PTQ-DH485

Quantum Platform

DH485 Communication Module

User Manual

May 05, 2008

Please Read This Notice

Successful application of this module requires a reasonable working knowledge of the Schneider Electric Quantum hardware, the PTQ-DH485 Module and the application in which the combination is to be used. For this reason, it is important that those responsible for implementation satisfy themselves that the combination will meet the needs of the application without exposing personnel or equipment to unsafe or inappropriate working conditions.

This manual is provided to assist the user. Every attempt has been made to ensure that the information provided is accurate and a true reflection of the product's installation requirements. In order to ensure a complete understanding of the operation of the product, the user should read all applicable Schneider Electric documentation on the operation of the Schneider Electric hardware.

Under no conditions will ProSoft Technology be responsible or liable for indirect or consequential damages resulting from the use or application of the product.

Information in this manual is subject to change without notice and does not represent a commitment on the part of ProSoft Technology Improvements and/or changes in this manual or the product may be made at any time. These changes will be made periodically to correct technical inaccuracies or typographical errors.

PTQ Installation and Operating Instructions

The statement "power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods Article 501-10(b) of the National Electrical Code, NFPA 70 for installations in the U.S., or as specified in section 18-1J2 of the Canadian Electrical Code for installations within Canada and in accordance with the authority having jurisdiction".

The following or equivalent warnings shall be included:

A Warning - Explosion Hazard - Substitution of components may Impair Suitability for Class I, Division 2;
B Warning - Explosion Hazard - When in Hazardous Locations, Turn off Power before replacing Wiring Modules, and
C Warning - Explosion Hazard - Do not Disconnect Equipment unless Power has been switched Off or the Area is known to be Nonhazardous.
D Caution: The Cell used in this Device may Present a Fire or Chemical Burn Hazard if Mistreated. Do not Disassemble, Heat above 100°C (212°F) or Incinerate.

Important Notice:

CAUTION: THE CELL USED IN THIS DEVICE MAY PRESENT A FIRE OR CHEMICAL BURN HAZARD IF MISTREATED. DO NOT DISASSEMBLE, HEAT ABOVE 100°C (212°F) OR INCINERATE.

Maximum battery load = 200 µA.

Maximum battery charge voltage = 3.4 VDC.

Maximum battery charge current = 500 µA.

Maximum battery discharge current = 30 µA.

Your Feedback Please

We always want you to feel that you made the right decision to use our products. If you have suggestions, comments, compliments or complaints about the product, documentation or support, please write or call us.

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PTQ-DH485 User Manual
May 05, 2008
PSFT.DH485.PTQ.UM.08.05.05

Contents

Guide to the PTQ-DH485 User Manual

Function		Section to Read	Details
Introduction (Must Do)	→	Start Here (page 11)	This Section introduces the customer to the module. Included are: package contents, system requirements, hardware installation, and basic configuration.
Verify Communication, Diagnostic and Troubleshooting	→	Verifying Communication (page 49) Diagnostics and Troubleshooting (page 67)	This section describes how to verify communications with the network. Diagnostic and Troubleshooting procedures.
Reference Product Specifications Functional Overview Glossary	→	Reference (page 81) Functional Overview (page 83) Product Specifications (page 81)	These sections contain general references associated with this product, Specifications, and the Functional Overview.
Support, Service, and Warranty Index	→	Support, Service and Warranty (page 109)	This section contains Support, Service and Warranty information. Index of chapters.

1 Start Here

In This Chapter

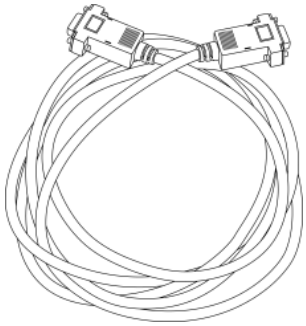
This guide is intended to guide you through the ProTalk module setup process, from removing the module from the box to exchanging data with the processor. In doing this, you will learn how to:

- Set up the processor environment for the PTQ module
- View how the PTQ module exchanges data with the processor
- Edit and download configuration files from your PC to the PTQ module
- Monitor the operation of the PTQ module

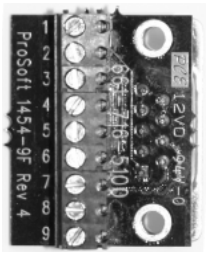
1.1 Hardware and Software Requirements

1.1.1 ProTalk Module Carton Contents

ProTalk Module



Null Modem Serial Cable



1454-9F DB-9 Female to 9 Pos Screw Terminal adapter (Serial protocol modules only)	ProSoft Solutions CD

Note: The DB-9 Female to 5 Pos Screw Terminal adapter is not required on Ethernet modules and is therefore not included in the carton with these types of modules.

1.1.2 Quantum / Unity Hardware

This guide assumes that you are familiar with the installation and setup of the Quantum / Unity hardware. The following should be installed, configured and powered up before proceeding:

- Quantum or Unity Processor
- Quantum rack
- Quantum power supply
- Quantum Modbus Plus Network Option Module (NOM Module) (optional)
- Quantum to PC programming hardware
- NOM Ethernet or Serial connection to PC

1.1.3 PC and PC Software

- Windows-based PC with at least one COM port
- Quantum programming software installed on machine

  or

- Concept™ PLC Programming Software version 2.6

  or
  ProWORX PLC Programming Software
  or
  UnityPro XL PLC Programming Software

- HyperTerminal (used in this guide) This is a communication program that is included with Microsoft Windows. You can normally find it in **Start / Programs / accessories / Communications**.

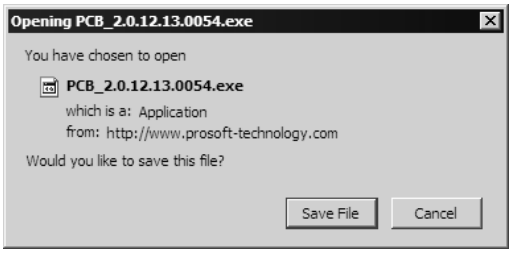
Note: ProTalk modules are compatible with common Quantum / Unity programming applications, including Concept and UnityPro XL. For all other programming applications, please contact technical support.

1.2 Install ProSoft Configuration Builder Software

You must install the ProSoft Configuration Builder (PCB) software in order to configure the PTQ-DH485 module. You can always get the newest version of ProSoft Configuration Builder from the ProSoft Technology web site.

To install ProSoft Configuration Builder from the ProSoft Web Site

1. Open your web browser and navigate to http://www.prosoft-technology.com/pcb
2. Click the **Download Here** link to download the latest version of ProSoft Configuration Builder.
3. Choose "Save" or "Save File" when prompted. The following illustrations show the file download prompt for two of the most common web browsers.



4. Make a note of the location where you saved the file, for example "Desktop", or "My Documents", so you can start the installation program.
5. When the download is complete, locate and open the file, and then follow the instructions on your screen to install the program.

If you do not have access to the Internet, you can install ProSoft Configuration Builder from the ProSoft Solutions CD-ROM, included in the package with your PTQ-DH485 module.

To install ProSoft Configuration Builder from the CD-ROM

1. Insert the ProSoft Solutions CD-ROM into the CD drive of your PC. Wait for the startup screen to appear.
2. On the startup screen, click *Product Documentation*. This action opens an explorer window.

3 Click to open the *Utilities* folder. This folder contains all of the applications and files you will need to set up and configure your module.
4 Double-click the *ProSoft Configuration Builder Setup* program and follow the instructions on your screen to install the software on your PC.

Note: Many of the configuration and maintenance procedures use files and other utilities on the CD-ROM. You may wish to copy the files from the Utilities folder on the CD-ROM to a convenient location on your hard drive.

2 Configuring the Processor with Concept

In This Chapter

The following steps are designed to ensure that the processor is able to transfer data successfully with the PTQ module. As part of this procedure, you will use Concept configuration software from Schneider Electric to create a project, add the PTQ module to the project, set up data memory for the project, and then download the project to the processor.

Important Note: Concept software does not report whether the PTQ module is present in the rack, and therefore is not able to report the health status of the module when the module is online with the Quantum processor. Please take this into account when monitoring the status of the PTQ module.

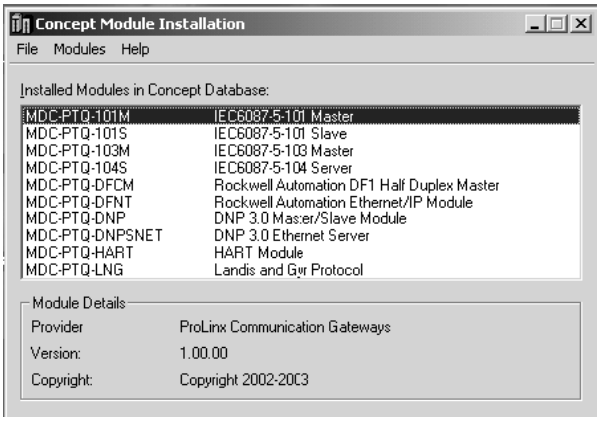
2.1 Information for Concept Version 2.6 Users

This guide uses Concept PLC Programming Software version 2.6 to configure the Quantum PLC. The ProTalk installation CD includes MDC module configuration files that help document the PTQ installation. Although not required, these files should be installed before proceeding to the next section.

2.1.1 Installing MDC Configuration Files

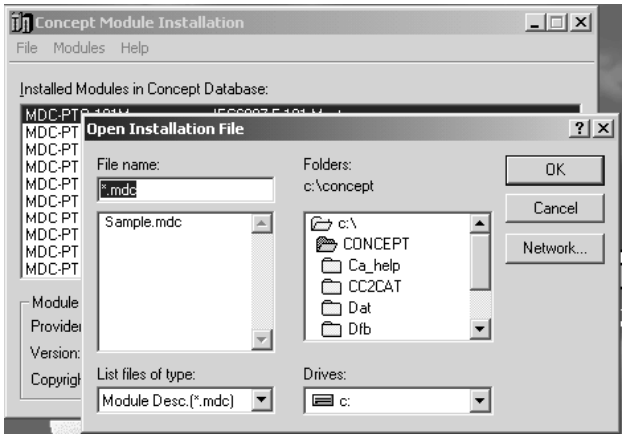
1 From a PC with Concept 2.6 installed, choose **Start / Programs / Concept / ModConnect Tool**.

This action opens the Concept Module Installation dialog box.



2 Choose **File / Open Installation File**.

This action opens the Open Installation File dialog box:

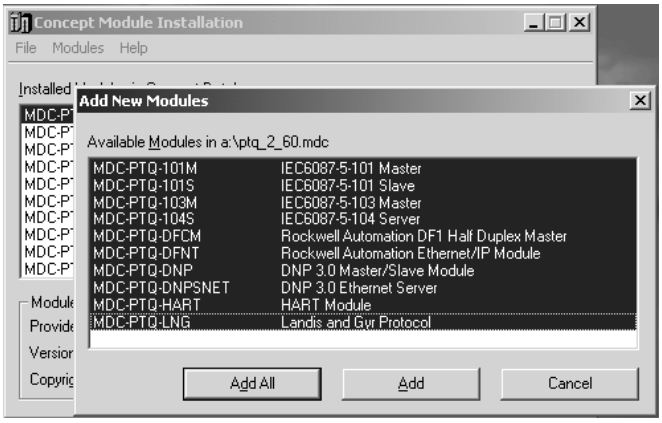


3 If you are using a Quantum processor, you will need the MDC files. In the Open Installation File dialog box, navigate to the **MDC Files** directory on the ProTalk CD.

4 Choose the MDC file and help file for your version of Concept:

- Concept 2.6 users: select PTQ_2_60.mdc and PTQMDC.hlp
- Concept 2.5 users: select PTQ_2_50.mdc and PTQMDC.hlp.

Select the files that go with the Concept version you are using, and then click **OK**. This action opens the add New Modules dialog box.

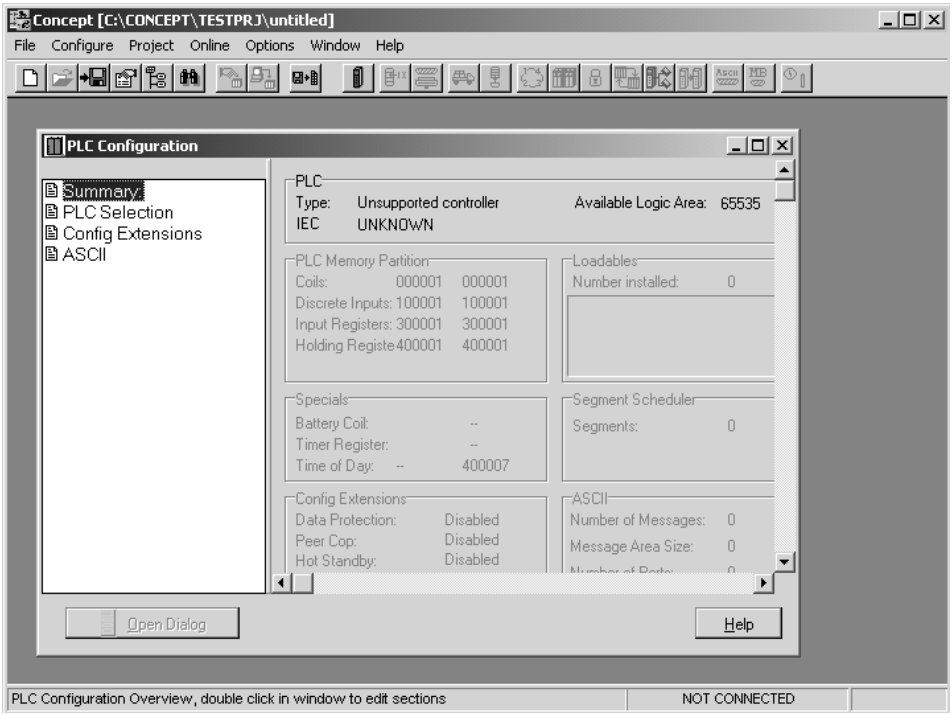


5 Click the **add all** button. A series of message boxes may appear during this process. Click **Yes** or **OK** for each message that appears.
6 When the process is complete, open the File menu and choose Exit to save your changes.

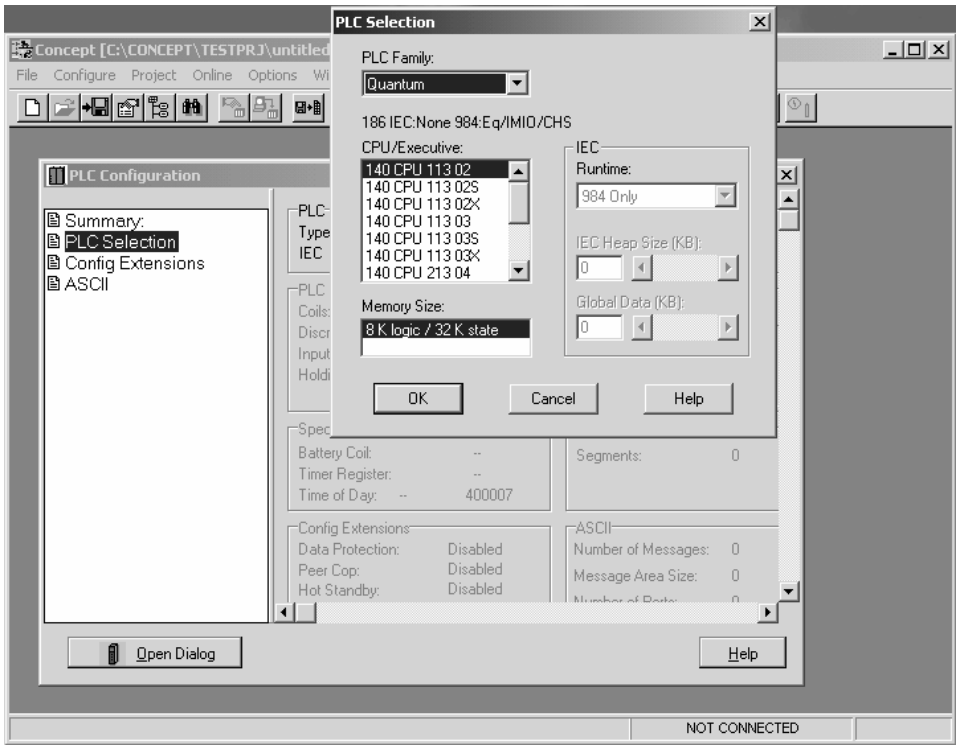
2.2 Create a New Project

This phase of the setup procedure must be performed on a computer that has the Concept configuration software installed.

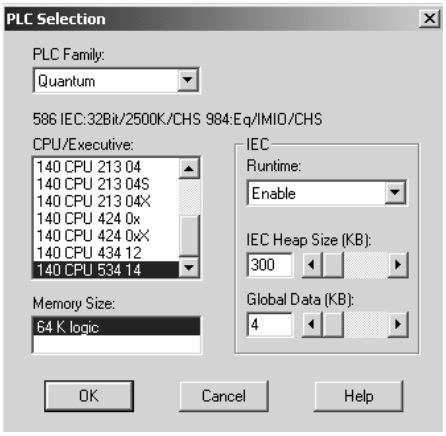
1 From your computer, choose **Start / Programs / Concept V2.6 XL.EN / Concept**. This action opens the Concept window.
2 Open the File menu, and then choose **New Project**. This action opens the PLC Configuration dialog box.



3 In the list of options on the left side of this dialog box, double-click the *PLC Selection* folder. This action opens the PLC Selection dialog box.

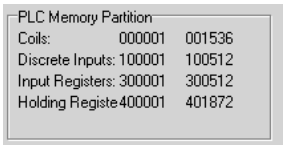


4 In the *CPU/Executive* pane, use the scroll bar to locate and select the PLC to configure.



5 Click **OK**. This action opens the *PLC Configuration* dialog box, populated with the correct values for the PLC you selected.

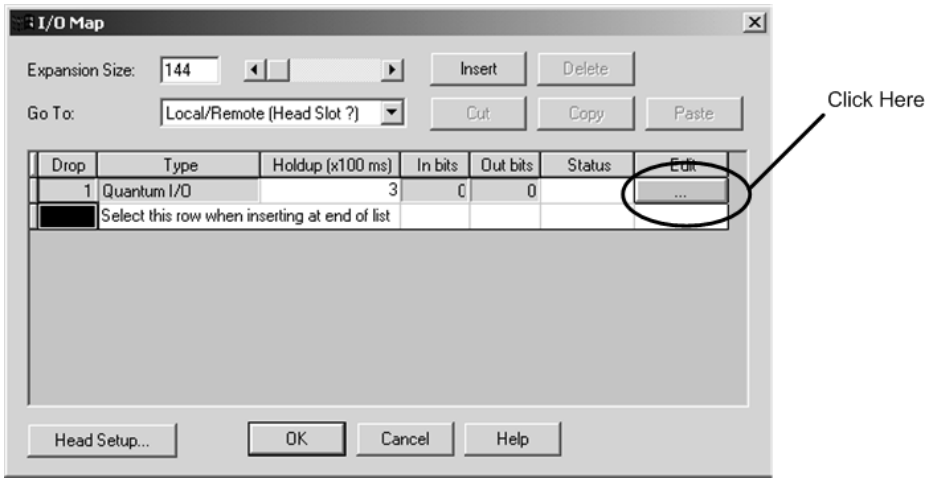
6 Make a note of the holding registers for the module. You will need this information when you modify your application as outlined in the ProTalk application Reference Guides. The Holding Registers are displayed in the PLC Memory Partition pane of the PLC Configuration dialog box.



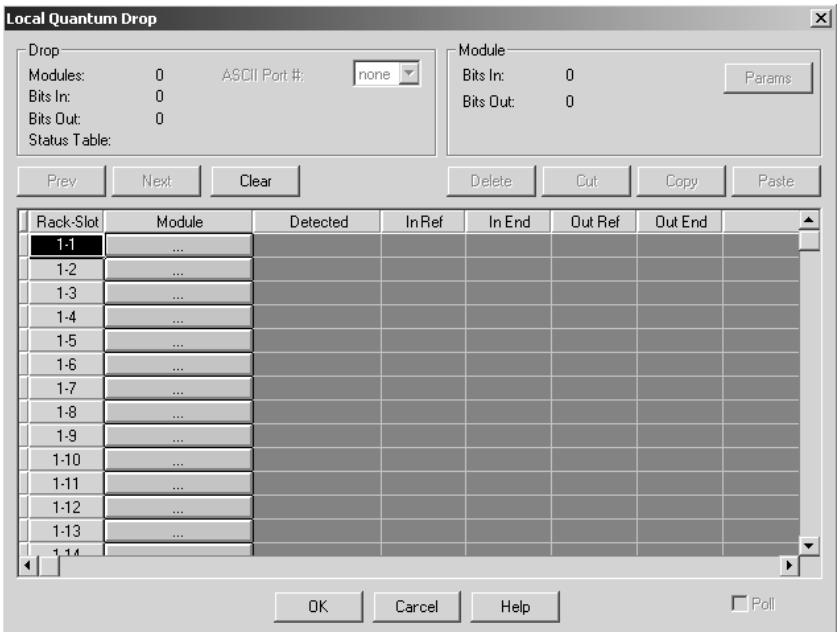
2.3 Add the PTQ Module to the Project

The next step is to add one or more of the PTQ modules to the Project. To add modules:

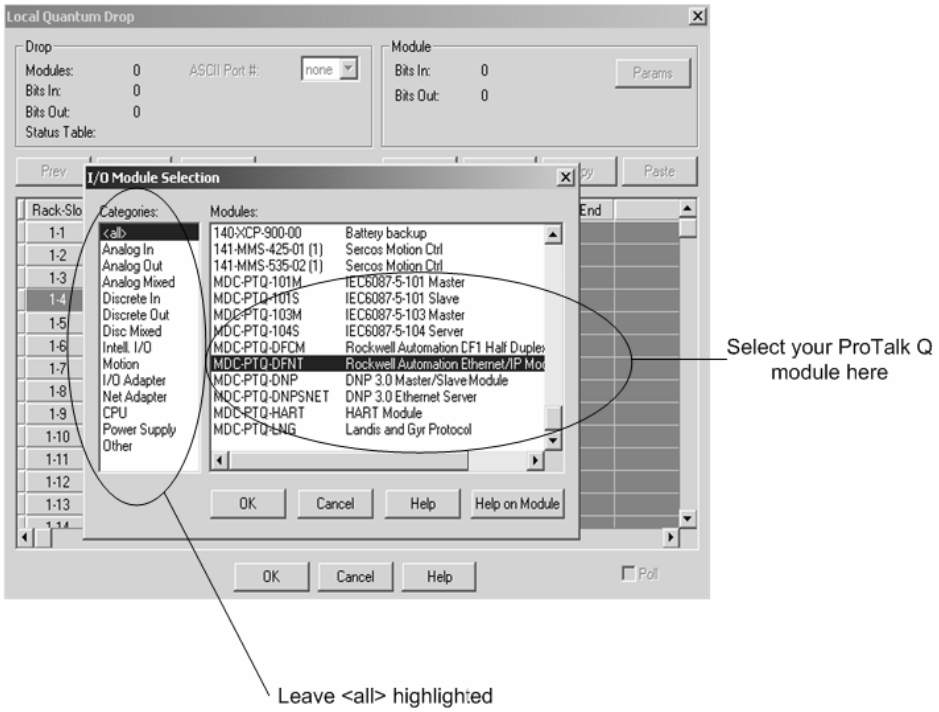
1 In the list of options on the left side of the *PLC Configuration* dialog box, double-click *I/O Map*. This action opens the I/O Map dialog box.



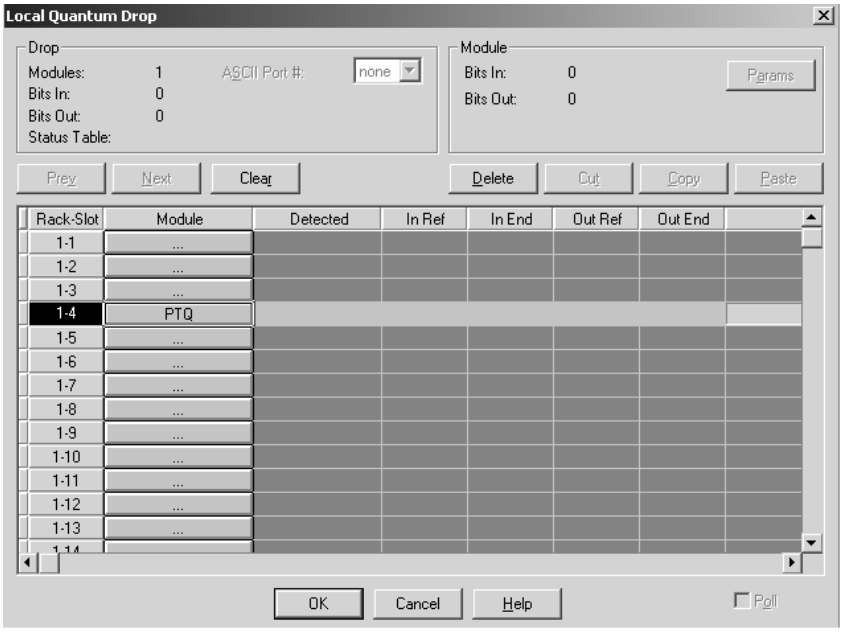
2 Click the **Edit** button to open the *Local Quantum Drop* dialog box. This dialog box is where you identify rack and slot locations.



3 Click the Module button next to the rack/slot position where the ProTalk module will be installed. This action opens the I/O Module Selection dialog box.



4 In the Modules pane, use the scroll bar to locate and select the ProTalk module, and then click OK. This action copies the description of the ProTalk module next to the assigned rack and slot number of the Local Quantum Drop dialog box.

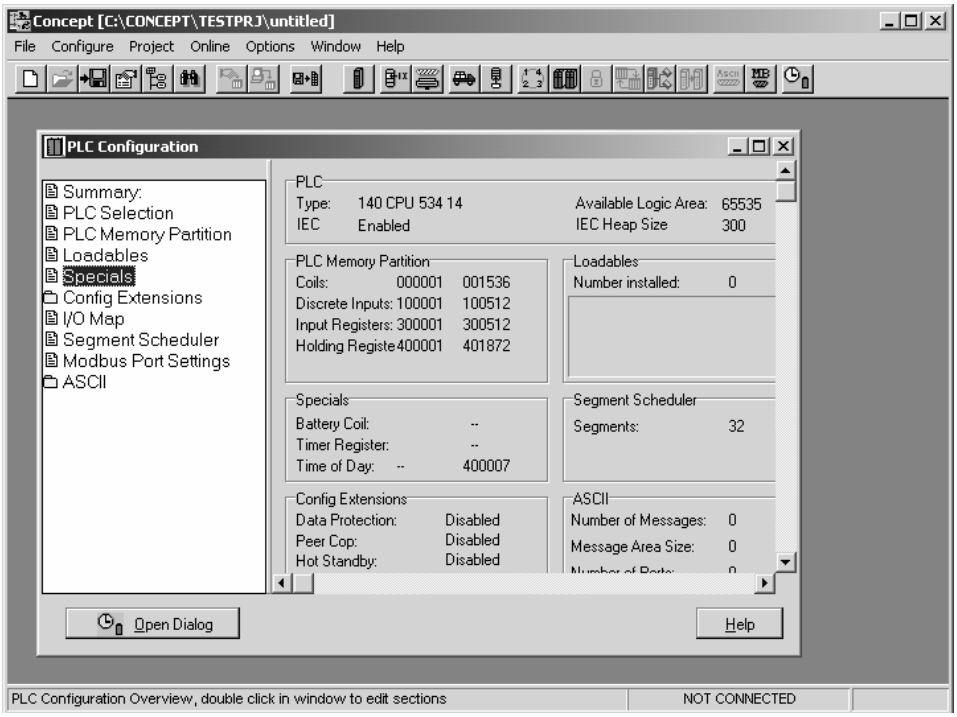


5 Repeat steps 3 through 5 for each ProTalk module you plan to install. When you have finished installing your ProTalk modules, click OK to save your settings. Click Yes to confirm your settings.

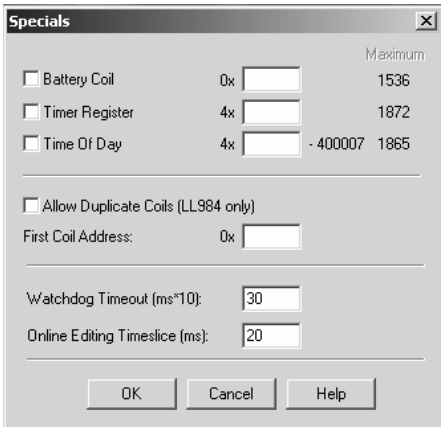
Tip: Select a module, and then click the Help on Module button for help pages.

2.4 Set up Data Memory in Project

1 In the list of options on the left side of the PLC Configuration dialog box, double-click Specials.

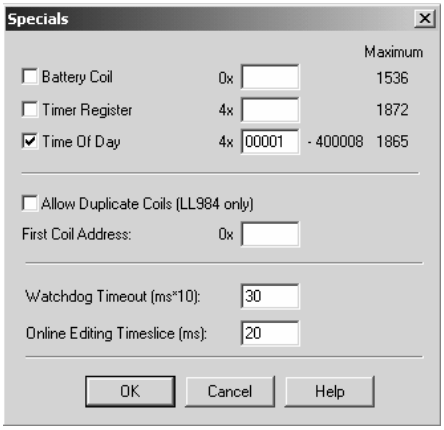


2 This action opens the Specials dialog box.



Selecting the Time of Day

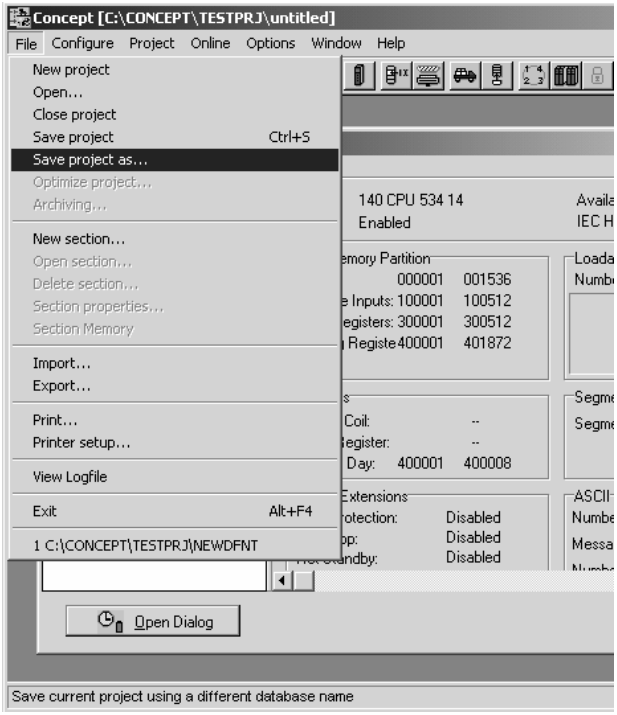
1 Select (check) the Time of Day box, and then enter the value 00001 as shown in the following example. This value sets the first time of day register to 400001.



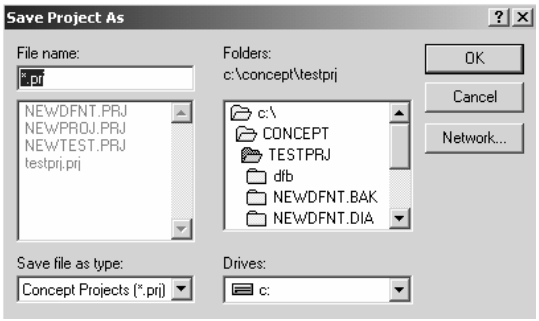
2 Click OK to save your settings and close the Specials dialog box.

Saving your project

1 In the PLC Configuration dialog box, choose File / Save project as.



2 This action opens the Save Project as dialog box.

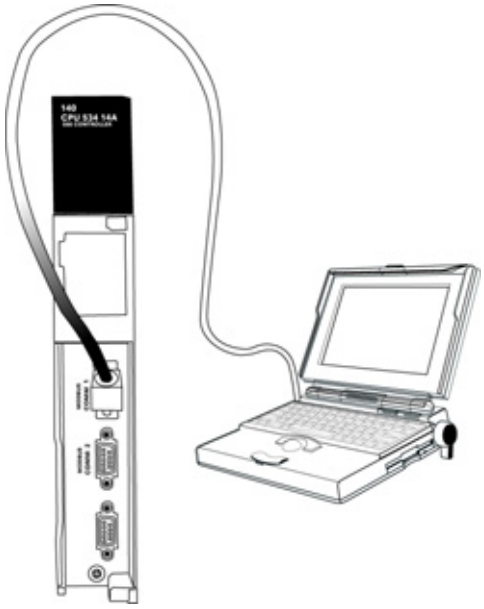


3 Name the project, and then click OK to save the project to a file.

2.5 Download the Project to the Processor

The next step is to download (copy) the project file to the Quantum Processor.

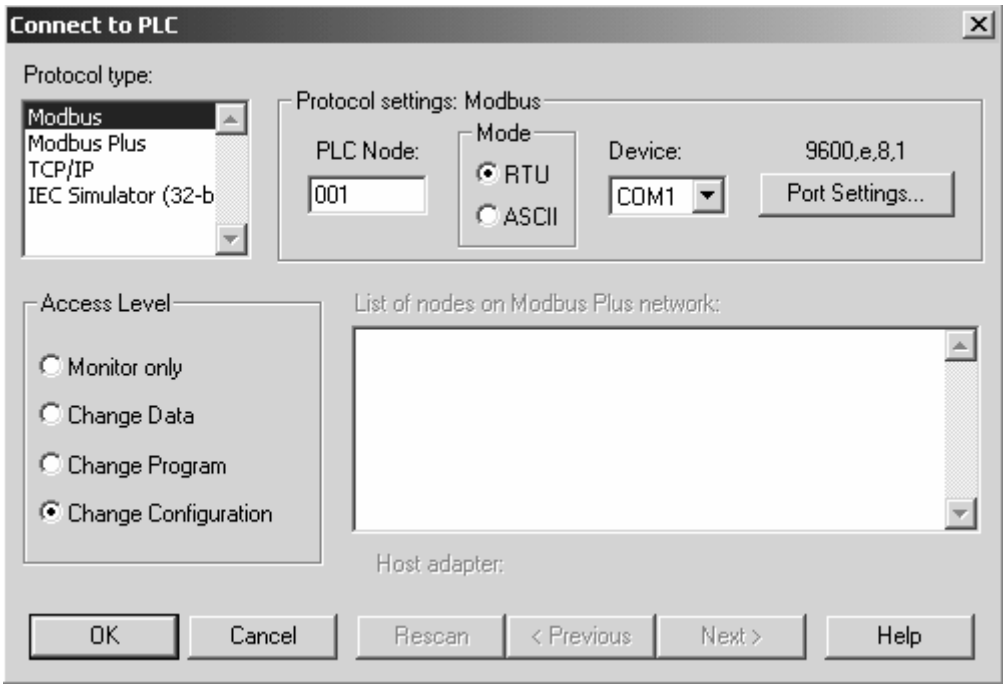
1 Use the null modem cable to connect your PC's serial port to the Quantum processor, as shown in the following illustration.



Note: You can use a Modbus Plus Network Option Module (NOM Module) module in place of the serial port if necessary.

2 Open the PLC menu, and then choose Connect.

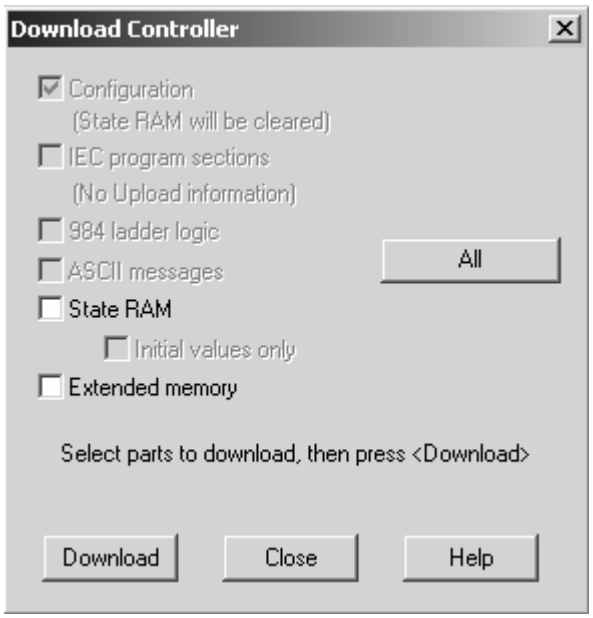
3 In the PLC Configuration dialog box, open the Online menu, and then choose Connect. This action opens the Connect to PLC dialog box.



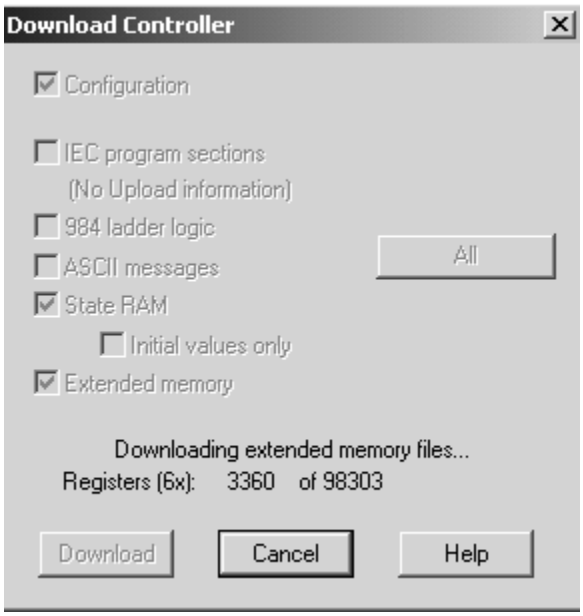
4 Leave the default settings as shown and click OK.

Note: Click OK to dismiss any message boxes that appear during the connection process.

5 In the PLC Configuration window, open the Online menu, and then choose Download. This action opens the Download Controller dialog box.



6 Click all, and then click Download. If a message box appears indicating that the controller is running, click Yes to shut down the controller. The Download Controller dialog box displays the status of the download as shown in the following illustration.

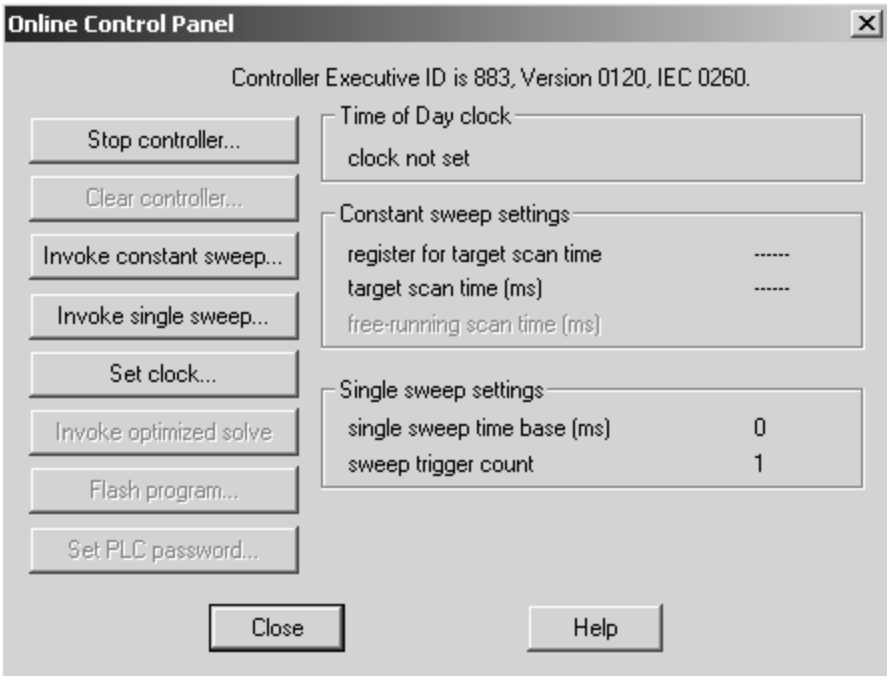


7 When the download is complete, you will be prompted to restart the controller. Click Yes to restart the controller.

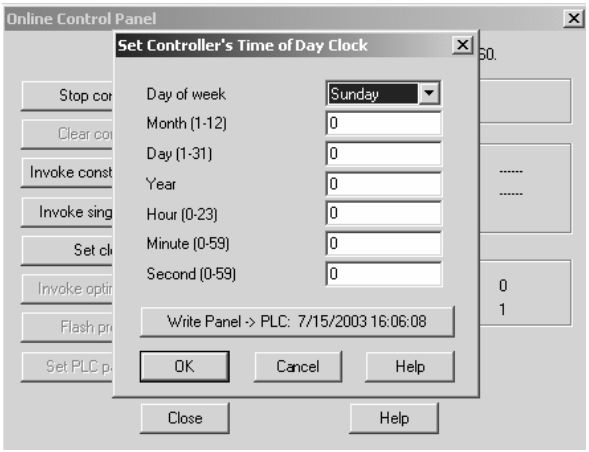
2.6 Verify Successful Download

The final step is to verify that the configuration changes you made were received successfully by the module, and to make some adjustments to your settings.

1 In the PLC Configuration window, open the Online menu, and then choose Online Control Panel. This action opens the Online Control Panel dialog box.



2 Click the Set Clock button to open the Set Controller's Time of Day Clock dialog box.

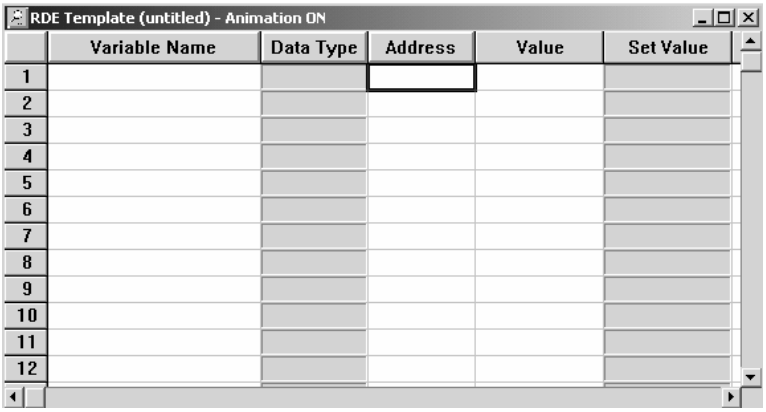


3 Click the Write Panel button. This action updates the date and time fields in this dialog box. Click OK to close this dialog box and return to the previous window.

4 Click Close to close the Online Control Panel dialog box.

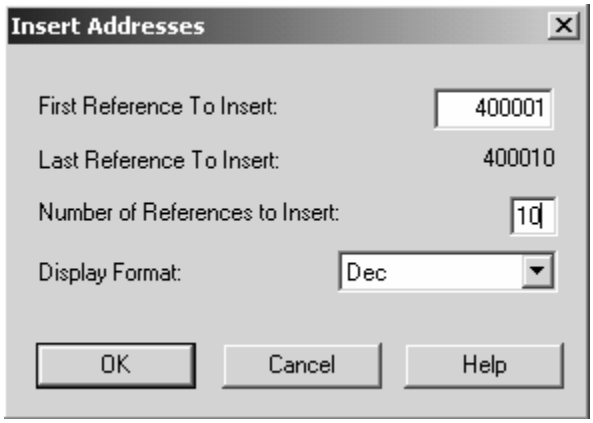
5 In the PLC Configuration window, open the Online menu, and then choose Reference Data Editor. This action opens the Reference Data Editor dialog box. On this dialog box, you will add preset values to data registers that will later be monitored in the ProTalk module.

6 Place the cursor over the first address field, as shown in the following illustration.

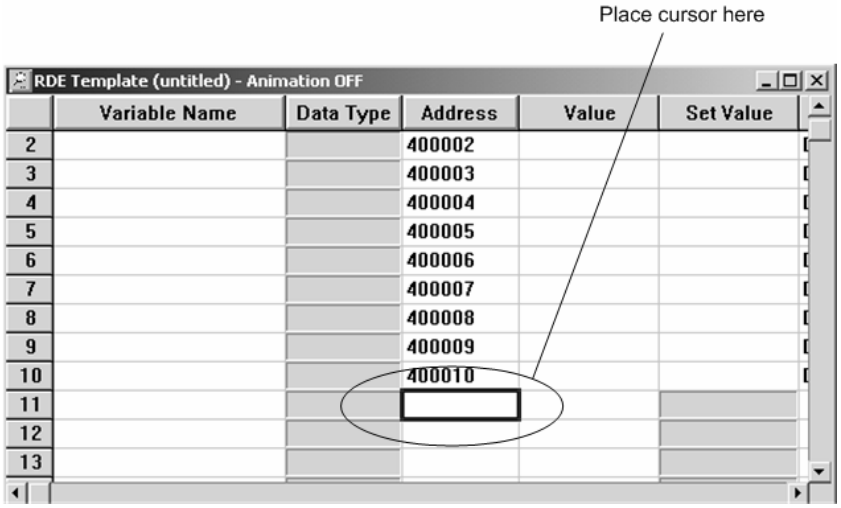


7 In the PLC Configuration window, open the Templates menu, and then choose Insert addresses. This action opens the Insert addresses dialog box.

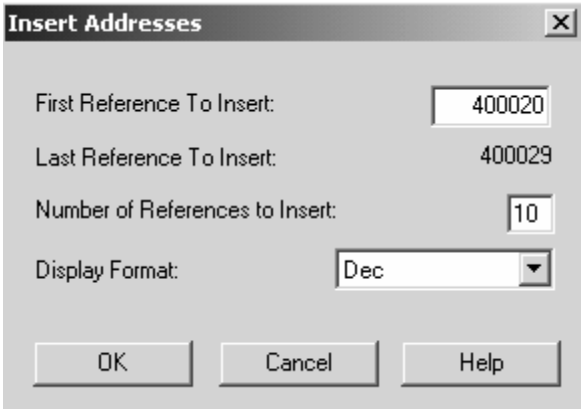
8 On the Insert addresses dialog box, enter the values shown in the following illustration, and then click OK.



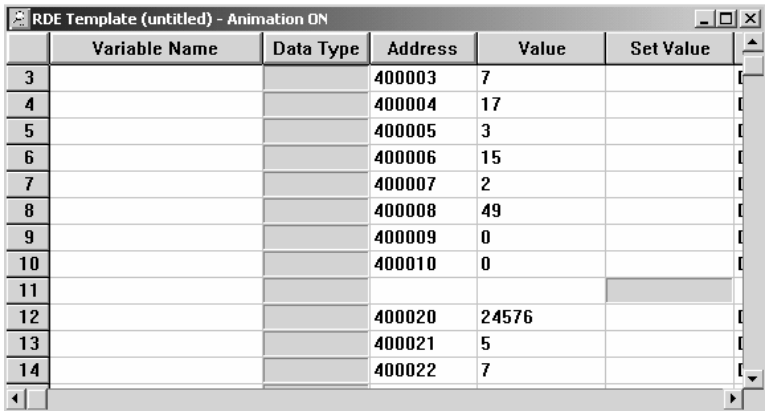
9 Notice that the template populates the address range, as shown in the following illustration. Place your cursor as shown in the first blank address field below the addresses you just entered.



10 Repeat steps 6 through 9, using the values in the following illustration:



11 In the PLC Configuration window, open the Online menu, and then choose animate. This action opens the RDE Template dialog box, with animated values in the Value field.



	Variable Name	Data Type	Address	Value	Set Value
3			400003	7	
4			400004	17	
5			400005	3	
6			400006	15	
7			400007	2	
8			400008	49	
9			400009	0	
10			400010	0	
11					
12			400020	24576	
13			400021	5	
14			400022	7	

12 Verify that values shown are cycling, starting from address 400065 on up.

13 In the PLC Configuration window, open the Templates menu, and then choose Save Template as. Name the template ptqclock, and then click OK to save the template.

14 In the PLC Configuration window, open the Online menu, and then choose Disconnect. At the disconnect message, click Yes to confirm your choice.

At this point, you have successfully

- Created and downloaded a Quantum project to the PLC
- Preset values in data registers that will later be monitored in the ProTalk module.

You are now ready to complete the installation and setup of the ProTalk module.

3 Configuring the Processor with ProWORX

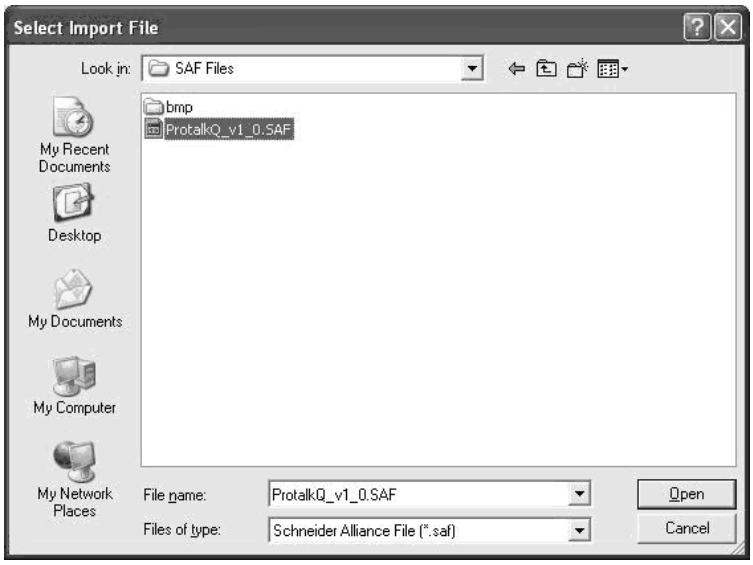
When you use ProWORX 32 software to configure the processor, use the example SaF file provided on the ProTalk Solutions CD-ROM.

Important Note: Proworx software does not report whether the PTQ module is present in the rack, and therefore is not able to report the health status of the module when the module is online with the Quantum processor. Please take this into account when monitoring the status of the PTQ module.

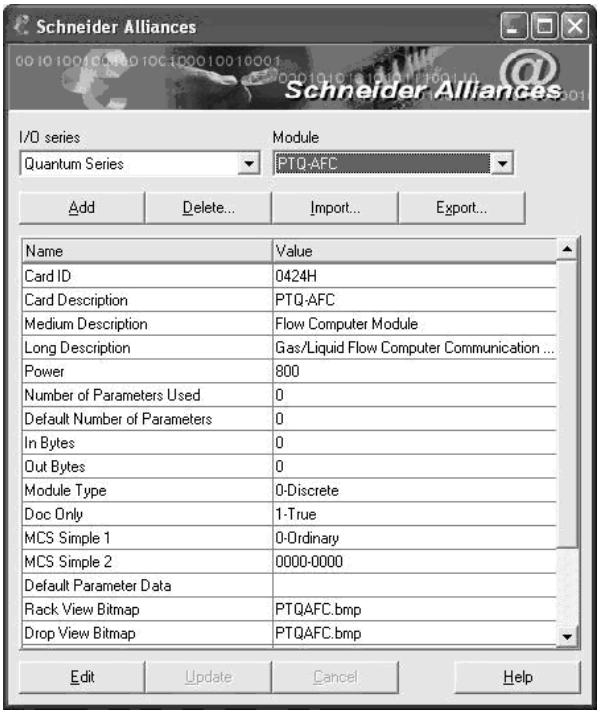
1 Run the Schneider_alliances.exe application that is installed with the Proworx 32 software:

2 Click on Import…

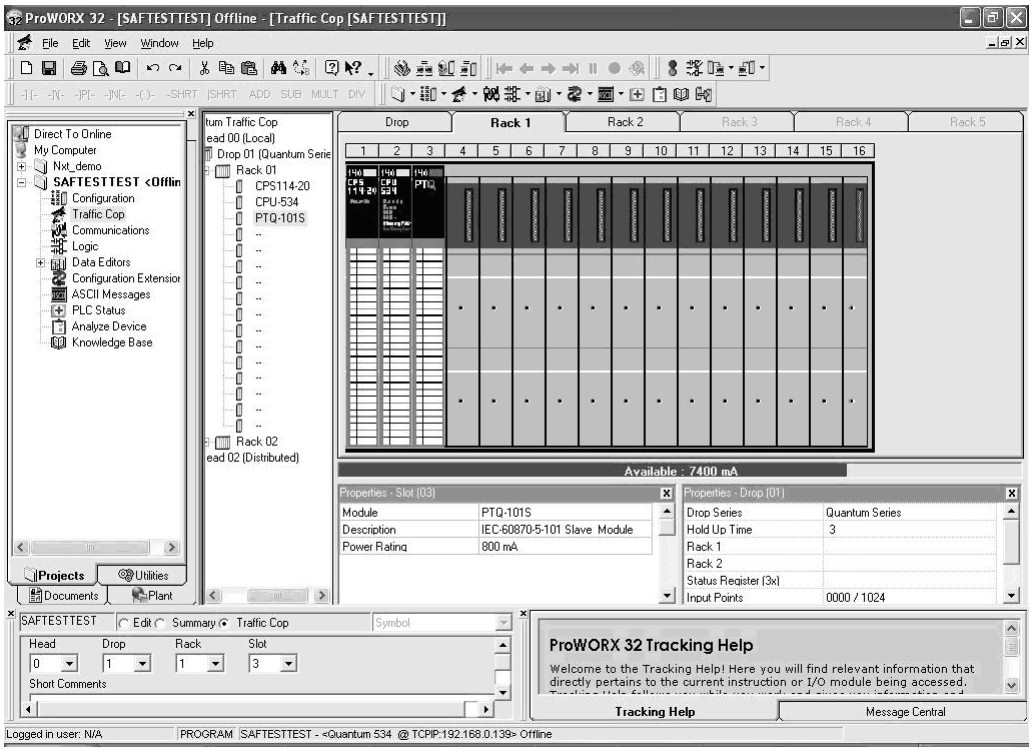
3 Select the .SaF File that is located at the CD-ROM shipped with the PTQ module.



4 After you click on Open you should see the PTQ modules imported (select I/O series as Quantum):



Now you can close the Schneider alliances application and run the Proworx 32 software. At the Traffic Cop section, select the PTQ module to be inserted at the slot:



4 Configuring the Processor with UnityPro XL

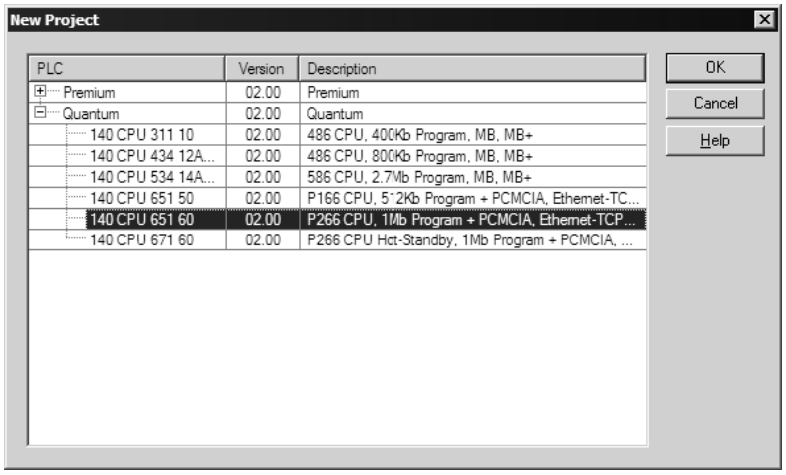
In This Chapter

The following steps are designed to ensure that the processor (Quantum or Unity) is able to transfer data successfully with the PTQ module. As part of this procedure, you will use UnityPro XL to create a project, add the PTQ module to the project, set up data memory for the project, and then download the project to the processor.

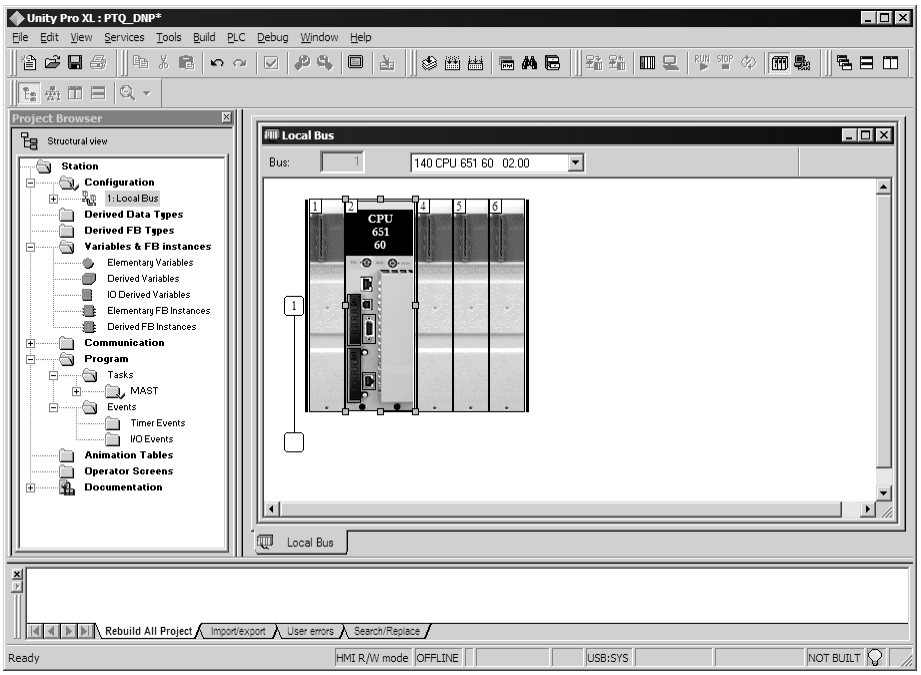
4.1 Create a New Project

The first step is to open UnityPro XL and create a new project.

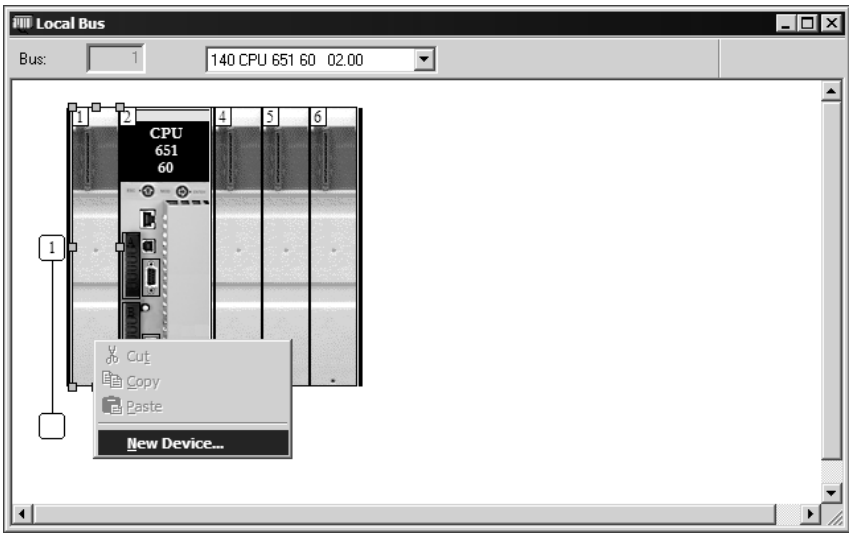
1 In the New Project dialog box, choose the CPU type. In the following illustration, the CPU is 140 CPU 651 60. Choose the processor type that matches your own hardware configuration, if it differs from the example. Click OK to continue.



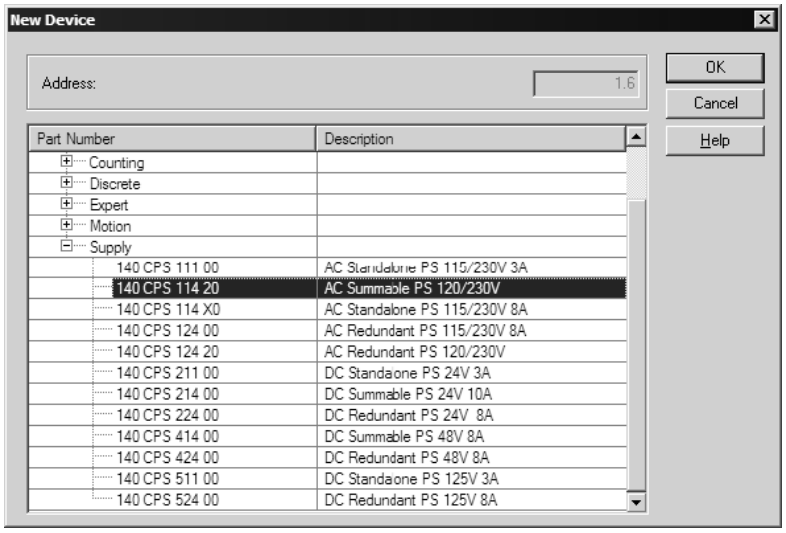
2 The next step is to add a power supply to the project. In the Project Browser, expand the Configuration folder, and then double-click the 1:LocalBus icon. This action opens a graphical window showing the arrangement of devices in your Quantum rack.



3 Select the rack position for the power supply, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose New Device..



4 Expand the Supply folder, and then select your power supply from the list. Click OK to continue.

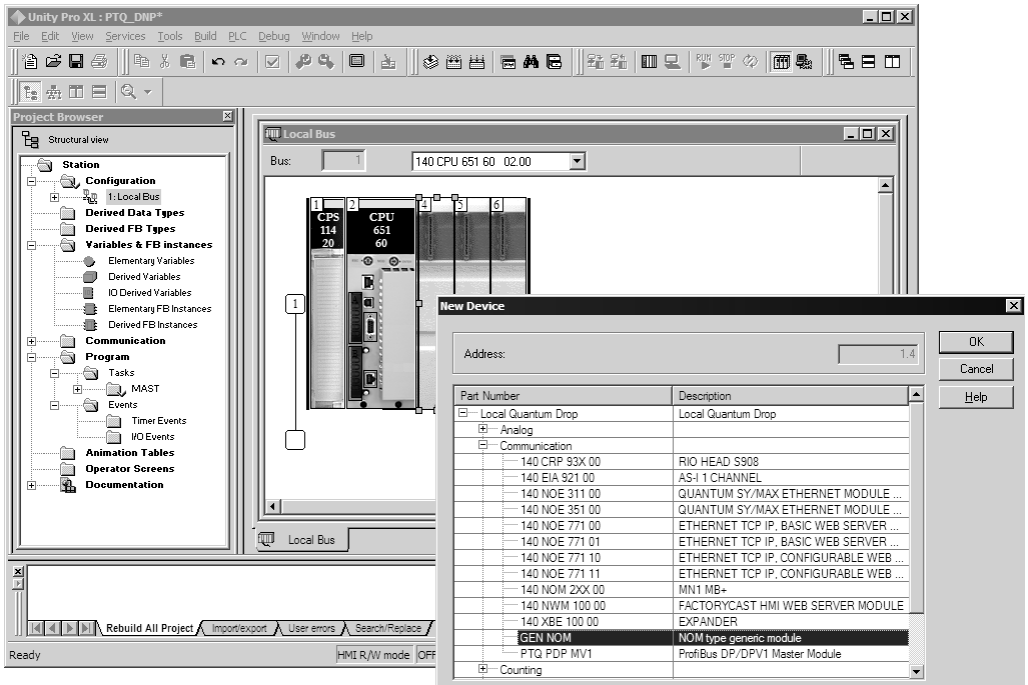


5 Repeat these steps to add any additional devices to your Quantum Rack.

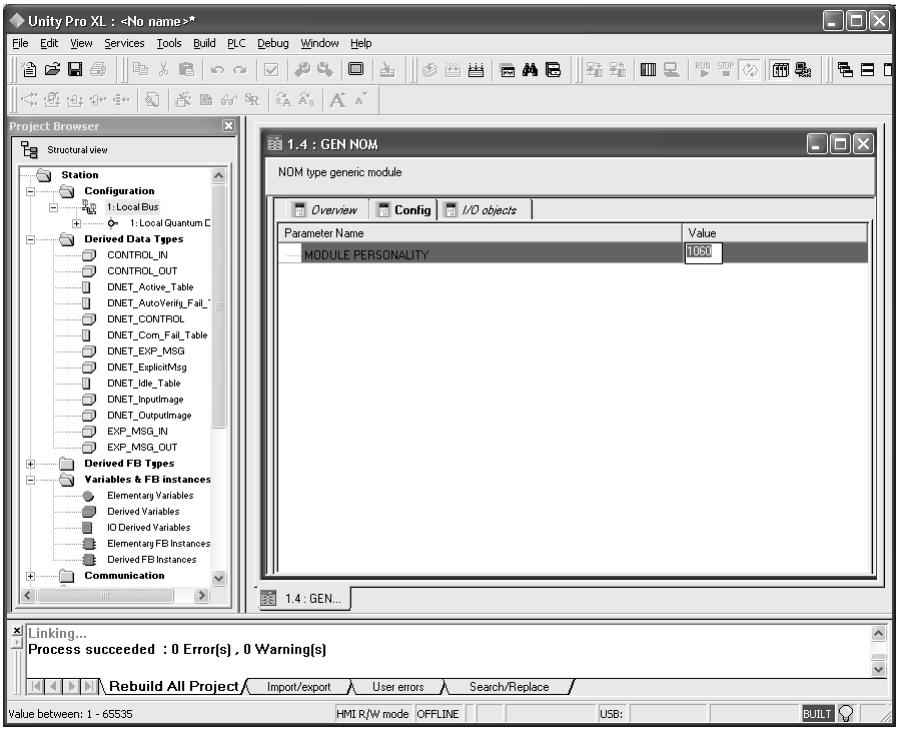
4.2 Add the PTQ Module to the Project

The next step is to add the PTQ module.

1 Expand the Communication tree, and select GEN NOM. This module type provides extended communication capabilities for the Quantum system, and allows communication between the PLC and the PTQ module without requiring additional programming.



2 Next, enter the module personality value. The correct value for ProTalk modules is 1060 decimal (0424 hex).



3 Before you can save the project in UnityProXL, you must validate the modifications. Open the Edit menu, and then choose Validate. If no errors are reported, you can save the project.

4 Save the project.

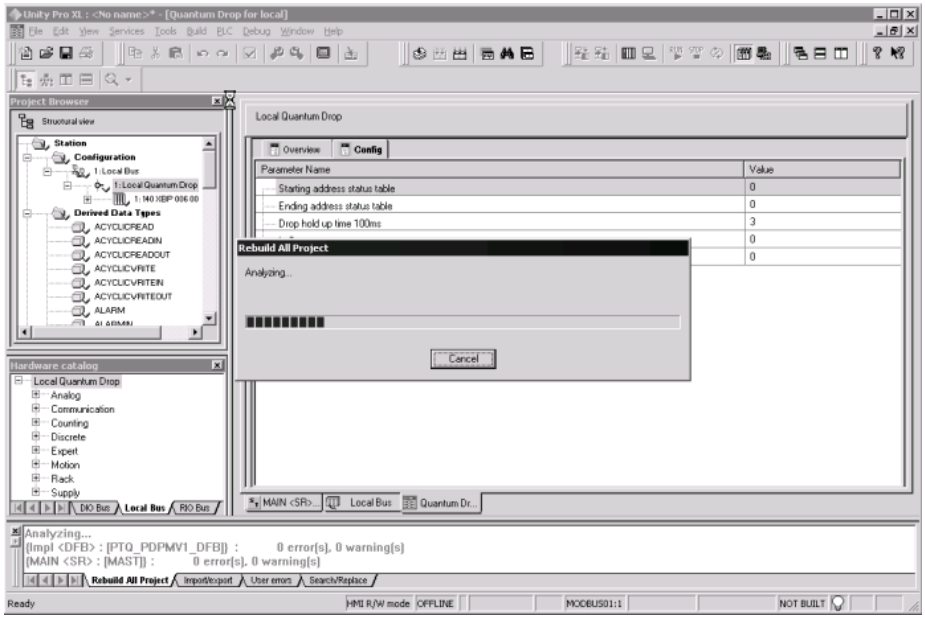
4.3 Build the Project

Whenever you update the configuration of your PTQ module or the processor, you must import the changed configuration from the module, and then build (compile) the project before downloading it to the processor.

Note: The following steps show you how to build the project in Unity Pro XL. This is not intended to provide detailed information on using Unity Pro XL, or debugging your programs. Refer to the documentation for your processor and for Unity Pro XL for specialized information.

To build (compile) the project:

1. Review the elements of the project in the Project Browser.
2. When you are satisfied that you are ready to download the project, open the Build menu, and then choose Rebuild all Project. This action builds (compiles) the project into a form that the processor can use to execute the instructions in the project file. This task may take several minutes, depending on the complexity of the project and the resources available on your PC.
3. As the project is built, Unity Pro XL reports its process in a Progress dialog box, with details appearing in a pane at the bottom of the window. The following illustration shows the build process under way.



After the build process is completed successfully, the next step is to download the compiled project to the processor.

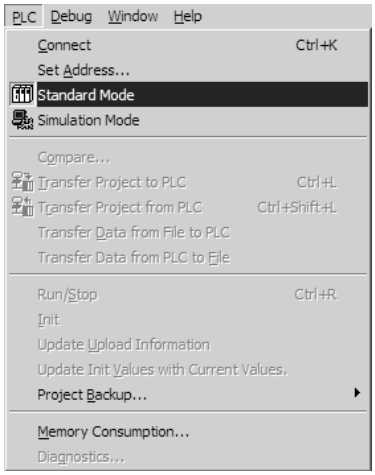
4.4 Connect Your PC to the Processor

The next step is to connect to the processor so that you can download the project file. The processor uses this project file to communicate over the backplane to modules identified in the project file.

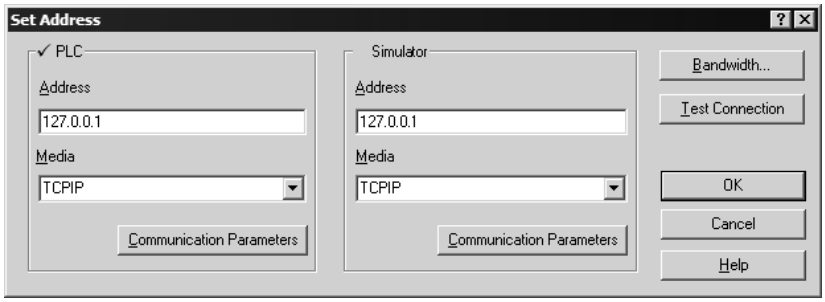
Note: If you have never connected from the PC to your processor before, you must verify that the necessary port drivers are installed and available to UnityPro XL.

To verify address and driver settings in UnityPro XL:

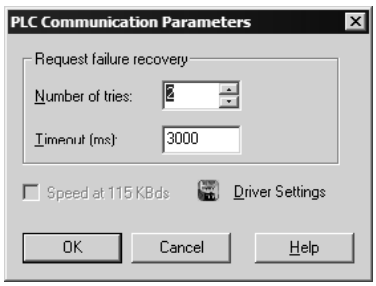
1. Open the PLC menu, and choose Standard Mode. This action turns off the PLC Simulator, and allows you to communicate directly with the Quantum or Unity hardware.



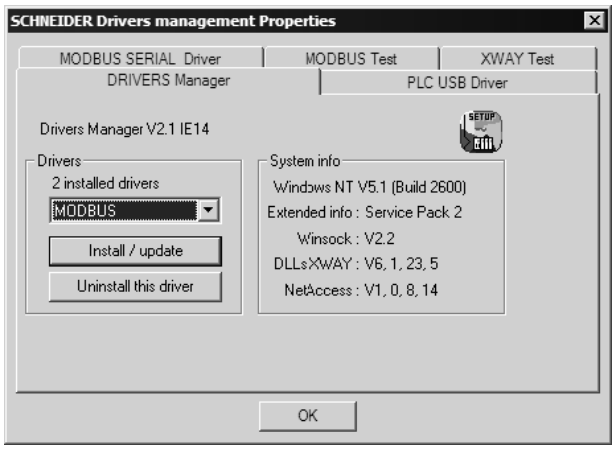
2. Open the PLC menu, and choose Set address... This action opens the Set address dialog box. Open the Media dropdown list and choose the connection type to use (TCPIP or USB).



3 If the Media dropdown list does not contain the connection method you wish to use, click the Communication Parameters button in the PLC area of the dialog box. This action opens the PLC Communication Parameters dialog box.



4 Click the Driver Settings button to open the SCHNEIDER Drivers management Properties dialog box.



5 Click the Install/update button to specify the location of the Setup.exe file containing the drivers to use. You will need your UnityPro XL installation disks for this step.

6 Click the Browse button to locate the Setup.exe file to execute, and then execute the setup program. After the installation, restart your PC if you are prompted to do so. Refer to your Schneider Electric documentation for more information on installing drivers for UnityPro XL.

4.4.1 Connecting to the Processor with TCPIP

The next step is to download (copy) the project file to the processor. The following steps demonstrate how to use an Ethernet cable connected from the Processor to your PC through an Ethernet hub or switch. Other connection methods may also be available, depending on the hardware configuration of your processor, and the communication drivers installed in UnityPro XL.

1 If you have not already done so, connect your PC and the processor to an Ethernet hub.
2 Open the PLC menu, and then choose Set address.

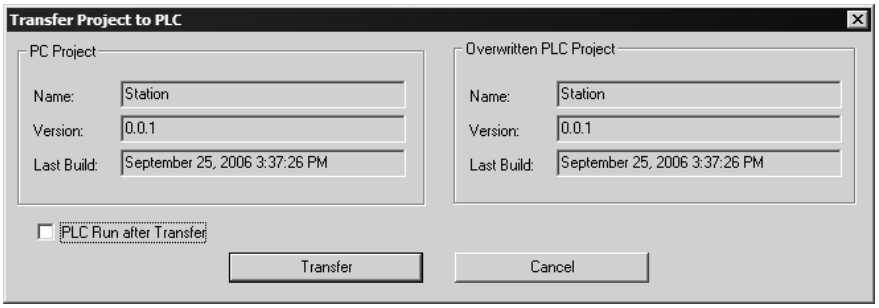
- Important: Notice that the Set address dialog box is divided into two areas. Enter the address and media type in the PLC area of the dialog box, not the Simulator area.

3 Enter the IP address in the address field. In the Media dropdown list, choose TCPIP.
4 Click the Test Connection button to verify that your settings are correct.

The next step is to download the Project to the Processor.

4.5 Download the Project to the Processor

1 Open the PLC menu and then choose Connect. This action opens a connection between the Unity Pro XL software and the processor, using the address and media type settings you configured in the previous step.
2 On the PLC menu, choose Transfer Project to PLC. This action opens the Transfer Project to PLC dialog box. If you would like the PLC to go to "Run" mode immediately after the transfer is complete, select (check) the PLC Run after Transfer check box.



3 Click the Transfer button to download the project to the processor. As the project is transferred, Unity Pro XL reports its process in a Progress dialog box, with details appearing in a pane at the bottom of the window.

When the transfer is complete, place the processor in Run mode.

5 Setting Up the ProTalk Module

In This Chapter

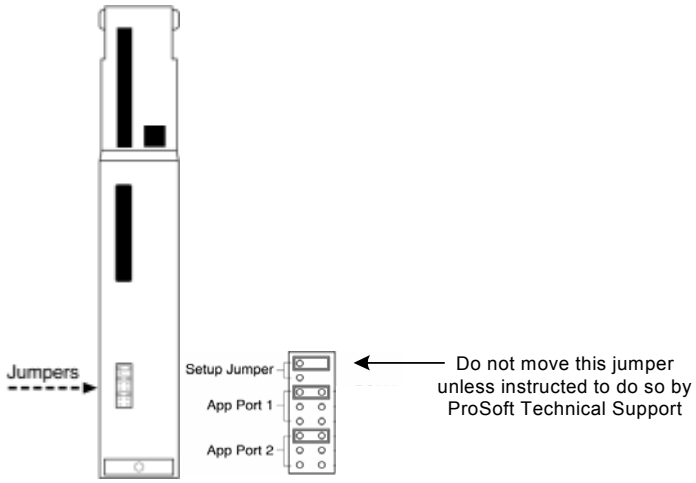
After you complete the following procedures, the ProTalk module will actively be transferring data bi-directionally with the processor.

5.1 Install the ProTalk Module in the Quantum Rack

5.1.1 Verify Jumper Settings

ProTalk modules are configured for RS-232 serial communications by default. To use RS-485, you must change the jumpers.

The jumpers are located on the back of the module as shown in the following illustration:

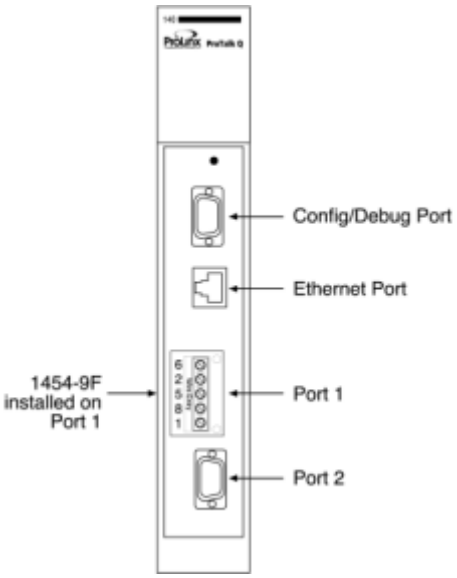


Note: The RS-422 jumper setting is not used with this module configuration.

The Setup Jumper acts as "write protection" for the module's flash memory. In "write protected" mode, the Setup pins are not connected, and the module's firmware cannot be overwritten. Do not jumper the Setup pins together unless you are directed to do so by ProSoft Technical Support.

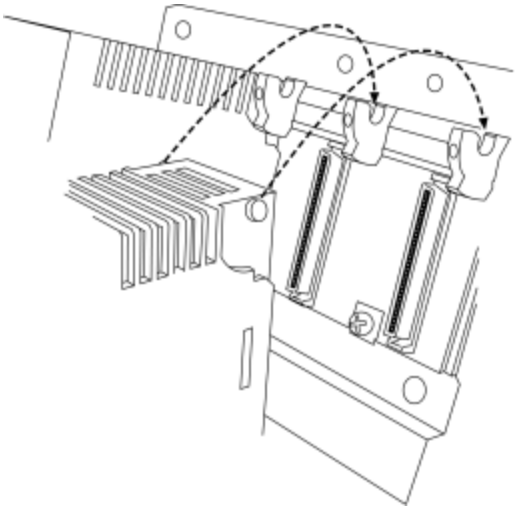
5.1.2 Inserting the 1454-9F connector

Insert the 1454-9F connector as shown. Wiring locations are shown in the table:

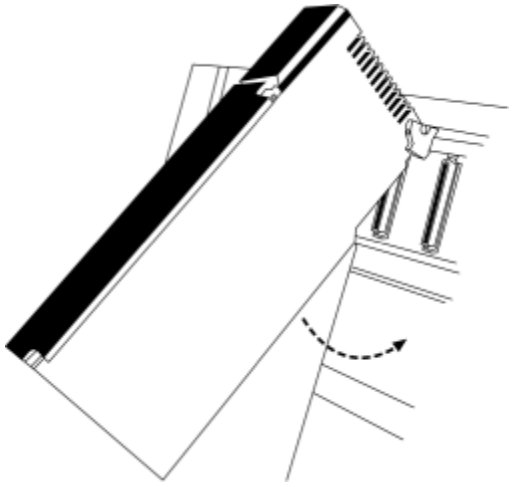


5.1.3 Install the ProTalk Module in the Quantum Rack

1. Place the Module in the Quantum Rack. The ProTalk module must be placed in the same rack as the processor.
2. Tilt the module at a 45° angle and align the pegs at the top of the module with slots on the backplane.



3 Push the module into place until it seats firmly in the backplane.

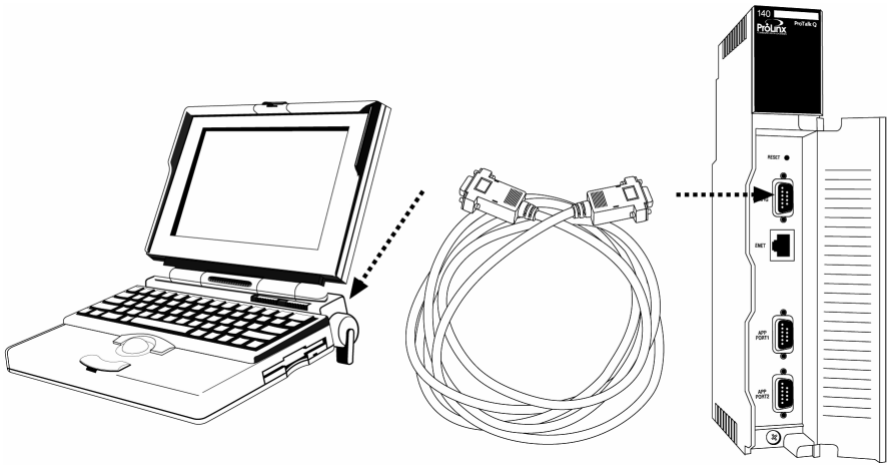


CaUTION: The PTQ module is hot-swappable, meaning that you can install and remove it while the rack is powered up. You should not assume that this is the case for all types of modules unless the user manual for the product explicitly states that the module is hot-swappable. Failure to observe this precaution could result in damage to the module and any equipment connected to it.

5.2 Connect the PC to the ProTalk Configuration/Debug Port

Make sure you have exited the Quantum programming software before performing these steps. This action will avoid serial port conflict.

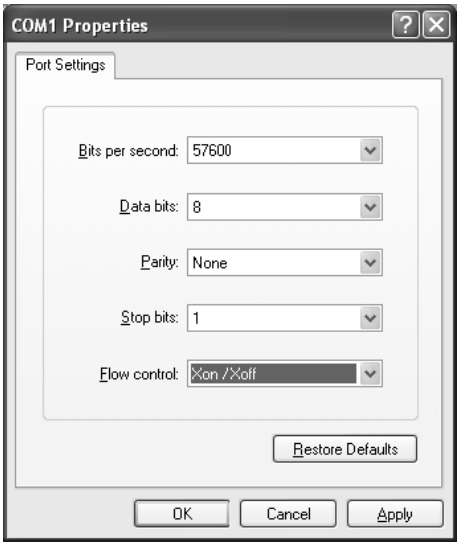
1 Using the supplied Null Modem cable, connect your PC or Laptop to the Configuration/Debug port on the ProTalk module as shown



2 Click the Windows Start button, then choose Programs / accessories / Communications / HyperTerminal.

3 In the HyperTerminal window, enter a connection name, for example **Test,** and then click OK. This action opens the Connect To dialog box.

4 In the Connect Using field, ensure that the com port matches the port on your PC to which you connected the Null Modem cable, and then click OK. This action opens the COMx Properties dialog box.



5 Verify that the settings match those shown in the example above, and then click OK. If your port settings are configured correctly, you will return to the HyperTerminal window.

6 In the HyperTerminal window, press **[?]**. This action opens the module's Configuration/Debug menu.

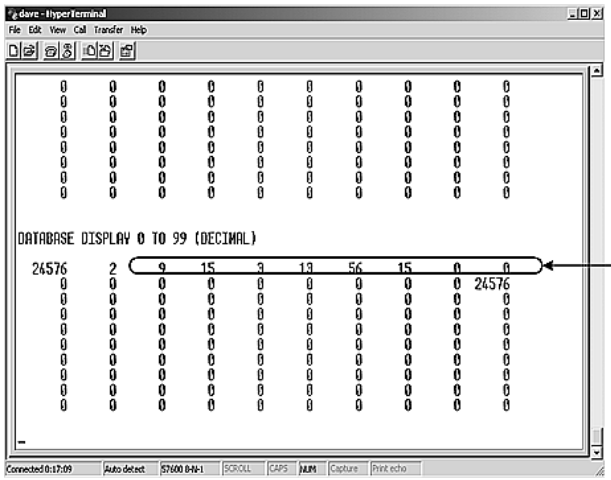
5.3 Verify Communication Between the Processor and the Module

This procedure will verify that the clock values we entered in the processor's data memory (page 22) can be read into the ProTalk module.

1 From the *Configuration/Debug Menu*, type **[D]**, then press **[?]**. This action opens the *Database View Menu*.

```
DATABASE VIEW MENU
 ?=Display Menu
 0-3=Pages 0 to 3000
 S=Show Again
 -=Back 5 Pages
 P=Previous Page
 +=Skip 5 Pages
 N=Next Page
 D=Decimal Display
 H=Hexadecimal Display
 F=Float Display
 A=ASCII Display
 M=Main Menu
```

2 Type [0] (zero). This displays values present in the ProTalk database for 0 to 99.



Value	Description
9	Month (September)
15	Day of the Month
3	Year (2003)
13	Hour (13:00 or 1:00 P.M.)
56	Minutes
15	Seconds

In this example, the register values read from the PLC indicate that the date and time returned is September, 15, 2003, 1:56:15 p.m.

3 Type [0] again. The values should be different than those shown in the previous view. For example, the minute and second values should be incrementing just as the values on the PLC are also incrementing.

At this point, you have successfully:

- Installed and set up the ProTalk module
- Verified Data Read access between the processor and the ProTalk module

You are now ready to proceed with implementation of your application.

6 Configuring the Module

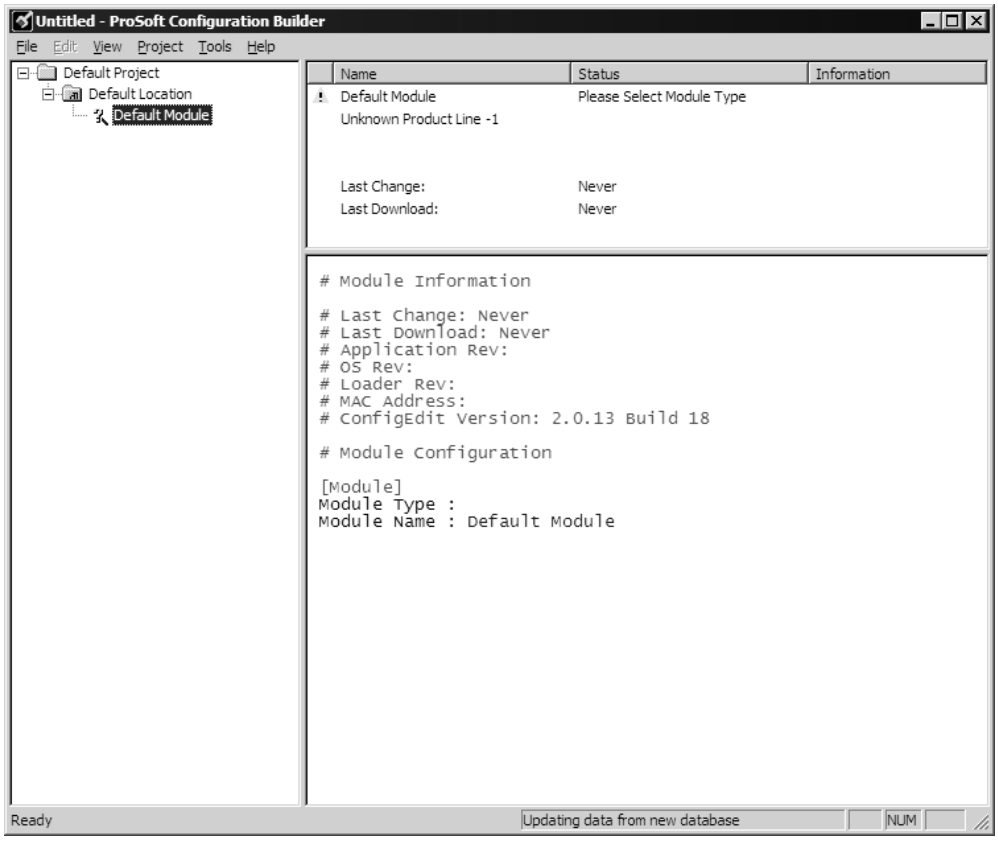
In This Chapter

6.1 ProSoft Configuration Builder

ProSoft Configuration Builder (PCB) provides a quick and easy way to manage module configuration files customized to meet your application needs. PCB is not only a powerful solution for new configuration files, but also allows you to import information from previously installed (known working) configurations to new projects.

6.1.1 Set Up the Project

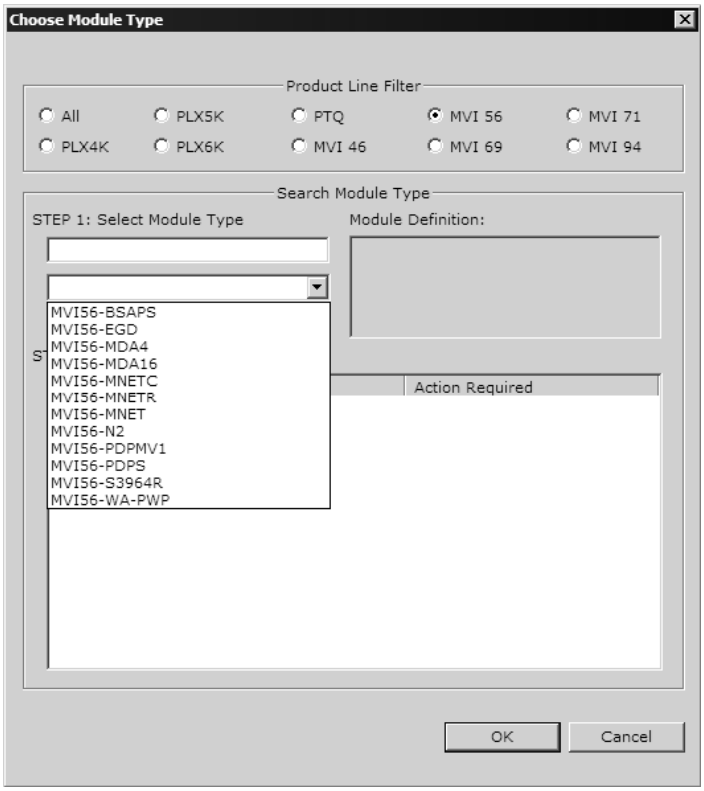
To begin, start ProSoft Configuration Builder. If you have used other Windows configuration tools before, you will find the screen layout familiar. ProSoft Configuration Builder's window consists of a tree view on the left, an information pane and a configuration pane on the right side of the window. When you first start ProSoft Configuration Builder, the tree view consists of folders for Default Project and Default Location, with a Default Module in the Default Location folder. The following illustration shows the ProSoft Configuration Builder window with a new project.



Your first task is to add the PTQ-DH485 module to the project.

1 Use the mouse to select "Default Module" in the tree view, and then click the right mouse button to open a shortcut menu.

2 On the shortcut menu, choose "Choose Module Type". This action opens the Choose Module Type dialog box.



3 In the Product Line Filter area of the dialog box, select PTQ. In the Select Module Type dropdown list, select PTQ-DH485, and then click OK to save your settings and return to the ProSoft Configuration Builder window.

The next task is to set the module parameters.

Adding a Project

To add a project to an existing project file:

1 Select the Default Project icon.
2 Choose Project from the Project menu, then choose Add Project. A new project folder appears.

Adding a Module

To add a module to your project:

1 Double-click the Default Module icon to open the Choose Module Type dialog box.
2 On the Choose Module Type dialog box, select the module type.

Or

1 Open the Project menu and choose Location.
2 On the Location menu, choose Add Module.

To add a module to a different location:

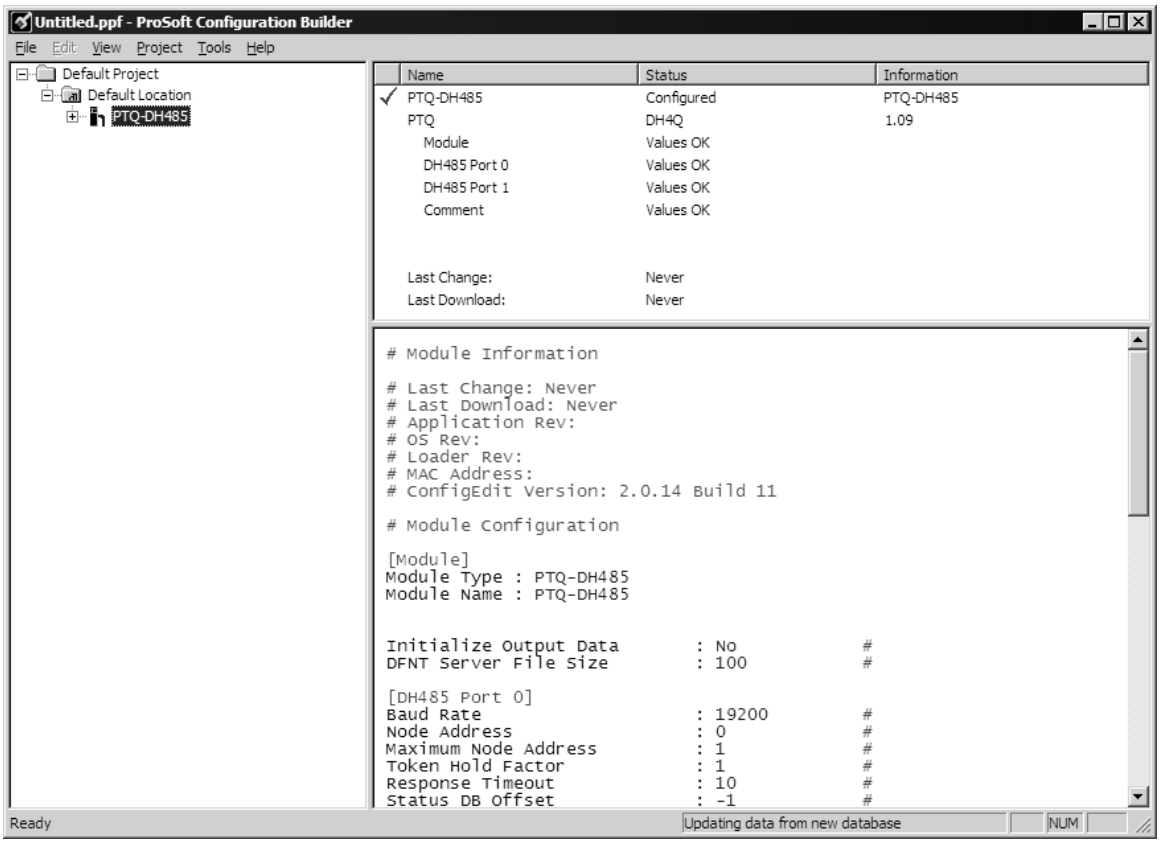
1 Right-click the Location folder and choose Add Module. A new module icon appears.

Or

1 Select the Location icon.
2 From the Project menu, select Location, then select Add Module.

6.1.2 Set Module Parameters

Notice that the contents of the information pane and the configuration pane changed when you added the PTQ-DH485 module to the project.



At this time, you may wish to rename the "Default Project" and "Default Location" folders in the tree view.

To rename an object:

1 Select the object, and then click the right mouse button to open a shortcut menu. From the shortcut menu, choose Rename.
2 Type the name to assign to the object.
3 Click away from the object to save the new name.

Module Entries

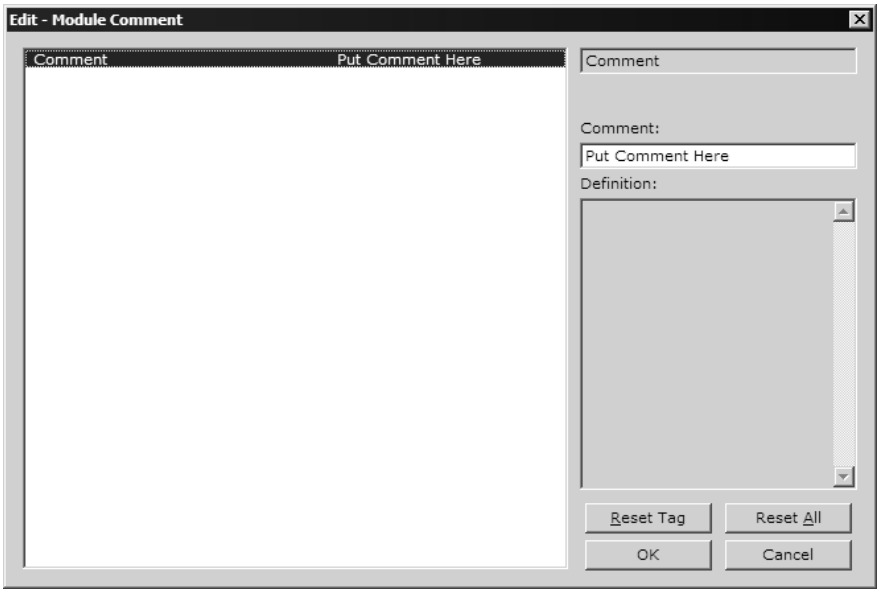
To configure module parameters

1. Click on the plus sign next to the icon Comment to expand module information.
2. Double-click the Module Comment icon to open the Edit dialog box.
3. To edit a parameter, select the parameter in the left pane and make your changes in the right pane.
4. Click OK to save your changes.

Comment Entries

To add comments to your configuration file:

1. Click the plus sign to the left of the Comment icon to expand the Module Comments.
2. Double-click the Module Comment icon. The Edit - Module Comment dialog appears.



3. Enter your comment and click OK to save your changes.

Printing a Configuration File

To print a configuration file:

1. Select the Module icon, and then click the right mouse button to open a shortcut menu.
2. On the shortcut menu, choose View Configuration. This action opens the View Configuration window.
3. On the View Configuration window, open the File menu, and choose Print. This action opens the Print dialog box.
4. On the Print dialog box, choose the printer to use from the dropdown list, select printing options, and then click OK.

6.2 [Module]

This section provides the module with a unique name, identifies the method of failure for the communications for the module if the PLC is not in run, and describes how to initialize the module upon startup.

The following example shows a sample [Module] section:

```
[Module]
Module Name: DH-485 Communication Module Test
Error/Status Pointer   :  3800  #Module status database offset (-1=ignore)
Read Register Start    :     0  #Starting DB address where read data stored
Read Register Count    :   500  #Number of regs to read from module by
processor
Write Register Start   :   500  #Starting DB address where write data accessed
Write Register Count   :   500  #Number of regs to write to module from
                                #processor
#Used to define the area in the Processor for the module to interface with
3x Register Start      :     1  #3x start register where data moved from module
                                #to processor (1-n)
4x Register Start      :     1  #4x start register where data moved from
                                #processor to module (1-n)
Initialize Output Data :    No  #Read output values from controller (Yes or No)
Modify each of the parameters based on the needs of your application.
```

6.2.1 Module Name

0 to 80 characters

This parameter assigns a name to the module that can be viewed using the configuration/debug port. Use this parameter to identify the module and the configuration file.

6.2.2 Error / Status Pointer

-1 to 3999

Starting register location in virtual database for the error/status table. If a value of -1 is entered, the error/status data will not be placed in the database. All other valid values determine the starting location of the data. This data area includes the module version information.

6.2.3 Read Register Start

Range 0 to 3999

This parameter specifies the starting register in the module where the data transferred from the processor will be placed. Valid range for this parameter is 0 to 3999.

6.2.4 Read Register Count

Range 0 to 3999

This parameter specifies the number of registers to be transferred from the module to the processor. Valid entry for this parameter is 0 to 3999.

6.2.5 Write Register Start

Range 0 to 3999

This parameter specifies the starting register in the module where data will be transferred from the module to the processor. Valid range for this parameter is 0 to 3999.

6.2.6 Write Register Count

Range 0 to 3999

This parameter specifies the number of registers to be transferred from the module to the processor. Valid entry for this parameter is 0 to 3999

6.2.7 3x Register Start

1 to n

The 3x Register Start parameter defines the starting address in the processor's 3x (Quantum) or %iw (Unity) memory area to use for data being moved from the module. Take care to use a starting address that will accommodate the entire block from the module, but that will not overwrite data that is used for other purposes.

6.2.8 4x Register Start

1 to n

The 4x Register Start parameter defines the starting address in the processor's 4x (Quantum) or %iw (Unity) memory area to use for data being moved from the processor to the module. Take care to use a starting address that does not contain data in the processor's registers that is used for other purposes.

6.2.9 Initialize Output Data

Yes or No

This parameter determines if the output data for the module should be initialized with values from the processor. If the value is set to 0, the output data will be initialized to 0. If the value is set to 1, the data will be initialized with data from the processor. Use of this option requires associated ladder logic to pass the data from the processor to the module.

6.3 [DH485 Port x]

General configuration information for the specified DH-485 port on the module

```
[DH485 Port 0]
Baud Rate              : 19200 #Baud rate of 1200, 2400, 9600 or 19200
Node Address           :     1 #My node address of 0 to 31
Maximum Node Address   :    31 #Maximum node address in network (1-31)
Token Hold Factor      :    10 #Value from 0 to 31 for this node to hold token
Response Timeout       :    10 #Response timeout in 100mSec increments (0-50)
Status DB Offset       :  3800 #DB loc for port status data (-1=ignore)
Command Error DB Offset:  3100 #DB loc for cmd list error data (-1=ignore)
CIF Read DB Offset     :  4000 #DB byte loc <- CIF read data (-1=ignore)
CIF Read Count         :   100 #Numb of bytes to read from CIF data area
                               #(0-244)
CIF Write DB Offset    :  4200 #DB byte loc -> CIF write data (-1=ignore)
First File             :     7 #First file number to emulate in DB
File Size              :   200 #Number of words in each file emulated
File Offset            :     0 #DB start address for file emulation
Min Command Delay      :  2000 #Min number of milliseconds between commands
```

6.3.1 Baud Rate

Range 1200 to 19200

This is the baud rate to use for the DH485 network. Select one of the listed baud rates.

6.3.2 Node Address

Range 0 to 31

This is the node address to be utilized by the DH-485 driver for this port on the network. Enter a value not already used on the network in the range of 0 to 31. If a value of 255 is utilized or set by the module, the port is disabled. Note: All nodes on the network should be set to the lowest set of values in the range of 1 to 4).

6.3.3 Maximum Node Address

Range 0 to 31

Enter the maximum address that the initiator searches for before wrapping to zero. The default is 31. This parameter should be set to the maximum node address set in the DH-485 network.

6.3.4 Token Hold Factor

Range 0 to 31

Enter the number of transmissions (plus retries) that a node holding a token can send onto the data link each time that it receives the token. Enter a value between 0 and 31. The default is 1.

6.3.5 Response Timeout

Range 1 to 50

This parameter sets the number of 100 millisecond time intervals to wait for a response to a request from the module. If the module does not receive the response with in the time period specified, a timeout condition will be set for the command.

6.3.6 Status DB Offset

Range -1 to 3980

This parameter sets the location of the status data for the port in the module's internal database. If the parameter is set to -1, the data is not placed in the database. If a valid value is entered, the module's status data will be placed in the database starting at the location indicated.

6.3.7 Command Error DB Offset

Range -1 to 3900

This parameter sets the location of the command error list data for the port in the module's internal database. If the parameter is set to -1, the data is not placed in the database. If a valid value is entered, the module's error list data will be placed in the database starting at the location indicated.

6.3.8 CIF Read DB Offset

Range -1 to 7500 (Only even values)

This parameter sets the starting byte location in the module's database where the CIF file Read will be placed. This data is passed from CIF memory area to the set location in the module's database. If this parameter is set to -1, no CIF read data will be utilized. When the CIF Read Area is disabled (CIF Read DB Offset = -1) or CIF Read Count = 0, the Debug menu shows this parameter as 65535.

6.3.9 CIF Read Count

Range 0 to 242

This parameters sets the number of bytes to transfer from the CIF file to the database. The CIF write count will be calculated as (244 - CIF Read Count)

6.3.10 CIF Write DB Offset

Range -1 to 7500 (Only even values)

This parameter sets the starting byte location in the module's database where the CIF file Write data will be read from. This data is passed to the CIF memory area from the set location in the module's database. If this parameter is set to -1, no CIF write data will be utilized. When the CIF Write Area is disabled (CIF Write DB Offset = -1) or CIF Write Count = 0, the Debug menu shows this parameter as 65535.

6.3.11 First File

Range 0 to 255

This parameter sets the file number for the first file to be emulated by the module.

6.3.12 File Size

Range 1 to 1000

This parameter sets the word size of all the files emulated in the module

6.3.13 File Offset

Range 1 to 999

This parameter sets the word offset into the module's database where the file emulation will start.

6.3.14 Min Command Delay

Range 0 to 10000

This parameter sets the minimum number of milliseconds to wait before issuing each command. This parameter is utilized to keep the network from being flooded with requests from the module.

6.4 [DH485 Port x Commands]

The [DH485 Port x Commands] section for each port defines the commands to be issued by the module to other devices on the network. These commands can be used for data collection and/or control.

6.4.1 Command List Overview

In order to interface the PTQ-DH485 module to act as a master device, you must construct a command list for each port. The commands in the list specify the node to be addressed, the function to be performed (read or write), the data area in the device to interface with and the registers in the internal database to be associated with the device data. The command list supports up to 100 commands. The command list is processed from top (command #0) to bottom. A poll interval parameter is associated with each command to specify a minimum delay time in seconds between the issuance of a command. If the user specifies a value of 10 for the parameter, the command will be executed no more frequently than every 10 seconds.

Write commands have a special feature, as they can be set to execute only if the data in the write command changes. If the register data values in the command have not changed since the command was last issued, the command will not be executed. If the data in the command has changed since the command was last issued, the command will be executed. Use of this feature can lighten the load on the network. In order to implement this feature; set the enable code for the command to a value of 2.

6.4.2 Command Entry Format

Each command entered in the command list section has the same format. The following is an example section for Port 0:

```
[DH485 Port 0 Commands]
#
# Enable Types  : 0=Disable, 1=Poll at interval, 2=Conditional Poll
# Swap Codes    : 0=None, 1=Swap Words, 2=Swap bytes and words, 3=Swap bytes
# Function Codes: 0=Read, 1=Write
# FileType Codes: 0=status, 1=bit, 2=timer, 3=counter, 4=control, 5=int,
#                  6=float, 10=CIF
#
# Enbl        DB  Elem   Swap  Poll  Node  Func  File  File  Element
# Type   Address count  Code   Int     #  Code  Type     #   Number
START
     1      1000     10     0     0     6     0     5     11      0
     1      1000     10     0     0     6     1     5     10      0
     0      1000     100    0     0     5     0     5     7       0
//read port 0 status data
     0      1000     100    0     0     5     1     5     16      0
//read port 1 status data
     0      1500     10     0     0     6     1     5    10       0
//write status data
     0      1500     10     0     0     6     0     5    11       0
//read  status data
#    1       250     1      0     0     2     1     6    8        5
//write status data
#    1       250     1      0     0     2     0     6    8        0
//write status data
     0      2260     10     0     0     6     1     10    9       10
//write status data
     0      2260     10     0     0     6     0     10    9       0
//write status data


END
```

The first part of each record in the section relates to the module interface and the last part relates to the node to be interfaced with. The following topics describe each field required for a user command

6.4.3 Enable Type Code

This field defines if the command is enabled and when it should be executed. The following codes are recognized by the application:

0 = Command is disabled

1 = Command is executed at the polling interval specified

2 = The write command is only executed when data changes

6.4.4 Database Start Address

This field defines the starting address in the module's internal database to associate with the command. This field can have a value from 0 to 3999. The address supplied is a word address in the database.

6.4.5 Element Count

This field defines the number of elements to be used with the command. If the command is interfacing with CIF data, this parameter represents a byte count. For data file access, the data size utilized is dependent on the file type used.

6.4.6 Swap Code

This field changes the order of the bytes and/or words used when sending or receiving the data. The following codes are utilized:

Swap Code	Description
0	None - No Change is made in the byte ordering (1234 = 1234)
1	Words - The words are swapped (1234=3412)
2	Words & Bytes - The words are swapped then the bytes in each word are swapped (1234=4321)
3	Bytes - The bytes in each word are swapped (1234=2143)

6.4.7 Poll Interval

This field sets the time interval between successive execution of the command. This parameter is specified in seconds. If the field is set to 10, the command will not be executed more frequently than every 10 seconds.

6.4.8 Node Number

This field defines the node address of the DH-485 node to send the command request. This field should be set to a value from 0 to 31.

6.4.9 Function Code

This field defines the function to be executed by the command. The module uses the following codes:

0 = Read

1 = Write

6.4.10 File Type

This field defines the file type to be interfaced with in the other DH-485 node. The program utilizes the following codes for this field:

0 = Status File (2 bytes per element)

1 = Bit File (2 bytes per element)

2 = Timer File (6 bytes per element)

3 = Counter File (6 bytes per element)

4 = Control File (6 bytes per element)

5 = Integer File (2 bytes per element)

6 = Floating-point File (4 bytes per element)

10 = CIF File (1 byte per element)

6.4.11 File Number

This field defines the file number to access. This field is ignored for CIF file access and should be set to 0. For Bit, Timer, Counter, Control, Integer, and Float data types, a maximum value of 255 is valid.

6.4.12 Element Number

This field defines the first element in the file specified to be associated with the command. For a CIF file, this parameter is given as the byte location. For Bit, Timer, Counter, Control, Integer, and Float data types, the maximum value is 255. For CIF data types the maximum value is 510.

Maximum Element Counts for Read/Write Commands

The maximum number of elements requested from a remote node is determined by the file type and function code utilized in the command. The following table lists the maximum element count for each file type:

File Type	Bytes/Elements	Read Result	Write Result
Status	2	83	83
Bit	2	118	115
Timer	6	39	38
Counter	6	39	38
Control	6	39	38

File Type	Bytes/Elements	Read Result	Write Result
Integer	2	118	115
Float	4	59	57
CIF	1	236	234

6.5 File Override Mapping

The [DH485 Port x Maps] section for each port defines file override mappings for the module. Use of these maps provides flexibility defining the file emulation supported in the slave driver of the module. Up to 50 maps can be defined in the module to override the fixed file-mapping feature of the module.

6.6 [DH485 Port x Maps]

Each file map entered in the configuration file has the same format. The following is an example section for Port 0:

```
# This section contains a list of file override values to overlay the database.
# The list will be searched by the driver for each data request made of the
# driver on the specified port. If the file:element value in the request
# matches an entry in the list, the database offset assigned to the entry
# will be used in conjunction with the other data in the entry to return
# or set the data.

[DH485 Port 0 Maps]
#  DB_Address    File_Number   Element    Length
START
#           0            110         0       100
#         100            112         0       100
END
```

These file maps are searched first when a node on the network makes a request. If the requested data area is found in the map list, the database area associated with the command will be used. If the requested data area is not found in the map list, the fixed mapping data configuration will be used.

The following topics describe each field required for an override map.

6.6.1 Database Start Address

This field defines the starting address in the module's database for the file emulation. This parameter can be assigned a value of 0 to 3999.

6.6.2 File Number

This field defines the file number to be emulated at the database location specified.

6.6.3 Element

This field specifies the first element in the file to be emulated. This element number corresponds to the database start address set for the record.

6.6.4 Word Count (Length)

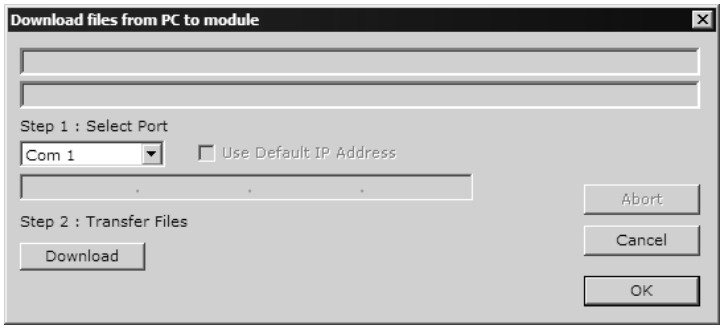
This field defines the number of word registers to be emulated in the file.

6.7 Download the Project to the Module

In order for the module to use the settings you configured, you must download (copy) the updated Project file from your PC to the module.

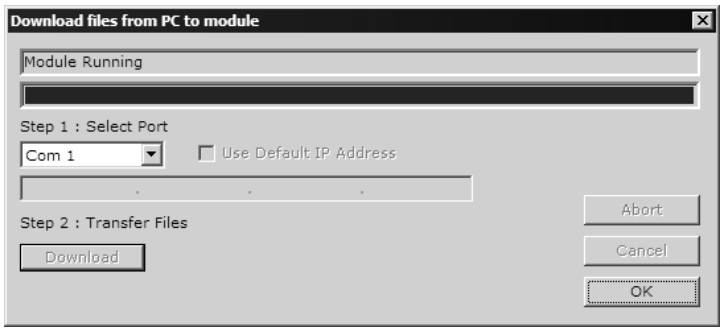
To Download the Project File

1. In the tree view in ProSoft Configuration Builder, click once to select the PTQ-DH485 module.
2. Open the **Project menu,** and then choose **Module / Download**. The program will scan your PC for a valid com port (this may take a few seconds). When PCB has found a valid com port, the following dialog box will open.



3. Choose the com port to use from the dropdown list, and then click the Download button.

   The module will perform a platform check to read and load its new settings. When the platform check is complete, the status bar in ProSoft Configuration Builder will be updated with the message *"Module Running*".



7 Diagnostics and Troubleshooting

In This Chapter

The module provides information on diagnostics and troubleshooting in the following forms:

- Status data values are transferred from the module to the processor.
- Data contained in the module can be viewed through the Configuration/Debug port attached to a terminal emulator.
- LED status indicators on the front of the module provide information on the module's status.

7.1 Reading Status Data from the Module

The PTQ-DH485 module provides the status data in each read block. This data can also be located in the module's database and will be transferred to the Quantum/Unity processor continuously with each read block.

The Configuration/Debug port provides the following functionality:

- Full view of the module's configuration data
- View of the module's status data
- Version Information
- Control over the module (warm boot and cold boot)
- Facility to upload and download the module's configuration file

7.1.1 Required Hardware

You can connect directly from your computer's serial port to the serial port on the module to view configuration information, perform maintenance, and send (upload) or receive (download) configuration files.

ProSoft Technology recommends the following minimum hardware to connect your computer to the module:

- 80486 based processor (Pentium preferred)
- 1 megabyte of memory
- At least one UART hardware-based serial communications port available. USB-based virtual UART systems (USB to serial port adapters) often do not function reliably, especially during binary file transfers, such as when uploading/downloading configuration files or module firmware upgrades.
- A null modem serial cable.

7.1.2 The Configuration/Debug Menu

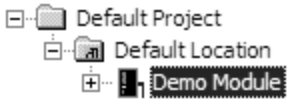
The Configuration and Debug menu for this module is arranged as a tree structure, with the Main Menu at the top of the tree, and one or more sub-menus for each menu command. The first menu you see when you connect to the module is the Main menu.

Because this is a text-based menu system, you enter commands by typing the command letter from your computer keyboard in the diagnostic window in ProSoft Configuration Builder (PCB). The module does not respond to mouse movements or clicks. The command executes as soon as you press the command letter — you do not need to press **[Enter]**. When you type a command letter, a new screen will be displayed in your terminal application.

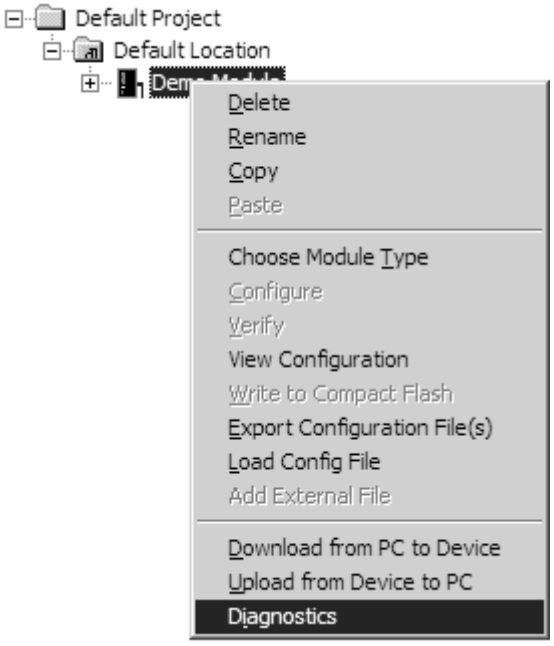
Using the Diagnostic Window in ProSoft Configuration Builder

To connect to the module's Configuration/Debug serial port:

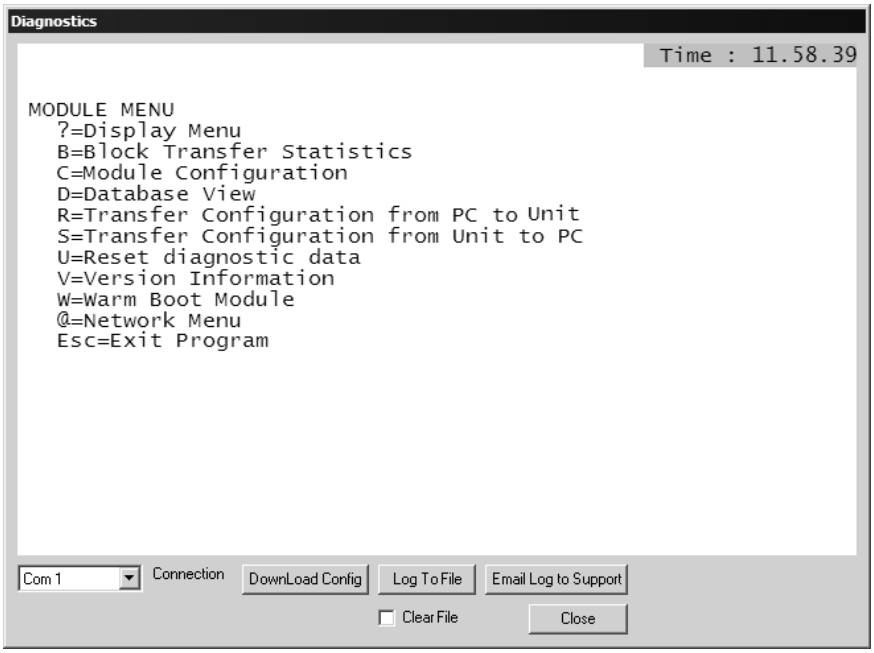
1 Start PCB program with the application file to be tested. Right click over the module icon.



2 On the shortcut menu, choose Diagnostics.



3 This action opens the Diagnostics dialog box. Press "?" to display the Main Menu.



Important: The illustrations of configuration/debug menus in this section are intended as a general guide, and may not exactly match the configuration/debug menus in your own module.

If there is no response from the module, follow these steps:

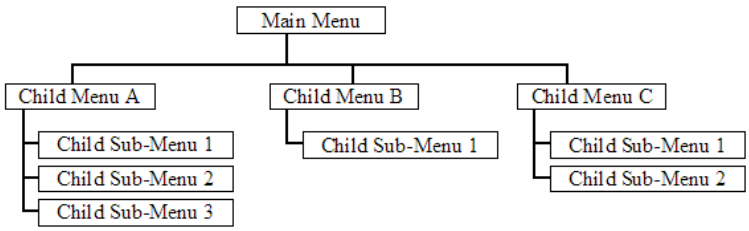
1 Verify that the null modem cable is connected properly between your computer's serial port and the module. A regular serial cable will not work.
2 On computers with more than one serial port, verify that your communication program is connected to the same port that is connected to the module.

If you are still not able to establish a connection, contact ProSoft Technology for assistance.

Navigation

All of the sub-menus for this module contain commands to redisplay the menu or return to the previous menu. You can always return from a sub-menu to the next higher menu by pressing **[M]** on your keyboard.

The organization of the menu structure is represented in simplified form in the following illustration:



The remainder of this section shows you the menus available for this module, and briefly discusses the commands available to you.

Keystrokes

The keyboard commands on these menus are almost always non-case sensitive. You can enter most commands in lower case or capital letters.

The menus use a few special characters (**[?]**, **[-]**, **[+]**, **[@]**) that must be entered exactly as shown. Some of these characters will require you to use the **[Shift]**, **[Ctrl]** or **[Alt]** keys to enter them correctly. For example, on US English keyboards, enter the **[?]** command as **[Shift][/]**.

Also, take care to distinguish capital letter **[I]** from lower case letter **[l]** (L) and number **[1]**; likewise for capital letter **[O]** and number **[0]**. Although these characters look nearly the same on the screen, they perform different actions on the module.

7.1.3 Main Menu

When you first connect to the module from your computer, your terminal screen will be blank. To activate the main menu, press the [?] key on your computer's keyboard. If the module is connected properly, the following menu will appear on your terminal screen:

```
DH485 APPLICATION MENU
  ?=Display Menu
  B=Block Transfer Statistics
  C=Module Configuration
  D=Database View
  E=DH485 Port 0 Menu
  F=DH485 Port 1 Menu
  R=Transfer Configuration from PC to Module
  S=Transfer Configuration from Module to PC
  V=Version Information
  W=Warm Boot Module
  Esc=Exit Program
```

Caution: Some of the commands available to you from this menu are designed for advanced debugging and system testing only, and can cause the module to stop communicating with the processor or with other devices, resulting in potential data loss or other failures. Only use these commands if you are specifically directed to do so by ProSoft Technology Technical Support staff. Some of these command keys are not listed on the menu, but are active nevertheless. Please be careful when pressing keys so that you do not accidentally execute an unwanted command.

Viewing Block Transfer Statistics

Press **[B]** from the Main Menu to view the Block Transfer Statistics screen.

Use this command to display the configuration and statistics of the backplane data transfer operations between the module and the processor. The information on this screen can help determine if there are communication problems between the processor and the module.

Tip: To determine the number of blocks transferred each second, mark the numbers displayed at a specific time. Then some seconds later activate the command again. Subtract the previous numbers from the current numbers and divide by the quantity of seconds passed between the two readings.

Viewing Module Configuration

Press **[C]** to view the Module Configuration screen.

Use this command to display the current configuration and statistics for the module.

Opening the Database Menu

Press **[D]** to open the Database View menu. Use this menu command to view the current contents of the module's database.

Opening the DH-485 Port x Menu

Press **[E]** (port 1) or **[F]** (port 2) to view the configuration and status data related to the DH-485 driver for each of the application ports.

Transferring the Configuration File from PC to PTQ module

Press **[R]** to send (upload) the configuration file from your PC to the module and store the file on the module's Compact Flash Disk.

Press **[Y]** to confirm the file transfer, and then follow the instructions on the terminal screen to complete the file transfer process.

After the file has been successfully downloaded, the module will restart the program and load the new configuration information. Review the new configuration using menu commands **[6]** and **[0]** to verify that the module is configured correctly.

Transferring the Configuration File from PTQ module to PC

Press **[S]** to receive (download) the configuration file from the module to your PC.

Press **[Y]** to confirm the file transfer, and then follow the instructions on the terminal screen to complete the file transfer process.

After the file has been successfully downloaded, you can open and edit the file to change the module's configuration.

Warm Booting the Module

Caution: Some of the commands available to you from this menu are designed for advanced debugging and system testing only, and can cause the module to stop communicating with the processor or with other devices, resulting in potential data loss or other failures. Only use these commands if you are specifically directed to do so by ProSoft Technology Technical Support staff. Some of these command keys are not listed on the menu, but are active nevertheless. Please be careful when pressing keys so that you do not accidentally execute an unwanted command.

Press **[W]** from the Main Menu to warm boot (restart) the module. This command will cause the program to exit and reload, refreshing configuration parameters that must be set on program initialization. Only use this command if you must force the module to re-boot.

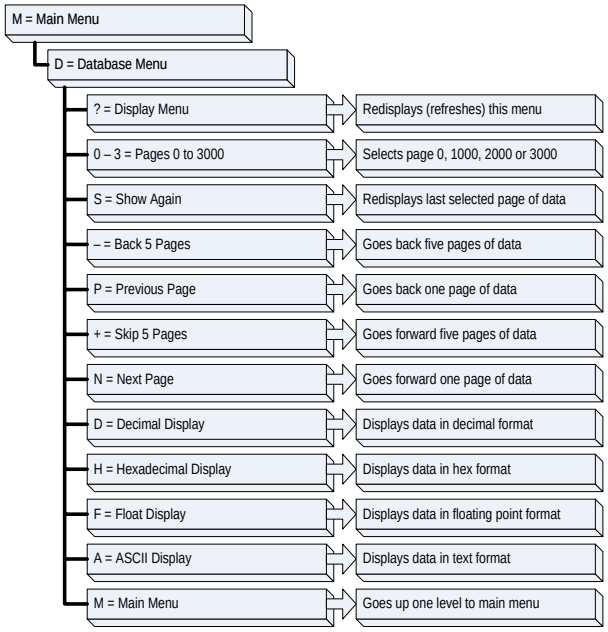
Exiting the Program

Caution: Some of the commands available to you from this menu are designed for advanced debugging and system testing only, and can cause the module to stop communicating with the processor or with other devices, resulting in potential data loss or other failures. Only use these commands if you are specifically directed to do so by ProSoft Technology Technical Support staff. Some of these command keys are not listed on the menu, but are active nevertheless. Please be careful when pressing keys so that you do not accidentally execute an unwanted command.

Press **[Esc]** to restart the module and force all drivers to be loaded. The module will use the configuration stored in the module's Flash ROM to configure the module.

7.1.4 Database View Menu

Press **[D]** from the Main Menu to open the Database View menu. Use this menu command to view the current contents of the module's database. Press **[?]** to view a list of commands available on this menu.



Viewing Register Pages

To view sets of register pages, use the keys described below:

Command	Description
[0]	Display registers 0 to 99
[1]	Display registers 1000 to 1099
[2]	Display registers 2000 to 2099

And so on. The total number of register pages available to view depends on your module's configuration.

Displaying the Current Page of Registers Again

```
DATABASE DISPLAY 0 TO 99 (DECIMAL)
   100   101   102     4     5     6     7     8     9    10
    11    12    13    14    15    16     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0     0
```

This screen displays the current page of 100 registers in the database.

Moving Back Through 5 Pages of Registers

Press **[-]** from the Database View menu to skip back to the previous 500 registers of data.

Viewing the Previous 100 Registers of Data

Press **[P]** from the Database View menu to display the previous 100 registers of data.

Skipping 500 Registers of Data

Hold down **[Shift]** and press **[=]** to skip forward to the next 500 registers of data.

Viewing the Next 100 Registers of Data

Press **[N]** from the Database View menu to select and display the next 100 registers of data.

Viewing Data in Decimal Format

Press **[D]** to display the data on the current page in decimal format.

Viewing Data in Hexadecimal Format

Press **[H]** to display the data on the current page in hexadecimal format.

Viewing Data in Floating Point Format

Press **[F]** from the Database View menu. Use this command to display the data on the current page in floating point format. The program assumes that the values are aligned on even register boundaries. If floating-point values are not aligned as such, they are not displayed properly.

Viewing Data in ASCII (Text) Format

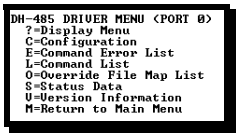
Press **[A]** to display the data on the current page in ASCII format. This is useful for regions of the database that contain ASCII data.

Returning to the Main Menu

Press **[M]** to return to the Main Menu.

7.1.5 DH485 Port x Menu

Use these commands to view the configuration and status data related to the DH-485 driver for each of the application ports. After selecting one of the commands, press the '**?**' key to display the following menu:



Select one of the options from the menu to perform one of the operations available on the menu. Each command is discussed in the following topics:

Viewing Port Configuration

Press **[C]** to view configuration information for the application port.

Use this command to display detailed configuration information for the port.

Opening the Command Error List Menu

Press **[E]** to open the Command Error List. This list consists of multiple pages of command list error/status data. Press **[?]** to view a list of commands available on this menu.

Opening the Command List Menu

Press **[L]** to open the Command List menu. Use this command to view the configured command list for the module.

Opening the Override File Map List Menu

Press **[O]** to view the Override File Map List. Use this command to view the user defined file map configuration data.

Viewing Port Status Data

Press **[S]** to view detailed status information for the application port.

The Cfg Error: parameter displayed will have a value of 0x0000 if there are no configuration errors for the driver. This is a bit mapped value (displayed in hexadecimal format) with each bit representing a configuration error. The following table lists the bits used by the module:

Bit	Code	Description
0	0x0001	Invalid baud rate
1	0x0002	Invalid node address
2	0x0004	Invalid maximum node address
3	0x0008	Invalid token hold factor
4	0x0010	Invalid response timeout
5	0x0020	Invalid status or command error DB offset

Bit	Code	Description
6	0x0040	Invalid CIF read count or DB offset
7	0x0080	Invalid CIF write DB offset
8	0x0100	Invalid file size
9	0x0200	Invalid file offset
10	0x0400	
11	0x0800	
12	0x1000	
13	0x2000	
14	0x4000	
15	0x8000	

Viewing Version Information

Press **[V]** to view Version information for the module.

Use this command to view the current version of the software for the module, as well as other important values. You may be asked to provide this information when calling for technical support on the product.

Values at the bottom of the display are important in determining module operation. The Program Scan Counter value is incremented each time a module's program cycle is complete.

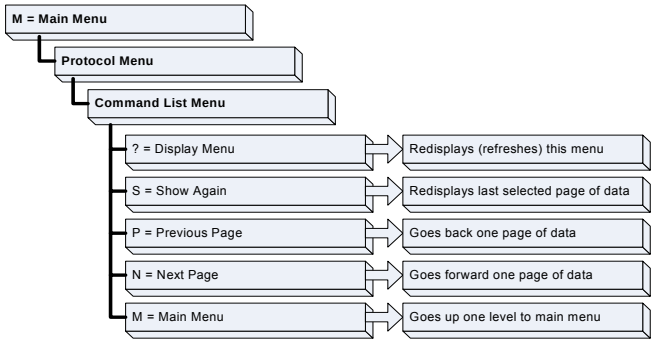
Tip: Repeat this command at one-second intervals to determine the frequency of program execution.

Returning to the Main Menu

Press **[M]** to return to the Main Menu.

7.1.6 Command List Menu

Use this menu to view the configured command list for the module. Press **[?]** to view a list of commands available on this menu.



Redisplaying the Menu

Press **[?]** to display the current menu. Use this command when you are looking at a screen of data, and want to view the menu choices available to you.

Redisplaying the Current Page

Press **[S]** to redisplay the current page of data.

Use this command to display the current page of commands. Ten commands are displayed on each page.

If an enabled command has an error, the EN field will contain a value of -1. This indicates that the command will be re-issued every 30 seconds.

Viewing the Previous Page of Commands

Press **[P]** to display the previous page of commands.

Viewing the Next Page of Commands

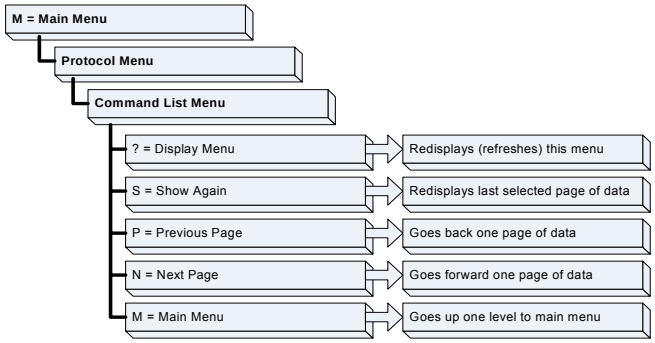
Press **[N]** to display the next page of commands.

Returning to the Main Menu

Press **[M]** to return to the Main Menu.

7.1.7 Master Command Error List Menu

Use this menu to view the command error list for the module. Press **[?]** to view a list of commands available on this menu.



Redisplaying the Current Page

Press **[S]** to display the current page of data.

Viewing the Previous 20 Commands

Press **[-]** to display data for the previous 20 commands.

Viewing the Previous Page of Commands

Press **[P]** to display the previous page of commands.

Viewing the Next 20 Commands

Press **[+]** to display data for the next 20 commands.

Viewing the Next Page of Commands

Press **[N]** to display the next page of commands.

Returning to the Main Menu

Press **[M]** to return to the Main Menu.

7.1.8 Override File Map List Menu

Press **[O]** to view the Override File Map List. Use this command to view the user defined file map configuration data.

Redisplaying the Current Page

Press **[S]** to display the current page of data.

Viewing the Next Page of Data

Press **[N]** to display the next page of data.

Viewing the Previous Page of Data

Press **[P]** to display the previous page of data.

Returning to the Main Menu

Press **[M]** to return to the Main Menu.

7.2 LED Status Indicators

The LEDs indicate the module's operating status as follows:

ProTalk Module	Color	Status	Indication
PRT1	Green	On	Data is being transferred between the module and a remote terminal using the Configuration/Debug port.
		Off	No data is being transferred on the Configuration/Debug port.
PRT2	Green	On	Port is communicating
		Off	Port is not communicating
PRT3	Green	On	Port is communicating
		Off	Port is not communicating
ERR2 P2 Fail	Red	Off	Normal Operation
		On	Time-out The port sent DH-485 command but did not receive response from its peer.
ERR3 P2 Fail	Red	Off	Normal Operation
		On	Time-out The port sent DH-485 command but did not receive response from its peer
Active	Green	On	The LED is on when the module recognizes a processor and is able to communicate if the [Backplane Data Movement] section specifies data transfer commands.
		Off	The LED is off when the module is unable to speak with the processor. The processor either absent or not running.
BAT Low	Red	Off	The battery voltage is OK and functioning.
		On	The battery voltage is low or the battery is not present. The battery LED will illuminate briefly upon the first installation of the module or if the unit has been un-powered for an extended period of time. This behavior is normal, however should the LED come on in a working installation please contact ProSoft Technology.
E-Link	Green	On	Not Used
		Off	Not Used
E-Data	Green	On	Not Used
		Off	Not Used

If your module is not operating, and the status LEDs are not illustrated in the table above, please call ProSoft Technology for technical assistance.

8 Reference

In This Chapter

8.1 Product Specifications

The DH-485 Communication Module allows Schneider Electric Quantum / Unity I/O compatible processors to interface easily with other DH-485 protocol compatible devices. Compatible devices include not only Rockwell Automation PLCs (which support the DH-485 protocol) but also a wide assortment of end devices.

8.1.1 Features and Benefits

The PTQ-DH485 module actively issues DH-485 commands to other nodes on the DH-485 network. One hundred user-defined commands are supported by the module on each port. The Quantum processor can be programmed to control the activity on the port by actively enabling or disabling each command directly.

The module also accepts DH-485 commands from an attached DH-485 master unit. The module permits a remote master to interact with all data contained in the module. This data can be derived from other DH-485 slave devices on the network through a master port or from the Quantum processor.

8.1.2 General Specifications

- Single Slot - Quantum backplane compatible
- The module is recognized as an Options module and has access to PLC memory for data transfer
- Configuration data is stored in non-volatile memory in the ProTalk module
- Up to six modules can be placed in a rack
- Local rack - The module must be placed in the same rack as processor
- Compatible with common Quantum / Unity programming tools
- Quantum data types supported: 3x, 4x
- High speed data transfer across backplane provides quick data update times
- Sample ladder file available

8.1.3 Hardware Specifications

Specification	Value
Backplane Current Load	800 mA @ 5 V
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5% to 95% (non-condensing)
Vibration	Sine vibration 4-100 Hz in each of the 3 orthogonal axes
Shock	30G, 11 mSec. in each of the 3 orthogonal axes
LED Indicators	Module Status Backplane Transfer Status Serial Port Activity LED Serial Activity and Error LED Status
Configuration Serial Port (PRT1)	DB-9M PC Compatible RS-232 only No hardware handshaking
Application Serial Ports	(PRT2, PRT3) DB-9M PC Compatible RS-232/422/485 jumper selectable RS-422/485 screw termination included RS-232 handshaking configurable 500V Optical isolation from backplane

8.1.4 Functional Specifications

The PTQ-DH485 module acts as an input/output module between the DH-485 network and the Schneider Electric Quantum backplane. The data transfer from the Quantum processor is asynchronous from the actions on the DH-485 network. A 4000-word register space in the module exchanges data between the processor and the DH-485 network.

- The module has a Common Interface File (CIF) with 244 words that can be accessed by remote DH-485 nodes
- Read and write commands can be sent associated to the following file types: status, bit, timer, counter, control, integer, float, and CIF
- User-definable module memory usage
- Two ports emulate the DH-485 devices (peer-to-peer) with distinct node addresses
- All configuration information contained in a single, user-defined text file
- Quantum / Unity backplane interface
- All module-related data is contained in an internal database
- Ability to add or remove nodes without disruption of the network
- Baud rates: 9600 or 19200 baud

8.2 Functional Overview

8.2.1 Backplane Data Exchange

Before modifying the configuration file, you must understand some important concepts. The following topics describe these concepts.

If you have used the parameters defined in the [Module] section, you have created the following memory map. We will use this map to explain how data transfer works between the processor and the ProTalk module.

PTQ Memory Address		Application Memory Address
0	=	0
10	=	10
20	=	20
30	=	30
40	=	40
50	=	50
60	=	60
70	=	70
80	=	80
90	=	90
100	=	100
110	=	110
120	=	120
130	=	130
140	=	140
149	=	149
…		…
500	=	500
510	=	510
520	=	520
530	=	530
540	=	540
549	=	549

A thorough understanding of the information contained in this section is required for successful implementation of the module in a user application.

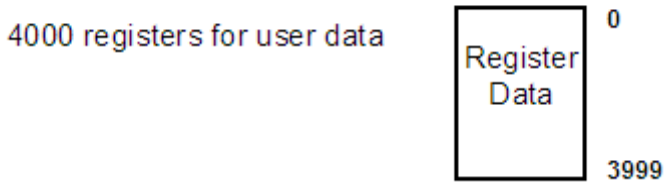
Backplane Data Transfer

The current version of the PTQ-DH485 backplane driver (version 2.10 or newer), uses a Large I/O model, which differs from previous versions of the backplane driver in that it transfers all of the data in the Read and Write databases between the module and the processor on every scan.

The [Module] section of the configuration file defines the starting registers for read and write operations, input data and output data will decide how many blocks must be transferred from module to processor and vice versa.

All data transferred between the module and the processor over the backplane is through the input (3x) and output (4X) images. The following illustration shows the layout of the database.

Module's Internal Database Structure



Data contained in this database is moved through the input (3x data) and output (4x data) images by coordination of the Processor and the PTQ-DH485 module's program. All data will be moved in every scan time. The block identification codes used by the module are listed in the following table:

Block Range	Descriptions
3000	Port 0 command disable block
3001	Port 0 command enable block
3002	Port 0 command conditional block
3100	Port 1 command disable block
3101	Port 1 command enable block
3102	Port 1 command conditional block
9998	Warm-boot control block
9999	Cold-boot control block

Each image has a defined structure depending on the data content and the function of the data transfer as defined in the following topics.

Input and Output Blocks

3X Read Block

These blocks of data transfer information from the module to the quantum/unity processors. The structure of the input image (Read Block) used to transfer this data is shown in the following table:

Read Data Block

Offset	Description	Length
0 to 63	Command/Control Data	64
64 to n	Read Data (Module to PLC)	x

Where n is the read register count

Using the large I/O transfer means all data will be moved from the processor to the module and vice versa at once every processor scan.

4X Write Block

These blocks of data transfer information from the processor to the module. The structure of the output image (Write block) used to transfer this data is shown in the following table.

Write Data Block

Offset	Description	Length
0 to 63	Command/Control Data	64
64 to n	Write Data (PLC to module)	x

Where n is the Write register count

Command Control Blocks

Command control blocks are special blocks used to control the module or perform special operations. The current version of the software supports four different command control blocks: initialize the read data, change command type control, warm boot, and cold boot:

Initialize Output Data

Important: In order to use this feature, you must change the "Initialize Output Data" parameter to "Yes" in the configuration file. No blocks to be transferred the module will initialize all read data starts at address 64 to n.

Change Command Type Control Block

Blocks 3000, 3001, 3002, 3100, 3101 and 3102 alter the command type for entries in the user command list. When commands are processed during the startup of the module, the command type is set to the value specified in the configuration file. These control blocks alter the configured command type.

Each block contains a command index list. The values entered in this list correspond to the indices of the commands configured by the user. The first command in the user command list has an index of 0 and the second has in index of 1. Therefore, to alter the command type of commands 3 and 5, set the number of command indexes (word 1) to 2 and enter the values 3 and 5 in words 2 and 3. Each block can handle up to 60 commands in the list.

Block 3000 and 3100 requests change the commands listed in the block to the disable type (type = 0). Block 3000 is used for Port 0 and 3100 is used for Port 1 commands. The format for the request block from the ladder logic is as follows:

Offset	**Description**	**Length**
0	Block Sequence Number	1
1	3000 or 3100	1
2	Number of command indexes	1
3 to 62	Command index list	60

Offset	Description	Length
63	Spare	1
64 to n	Write Data (Module to PLC)	x

Where value for x is from 0 to 3999

The response block from the module to the processor has the following format:

Offset	Description	Length
0	Block Sequence Number	1
1	3000 or 3100	1
2	Number of commands processed	1
3 to 63	Not Used	61
64 to n	Read Data (Module to PLC)	x

Block 3001 and 3101 requests change the commands listed in the block to the enable type (type = 1). Block 3001 is used for Port 0 and 3101 is used for Port 1 commands. The format for the request block from the ladder logic is as follows:

Offset	Description	Length
0	Block Sequence Number	1
1	3001 or 3101	1
2	Number of command indexes	1
3 to 62	Command index list	60
63	Spare	1
64 to n	Write Data (Module to PLC)	x

The response block from the module to the processor has the following format:

Offset	Description	Length
0	Block Sequence Number	1
1	3001 or 3101	1
2	Number of commands processed	1
3 to 63	Not used	60
64 to n	Read Data (Module to PLC)	x

Block 3002 and 3102 requests change the commands listed in the block to the conditional type (type = 2). Block 3002 is used for Port 0 and 3102 is used for Port 1 commands. This type code should only be utilized for write commands. The format for the request block from the ladder logic is as follows:

Offset	Description	Length
0	Block Sequence Number	1
1	3002 or 3102	1
2	Number of command indexes	1
3 to 62	Command index list	60
63	Spare	1
64 to n	Write Data (Module to PLC)	x

The response block from the module to the processor has the following format:

Offset	Description	Length
0	Block Sequence Number	1
1	3002 or 3102	1
2	Number of commands processed	1
3 to 63	Not used	61
64 to n	Read Data (Module to PLC)	x

Where value for x is from 0 to 3999.

Warm Boot Block

This block is sent from the processor to the module (4x data) when the module is required to perform a warm boot (software reset operation). This block is commonly sent to the module any time the configuration file is modified. This will force the module to read the new configuration information and to restart. The structure of the control block is shown below:

Offset	Description	Length
0	Block Sequence Number	1
1	9998	1
2 to 63	Spare	60
64 to n	Write Data (PLC to Module)	x

Module Warm Boot Response (Read Block)

Offset	Description	Length
0	Block Sequence Number	1
1	9998	1
2 to 63	Spare	60
64 to n	Read Data (Module to PLC)	x

Cold Boot Block

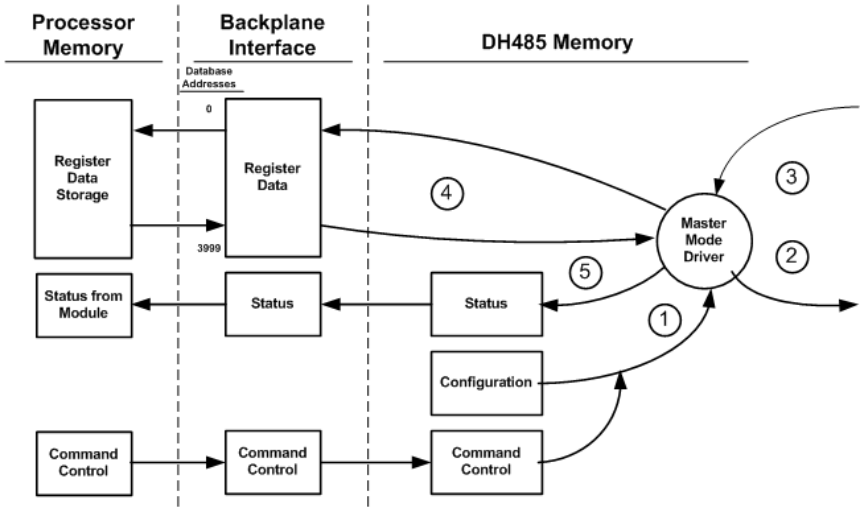
Block 9999 performs a cold-boot operation on the module. The format of the block constructed by the processor is as follows:

Offset	Description	Length
0	Block Sequence Number	1
1	9999	1
2 to 63	Spare	60
64 to n	Write Data (PLC to Module)	x

Where value for x is from 0 to 3999.

8.2.2 Master Driver

Master mode of the PTQ-DH485 module is responsible for issuing read or write commands to other remote devices on the DH-485 network. These commands are user configured in the module via the Master Command List received from the configuration file. Command status is returned to the processor for each individual command in the command list status data area. The location of this status block in the module's internal database is user defined. The following flow chart and associated table describe the flow of data into and out of the module.

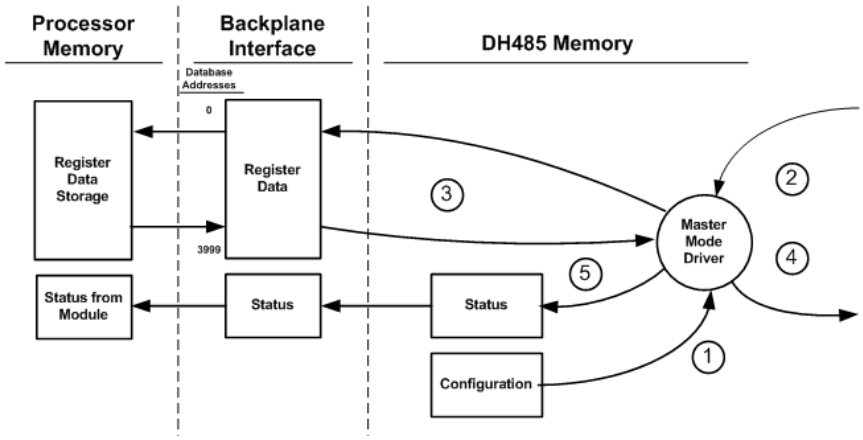


Step	Description
1	The Master driver obtains configuration data from the configuration file which already exist in the image. This information is used by the Master driver to determine the type of commands to be issued to the other nodes on the DH-485 network.
2	After configuration, the Master driver begins transmitting read and/or write commands to the other nodes on the network. If writing data to another node, the data for the write command is obtained from the module's internal database to build the command.
3	Presuming successful processing by the node specified in the command, a response message is received into the Master driver for processing.
4	Data received from the node on the network is passed into the module's internal database, assuming a read command.
5	Status is returned to the processor for each command in the Master Command List. Within the configuration file there is a status pointer so user can relocate status data to any required area in the module data base and then to be passed to the processor.

Refer to Edit the Sample Configuration File Sections for a complete description of the parameters required to define the virtual DH-485 master port. Care must be taken in constructing each command in the list for predictable operation of the module. If two commands write to the same internal database address of the module, the results will not be as desired. All commands containing invalid data will be ignored by the module.

8.2.3 Slave Driver

The Slave Driver Mode allows the PTQ-DH485 module to respond to CIF and data read and write commands issued by a remote node on the DH-485 network. The following flow chart and associated table describe the flow of data into and out of the module.



Step	Description
1	The DH-485 slave port driver configuration information are included in the module image. This information configures the serial port and define the slave node characteristics. The module simulates N-files and CIF to permit remote access of the database.
2	A Host device, issues a read or write command to the module's node address. The port driver qualifies the message before accepting it into the module.
3	After the module accepts the command, the data is immediately transferred to or from the internal database in the module or the CIF data area. If the command is a read command, the data is read out of the database and a response message is built. If the command is a write command, the data is written directly into the database and a response message is built.
4	After the data processing has been completed in Step 3, the response is issued to the originating master node.
5	Counters are available in the Status Block that permit the ladder logic program to determine the level of activity of the Slave Driver.

Review Edit the Sample Configuration File Sections for a complete list of the parameters that must be defined for a slave port. The slave driver supports the following DH-485 command set:

Type	Access	Description
CIF	Read	485CIF, Peer-to-Peer, Read MSG requests
CIF	Write	485CIF, Peer-to-Peer, Write MSG requests
Data Table	Read	500CPU, Peer-to-Peer, Read MSG requests
Data Table	Write	500CPU, Peer-to-Peer, Write MSG requests

The Data table commands require the use of files. These files are emulated in the module. The user configuration of the module defines how these files are emulated in the module. Two file mappings are available. The first sets the first file number and file size for each file. Using this mapping, the files are set as contiguous files overlaying the database. For example, if the user sets the file size to 200 and sets the first file number as 7, the files will overlay the database as shown in the following diagram:

		Database Register
N7:0	---------->	0
N8:0	---------->	200
N9:0	---------->	400
N10:0	---------->	600
N11:0	---------->	800
N12:0	---------->	1000
N13:0	---------->	1200
N14:0	---------->	1400
N15:0	---------->	1600
N16:0	---------->	1800
N17:0	---------->	2000
N18:0	---------->	2200
N19:0	---------->	2400
N20:0	---------->	2600
N21:0	---------->	2800
N22:0	---------->	3000
N23:0	---------->	3200
N24:0	---------->	3400
N25:0	---------->	3600
N26:0	---------->	3800

In addition to the fixed file emulation, the module also supports user defined mapping of files. With this mapping, the user defines the database offset, file number, the starting element number and the length. This data is entered in the [DH485 Port x Maps] section of the configuration file for each port (x=0 for Port 0 and 1 for Port 1. The following is an example for Port 0:

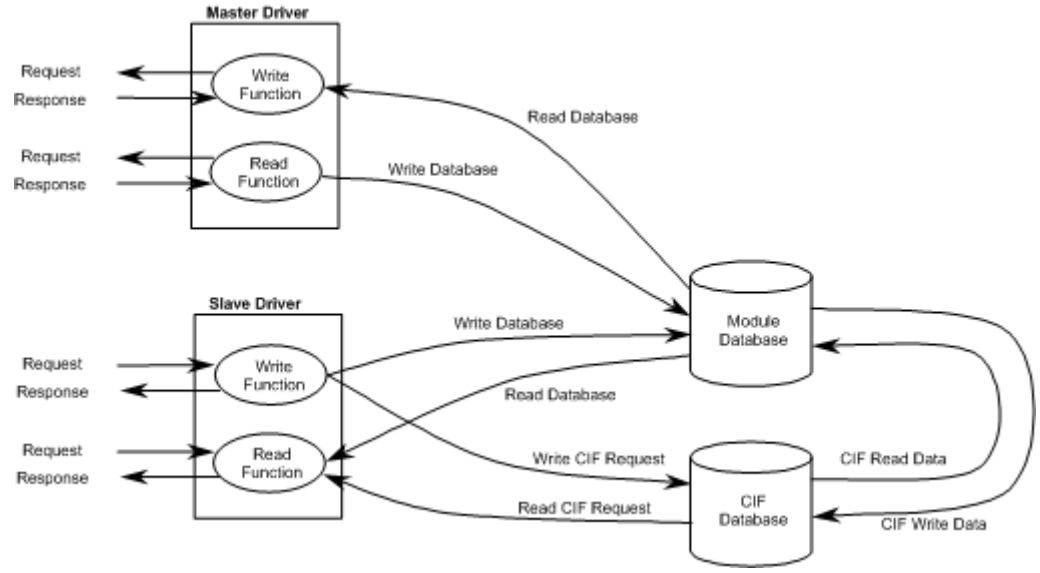
```
[DH485 Port 0 Maps]
# DB_Address File_Number Element Length
START
 0 10 0 100
 100 12 100 100
END
```

With the configuration displayed above, requests for file 10 elements 0 to 99 will be associated with the module's internal data registers 0 to 99 and file 12 elements 100 to 199 will be associated with the data base registers 100 to 199. The module supports up to 50 of these data mappings. When a request is made of the slave driver, the mapping defined in this override section will first be searched first. If the data area in the request is found in the list, that data mapping will be utilized. If the data area in the request is not found in the list, the fixed data area mapping will be used.

8.2.4 CIF Data

The module supports the common interface file (CIF) of the DH-485 protocol. A separate data area can be defined for each application port. This data area is divided into read and writes data and is mapped into the module's internal database. The module's application constantly transfers the read CIF data from the CIF database to the module database and the write CIF data from the module to the CIF database. The parameters used to define the CIF database are contained in the configuration file. This optional feature of the module should only be utilized if required by a remote master on the network. Otherwise, the data file functions (500CPU message) instructions should be used to access and control the module's data. The following diagram shows the relationship of the DH-485 drivers, the CIF database and the module's database:

DH-485 Network



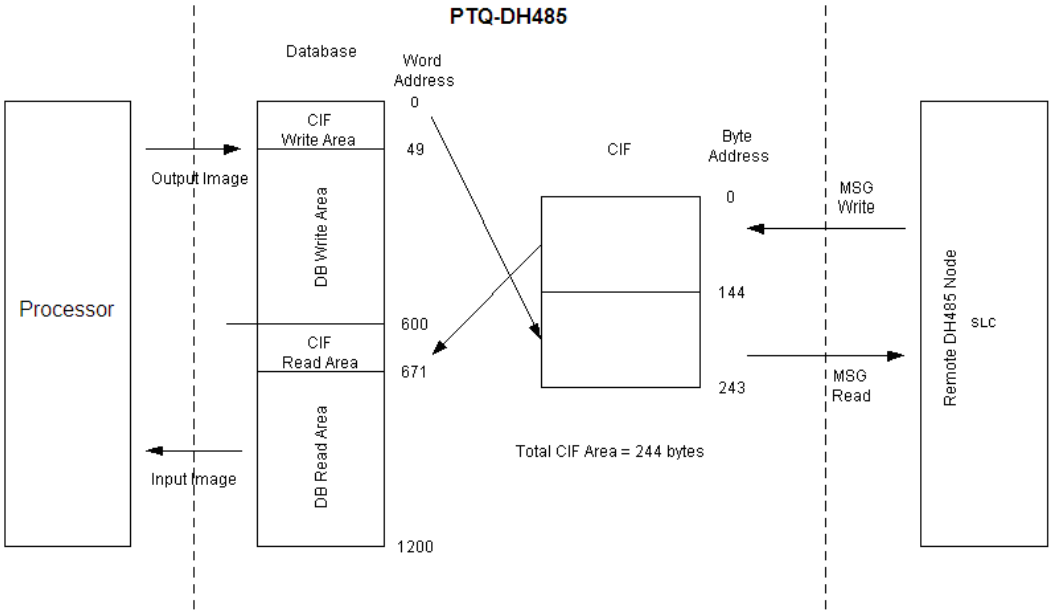
Important: The user can configure the size of the CIF Read Area using the CIF Read Count Parameter. The size of the CIF Write area is calculated using the following formula:

```
CIF Write Count = 244 - CIF Read Count.
```

In order to clarify the direction of data flow, the following shows an example:

Parameter	Value	Format
Read Register Start	600	Word
Read Register Count	600	Word
Write Register Start	0	Word
Write Register Count	600	Word
CIF Read DB Offset	1200	Byte
CIF Read Count	144	Byte
CIF Write DB Offset	0	Byte

This configuration will imply that the data will be transferred as shown in the following diagram:

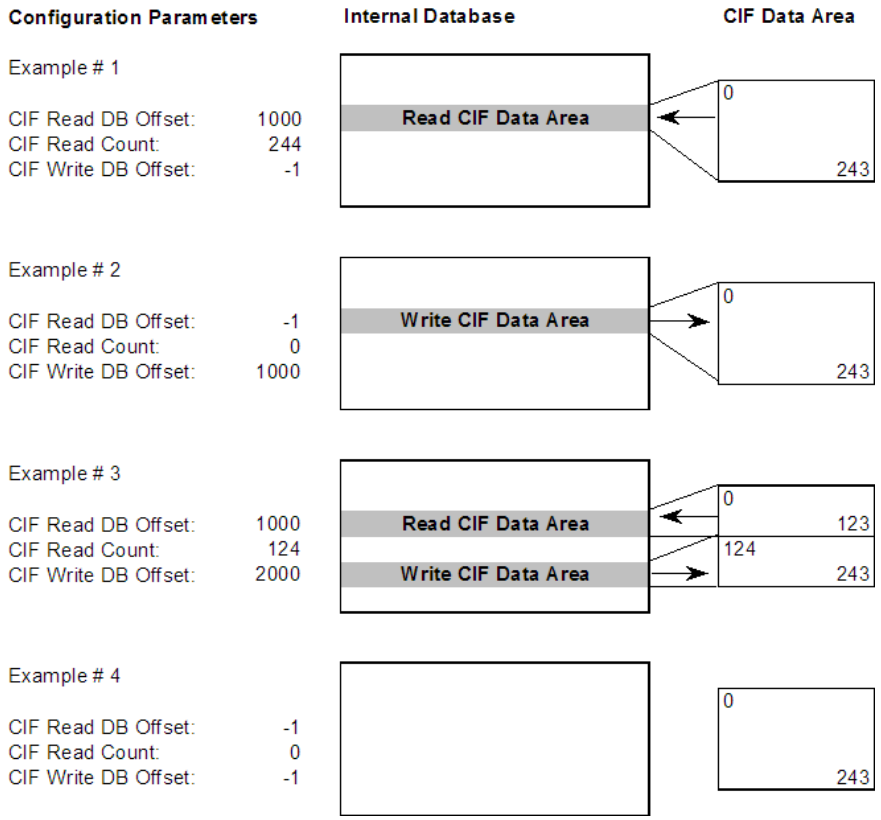


As shown in the diagram, the CIF area is split into the Read and Write areas. The CIF Read area always starts at an offset in the CIF file, except when the CIF Read Count is equal to 0. In this case, the CIF Read Area will not exist.

The diagram shows how the CIF area should interact with the backplane read and write area in order to achieve the correct flow of data.

If a Write MSG from a remote SLC processor is sent to byte addresses 0 and 1 in the module's CIF area, the data would be copied to word address 600 in the database and would then be read to the Quantum processor.

The following illustration shows four different uses and configurations of the CIF data area:



Example 1 only uses CIF read data and utilizes the maximum read data area. Example 2 only uses the CIF write data and utilizes the maximum write data area. Example 3 uses both CIF read and write data. 124 bytes of read data are used and 120 bytes of write data are used. Example 4 does not use the CIF data in the application.

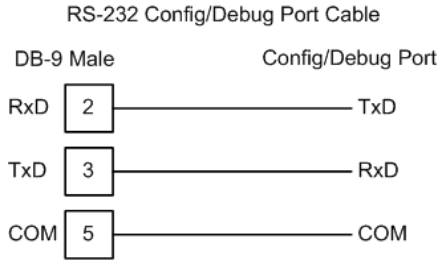
8.3 Cable Connections

The application ports on the PTQ-DH485 module support RS-232 and RS-485 interfaces. Please look at the module to ensure that the jumpers are set correctly to correspond with the type of interface you are using.

Note: When using RS-232 with radio modem applications, some radios or modems require hardware handshaking (control and monitoring of modem signal lines). Enable this in the configuration of the module by setting the UseCTS parameter to 1.

8.3.1 RS-232 Configuration/Debug Port

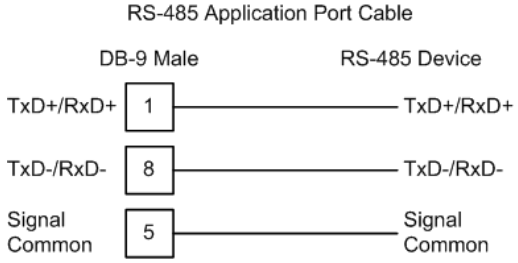
This port is physically a DB-9 connection. This port permits a PC based terminal emulation program to view configuration and status data in the module and to control the module. The cable for communications on this port is shown in the following diagram:



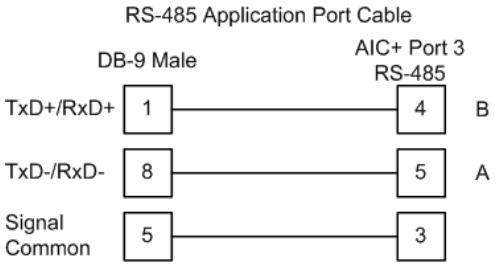
The Ethernet port on this module (if present) is inactive.

8.3.2 RS-485

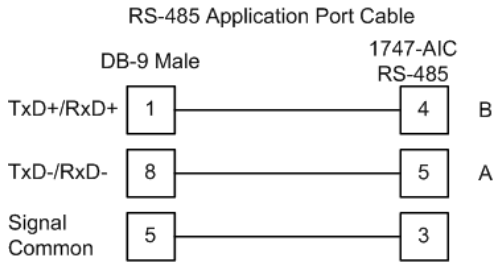
The RS-485 uses a single two or three wire cable. The use of the ground is optional and dependent on the RS-485 network. The cable required for this interface is shown in the following diagram:



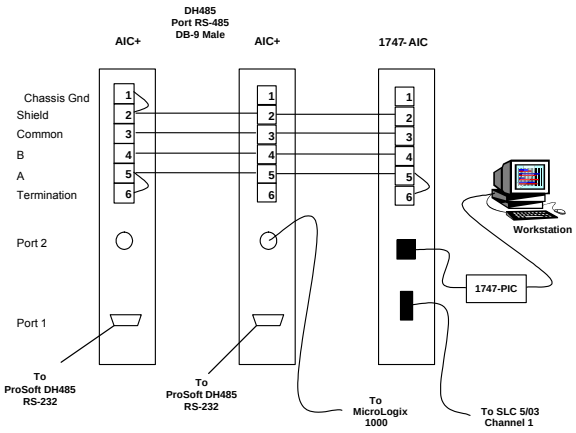
When connecting to port 3 of an AIC+ module, the following is the correct wiring:



When connecting to a 1747-AIC module, the following is the correct wiring:



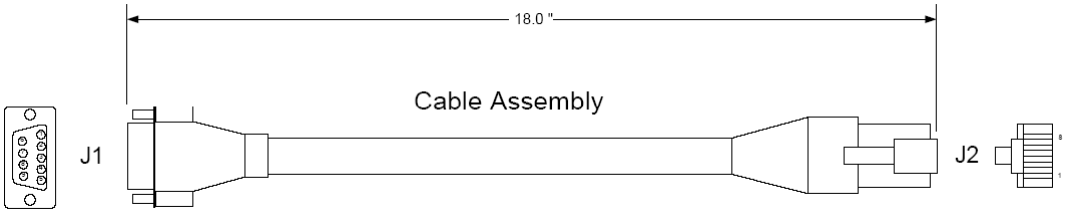
The following illustration shows an example DH-485 network.

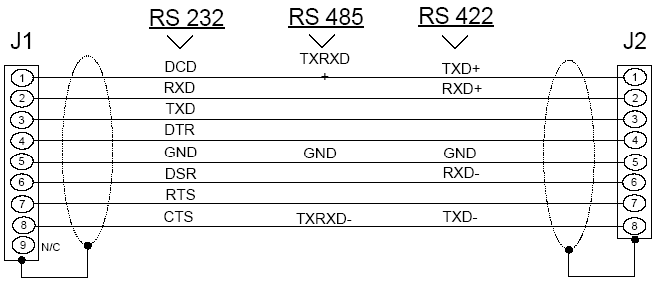


This network displays the two different methods to configure the module for a DH-485 network. Please note there is no place on the module's RS-485 to land the shield, and when used in the configuration shown, it must be wired externally. Verify that the RS interface jumper on the module is set to the correct position: RS-232 or RS-485.

Note: Terminating resistors are generally not required on the RS-485 network, unless you are experiencing communication problems that can be attributed to signal echoes or reflections. In this case, install a 120 ohm terminating resistor on the RS-485 line.

8.3.3 DB9 to RJ45 Adaptor (Cable 14)





Wiring Diagram

8.4 Status Data Definition

This section contains a listing status data presented to the processor by the module. The following table lists the data returned with each normal read block:

Word#	Byte#	Description
202		Scan Counter
203 to 204		Product Name (ASCII)
205 to 206		Revision (ASCII)
207 to 208		Operating System Revision (ASCII)
209 to 210		Production Run Number (ASCII)
211		Read Block Count
212		Write Block Count
213		Parse Block Count
214		Reserved
215		Reserved
216		Number of Block Errors

The user can also copy this data block to the module using the Error/Status Pointer parameter in the configuration file.

The following table lists the status data passed from the module to the Quantum processor in blocks 0 and -1.

Note: Word offset can change to any place in the database (0-3950).

Port 0

Word#	Byte#	Description
2 to 3	0 to 3	Active node bits for stations 0 to 31
4	4 to 5	Online status (0=Offline, 1=Online)
5	6 to 7	Node address of the unit/port emulated
6	8 to 9	Current command index being issued
7	10 to 11	Total number of request messages
8	12 to 13	Total number of response messages received
9	14 to 15	Total number of command list errors
10	16 to 17	Configuration error word. Each bit represent a configuration error condition.
11	18 to 19	Reserved for future use.
12	20 to 21	Total number of packets received
13	22 to 23	Total number of packets transmitted
14	24	Total retry count
	25	Retry failure counter
15	26	Total number of NAK's because of no memory for reception
	27	Total number of NAK's because of no memory for transmission
16	28	Total number of bad packets
	29	Total number of bad control packets
17	30	Total number of packets received with a bad CRC value
	31	Total number of parity errors
18	32	Total number of framing errors
	33	Total number of overrun errors
19	34	Total number of unexpected bytes received
	35	Total number of bad LSAP's received
20 to 51		Reserved for future use.

Port 1

Word#	Byte#	Description
52 to 53	0 to 3	Active node bits for stations 0 to 31
54	4 to 5	Online status (0=Offline, 1=Online)
55	6 to 7	Node address of the unit/port emulated
56	8 to 9	Current command index being issued
57	10 to 11	Total number of request messages
58	12 to 13	Total number of response messages received
59	14 to 15	Total number of command list errors
60	16 to 17	Configuration error word. Each bit represent a configuration error condition.
61	18 to 19	Reserved for future use.
62	20 to 21	Total number of packets received
63	22 to 23	Total number of packets transmitted
64	24	Total retry count

Word#	Byte#	Description
	25	Retry failure counter
65	26	Total number of NAK's because of no memory for reception
	27	Total number of NAK's because of no memory for transmission
66	28	Total number of bad packets
	29	Total number of bad control packets
67	30	Total number of packets received with a bad CRC value
	31	Total number of parity errors
68	32	Total number of framing errors
	33	Total number of overrun errors
69	34	Total number of unexpected bytes received
	35	Total number of bad LSAP's received

Common

Word#	Byte#	Description
102 to 201		Reserved for future use.
202		Scan Counter
203 to 204		Product Name (ASCII)
205 to 206		Revision (ASCII)
207 to 208		Operating System Revision (ASCII)
209 to 210		Production Run Number (ASCII)
211		Read Block Count
212		Write Block Count
213		Parse Block Count
214		Reserved
215		Reserved
216		Number of Block Errors

The data in words 10 and 60 (Configuration Error Word) are bit-mapped values with the following definition:

Bit	Code	Description
0	0x0001	Invalid baud rate
1	0x0002	Invalid node address
2	0x0004	Invalid maximum node address
3	0x0008	Invalid token hold factor
4	0x0010	Invalid response timeout
5	0x0020	Invalid status or command error DB offset
6	0x0040	Invalid CIF read count or DB offset
7	0x0080	Invalid CIF write DB offset
8	0x0100	Invalid file size
9	0x0200	Invalid file offset
10	0x0400	
11	0x0800	

Bit	Code	Description
12	0x1000	
13	0x2000	
14	0x4000	
15	0x8000	

When no configuration errors are present, the words will have a value of 0x0000 (hexadecimal). Configuration errors should be corrected to have the module perform as required by the application.

Additionally, each command in the user command list contains an error status data area. This data can be viewed through the debug/configuration port. This data can be configured to be placed in the module's database with each register containing an error value for each command for each port as shown in the following diagram:

Word#	Description
0	Error code for command index 0.
1	Error code for command index 1.
...	...
99	Error code for command index 99.

The error codes placed in this data area have the following definitions:

8.4.1 DH485 General Error Codes

Error #	Description
0	Operation successful
1	Invalid parameter
2	Device is already open
3	Device is not present
4	Invalid access
5	The function has timed out
6	
7	Unable to configure the requested port
8	Unable to allocate memory for DH-485 driver

8.4.2 DH485 API Specific Error Codes

Error #	Description
0x0800	Command only permitted in master mode
0x0801	Command already active on the port
0x0802	Response to request timed out
0x0803	Unable to allocate memory for the request
0x0804	Illegal command or format
0x0805	Host could not complete request (hardware fault)
0x0806	Out of memory, file or rung does not exist
0x0807	Field has an illegal value

Error #	Description
0x0808	Not enough fields in request message
0x0809	Too many fields in request message
0x080A	Symbol not found
0x080B	Symbol 0 or greater than maximum characters permitted in message
0x080C	Does not exist, illegal size
0x080D	File wrong size, address past end of file
0x080E	Data or file too large (memory not available)
0x080F	Request too large to transmit message (size+address > max message)
0x0810	Access denied
0x0811	Command cannot be executed
0x0812	Illegal data type information
0x0813	Illegal parameter, invalid data in search or command block
0x0814	File open by another node
0x0815	Program owned by another node
0x0816	Unknown error returned from host
0x0817	No message active on the port

8.5 Configuration Data

This section contains a listing of the data required in the DH485.CFG file in order to configure the module. The following table lists the sections and items for each section that can be used in the module configuration file (DH485.CFG):

[Section]/Item	Range	Description	IF Error	Config. Value
[MODULE]		Configuration header for general module information		
Module Name:	Up to 80 chars	Name of the module for use on reports. Use this parameter to identify your module in your system.		
Error/Status Pointer:	-1 to 3955	Starting register location in virtual database for the error/status table. If a value of -1 is entered, the error/status data will not be placed in the database. All other valid values determine the starting location of the data. This data area includes the module version information. Refer to Status Data Definition (page 96) for information about this data block.	-1	
Write Register Start:	0 to 3999	This parameter specifies the starting register in the module where the data transferred from the processor will be placed. Valid range for this parameter is 0 to 3999.	0	

[Section]/Item	Range	Description	IF Error	Config. Value
Write Register Count:	0 to 4000	This parameter specifies the number of registers to transfer from the processor to the module. Valid entry for this parameter is 0 to 4000.	0	
Read Register Start:	0 to 3999	This parameter specifies the starting register in the module where data will be transferred from the module to the processor. Valid range for this parameter is 0 to 3999.	0	
Read Register Count:	0 to 4000	This parameter specifies the number of registers to be transferred from the module to the processor. Valid entry for this parameter is 0 to 4000.	0	
Failure Flag Count:	0 to 1000	This parameter specifies the number of successive transfer errors that must occur before the communication ports are shut down. If the parameter is set to 0, the communication ports will continue to operate under all conditions. If the value is set larger than 0 (1 to 1000), communications will cease if the specified number of failures occur.	0	
Initialize Output Data:	0 or 1	This parameter determines if the output data for the module should be initialized with values from the processor. If the value is set to 0, the output data will be initialized to 0. If the value is set to 1, the data will be initialized with data from the processor. Use of this option requires associated ladder logic to pass the data from the processor to the module.	0	

Variable Name	Data Range	Description	IF Error	Config. Value
[DH485 PORT x]		General configuration information for the specified DH-485 port on the module.		
Baud Rate:	9600 or 19200	This is the baud rate to use for the DH-485 network. Select one of the listed baud rates.	19200	

Variable Name	Data Range	Description	IF Error	Config. Value
Node Address:	0 to 31	This is the node address to be utilized by the DH-485 driver for this port on the network. Enter a value not already used on the network in the range of 0 to 31. If a value of 255 is utilized or set by the module, the port is disabled. Note: All nodes on the network should be set to the lowest set of values in the range of 1 to 4).	255	
Maximum Node Address:	0 to 31	Enter the maximum address that the initiator searches for before wrapping to zero. The default is 31. This parameter should be set to the maximum node address set in the DH-485 network.	31	
Token Hold Factor:	1 to 4	Enter the number of transmissions (plus retries) that a node holding a token can send onto the data link each time that it receives the token. Enter a value between 0 and 31. The default is 1.	1	
Response Timeout:	1 to 50	This parameters sets the number of 100 millisecond time intervals to wait for a response to a request from the module. If the module does not receive the response with in the time period specified, a timeout condition will be set for the command.	10	
Status DB Offset:	-1 and 0 to 3980	This parameter sets the location of the status data for the port in the module's internal database. If the parameter is set to -1, the data is not placed in the database. If a valid value is entered, the module's status data will be placed in the database starting at the location indicated.	-1	
Command Error DB Offset:	-1 and 0 to 3900	This parameter sets the location of the command error list data for the port in the module's internal database. If the parameter is set to -1, the data is not placed in the database. If a valid value is entered, the module's error list data will be placed in the database starting at the location indicated.	-1	

Variable Name	Data Range	Description	IF Error	Config. Value
CIF Read DB Offset:	-1 and 0 to 7500 (only even values)	This parameter sets the starting byte location in the module's database where the CIF file Read will be placed. This data is passed from CIF memory area to the set location in the module's database. If this parameter is set to -1, no CIF read data will be utilized. When the CIF Read Area is disabled (CIF Read DB Offset = -1) or CIF Read Count = 0, the Debug menu shows this parameter as 65535.	-1	
CIF Read Count:	0 to 242	This parameters sets the number of bytes to transfer from the CIF file to the database. The CIF write count will be calculated as (244 - CIF Read Count)	0	
CIF Write DB Offset:	-1 and 0 to 7500 (only even values)	T`his parameter sets the starting byte location in the module's database where the CIF file Write data will be read from. This data is passed to the CIF memory area from the set location in the module's database. If this parameter is set to -1, no CIF write data will be utilized. When the CIF Write Area is disabled (CIF Write DB Offset = -1) or CIF Write Count = 0, the Debug menu shows this parameter as 65535.	-1	
First File:	0 to 255	This parameter sets the file number for the first file to be emulated by the module.	0	
File Size:	1 to 1000	This parameter sets the word size of all the files emulated in the module.	1000	
File Offset:	0 to 999	This parameter sets the word offset into the module's database where the file emulation will start.	0	
Min Command Delay:	0 to 10000	This parameter sets the minimum number of milliseconds to wait before issuing each command. This parameter is utilized to keep the network from being flooded with requests from the module.	0	

[DH485 Port x Commands]	Command list for specified DH-485 port

```
wap Codes: 0=None, 1=Swap Words, 2=Swap bytes and words, 3=Swap bytes

ileType Codes: 0=status, 1=bit, 2=timer, 3=counter, 4=control, 5=int, 6=flo
CIF

nableCode DB_Address Count Swap Poll_Int Node Func FileType File# Element#

RT

1000 10 0 0 1 1 5 10 0

1010 10 0 0 1 0 5 11 0
```

[DH485 Port x Maps]	Override file maps for specified DH-485 port

```
B_Address File_Number Element Length

RT

10 0 100

0 12 0 100
```

The following table lists the fields required for each command list entry:

Field	Definition
Enable Type Code	This field defines if the command is enabled and when it should be executed. The following codes are recognized by the application: 0 = Command is disabled 1 = Command is executed at the polling interval specified 2 = The write command is only executed when data changes (The enable code only applies to write commands)
Database Start Address	This field defines the starting address in the module's internal database to associate with the command. This field can have a value from 0 to 3999. The address supplied is a word address in the database.
Element Count	This field defines the number of elements to be used with the command. If the command is interfacing with CIF data, this parameter represents a byte count. For data file access, the data size utilized is dependent on the file type used. Refer to the Maximum Element Counts table.

Field	Definition
Swap Code	This field changes the order of the bytes and/or words used when sending or receiving the data. The following codes are utilized:

Swap Code	Description
0	None - No Change is made in the byte ordering (1234 = 1234)
1	Words - The words are swapped (1234=3412)
2	Words & Bytes - The words are swapped then the bytes in each word are swapped (1234=4321)
3	Bytes - The bytes in each word are swapped (1234=2143)

Poll Interval	This field sets the time interval between successive execution of the command. This parameter is specified in seconds. If the field is set to 10, the command will not be executed more frequently than every 10 seconds.
Node Number	This field defines the node address of the DH-485 node to send the command request. This field should be set to a value from 0 to 31.
Function Code	This field defines the function to be executed by the command. The module uses the following codes: 0 = Read 1 = Write
File Type	This field defines the file type to be interfaced with in the other DH-485 node. The program utilizes the following codes for this field: For further detail on Timer and Counter Data types, refer to Timer and Counter Data Types following this table. 0 = Status File (2 bytes per element) 1 = Bit File (2 bytes per element) 2 = Timer File (6 bytes per element) 3 = Counter File (6 bytes per element) 4 = Control File (6 bytes per element) 5 = Integer File (2 bytes per element) 6 = Floating-point File (4 bytes per element) 10 = CIF File (1 byte per element)
File Number	This field defines the file number to access. This field is ignored for CIF file access and should be set to 0.
Element Number	This field defines the first element in the file specified to be associated with the command.

Maximum Element Counts for Read/Write Commands

File Type Code	File Type	Bytes/ Element	Max Read Elements	Max Write Elements
0	Status	2	83	83
1	Bit	2	118	115
2	Timer	6	39	38
3	Counter	6	39	38
4	Control	6	39	38
5	Integer	2	118	115
6	Float	4	59	57
10	CIF	1	236	234

8.5.1 Timer, Counter, and Control Data Types

Timer Data Type

The Timer data type uses its 3 words (6 bytes) as described below (for example, T4:0):

Word 0:

Bit 9: timebase selection
Bit 13: T4:0.DN
Bit 14: T4:0.TT
Bit 15: T4:0.EN

Word 1:

T4:0.PRE

Word 2:

T4:0.ACC

Counter Data Type

The Counter data type uses its 3 words (6 bytes) as described below (for example, C5:0)

Word 0:

Bit 10:UA
Bit 11:UN
Bit 12:OV
Bit 13:DN
Bit 14:CD
Bit 15:CV

Word 1: C5:0.PRE

Word 2: C5:0.ACC

Control Data Type

The Control Data Type uses its three words (6 bytes) as shown in the following example. For example, R6:0.

Word 0:

Bit 8:	FD
Bit 9:	IN
Bit 10:	UL
Bit 11:	ER
Bit 12:	EM
Bit 13:	DN
Bit 14:	EU
Bit 15:	EN

Word 1: R6:0.LEN

Word 2: R6:.0.POS

The following is a form for setting up the command list:

Enable Type Code	Database Start Address	Element Count	Swap Code	Poll Interval	Node Number	Function Code	File Type	File Number	Element Number

The following table lists the fields required for each record in the [DH485 Port x Maps] section:

Field	Definition
Database Start Address	This field defines the starting address in the module's database for the file emulation. This parameter can be assigned a value of 0 to 4999.
File Number	This field defines the file number to be emulated at the specified database location.
Element	This field specifies the first element in the file to be emulated. This element number corresponds to the database start address set for the record.
Word Count (Length)	This field defines the number of word registers to be emulated in the file.

The following is a form for setting up the override map list:

File Override Map Definition Form

Database Start Address	File Number	Element Number	Word Count (Length)

9 Support, Service & Warranty

In This Chapter

Be sure and read the full Warranty that can be found on our web site at www.prosoft-technology.com for details and other terms and conditions. The content in this summary is subject to change without notice. The content is current at date of publication.

ProSoft Technology, Inc. strives to provide meaningful support to its customers. Should any questions or problems arise, please feel free to contact us at:

Internet	Web Site: http://www.prosoft-technology.com/support
	E-mail address: support@prosoft-technology.com

Those of us at ProSoft Technology, Inc. want to provide the best and quickest support possible, so before calling please have the following information available. You may wish to fax this information to us prior to calling.

1 Product Version Number
2 System architecture
3 Network details

In the case of hardware, we will also need the following information:

1 Module configuration and contents of file
2 Module Operation
3 Configuration/Debug status information
4 LED patterns
5 Information about the processor and user data files as viewed through the development software and LED patterns on the processor
6 Details about the networked devices interfaced, if any

For technical support calls within the United States, an after-hours answering system allows pager access to one of our qualified technical and/or application support engineers at any time to answer your questions.

9.1 How to Contact Us: Sales and Support

All ProSoft Technology Products are backed with full technical support. Contact our worldwide Technical Support team and Customer Service representatives directly by phone or email:

USA / Latin America (excluding Brasil) (Office in California)

+1(661) 716-5100
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Languages spoken include: Portuguese, English

9.2 Return Material Authorization (RMA) Policies and Conditions

The following RMA Policies and Conditions apply to any returned product. These RMA Policies are subject to change by ProSoft without notice. For warranty information, see Section C below entitled "Limited Warranty". In the event of any inconsistency between the RMA Policies and the Warranty, the Warranty shall govern.

9.2.1 All Product Returns

1 In order to return a Product for repair, exchange or otherwise, the Customer must obtain a Returned Material Authorization (RMA) number from ProSoft and comply with ProSoft shipping instructions.
2 In the event that the Customer experiences a problem with the Product for any reason, Customer should contact ProSoft Technical Support at one of the telephone numbers listed above in Section A. A Technical Support Engineer will request several tests in an attempt to isolate the problem. If after these tests are completed, the Product is found to be the source of the problem, ProSoft will issue an RMA.
3 All returned Products must be shipped freight prepaid, in the original shipping container or equivalent, to the location specified by ProSoft, and be accompanied by proof of purchase. The RMA number is to be prominently marked on the outside of the shipping box. Customer agrees to insure the Product or assume the risk of loss or damage in transit. Products shipped to ProSoft without an RMA number will be returned to the Customer, freight collect. Contact ProSoft Technical Support for further information.
4 Out of warranty returns are not allowed on RadioLinx accessories such as antennas, cables, and brackets.

The following policy applies for Non-Warranty Credit Returns:

A 10% Restocking Fee if Factory Seal is *not* broken
B 20% Restocking Fee if Factory Seal is broken

ProSoft retains the right, in its absolute and sole discretion, to reject any non-warranty returns for credit if the return is not requested within three (3) months after shipment of the Product to Customer, if the Customer fails to comply with ProSoft's shipping instructions, or if the Customer fails to return the Product to ProSoft within six (6) months after Product was originally shipped.

9.3 Procedures for Return of Units Under Warranty

1 A Technical Support Engineer must pre-approve all product returns.
2 Module is repaired or replaced after a Return Material Authorization Number is entered and a replacement order is generated.
3 Credit for the warranted item is issued within 10 business days after receipt of product and evaluation of the defect has been performed by ProSoft. The credit will only be issued provided the product is returned with a valid Return Material Authorization Number and in accordance with ProSoft's shipping instructions.

a) If no defect is found, a credit is issued.

b) If a defect is found and is determined to be customer generated or if the defect is otherwise not covered by ProSoft's Warranty, or if the module is not repairable, a credit is not issued and payment of the replacement module is due.

9.4 Procedures for Return of Units Out of Warranty

1 Customer sends unit in for evaluation.

2 If no defect is found, Customer will be charged the equivalent of US $100 plus shipping, duties and taxes that may apply. A new Purchase Order will be required for this evaluation fee.

If the unit is repaired the charge to the Customer will be 30%* of the list price plus any shipping, duties and taxes that may apply. A new Purchase Order will be required for a product repair.

3 For an immediate exchange, a new module may be purchased and sent to Customer while repair work is being performed. Credit for purchase of the new module will be issued when the new module is returned in accordance with ProSoft's shipping instructions and subject to ProSoft's policy on non-warranty returns. This is in addition to charges for repair of the old module and any associated charges to Customer.

4 If, upon contacting ProSoft Customer Service, the Customer is informed that unit is believed to be unrepairable, the Customer may choose to send unit in for evaluation to determine if the repair can be made. Customer will pay shipping, duties and taxes that may apply. If unit cannot be repaired, the Customer may purchase a new unit.

9.4.1 Un-repairable Units

- 3150-All
- 3750
- 3600-All
- 3700
- 3170-All
- 3250
- 1560 can be repaired, if defect is the power supply
- 1550 can be repaired, if defect is the power supply
- 3350
- 3300
- 1500-All

*** 30% of list price is an estimated repair cost only. The actual cost of repairs will be determined when the module is received by ProSoft and evaluated for needed repairs.**

Purchasing Warranty Extension

As detailed below in ProSoft's Warranty, the standard Warranty Period is one year (or in the case of RadioLinx modules, three years) from the date of delivery. The Warranty Period may be extended for an additional charge, as follows:

- Additional 1 year = 10% of list price
- Additional 2 years = 20% of list price
- Additional 3 years = 30% of list price

9.5 LIMITED WARRANTY

This Limited Warranty ("Warranty") governs all sales of hardware, software and other products (collectively, "Product") manufactured and/or offered for sale by ProSoft, and all related services provided by ProSoft, including maintenance, repair, warranty exchange, and service programs (collectively, "Services"). By purchasing or using the Product or Services, the individual or entity purchasing or using the Product or Services ("Customer") agrees to all of the terms and provisions (collectively, the "Terms") of this Limited Warranty. All sales of software or other intellectual property are, in addition, subject to any license agreement accompanying such software or other intellectual property.

9.5.1 What Is Covered By This Warranty

A *Warranty On New Products*: ProSoft warrants, to the original purchaser only, that the Product that is the subject of the sale will (1) conform to and perform in accordance with published specifications prepared, approved, and issued by ProSoft, and (2) will be free from defects in material or workmanship; provided these warranties only cover Product that is sold as new. This Warranty expires one year (or in the case of RadioLinx modules, three years) from the date of shipment (the "Warranty Period"). If the Customer discovers within the Warranty Period a failure of the Product to conform to specifications, or a defect in material or workmanship of the Product, the Customer must promptly notify ProSoft by fax, email or telephone. In no event may that notification be received by ProSoft later than 15 months (or in the case of RadioLinx modules, 39 months) from the date of delivery. Within a reasonable time after notification, ProSoft will correct any failure of the Product to conform to specifications or any defect in material or workmanship of the Product, with either new or used replacement parts. Such repair, including both parts and labor, will be performed at ProSoft's expense. All warranty service will be performed at service centers designated by ProSoft. If ProSoft is unable to repair the Product to conform to this Warranty after a reasonable number of attempts, ProSoft will provide, at its option, one of the following: a replacement product, a full refund of the purchase price or a credit in the amount of the purchase price. All replaced product and parts become the property of ProSoft. These remedies are the Customer's only remedies for breach of warranty.

B *Warranty On Services*: Material and labor used by ProSoft to repair a verified malfunction or defect are warranted on the terms specified above for new Product, provided said warranty will be for the period remaining on the original new equipment warranty or, if the original warranty is no longer in effect, for a period of 90 days from the date of repair.

C The Warranty Period for RadioLinx accessories (such as antennas, cables, brackets, etc.) are the same as for RadioLinx modules, that is, three years from the date of shipment.

9.5.2 What Is Not Covered By This Warranty

A ProSoft makes no representation or warranty, expressed or implied, that the operation of software purchased from ProSoft will be uninterrupted or error free or that the functions contained in the software will meet or satisfy the purchaser's intended use or requirements; the Customer assumes complete responsibility for decisions made or actions taken based on information obtained using ProSoft software.

B With the exception of RadioLinx accessories referenced in paragraph 1(c) this Warranty does not cover any product, components, or parts not manufactured by ProSoft.

C This Warranty also does not cover the failure of the Product to perform specified functions, or any other non-conformance, defects, losses or damages caused by or attributable to any of the following: (i) shipping; (ii) improper installation or other failure of Customer to adhere to ProSoft's specifications or instructions; (iii) unauthorized repair or maintenance; (iv) attachments, equipment, options, parts, software, or user-created programming (including, but not limited to, programs developed with any IEC 61131-3 programming languages, or "C") not furnished by ProSoft; (v) use of the Product for purposes other than those for which it was designed; (vi) any other abuse, misapplication, neglect or misuse by the Customer; (vii) accident, improper testing or causes external to the Product such as, but not limited to, exposure to extremes of temperature or humidity, power failure or power surges outside of the limits indicated on the product specifications; or (viii) disasters such as fire, flood, earthquake, wind or lightning.

D The information in this Agreement is subject to change without notice. ProSoft shall not be liable for technical or editorial errors or omissions made herein; nor for incidental or consequential damages resulting from the furnishing, performance or use of this material. The user guides included with your original product purchased by you from ProSoft, contains information protected by copyright. No part of the guide may be duplicated or reproduced in any form without prior written consent from ProSoft.

9.5.3 DISCLAIMER REGARDING HIGH RISK ACTIVITIES

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9.5.4 DISCLAIMER OF ALL OTHER WARRANTIES

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9.5.5 LIMITATION OF REMEDIES**

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** Some areas do not allow time limitations on an implied warranty, or allow the exclusion or limitation of incidental or consequential damages. In such areas the above limitations may not apply. This Warranty gives you specific legal rights, and you may also have other rights which vary from place to place.

9.5.6 Time Limit for Bringing Suit

Any action for breach of warranty must be commenced within 15 months (or in the case of RadioLinx modules, 39 months) following shipment of the Product.

9.5.7 No Other Warranties

Unless modified in writing and signed by both parties, this Warranty is understood to be the complete and exclusive agreement between the parties, suspending all oral or written prior agreements and all other communications between the parties relating to the subject matter of this Warranty, including statements made by salesperson. No employee of ProSoft or any other party is authorized to make any warranty in addition to those made in this Warranty. The Customer is warned, therefore, to check this Warranty carefully to see that it correctly reflects those terms that are important to the Customer.

9.5.8 Intellectual Property

A Any documentation included with Product purchased from ProSoft is protected by copyright and may not be photocopied or reproduced in any form without prior written consent from ProSoft.

B ProSoft's technical specifications and documentation that are included with the Product are subject to editing and modification without notice.

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9.5.9 Additional Restrictions Relating To Software And Other Intellectual Property

In addition to complying with the Terms of this Warranty, Customers purchasing software or other intellectual property shall comply with any license agreement accompanying such software or other intellectual property. Failure to do so may void this Warranty with respect to such software and/or other intellectual property.

9.5.10 Allocation of risks

This Warranty allocates the risk of product failure between ProSoft and the Customer. This allocation is recognized by both parties and is reflected in the price of the goods. The Customer acknowledges that it has read this Warranty, understands it, and is bound by its Terms.

9.5.11 Controlling Law and Severability

This Warranty shall be governed by and construed in accordance with the laws of the United States and the domestic laws of the State of California, without reference to its conflicts of law provisions. If for any reason a court of competent jurisdiction finds any provisions of this Warranty, or a portion thereof, to be unenforceable, that provision shall be enforced to the maximum extent permissible and the remainder of this Warranty shall remain in full force and effect. Any cause of action with respect to the Product or Services must be instituted in a court of competent jurisdiction in the State of California.

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