
PanelMate^â

Generic Protocol

Communication Driver Manual

Preface

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Introduction

1

In this chapter, you will learn:

- *About driver installation*
- *How to download drivers to a PanelMate unit*

Introduction

The Generic Protocol allows you to use the Operator Station with any intelligent controller (PLC or PC) capable of sending and receiving characters over an RS232 or RS422 serial connection. If your controller cannot be linked through any of the Operator Station's built-in communications interfaces, you can use the Generic Protocol to gain access to the Operator Station's features.

The Generic Protocol simply defines the way in which the Operator Station expects data to be transmitted to it, and the way in which it will send operator inputs to the PLC or host.

Installing Drivers

PanelMate Configuration Editor software is installed using a CD-ROM. To install the Generic driver from the CD-ROM, browse to the **/PM/Drivers** directory and select the directory corresponding to the desired driver. Run the **Setup** file within this directory to install the driver.

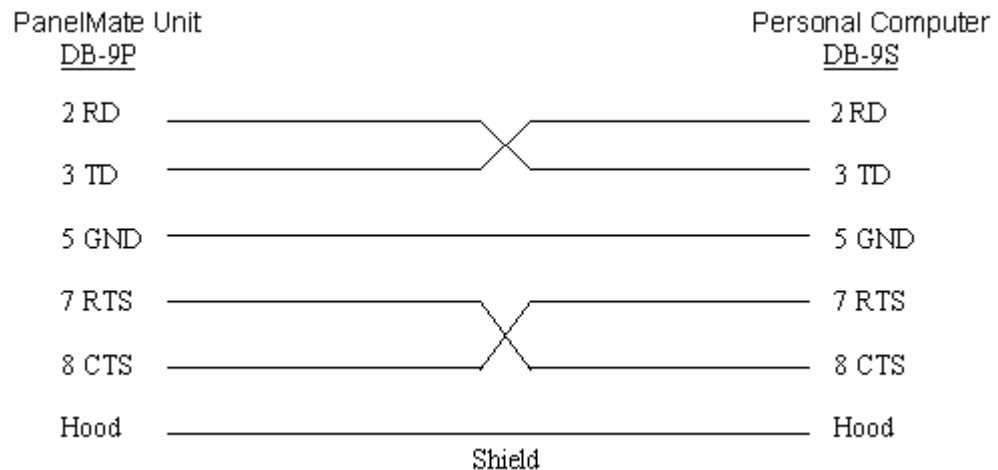
Downloading Drivers to a PanelMate Unit

- In the VCP Transfer Utility, choose the “Executive” tab and select the proper Executive Firmware to download to the PanelMate unit.
- Click the button labeled “Add to Operation List.”
Note: In order to download to a PanelMate for the first time or to clear the existence of another driver, the PanelMate must first be loaded with Executive Firmware.
- Choose the “Driver” tab.
- Select the appropriate driver to be downloaded to the PanelMate.
- Click the button labeled “Add to Operation List.”
- Place the PanelMate unit in Serial Transfer Mode.
- Connect a serial transfer cable from the correct port on the PC to port 1 on the PanelMate. (See cabling below.)
- Click “Start” at the bottom of the VCP Transfer Utility window.

Note: For a more detailed description of downloading procedures and troubleshooting see *PanelMate PowerPro, Pro LT Transfer Utility User’s Guide*.

Serial Transfer Cables

Cable P/N 0518



Method of Operation



In this chapter, you will learn:

- *How to connect an operator station to a Generic Protocol host system*

Communications Interface

When Generic Protocol is used, the Operator Station operates as a slave and the host is always the master. This means that the Operator Station does not initiate transmissions. Instead, the Operator Station waits until the host directs a command to it and then responds appropriately. The options available to the host include:

- Transmitting a group of register values
- Asking for any new operator inputs
- Asking for the last response to be repeated
- Testing the communication link

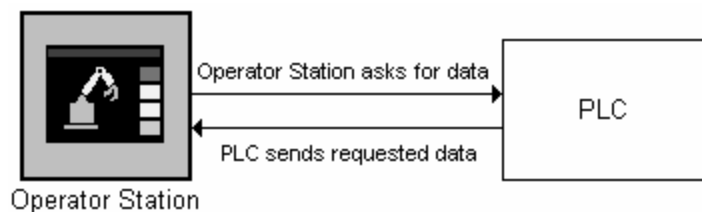
In response to commands received from the host, the Operator Station can:

- Acknowledge proper receipt of the commands
- Send operator inputs

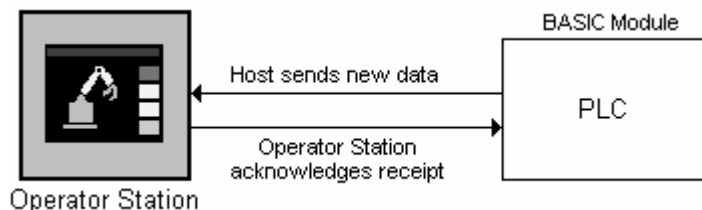
Each transmission between the host and the Operator Station begins and ends in a similar fashion. Transmissions will vary in length, and will consist of numbers (primarily register values) sent as sequences of printable ASCII characters, separated by punctuation. The use of ASCII makes this protocol very straightforward to implement, even by using a PLC BASIC module with a limited instruction set.

In spite of the fact that it is a slave, the Operator Station still remains very much in control of updating screen information (once it receives new data from the host), detecting and announcing alarms, and accepting and managing operator inputs. The primary difference between using Generic Protocol and specific communications interfaces is in how the transfer of register and I/O data occurs. In the latter case, the Operator Station constantly asks for data, which the PLC then sends. When the Generic Protocol is used, the host or BASIC module controls when (and how frequently) the data is sent out.

PLC Specific Interface



Generic Protocol Interface



Cabling and Setup

3

In this chapter, you will learn:

- *The cabling requirements for Generic Protocol*
- *How to set up Generic Protocol communications in your application*
- *How to test the Generic Protocol communications link*

Cable Configurations

Select Generic Protocol on Operator Station

Note: All system configurations should be backed-up to a PC before clearing memory. Clearing memory causes the Operator Station to reset all of its memory.

To configure an Operator Station's port for Generic Protocol, use the PLC Name and Port Editor to complete the configuration.

Communication parameters set at the host are generally selected using hardware switches, software calls, or a combination of the two. Since each device may handle these parameters differently, it is recommended to consult the host user's manual.

Operator Station 9-pin Pinouts

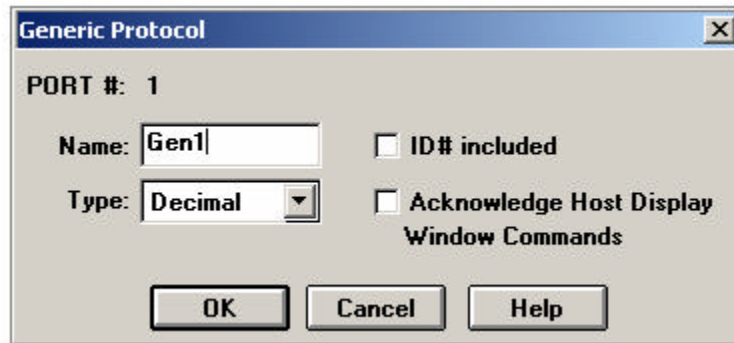
The Operator Stations have 9-pin female connectors (DB-9S) that must have cables configured with male connectors (DB-9P).

RS232 Pin Assignments Operator Station 9-pin (male)			RS422 Pin Assignments Operator Station 9-pin (male)		
Hood	Shield	Hood	Hood	Shield	Hood
2 RD		TXD	9 RD-		TD(-)
3 TD		RXD	4 RD+		TD(+)
5 SG		GND	1 TD+		RD(+)
			6 TD-		RD(-)
			5 SG		SG

Configuring

Use the following steps to configure the **PLC Name and Port Table** dialog box in the PanelMate Configuration Editor:

1. Select Port number (Selecting Port 2 is recommended, if available, so that Port 1 can be used to upload and download configurations. However, Port 1 **must** be selected for PanelMate 1100 LT PowerPro units.
2. Select "Generic" for Device Use field
3. Set Local ID to any number between 1 and 254 (This is the operator station's ID used in the communication protocol frame)
4. Set Port Settings parameters to match those of the host system
5. Select the "Generic" button to display the Generic Protocol parameters dialog box below:



6. Enter up to 6 characters for the “Name” (this corresponds to the “plcname” used for addressing). Note that you must use a alphanumeric or underscore (_) characters.
7. “Type” must be set to Decimal (Octal is not supported)
8. Select “ID# included” to be set or not (determines if ID field is used in the protocol)
9. Select “Acknowledge Host Display Window Commands” to be set or not (determines if the Operator Station returns a response to task codes 69 & 70)

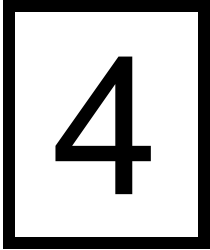
The Screen, Message and Alarm Scan delay fields of the **System Parameters** dialog box are not applicable to Generic Protocol implementations.

Testing Communication Link

The integrity of the communication link to Operator Station can be monitored by the host in three ways:

1. Continual polling of the Operator Station for operator input (either task code 132 or 133). Receipt of any response from the Operator Station verifies that both units and the link are functioning.
2. Monitoring of the Operator Station's fault relay contact. An energized contact indicates that the Operator Station is operating correctly.
3. Monitoring the number of times that a message must be sent before it is properly received by the Operator Station. If the host needs to re-send messages frequently, this would indicate a poor communication link, probably due to noise interference.

Generic Protocol Format



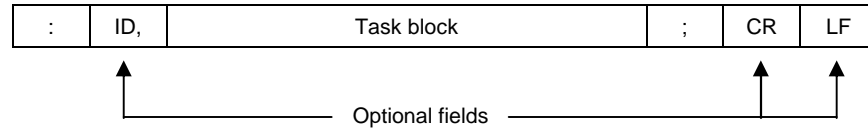
In this chapter, you will learn:

- *About frames*
- *What are task blocks*
- *The different task codes*

Frames

As was indicated earlier, all transmissions between the host and the Operator Station have a common structure, although length and specific content will differ. This common format is called the frame, and it defines how all transmitted messages should begin and end. The Generic Protocol makes it easy for programs to create and send messages, and to detect the beginning and end of incoming messages.

The standard frame for messages in Generic Protocol is shown below:



:	The ASCII character ":" (58 dec, 3A hex). This indicates the beginning of a new message.
ID,	The ID# of the Operator Station involved in the transmission. This is the Local ID number assigned in the PLC Name and Port Editor. This number can be 1-254. The ID# is sent as one or more ASCII characters and must be followed by a comma (ASCII code 44 dec, 2C hex). Leading zeroes and blanks are allowed, (no leading characters will be sent by the Operator Station).
task block	This is the main body of the frame. It contains ASCII numbers, separated by commas, which define the type of operation and any associated data. The task block varies in length. See the following section, Task Blocks, for specific details.
;	The ASCII character ";" (59 dec, 3B hex). This indicates the end of the transmission.
CR LF	The ASCII characters for carriage return (13 dec, 0D hex), and line feed (10 dec, 0A hex) can be optionally sent after the ";" to simplify host programming. All frames transmitted by the Operator Station include the CR and LF at the end of transmission.

Task Blocks

The task block defines the specific purpose of the transmission, and must be sent within the frame previously described. The host must create the task block, place it in a frame, and send it to the Operator Station. The response from the Operator Station will also include a task block within a frame. The formats of the possible task blocks are given below, each starts with a unique "task code".

Task Code	Description
4	Host sends data to the Operator Station <div> <div>4</div> <div>,addr</div> <div>,value1</div> <div>,value2</div> <div>...</div> <div>,value60</div> </div> <div>1 to 60 values</div>
5	Host requests current page from Operator Station <div>5</div>
132	Host sends data to Operator Station and requests operator input <div> <div>132</div> <div>,addr</div> <div>,value1</div> <div>,value2</div> <div>...</div> <div>,value60</div> </div> <div>1 to 60 values</div>
133	Host requests operator input from Operator Station <div>133</div>
134	Host requests Operator Station to re-transmit last frame <div>134</div>
64	Operator Station sends standard acknowledgement to host <div>64</div> <div>,page</div>
65	Operator Station sends integer keypad input to host <div>65</div> <div>,page</div> <div>,addr</div> <div>,value</div>
67	Operator Station sends control button input to host <div>67</div> <div>,page</div> <div>,addr</div> <div>,bit</div> <div>,value</div>
68	Host transmits ASCII information directly through Operator Station to an attached printer <div>68</div> <div>Text up to 80 characters</div>
69	Host Display Window Text Message <div>69</div> <div>,row</div> <div>,col</div> <div>,fg</div> <div>,bg</div> <div>,font</div> <div>,bnk</div> <div>,text</div>
70	Host Display Window Text Erase <div>70</div> <div>,row</div> <div>,col</div> <div>,fg</div> <div>,bg</div> <div>,font</div> <div>,bnk</div> <div>,num_row</div> <div>,num_col</div>

Task Codes

4 - Host Sends Data to Operator Station

Using task code 4, the host can transmit from 1 to 60 specific register values to the Operator Station.

In response, the Operator Station is expected to return a task block containing task code 64.

4	,addr	,value1	,value2	...	,value60
1 to 60 values					

- 4 The ASCII character '4' (52 dec, 34 hex).
- ,addr The reference address associated with the first value in the group of values which follow. Addresses of subsequent values in the group are assumed to be sequential. The address may be 0 to 65535, sent in ASCII, and must be preceded by a comma.
- ,value A register value, which can range from -32768 to 32767. From 1 to 60 values may be transmitted in a block. Values are sent in ASCII and are preceded by commas. Leading zeroes and spaces are permitted but not required.

5 - Host Requests Current Page from Operator Station

Using task code 5, the host can ask the Operator Station what page is currently being displayed. This task code can also be used by the host to determine if the Operator Station is actually online.

In response, the Operator Station is expected to return a task block containing task code 64.

5

- 5 The ASCII character '5' (53 dec, 35 hex)

132 - Host Sends Data and Requests Operator Input

Using task code 132, the host can transmit from 1 to 60 specific register values to the Operator Station and expect the unit to return any new operator inputs.

In response, the Operator Station will use one of the following task codes:

- 64 Indicates no new operator inputs are available
- 65 Transmits an integer value
- 67 Transmits an instruction to set or clear a bit

132

132 The ASCII characters '1', '3', & '2'.

,addr The reference address associated with the first value in the group of values which follow. Addresses of subsequent values in the group are assumed to be sequential. The address may be 0 to 65535, sent in ASCII, and must be preceded by a comma.

,value A register value, which can range from -32768 to 32767. From 1 to 60 values may be transmitted in a block. Values are sent in ASCII and are preceded by commas. Leading zeroes and spaces are permitted, but not required.

133 - Host Requests Operator Input from Operator Station

Using task code 133, the host can ask the Operator Station for any new operator inputs.

In response, the Operator Station will use one of the following task codes:

- 64 Indicates no new operator inputs are available
- 65 Transmits an integer value
- 67 Transmits an instruction to set or clear a bit

133

133 The ASCII characters '1', '3', & '3'.

134 – Host Requests Operator Station to Re-Transmit Last Frame

Using task code 134, the hosts requests the Operator Station to repeat the last frame it has transmitted.

In response, the Operator Station will re-transmit its last frame, which will include one of the task codes 64, 65, or 67.

134

134 The ASCII characters '1', '3', & '4'.

64 - Operator Station Sends Standard Acknowledgment to Host

Using task code 64, the Operator Station indicates to the host that it has successfully received a transmission from the host. As a response to a request for operator input, task code 64 indicates that no new operator inputs are available for transmission.

If the Operator Station has not successfully received a transmission from the host, the Operator Station will not respond at all.

This task code may be sent by the Operator Station as a response to host task codes 4, 5, 132, 133, 134, 68, 69, or 70.

64	,page
----	-------

64 The ASCII characters '6' & '4'.

,page The number of the page currently being displayed, sent in ASCII, preceded by a comma.

65 - Operator Station Sends Integer Keypad Input to Host

Using task code 65, the Operator Station sends an integer value to the host. This value is the result of the Input Value Expression as defined for a numeric keypad input associated with a template.

This task code may be sent by the Operator Station as a response to host task codes 132, 133 or 134.

65	,page	,addr	,value
----	-------	-------	--------

65 The ASCII characters '6' & '5'.

,page The number of the page currently being displayed, sent in ASCII, preceded by a comma.

,addr The Target Word Address configured for this numerical input point. Only the word address is sent, in ASCII, preceded by a comma.

,value The result of the associated Input Value Expression. This number is an integer in the range -32768 to 32767 and is sent in ASCII, preceded by a comma.

67 – Operator Station Sends Control Button Input to Host

Using task code 67, the Operator Station sends an instruction to the host to set or clear a bit that is associated with a control button input by the operator.

This task code may be sent by the Operator Station as a response to host task codes 132, 133 or 134.

67	,page	,addr	,bit	,value
----	-------	-------	------	--------

- 67 The ASCII characters '6' & '7'.
- ,page The number of the page currently being displayed, sent in ASCII, preceded by a comma.
- ,addr The word number portion of the bit address configured for the control button, sent in ASCII, preceded by a comma.
- ,bit The bit number portion of the bit address configured for the control button. Range is 1-16 sent in ASCII, preceded by a comma.
- ,value This will be a one if the bit is to be turned on, or a zero if it is to be turned off. It is sent in ASCII, preceded by a comma.

68 - Host Transmits Data through Operator Station to Serial Port

Using task code 68, the Operator Station users can assign their host devices to transmit ASCII information directly through the Operator Station to an attached printer. This operation has no effect on the simultaneous processing of data by the Operator Station through its other ports.

In response, the Operator Station is expected to return a task block containing task code 64.

68	Text up to 80 characters
----	--------------------------

- 68 The ASCII characters '6' & '8'.
- Data Text up to 80 ASCII characters.

Pass through requests are limited to 80 characters of text. Since each request is considered one line, no CR LF pair need be embedded in the text. These will be automatically inserted by the Operator Station. Note that the optional CR LF pair at the end of the packet is still supported.

Semicolons are not allowed in the ASCII text field since a semicolon is used to delimit the end of the packet.

Pass through requests will be handled as an individual line of output, and no coordination of the printer port with alarm routines is performed. If data which could cause an alarm is received by the Operator Station through one port while a pass through request is being processed through another port, the alarm data will be processed immediately after the current pass through line is processed. The host is responsible for avoiding this conflict of data transfers.

69 – Host Transmits Message to Host Display Window

Using task code 69, the host can send a text message to the Operator Station's host display window. The host display window is a 22 x 66 rectangular area, which is the same size as the 3 x 5 cell matrix area used for templates. The upper left-hand corner of this area is row 0, column 0. The bottom right-hand corner of this area is row 21, column 65. The message will be truncated if larger than the size permitted by the above dimensions. Note that if a message is sent to an out of range row or column location, the message will be displayed on the screen in the wrong location.

If the “Acknowledge Host Display Window Commands” is set in the PLC Name and Port Table (see **Configuring**), the Operator Station is expected to return a task block containing task code 64. If the “Acknowledge Host Display Window Commands” is not set, no response is expected from the Operator Station.

69	,row	,col	,fg	,bg	,font	,bnk	,text
----	------	------	-----	-----	-------	------	-------

69 The ASCII characters ‘6’ & ‘9’.

,row Row number in text area starting at the upper left-hand corner (0-21).

,col Column number in the text area starting at the upper left-hand corner (0-65).

,fg Foreground color (0-255) of the text message.

,bg Background color (0-255) of the text message.

Sample Color Values (Corresponding to index in the color palette)			
0	Black	8	Black
1	Blue	9	Blinking Blue
2	Green	10	Blinking Green
3	Cyan	11	Blinking Cyan
4	Red	12	Blinking Red
5	Magenta	13	Blinking Magenta
6	Yellow	14	Blinking Yellow
7	White	15	Blinking White

,font Font type (0-3).

Font Types	
0	Normal
1	Graphics
2	Double High
3	Quad

,bnk Must be 0.

,text Message to display

70 – Erase Rectangle Section of Host Display Window

Using task code 70, any rectangular block may be erased.

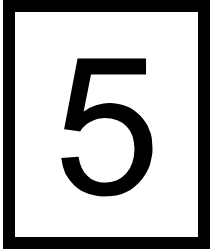
If the “Acknowledge Host Display Window Commands” is set in the PLC Name and Port Table (see **Configuring**), the Operator Station is expected to return a task block containing task code 64. If the “Acknowledge Host Display Window Commands” is not set, no response is expected from the Operator Station.

70	,row	,col	,fg	,bg	,font	,bnk	,num_row	,num_col
----	------	------	-----	-----	-------	------	----------	----------

70	The ASCII characters ‘7’ & ‘0’.							
,row	Starting row number beginning in the upper left-hand corner (0-21).							
,col	Starting column number beginning in the upper left-hand corner (0-65).							
,fg	Must be 0.							
,bg	Must be 0.							
,font	Must be 0.							
,bnk	Must be 0.							
,num_row	Number of rows to erase.							
,num_col	Number of columns to erase.							

The row and column fields, along with the number of rows and columns field, define a rectangular area starting at the row and column values.

Word and Bit References



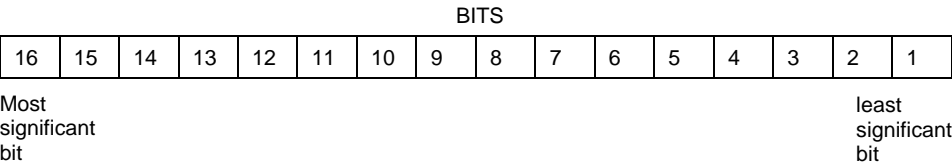
In this chapter, you will learn:

- *How to configure word and bit references*

Memory

When configuring templates or elements that will be updated using the Generic Protocol, a simple number, like [123], is used to represent word addresses. The addresses [1] through [65535] are all valid.

A Generic bit address is a two-part number consisting of a word number, followed by a period, then the number of the bit within the word.



Thus, bit addresses range from [1.1] to [1.16], [2.1] to [2.16], and so on up to [65535.16].

Memory Ranges

The following diagram summarizes the range of available addresses that can be used.

		Bit	16	9	8	1
WORD	1					
	2					
	3					
	4					
	5					
	6					
	65534					
	65535					

Word Referencing Method

The general word referencing method is:

[plcname,word]

The "plcname" is the name of the designated PLC as listed in the PLC Name and Port Table. The "word" is the reference number (address) of the word or register to be read or written. The "plcname" is optional if you are using the default PLC.

Note: The "#format" modifier which specifies the format of the data being read or written is not supported by the Generic Protocol Communication driver.

Bit Referencing Method

The general bit referencing method is:

[plcname,bit]

The "plcname" is the designated PLC as listed in the PLC Name and Port Table. The "bit" is the reference number (address) of the bit to be written or read.

See the "Word and Bit References" topic in the Configuration Software Online Help for a more detailed explanation of word and bit references, including format descriptions.

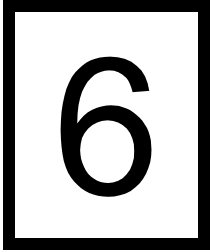
Examples

The following are examples of valid Generic references that may be assigned in the Operator Station expression fields.

Word References	
[1]	Word 1
[123]	Word 123
[65535]	Word 65535

Bit References	
[1.8]	Word 1 bit 8
[123.14]	Word 123 bit 14
[65535.2]	Word 65535 bit 2

Maintenance Access



In this chapter, you will learn:

- *How to use the Maintenance Template*

Maintenance Access

A Maintenance Template cannot be used to monitor Generic Protocol references.

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