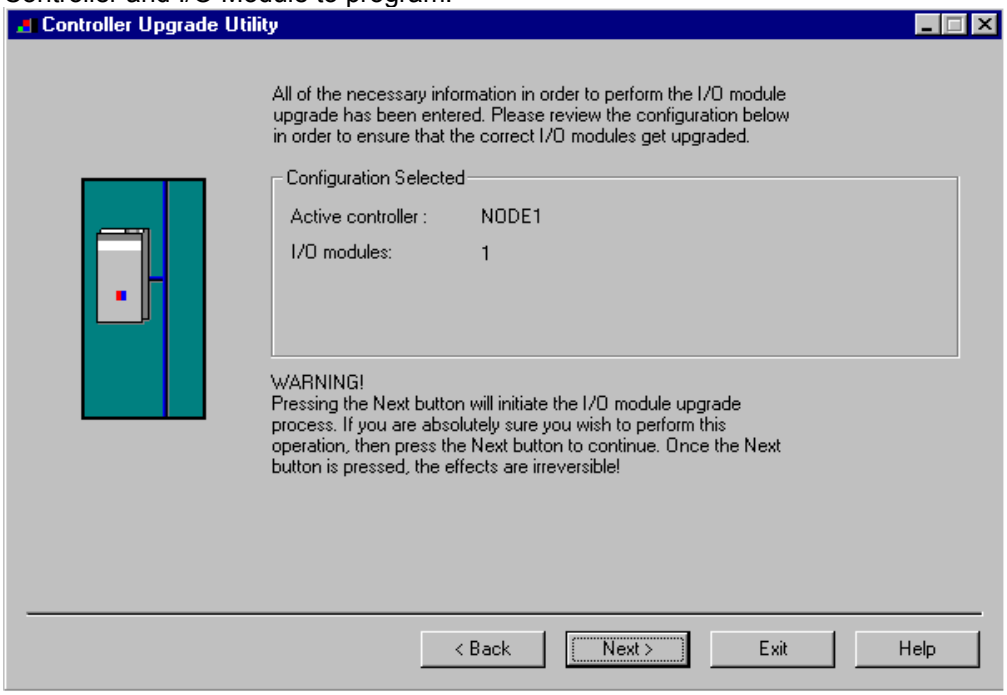
This is shown in the following dialog.



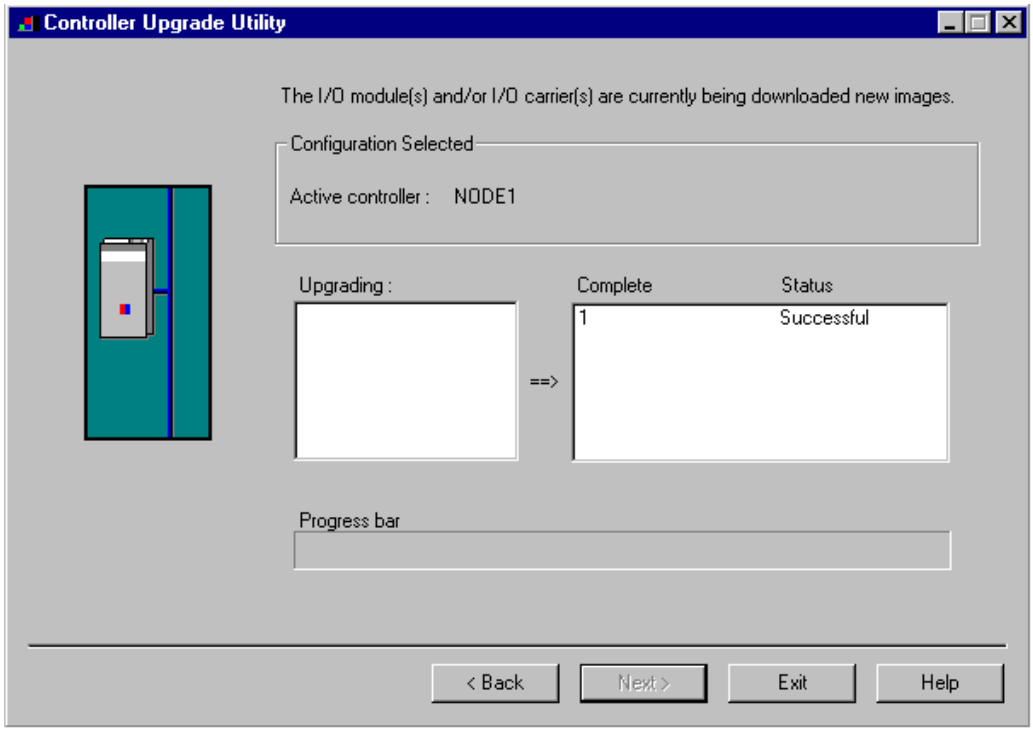
8. After selecting the .SDF file, Click on Open. This dialog will close and you will be back to the following:



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

This section describes the steps necessary to configure the DeltaV PSIC to obtain proper communication. Each Serial Card in the I/O subsystem contains two channels or ports. Each port will be enabled or disabled individually and each port will contain some port specific configuration parameters. The configuration parameters will determine what type of registers are being read or written. Both ports can be configured as Julabo, IKA or one type on each.

4.1 Port Configuration

Specify the Port type as RS-232. The Baud Rate, Parity, Data bits and Stop bits parameters must match the field device settings. Factory defaults for the Julabo are 4800 baud, 7 data bits, even parity and 1 stop bit. Factory defaults for the IKA are 9600 baud, 7 data bits, even parity and 1 stop bit.

4.2 Device Configuration

Specify one device for the Julabo or IKA. The device address is not used. It can be defaulted to 1.

4.3 Dataset Configuration

Datasets contain the field values read or DeltaV values being written to the field device.

4.3.1 Data Direction:

The Data Direction for dataset should be defined as Input or output.

4.3.2 Output Mode:

This parameter is not used. It should be left at its default value.

4.3.3 DeltaV Data Type:

The type of Julabo/IKA register being mapped will determine the Dataset Data Type. This is described in the following table:

Table 1

Field Value Type	Field Device	Dataset Register Type
Version	Julabo/IKA	String with status
Status	Julabo/IKA	String with status
Name	IKA	String with status
Output data	Julabo	Floating point with status
Input data	Julabo	Floating point with status
Input ramp data	IKA	String with status

4.3.4 DeviceDataType

The DeviceDataType determines Julabo/IKA commands being sent to the field device. This is described in the following table:

Table 2

Device Data Type	Command Type
0	Julabo
1	IKA

4.3.5 Data Start Address and Number of Values

The Start Address for each dataset will always be 0. The Number of values for each dataset type vary, depending on the type of data read/written. Dataset type is configured in special data 1 and 2. All other special data registers are unused. The following table describes the Julabo configuration.

Table 3a

Device Data Type	Special Data 1	Special Data 2	Number of Values/Type	Direction	Register Reference
Julabo	0	0	6 – Floating	Input	R1 – IN_SP_0 R2 – IN_SP_1 R3 – IN_SP_2 R4 – IN_SP_3 R5 – IN_PV_0 R6 – IN_PV_1
Julabo	1	0	6 – Floating	Output	R1 – OUT_SP_0 R2 – OUT_SP_1 R3 – OUT_SP_2 R4 – OUT_SP_3 R5 – OUT_MODE_0 R6 – OUT_MODE_5
Julabo	2	0	100 - String	Input	R1 – Version
Julabo	3	0	100 - String	Input	R1 – Status

The following table describes the IKA configuration.

Table 3b

Device Data Type	Special Data 1	Special Data 2	Number of Values/Type	Direction	Register Reference
IKA	0	0	7 – Floating	Output with readback	R1 – IN_PV_4 R2 – IN_PV_5 R3 – IN_SP_4 R4 – Current Ramp # R5 – OUT_SP_4 R6 – Command Valid Commands: 6 - Reset 7 – Start 8 – Stop 9 – Ramp Start 10 – Ramp Stop 11 – Ramp Pause 12 – Ramp Continue 13 – Ramp Reset 16 – Local Mode 17 – Remote Mode
IKA	1	0	100 – String	Output	R1 – Device Name Not supported at this time.
IKA	2	0	100 - String	Input	R1 – Version
IKA	3	0	100 - String	Input	R1 – Status
IKA	4	0	100 – String	Input	R1 – Name
IKA	5	0	100 – String	Input	R1 – Current Ramp SP/Duration
IKA	6	N	4 – Floating	Output	R1 – Ramp SP R2 – Ramp Segment duration hours R3 – Ramp Segment duration minutes R4 – Ramp Segment duration seconds N – Segment number 1-11 only

Commands are entered in R6 of the command dataset. After completion, the PSIC sets command register R6 to 0. For example, to send a Reset, enter 6 in R6. After completion, R6 will contain 0.

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 Julabo/IKA I/O 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	P1.0	(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.

- 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 4000 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

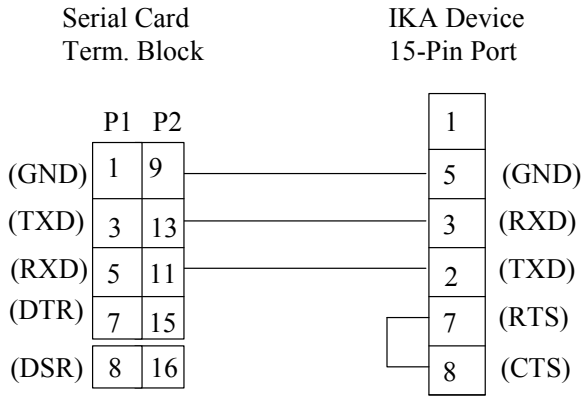
Terminal Number	Signal Description
1	Port 1 - Isolated Ground (GND)
2	Port 1 - Data +
3	Unused
4	Port 1 - Data -
5	Unused
6	Unused
7	Unused
8	Unused
9	Port 2 - Isolated Ground (GND)
10	Port 2 – Data +
11	Unused
12	Port 2 - Data -
13	Unused
14	Unused
15	Unused
16	Unused

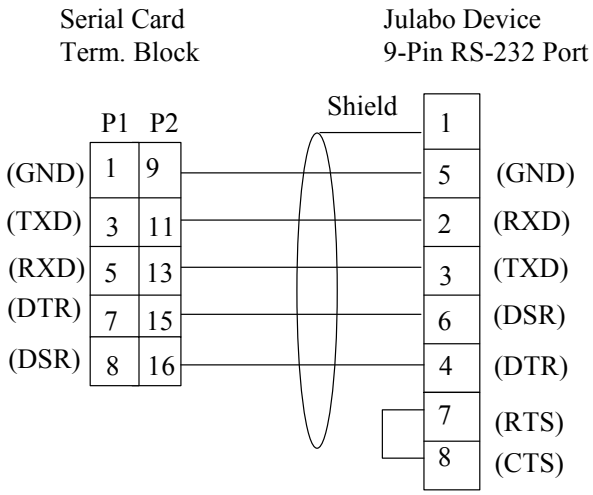
RS-422/485 Full Duplex Standard

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.





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.

For Product functionality questions, ask for the people in the following order:
1. Nobin William
2. Martin Berutti

For Commercial issues, ask for people in the following order:
1. Martin Berutti
2. Jane Wagner

For all other driver and related questions, ask for Nobin William.

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

Support@mynah.com

Thank you for using DeltaV.