Allen-Bradley

PanelBuilder™ 1400e Configuration Software for Windows®

(Cat. No. 2711E–UMOD)

Modbus User Manual

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or in part, without written permission of Allen-Bradley Company, Inc., is prohibited.

Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

PanelBuilder, PanelView, Data Highway Plus, ControlNet, DH+, and SLC are trademarks, and PLC, PLC-2, and PLC-3 are registered trademarks of Allen-Bradley Company, Inc.
RSView is a trademark of Rockwell Software, Inc.
IBM, PC, PS/2, VGA, and PC-DOS are registered trademarks of International Business Machines Corporation.
Epson is a registered trademark of Seiko Epson Corporation.
Microsoft, Windows, MS, and MS-DOS are registered trademarks of Microsoft Corporation.
Mouse Systems is a trademark of MSC Technologies, Inc.
AutoCAD is a registered trademark of Autodesk, Inc.
Taylor, and ProWORXPLUS are registered trademarks of Taylor Industrial Software, Inc.
MODICON, MODSOFT, Quantum, and Modbus are registered trademarks of AEG Schneider Automation, Inc.
All other brand and product names are trademarks of their respective companies and are hereby acknowledged.

Table of Contents

Preface

About this Manual P–1
Registering Your Copy of PanelBuilder 1400e P–1
Other Documentation P–1
What's in This Manual? P–2
  Who Should Read This Manual P–3
Terminology P–4
Conventions Used P–4
  Mouse Conventions P–4
  Selection Conventions P–4
    Selection Conventions in Dialog Boxes P–5
  Key Conventions P–5
  Command Conventions P–5
Before You Begin P–6
Supported Devices P–6
Technical Support Services P–6

Overview of PanelBuilder 1400e with Modbus Connectivity

Chapter 1

About PanelBuilder 1400e 1–1
PanelBuilder, PanelView Terminals, and the Controller or Other Modbus Slave Device 1–1
  PanelBuilder 1400e 1–2
  PanelView Operator Terminals 1–2
  The Controller or Other Modbus Slave Device 1–5
  Understanding the Modbus Network 1–5

Planning an Application for Modbus

Chapter 2

Defining Nodes and Scan Classes 2–1
Defining the Nodes 2–2
  Recording Node Information 2–2
About Scanning 2–3
Recording Tag Information 2–3

Basic Application Operations

Chapter 3

Creating a New Application 3–1
Creating Reports 3–1
  Additional Report on Options 3–2

Defining Communications — Chapter 4

Configuring Communications 4–1
Setting up Terminal Communications 4–2
Setting the Driver Parameters 4–2
Configuring Nodes 4–2
Configuring Scan Classes 4–5

Changing the Network Type — Chapter 5

Converting from DH+ to Modbus 5–1
Converting from Remote I/O to Modbus 5–2
Converting from ControlNet to Modbus 5–4
Converting from Modbus to DH+ 5–5
Converting from Modbus to Remote I/O 5–6
Converting from Modbus to ControlNet 5–7

Defining Tags — Chapter 6

Tag Types 6–1
Read and Write Tags 6–1
Data Sources 6–2
Device 6–2
Configuring Tag Type 6–2
Configuring an Analog Tag 6–3
Modbus Address Space 6–6
Addressing Syntax 6–7
Configuring a Digital Tag 6–8
Addressing Syntax 6–9
Configuring a String Tag 6–10
Addressing Syntax 6–12
Configuring a Block Tag 6–13
Addressing Syntax 6–14
Specifying a Data Source 6–15
Device Data Source 6–16
Validation 6–16
Specifying Device as the Data Source 6–16
Tag Database Import and Export 6–17
Database Formats Supported 6–17
CSV File Column Ordering 6–23
Creating a New Tag Database 6–24

Configuring the PanelView Terminal for Modbus Communications — **Chapter 7**

Configuring the Modbus Communication Interface Card 7–1
Installing Modbus Firmware in the PanelView Terminal 7–3
Configuring the Terminal Network Setup Screen 7–5

Transferring Applications — **Chapter 8**

Validating Applications 8–1
About Application File Transfers and Modbus 8–1

Troubleshooting for Modbus Applications — **Chapter 9**

Modbus Communication Errors 9–1

Sample Worksheets — **Appendix A**

Index

Preface

About this Manual

This manual is designed to supplement the regular set of PanelBuilder and PanelView manuals, listed under "Other Documentation," below. This manual contains information specific to creating PanelBuilder applications for Modbus, and running them on PanelView 1000e and 1400e terminals equipped with Modbus-capable hardware and software.

Note: PanelView 1200 and 1200e terminals do not support Modbus communications.

Registering Your Copy of PanelBuilder 1400e

To register your software, mail the registration card to this address:

Rockwell Software
Software Services
6680 Beta Drive
Mayfield Village, Ohio 44143

or fax the card to (216) 646-7701.

Other Documentation

Your PanelBuilder 1400e software comes with the following manuals, which you may need to refer to periodically while reading this manual:

- *Getting Started with PanelBuilder 1400e Configuration Software for Windows* (Publication Number 2711E-818) guides you through setting up PanelBuilder 1400e and introduces you to PanelBuilder 1400e basics. It includes a tutorial to give you hands-on experience in creating and running a sample application.
- The *PanelBuilder 1400e Configuration Software for Windows User Manual* (Publication Number 2711E-819) explains PanelBuilder 1400e in more detail, and provides step-by-step instructions for planning, creating, and working with applications.
- The *PanelBuilder 1400e Screen Objects Reference Manual* (Publication Number 2711E-820) provides detailed reference information for application screen objects.
- The *PanelBuilder 1200/1400e Transfer Utility User Manual* (Publication Number 2711E-6.8) provides detailed instructions for transferring application files using the Transfer Utility that comes with PanelBuilder 1400e, Version 3.

- Context-sensitive Help provides a quick reference for any procedures or commands you need explained, or problems you may encounter. To get help, press F1 or choose the Help button if you're in a dialog box.
- The *PanelBuilder 1400e Readme* file is a Microsoft Windows Notepad file that is copied to your hard disk when you install PanelBuilder 1400e. The *Readme* file informs you of any software changes after the manuals were printed.
- The *PanelView 1000e, 1200e, and 1400e Operator Terminals User Manual* (Publication Number 2711E-821) describes how to install, configure, maintain, and troubleshoot the PanelView terminal.

A complete list of publications relating to PanelBuilder 1400e, PanelView terminals, and programmable logic controllers is available in the preface of the *PanelBuilder 1400e User Manual.*

What's in This Manual?

This manual provides information which is specific to creating Modbus applications with PanelBuilder, and running them at the PanelView terminal.

Chapter 1, *Overview of PanelBuilder 1400e with Modbus Connectivity,* provides an introduction to what PanelBuilder 1400e is, what it does, and how it works with PanelView terminals and the programmable logic controller.

Chapter 2, *Planning an Application for Modbus*, provides information about planning a Modbus application, including defining nodes. It is a supplement to Chapter 2, "Planning Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* publication 2711E-819, which provides details about assigning scan classes and assigning tags.

Chapter 3, *Basic Application Operations,* describes basic application operations for the Modbus network, and supplements the information in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* publication 2711E-819.

Chapter 4, Defining Communications, provides instructions for defining PLC communications for Modbus applications, including selecting the controller, and defining nodes and scan classes. This chapter supplements information in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* publication 2711E-819.

Chapter 5, *Changing the Network Type*, describes how to convert an application from one network type to another.

Chapter 6, *Defining Tags*, provides information about using the Tag Database editor to define tags. This chapter supplements information in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, publication 2711E-819.

Chapter 7, *Configuring the PanelView Terminal for Modbus Communications*, provides instructions for configuring the firmware in PanelView terminals for use with the Modbus network. This chapter supplements information in the *PanelView 1000e, 1200e, and 1400e Operator Terminals User Manual*, publication 2711E-821.

Chapter 8, *Transferring Applications*, provides information to get you started on validating and transferring applications.

Chapter 9, *Troubleshooting for Modbus Applications*, lists the Modbus error messages that could occur and their causes, and provides possible solutions to the problems.

Who Should Read This Manual

This manual is designed for the novice or experienced user of PanelBuilder. It does require that you have knowledge of the Modbus Communications Protocol.

If this describes you:	Read this:
Want information about installing PanelBuilder	*Getting Started*, Chapter 2
Unfamiliar with both PanelBuilder 1400e and Windows	*Getting Started*, Chapters 1–3 Windows User Documentation
Familiar with PanelBuilder 1400e and want to know about writing applications for Modbus using PanelBuilder	This manual
Want information about the PanelBuilder Drawing Objects	*Reference Manual*
Want information about validating PanelBuilder applications, including those for Modbus	*User Manual*, Appendix D
Want information about transferring applications to and from PanelView terminals	*Transfer Utility User Manual* and *Operator Terminals User Manual*

Terminology

The term *PanelBuilder* refers to PanelBuilder 1400e Configuration Software for Windows. Where confusion may arise between the current and previous versions of the software, the current release of the software is "PanelBuilder 1400e, Version 3."

Similarly, the terms *terminal* and *PanelView terminal* refer to a PanelView 1000e or 1400e terminal. Where confusion may arise between the 1000e and 1400e terminals and previous revisions, specific series and revision names will be used.

Note: PanelView 1200 and 1200e terminals do not support Modbus communications.

The terms *programmable controller* and *controller* refer to the Modicon line of Programmable Logic Controllers or any other controlling device.

Conventions Used

Information is provided in a consistent way throughout the entire PanelBuilder user documentation set. There are mouse selection, shortcut key, and command conventions.

Mouse Conventions

You can use a mouse with one or two buttons. This manual assumes that if you have a multiple-button mouse, the left mouse button is configured as the primary mouse button. Procedures that require you to click a secondary button refer to it as the right mouse button.

Selection Conventions

This word or phrase	Means
Choose	Carry out a menu command or a command button in a dialog box or Help window. Choose also means to double-click an icon.
Choose OK	Either click on the OK button with the mouse or press Enter on the keyboard to carry out the action.
Select	Either highlight the piece of text you want your next action to affect, or select a specific dialog box option.
Click	Position the mouse pointer on the object, area, or field, and click the left button once.
Double-click	Position the mouse pointer on the object, area, or field, and click twice quickly.

Selection Conventions in Dialog Boxes

Dialog boxes contain standard Windows fields that require different selection conventions. Refer to your Windows user documentation for information on the selection conventions.

The following shortcut keys allow you to complete dialog boxes faster:

This key or key combination	Does this
Tab	Moves the cursor to the next field, option, or command button.
Shift+Tab	Moves the cursor to the previous field, option, or command button.
Alt+underlined letter	Selects an option, or displays a drop-down list.
Alt+↓	Displays a drop-down list.
Spacebar	Turns check boxes on or off.

Key Conventions

This key combination	Means
Key1+Key2	Press and hold the first key while you press the second key. For example, press “Ctrl+A” means to press the Ctrl key, and while pressing it, press the A key. Then release both keys.
Shift+click	Press and hold the Shift key while you click an object with the pointer.

Command Conventions

Following are three methods for carrying out commands. Instructions in this manual don’t always outline each method.

- choosing a menu command
- choosing an icon on the toolbar
- using a key combination

For example:

Use any of these commands to open an application:
Choose “Open Application” in the File menu.
Choose from the toolbar.
Press Ctrl+O.

Before You Begin

Before you begin, you should already have installed and know how to operate this equipment and software:

- a personal computer with at least a 486, 25-MHz microprocessor and at least 8 MB Random Access Memory (RAM) (16 MB recommended), and SVGA monitor with 256 colors (recommended). For users working with imported .dxf files, at least 16 MB RAM is required.

  If you want to resize graphic images in PanelBuilder, set your display adapter to 65,536 colors.
- Microsoft Windows 3.1 operating system and above, or Windows 95
- the family of programmable logic controllers you'll be monitoring and controlling

Supported Devices

PanelView terminals have been tested and verified to work with the following Modbus-capable devices:

- Quantum® 140 CPU 113 02
- Quantum 140 CPU 113 03
- Compact PC-A984-145
- Modicon 984X
- BM85 Bridge Multiplexer
- LD485A-MP line driver

The PanelView terminal is always a master device on the Modbus network, never a slave.

Technical Support Services

If you have questions about PanelBuilder, please consult the manuals or Help first. If you can't find the answer, take advantage of our Technical Support Fax Back system, available 24 hours a day, 7 days a week at 1-216-646-5436, or browse through our technical support document library at **http://www.ab.com/mem/prodserv/services/technotes/techmain.html** on the World Wide Web.

Alternatively, contact:

Allen-Bradley
Technical Support
1 Allen Bradley Drive
Mayfield Heights, Ohio 44124-6118

or call 1-216-646-6800 or fax 1-216-646-6890 for technical support between the hours of 8 AM and 5 PM (EST), Monday to Friday.

Please have the serial number for your software ready when you call, or include it on your fax. You can find this number in three places:

- on the Software Registration card that was shipped with your software
- on the screen that appears when you start up PanelBuilder
- in the main Help menu, when you choose “About”

If you have questions about your Modbus controller or device, contact the manufacturer directly.

Overview of PanelBuilder 1400e with Modbus Connectivity

This chapter provides an overview of PanelBuilder 1400e. It describes these topics:

- what PanelBuilder is
- how PanelBuilder interacts with the PanelView terminal and the controller or other Modbus slave device
- important new PanelBuilder features

About PanelBuilder 1400e

PanelBuilder 1400e is a software package that runs under Microsoft Windows 3.1 and Windows 95. With it you create and design control panel applications for PanelView operator terminals.

As human-machine interfaces, these control panel applications enable an operator to monitor and control automated plant processes.

Important: To create applications for Modbus networks, you need PanelBuilder Version 3 or later.

PanelBuilder, PanelView Terminals, and the Controller or Other Modbus Slave Device

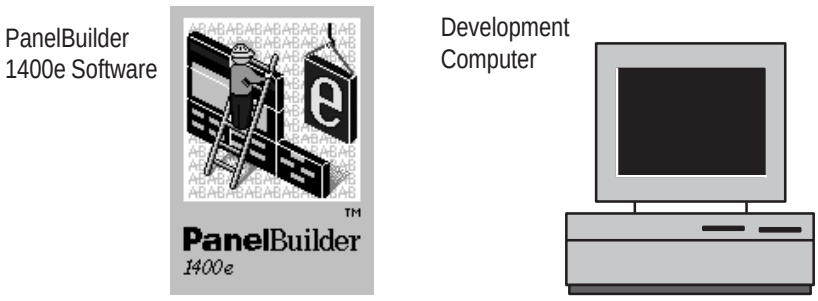
The relationship between PanelBuilder, the PanelView terminal, and the controller or other Modbus slave device is as follows:

- **PanelBuilder**—The Modbus application is created in PanelBuilder on the personal computer, and downloaded to the PanelView terminal.
- **Controller or other Modbus slave device**—When communicating over a Modbus network, the controller or other Modbus slave device can respond to queries from the PanelView terminal and other input or output devices.
- **PanelView terminal**—The PanelView terminal displays the process status information sent from the controller. This enables the operator to make decisions about the process. The operator provides input back to the controller. The PanelView terminal is a master on the Modbus network, never a slave. In addition:
  - the PanelView 1200/1400e Transfer Utility is used to transfer Modbus applications from the development computer to the terminal.
  - the PanelView Serial Firmware Upgrade Utility is used to install or upgrade firmware in the PanelView terminal. You need to install Modbus-capable firmware in all PanelView terminals you intend to connect to the Modbus network.

Note: The development computer doesn't need to be connected to the controller or the PanelView terminal to run the process. It must be connected only when you're installing or upgrading firmware in the PanelView terminal, using the PanelView Serial Firmware Upgrade Utility, or when downloading or uploading the application serially. To upload or download the application you can also install the PanelView 1200/1400e Transfer Utility on a portable computer, transfer the application to the portable computer, and then upload or download it from the portable computer. See the *PanelView 1200/1400e Transfer Utility User Manual* for details. For information about installing or upgrading the terminal's firmware, see Chapter 7, "Configuring the PanelView Terminal for Modbus Communications," in this manual, or see the Readme file on the PanelView Serial Firmware Upgrade Utility diskette.

PanelBuilder 1400e

PanelBuilder is the development software package you use to create and configure control panel application screens. Applications developed with PanelBuilder software on a personal computer are downloaded to PanelView terminals, where they are run.



PanelView Operator Terminals

The following terminals will run PanelBuilder 1400e applications on the Modbus network:

- PanelView 1000e terminals, Series A and above, running Version 3 and later firmware
- PanelView 1400e terminals, Series A and above, running Version 3 and later firmware

Note: To communicate over a Modbus network, you must use a PanelView 1000e or 1400e terminal that has been upgraded to include a supported Modbus ISA communications card and Version 3 firmware with the Modbus communications driver. The PanelView Serial Firmware Upgrade Utility must be used to install Modbus-capable firmware in the terminal. For details about installing and configuring a Modbus communications device (serial card), and installing Modbus-capable firmware, see Chapter 7, "Configuring the PanelView Terminal for Modbus Communications."

See the *PanelView Enhanced Modbus Communications Option Kit Release Note,* Publication Number 2711E-6.12.1, for a list of currently-supported Modbus communications cards.

The application screens created in PanelBuilder appear on the PanelView terminal, replacing traditional hard-wired control panels. They provide the physical interface between the controller and the human operator.

Application screens contain objects that function like control panel components. By using these objects to enter data or carry out commands, the operator can monitor and control the process.

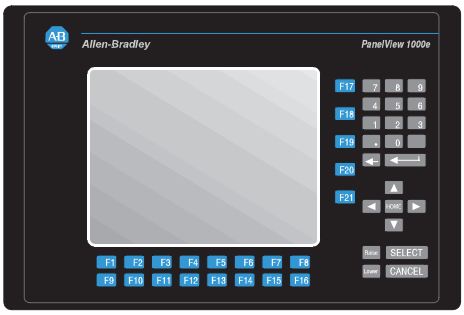
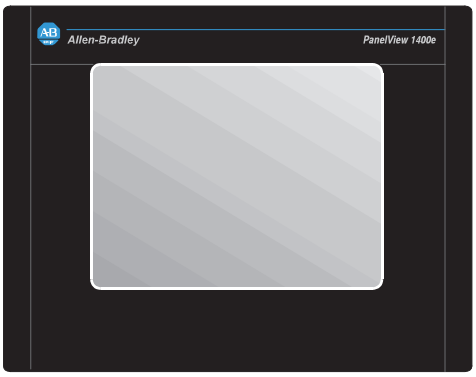
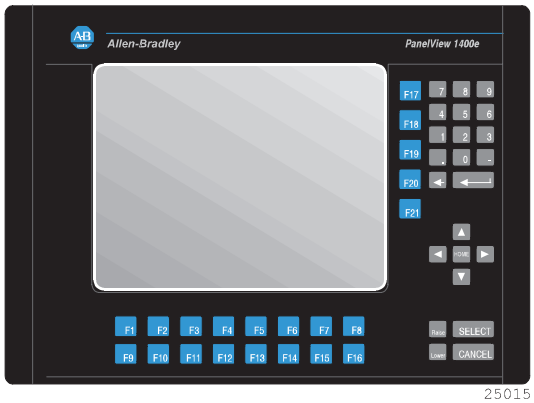
For information about installing and running PanelBuilder, see *Getting Started with PanelBuilder 1400e Configuration Software for Windows*, Publication Number 2711E-818. This manual also contains a tutorial that guides you through enhancing an existing application and running it on the PanelView terminal. A Modbus version of this tutorial is also provided. The following .pvc files in the Tutorial directory are the Modbus versions, which need to be enhanced:

- Mkctutor.pvc
- Mtctutor.pvc

The following .pvc files in the Tutorial directory are the Modbus versions which have been enhanced:

- Mtutork.pvc
- Mtutort.pvc

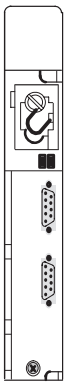
The program for Modicon controllers is called "Tutorial," and it is located in the Tutorial directory.

	Touch Screen Terminals	Keypad Terminals
PanelView 1000e Terminals		
PanelView 1400e Terminals		

The Controller or Other Modbus Slave Device

When communicating over a Modbus network, the controller can respond to queries from the PanelView terminal and other input or output devices.

Modicon Controller



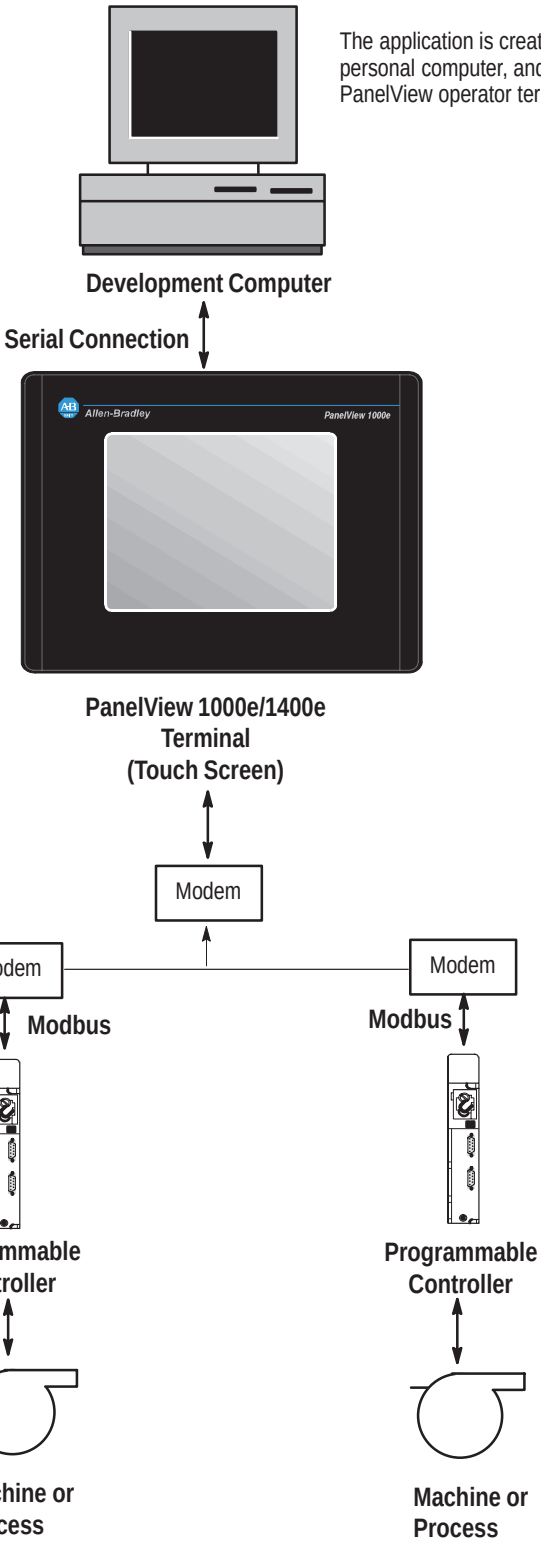
24762

The PanelView terminal can be connected to a controller, or other slave device on the Modbus network. The terminal can control and monitor coils, inputs, and registers in these devices on the network.

Understanding the Modbus Network

The following illustration shows the relationship between PanelBuilder, the PanelView terminal, and the controller. In the following illustration, the PanelView terminal is connected over Modbus:

The application is created in PanelBuilder on the personal computer, and downloaded to the PanelView operator terminal.



The PanelView terminal queries the controller for process or machine status information.

Operator input to the terminal is sent to the controller. The controller uses this information to control the machine or process.

Planning an Application for Modbus

This chapter provides information about planning a Modbus application, including defining nodes. For details about assigning scan classes and assigning tags, refer to Chapter 2, "Planning Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* publication 2711E-819.

To plan a Modbus application, use the Modbus Communications Worksheet and the Device Tags Worksheet (included in Appendix A). They help you identify the devices with which your application will be communicating and the device addresses relevant to your application.

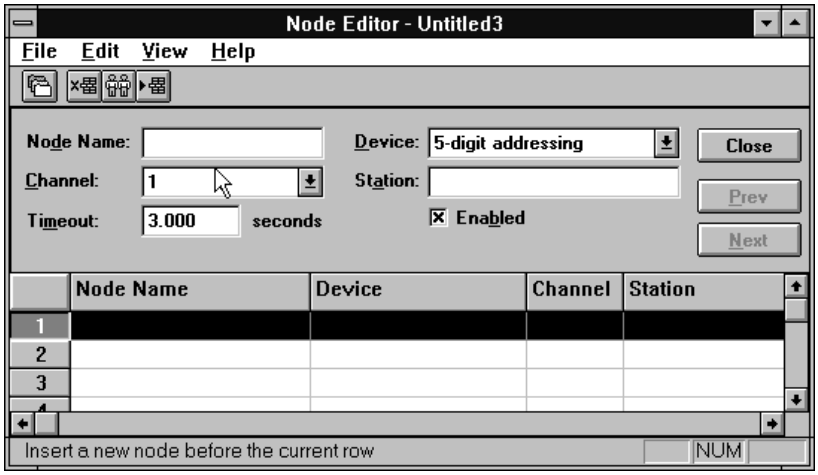
Use the information you record in these worksheets when assigning tags to objects in the Tag Database editor and defining communications using the Nodes editor and Scan Classes editor.

Defining Nodes and Scan Classes

Record node and scan class information on the Modbus Communications worksheet to help keep track of terminal communication information. Use these worksheets as a reference when configuring nodes in the Nodes editor, and when assigning scan classes to tags in the Tag Database editor. See Chapter 4, "Defining Communications," for details about working with these editors.

Defining the Nodes

A node is a Modbus slave device with which your application will be communicating on a network. For each node, you must identify the type of addressing the device uses (5- or 6-digit addressing), its station address, and the timeout value. Each node must be given a name to be used when defining tags.



Recording Node Information

For each node, fill in:

- **Node Name:** A user-defined node name. The name can be up to 40 characters long, and can include letters, numbers, dash (–), and the underscore character (_). You cannot use spaces.

  Tip: Use a name that will help you to identify your Modbus device when you are assigning tags later in your application. For example, you could name your Modbus devices according to their locations or the machine or part of the process they will be controlling or monitoring.

  Note: The node name “Unsolicited_Msgs” is reserved for system use in DH+ applications and cannot be assigned to a node defined by the user. It allows the terminal to support unsolicited messages to and from the controller. You cannot use a node with this name in Modbus applications.

- **Device:** The type of controller or Modbus device. Specify a 5- or 6-digit addressable device.
- **Channel:** The Channel number is 1 by default. The application network type determines this channel. You cannot change this value.
- **Station:** The address that identifies the Modbus device’s location on the network. Valid station addresses are between 1 and 247 (decimal).

Note: The PanelView terminal communicates with local Modbus stations or with remote, bridged devices if a BM85 module is connected and configured for the network.

- **Enabled:** If a node is enabled, the terminal will communicate with the device at the node. If the node is not enabled, the terminal will not communicate with the device. Instead, the PanelView terminal stores values to be written to the device. This allows system designers to test their applications without setting up communications, and to avoid communication errors at the terminal during testing.
- **Timeout:** The number of seconds the PanelView terminal should wait before reporting a communication error. Three seconds is the default when a new node is created.

About Scanning

Scanning works the same way for Modbus as it does for Data Highway Plus. For information about scanning, refer to Chapter 2, "Planning Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, publication 2711E-819.

Recording Tag Information

Assigning tags to objects for the Modbus release of PanelBuilder is similar to assigning tags to objects for DH+. You assign tags with the Data Source type Device for Modbus applications. Analog, digital, string, and block tags can all be used in Modbus applications. Where differences exist between DH+ and Modbus applications, with respect to assigning tags, they are highlighted in Chapter 6, "Defining Tags."

For generic information about assigning tags, see Chapter 2, "Planning Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, publication 2711E-819.

Note: You can use the Device Tags Worksheet to record tag information for each dynamic object in a PanelBuilder application for Modbus.

Note: For Modbus Device tags, the Tag Database editor supports the full addressing syntax and range supported by the 5- and 6-digit addressable devices.

Basic Application Operations

This chapter supplements the information in the PanelBuilder 1400e Configuration Software for Windows User Manual, publication 2711E-819. It describes only changes to basic application operations for the Modbus network. For detailed information about other basic application operations, consult Chapter 3, "Working with Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, publication 2711E-819.

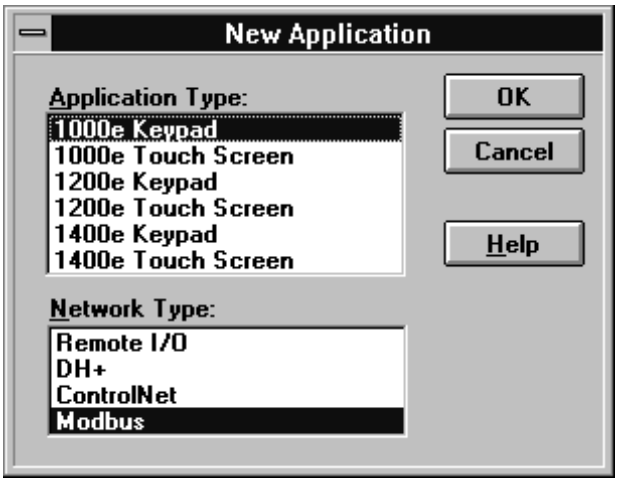
This chapter describes how to create a new application, and some changes to report options.

Note: PanelView 1200 and 1200e terminals do not support Modbus communications.

Creating a New Application

To create a new application for Modbus:

1. Select the Application Type and highlight the Modbus option in the Network Type list box.



2. Choose OK.

Creating Reports

Creating reports for a Modbus application is the same as for DH+ and Remote I/O applications. The only difference is the PLC Communications report.

For detailed information about creating reports, see "Creating Application Reports" in Chapter 3, "Working with Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, publication 2711E-819.

Additional Report on Options

You can generate a PLC Communications report for a Modbus application that will display the following information:

- communications setup information
- node and scan class definitions

Defining Communications

To define communications for a Modbus application, use these three editors:

- **Communication Setup editor**—to specify the driver information for connecting a PanelView terminal to a Modbus device.
- **Nodes editor**—to identify the types and addresses of the controllers the application will communicate with.
- **Scan Classes editor**—to define the speed at which tags used in an application will be scanned for new values.

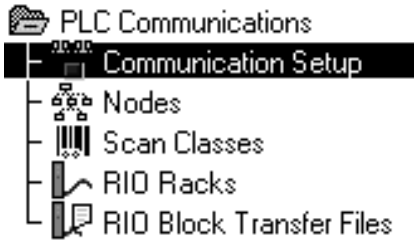
The other two editors in the PLC Communications folder, the RIO Racks and RIO Block Transfer Files editors, are used exclusively for defining Remote I/O communications.

Configuring Communications

The Configure Communication Setup dialog box has two tabs: Terminal Communications and Network File Transfer.

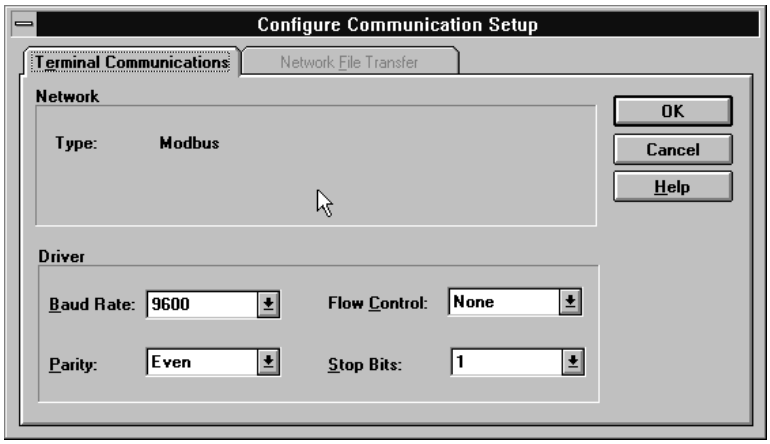
In the Terminal Communications tab, you specify the driver parameters for communicating with the Modbus network.

You cannot access the Network File Transfer tab from the Communication Setup dialog box, because Network File Transfers are not supported on Modbus networks.



To open the Configure Communication Setup dialog box:

▶ Open the PLC Communications folder and choose Communication Setup, or choose from the toolbar.



Setting up Terminal Communications

In the Terminal Communications tab you can set the driver parameters.

Setting the Driver Parameters

You must configure the driver parameters to correspond with the communication settings of the device to which the PanelView terminal is most immediately connected (whether a controller, modem, BM85 module, or other Modbus device).

- Fill in the fields in the Driver section of the Configure Communication Setup dialog box as follows:

  Baud Rate
  Specify the data-transfer rate between the PanelView terminal and the device to which it is connected. The default setting is 9600.

  Parity
  Specify None, Even, or Odd for the type of error-checking to be used. The default setting is Even.

  Flow Control
  Specify Hardware or None to determine whether handshaking is used for data transfer between the PanelView terminal and the device to which it is connected. The default setting is None.

  Note: Hardware flow control must be used with line drivers or modems.

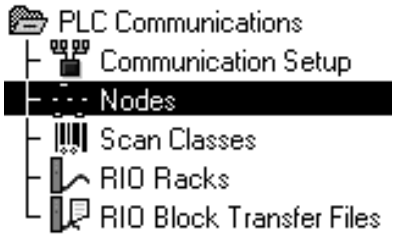
  Stop Bits
  Specify the number of stop bits used to signal the end of a data packet transferred between the PanelView terminal and the device to which it is connected. The default setting is 1.

  Note: The number of data bits is fixed at 8.

Configuring Nodes

A node is a device connected to the Modbus network. When you configure nodes, you specify a name, device type, and station address for each device the application will communicate with. A device at a Modbus station is referred to throughout a PanelView application by its node name.

You should already have determined the station address for each node when you completed the Modbus Communications Worksheet. If not, see Chapter 2, “Planning an Application for Modbus,” for details about determining station addresses.



Note: A node configuration can be changed at any time during application development. At application or screen validation, or download, the nodes used by the tags in the application must be defined. If you change the node's device type, the tags that use this node may have invalid addresses. If you change the node name, you can automatically update your tags at the same time.

To open the Node Editor:

- Open the PLC Communications folder and choose Nodes, or choose from the toolbar. The Node Editor opens.

The Node Editor has two parts: the data entry form on top where you define the node, and the spreadsheet viewer on the bottom where you see all the nodes and select one for editing.

To configure the nodes:

1. Fill in the following information for each node. Use the information you recorded in the Communications worksheet.

   Node Name
   Type a name of your choice up to 40 characters long. This name represents a device on the network. The only valid characters for a node name are a-z, A-Z, 0-9, – (dash), and _ (underscore). You cannot use spaces. The name is not case-sensitive; your characters will be displayed as you typed them.

   Note: The node name "Unsolicited_Msgs" is reserved for system use in DH+ applications and cannot be assigned to a node defined by the user. It allows the terminal to support unsolicited messages to and from the controller. You cannot use a node with this name in Modbus applications.

Tip: Use a name that will help you to identify your controllers when you are assigning tags later in your application. For example, you could name your controllers according to their locations or according to the machine or part of the process they will be controlling or monitoring.

Device
Select the type of device you are using from the drop-down list. The type of device determines the addressing syntax and range for all the tags with addresses on this node.

For Modbus applications, select 5-digit addressing or 6-digit addressing, depending on the device you are using. See the user manual for the device you are using, to determine whether to use 5- or 6-digit addressing.

Channel
The Channel number is 1 by default. The application network type that you specified when you created your application refers to this channel. You cannot change this value. This field maintains compatibility with RSView™ and provides future communication option expansion.

Station
Type the address of the device.

For Modbus applications, values are between 1 and 247 (decimal), whether the station is local or bridged.

Timeout
Type the number of seconds (0.100 to 6553.500) you want the terminal to wait before reporting a communication error. The default timeout period is 3 seconds.

Enabled
Normally nodes are enabled, allowing data collection. However, while you are debugging your application or troubleshooting your network, you can disable a node to prevent communication faults or invalid data. Once the application file is downloaded and running, any values normally sent to a disabled node will be recorded in the terminal, but the actual device value will remain unchanged.

To disable nodes, clear the Enabled check box.

Important: Make sure the nodes are enabled before you run an application in an online environment.

2. When you've finished configuring nodes, choose Close.

Configuring Scan Classes

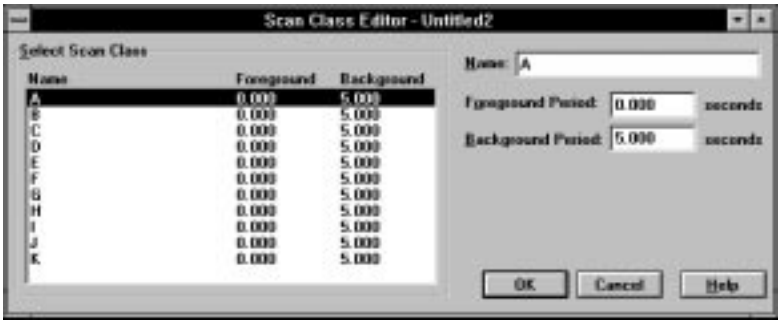
Any tag that has Device as its data source must be assigned to a scan class. At runtime, the PanelView terminal periodically updates its tag information by scanning the device addresses. You determine how often a tag value is updated by assigning the tag to a scan class that you have configured in the Scan Classes editor. Make sure that tags with rapidly changing device values are assigned to a fast scan rate, while those that don't change often are scanned less frequently. This helps optimize traffic flow on the Modbus network. Proper use of scan classes can reduce traffic on the Modbus network.

You should already have determined the rates for the scan classes when you completed the Communications worksheet. If not, see Chapter 2, "Planning Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, for tips on assigning foreground and background scan rates.

To open the Scan Class Editor dialog box:

- Open the PLC Communications folder and choose Scan Classes, or choose from the toolbar.

  The Scan Class Editor opens.



To configure scan classes:

1. Fill in the following information for each scan class. Use the information you recorded in the Communications worksheet.

   Name—A Through K
   You can keep the letter for the name of the scan class or you can type a name up to 20 characters long. The name can have upper and lower case letters, numbers, dashes, and underscores. You cannot use spaces.

   If you type a meaningful name, it will be easier to keep track of what the scan classes represent. For example, you might name one scan class TimeCritical, another SlowChanging, and so on.

Foreground and Background Period
The period specifies, in seconds, how often the device address will be scanned. A foreground period applies to tags used on the current screen, to the alarm and information window tags, and to the tags under the PLC Controlled tab in the PLC I/O Control dialog. The background scan period applies to tags used in all other screens in the system. The valid range of values is 0 to 86,400 seconds (24 hours), with a 0.1 second resolution.

To specify a period, type a number. You can use fractions of a second. For example, 0.6 means scan every six-tenths of a second. Keep the background rate slow so as not to slow down network traffic.

Tip: For more information about optimizing Modbus network traffic, refer to your network user documentation. Also see "Guidelines for Configuring Scan Classes" in Chapter 2, "Planning Applications," in the *PanelBuilder 1400e Configuration Software for Windows User Manual*.

Note: If a tag is being used by both a foreground and background component, the tag will be scanned at the foreground rate.

2. To save the information you've configured, choose OK.

Note: If you change the name of a scan class used by tags, you have the option of automatically updating the tags with the new name.

Changing the Network Type

When you create an application, you specify the type of network it is to run on, and set up the communication parameters accordingly. You can change the network type of an existing application to run it on another network. You do this using the Change Network Type dialog box.

Note: When you change the network type to Remote I/O, all communication specifications, including node definitions and scan classes, will be lost. You will have to re-configure communications for your application.

This chapter describes the following network switches:

- converting from DH+ to Modbus
- converting from Remote I/O to Modbus
- converting from ControlNet to Modbus
- converting from Modbus to DH+
- converting from Modbus to Remote I/O
- converting from Modbus to ControlNet

Note: You can either convert only the application, or the application and its tags. In either case, you must edit tag addresses and node definitions to make them valid for the new network type.

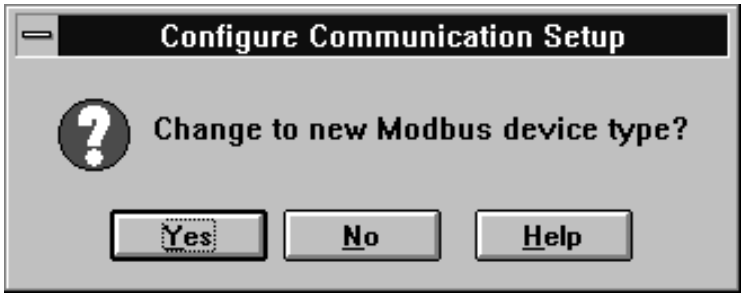
Converting from DH+ to Modbus

To change the network type from DH+ to Modbus:

Important: When you change an application from DH+ to Modbus, you will have to add valid Modbus device tag addresses.

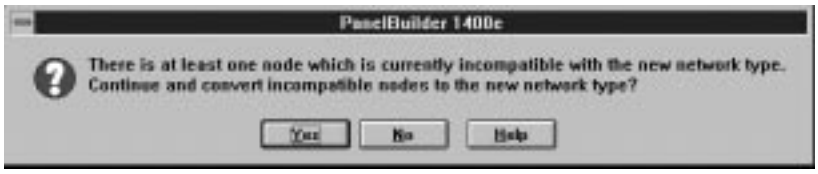
1. Choose Change Network Type from the Tools menu.
2. In the Target Network field, choose Modbus.
3. Choose OK.

   The following message will appear:



4. Choose Yes to change your DH+ application to Modbus. Choose No if you do not wish to continue with the conversion.

   Note: When converting to a Modbus application, the device type defined for each node will be incompatible with the Modbus network type. The following message will appear, prompting you to convert the incompatible nodes.



5. Select Yes or No.

   If you select Yes:

   - the device type of any node will be changed to 5-digit addressing
   - the Unsolicited_Msgs node will be deleted
   - any node with an invalid station number for the Modbus network will be changed to have a station number of 1
   - tag addresses will remain as DH+ addresses. You must change these tag addresses to Modbus tag addresses.

   If you select No, the network conversion will be cancelled.

Converting from Remote I/O to Modbus

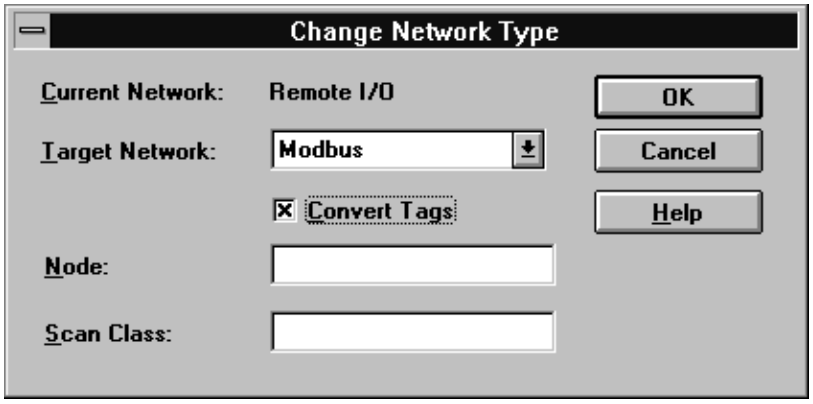
To change the network type from Remote I/O to Modbus:

Important: When you change an application from Remote I/O to Modbus, you will have to define the necessary Modbus nodes and scan classes and add valid Modbus device tag addresses.

1. Choose Change Network Type from the Tools menu.
2. In the Target Network field, choose Modbus.
3. To convert the tags in the application, select the Convert Tags check box. If you don't want to convert tags in the application, clear the check from the Convert Tags check box.
   - If you don't convert the tags to Modbus format, the tags' data source remains Remote I/O. For any tags to be used in the Modbus application, you will have to change the data source to Device and give them valid Modbus addresses.
   - If you do convert the tags to Modbus format, all the tags in the database that are used by your application will be converted to Device tags. Analog tags using the binary data type will be switched to unsigned integer because binary is not supported for Modbus applications.

Note: If you convert shared tags, this may make them invalid for the other applications that are using them. Unused tags are not converted and remain as Remote I/O tags.

Note: If you convert an application from Remote I/O to Modbus, or vice-versa, the tag addresses will be invalid for the network to which you are converting. Change the tag addresses to match the network type.



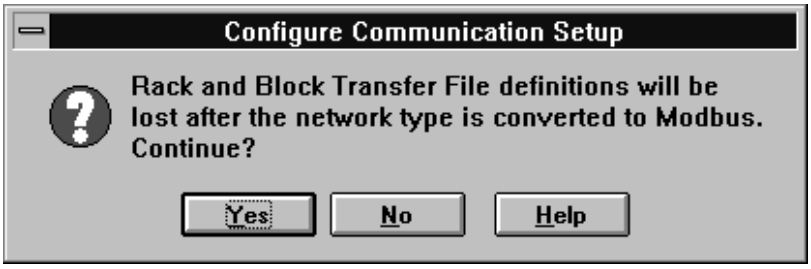
4. Specify a node name and scan class if required.

You can specify a node name and scan class when you do the conversion, or you can leave them blank. If you enter a node name and scan class, they will be used in all the tags that are converted. In addition, the node and scan class will be created for you with the default settings. You can change the settings to suit your application later.

If you leave the Node Name and Scan Class fields blank, you will have to create the nodes and scan classes that your tags will use, then update each tag with the node and scan class names that you have created. The converted tags will have a blank node and scan class name.

5. Choose OK.

   The following message will appear:



6. Choose Yes to confirm that you want to continue.

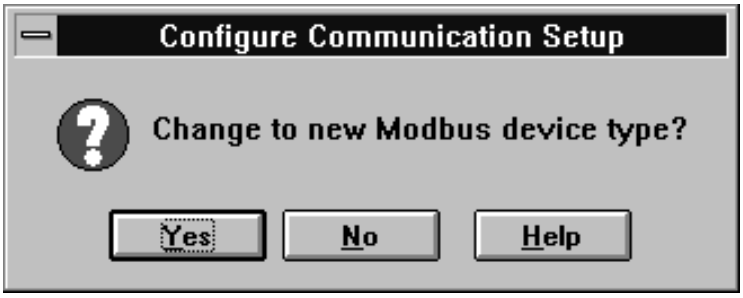
Converting from ControlNet to Modbus

To change the network type from ControlNet to Modbus:

Important: When you change an application from ControlNet to Modbus, you will have to add valid Modbus device tag addresses.

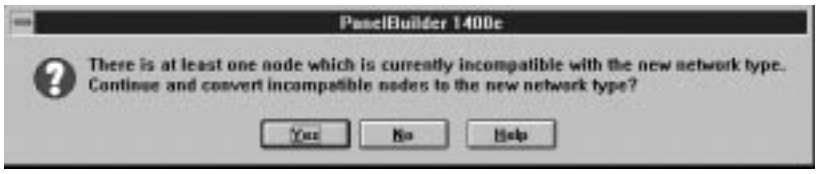
1. Choose Change Network Type from the Tools menu.
2. In the Target Network field, choose Modbus.
3. Choose OK.

   The following message will appear:



4. Choose Yes to change your ControlNet application to Modbus. Choose No if you do not wish to continue with the conversion.

   Note: When converting to a Modbus application, the device type defined for each node will be incompatible with the Modbus network type. The following message will appear, prompting you to convert the incompatible nodes.



5. Select Yes or No.

   If you select Yes:

   - the device type of any node will be changed to 5-digit addressing
   - any node with an invalid station number for the Modbus network will be changed to have a station number of 1

   If you select No, the network conversion will be cancelled.

Converting from Modbus to DH+

To change the network type from Modbus to DH+:

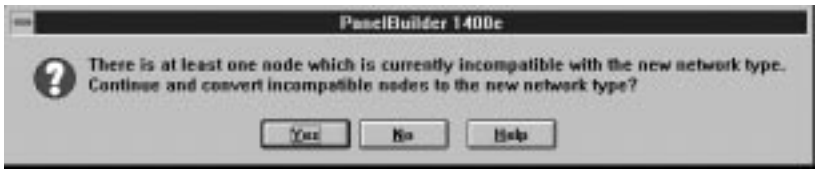
Important: When you change an application from Modbus to DH+, you will have to add valid DH+ device tag addresses.

1. Choose Change Network Type from the Tools menu.
2. In the Target Network field, choose DH+.
3. Choose OK.

   The following message will appear:

4. Choose Yes to change your Modbus application to DH+. Choose No if you do not wish to continue with the conversion.

Note: PanelBuilder checks that the station numbers and device types of all Modbus nodes are valid when the network type is converted to DH+. For example, station number 8 is an invalid octal number. The following message will appear, prompting you to convert incompatible nodes:



5. Select Yes or No.

   If you select Yes:

   - the device type of any node will be changed to PLC-5 (Enhanced)
   - an Unsolicited_Msgs node will be added

   If you select No, the network conversion will be cancelled.

Converting from Modbus to Remote I/O

If you change an application from Modbus to Remote I/O, you will have to define the necessary Racks, specify the Block Transfer File and Pass-Through control bytes, if needed, and add new tag addresses, which are valid for Remote I/O.

To change the network type from Modbus to Remote I/O:

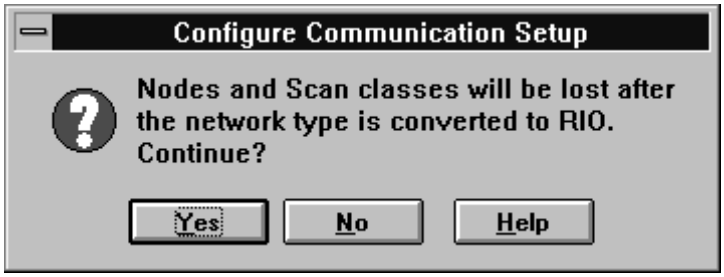
1. Choose Change Network Type from the Tools menu.
2. In the Target Network field, choose Remote I/O.
3. To convert the tags in the application, select the Convert Tags check box. If you don't want to convert tags in the application, clear the check from the Convert Tags check box.
   - If you don't convert the tags to Remote I/O format, the tags' data source remains Device and the address is unchanged. You will have to change the data source to Remote I/O manually for any of these tags that you want to use, and give them each a Remote I/O address.
   - If you convert the tags to Remote I/O, the data source for all the tags is changed to Remote I/O, but you will still have to give them valid Remote I/O addresses manually.

Note: Converting tags that are shared may make them invalid for the other applications that are using them. Unused tags that are not converted will stay as Modbus tags.

Note: If you convert an application from Modbus to Remote I/O, or vice-versa, the tag addresses will be invalid for the network to which you are converting. Change the tag addresses to match the network type.

4. Choose OK.

   The following message appears:



5. Choose Yes to confirm that you want to continue.
6. Once you have changed the network type you will have to configure the controller type, rack assignments, block transfer files, and Pass-Through control byte, if needed, in the Rack and Block Transfer File editors.

Converting from Modbus to ControlNet

To change the network type from Modbus to ControlNet:

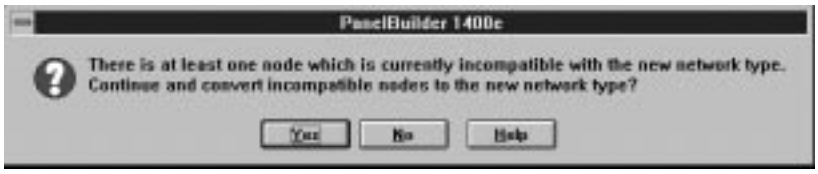
Important: When you change an application from Modbus to ControlNet, you will have to add valid ControlNet device tag addresses.

1. Choose Change Network Type from the Tools menu.
2. In the Target Network field, choose ControlNet.
3. Choose OK.

   The following message will appear:

4. Choose Yes to change your Modbus application to ControlNet. Choose No if you do not wish to continue with the conversion.

Note: If a Modbus node is defined as station 1, or station 64 through 247 (inclusive), it will be invalid for a ControlNet application. The following message will appear, prompting you to convert the station number. The device types defined for all nodes will also have to be changed when the application is converted to ControlNet.



5. Select Yes or No.

   If you select Yes:

   - the device type of any node will be changed to PLC5-Enhanced
   - any node with an invalid station number for the ControlNet network will be changed to have a station number of 2

   If you select No, the network conversion will be cancelled.

Defining Tags

Use tags to name controller addresses for easy reference. For more information about tags and their role, the tag database editor, and how to create tags, see Chapter 6, "Defining Tags," in the *PanelBuilder 1400e Configuration Software for Windows User Manual*.

Tag Types

PanelBuilder uses the following types of tags:

This tag type:	Stores this type of data:
Analog	Range of values (depends on the data type (integer or floating point) selected) These tags can represent complex states such as temperature or the position of rotary controls.
Digital	0 or 1 These tags can represent devices that can only be on (1) or off (0), such as push buttons.
String	ASCII string, series of characters or whole words (maximum of 82 characters) These tags are used only when defining ASCII Input and ASCII Display objects, and for sending alarm messages to the controller.
Block	A contiguous bit stream of up to 1024 bits. A block tag is used strictly for defining the Alarm Triggers tag and Acknowledge to PLC tag when multiple simultaneous alarms need to be monitored. Use Block Tags when using bit-triggered alarms. PanelBuilder Version 3 supports Device block tags as well as Remote I/O block tags.

Read and Write Tags

At runtime, PanelBuilder objects and control functions can read from or write to controller addresses assigned to any of the tag types. The terms *read tag* and *write tag* will sometimes be used. A read tag is a tag with a controller address that only needs to be read by PanelBuilder objects and functions. A write tag is a tag with a controller address that can be written to by PanelBuilder objects and functions.

Note: When connected to a Modbus network, the PanelView terminal is the only device initiating reads and writes (master device). All other devices are slaves.

Note: You can use Expressions to perform calculations, logical, and conditional operations to manipulate the values of tags. See Chapter 7, “Creating Expressions” in the *PanelBuilder 1400e Configuration Software for Windows User Manual.*

Data Sources

The other two data sources you can see in the Tag Database editor, Memory and DDE, are used only by RSView.

Device

When you create tags for a Modbus application, select Device as the data source. This means that the data comes from a specific memory location in a controller that is connected to the Modbus network.

For each tag you must specify a node name, a scan class, and the physical address within the controller that the tag references. The node name refers to the controller’s location on the Modbus network; the scan class determines how often the terminal checks the value at this address. See Chapter 2, “Planning Applications,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* for details on configuring nodes and scan classes. Appendix A of this manual contains a worksheet to help you plan scan classes.

Configuring Tag Type

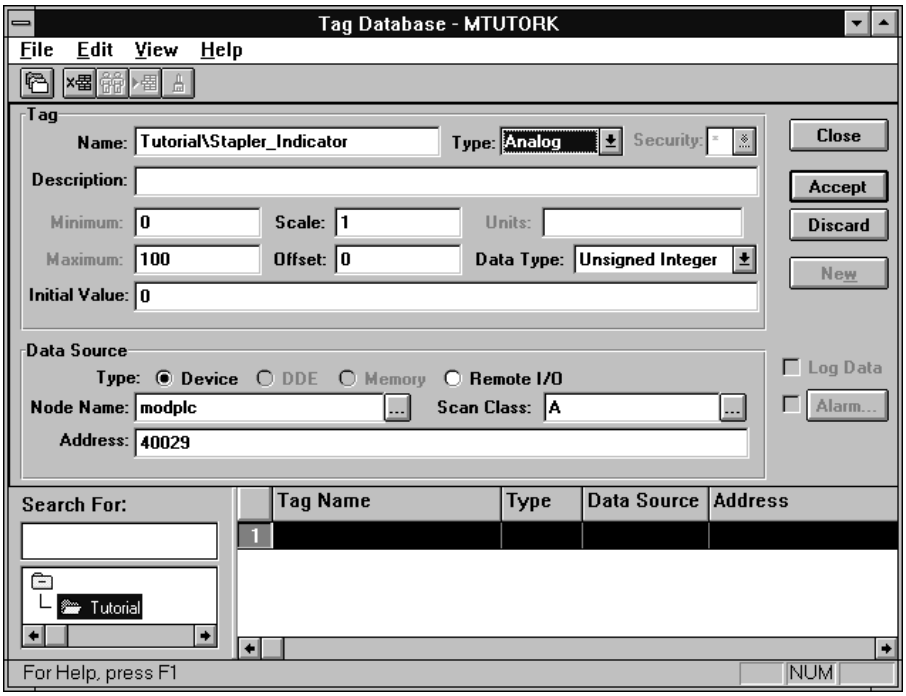
This section describes how to fill in the fields for analog, digital, string, and block tag types. Use the information you entered on the Device Tags worksheet described in Chapter 2, “Planning Applications,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual.* The Device Tags worksheet is included in Appendix A of this manual.

Note: The Log Data and Alarm check boxes in the Tag Database editor are present to maintain compatibility with RSView databases. You cannot use them in PanelBuilder.

Tip: For information about assigning tag addresses that optimize network traffic, see “Guidelines For Organizing Tags to Optimize Network Performance” in Chapter 2, “Planning Applications,” in the *PanelBuilder Configuration Software for Windows User Manual.*

Configuring an Analog Tag

1. If the tag is part of a folder, select that folder in the folder hierarchy. The folder name appears in the Name field and is the first part of the tag name.
2. Type a tag name. If the tag is part of a folder, type the name after the backslash (\).



3. For Type, select Analog.
4. Fill in the fields as outlined below:

Security
This field is reserved for RSView databases. You cannot enter anything in the Security field.

Description
Type a description of this tag up to 128 characters long.

Minimum and Maximum
These fields are reserved for RSView databases. You cannot enter anything in the Minimum and Maximum fields.

Scale and Offset

Type a number. For the scale, do not use 0.

Scale and offset together transform raw controller data into meaningful units for the operator. At runtime, all data read from the controller into an analog tag will be scaled using the formula:

$y = (mx) + b$

where m = scale
x = raw PLC data
b = offset
y = scaled value

The terminal displays the scaled value. When data is written to the controller using an analog tag, the value will be inversely scaled using the formula:

$$x = \frac{(y - b)}{m}$$

This converts the value back to raw controller data before it is written to the PLC. With Scale = 1 and Offset = 0 (the default values for a new analog tag), the controller data is not changed.

Important: A fractional scale or offset value will result in a floating point scaled value. This will be true regardless of the tag's data type. Extensive use of floating point values can slow a terminal's performance.

Important: If the descaled value to be written to the tag address is a fraction, but the tag is not configured to deal with floating point data (i.e., Float data type or Default data type with a tag address in the Float section of the controller), the value will be truncated to the nearest whole number before it is written to the tag address.

Note: You can also use expressions to perform calculations on the values of analog and digital tags that read information from the controller. See Chapter 7, "Creating Expressions," in the *PanelBuilder 1400e Configuration Software for Windows User Manual.*

Units

This field is reserved for RSView databases. You cannot enter anything in the Units field.

Data Type

Select the data type that matches the format of the data stored in the controller. The default entry in the data type field is Default. In Modbus applications, the Default data type is Unsigned Integer with an address length of 16 bits. Unless special data is expected, Default should be acceptable.

The following data types are supported for Analog tags in a Modbus application:

Data Type	Description
Default	Unsigned 16-bit value.
Byte	Unsigned 8-bit value. Uses the lower 8 bits of the 16-bit address.
Unsigned Integer	Unsigned 16-bit value.
Integer	Signed 16-bit value.
Long Integer	Signed 32-bit value.
Bit Position	Value range from 0 to 16. Address length fixed at 16 bits.
1 BCD	Value range 0 to 9. Uses lower 4 bits of 16-bit address.
2 BCD	Value range 0 to 99. Uses lower 8 bits of 16-bit address.
3 BCD	Value range 0 to 999. Uses lower 12 bits of 16-bit address.
4 BCD	Value range 0 to 9999.
Floating Point	Single-precision (32-bit) floating point value. The range of data values is –3.402823E +38 to –1.175494E –37, 0, and +1.175494E –37 to +3.402823E +38.
BIN 3	Value range 0 to 999. Uses a 16-bit address.
BIN 4	Value range 0 to 9999. Uses a 16-bit address.
BIN 6	Value range 0 to 999999. Uses a 32-bit address.
BIN 8	Value range 0 to 99999999. Uses a 32-bit address.

Initial Value

This is the default value of the tag at the terminal. When a tag is used with a PanelBuilder input object or function, this initial value, after descaling, is written to the controller when the application first executes.

For a PanelBuilder object with an initial state and a main control tag, the object's initial state value supersedes the tag's initial value, so that the initial state value is written to the controller instead of the tag's initial value. On application upload, the object's initial state value is used as the tag's initial value.

Note: For the PanelView terminal to write default values to the controller, you must choose No for "Use Default Operation," on the terminal's Application Startup screen, and you must cycle power to the terminal. Default values are written to the controller whenever you subsequently cycle power to the terminal.

5. To fill in the fields for data source, see “Specifying a Data Source” later in this chapter.

Modbus Address Space

Modbus devices can contain four distinct address spaces. Two spaces are reserved for Coil data and two are reserved for Register data. The PanelView terminal can only write to one of the two Coil address spaces but can read from both spaces. The same is true for the two Register address spaces.

Modicon controllers store read and write address spaces in the following data table locations:

Reference	Address Type	Data Access	Description
0	Discrete Output or Coil (internal)	bit read or write	Use to drive a real output through an output module or to set one or more internal coils. A coil can be used to drive multiple contacts.
1	Discrete Input	bit read-only	Use to drive contacts in the logic program. The input state is controlled by an input module.
3	Input Register	word read-only	Holds numeric inputs from an external source (for example, a thumb wheel entry, an analog signal or data from a high speed counter). A 3x register can also store 16 contiguous discrete signals that are entered into the register in either binary or binary coded decimal (BCD) formats.

Reference	Address Type	Data Access	Description
4	Output Holding Register	word read and write	Use to store numerical (decimal or binary) information or to send the information to an output module.
6	Extended Memory Register	access through Logic Program only	Use to store information in an extended memory area. Only available in controllers with 24 bit CPUs that support extended memory such as the 984B, E984-785, and Quantum series of controllers.

Addressing Syntax

For analog tags, the addressing syntax is as follows:

Addressing Syntax for Devices Using 5-digit Addressing:

Reference	Operations	Addressing Syntax
0	bit read and write	0*bbbb* where *bbbb* = bit 0001 to 9999 (decimal) and *bbbb* must align on word boundaries (e.g. 00001, 00017, 00033)
1	bit read only	1*bbbb* where *bbbb* = bit 0001 to 9999 (decimal) and *bbbb* must align on word boundaries e.g. 00001, 00017, 00033)
3	word read only	3*wwww* where *wwww* = word offset 0001 to 9999 (decimal). Bit offsets are not supported.
4	word read and write	4*wwww* where *wwww* = word offset 0001 to 9999 (decimal). Bit offsets are not supported.

Addressing Syntax for Devices Using 6-digit Addressing:

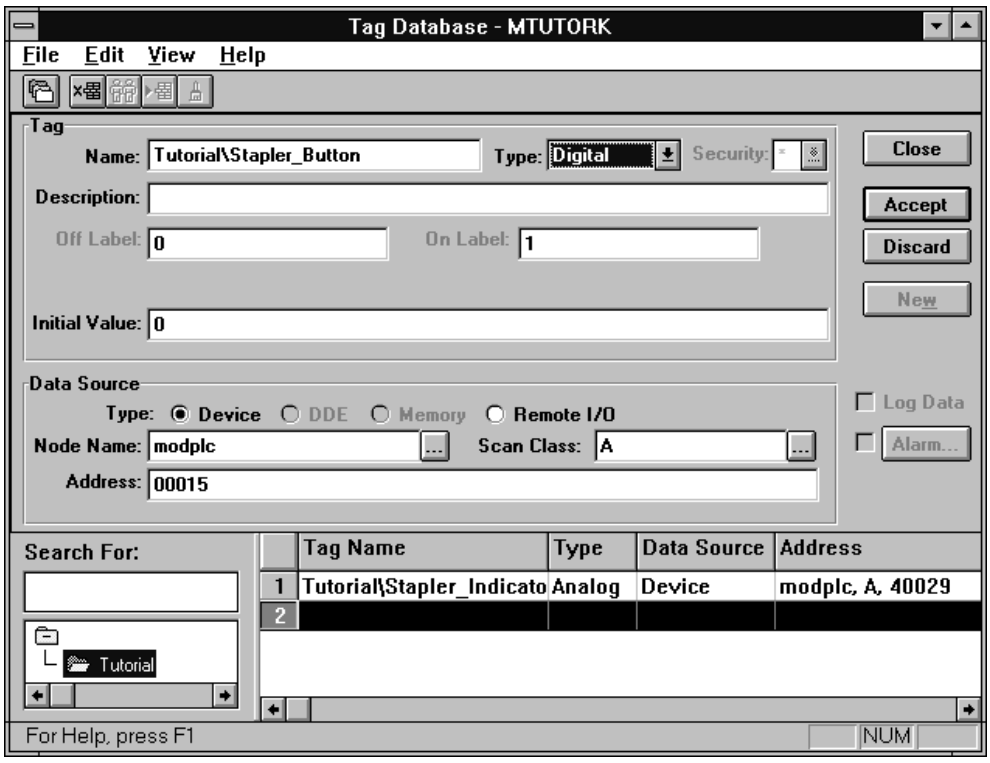
Reference	Operations	Addressing Syntax
3	word read only	3*wwwww* where *wwwww* = word offset 00001 to 65535 (decimal). Bit offsets are not supported.
4	word read and write	4*wwwww* where *wwwww* = word offset 00001 to 65535 (decimal). Bit offsets are not supported.

Important: Because analog tags with References 1 or 3 are read only, they can only be assigned to display objects (e.g. Numeric Data Display). An error will be generated when you validate the application, if a tag with Reference 1 or 3 has been assigned to an input object. For more information about types of objects, see Chapter 9, “Creating Objects,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, Publication Number 2711E-819.

Configuring a Digital Tag

A digital tag has two possible values at runtime: 0 or 1. Use a digital tag wherever a toggle or Boolean function is needed.

1. If the tag is part of a folder, select the folder in the folder hierarchy. The folder name appears in the Name field and is the first part of the tag name.
2. Type a tag name. If the tag is part of a folder, type the name after the backslash (\).
3. For Type, select Digital.



4. Fill in the fields as outlined below:

   Security
   This field is reserved for RSView databases. You cannot enter anything in the Security field.

   Description
   Type a description of this tag up to 128 characters long.

   Off Label and On Label
   These fields are reserved for RSView databases. You cannot enter anything in them.

   Initial Value
   Enter an initial value of 0 or 1 for the digital tag. When a tag is used with a PanelBuilder input object or function, this initial value is written to the controller when the application first executes.

   For a PanelBuilder object with an initial state and a main control tag, the object's initial state value supersedes the tag's initial value, so that the initial state value is written to the controller instead of the tag's initial value. On application upload, the object's initial state value is used as the tag's initial value.

   ▶ **Note:** For the PanelView terminal to write default values to the controller, you must choose No for "Use Default Operation," on the terminal's Application Startup screen, and you must cycle power to the terminal. Default values are written to the controller whenever you subsequently cycle power to the terminal.

5. To fill in the fields for data source, see "Specifying a Data Source" later in this chapter.

Addressing Syntax

For digital tags, the addressing syntax is as follows:

Addressing Syntax for Devices Using 5-digit Addressing:

Reference	Operations	Addressing Syntax
0	bit read and write	0*bbbb* where *bbbb* = bit 0001 to 9999 (decimal)
1	bit read only	1*bbbb* where *bbbb* = bit 0001 to 9999 (decimal)
3	word read only	3*wwww/bb* where *wwww* = word offset 0001 to 9999 (decimal) */bb* = bit offset in word 01 to 16 (decimal)
4	word read only	4*wwww/bb* where *wwww* = word offset 0001 to 9999 (decimal) */bb* = bit offset in word 01 to 16 (decimal)

Addressing Syntax for Devices Using 6-digit Addressing:

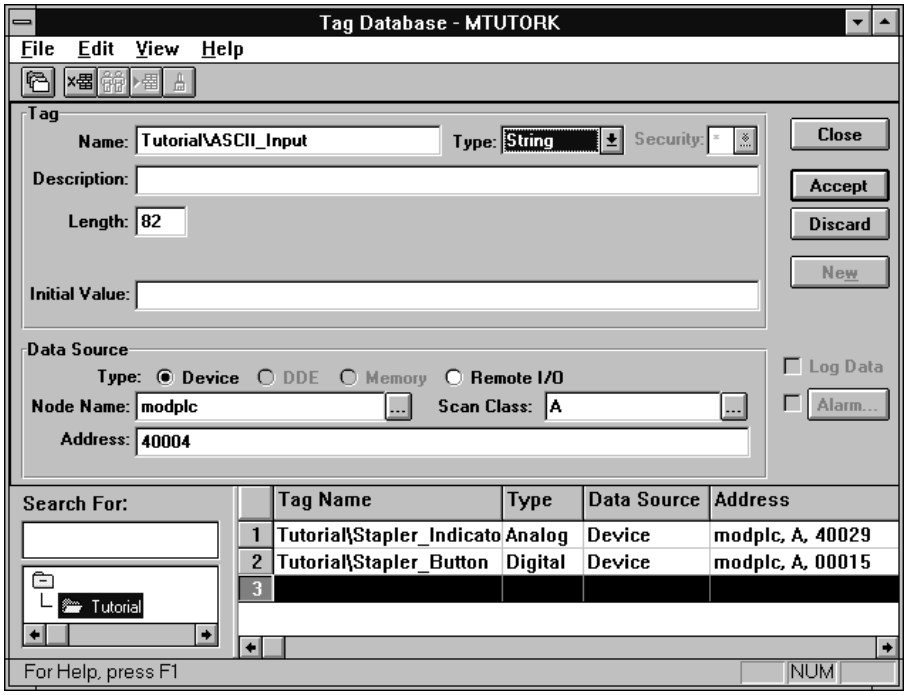
Reference	Operations	Addressing Syntax
3	word read only	3*wwwww/bb* where *wwwww* = word offset 00001 to 65535 (decimal) */bb* = bit offset in word 01 to 16 (decimal)
4	word read only	4*wwwww/bb* where *wwwww* = word offset 00001 to 65535 (decimal) */bb* = bit offset in word 01 to 16 (decimal)

Note: Digital tags support only bit addresses.

Important: Because digital tags with References 1, 3, or 4 are read-only, they can only be assigned to display objects (e.g. Numeric Data Display). An error will be generated when you validate the application if a tag with Reference 1, 3, or 4 has been assigned to an input object. For more information about types of objects, see Chapter 9, “Creating Objects,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* Publication Number 2711E-819.

Configuring a String Tag

1. If the tag is part of a folder, select the folder in the folder hierarchy. The folder name appears in the Name field and is the first part of the tag name.



2. Type a tag name. If the tag is part of a folder, type the name after the backslash (\).

3. For Type, select String.

4. Fill in the fields as outlined below:

   Security
   This field is reserved for RSView databases. You cannot enter anything in the Security field.

   Description
   Type a description of this tag up to 128 characters long.

   Length
   Type a number between 1 and 82 to specify the length of the string tag in bytes. The length must be a multiple of 2. Tags using References 0 and 1 must align on word boundaries.

   Initial Value
   Enter an initial value for the tag. When a tag is used with a PanelBuilder input object or function, this initial value is written to the controller when the application first executes.

   ▶ **Note:** For the PanelView terminal to write default values to the controller, you must choose No for "Use Default Operation," on the terminal's Application Startup screen, and you must cycle power to the terminal. Default values are written to the controller whenever you subsequently cycle power to the terminal.

   ▶ **Note:** There can be no more than 720 string tags in an application.

5. To fill in the fields for data source, see "Specifying a Data Source" later in this chapter.

Addressing Syntax

For string tags, the addressing syntax is as follows:

Addressing Syntax for Devices Using 5-digit Addressing:

Reference	Operations	Addressing Syntax
0	bit read and write	0*bbbb* where *bbbb* = bit 0001 to 9999 (decimal) and *bbbb* must align on word boundaries (e.g. 00001, 00017, 00033)
1	bit read only	1*bbbb* where *bbbb* = bit 0001 to 9999 (decimal) and *bbbb* must align on word boundaries (e.g. 00001, 00017, 00033)
3	word read only	3*wwww* where *wwww* = word offset 0001 to 9999 (decimal). Bit offsets are not supported.
4	word read and write	4*wwww* where *wwww* = word offset 0001 to 9999 (decimal). Bit offsets are not supported.

Addressing Syntax for Devices Using 6-digit Addressing:

Reference	Operations	Addressing Syntax
3	word read only	3*wwwww* where *wwwww* = word offset 00001 to 65535 (decimal). Bit offsets are not supported.
4	word read and write	4*wwwww* where *wwwww* = word offset 00001 to 65535 (decimal). Bit offsets are not supported.

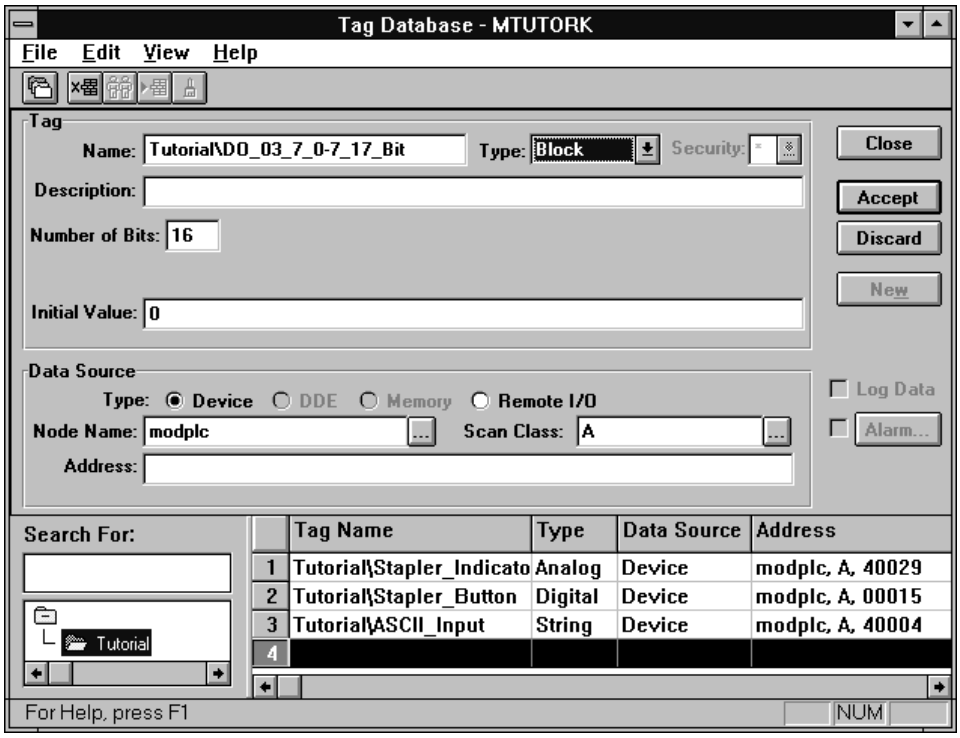
Important: Because string tags with References 1 or 3 are read-only, they can only be assigned to display objects (e.g. Numeric Data Display). An error will be generated when you validate the application if a tag with Reference 1 or 3 has been assigned to an input object. For more information about types of objects, see Chapter 9, “Creating Objects,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual*, Publication Number 2711E-819.

Configuring a Block Tag

Use the following procedure to configure a block tag:

Important: Block tags are used only for the Alarm Control and the Alarm Acknowledge Value control when multiple, simultaneous alarms need to be monitored. For more information, see Chapter 11, “Configuring Alarms,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual.*

1. If the tag is part of a folder, select the folder in the folder hierarchy. The folder name appears in the Name field and is the first part of the tag name.
2. Type a tag name. If the tag is part of a folder, type the name after the backslash (\).
3. For Type, select Block.



4. Fill in the fields as outlined below:

   Security
   This field is reserved for RSView databases. You cannot enter anything in the Security field.

   Description
   Type a description of this tag up to 128 characters long.

   Number of Bits
   Enter a number from 1 to 1024 to define the length of the block.

   The tag's address must start on a word boundary, e.g. 00001, 00017, 00033, and the number of bits must be a multiple of 16.

   Initial Value
   Enter a 1 or 0 to initialize the entire block to 1 or 0 (i.e., all bits 1 or all bits 0). When a tag is used with a PanelBuilder input object or function, this initial value is written to the controller when the application first executes.

   Note: For the PanelView terminal to write default values to the controller, you must choose No for "Use Default Operation," on the terminal's Application Startup screen, and you must cycle power to the terminal. Default values are written to the controller whenever you subsequently cycle power to the terminal.

5. To fill in the fields for data source, see "Specifying a Data Source," next.

Addressing Syntax

For block tags, the addressing syntax is as follows:

Addressing Syntax for Devices Using 5-digit Addressing:

Reference	Operations	Addressing Syntax
0	bit read and write	0*bbbb* where *bbbb* = bit 0001 to 9999 (decimal) and *bbbb* must align on word boundaries (e.g. 00001, 00017, 00033)
1	bit read-only	1*bbbb* where *bbbb* = bit 0001 to 9999 (decimal) and *bbbb* must align on word boundaries (e.g. 00001, 00017, 00033)
3	word read-only	3*wwww* where *wwww* = word offset 0001 to 9999 (decimal). No bit offsets are supported.
4	word read and write	4*wwww* where *wwww* = word offset 0001 to 9999 (decimal). No bit offsets are supported.

Addressing Syntax for Devices Using 6-digit Addressing:

Reference	Operations	Addressing Syntax
3	word read-only	3*wwwww* where *wwwww* = word offset 00001 to 65535 (decimal). No bit offsets are supported.
4	word read and write	4*wwwww* where *wwwww* = word offset 00001 to 65535 (decimal). No bit offsets are supported.

Important: Because block tags with References 1 or 3 are read only, they can only be assigned to display objects (e.g. Numeric Data Display). An error will be generated when you validate the application if a tag with Reference 1 or 3 has been assigned to an input object. For more information about types of objects, see Chapter 9, "Creating Objects," in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* Publication Number 2711E-819.

Specifying a Data Source

The data source determines where a tag's data comes from. Tags defined for a Modbus application must specify the Device data source.

Note: DDE and Memory data sources are only used by RSView.

For a Modbus application, the tag's reference determines whether it is a read or a write tag:

Reference Number	Operation
0	read and write
1	read only
3	read only
4	read and write

Note: The exception is for digital tags, for which Reference 4 is read only.

Important: Because tags with References 1 or 3 are read-only, they can only be assigned to display objects (e.g. Numeric Data Display). An error will be generated when you validate the application if a tag with Reference 1 or 3 has been assigned to an input object. For more information about types of objects, see Chapter 9, "Creating Objects," in the *PanelBuilder 1400e Configuration Software for Windows User Manual,* Publication Number 2711E-819.

Important: For Modbus analog tags, the entire controller data file element assigned to the tag's address is used in determining the tag's value. This is true regardless of the tag's data type. For example, a Byte data type assigned with the address 30001 will still look at the entire 16 bits of the integer element, even though the tag is interested only in the lower 8 bits. The controller's logic must ensure that the unused bits are 0, to prevent invalid or out of range data from being read from the address.

Device Data Source

A tag with Device as its data source reads or writes its data to or from a device on the Modbus network. If you have not configured the node and scan class for the tag, you can configure them from the Tag Database editor while you are defining a tag, or you can configure them after you have finished creating tags. If you want to define them after the tag is created, make sure any one of the node, scan class, or address fields is blank so that Accept will not validate and expect a valid tag record complete with supporting node and scan class definitions.

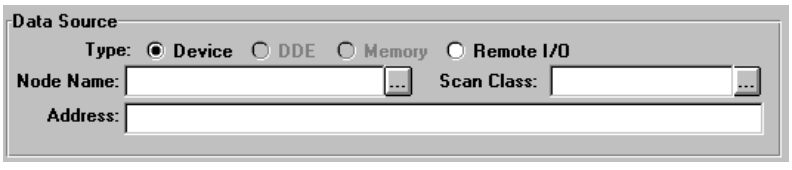
Validation

Tags are validated when you choose Accept, and any errors must be corrected before the tag definition will be saved. Validation ensures that any node and scan class definitions needed by the tag exist.

Specifying Device as the Data Source

Use the information on the Device Tags worksheets to fill in the tag addresses.

1. Choose Device.



2. The node is the controller that this tag addresses. In the Node Name field, do one of the following:
   - type a node name.
   - double-click in the Node Name field to open the Add Node or Edit Node dialog box. If the field is empty you can create a new node definition; if the field contains the name of an existing node, you can edit that node's definition.
   - choose to open a selection list and select a node name.

   For information about configuring nodes see Chapter 4, *Defining Communications.*
3. Select a scan class.

   For information about configuring scan classes, see Chapter 2, "Planning Applications" in the *PanelBuilder 1400e Configuration Software for Windows User Manual.*
4. In the Address field, type the tag's physical memory location in the PLC.

   Note: For Device block tags, the address is the starting address for the block. For References 3 and 4, the block must be element aligned. For References 0 and 1, the block must be word aligned. The address cannot cross the controller's reference boundaries.

   The address syntax depends on the controller's addressing convention. For detailed information about address syntax for each tag type, see the sections on each of the tag types earlier in this chapter.

Tag Database Import and Export

You can import or export a tag database, to reduce re-keying and errors when tags are converted between systems.

Database Formats Supported

When you import a database, the tag definitions are copied into your current database. If the database is private, it remains private. A shared database remains shared.

The following file formats are supported:

- PanelBuilder .csv—exported by RSView and PanelBuilder. You can also create a database in Microsoft Excel, save it as a .csv file, and then import it into PanelBuilder.
- A.I. Series .csv—exported by the A.I. Series software
- Logic 5 .csv—exported from a Logic 5 database (see note below)
- PanelBuilder Tag Database—an independent tag database

- Taylor ProWORXPLUS database
- MODSOFT database in flat text format

Note: To import information from an A.I. Series database, you must first export the database in text format using the A.I. software. PanelBuilder imports this text file. To import a Logic 5 database, export it to a text file and import this into A.I. software. You can then export the text file from A.I. as you would any other A.I. database, and import it to PanelBuilder. You can also import a PanelBuilder 900 database by exporting it in an A.I. text format, and then importing this into PanelBuilder as an A.I. database.

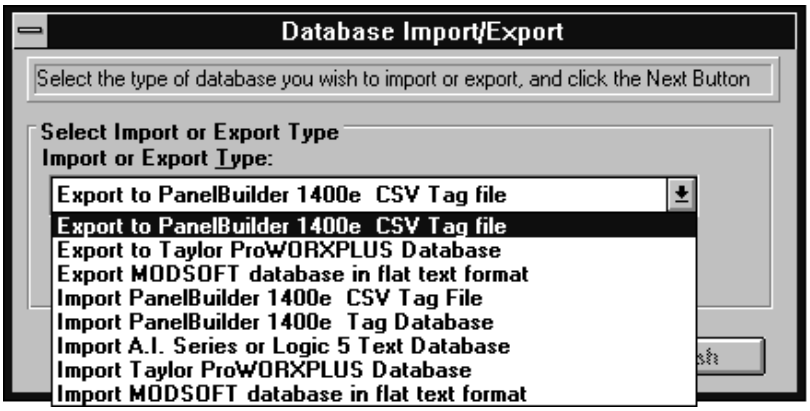
You can export a tag database created in PanelBuilder to any of the following formats:

- PanelBuilder .csv file (comma separated variable) that can be used by third-party software such as Microsoft Excel.
- Taylor® ProWORXPLUS® database
- MODSOFT® database in flat text format

Tip: An exported PanelBuilder 1400e database can also be imported back into the application. This means you can use the Database Export feature to back up or update the database.

To import a database or .csv tag file:

1. Open the application you want to import a tag database to.
2. Select Import/Export from the Database menu.



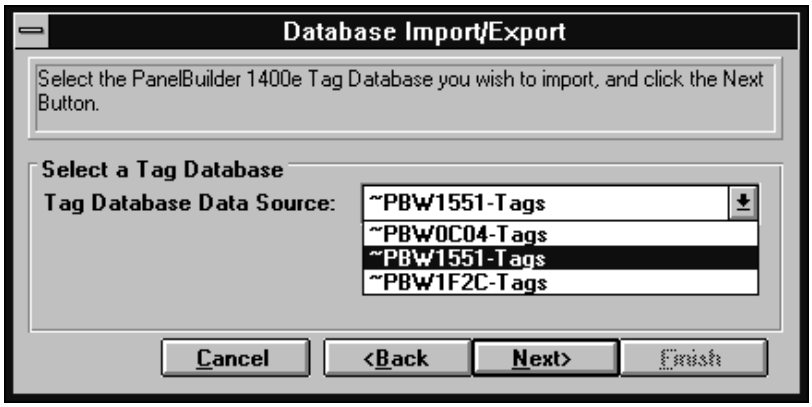
3. From the list that is displayed, choose the type of database you want to import.

4. To make the import faster, select the Skip Existing Tags button.

   To update existing tags from the tags being imported, select the Update Existing Tags button.

5. Select Next.

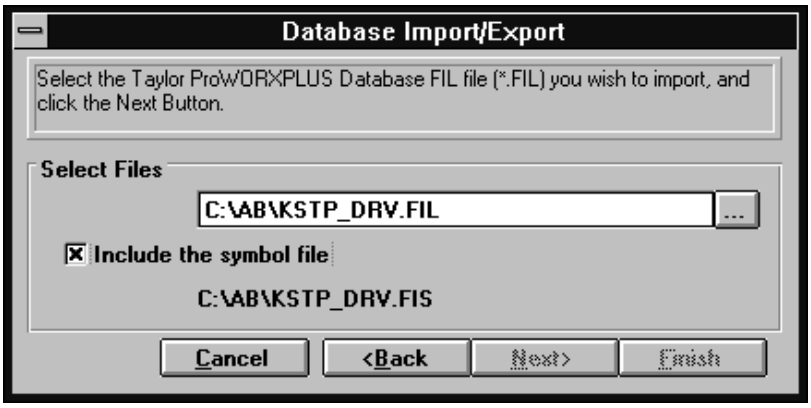
6. If you are importing a tag database, as opposed to a .csv format file, specify a Tag Database Data Source, or select the Down Arrow to display the list of sources, and choose one from it.



   If you are importing a .csv tag file or a text database, specify the file or choose the ... button and select the file from the Select File dialog box.

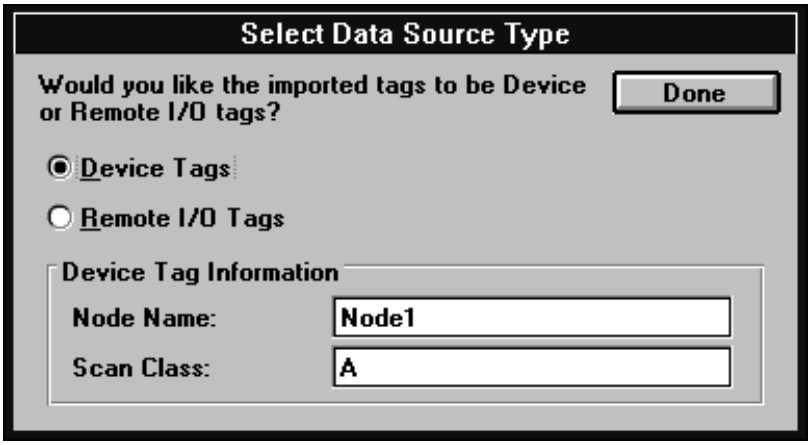
7. Select Next.

If you are importing a Taylor ProWORXPLUS database, you can choose to include the symbol file (*.fis). This file contains only the tag addresses, and their corresponding names. The symbol file must have the same name as the database file, and must be located in the same directory.

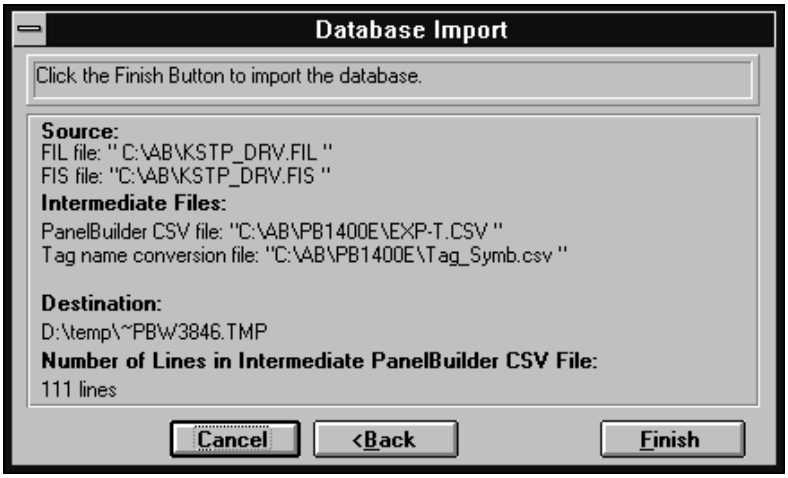


8. Select Next.

If you are importing a Taylor ProWORXPLUS database, ensure the tags are imported as Device Tags, since Remote I/O tags are not supported for Modbus applications. You can specify a default node name and scan class for the tags you are importing.



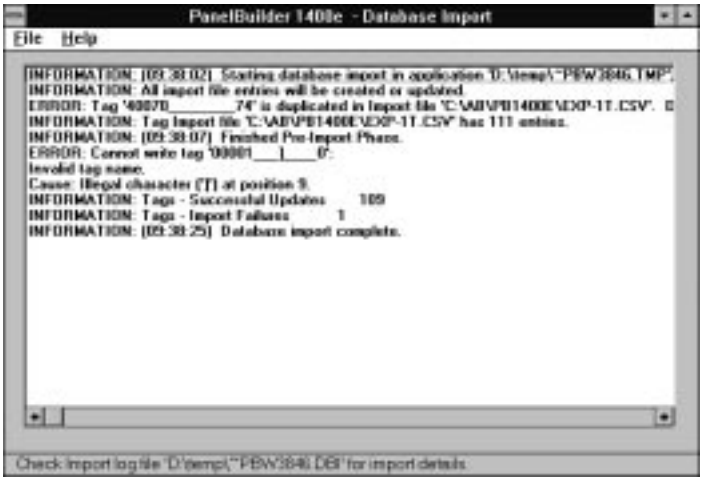
9. When you choose Done, a summary dialog is displayed.



It contains the following fields:

- **Source**—this is the file from which you are importing tags.
- **Intermediate Files**—the PanelBuilder .csv file is the file which is imported into PanelBuilder as a result of the tag conversions from the source database. The Tag Name Conversion File shows how tag names were converted from the Taylor or MODSOFT symbols to PanelBuilder. Check this file if you want to check tag name conversions. This file does not exist for database formats other than Taylor or MODSOFT.
- **Destination**—this is the name of the current PanelBuilder application's database.
- **Number of Lines in Intermediate PanelBuilder CSV File**—the number of tags imported.

Once the import is complete, a summary window is displayed. Errors, if any, and their locations in the Tag Import file are displayed. To correct the errors, edit the Tag Import file directly.



Note: Choose Print from the File menu, to print the contents of the Database Import information window. The log file is also saved at the location and file name specified on the status bar.

Note: Choose Exit from the File menu to close this window and complete the import. The Database menu item on the Application Window menu bar remains grayed, and cannot be selected, until the Database Import information window is closed.

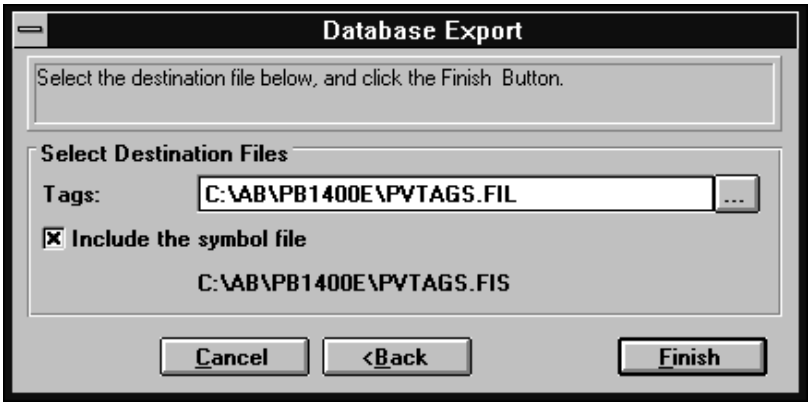
Note: If you import a database that contains the Unsolicited_Msgs node into a Modbus application, you must delete the node before you download the application. Otherwise, PanelBuilder will report a validation error.

To export a database:

1. Open the application you want to export a tag database from.
2. Select Import/Export from the Database menu.
3. From the list that is displayed, choose the type of file or database you want to export to and choose Next.

   A default destination file name (pvtags.csv) and path are displayed.

   If you are exporting to a Taylor ProWORXPLUS database, you can choose to include the symbol file (*.fis). This file contains only the tag addresses, their corresponding names, and their descriptions.



4. Choose Finish to complete the export, or type a new destination file name and/or path, and then choose Finish.

Note: When exporting a PanelBuilder database in MODSOFT format, tag addresses for 5-digit addressable devices are converted to 6-digit addresses. A zero is added after the reference number to convert the tag to 6-digit addressing.

Note: When exporting a PanelBuilder database in Taylor ProWORXPLUS or MODSOFT format, tags with duplicate addresses are not exported. Only the first instance of the tag address is exported.

Note: For Taylor ProWORXPLUS databases, lines containing short comments, long comments or page titles are not imported or exported.

Important: When exporting a PanelBuilder database to Taylor ProWORXPLUS, a 'Z' is added to any tag name that begins with a number. Tag names longer than 32 characters are truncated, and modified, if necessary, to prevent duplication. See the symb_tag.csv file in the directory in which PanelBuilder is installed, to check tag name conversions.

CSV File Column Ordering

When you convert a PanelBuilder database to a comma separated variable (.csv) file, or when you create a spreadsheet in third-party software, it should consist of the following columns:

Column	Description
A Tag Type	A, D, S, T, B, or F (Analog, Digital, String, Structure, Block, Folder)
B Tag Name	Any legal tag name
C Tag Description	Text describing the tag
D Read Only	T or F: use F (Specifies whether the tag is editable in the database.)
E Data Source	D, E, R, I, M, S (Device, DDE, Remote, I/O, Memory, System)
F Security Code	* (asterisk) or letters A-P: use * (A-P used by RSView only)
G Alarmed	T or F (not yet supported): use F
H Data Logged	T or F (not yet supported): use F
I Native Type	D, U, I, L, F, B, P, N, W, X, Y, Z and 1-8 (Default, Unsigned Integer, Integer, Long, Floating Point, Byte, Bit Position, Binary, BIN3, BIN4, BIN6, BIN8, and 1BCD-8BCD)
J Value Type	L or F (Use F if scale offset or initial analog value uses decimal digits, otherwise use L)
K Min Analog	Minimum analog value: use 0
L Max Analog	Maximum analog value: use 100
M Initial Analog	Initial analog value (analog tag)
N Scale	Scale multiplier (val = Scale(X) + Offset) (analog tag)
O Offset	Offset (analog tag)
P Deadband	Deadband (Unused): use 0
Q Units	Units label: use blank
R Off Label Digital	Digital off label: use blank

Column	Description
S On Label Digital	Digital on label: use blank
T Initial Digital	Initial digital value (must be either the on or off label): use 0 or 1 (digital tag)
U Length String	String length (string tag)
V Initial String	Initial string value (string tag)
W Node Name	Node name (device tag)
X Address	Programmable logic controller address (device tag)
Y Scan class	Scan class name: use A–K or custom names (device tag)
Z DDE Application	DDE application name: use blank
AA DDE Topic	DDE topic name: use blank
AB DDE Item	DDE item name: use blank
AC System Source	System data source name: leave blank
AD System Source Index	System data source index: leave blank
AE RIO Address	Remote I/O address (Remote I/O tags)
AF Element Size Block	Use B (block tag)
AG Number Elements Block	Number of bits in the block tag
AH Initial Block	Initial value of a block tag (0 or 1)

Creating a New Tag Database

The New Database command on the Database menu creates a new, empty tag database for the application. When you use this, all the tags in the current database, whether it is private or shared, are deleted. If the application has a shared database that no longer exists, a new shared database is created.

Configuring the PanelView Terminal for Modbus Communications

This chapter is intended to supplement the information in the *PanelView 1000e, 1200e, and 1400e Operator Terminals User Manual,* Publication Number 2711E-821. Please refer to it for information about the PanelView terminal's power-up and online tests, and for more detailed information about configuring the PanelView terminal.

Configuring the Modbus Communication Interface Card

To communicate on a Modbus network, install a serial communications interface card in your PanelView terminal. This card enables the terminal to communicate with devices on the Modbus network. You also need to upgrade the firmware of all PanelView terminals you intend to use on the Modbus network, using the PanelView Serial Firmware Upgrade Utility.

For information about installing communications cards in the PanelView terminal see *PanelView ISA Card Adapter Installation Data,* Publication Number 2711E-5.6. This document is included in the PanelView 1400e ISA Card Adapter Kit (A-B Catalog Number 2711E-NA1) and PanelView 1000e ISA Card Adapter Kit (A-B Catalog Number 2711E-NA2).

See the *PanelView Enhanced Modbus Communications Option Kit Release Note,* Publication Number 2711E-6.12.1, for a list of currently-supported Modbus communications cards.

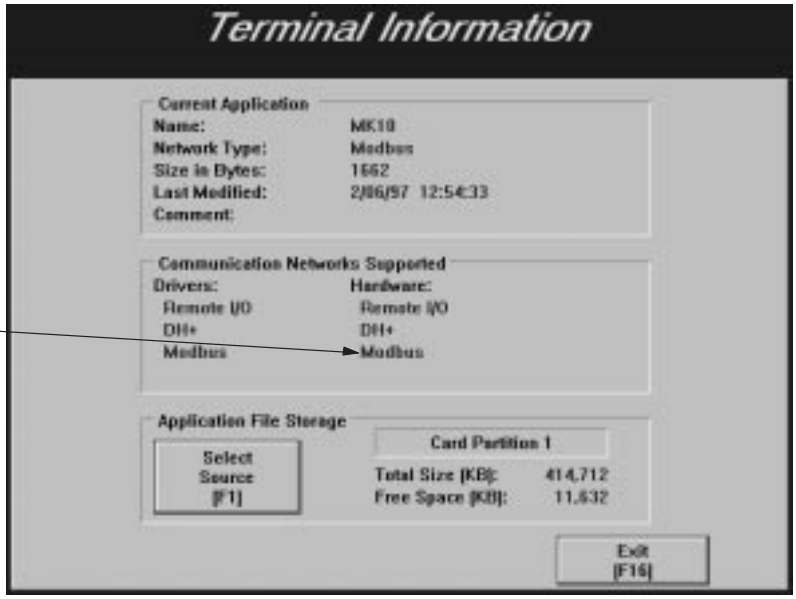
You must only use recommended communications cards that have been tested to operate effectively with the PanelView terminals and firmware, and have passed FCC and EC testing.

Important: The jumper or DIP switch settings on the serial communications interface card must be configured to work with PanelView. See the documentation that came with your communications card for details about locating jumpers and DIP switches. Configure the card for the following settings:

The jumper or DIP switch for the	Should be set to
Port	COM 1
Base Address	3F8
Interrupt Request Line	IRQ 3

Tip: For pinout information and signal levels, see the documentation supplied with your serial communications interface card and your Modbus device.

Once you have installed the serial communications card in your PanelView terminal, press the Terminal Information button on the Terminal Configuration Screen to verify that the card is detected correctly.



This indicates that the Modbus hardware is installed and detected.

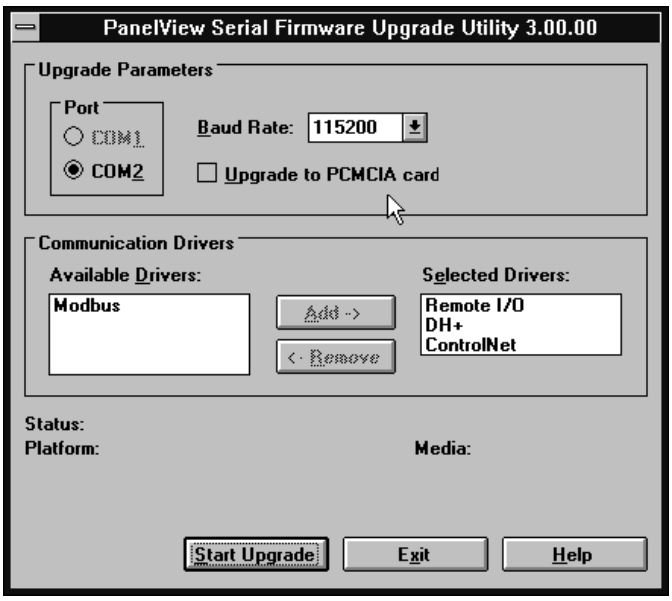
This screen displays:

- the current application file name
- the network type of the current application
- the size of the current application file
- the date you last modified the current application file
- any application file comments from the Application File Comment field of the Terminal Setup dialog in *PanelBuilder 1400e Configuration Software for Windows User Manual*.
- the supported communication networks
- the amount of application file storage space (in memory and on Card Partitions 1 and 2). You can use this information before you do any downloading.

Installing Modbus Firmware in the PanelView Terminal

Use the PanelView Serial Firmware Upgrade Utility to install Modbus firmware on a PanelView terminal. For information about installing the Serial Firmware Upgrade Utility, see Appendix D, “Installing the PanelView Serial Firmware Upgrade Utility,” in the *PanelView 1000e, 1200e, and 1400e Operator Terminals User Manual*, Publication Number 2711E-821.

After you install the Modbus driver and start the Serial Firmware Upgrade Utility, the Serial Firmware Upgrade Utility dialog is displayed. The Modbus communication driver is displayed in the list of available drivers. To use the Modbus communication driver, you must add it to the list of selected drivers.



To add Modbus to the list of selected drivers:

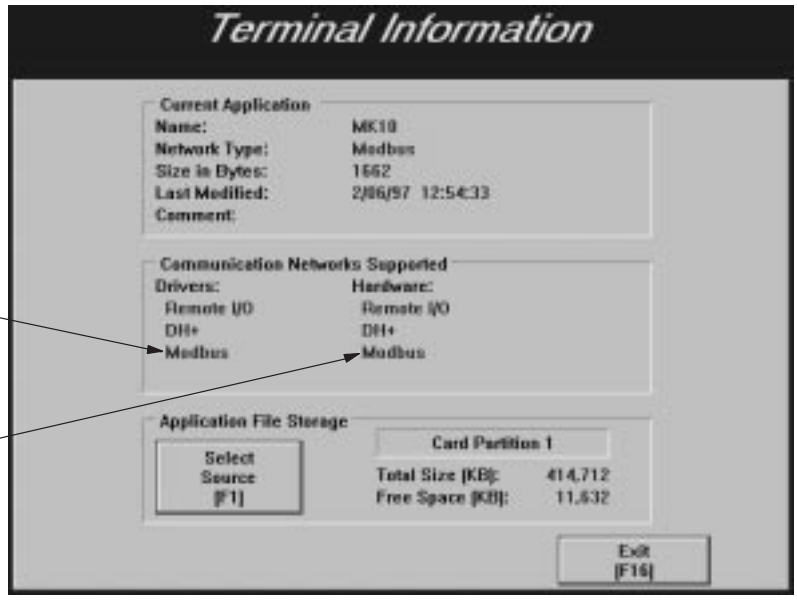
1. The selected drivers list can only contain three drivers.To add Modbus, remove one of the three default drivers (Remote I/O, DH+, or ControlNet) in the selected drivers list by highlighting the driver you want to remove and clicking on Remove.
2. Highlight Modbus in the available drivers list, and click on Add.

For instructions on how to configure parameters and initiate a firmware upgrade, press F1 to bring up online help.

Once you have installed Modbus firmware in your PanelView terminal, press the Terminal Information button on the Terminal Configuration Screen to verify that the firmware is installed correctly.

This indicates that Modbus firmware is installed.

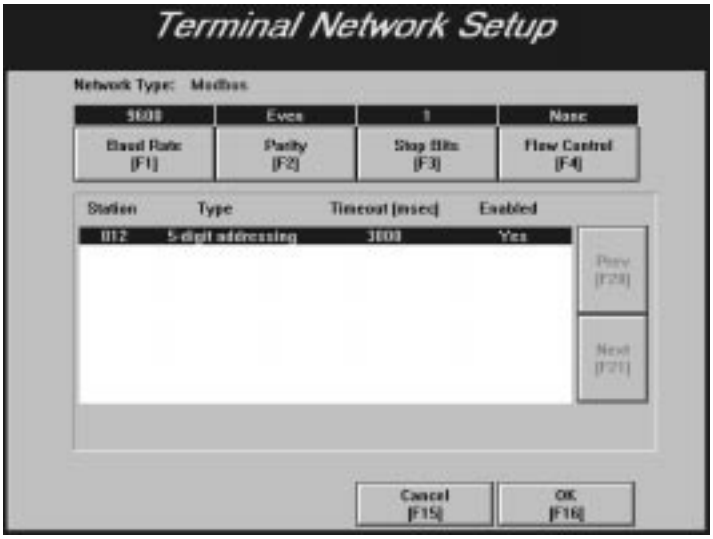
This indicates that the Modbus hardware is installed and detected.



Once you have verified that the hardware and Modbus firmware are installed correctly, you are ready to download your PanelBuilder application to the terminal, and run it. For information about transferring applications files to and from PanelView terminals, see the *PanelView 1200/1400e Transfer Utility User Manual*, Publication Number 2711E-6.8.

Configuring the Terminal Network Setup Screen

To view the terminal settings of the current Modbus application file, press the Terminal Network Setup button on the Terminal Configuration screen. Terminal and PLC information is displayed as shown in the screen representation below.



Important: For information to be displayed on the screen, an application must be made current (selected).

The network you are communicating on is displayed at the top of the screen. Underneath it are the terminal's current serial communications settings (baud rate, parity, number of stop bits, and flow control method). Each of these settings can be changed by pressing the corresponding button. The default settings are 9600 for baud rate, Even for parity, 1 for stop bits, and None for flow control. The values you enter on this screen are retained across power cycles of the PanelView terminal, but may be lost if you choose Load Application Initial Values or Load Terminal Configuration Defaults from the Restore Defaults screen in Configure Mode.

Note: The number of data bits is always 8.

Important: To communicate using modems or line drivers, the PanelView terminal must be configured for Hardware Flow Control.

All nodes (devices) with which your application will communicate are listed. The Station number, Device Type, and Timeout are displayed in the window. The Enabled column shows whether the node is enabled. You can scroll through the entries in this window using the Prev and Next buttons.

Transferring Applications

Validating Applications

Before you can transfer an application to a PanelView terminal, you will need to validate the application to ensure that it can be compiled for use on the terminal. For information about validating applications, see Chapter 3, “Working with Applications,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual*. For a complete list of validation error messages and their meanings, see Appendix D, “Troubleshooting,” in the *PanelBuilder 1400e Configuration Software for Windows User Manual*.

About Application File Transfers and Modbus

It is not currently possible to transfer applications from a personal computer to a remote PanelView terminal over a Modbus network.

To transfer application files to or from PanelView terminals running Modbus-capable firmware, perform a serial upload or download, as described in the *PanelView 1200/1400e Transfer Utility User Manual,* Catalog Number 2711E-6.8.

For information about configuring the PanelView terminal for application file transfers, and about running the application at the terminal, refer to the *PanelView 1000e, 1200e, and 1400e Operator Terminals User Manual,* Catalog Number 2711E-821.

Troubleshooting for Modbus Applications

This section describes how to diagnose and solve Modbus communication problems. To help solve PanelBuilder software problems, refer to your *PanelBuilder 1400e Configuration Software for Windows User Manual*.

Refer to the Modbus equipment documentation for Modbus-specific troubleshooting information.

PanelView terminals on a Modbus network may communicate with controllers or other devices made by manufacturers other than Allen-Bradley. You may have to obtain integration and support services in whole or in part from the controller or device manufacturer. Contact your local Allen-Bradley office for information on services available from Global Technical Support or Allen-Bradley authorized system integrators.

Modbus Communication Errors

Consult the following table to identify the communications problems over the Modbus network.

Problem	Cause	What to do:
Remote station has not replied within specified timeout period.	The station is not responding.	Cycle power to the station.
	Electrical noise interference or a faulty cable.	Check all cables and connections. Have the system evaluated for noise susceptibility. If the problem persists, contact the controller or device manufacturer.
	The slave controller sent more data than it should have. This usually indicates a faulty controller.	Consult the documentation for the controller or device being used. If the problem persists, contact the controller or device manufacturer.
Remote station Exception Response — illegal function	The controller could not perform the specified command.	Consult the documentation for the controller or device being used. Check for the availability of the requested function. Contact the controller or device manufacturer to determine what functions the controller or device supports.
Remote station Exception Response — illegal data address	The tag address referenced by your application is invalid.	Edit the tag address.
	The specified tag address has not been allocated in the controller.	Allocate more registers in the controller, or change the tag address used in the application.
Remote station Exception Response — illegal data value	The value referenced in the data field is not allowable in the addressed slave location.	Enter a value within the specified range, or allocate more registers in the controller to modify the range to include the value you entered.

Problem	Cause	What to do:
Remote station Exception Response—failure in associated device	The controller did not respond because of an error within the controller.	Consult the documentation for the controller or device being used. Contact the controller or device manufacturer to determine the cause of the error.
Remote station Exception Response—Acknowledge	The controller accepted the command, but it needs some time to complete the command.	Consult the documentation for the controller or device being used. Increase the node editor timeout value. Contact the controller or device manufacturer to determine the cause of the delay.
Remote station Exception Response—busy, reject message	The controller was too busy to accept the message.	To determine if the controller or device is in a busy state, consult the documentation for the controller or device being used. Contact the controller or device manufacturer to determine the cause of the problem.
Remote station Exception Response—Negative Acknowledgement (NAK)	The controller was unable to run the requested program.	Consult the documentation for the controller or device being used. Check for the availability of the requested function. Contact the controller or device manufacturer to determine what functions the controller or device supports.
Remote station Exception Response—memory parity error	The controller encountered a parity error while reading its extended memory.	Retry the command that caused the error. Consult the documentation for the controller or device being used. Contact the controller or device manufacturer to determine the cause of the error.
Unable to communicate with remote station	The IRQ was incorrectly set on the serial card.	Correct the IRQ.
	The same IRQ has been assigned to more than one device.	Correct the IRQ.
	The flow control is enabled, and the Clear-To-Send (CTS) signal is not changing.	Specify the correct flow control for Modbus.
	You are using a plug and play card, which is not supported.	Use a serial card that is supported. For a list of supported serial cards, see the *PanelView 1400e Modbus Firmware Release Note*.
The communication drivers required to execute this application have not been installed.	The Modbus firmware driver is not loaded.	Use the Serial Firmware Upgrade Utility with the Modbus driver enhancement kit to upgrade the terminal's firmware with the Modbus driver.
The terminal does not contain the necessary communication card to execute this application.	The serial communications card is not installed.	Install a serial communications card for Modbus into the PanelView terminal. On the PanelView terminal, use the Terminal Information screen to verify that the card is detected correctly. For more information, see the *PanelView 1000e, 1200e, and 1400e Operator Terminals User Manual*.

Sample Worksheets

The worksheets in this appendix are designed to help you plan your application. To complete these worksheets, see Chapter 2, *Planning an Application for Modbus*. Make copies of the worksheets as you need them and save the originals for future use.

This Appendix contains the following worksheets:

- Modbus Communications Worksheet

  Use this worksheet to record details of the devices the terminal will be communicating with.

- Device Tags Worksheet

  Use this worksheet to help you assign device addresses to each object on a screen.

Modbus Communications Worksheet

Application File Name: _____

PanelView Station Number: _____

Node Definitions

Node Name	Modbus Slave Device	Station Address	Timeout (sec)

Note: For more node definitions, use additional copies of this worksheet.

Scan Class Definitions

Name	Foreground (sec)	Background (sec)

Name	Foreground (sec)	Background (sec)

Note: The default foreground and background rates are 0.000 seconds and 5.000 seconds, respectively.

Device Tags Worksheet

Application File Name: _____ **Screen Number:** _____

Object			Tag							Address		
Ref No.	Type	Initial State Value	Name	Type	Analog Tag Only			Initial Value	Range of Values	Address	Number of characters (string tag only)	Tag Start Value
					Scale	Offset	Data Type					

Notes:

Initial State Value: Objects such as Multistate Push Buttons have a user-configurable initial state whose value will supersede the tag's initial value when the application is first run. This is called the tag's Start Value.

Start Value: The start value is the tag initial value, or the object initial state value, if one exists.

For information about addressing syntax, refer to Chapter 6, *Defining Tags.*

Symbols

.csv file, 6–18
  and column ordering, 6–23
  importing a database, 6–18

Numbers

24-hour support, P–6

A

A.I. Series software, importing a database, 6–18
Analog tags, configuring, 6–3
Application File Comment field, 7–2
Application file storage, displayed on Terminal Information screen, 7–2
Application screens, about, 1–3
Applications, opening, P–5

B

Baud Rate
  See also Driver
  displayed on screen, 7–5
Parity, displayed on screen, 7–5
Block tags, configuring, 6–13

C

Channel number, 4–4
Commands, conventions, P–5
Communication errors, time before reporting, 4–4
Communication Setup editor, about, 4–1
Communications, defining, 4–1
Communications settings, 7–5
Configuring
  analog tags, 6–3
  block tags, 6–13
  digital tags, 6–8
  nodes, 4–2, 4–3
  scan classes, 4–5
  string tags, 6–10
  tag type, 6–2
Conventions
  commands, P–5
  dialog boxes, P–5
  key, P–5
  mouse, P–4
  selection, P–4
  shortcut keys, P–5
  used in the manual, P–4
Creating, tags, 6–1
Current application file, information about, 7–2

D

Data sources, 6–15
  device, 6–16
    and scan classes, 4–5
  for Modbus applications, 6–2
  specifying, 6–16
Defining
  communications, 4–1
  nodes, 2–1, 2–2
  scan classes, 2–1, 2–3
Device
  choosing as data source, 6–16
  data source, for Modbus applications, 6–2
Device data source, and scan classes, 4–5
DH+ Communications Worksheet, A–1
DH+ Device Tags Worksheet, A–1
Dialog boxes, conventions, P–5
Digital tags, configuring, 6–8
Disabling, nodes, 4–4
Driver, configuring, 4–2

E

Editors, Scan Classes, 4–5–4–6
Enabling, nodes, 4–4
Errors, communication, time before reporting, 4–4
Exporting, tag database, 6–17

F

Fax Back, technical support services, P–6

Flow Control. *See* Driver

Folders, digital tags, 6–10, 6–13

H

Help, online, P–2

Hot keys. *See* Shortcut keys

I

Importing, tag database, 6–17
- from A.I. Series database, 6–18
- from Logic 5 database, 6–18
- from PanelBuilder 900 database, 6–18

Internet, technical support services, P–6

K

Key conventions, P–5

Keys, shortcut, P–5

L

Logic 5 software, importing a database, 6–18

M

Modbus, choosing device as data source, 6–2

Modbus communication driver
- adding to the list of available drivers, 7–3
- installing on the PanelView Serial Firmware Upgrade Utility, 7–3

Mouse
- conventions, P–4
- multiple-button, P–4

N

Network type, changing
- from ControlNet to Modbus, 5–4
- from DH+ to Modbus, 5–1
- from Modbus to ControlNet, 5–7
- from Modbus to DH+, 5–5
- from Modbus to Remote I/O, 5–6
- from Remote I/O to Modbus, 5–2

Node, name, valid characters, 4–3

Nodes
- configuring, 4–2, 4–3
- defining, 2–1, 2–2
- enabled, 4–4
- PLC type, 4–4
- station address, 4–4
- timeout, 4–4

Nodes editor, about, 4–1

O

Online Help, P–2

Opening, applications, P–5

Operator terminals, 1–2

P

PanelBuilder 1400e
- about, 1–1, 1–2
- related publications, P–2
- relationship between PanelBuilder 1400e, PanelView terminals and PLC, 1–1

PanelBuilder 900, importing a database, 6–18

PanelView terminals
- about, 1–2
- relationship between PanelBuilder 1400e, PanelView terminals and PLC, 1–1

Parity. *See* Driver

PLC
- about, 1–5
- relationship between PanelBuilder 1400e, PanelView terminals and PLC, 1–1

PLC type, 4–4

Programmable logic controller. *See* PLC

Publications, relating to PanelBuilder 1400e, P–2

R

Readme file, about, P–2

Recording, tag information, 2–3

Registering PanelBuilder 1400e, P–1

Registration, software, P–1

Requirements, system, P–6

S

Scan classes
  configuring, 4–5–4–6
    for Device data source tags, 4–5
  defining, 2–1, 2–3
Scan Classes editor, using, 4–5–4–6
Scan classes editor, about, 4–1
Scanning
  about, 2–3
  scan classes, configuring, 4–5
  scan period
    background, 4–6
    foreground, 4–6
Screens, application, about, 1–3
Selection conventions, P–4
Serial number, software, P–7
Setting up, terminal communications, 4–2
Shortcut keys, P–5
Software, registration, P–1
Station address, 4–4
Station numbers
  converting from DH+ to Modbus, 5–2, 5–5
  converting from Modbus to ControlNet, 5–8
  converting from Modbus to DH+, 5–6
Flow Control, displayed on screen, 7–5
Stop Bits
  See also Driver
  displayed on screen, 7–5
String tags, configuring, 6–10
Support services, P–6
System requirements, P–6

T

Tag data, specifying source, 6–16
Tag database, importing and exporting, 6–17
Tag information, recording, 2–3
Tags
  analog, 6–1
    configuring, 6–3
  block, 6–1
    configuring, 6–13
  configuring type, 6–2
  converting from Remote I/O to Modbus, 5–2
  creating, 6–1
  data sources, 6–15
  digital, 6–1
    configuring, 6–8
  read tags, 6–1
  string, 6–1
    configuring, 6–10
  types, 6–1
  updating values of, 4–5
  write tags, 6–1
Technical support services, P–6
Terminal communications, setting up, 4–2
Terminal Information button, 7–2, 7–4
Terminal Network Setup screen, 7–5
Terminals
  operator, 1–2
  PanelView, 1–2
Terminology, defined, P–4
Timeout, 4–4

V

Viewing
  block transfer file definitions, 7–5
  rack assignments, 7–5

W

Worksheets
  DH+ Communications, A–1
  DH+ Device Tags, A–1

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 2711E-6.12 – November 1997
Supersedes Publication 2711E-6.12 – August 1997

41061-033-01(B)

Copyright 1997 Allen-Bradley Company, Inc. Printed in USA