MYNAH℠

Allen-Bradley 1774-CI2
Programmable Serial Interface Card
Series 2

USER MANUAL

Rev. P1.55

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1 INTRODUCTION

1.1 Scope

This document is the Design Document for the Allen-Bradley 1774 communications driver firmware for the Emerson Process Management (EPM) DeltaV Control System. The driver will run in the DeltaV Series 2 Programmable Serial Interface Card (PSIC). The reader should be familiar with EPM's DeltaV PSIC and connected Allen-Bradley 1774 devices.

1.2 Document Format

This document is organized as follows:

Table 1: Document Format

Introduction	Describes the scope and purpose of this document.
Theory of Operation	Provides a general functional overview of the Allen-Bradley 1774 Driver.
Downloading Firmware	Describes downloading procedures for the 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 Allen-Bradley 1774 devices. Also describes the cable pin assignments for RS-232.
Technical Support	Describes who to call if you need assistance.

1.3 System Specifications

The following table lists the minimum system requirements for the driver:

Table 2: Specifications

Protocol Compatibility and Reference documents	The communication protocol used will be the Allen-Bradley 1774 RS485 Communication Protocol described in the AB1774_CI2 module manual.
Software Requirements	DeltaV System Software (Release 6.3.2 or later) installed on a hardware-appropriate Windows workstation configured as a ProfessionalPlus for DeltaV Serial Interface Port License (VE4102)
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

1.4 Revision History

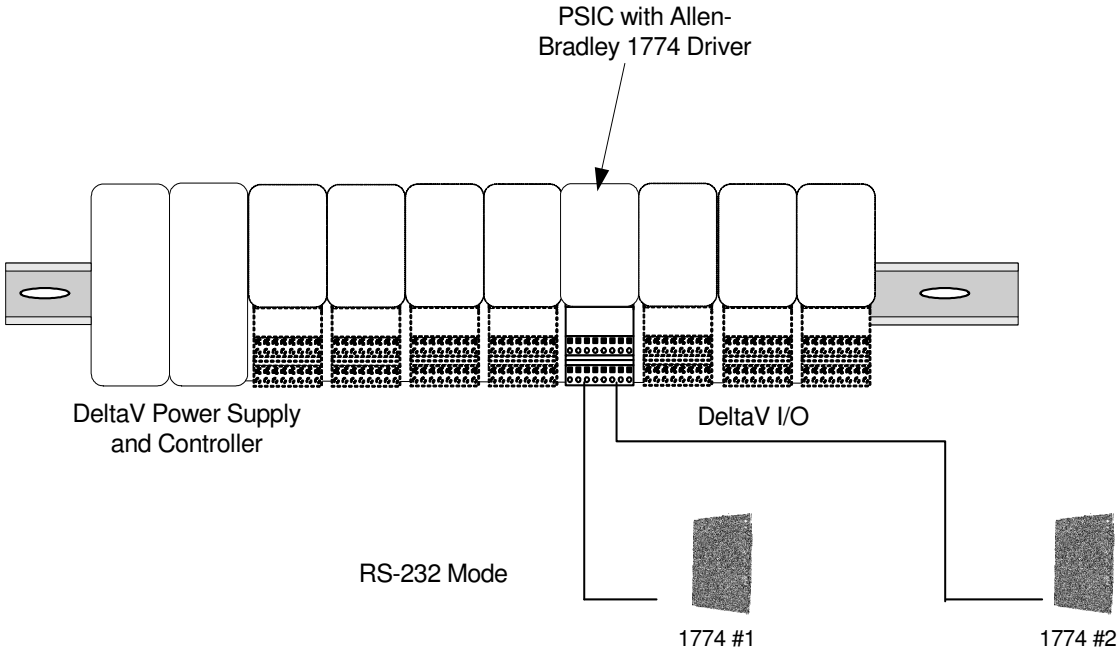
Rev	Release Date	Revised By	Checked By	Description
1.10	4/04	EC	NFW	Initial Release
1.55	4/09	NFW	NFW	Update to use driver toolkit v3.01

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 Allen-Bradley 1774 devices, the PSIC will connect to the 25 pin RS232 Computer Interface Interconnect Cable as illustrated in Figure 2.3 of the Allen-Bradley 1774 manual. The driver will utilize both ports for communications. Each port supports one device. This is illustrated below.

The driver runs in Master mode only. Each dataset on the port can be configured for different individual commands. The datasets can be configured in any manner that the user wishes. For input commands, once the dataset is configured, the device will be interrogated continuously with that command. For output commands, the command will only be sent when the user changes data in the dataset.



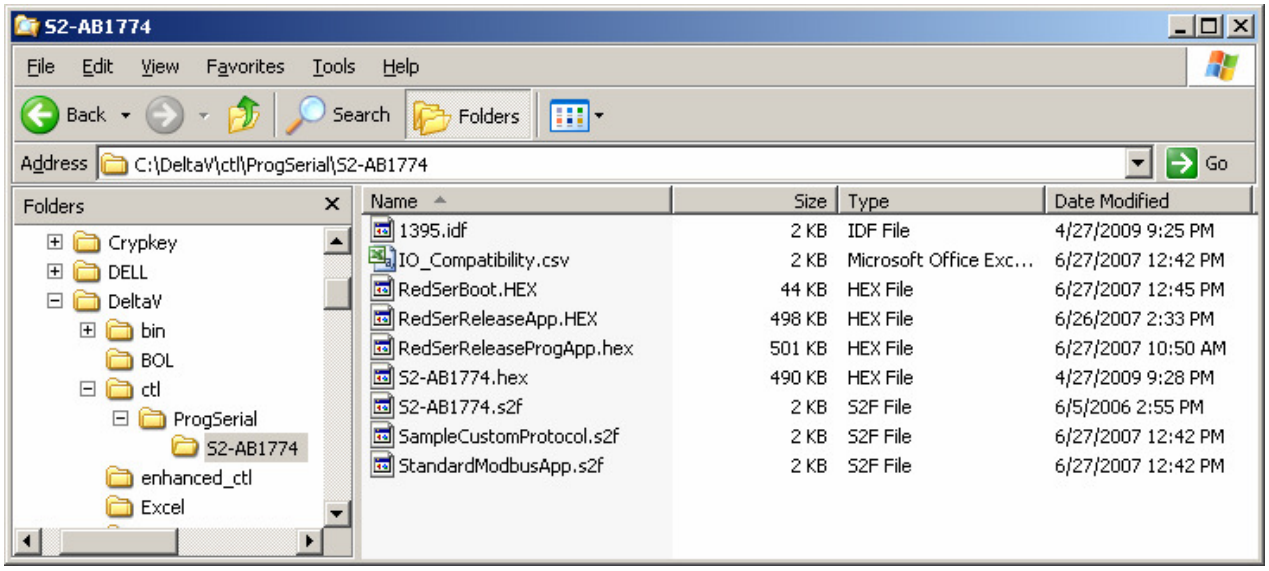
Allen-Bradley 1774
DeltaV Setup Information

3 Downloading the firmware

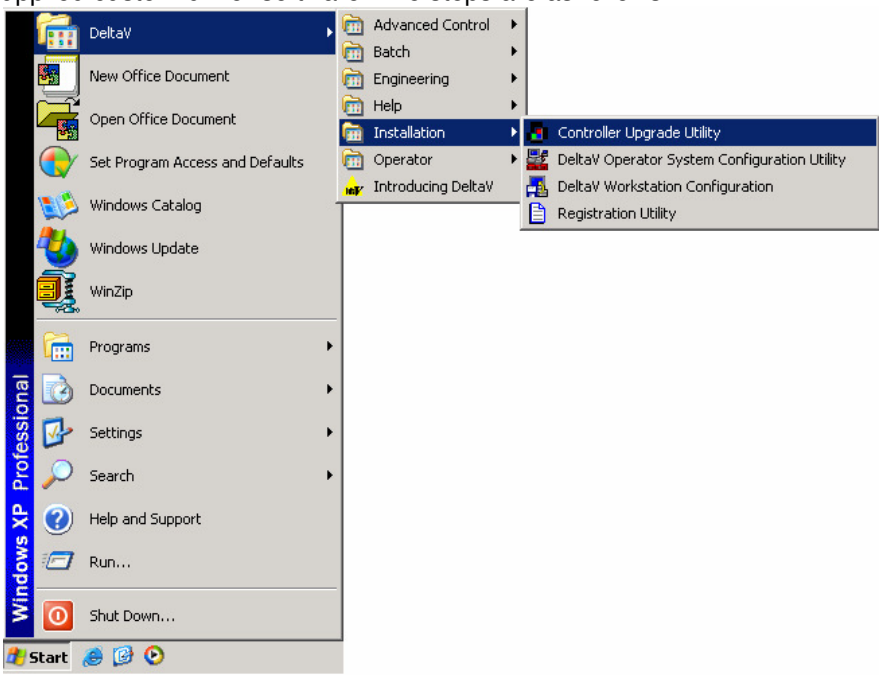
The driver software distribution comprises 14 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

\DeltaV\ctl\ProgSerial\S2-AB1774

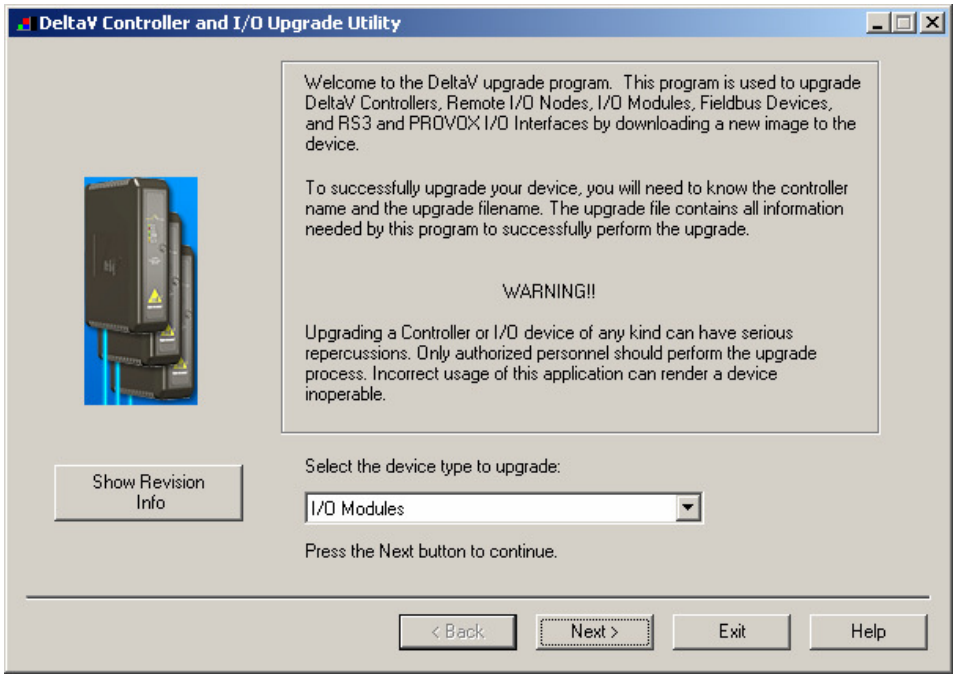
Note that you will have to create the \S2-AB1774 subdirectory. The following files will be copied:



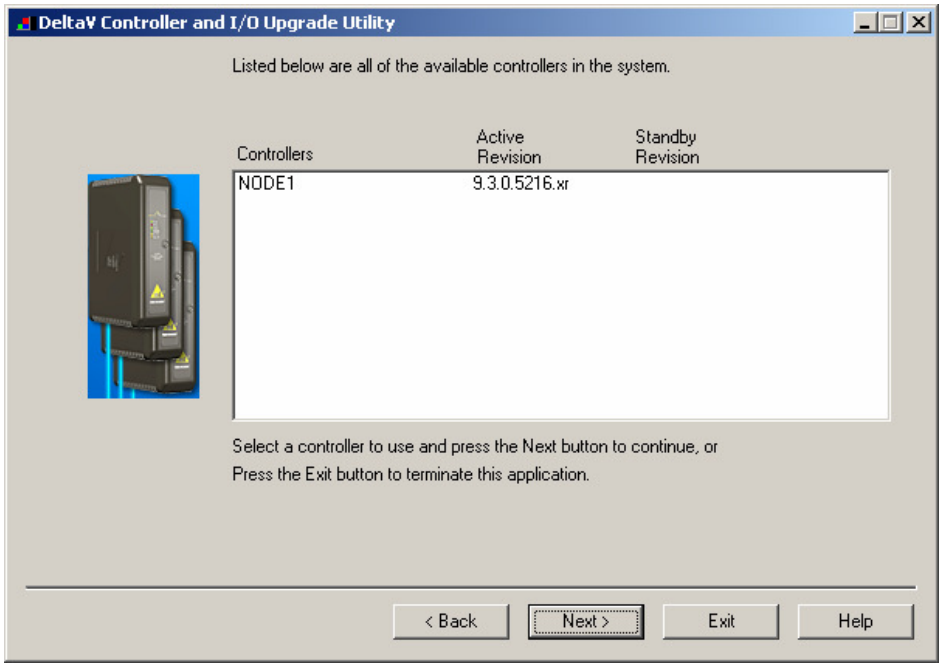
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:



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

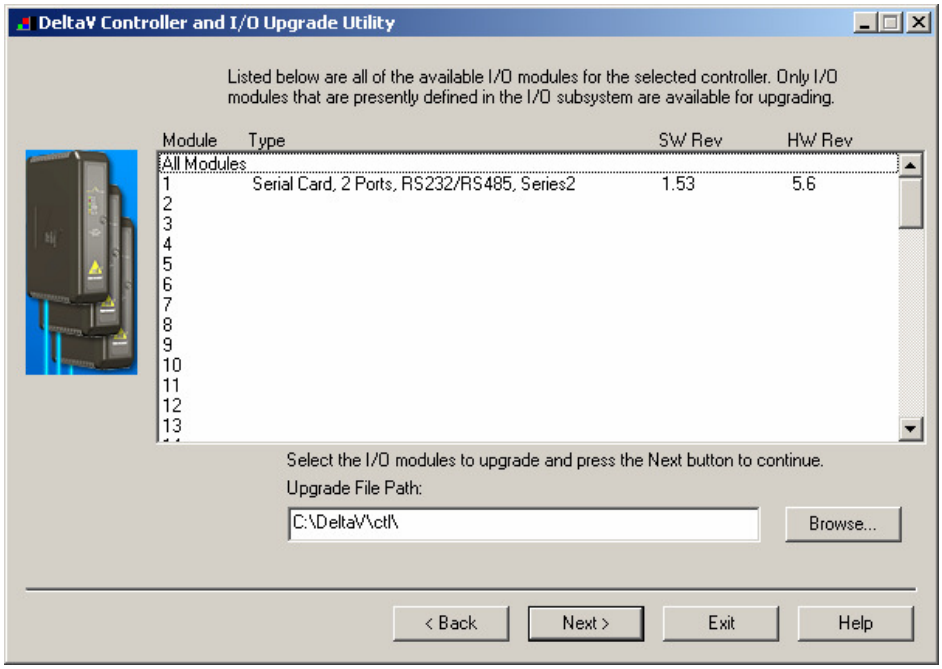


2. Choose Upgrade I/O Modules from the drop down menu and click Next.



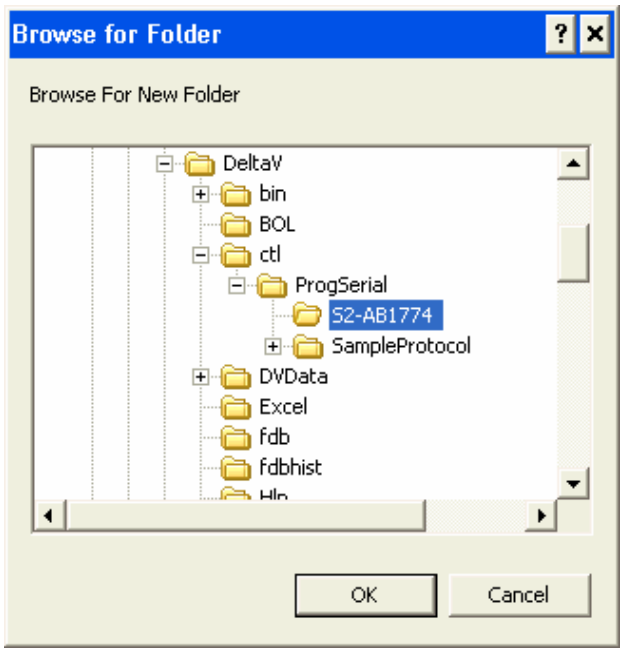
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

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.

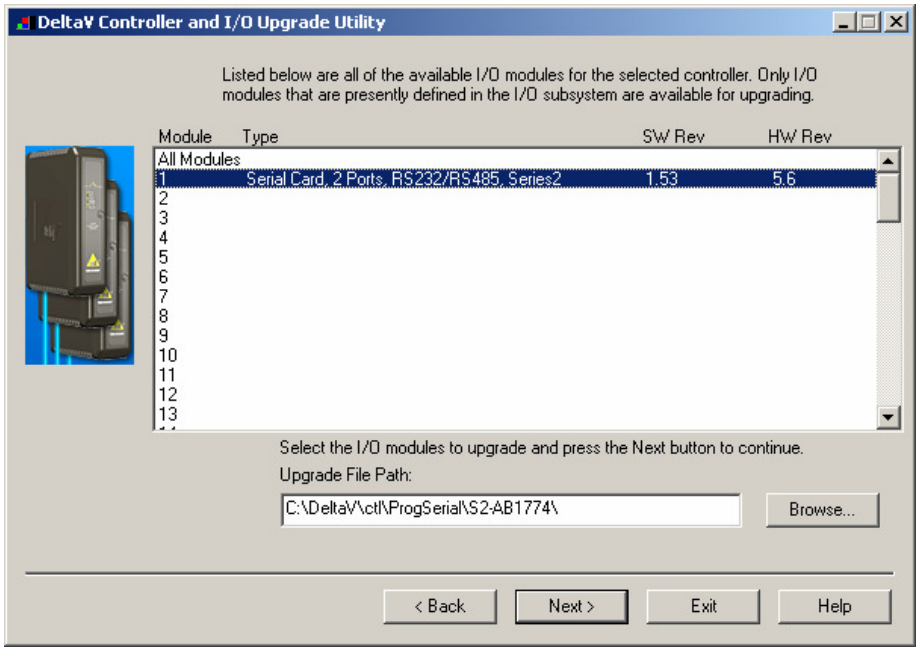


Note: The first time a standard Serial card is upgraded to the 1774 Driver, the dialog will be as shown below. When upgrading an existing Programmable Serial Card, skip Steps 4, 5 and 6, and go to Step 7.

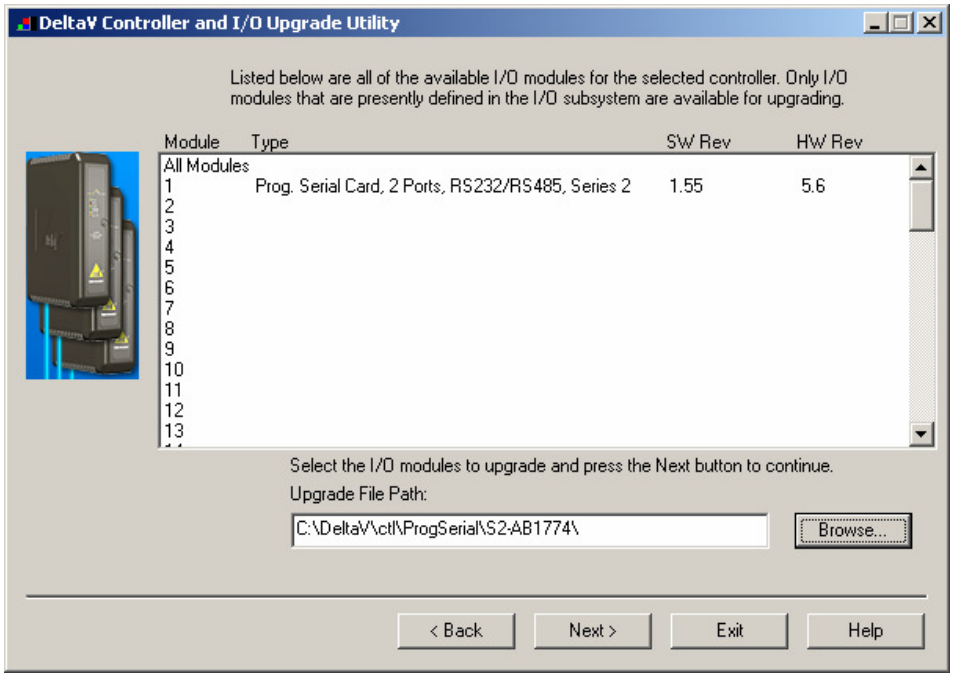
5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.



6. 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.



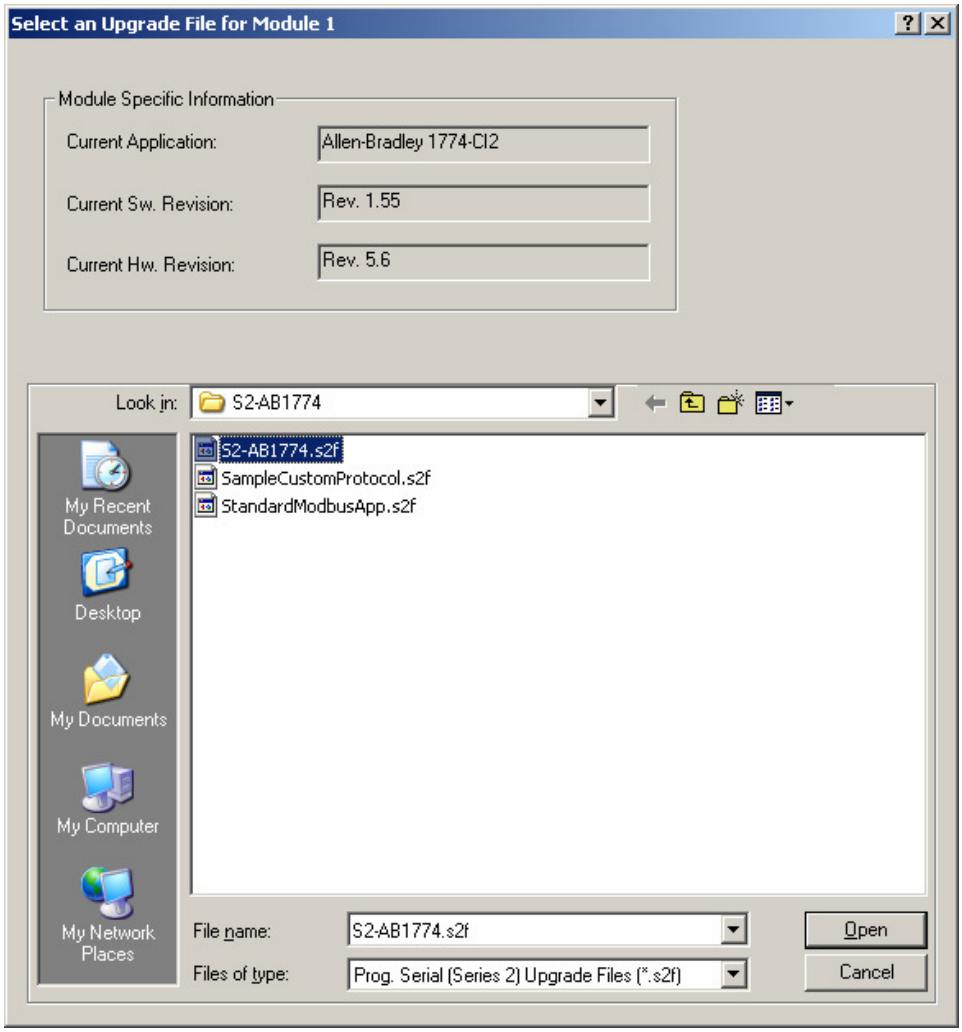
For example, we will select I/O Module 1. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

\DeltaV\ctl\ProgSerial\S2-AB1774

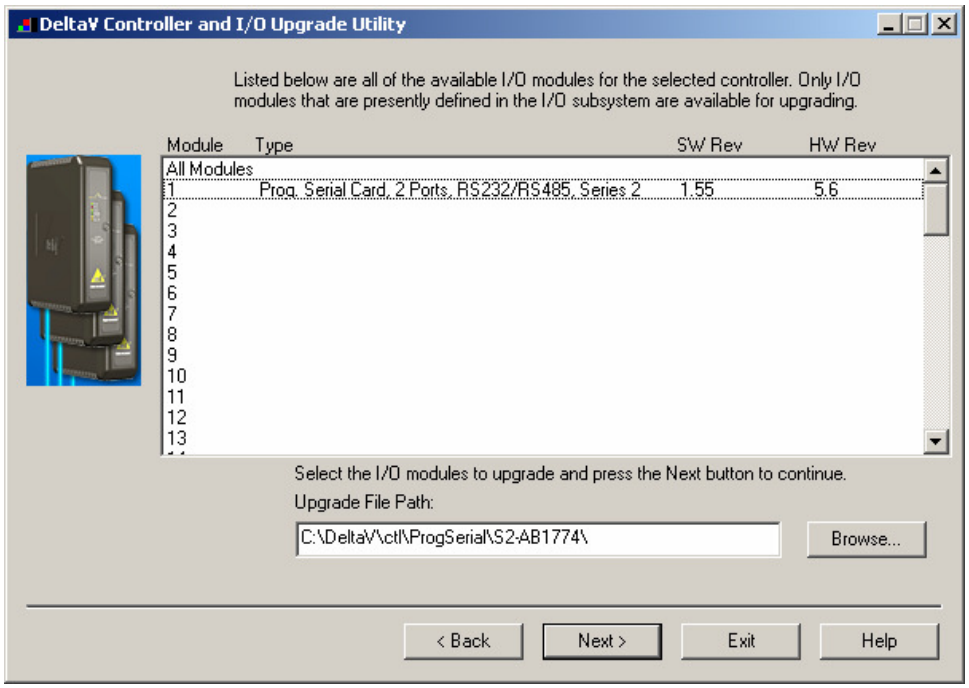
Once you are in the specified directory, you will need to select the following file:

S2-AB1774.S2F

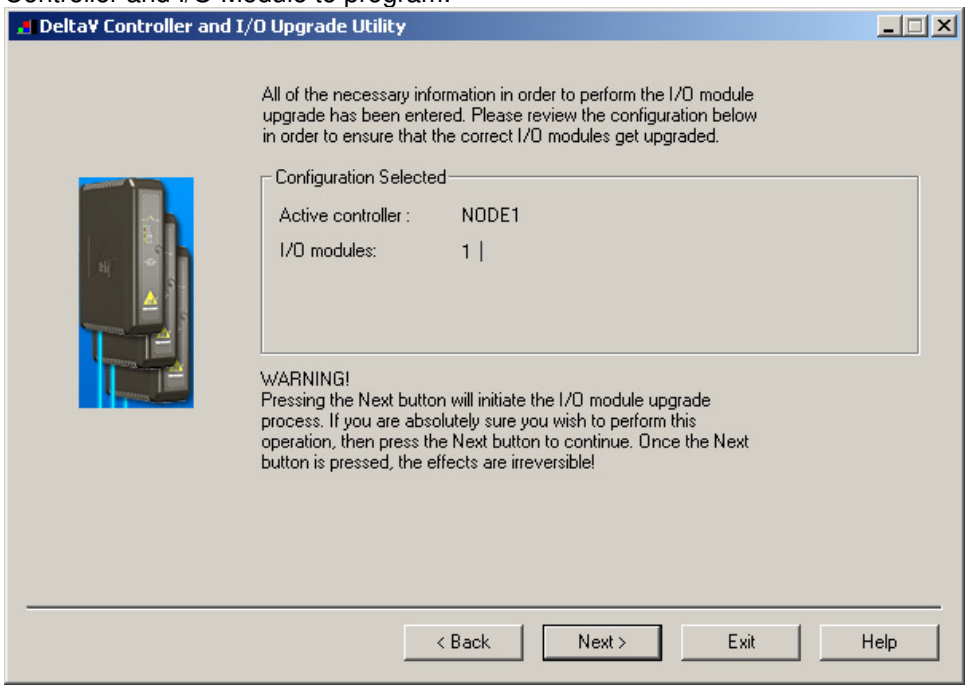
This is shown in the following dialog.



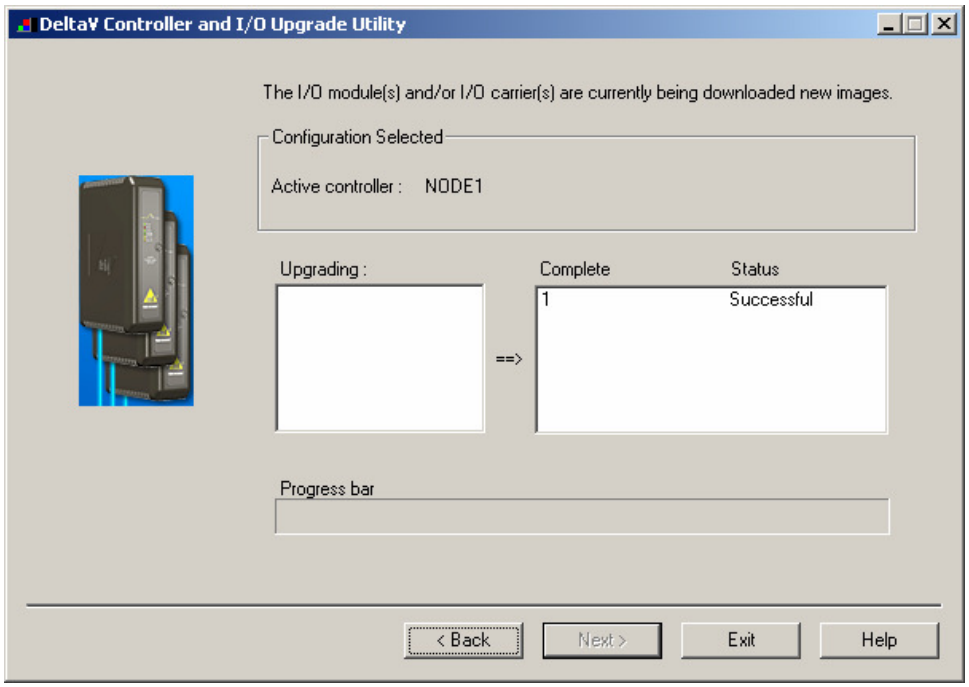
8. After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:



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.

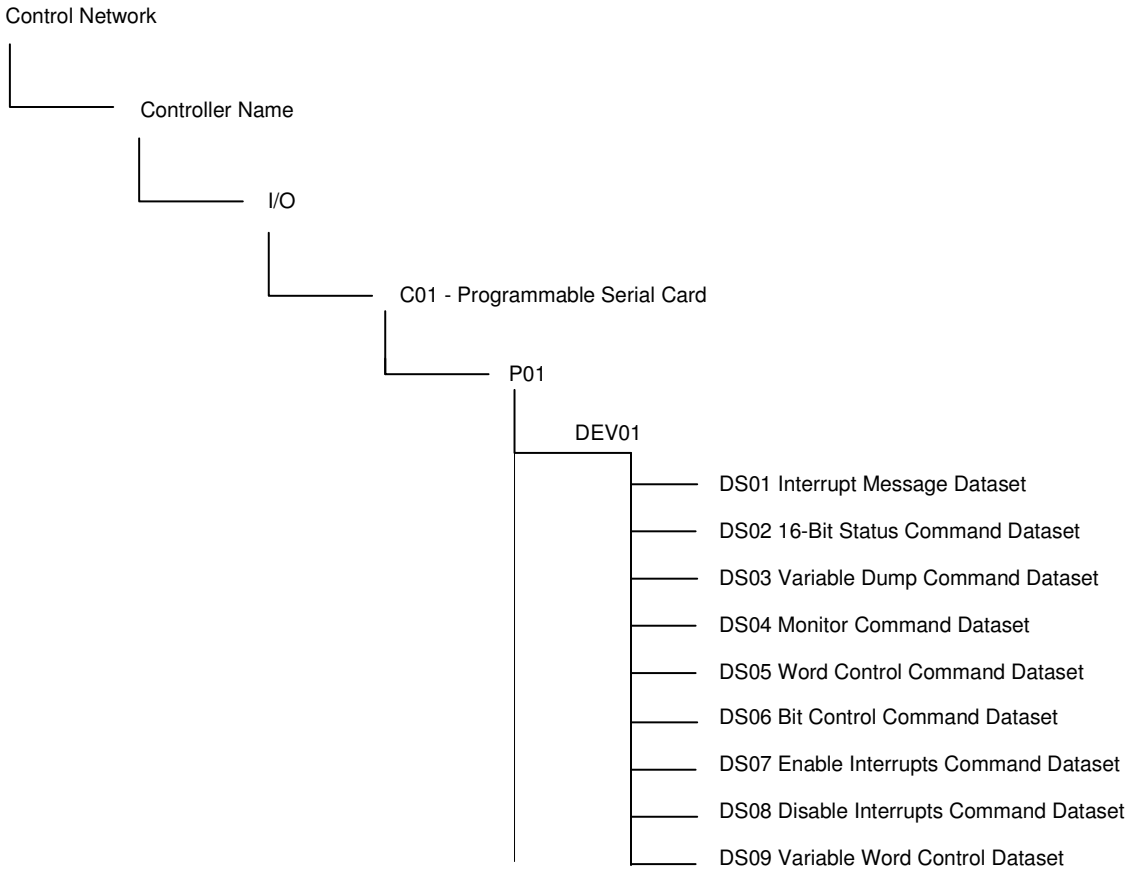
4 CONFIGURATION INFORMATION

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. The PSIC has 2 communication ports that can be configured as RS-232, RS-485 (Half Duplex), or RS-422 (Full Duplex). Various communications parameters, such as baud rate, are configurable.

Under each communication port, a user can configure devices; their addresses do not matter in this driver. Under the device, one or more datasets can be assigned. The first dataset must be the Interrupt Message Dataset, the rest of the datasets may be configured however the user wishes. Each dataset will correspond to a different command to the Allen-Bradley 1774, the command will be determined by the Device Data Type of the dataset. Any number of datasets may be configured for the device up to the maximum of 16. Please note that the driver does not verify configurations, and any incorrectly configured datasets may result in unexpected results.

The communication port must be configured as Master. One Allen-Bradley 1774 can be configured under each communication port. This will require the electrical connection to be RS-232 (full duplex); RS-485 (half duplex) and RS-422 (full duplex) are not supported.

The figure below shows and example Allen-Bradley 1774 setup:



4.1 Port Configuration

The port should be configured as master. Retry Count, Message Timeout, and Transmit Delay can be left as default or changed at users discretion. The Port Type should be set as RS232. The Allen-Bradley 1774 does not support RS485 or RS422. The Baud Rate, Parity, Data Bits and Stop Bits should match the settings in the Allen-Bradley 1774 device.

4.2 Device Configuration

One device should be configured for all of the datasets. The device address is not used. Up to 16 datasets may be configured per port, each of which corresponds to a different Allen-Bradley 1774 command.

4.3 Dataset Configuration

4.3.1 Data Direction:

Commands 1, 2, 4 and 11 require the dataset to be configured as input, commands 3 and 5-9 require the dataset to be output.

4.3.2 Output Mode and Readback:

Output mode should be left as default for all commands except command V (9), 0 is used for block writes, 1 is used for single register writes. This means if one register's value is changed, all values will be sent when set for block writes, or only the changed value will be sent for single register writes. Generally command V should always be set to single register writes. Readback mode is only required for command X, Readback mode should be left at the default for the rest of the commands.

4.3.3 DeltaV Data Type:

See below.

4.3.4 Device Data Type and Number of Values

Table 3: Dataset Configuration

COMMAND	DESCRIPTION	DeltaV DATA TYPE	DEVICE DATA TYPE	DATA START ADDRESS	NUMBER OF VALUES
I	PLC Interrupt Data	16-Bit UINT	11	N/A	1
Z	16-Bit Status	16-Bit UINT	1	N/A	1
S	8-Bit Status	8-Bit UINT	2	N/A	1
X	Data Dump	16-Bit UINT	3	NA	2-100
M	Monitor	16-Bit UINT	4	1-255	1
W	Word Control	16-Bit UINT	5	N/A	3
B	Bit Control	8-Bit UINT	6	N/A	4
E	Enable Interrupts	Boolean	7	N/A	1
D	Disable Interrupts	Boolean	8	N/A	1
V	Variable Word Control	16-Bit UINT	9	NA	2-100

Please note that there is not a command “I” that is sent by this driver, it is the command sent to the driver by the Allen-Bradley 1774 as an interrupt. Dataset 1 must always be this command type.

4.3.5 Special Data

The Special Data values (1-5) will not be used in this driver and can be left as the defaults.

4.3.6 Register Mappings

Table 4: Dataset Register Mapping for Gauge Data

Command	Register	Description
Z	1	Integer value of returned 16-bit status bitmask.
S	1	Integer value of returned 8-bit status bitmask.
X	1	Starting word address to read data from.
	2-100	Values returned by the variable dump command.
M	1	Value returned by the monitor command.
W	1	Starting word address to write data to. (1-254)
	2	Value to be written to memory.
	3	Send Command (set to 1 to send)
B	1	Word address of memory to be modified. (1-254)
	2	Bit location (0-base) in 16-bit word to modify. (0-15)
	3	Desired state of bit. (0-1)
	4	Send Command (set to 1 to send)
E	1	Set to 1 to send command. Reset to 0 when complete
D	1	Set to 1 to send command. Reset to 0 when complete
V	1	Starting word address to write data to.
	2-100	Data to be written to memory.

4.3.7 Errors

If the Allen-Bradley 1774 continuously sends NACK messages to the driver, the Status of the dataset will be set to “NACK” to indicate this. This usually indicates mis-configuration of the Allen-Bradley 1774, such as leaving it set to program mode. If an invalid address is entered into either the Data Start Address or a register used for setting the Word Address of the command, the Status will show “Address Out Of Range.” Note that addresses 0 and 255 cannot be accessed. Status may also show "Receive buffer exceeds maximum size" if the receive buffer size is exceeded.

Normally the status of the output datasets isn’t updated until a value in the dataset changes and data is successfully sent. A change has been made so that when any input dataset’s status is updated, all output dataset’s are updated as well, but only when the status of the output dataset is “No Communications.”

5.0 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 Allen-Bradley 1774 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	1.10 (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 Allen-Bradley 1774 settings.
- Verify device configuration: User must check for the proper device address is entered.
- Verify Dataset configuration: see section 4 for correct configuration parameters.

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 and written between the foreign device into the PSIC. For input data, the values should be changed in the foreign device and verified that the new data are correctly reported. For output data, change the values in the controller and then verify that the values are transferred to the foreign device.

- To assign a Dataset and a register in the Dataset to an I/O module, follow these steps:

    1. Double click the IO_IN/IO_OUT parameter for the module. This brings up the IO_IN/IO_OUT Property window.
    2. Click on the Browse button. This brings up the Browse window.
    3. Click on the Object_Type drop down list, select All. This displays all the Dataset tags.
    4. Double click on the desired Dataset tag. This assigns the tag to the module and closes the Browse window.
    5. Choose the desired register in the Parameter drop down list.
    6. Click the OK button.

- For output modules, user also needs to change the MODE parameter to Manual for Normal Mode and Target.

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. The Allen-Bradley 1774 operates in RS-232 mode only.

6.1 Pin Assignments for DeltaV PSIC

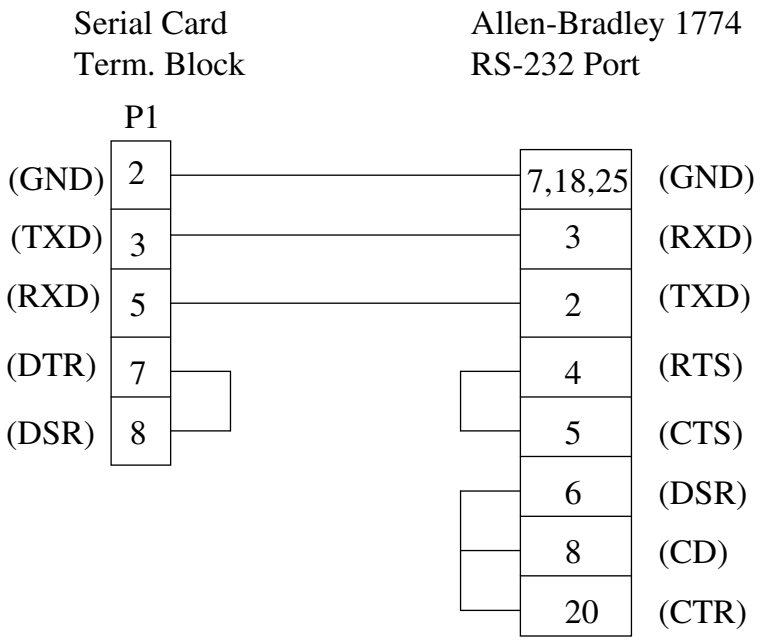
RS-232 Standard

Table 5: DeltaV Wiring Configuration

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

6.2 Wiring Connections

The figure below shows the connections between the Allen-Bradley 1774 RS-232 port and Port 1 on the Serial Card 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.

You can also send us your questions via e-mail. Our address is:

support@mynah.com

Thank you for using DeltaV.