

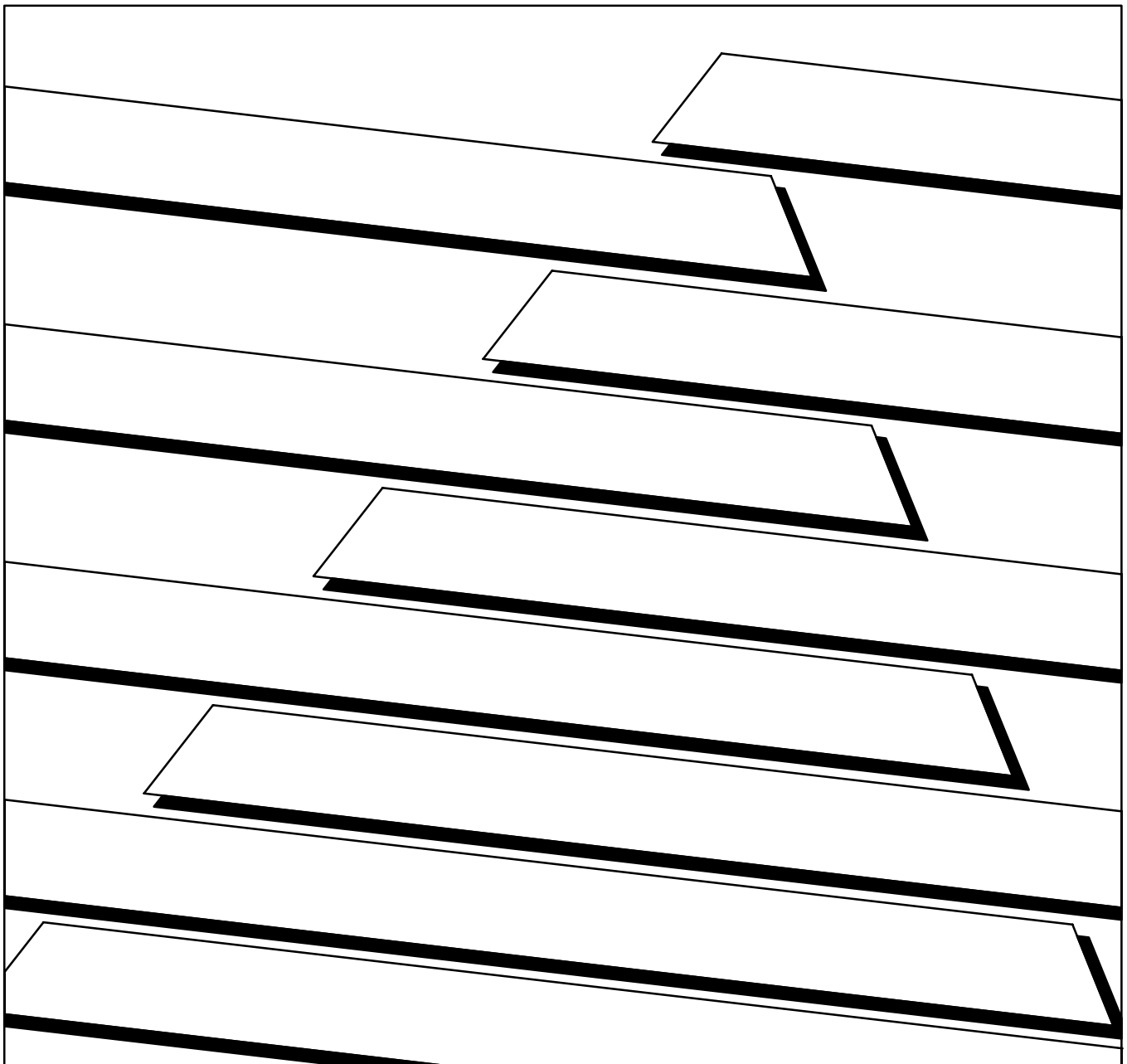


**ALLEN-BRADLEY**

# **PanelBuilder™ Development Software**

Catalog Number 2711-ND1

## **User Manual**



## Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. “Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls” (Publication SGI-1.1) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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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.

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Attentions help you:

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

**IMPORTANT:** Identifies information that is especially important for successful application and understanding of the product.

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## ***Table of Contents***

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<b>Preface</b> .....	<b><a href="#">P-1</a></b>
Manual Overview .....	<a href="#">P-1</a>
Intended Audience .....	<a href="#">P-1</a>
Glossary of Terms .....	<a href="#">P-1</a>
Related Publications .....	<a href="#">P-3</a>
After-Sales Support .....	<a href="#">P-4</a>
 <b>Introduction to PanelBuilder</b> .....	 <b><a href="#">1-1</a></b>
Fast, Easy, Offline Configuration .....	<a href="#">1-1</a>
PanelBuilder Features .....	<a href="#">1-1</a>
Direct or Data Highway Downloading .....	<a href="#">1-1</a>
List Selection of Objects .....	<a href="#">1-2</a>
Dynamic Memory Display .....	<a href="#">1-2</a>
Security .....	<a href="#">1-2</a>
Printed Documentation .....	<a href="#">1-2</a>
Message and Alarm Handling Utilities .....	<a href="#">1-3</a>
Options and Accessories .....	<a href="#">1-3</a>
Additional Upload/Download Cable .....	<a href="#">1-3</a>
Optional Remote Keyswitch & RS-232 Port Assembly .....	<a href="#">1-3</a>
Optional EEPROM or EPROM for Back-up or Additional Application Memory .....	<a href="#">1-4</a>
Mouse .....	<a href="#">1-4</a>
Printer .....	<a href="#">1-5</a>
Objects, Windows, and PLC Controlled Options .....	<a href="#">1-5</a>
Objects Common to All PanelView Terminals .....	<a href="#">1-7</a>
Objects for the Keypad Terminal .....	<a href="#">1-9</a>
Objects for the Touch Screen Terminal .....	<a href="#">1-10</a>
Information and Alarm Windows .....	<a href="#">1-10</a>
Summary of PLC Controlled Options .....	<a href="#">1-10</a>
Applicable Programmable Controllers and Connections .....	<a href="#">1-11</a>
PLC-5/11, 5/15, 5/20, 5/25, 5/30, 5/40, 5/60 and 5/250 Processors .....	<a href="#">1-12</a>
PLC-5/10 Processor .....	<a href="#">1-12</a>
PLC-3 and PLC-3/10 Processors .....	<a href="#">1-12</a>
PLC-2 Family Processors via 1771-SN or 1772-SD2 .....	<a href="#">1-13</a>
SLC 5/02 via 1747-SN .....	<a href="#">1-13</a>
1771-SN I/O Subscanner Module .....	<a href="#">1-13</a>
6008-SI IBM PC I/O Scanner .....	<a href="#">1-13</a>
6008-SV VME I/O Scanner .....	<a href="#">1-13</a>
6008-SQ DEC Q-BUS I/O Scanner .....	<a href="#">1-14</a>

<b>Installing PanelBuilder</b> .....	<b><a href="#">2-1</a></b>
Software Requirements .....	<a href="#">2-1</a>
Hardware Requirements .....	<a href="#">2-1</a>
PanelBuilder Files .....	<a href="#">2-2</a>
Remote I/O Pass-Through Utility .....	<a href="#">2-3</a>
The DEFAULTS File .....	<a href="#">2-3</a>
Installing PanelBuilder on a Hard Disk .....	<a href="#">2-4</a>
Starting PanelBuilder .....	<a href="#">2-4</a>
Version Compatibility .....	<a href="#">2-5</a>
PanelView Default Settings .....	<a href="#">2-7</a>
Verifying the PanelView Firmware Version .....	<a href="#">2-7</a>
Compatibility Reports .....	<a href="#">2-8</a>
 <b>Using PanelBuilder</b> .....	 <b><a href="#">3-1</a></b>
Getting Help .....	<a href="#">3-1</a>
The Keyboard .....	<a href="#">3-1</a>
Menu Keys .....	<a href="#">3-1</a>
Data Entry Keys .....	<a href="#">3-2</a>
Keys for Editing Objects and Lines .....	<a href="#">3-3</a>
PanelBuilder Menu Structure .....	<a href="#">3-6</a>
The Main Menu .....	<a href="#">3-6</a>
The Develop Menu .....	<a href="#">3-7</a>
The Transfer Menu .....	<a href="#">3-8</a>
The Reports Menu .....	<a href="#">3-9</a>
The Files Menu .....	<a href="#">3-9</a>
The Setup Menu .....	<a href="#">3-10</a>
The Exit Menu .....	<a href="#">3-12</a>
The File Menu .....	<a href="#">3-12</a>
The Screens Menu .....	<a href="#">3-13</a>
The Windows Menu .....	<a href="#">3-13</a>
The Options Menu .....	<a href="#">3-15</a>
The Communications Menu .....	<a href="#">3-19</a>
The Screen Menu .....	<a href="#">3-20</a>
The Add Menu .....	<a href="#">3-21</a>
The Edit Menu .....	<a href="#">3-22</a>
Move, Delete, and Memorize .....	<a href="#">3-22</a>
Recall .....	<a href="#">3-24</a>
Options .....	<a href="#">3-25</a>
Exit .....	<a href="#">3-26</a>
The Object Menu .....	<a href="#">3-26</a>
Move and Size .....	<a href="#">3-28</a>
Look .....	<a href="#">3-29</a>
Buttons .....	<a href="#">3-30</a>
List .....	<a href="#">3-31</a>
States and Text .....	<a href="#">3-32</a>

Text and Outer Text .....	<a href="#">3-33</a>
Format .....	<a href="#">3-33</a>
Address .....	<a href="#">3-34</a>
Utility .....	<a href="#">3-35</a>
Exit .....	<a href="#">3-36</a>
Buttons and Keypad Terminals .....	<a href="#">3-36</a>
Button Concepts .....	<a href="#">3-36</a>
Buttons and Touch Screen Terminals .....	<a href="#">3-37</a>
Buttons and Auto-Repeat .....	<a href="#">3-38</a>

<b>Planning Your Application .....</b>	<b><a href="#">4-1</a></b>
Safety and PLC Programming Considerations .....	<a href="#">4-1</a>
Emergency Stops and Other Critical Controls .....	<a href="#">4-1</a>
System Response to a PanelView Terminal Failure .....	<a href="#">4-2</a>
Button Location Considerations .....	<a href="#">4-2</a>
Understanding Rack and Block Transfer Assignments .....	<a href="#">4-3</a>
Starting Module Groups and Fractional Racks .....	<a href="#">4-3</a>
Block Transfers .....	<a href="#">4-4</a>
Determining Rack and Block Transfer Needs .....	<a href="#">4-5</a>
Reducing PLC Addressing Needs .....	<a href="#">4-6</a>
Worksheets .....	<a href="#">4-7</a>
How to Complete the Worksheets .....	<a href="#">4-7</a>
Screen Worksheets .....	<a href="#">4-9</a>
Screen Worksheet for Keypad Terminals .....	<a href="#">4-9</a>
Screen Worksheet for Touch Screen Terminals .....	<a href="#">4-10</a>
The Object Address List .....	<a href="#">4-11</a>
Object Address List and I/O Usage Worksheets .....	<a href="#">4-11</a>
The I/O Usage Worksheets .....	<a href="#">4-12</a>
Completing the Object Address List and I/O Worksheets .....	<a href="#">4-14</a>
Object .....	<a href="#">4-14</a>
Address .....	<a href="#">4-15</a>
Block Transfer PLC Address .....	<a href="#">4-16</a>
Preset .....	<a href="#">4-16</a>
Number of States .....	<a href="#">4-16</a>
Data Types .....	<a href="#">4-16</a>
Number of Bits .....	<a href="#">4-19</a>
PLC Communications Worksheet .....	<a href="#">4-20</a>
PLC/Scanner Type .....	<a href="#">4-21</a>
Baud Rate .....	<a href="#">4-21</a>
Rack Assignments .....	<a href="#">4-21</a>
Block Transfer Assignments .....	<a href="#">4-22</a>
Estimating PanelView Terminal Memory Requirements .....	<a href="#">4-23</a>
Object Memory Usage .....	<a href="#">4-24</a>
Reducing Memory Requirements .....	<a href="#">4-26</a>
Sample Application Planned with Worksheets .....	<a href="#">4-26</a>

After Planning the Application, Create the Application File .....	<a href="#">4-39</a>
<b>Creating A Sample Application File .....</b>	<b><a href="#">5-1</a></b>
Start up PanelBuilder .....	<a href="#">5-1</a>
Step 1: Create the Application File .....	<a href="#">5-1</a>
Step 2: Configure PLC Communications .....	<a href="#">5-3</a>
Define PLC Type .....	<a href="#">5-3</a>
Define Rack Assignments .....	<a href="#">5-4</a>
Define Block Transfer Files .....	<a href="#">5-6</a>
Set the Baud Rate .....	<a href="#">5-7</a>
Step 3: Create the Screens .....	<a href="#">5-8</a>
Screen 1: MAIN SCREEN .....	<a href="#">5-8</a>
Screen 2: CONVEYOR CONTROLS .....	<a href="#">5-20</a>
Screen 3: PUMP CONTROLS .....	<a href="#">5-41</a>
<b>File Operations .....</b>	<b><a href="#">6-1</a></b>
Loading Files .....	<a href="#">6-1</a>
Basic File Operations .....	<a href="#">6-1</a>
Saving Files .....	<a href="#">6-2</a>
Copying, Deleting and Renaming Files .....	<a href="#">6-2</a>
Printing Reports .....	<a href="#">6-3</a>
Methods of Loading Application Files into PanelView Terminals ...	<a href="#">6-10</a>
Direct Downloading and Uploading with the Upload /Download Cable	<a href="#">6-10</a>
Setting Upload/Download Communications on the PanelView Terminal .....	<a href="#">6-10</a>
Setting Upload/Download Communications on the PanelBuilder Computer .....	<a href="#">6-11</a>
Downloading to PanelView .....	<a href="#">6-12</a>
Downloading Considerations .....	<a href="#">6-14</a>
Uploading from PanelView .....	<a href="#">6-15</a>
Downloading and Uploading over the Data Highway + .....	<a href="#">6-16</a>
Configuring the Pass-Through Parameters .....	<a href="#">6-17</a>
Downloading over the Data Highway + .....	<a href="#">6-23</a>
Uploading Over the Data Highway + .....	<a href="#">6-27</a>
Burning the User EPROM .....	<a href="#">6-30</a>
Burn EPROMS .....	<a href="#">6-30</a>
Burn Single EPROM .....	<a href="#">6-32</a>
Programming EEPROMs .....	<a href="#">6-33</a>
Burn EEPROMS .....	<a href="#">6-34</a>

<b>Information and Alarm Windows</b> .....	<b><a href="#">7-1</a></b>
The Information Window .....	<a href="#">7-1</a>
Configuring the Information Window .....	<a href="#">7-2</a>
Creating Messages .....	<a href="#">7-3</a>
Importing and Exporting Information Messages .....	<a href="#">7-3</a>
Editing Messages .....	<a href="#">7-6</a>
Copying Messages .....	<a href="#">7-7</a>
Deleting Messages .....	<a href="#">7-7</a>
Setting the Window's Appearance .....	<a href="#">7-8</a>
Address Assignment for the Information Window .....	<a href="#">7-8</a>
Address Assignment and PLC Information Message Triggering ..	<a href="#">7-10</a>
Information Window Acknowledgement .....	<a href="#">7-12</a>
The Alarm Window .....	<a href="#">7-12</a>
Alarm Messages .....	<a href="#">7-13</a>
Configuring the Alarm Window .....	<a href="#">7-15</a>
Creating Messages .....	<a href="#">7-15</a>
Importing and Exporting Messages .....	<a href="#">7-17</a>
Editing Messages .....	<a href="#">7-20</a>
Address Assignment for the Alarm Window .....	<a href="#">7-23</a>
Address Assignment and PLC Alarm Message Triggering .....	<a href="#">7-25</a>
Acknowledge Button Address .....	<a href="#">7-29</a>
Remote Window Processing .....	<a href="#">7-29</a>
Buttons on the Full Alarm Window .....	<a href="#">7-32</a>
Alarm History Screen .....	<a href="#">7-33</a>
The Alarm Status Screen .....	<a href="#">7-35</a>
Notes on the Alarm Quantity (Qty) and Accumulated Time (Accum Time) .....	<a href="#">7-36</a>
Configuring the Alarm Status Screen .....	<a href="#">7-37</a>
Alarm QTY/TIME Reset to PLC Controller .....	<a href="#">7-38</a>
Alarm Status Screen Buttons .....	<a href="#">7-41</a>
Viewing the Display .....	<a href="#">7-41</a>
Active Alarms (Display Active Alarms Mode) .....	<a href="#">7-42</a>
All Msgs (Display All Alarms Mode) .....	<a href="#">7-43</a>
Past Alarms (Past Alarms Mode) .....	<a href="#">7-43</a>
 <b>Screen Operations</b> .....	 <b><a href="#">8-1</a></b>
Basic Utility Functions .....	<a href="#">8-1</a>
Copying a Screen from One Application File to Another .....	<a href="#">8-2</a>
Security .....	<a href="#">8-3</a>
The Powerup Screen .....	<a href="#">8-4</a>
Application File Comment .....	<a href="#">8-5</a>

<b>PLC Controlled Options</b> .....	<b><a href="#">9-1</a></b>
Assigning Addresses .....	<a href="#">9-2</a>
Time and Date to PLC Controller .....	<a href="#">9-3</a>
Current Screen Number to PLC Controller .....	<a href="#">9-4</a>
Screen Print Active to PLC Controller .....	<a href="#">9-4</a>
PLC Controlled Audio .....	<a href="#">9-4</a>
PLC Controlled Alarm Relay .....	<a href="#">9-5</a>
PLC Controlled Screen Number .....	<a href="#">9-5</a>
PLC Controlled Screen Print .....	<a href="#">9-6</a>
About Screen Prints .....	<a href="#">9-6</a>
PLC Controlled Time and Date .....	<a href="#">9-7</a>
Other PLC Controlled Options .....	<a href="#">9-8</a>
 <b>The Objects</b> .....	 <b><a href="#">10-1</a></b>
Object Characteristics .....	<a href="#">10-1</a>
Retentive Objects .....	<a href="#">10-2</a>
The Add Menu .....	<a href="#">10-3</a>
Push Buttons .....	<a href="#">10-4</a>
Momentary Normally Open (N/O) Push Button .....	<a href="#">10-4</a>
Momentary Normally Closed (N/C) Push Button .....	<a href="#">10-5</a>
Latched Push Button .....	<a href="#">10-6</a>
Maintained Push Button .....	<a href="#">10-7</a>
Interlocked Push Button .....	<a href="#">10-8</a>
Control Selectors .....	<a href="#">10-9</a>
Control List Selector Addressing .....	<a href="#">10-9</a>
Control List Selector with Enter .....	<a href="#">10-11</a>
Control List Selector without Enter .....	<a href="#">10-13</a>
Set Bit Cursor Points (Keypad terminals only) .....	<a href="#">10-14</a>
Screen Selectors .....	<a href="#">10-18</a>
“Go To Screen” Button .....	<a href="#">10-18</a>
“Return To Previous Screen” Button .....	<a href="#">10-18</a>
Screen List Selector .....	<a href="#">10-19</a>
Keypad Screen Selectors (Small and Large) (Touch Screen Terminals Only) .....	<a href="#">10-20</a>
Screen Keypad-Enable Button (Keypad terminals only) .....	<a href="#">10-21</a>
Indicators .....	<a href="#">10-22</a>
Multi-State Indicator .....	<a href="#">10-22</a>
List Indicator .....	<a href="#">10-23</a>
Numerics .....	<a href="#">10-25</a>
Set Value Button .....	<a href="#">10-26</a>
Increment Value Button .....	<a href="#">10-27</a>
Decrement Value Button .....	<a href="#">10-28</a>
Numeric Data Display .....	<a href="#">10-30</a>
Standard Numeric Data Display .....	<a href="#">10-30</a>
Scaled Numeric Data Display .....	<a href="#">10-32</a>



Numeric Keypad-Enable Button (Keypad Terminals only) . . . . .	<a href="#">10-34</a>
Small or Large Numeric Entry Keypads (Touch Screen terminals only) . . . . .	<a href="#">10-37</a>
Numeric Input Cursor Point (Keypad Terminals Only) . . . . .	<a href="#">10-40</a>
Editing an Array of Numeric Values . . . . .	<a href="#">10-47</a>
Text/Draw . . . . .	<a href="#">10-50</a>
Text . . . . .	<a href="#">10-50</a>
Line . . . . .	<a href="#">10-50</a>
Box . . . . .	<a href="#">10-53</a>
Arc . . . . .	<a href="#">10-53</a>
Symbols . . . . .	<a href="#">10-55</a>
Bar Graphs . . . . .	<a href="#">10-56</a>
Time and Date . . . . .	<a href="#">10-57</a>
Time Display . . . . .	<a href="#">10-57</a>
Date Display . . . . .	<a href="#">10-58</a>
Local Message Display . . . . .	<a href="#">10-58</a>
Importing and Exporting Messages . . . . .	<a href="#">10-58</a>
Address Assignment and PLC Message Triggering . . . . .	<a href="#">10-61</a>
Screen Print Button . . . . .	<a href="#">10-63</a>
ASCII Display . . . . .	<a href="#">10-64</a>
Special Characters and Control Sequences . . . . .	<a href="#">10-66</a>
Invalid Control Sequences . . . . .	<a href="#">10-68</a>
ASCII Input Object . . . . .	<a href="#">10-68</a>
Buttons . . . . .	<a href="#">10-71</a>
Configuring the ASCII Input Object . . . . .	<a href="#">10-74</a>
Scrolling List Object . . . . .	<a href="#">10-78</a>
Cursor List . . . . .	<a href="#">10-79</a>
Object List . . . . .	<a href="#">10-85</a>
Button Operation . . . . .	<a href="#">10-93</a>
About Retentive Objects . . . . .	<a href="#">10-94</a>
Retentive Objects and Presets . . . . .	<a href="#">10-95</a>
Safety Considerations for Retentive Objects . . . . .	<a href="#">10-96</a>
<b>Testing Your Application File . . . . .</b>	<b><a href="#">11-1</a></b>
Testing the Screens . . . . .	<a href="#">11-1</a>
Connecting the Programmable Controller . . . . .	<a href="#">11-2</a>
Test Retentive Objects . . . . .	<a href="#">11-2</a>
Testing the Whole System . . . . .	<a href="#">11-3</a>
<b>PLC Programming Considerations . . . . .</b>	<b><a href="#">A-1</a></b>
Block Transfer Programming . . . . .	<a href="#">A-1</a>
Rack Number . . . . .	<a href="#">A-1</a>
Module Group (Word) . . . . .	<a href="#">A-1</a>
Byte (slot) . . . . .	<a href="#">A-2</a>
Number of Words . . . . .	<a href="#">A-2</a>

PLC-5/15 Block Transfer Programming Examples .....	<a href="#">A-3</a>
“Non-Continuous” Block Transfer Mode .....	<a href="#">A-3</a>
Bi-Directional Block Transfer Example (PLC-5/15) .....	<a href="#">A-3</a>
PLC-3 Block Transfer Programming Examples .....	<a href="#">A-6</a>
PLC-2/30 Block Transfer Programming Example .....	<a href="#">A-10</a>
Configuring a PLC-5 for Multi-Chassis I/O Rack Addressing .....	<a href="#">A-10</a>
Using PLC-2s and a 1771-SN Subscanner with PanelView .....	<a href="#">A-12</a>
Input Data (Block Transfer Read) .....	<a href="#">A-13</a>
Output Data (Block Transfer Write) .....	<a href="#">A-14</a>
Ladder Program for Remote I/O .....	<a href="#">A-15</a>
System Response Times .....	<a href="#">A-15</a>
Discrete Data Response Time .....	<a href="#">A-15</a>
Block Transfer Timing Considerations .....	<a href="#">A-16</a>
PLC-5 Block Transfer Timing .....	<a href="#">A-18</a>
PLC-3 Family Block Transfer Timing .....	<a href="#">A-20</a>
SLC 5/02 Programming Example .....	<a href="#">A-21</a>
Scrolling List Example .....	<a href="#">A-25</a>
Step 1: Create the Cursor List .....	<a href="#">A-26</a>
Step 2: Create the Object Lists .....	<a href="#">A-27</a>
Step 3: Program the PLC .....	<a href="#">A-30</a>
 <b>Troubleshooting</b> .....	 <b><a href="#">B-1</a></b>
Verifying Configuration Settings .....	<a href="#">B-1</a>
PanelBuilder Problems .....	<a href="#">B-2</a>
PanelBuilder Error Messages .....	<a href="#">B-3</a>
PanelView Error Messages .....	<a href="#">B-4</a>
PLC Communication Problems .....	<a href="#">B-6</a>
Pass-Through Upload/Download Problems .....	<a href="#">B-7</a>
 <b>Sample Worksheets</b> .....	 <b><a href="#">C-1</a></b>
 <b>ISA Symbols</b> .....	 <b><a href="#">D-1</a></b>
Valves .....	<a href="#">D-1</a>
Filters .....	<a href="#">D-4</a>
Electrical .....	<a href="#">D-5</a>
Containers and Vessels .....	<a href="#">D-6</a>
Rotating Equipment .....	<a href="#">D-10</a>
Material Handling .....	<a href="#">D-12</a>
Heat Transfer Devices .....	<a href="#">D-14</a>
Miscellaneous .....	<a href="#">D-15</a>
 <b>The Extended Character Set</b> .....	 <b><a href="#">E-1</a></b>

## Preface

### Manual Overview

This manual explains how PanelBuilder™ Development Software is used to design screens for PanelView™ terminals.

The manual provides information and examples for:

- developing application files for PanelView terminals using the PanelBuilder Development Software
- troubleshooting the completed system

### Intended Audience

This manual is written to help those who want to develop PanelView screens for use with PLC control applications.

Before you begin designing PanelView screens, familiarize yourself with your plant's PLC system, especially the PLC controller's program and data table. Acquire a clear understanding of how the PanelView terminal will be used to control and monitor your PLC controllers.

### Glossary of Terms

The following terms are used throughout this manual.

**Application File:** A PanelView terminal application file contains a series of screens and configurations which, when interpreted and executed by PanelView, replace the functions of a control panel of buttons, switches and indicators. The screens are created on a development computer running PanelBuilder Development Software and then saved in an application file on the development computer's disk. The application file is then downloaded to a PanelView terminal where it stays in battery-backed RAM.

**Battery-Backed RAM:** Application files are stored in the PanelView terminal's random access memory (RAM). The RAM is backed by an internal battery so that the application file and the status of the retentive objects are maintained even when AC power is switched off.

**Hex Files:** Application files which have been converted into Intel™ Hex format for transfer to user PROMs.

**Object:** An object is an individual component of a PanelView screen. Each object takes the function of a button, switch or indicator on a control panel. The objects can be dynamic—they can change color or value and can display information. Each object is defined by the developer of the PanelView screen. Examples of objects include Push Buttons, Selectors, Bar Graphs, Numeric Displays, etc.

**PanelBuilder Development Software:** The program runs on the development computer to develop application files for PanelView terminals.

**PanelView Terminal:** A type of Allen-Bradley terminal with a touch screen or rugged keypad, designed for easy operator interaction with a PLC system over the Remote I/O link.

**RAM:** Static Random Access Memory. A type of memory that can maintain its contents through the use of a battery. It does not require continuous refreshing to maintain its contents.

**Retentive:** An object is described as retentive when it “retains” its PLC value in the PanelView terminal after a screen change, an operator’s object action, and even after the terminal’s power cycle. For example, when a maintained push button is pressed, the corresponding PLC input is set to 1 and will not change until the button is pressed a second time. Retentive objects always display their current states or values.

**Screen:** A display containing objects (such as push buttons or bar graphs) which can monitor and control a PLC system. Screens are created with the PanelBuilder Development Software.

**System Memory:** The read-only memory that contains the operating firmware for the PanelView terminal.

**Upload/Download:** Downloading is the process of transferring an application file from a development computer running the PanelBuilder Development Software, to a PanelView terminal. Uploading is the process of transferring an application file from the terminal back to the development computer.

**User PROM:** The read-only memory chip that can be used to contain a back-up copy of an application file, or to increase the memory available for the application file from 64K to 128K. The chip can be either an EPROM or an EEPROM.

There are two types of user PROM chips that can be used in PanelView terminal: EPROMs and EEPROMs. EPROMs are Electrically Programmable Read Only Memory chips. EEPROMs are Electrically Erasable Programmable Read Only Memory chips.

The user PROMs store application files in memory that is protected from power failure and failure of the internal battery. A PROM burner is required to copy application files into EPROMs.

If your system includes EEPROMS, application files downloaded through the Upload/Download cable will be stored in both battery-backed RAM and in the EEPROMS. No PROM burner is required.

**Window:** An area on the screen containing information. These windows are triggered by the PLC controller and overlay any screen that is displayed.

## Related Publications

The following related publications provide additional information on programmable controllers and I/O scanners.

**Table P.A**  
**Allen-Bradley Remote I/O Scanner Module User's Manuals**

Publication	Pub. No.
1772-SD/SD2 Remote I/O Scanner/Distribution Panel	1772-2.18
1775-S4A I/O Scanner-Programmer Interface Module User's Manual	1775-6.5.1
1775-S5, 1775-SR5 I/O Scanner-Communication Adapter Module User's Manual	1775-6.5.5
5150-RS PI Start-up and Integration Manual	5000-6.5.1
6008-SI IBM® PC I/O Scanner User's Manual	6008-6.5.3
6008-SV VME I/O Scanner User's Manual	6008-6.5.2
6008-SQ Q-Bus I/O Scanner Utility Software User's Manual	6008-6.4.1
1771-SN Sub I/O Scanner Module Data Sheet	1771-2.91
1747-SN RIO Scanner User's Manual	1747-NM005

**Table P.B**  
**Allen-Bradley Programmable Controller User's Manuals**

Publication	Pub. No.
1772-LP2 PLC-2/20 Programming and Operations Manual	1772-6.8.1
1772-LP3 PLC-2/30 Controller Programming and Operations Manual	1772-6.8.3
PLC-3 Family Controller Programming Reference Manual	1775-6.4.1
PLC-5 Family Programmable Controllers Hardware Installation Manual	1785-6.6.1
PLC-5 Programming Software	6200-6.4.7
5250-LP1, LP2 PLC-5/250 Programming Manual	5000-6.4.8
SLC 500 Family of Programmable Controllers Advanced Programming Software User's Manual	1747-NM002

To identify the manuals referring to these programmable controllers, consult the Publications Index, Publication SD499, available from Allen-Bradley.

**Table P.C**  
**Allen-Bradley Application Notes**

Publication	Pub. No.
Using a Mouse with PanelBuilder Development Software	2711-2.4

## After-Sales Support

If you need help with your PanelBuilder Development Software, contact:

Allen-Bradley  
Software Support  
6680 Beta Drive  
Mayfield Village, Ohio 44143

Inside USA and Canada: 1-800-289-2279

Outside USA and Canada, contact your local Allen-Bradley office or call USA (216) 646-6800.

The serial number for your software is on the card in the front of the User Manual. Please have this number ready when you call for technical support.

Please register your software by mailing the registration card to the address above, or by FAXing the card to (216) 646-6770.

## Introduction to PanelBuilder

This chapter provides an overview of the PanelBuilder Development Software. It describes:

- the features of PanelBuilder Development Software
- available objects, windows and PLC controlled options

### PanelBuilder Features

#### Fast, Easy, Offline Configuration

PanelBuilder displays easy-to-use menus and fill-in-the-blank windows. With arrow keys or a mouse, you choose options from the menus, and position objects on the screens.

Even a monochrome display can be used to design screens for a color PanelView terminal. On color computers, the colors are displayed as they will appear on the PanelView terminal.

Changes and additions to application files are fast and easy: the original file can be edited, or a copy uploaded from the PanelView terminal to the development computer.

Application files can be created without a PanelView terminal connected. To run the application file, however, it must first be downloaded to the PanelView terminal.

#### Direct or Data Highway Downloading

Application files can be downloaded from the development computer to the terminal via the Upload/Download cable (an RS-232 connection), or via a Data Highway Plus, using the PLC-5 Pass-Through feature.

By using the Data Highway for downloading, you can download to several terminals from a single development computer without having to go from terminal to terminal, connecting the Upload/Download cable for each one.

## **List Selection of Objects**

Creating screens is made simple with PanelBuilder. To create a screen, you choose the kind of object you want from a list and position it on the screen. You then adjust its shape, size, color, text labels, PLC address, etc., and continue adding objects until the screen is done.

If you are designing screens for a Keypad terminal, you assign custom soft-key labels to each of the Keypad buttons. If you are configuring a Touch Screen terminal, you position the labels over touch cell areas. Most of the remaining functions are identical for Keypad and Touch Screen terminals.

## **Dynamic Memory Display**

As you develop or edit an application, PanelBuilder displays the amount of memory the application will require in a PanelView terminal. As each object is edited, the display is updated with the current application file size. This makes it easy to be sure that your application file will fit in the amount of memory in your terminal(s).

## **Security**

With PanelBuilder Development Software, any PanelView screen can be assigned a security classification. Before PanelView will display a screen with assigned security, the operator must enter a 5-digit access code. Up to 8 operators can be allowed access to a designated screen.

Alternatively, up to 8 levels of access can be defined for each screen. You can even change access codes or enable and disable security directly from a PanelView terminal in Configuration Mode.

Security cannot be assigned to the Alarm History or Alarm Status Screens, since they must be available to every operator. The terminal also ignores security for the Powerup screen and for screens requested by the PLC controller.

## **Printed Documentation**

A wide variety of reports can be printed from PanelBuilder. These include all screens, functions and PLC addresses configured for specific application files.



## **Message and Alarm Handling Utilities**

A PanelView application can be configured with stored messages that can be triggered by the PLC controller. There are three kinds of message displays:

- Local Message Displays can appear in any free location on a specific screen (875 messages maximum)
- Information Windows can pop up regardless of the screen currently displayed (496 messages maximum)
- Alarm Windows can pop up regardless of the screen currently displayed (496 messages maximum)

For each type of message displayed—local, information, or alarm—there is a message list. You can add or edit messages using PanelBuilder software, or you can create your messages in any text editor and import (and export) the text as an ASCII file. Messages are numbered and listed in numerical order in the message list.

See Chapter 7, *Information and Alarm Windows*, for more information.

## **Options and Accessories**

Optional hardware that you may find convenient to use with the PanelBuilder Development Software and the PanelView terminal is available. For catalog numbers see Table 1.A in the *PanelView Operator Terminals User Manual*.

### **Additional Upload/Download Cable**

The Development Kit includes an Upload/Download cable that connects the development computer's RS-232 Port to the PanelView terminal's RS-232 Port. An additional Upload/Download Cable may be convenient if you have a number of terminals, or if you want a spare.

### **Optional Remote Keyswitch & RS-232 Port Assembly**

On the back of all PanelView terminals is a Mode Select Keyswitch and RS-232 Port. The Remote Keyswitch and RS-232 Port Assembly allows you to mount the port and keyswitch to the front of your control panel while maintaining a NEMA 4X seal. This is convenient if you don't have easy access to the rear of the PanelView terminal. See Chapter 3, *Installing Your PanelView Terminal*, for details on mounting and dimensions.

## **Optional EEPROM or EPROM for Back-up or Additional Application Memory**

Earlier PanelView terminals contained two sockets for optional EPROM or EEPROM chips. Series D and E PanelView terminals have only one socket for an optional EPROM/EEPROM, called the user PROM.

- an EPROM can be used for application file back-up, which is useful for keeping the application file safe, even in the event of a battery failure. The application file is programmed into the EPROM with a PROM burner. Once programmed, they cannot be erased or overwritten.

An application file must be burned into the EPROM by connecting an EPROM burner to the development computer. The PanelBuilder Development Software has been tested with the Data I/O Model 29A EPROM burner. PanelBuilder downloads application files to the EPROM burner in Intel Hex Format. Your EPROM burner must be able to accept a simple dump of Intel Hex format data and use 27C512 or 28C512 type PROMs without special commands or operations.

PanelBuilder can also translate your application file to a DOS file with the Intel Hex Format. This allows you to use other EPROM burners (with their own software drivers) for the IBM PC®.

- an EEPROM can be used for application file back-up or for extra application memory.
  - when the EEPROM is used for application back-up, the downloaded application file is automatically copied to the EEPROM during the download operation.
  - the EEPROM can also be used to increase the memory available for application file storage from 64K to 128K. If the EEPROM is used in this way, it cannot be used as back-up for the application file.

## **Mouse**

The mouse provides an optional convenience in PanelBuilder. The Mouse menu allows you to set a damping factor to control how quickly the screen cursor reacts to mouse movement. You can use the mouse instead of the arrow and **Enter** keys, when developing screens. See Chapter 3, *Using PanelBuilder* for information on configuring the mouse.

## **Printer**

Any standard text printer can print out reports. A printer that supports the IBM extended character set is required for screen printouts. Specific cabling instructions depend on your computer and printer.

## **Objects, Windows, and PLC Controlled Options**

The objects, windows and PLC controlled options are listed in three groups: those used on both Keypad and Touch Screen terminals, those used for Keypad terminals only, and those used for Touch Screen terminals only.

You will note that the objects are identified as either dynamic or static. Dynamic objects interact with the PLC controller; static objects do not.

See Chapter 10, *The Objects*, for complete details on all objects. Chapter 7, *Information and Alarm Windows*, describes the windows. Chapter 9, *PLC Controlled Options*, describes the options that can be controlled from the PLC controller.

**Table 1.A**  
**PanelView Objects**

Object	Terminal	Type
Momentary Push Button (Normally Open)	Both	Dynamic
Momentary Push Button (Normally Closed)	Both	Dynamic
Latched Input Push Button	Both	Dynamic
Maintained Push Button	Both	Dynamic
Interlocked Push Button	Both	Dynamic
Control List Selector with Enter	Both	Dynamic
Control List Selector without Enter	Both	Dynamic
Go To Screen Button	Both	Static
Return to Previous Screen Button	Both	Static
Screen List Selector	Both	Static
Multi-State Indicator	Both	Dynamic
List Indicator	Both	Dynamic
Set Value Button	Both	Dynamic
Increment Value Button	Both	Dynamic
Decrement Value Button	Both	Dynamic
Numeric Data Display	Both	Dynamic
Text	Both	Static
Line	Both	Static
Box	Both	Static
Arc	Both	Static
ISA Symbol	Both	Dynamic
Bar Graphs (vertical or horizontal)	Both	Dynamic
Time Display	Both	Dynamic
Date Display	Both	Dynamic
Screen Print Button	Both	Static
Local Message Display	Both	Dynamic
ASCII Display	Both	Dynamic
ASCII Input	Both	Dynamic
Numeric Input Cursor Point	Keypad	Dynamic
Numeric Keypad-Enable Button	Keypad	Dynamic
Screen Keypad-Enable Button	Keypad	Static
Set Bit Cursor Point	Keypad	Dynamic
Keypad Screen Selector	Touch Screen	Static
Numeric Keypad	Touch Screen	Dynamic
Scrolling List Object	Both	Dynamic

#### Objects Common to All PanelView Terminals

The following objects can be displayed on both the Keypad terminal and the Touch Screen terminal:

- **Momentary Push Button (Normally Open)** turns on (sets to 1) a PLC input control bit, as long as the button is held.
- **Momentary Push Button (Normally Closed)** resets a PLC input control bit that is normally set to 1. This bit stays off as long as the button is pressed.
- **Latched Input Push Button** turns on a PLC input control bit and holds the bit on until the PanelView terminal sees a PLC output bit (handshake bit) turn on.
- **Maintained Push Button** turns on a specific PLC input control bit until the button is pressed a second time.
- **Interlocked Push Buttons** are several push buttons which function as a group. When you press one of the buttons, it cancels the other buttons and makes the selection. The PLC controller is informed—via a common PLC input address—which button in the group is the currently selected option.
- **Control List Selector with Enter** contains a vertical list of operator choices. An operator can use the object's **Up Cursor** and **Down Cursor** buttons to move an arrow through the available selections. The selection is only sent to the PLC controller when the **Enter** button is pressed.
- **Control List Selector without Enter** contains a vertical list of choices. The operator uses the object's **Up Cursor** and **Down Cursor** buttons to move through the available selections. The current selection is automatically sent to the PLC controller via the object's PLC input control address.
- **Go To Screen Button** allows the operator to switch to an assigned screen.
- **Return to Previous Screen Button** switches back to the previous screen.
- **Screen List Selector** allows an operator to choose a screen from a list.
- **Multi-State Indicator** is a display area with up to sixteen different display states, each with a unique combination of text, colors and attributes. The value in the PLC address determines which state is displayed.

- **List Indicator** displays a list of PLC states and highlights the current state. The value of the PLC address determines the item that will be highlighted in the list.
- **Set Value Button** transfers a pre-defined value to the PLC controller via the assigned PLC input address.
- **Increment Value Button** increases the PLC input value each time the button is pushed. If the button is held down the PLC input value continues to increase to a pre-assigned upper limit.
- **Decrement Value Button** decreases the value stored at a PLC input address each time the button is pushed. If the button is held down the PLC value continues to decrease to a pre-assigned bottom limit.
- **Numeric Data Display** displays the current value of an assigned PLC address (binary, BCD, or integer). Scaling ( $Y=Mx+b$ ) and other options can be used to display the number in appropriate units.
- **Text** is used for screen titles, to provide instructions, or for any text that is not bound to an object.
- **Lines** (Horizontal, vertical and diagonal) are used to illustrate, and to separate sections of screens.
- **Boxes** are graphic objects like lines, which can surround other objects or simply illustrate.
- **Arcs** are used to illustrate quarter, semi, and three quarter circles, as well as circles. They can also be used to connect line objects to form rounded corners.
- **ISA Symbols** (32 in total) allow you to assign display attributes to four possible states for each symbol object. The symbols have two sizes: large and small. See Appendix D, *ISA Symbols*, for symbol illustrations.
- **Bar Graphs** can be used to monitor changing conditions, such as temperature or fluid levels. Each graph can be up to 80 characters wide and 24 characters high.
- **Time Display** can be located anywhere on the screen.
- **Date Display** can be located anywhere on the screen.
- **Screen Print Button** allows an operator to print any screen currently displayed on the PanelView terminal.

- **Local Message Display** can be defined as a rectangular area of any size, and placed in any location on the PanelView screen. A PLC control address is assigned to the object, allowing the PLC controller to trigger any one of up to 875 local messages to appear in this area.
- **ASCII Display** is used to display a character string, sent from the PLC controller, directly on the PanelView terminal. The display is updated whenever the string changes.
- **ASCII Input** objects are on-screen keyboards which allow you to create a text string and send it to the PLC controller.
- **Scrolling List** object is an extended and enhanced control list selector/list indicator that is not limited by the number of lines on the screen. The Scrolling List object can consist of any combination of local message display, multi-state indicator, and numeric display lists, with up to 999 items in each list. The Scrolling List object reduces PLC ladder logic and addressing typically needed to display and edit large amounts of data.

The Scrolling List object can be used to control and monitor sequential operations in both auto and manual modes or to provide operators with a selection list.

### Objects for the Keypad Terminal

The following objects can be displayed only on a Keypad terminal:

- **Numeric Input Cursor Point** consists of a numeric display and a cursor character. This object can be used to enter numbers into an array of numeric fields similar to an array of thumb-wheel switches on a control panel. This object has an associated PLC input address in which the value is communicated to the PLC controller.
- **Numeric Keypad-Enable Button** pops up the Numeric Entry Scratchpad in which the operator can enter a number. The number is then stored in the specified PLC input address.
- **Screen Keypad-Enable Button** pops up the Numeric Entry Scratchpad in which the operator can enter a screen number. The screen with that number is displayed.
- **Set Bit Cursor Point** consists of a bit and a cursor character. This object is used to “point” to a screen character. Several set bit cursor points can be in the same screen. Each one can have a different (user defined) pointer; only the current pointer is visible and blinking. The current cursor point’s input bit is always on, so the PLC controller always “knows” the current selection.

Both the set bit and numeric input cursor points can be used on the same screen.

## **Objects for the Touch Screen Terminal**

The following objects can be displayed only on a Touch Screen terminal:

- **Numeric Keypad** is used to send a value to the PLC controller. A unique PLC input address is assigned to each Numeric Keypad; the value that the operator enters is stored at this address. The keypad is available in large and small sizes.
- **Keypad Screen Selector** allows an operator to display a screen by entering the screen number. The selector is available in large and small sizes.

## **Information and Alarm Windows**

The Information and Alarm Windows can pop up on the screen at any time to display important information:

- **Information Window** displays a message when triggered by the PLC controller. The window remains until the operator presses the **Clear/ACK** button, or until the PLC controller clears it. There can be as many as 496 different messages for the Information Window.
- **Alarm Window** is similar to the Information Window but with many additional features. Each message can be configured to sound the audio indicator (beeper), trip the alarm relay or print a message on a printer.

Alarms are time and date stamped and listed in the order they occur. The operator can acknowledge the alarm, clear the display, silence the alarm, view the Alarm History Screen, or view the Alarm Status Screen. There can be as many as 496 different messages for the Alarm Window.

## **Summary of PLC Controlled Options**

The following options can be controlled by the PLC controller:

- **PLC Controlled Audio** allows the PLC controller to control the PanelView terminal's audio beeper. A PLC bit address is assigned; when the PLC controller sets this bit, the terminal's beeper is activated. This does not interfere with the Alarm Window's use of the beeper.
- **PLC Controlled Alarm Relay** allows the PLC controller to control the PanelView terminal's alarm relay. A PLC bit address is assigned, and when the PLC controller sets this bit, the terminal's alarm relay is energized. This does not interfere with the Alarm Window's use of the relay.



- **PLC Controlled Alarm Quantity/Accum Time Reset** allows the PLC controller to reset the alarm count and the accumulated time in-alarm total. These totals are shown in the Alarm Status screen.
- **PLC Controlled Screen Number** allows the PLC controller to control which screen is displayed. When the PLC controller puts a screen number in an assigned address, PanelView displays the screen. This PLC controlled screen change always has precedence over operator-controlled screen changes, and operator-generated screen changes are only allowed if the PLC address contains 0.
- **PLC Controlled Screen Print** allows the PLC controller to trigger a printout of the screen displayed on the PanelView terminal.
- **PLC Controlled Time and Date** allows the PanelView terminal to read the time and date from the PLC controller and set its internal clock.
- **PLC Controlled Clear Window** clears the alarm window, the alarm beeper and the alarm relay when a 0 to 1 transition is detected in the assigned PLC address bit.
- **PLC Controlled Silence Alarms** silences the beeper and deactivates the alarm relay when a 0 to 1 transition is detected on this bit.

### Applicable Programmable Controllers and Connections

PanelView terminals can be connected to any Allen-Bradley 1771 Remote I/O Link. Applicable host controllers include almost all Allen-Bradley Programmable Logic Controllers as well as certain IBM computers, VME Controllers, and the DEC Q-Bus interface.

Newly released Allen-Bradley programmable controllers that are not yet listed will support PanelView terminals, as long as they support the 1771 remote I/O link.

The PanelView terminal appears as one or more I/O rack(s) to a programmable controller. It has the same configurability—and more—as a standard I/O rack. Refer to your applicable Allen-Bradley Programmable Controller and Remote I/O Scanner user's manuals for various connection and remote I/O configuration limitations. Chapter 4, *Planning Your Application*, describes how to determine rack numbers, sizes, etc.

### **PLC-5/11, 5/15, 5/20, 5/25, 5/30, 5/40, 5/60 and 5/250 Processors**

You can connect one or more PanelView terminals directly to a PLC-5 Remote I/O Port (in Scanner Mode) along with other I/O racks. If the PLC-5 Remote I/O Port is used in the adapter mode, one or more PanelView terminals can be connected to that PLC-5 along with other I/O racks via a 1771-SN I/O Subscanner Module.

All Series C Rev A and later terminals can communicate at 230.4K baud with any PLC-5 capable of supporting that baud rate.

If you are using a PLC-5/15 with partial rack addressing and block transfers, you must use PLC-5/15 series B, revision J or later.

**Table 1.B**  
**Rack Address Ranges of the PLC-5 Family**

PLC-5/11	Rack 3 only
PLC-5/15	1-3 (octal)
PLC-5/20	1-3 (octal)
PLC-5/25	1-7 (octal)
PLC-5/30	1-7 (octal)
PLC-5/40	1-17 (octal)
PLC-5/60	1-27 (octal)
PLC-5/250	0-37 (octal)

### **PLC-5/10 Processor**

One or more PanelView terminals can be connected to this processor along with other I/O racks via the 1771-SN I/O Subscanner Module.

### **PLC-3 and PLC-3/10 Processors**

One or more PanelView terminals can be connected directly to a PLC-3 or PLC-3/10 remote I/O Scanner along with other I/O racks.

If you are using a 1775-S4A Remote Scanner /Distribution panel, you must use Series B or higher.

## **PLC-2 Family Processors via 1771-SN or 1772-SD2**

This includes the PLC-2/05, 2/15, 2/30, 2/40, etc. One or more PanelView terminals can be connected to these processors along with other I/O racks via the 1771-SN I/O Subscanner Module.

If you are using a 1772-SD2 Scanner /Distribution panel, you must use revision 3 or later.

## **SLC 5/02 via 1747-SN**

One or more PanelViews can be connected to the 1747-SN I/O Subscanner Module (SLC 500 RIO connection) for the SLC 5/02 processor. Each module provides an additional remote I/O link for the host programmable controller. The rack range of the 1747-SN is 0 to 3.

**IMPORTANT:** With the SLC 5/02 and 1747-SN module, no block transfers are possible.

## **1771-SN I/O Subscanner Module**

One or more 1771-SN I/O Subscanner Modules can be installed in any standard Allen-Bradley 1771 I/O rack. Each module provides an additional remote I/O link for the host programmable controller. One or more PanelView terminals can be connected to any of the previously mentioned processors along with other I/O racks via a 1771-SN I/O Subscanner Module. Refer to the *1771-SN Sub I/O Scanner Module Data Sheet* for specific details.

## **6008-SI IBM PC I/O Scanner**

This module can be installed in an IBM PC or compatible computer to provide the computer with an Allen-Bradley 1771 Remote I/O Link. You can then connect Allen-Bradley Remote I/O racks and devices such as the PanelView terminal to this computer.

## **6008-SV VME I/O Scanner**

This module can be installed in a VME backplane, providing the VME controller with an Allen-Bradley 1771 Remote I/O Link. Allen-Bradley Remote I/O racks and devices such as the PanelView terminal can then be connected to this VME controller.

### **6008-SQ DEC Q-BUS I/O Scanner**

This module can be installed into a DEC™ Q-Bus™ controller to provide it with an Allen-Bradley 1771 Remote I/O Link. Allen-Bradley Remote I/O racks and devices such as the PanelView terminal can then be connected to this controller.

## Installing PanelBuilder

This chapter includes information on:

- PanelBuilder's hardware and software requirements
- how to install and start up PanelBuilder
- the compatibility of older versions of PanelView terminals with applications created by the current release of PanelBuilder

### Software Requirements

PanelBuilder requires DOS 3.0 or above.

### Hardware Requirements

PanelBuilder Development Software requires one of the following computers:

- Allen-Bradley 1784 series industrial terminals and laptop computers
- Allen-Bradley 6120 series industrial computers and 6160 series industrial workstations
- IBM XT<sup>™</sup>, AT<sup>™</sup>, PS/2<sup>™</sup> or 100% compatible

In addition your system must have:

- one of the following video adapters and appropriate monitors:
  - Standard Monochrome Adapter
  - Hercules<sup>™</sup> Graphics Card
  - Color Graphics Adapter (CGA<sup>™</sup>)
  - Enhanced Graphics Adapter (EGA<sup>™</sup>)
  - Video Graphics Array (VGA<sup>™</sup>)

Screens for all terminals can be created using either a monochrome or color monitor.

- at least 640K of RAM
- a floppy drive capable of reading the disks

- a hard disk with at least 1.55Mb free space
- an RS-232 Serial Port: this port is required to upload and download application files to and from your PanelView terminal
- an Upload/Download cable: this cable connects the development computer's RS-232 port to the PanelView terminal's RS-232 port

### PanelBuilder Files

The original PanelBuilder Development Software disks are *not* for running the software. The floppy disks contain data-compacted, non-executable files. The INSTALL procedure converts these files into executable form so that PanelBuilder can run. The files can then be copied using standard DOS commands.

Some of these files are for demonstration use and can be erased.

**Table 2.A**  
**PanelBuilder Files**

Filename	Description	Status
PDS.EXE	PanelBuilder Development Software	Essential
PDS.HLP	PanelBuilder Help File	Essential
KC-DEMO.CFG	Color Keypad demo program for PLC-5/15	Demo
TC-DEMO.CFG	Color Touch Screen demo program for PLC-5/15	Demo
KCSLCDEM.CFG	Color Keypad demo program for SLC 5/02	Demo
TCSLCDEM.CFG	Color Touch Screen demo program for SLC 5/02	Demo
2711.B0\$	Rung comment, instruction comment, address comment and symbol files for PLC-5	Demo
2711.B1\$		
2711.IX\$		
2711.LX\$		
2711.OP\$		
2711.PC\$		
2711.AC\$		
2711.CON		

Filename	Description	Status
PVSLCDEM.AC\$	APS rung comment, instruction comment, address comment and symbol files for SLC 5/02	Demo
PVSLCDEM.B0\$		
PVSLCDEM.B1\$		
PVSLCDEM.IX\$		
PVSLCDEM.LX\$		
PVSLCDEM.OP\$		
PVSLCDEM.PC\$		
2711.AF5	Offline format of PLC-5 processor memory (also known as an archive file)	Demo
2711.D1\$		
2711.P1\$		
2711.LOG	Import/Export log file of PLC-5	Demo
PVSLCDEM.ACH	SLC 5/02 ladder program for use with demo	Demo
PVSLCDEM.LIS	SLC 5/02 program listing report	Demo
PVSLCDEM.NAM	SLC 5/02 ladder file names	Demo
PVSLCDEM.PCR	SLC 5/02 Processor Configuration Report	Demo

### Remote I/O Pass-Through Utility

The Remote I/O Pass-Through Utility disk is now provided with the PanelBuilder Development Software disk set. You must install the Remote I/O Pass-Through Utility to upload and download application files via the Data Highway + and Remote I/O networks.

To install the Remote I/O Pass-Through Utility, place the disk labeled Remote I/O Pass-Through Utility in a floppy drive, and at the DOS prompt, type:

**install** press *Enter*

For information on uploading and downloading via pass-through, refer to Chapter 6, *File Operations*, in the PanelBuilder Development Software User Manual.

### The DEFAULTS File

A DEFAULTS file is created when you first run PanelBuilder. The file contains the default parameters for the mouse; the ports; the data file directory; the display colors for PanelBuilder menus; and for all touch screen and function key objects.

If your system contains a default file from an earlier version of PanelBuilder, the file will be converted to version 5 format, and your previously configured defaults will apply to the new installation. A copy of the original file will be renamed as `DEFAULT.nnn`, where *nnn* is the previous version number. (A defaults file from version 2.0 of PanelBuilder, for example, would be renamed and saved as `DEFAULTS.200`.)

### Installing PanelBuilder on a Hard Disk

PanelBuilder Development Software is distributed on floppy disks. Before installing PanelBuilder, make a backup copy of the original software. Store the original software in a safe place and install PanelBuilder from the copy.

The software installation program creates a disk directory for PanelBuilder and copies all the necessary files. By default, the directory is `\PDS` on drive C.

---

#### Example: Installing PanelBuilder in the `\PDS` directory on Drive C

Insert the (first) PanelBuilder Development Software disk in drive A and switch to drive A. Type:

**A:** *press Enter*

To run the installation program, type:

**install** *press Enter*

Follow the instructions on the screen. If you wish to install the software in some other directory or drive, you can change the drive and the pathname when prompted by the installation program.

---

### Starting PanelBuilder

Follow these steps to start PanelBuilder:

1. Turn on the computer; if you are prompted, enter the time and date.
2. If the directory path isn't specified, change to the PDS directory. If you followed the `INSTALL` example, PanelBuilder is on the C drive.

Type:

**C:** *press Enter*

**CD PDS** *press Enter*



- To start the program type:

**PDS** press *Enter*

## Version Compatibility

PanelBuilder Development Software has been upgraded four times: in version 2, version 3, version 4 and now version 5.

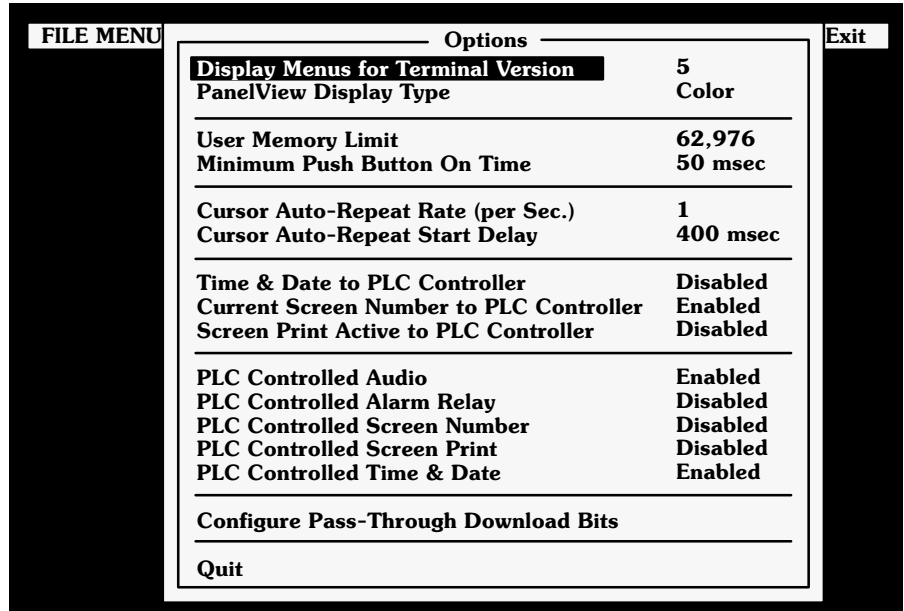
As long as only the original objects and original features are used, your application file will run on all PanelView terminals. If version 2 objects are used in your application, the application will run on version 2, 3, 4 and 5 terminals, but not on version 1 terminals. If version 3 objects are used in your application, it will run only on version 3, 4 and 5 terminals. Version 4 objects run on version 4 and 5 terminals. Enabling any of the new objects in version 5 will make your application compatible with version 5 terminals only.

**Table 2.B**  
**Firmware Version Required for Objects and Features**

These features require Version 2 firmware:	These features require Version 3 firmware:	These features require Version 4 firmware:	These features require Version 5 firmware:
Arc	Extended Memory (via user EEPROM)	Optional User EPROM/EEPROM Power-Up Test	Scrolling List object
Diagonal Line	Pass-Through Upload/Download	PLC Time and Date	Maximum of 875 Local Messages
ASCII Display	Maintained Alarm Data	Printer Form-Feed Control	Alarm Status Reset Time/Date Stamp
Alarm Status Screen	Enhancements including up to 496 Alarm Messages	Improved Numeric Input Cursor Point object	Terminal Pass-Through Configuration
Background Alarming	Alarm Messages longer than 36 characters	Screen Print Active feature	
Screen Printing	Single Line Alarm Window	Acknowledge Alarm Indication	
Auto-Repeat feature	230k Baud Rate: Series C Revision A and later terminals	Acknowledge Information Message Indication	
Alarm History Screen number other than 255	Block Transfer File 5 added	ASCII Input object	
Remote Clear/Silence of Alarm Window	Control List Selector Enhancement	Maximum of 255 objects on screen	
Touch Screen Numeric Keypad Enter Bit	Security Access Code Improvement		

For a new application, the Version 5.0 PanelBuilder menus will default to Version 5.0 features. See [PanelBuilder User's Guide](#) for modifying PanelBuilder menus.

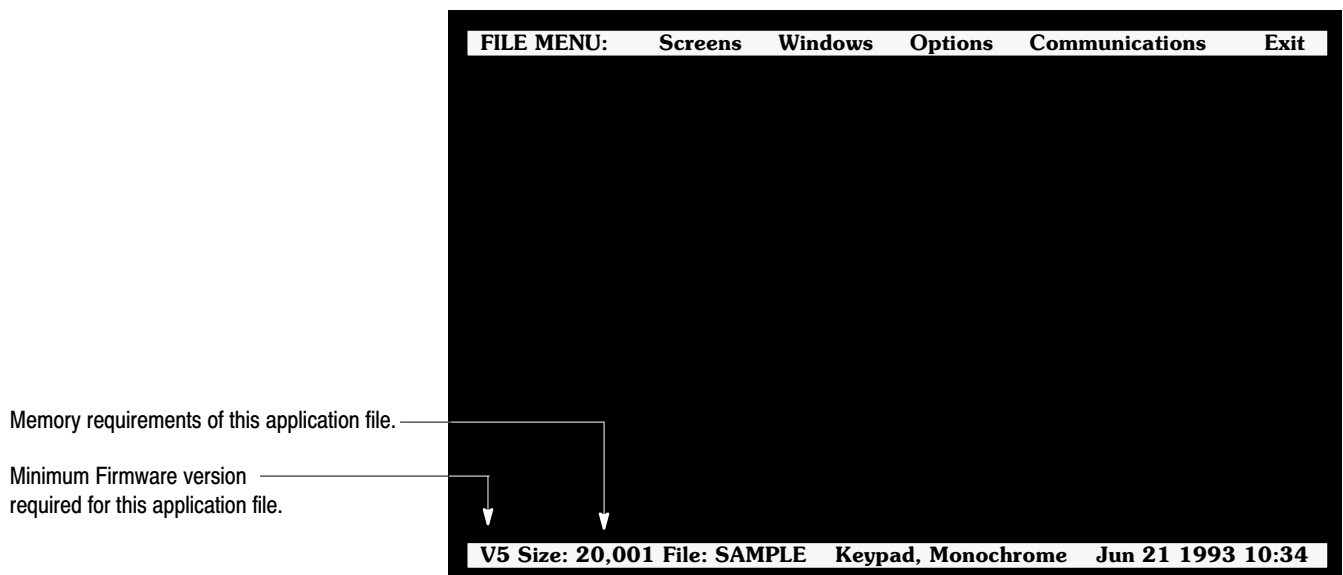
**Figure 2.1**  
Setting the Version for PanelBuilder Menus to Version 5.0



23020

When you're developing an application file, PanelBuilder displays the lowest level of compatibility for the application, at the left of the status line.

**Figure 2.2**  
Version Compatibility and Memory Requirements of the Application File



23137

**Table 2.C**  
**Version Compatibility**

A Compatibility Level of:	Runs on firmware releases:
1	1,2,3,4,5
2	2,3,4,5
3	3,4,5
4	4,5
5	5

Whenever you add or edit an object or enable or disable a feature in a way that affects the file's compatibility with various terminals, a message will appear to inform you of the change.

### PanelView Default Settings

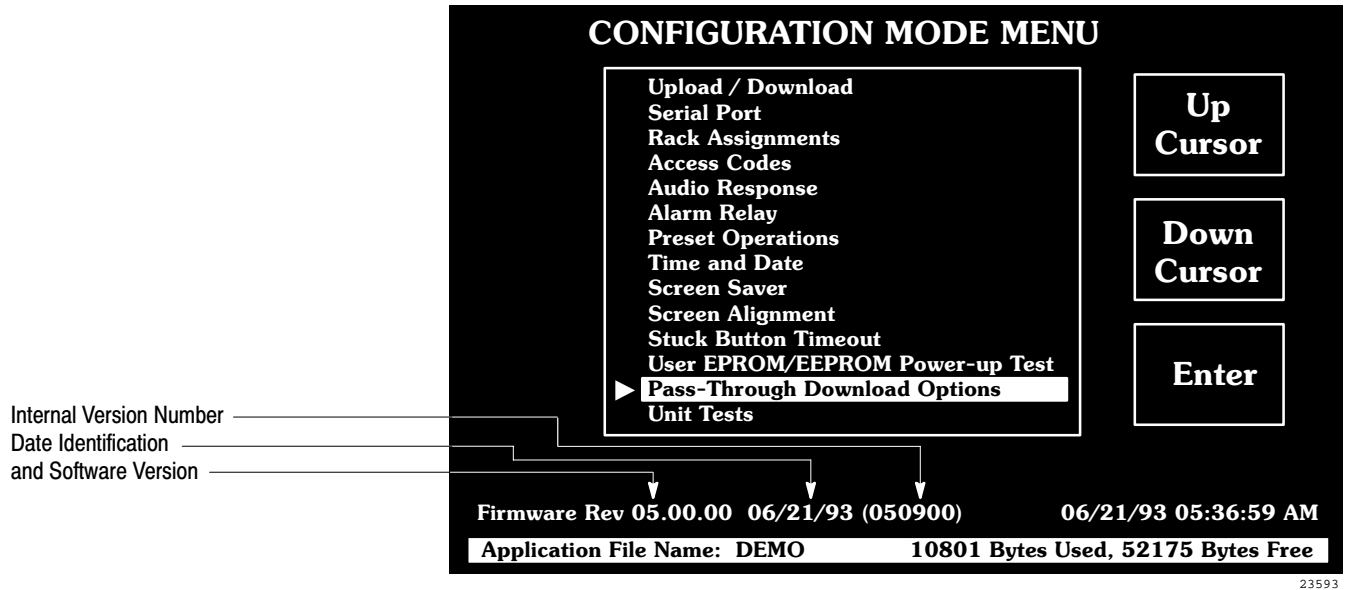
In the unlikely event that version 1 firmware EPROMs are re-installed after a terminal has been run with version 2, 3, 4 or 5 firmware EPROMs, the following default settings will be lost:

- serial port settings
- access codes
- audio response
- alarm relay
- preset operations
- screen saver
- stuck button timeout
- screen alignment
- pass-through configuration

### Verifying the PanelView Firmware Version

The firmware version is displayed on the PanelView terminal Configuration Mode Menu screen along with the date of release, internal version number and the current time and date.

**Figure 2.3**  
**The PanelView Firmware Version Number**



In Figure 2.3 the Firmware Rev. 05.00.00 indicates version 5. Version 1 firmware is shown as 01.xx.xx., version 2 as 02.xx.xx, version 3 as 03.xx.xx and version 4 as 04.xx.xx.

## Compatibility Reports

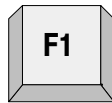
PanelBuilder can print a report listing all objects and global functions in an application file. The report lists all screens and all objects used in a file. More important for those with older terminals, the object listing shows the version of firmware that is required for each object. With this report, you can identify which objects must be removed or modified to make an application file compatible with older terminals.

For details on how to print reports, see Chapter 6, *File Operations*.

## Using PanelBuilder

This chapter describes the basics of PanelBuilder including how to get help and how to use the menus and the keyboard.

### Getting Help



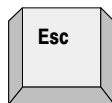
Press **F1** to display a help screen relevant to the screen or object you're working on.

### The Keyboard

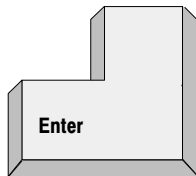
Certain keys are used to move through menus, enter data, or work with objects on a screen. This section illustrates these keys and describes their functions within the PanelBuilder software.

#### Menu Keys

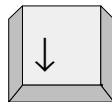
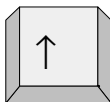
The menu keys help you move quickly through the menus and the options they provide.



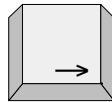
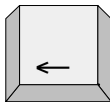
The **Escape** key closes an open menu.



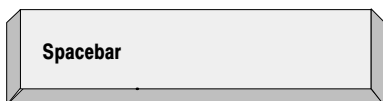
The **Enter** key chooses the highlighted option.



The **Up** and **Down** arrow keys move upward and downward through the menu options. The **Down** arrow also opens a menu.



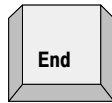
The **Left** and **Right** arrow keys move horizontally through a selection of menus. These keys also close a menu and open the next one to the right or the left.



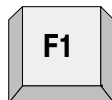
The **space bar** moves horizontally through a selection of menus, or vertically through the options of a single menu.



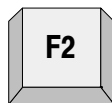
The **Home** key moves to the first item in a menu or selection.



The **End** key moves to the last item in a menu.



The **F1** key displays the Help Screen.



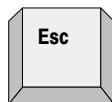
The **F2** key toggles the bottom status line on and off.

### **A Shortcut**

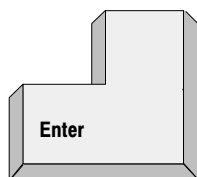
In most menus, typing the first letter of an option's name highlights that option and opens that option's window.

### **Data Entry Keys**

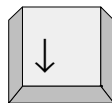
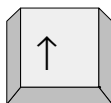
Data is entered by choosing an item from a list or by typing in the required information. Use the following keys when entering data.



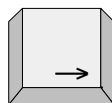
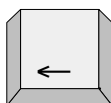
The **Escape** key cancels the entry without saving the information.



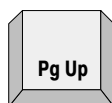
The **Enter** key saves information once it is entered or chosen.



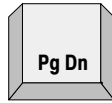
The **Up** and **Down** arrows move through a list of choices.



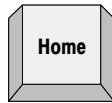
The **Left** and **Right** arrows move the cursor through typed information, for editing.



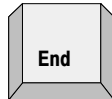
**Pg Up** moves several items upwards in a list or menu.



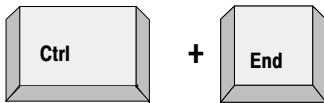
**Pg Dn** moves several items downwards in a list or menu.



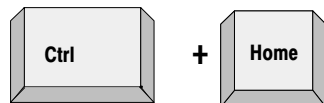
**Home** moves the cursor to the top of a list or to the beginning of a data entry field.



**End** moves the cursor to the bottom of a list, or to the end of a data entry field.



**Ctrl-End** clears from the cursor to the end of a data entry field.



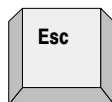
**Ctrl-Home** clears a data entry field.



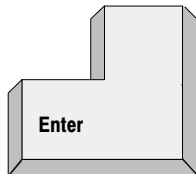
**Insert** toggles between insert and over-strike modes in a data entry field.

### Keys for Editing Objects and Lines

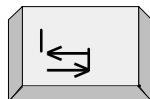
The following keys are used to edit objects or lines on the screen.



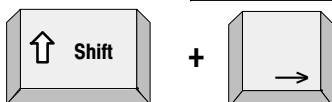
**Escape** cancels the current operation and returns to the menu.

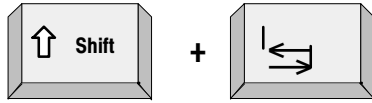


**Enter** finishes and saves the current operation and returns to the menu.

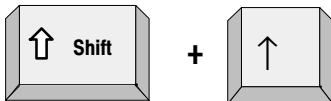
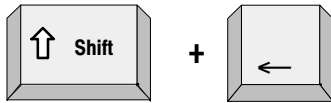


**Tab** or **Shift Right** moves the cursor, or the object, eight columns to the right.

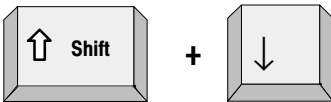




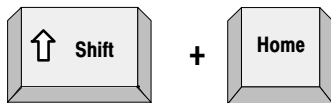
**Shift Tab** or **Shift Left** moves the object, or cursor, eight columns to the left.



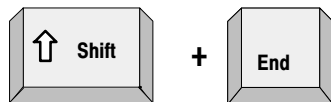
**Shift Up** moves the object, or cursor, two rows up.



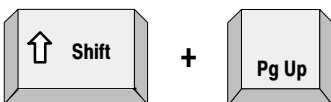
**Shift Down** moves the object, or cursor, two rows down.



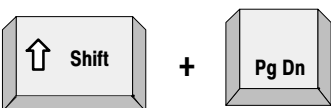
**Shift Home** moves the object or cursor diagonally two rows up and eight columns to the left.



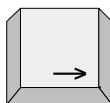
**Shift End** moves the object or cursor diagonally two rows down and eight columns to the left.



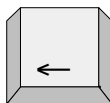
**Shift Pg Up** moves the object or cursor diagonally two rows up and eight columns to the right.



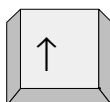
**Shift Pg Dn** moves the object or cursor two rows down and eight columns to the right.



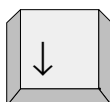
The **Right** arrow key moves the cursor, or the object, to the right. It also draws or erases a horizontal line segment to the right. If you are setting the size of an object, the **Right** arrow makes it larger.



The **Left** arrow key moves the cursor, or the object, to the left. It also draws and erases a horizontal line segment to the left. If you are setting the size of an object, the **Left** arrow makes it smaller.

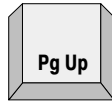


The **Up** arrow moves the cursor or object upwards. It also draws or erases a vertical line segment upwards. If you are setting the size of an object, pressing the **Up** arrow makes it smaller.



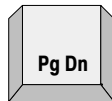
The **Down** arrow moves the cursor, or the object, downwards. It also draws or erases a vertical line segment downwards. If you are setting the size of an object, pressing the **Down** arrow makes it larger.





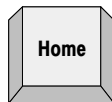
**Pg Up** moves the cursor or object diagonally up and to the right. If you are sizing an object, this key will increase the width and decrease the height of the object.

**Pg Up** also draws or erases a diagonal line segment up and to the right.



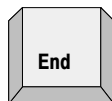
**Pg Down** moves the object, or cursor, diagonally down and to the right. If you are sizing an object, this key increases the width and height of the object.

**Pg Down** also draws or erases a diagonal line segment down and to the right.



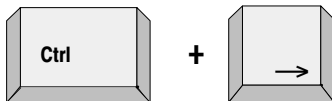
**Home** moves the object or cursor diagonally up and to the left. If you are sizing an object, this key decreases the width and height of the object.

The **Home** key also draws and erases a diagonal line segment up and to the left.

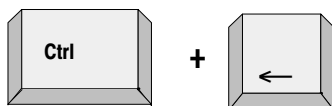


**End** moves the object or cursor diagonally down and to the left. If you are sizing an object, the **End** key decreases the object's width and increases its height.

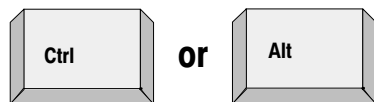
The **End** key also draws and erases a diagonal line segment down and to the left.



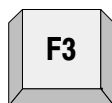
**Ctrl Right** moves the cursor to the next text string when editing display text.



**Ctrl Left** moves the cursor to the previous text string when editing display text.



Press the **Ctrl** or the **Alt** key to use the alternate character set for typing object text. The set is illustrated in Appendix E, *The Extended Character Set*.

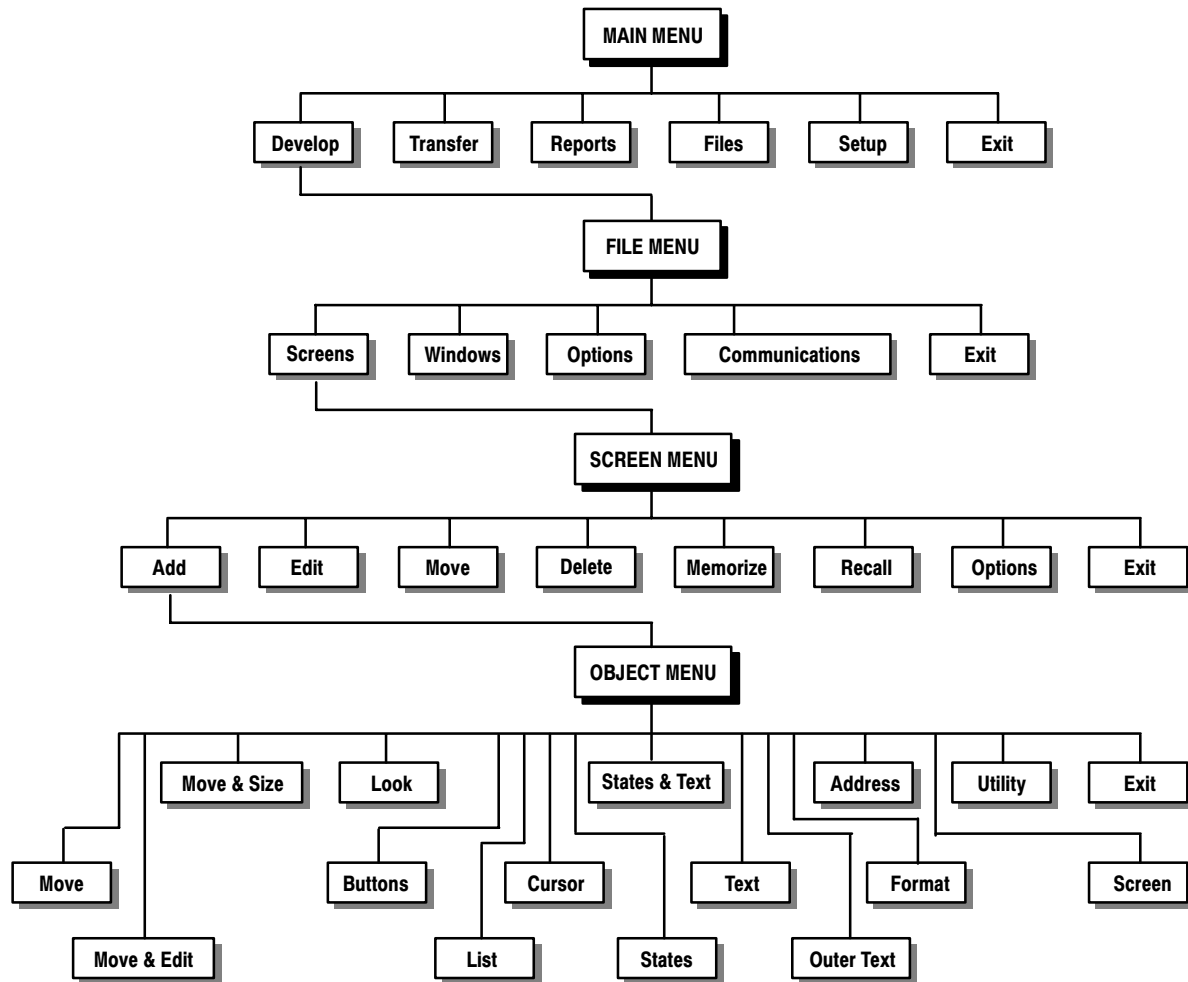


The **F3** key identifies the object being edited by causing it to blink.

## PanelBuilder Menu Structure

Figure 3.1 provides a guide for the menu structure of PanelBuilder Development Software. Note that the Object Menu, at the bottom, shows 16 different items; in actual use, you will never see all of the items at once. The contents of the Object menu change depending on the object being edited.

**Figure 3.1**  
**PanelBuilder Menu Structure**



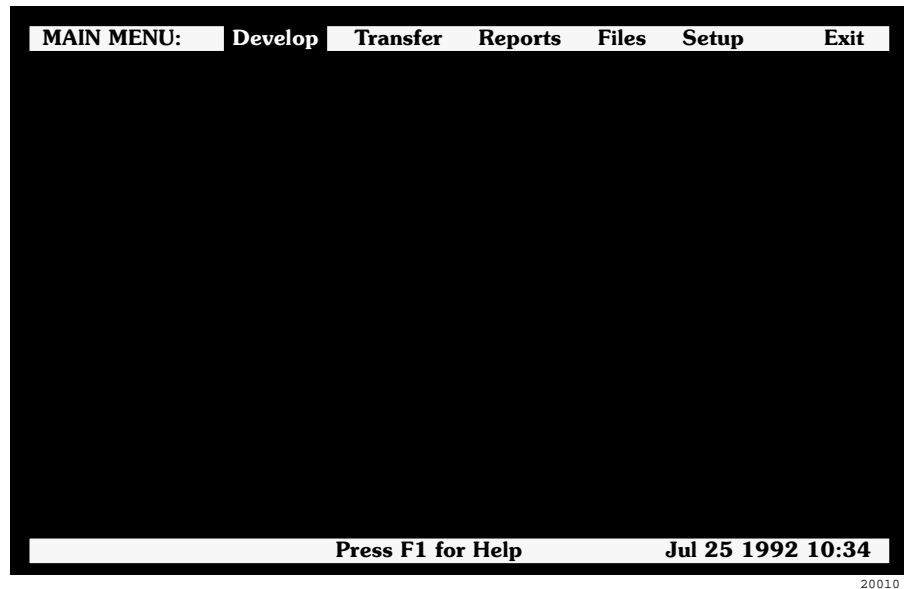
20235

## The Main Menu

The Main menu is the first menu displayed when PanelBuilder starts up, and the last one displayed before shut-down. It contains the menus that allow you to create, edit and manipulate application files. The Main menu also allows you to send or receive application files to or from the PanelView terminal, print reports on application screens, and set the software for the creation of screens.

To open the Main menu, press any key when the Introduction Screen is displayed.

**Figure 3.2**  
**The Main Menu**



20010

### The Develop Menu

To open the Develop menu, highlight *Develop* and press **Enter**. Use this menu to create new application files, or to edit existing ones.

**Figure 3.3**  
**The Develop Menu**



20011

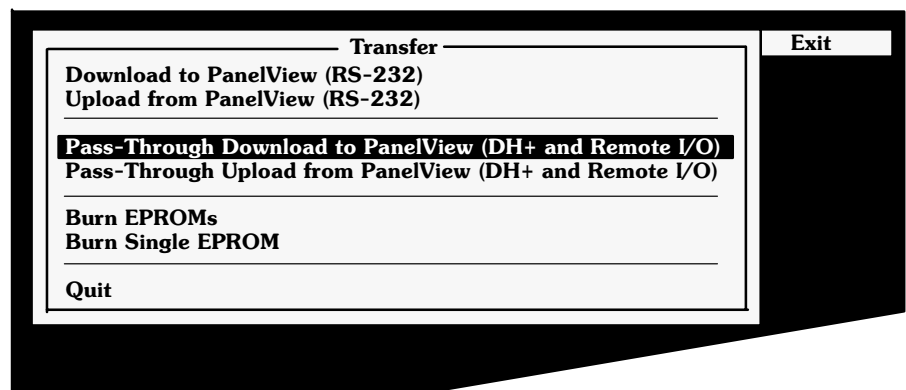
- **Select File** displays a list of application files which can be loaded and edited.

- **Create New File** allows you to make a new application file. After you choose this option, type in a name for the new file and press **Enter**. You'll be asked if the file is for a Touch Screen or Keypad terminal. Choose one or the other, and a new application file will be created.
- **Directory** shows the current directory setting. Type in a different disk or directory name to change the directory for loading or saving application files.

### The Transfer Menu

Choose *Transfer* from the Main menu, to open the Transfer menu. Use this menu to send and receive application files to and from the PanelView terminal.

**Figure 3.4**  
**The Transfer Menu**



22013

- **Download to PanelView Terminal (RS-232)** sends a finished application file to a terminal. The process involves the following steps:
  1. Choose the file you want to send.
  2. Establish the communications port.
  3. Send the file.
- **Upload from PanelView Terminal (RS-232)** retrieves an application file from a PanelView terminal for editing.
- **Pass-Through Download to PanelView (DH+ and Remote I/O)** allows you to download PanelView files via a PLC-5 on a Data Highway+ and remote I/O network. Before trying a pass-through download or upload, refer to Chapter 6, *File Operations*.

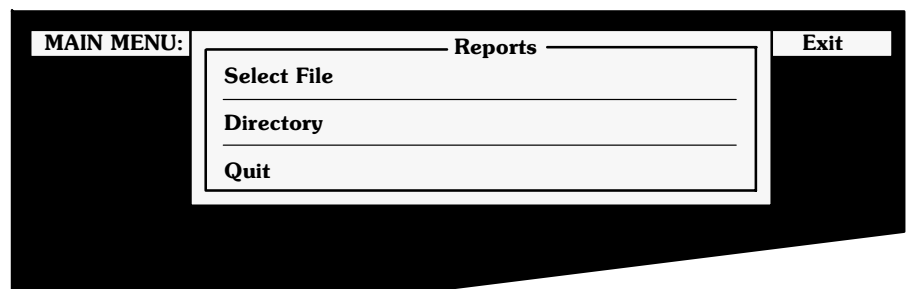
- **Pass-Through Upload from PanelView (DH+ and Remote I/O)** allows you to upload PanelView files via a PLC-5 on a Data Highway+ and Remote I/O network. For more information on pass-through download or upload, refer to Chapter 6, *File Operations*.
- **Burn EPROMs** allows an application file to be copied into EPROMs for installation onto a PanelView terminal. Before burning EPROMs, refer to Chapter 6, *File Operations*.
- **Burn Single EPROM** allows an application file to be burned into a single EPROM for use with Series D or E terminals. This option must also be used for upgraded older terminals with logic boards accepting only one EPROM.

### The Reports Menu

Choose *Reports* from the Main menu and the Reports menu appears. Use this menu to generate printed reports of application files you have created.

For more information on reports and how to print them, see Chapter 6, *File Operations*.

**Figure 3.5**  
**The Reports Menu**

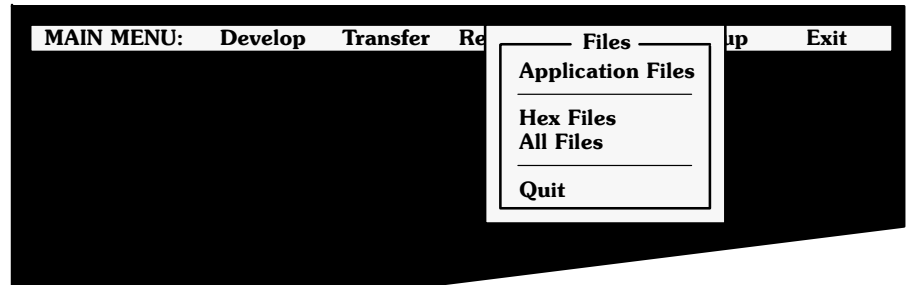


- **Select File** presents a list of application files. Choosing any one will open other menus where you can choose the types of reports you wish to print, and choose a printer port.
- **Directory** changes the directory setting, allowing you to locate files for printing.

### The Files Menu

Choose *Files* from the Main menu to open the Files menu. Use this menu to copy, erase, rename, and move files to different disk directories.

**Figure 3.6**  
**The Files Menu**



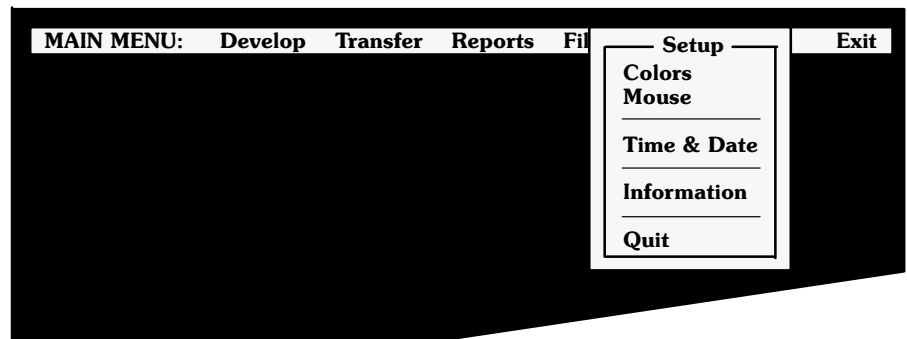
20014

- **Application Files** opens a menu that allows you to copy, erase and rename application files.
- **Hex Files** opens a menu that allows you to copy, delete and rename hex files. (Hex files are application files in Intel hex format—the format for burning into EPROMs).
- **All Files** provides the same options for DOS files as those provided in Application and Hex Files.

### The Setup Menu

Choose *Setup* from the Main menu to open the Setup menu. Use this menu to set various attributes for the PanelBuilder software, including the color of PanelBuilder's menus and text, and the time and date.

**Figure 3.7**  
**The Setup Menu**



20015

- **Colors** permits you to choose the default palette of colors, or select your own colors for the menus, data fields, etc., that will appear in PanelBuilder during screen development.

- **Mouse** allows you to use a mouse in PanelBuilder. A variety of serial and bus mouse packages are available commercially, including software drivers that emulate the functions of the arrow keys and **Enter**.

To use a mouse, you must install the driver and configure it to output the cursor key codes when the mouse is moved. Similarly, the codes for the **Enter** key and the **Esc** key must be assigned to two of the mouse's buttons. Refer to the mouse's documentation for details.

Choosing **Mouse** allows you to adjust the “damping factors”—the amount of mouse movement required to move the screen cursor. Keep in mind the following points:

- a lower number moves the cursor further with the same mouse movement
- with a bus mouse the damping factors may have to be set much higher than the default settings
- settings that are too high or too low may cause undesirable operation

**IMPORTANT:** Allen-Bradley does not provide mouse driver software for PanelBuilder. Ensure that the mouse package you purchase includes driver software that allows the mouse to emulate the arrow, **Enter**, and **Esc** keys. To use the cursor keys on the keyboard, the mouse option must be disabled.

For information on how to interface the following mouse packages, ask your Allen-Bradley representative for a copy of the application note *Using a Mouse with PanelBuilder Development Software*:

- Microsoft® Serial Mouse Version 7.03
  - Microsoft Bus Mouse
  - Logitech™ Serial Mouse Version 4.01
  - Mouse Systems™ Serial White Mouse *or*  
Mouse Systems PC Mouse II Version 6.23
- **Time & Date** allows you to change the system's time and date clock.
  - **Information** provides information on the version number of the PanelBuilder software. For more details on version control, see Chapter 2, *Installing PanelBuilder*.

## The Exit Menu

Choose *Exit* from the Main menu to leave PanelBuilder.

**Figure 3.8**  
The Exit Menu

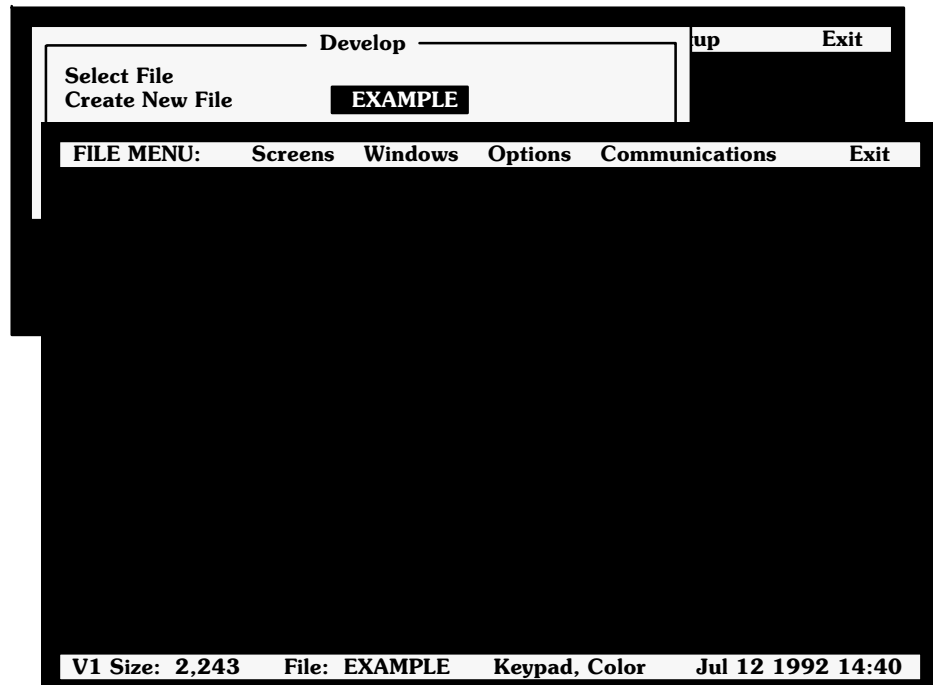


20016

## The File Menu

The File menu consists of five menus which allow you to edit application files. To open the File menu, choose *Select File* or *Create New File* from Develop in the Main menu.

**Figure 3.9**  
The File Menu



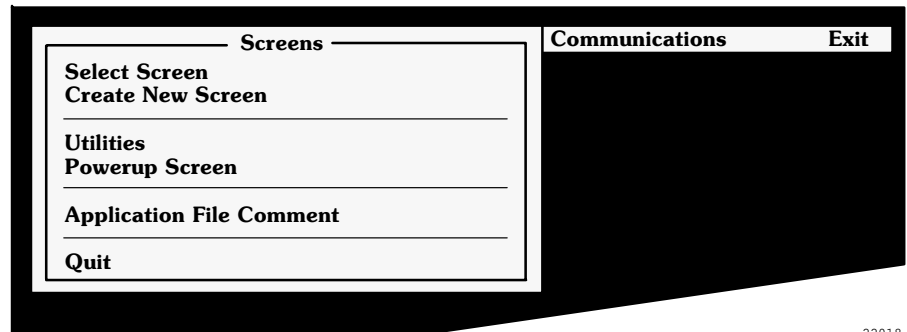
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### The Screens Menu

Choose *Screens* from the File menu and the Screens menu appears, where you create or edit screens and assign security levels.

**Figure 3.10**  
**The Screens Menu**



- **Select Screen** chooses a screen from the application file.
- **Create New Screen** makes a new screen to work on.
- **Utilities** allows you to copy, delete or rename screens, and assign screen security levels.

For details on the Utilities menu see Chapter 8, *Screen Operations*.

- **Powerup Screen** allows you to specify the screen to be displayed when the PanelView terminal starts up.
- **Application File Comment** allows you to add a 24 character message about the application file.

### The Windows Menu

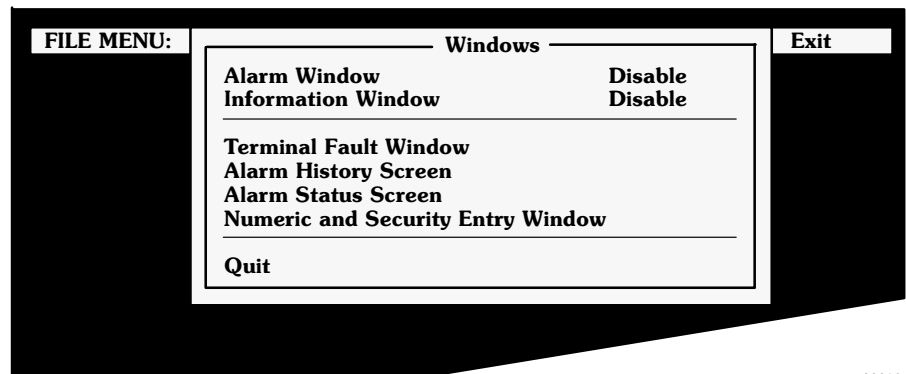
Once you have returned to the Files menu, choose *Windows* to open the Windows menu. Use this menu to:

- configure the Alarm and Information windows
- set the colors for the Terminal Fault, Alarm History and Alarm Status screens
- set the numbers for the Alarm History and Alarm Status screens
- view alarm and information messages

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For more information see Chapter 7, *Information and Alarm Windows*.

**Figure 3.11**  
**The Windows Menu**



20019

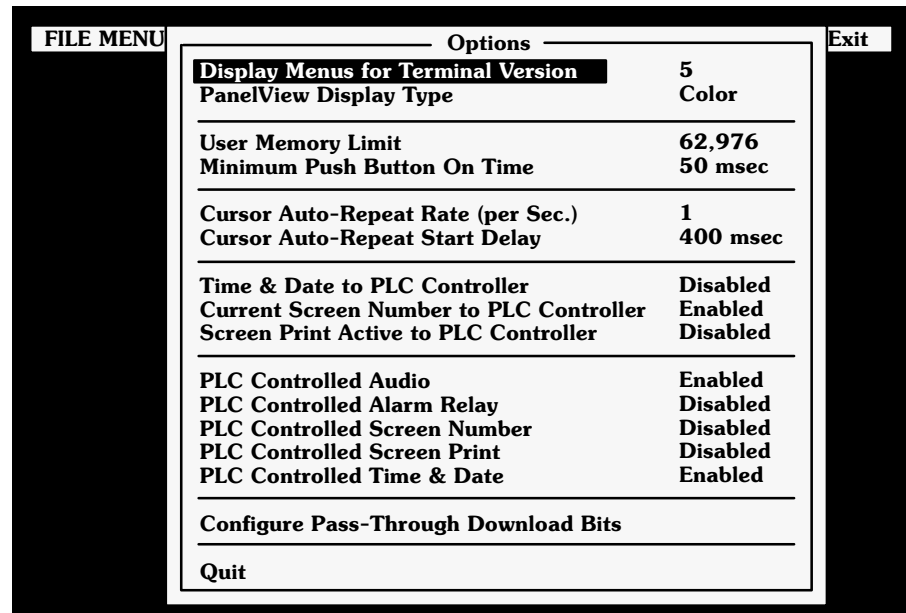
- **Alarm Window** allows you to configure an alarm window for the application file being edited. You can specify the alarm and information messages and configure them to sound the alarm, trigger the alarm relay, or print an alarm. You can also specify color (for a color terminal) and size of the window, assign the PLC control address, define how alarm acknowledgement will be communicated to the PLC controller, and choose from various PLC controlled options.
- **Information Window** allows you to configure an information window for the application file being edited. You can specify the information messages, the color (for a color terminal) and size of the information window, assign the PLC control address, and enable an acknowledge indicator that tells the PLC controller when a message has been acknowledged.
- **Terminal Fault Window** permits you to set the colors for the Fault Window on a color PanelView terminal.
- **Alarm History Screen** permits you to set the screen number for the alarm history screen, and for a color terminal, set the screen colors.
- **Alarm Status Screen** permits you to set the screen number for the alarm status screen. It also allows you to enable/disable the Alarm Status Reset Button, set the PLC Controlled Qty/Time Reset address, and set the Qty/Time Reset to PLC Controller. Finally, in this screen you can set the screen colors for a color terminal.
- **Numeric and Security Entry Window** allows you to set the Numeric Entry and Security Window colors on a color system.

## The Options Menu

Choose *Options* from the File menu to open the Options menu. Use this menu to:

- specify the PanelView display type including button delay, repeat options and various PLC controlled functions
- use the optional user EEPROM as a source of extra application memory, to expand the application memory to 128K
- set status/control bits which are used during pass-through transfer on a Data Highway+

**Figure 3.12**  
**The Options Menu**



23020

**Display Menus for Terminal Version** allows you to set PanelBuilder's menus so the files you create will be compatible with version 1, version 2, version 3, version 4 or version 5 of PanelView terminal firmware. Only available features and objects compatible with the version you select will be displayed. For more information on version control see Chapter 2, *Installing PanelBuilder*.

**PanelView Display Type** sets the type of monitor that the application will run on—either monochrome or color. For a color display, you can set and change the palette of colors. You can create an application for a color terminal even if your development system has a monochrome monitor.

**User Memory Limit** allows you to set the maximum amount of application memory the file can occupy. With the standard amount of application memory in the terminal (64K) you can choose whether or not to retain the Alarm Status Screen data (the alarm count and accumulated time in-alarm) in battery-backed memory. By choosing *not* to retain this data in battery-backed memory, you increase the amount of memory available to applications you have developed. To extend the amount of memory even further, use the optional user EEPROM for extra application memory. Then you can choose one of the 128K memory options.

**IMPORTANT:** A User EEPROM must be installed in the terminal to supply the extra memory. When the EEPROM is used for extended application memory, it can't be used to back up the application file.

**Figure 3.13**  
**Selecting the User Memory Limit**

Options	
Display Menus for Terminal Version	5
PanelView Display Type	Color
<b>User Memory Limit</b>	<b>62,976</b>
59,904	Alarm Status Screen Data Battery-Backed
<b>62,976</b>	Alarm Status Screen Data NOT Battery-Backed
124,928	Alarm Status Screen Data Battery-Backed
128,000	Alarm Status Screen Data NOT Battery-Backed
Current Screen Number to PLC Controller	Enabled
Screen Print Active to PLC Controller	Disabled
PLC Controlled Audio	Enabled
PLC Controlled Alarm Relay	Disabled
PLC Controlled Screen Number	Disabled
PLC Controlled Screen Print	Disabled
PLC Controlled Time & Date	Enabled
Configure Pass-Through Download Bits	
Quit	

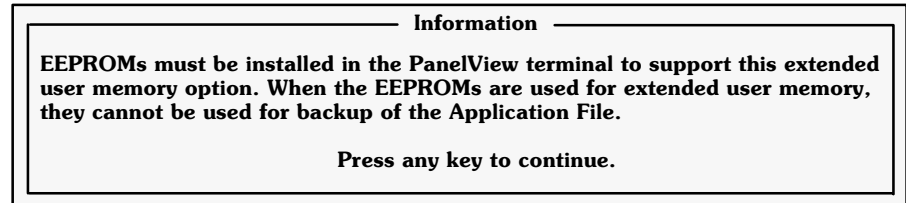
23550

The default is 62,976 *Alarm Status Screen NOT Data Battery-Backed*. The setting you choose is saved in the application file.

**IMPORTANT:** Your application file size must be in the same range as the terminal's memory configuration. If your file will fit into the lower memory setting (59,904 or 62,976), choose one of these options.

If you select either of the higher options (124,928 or 128,000), the following message will be displayed:

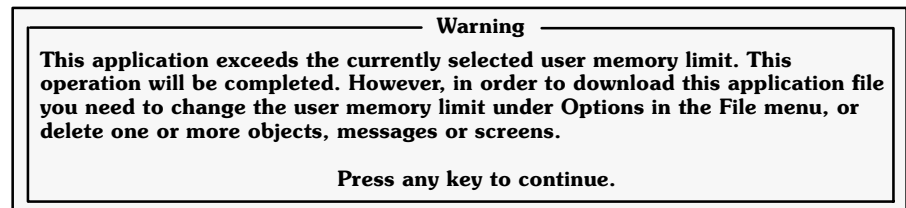
**Figure 3.14**  
**Memory Limit Information Message**



22551

If, while you are editing your application, you increase the file size beyond the User Memory Limit setting, the following message will be displayed:

**Figure 3.15**  
**Memory Limit Warning Message**



22553

If you do not change the User Memory Limit to accommodate the extra memory requirements, you will get an error message any time the file size is critical, when attempting to download application files or create hex files, for example.

- **Minimum Push Button On Time** extends the time that a button is actually held on. This option helps to prevent a very quick button press from being “ignored” by a PLC program or I/O scan.
- **Cursor Auto Repeat Rate (per Sec.)** allows you to set the repeat rate for certain buttons including: list selectors, arrow keys, alarm window and alarm status screens.
- **Cursor Auto-Repeat Start Delay** allows you to set a delay before the repeat function starts, after a button has been pressed.
- **Time and Date to PLC Controller** enables or disables the transfer of time and date from the PanelView terminal to the PLC controller.
- **Current Screen Number to PLC Controller** sends the current PanelView screen number to the PLC controller each time the screen changes.

- **Screen Print Active to PLC Controller** warns the operator if the printer is already busy with a screen print at the time the operator requests a screen print.
- **PLC Controlled Audio** allows the PLC controller to sound the beeper on the PanelView terminal.
- **PLC Controlled Alarm Relay** allows the PLC controller to trigger the PanelView terminal's alarm relay.
- **PLC Controlled Screen Number** allows the PLC controller to change screens on the PanelView terminal, with priority over the operator's settings.
- **PLC Controlled Screen Print** allows the PLC controller to trigger a screen print of whatever screen is displayed on the PanelView terminal.
- **PLC Controlled Time and Date** allows the PLC controller to trigger PanelView to obtain the time and date from the PLC controller and to reset its internal clock to correspond.
- **Configure Pass-Through Download Bits** is only used for downloading application files over a Data Highway Plus using the PLC-5 Pass-Through feature. For more information on downloading application files over the Data Highway +, see Chapter 6, *File Operations*.

When you choose this item, a second menu pops up, identifying three optional (but strongly recommended) bits that can be configured for a download. These addresses are only useful in conjunction with a PLC program that can detect them and react to them.

- **PLC Inhibit Bit Address**—when this output address is set, the PanelView terminal will not permit a download.
- **Pass-Through Request Bit Address**—this input address is set when the download request is received, and is cleared once the actual download begins.
- **Pass-Through Status Bit Address**—this input address is set while the download is in progress, and is cleared once the download is complete.

All three choices are set in the same way: a menu pops up where you assign the address, rack number, start word, start bit, communication type, and input or output.

**Figure 3.16**  
**PLC Inhibit Bit Address Menu**

PLC Inhibit Bit Address	
Current Address	Unassigned Address
<b>Data Type</b>	<b>Bit</b>
<b>Communications</b>	<b>Discrete</b>
<b>Input/Output</b>	<b>Output</b>
<b>Rack</b>	<b>1</b>
<b>Start Word</b>	<b>0</b>
<b>Start Bit</b>	<b>0</b>
<b>Number of Bits</b>	<b>1</b>
<b>Update Address</b>	
<b>View Address Map</b>	
<b>Delete Address</b>	
<b>Quit</b>	

23590

Make the settings you require, and then choose *Update Address* to make the settings current.

**The Communications Menu**

Choose *Communications* from the File menu to open the Communications menu. Within this menu you can make rack assignments, assign block transfer files, set the PLC baud rate and set up pass-through configuration addresses.

**Figure 3.17**  
**The Communications Menu**

FILE MENU: Sc

Communications	
<b>PLC Type</b>	<b>PLC-5/15 integral</b>
<b>Rack Assignment</b>	
<b>Block Transfer</b>	
<b>PLC Baud Rate</b>	<b>57.6K</b>
<b>Pass-Through Configuration</b>	
<b>Quit</b>	

22021

- **PLC Type** allows you to choose from a menu of supported PLC types.

- **Rack Assignment** opens a menu where up to eight rack assignments can be entered. Each one has a selection for rack number, starting module group, rack size, and last chassis.
- **Block Transfer** opens a menu where up to five block transfer files can be assigned. Each one has a selection for rack number, module group, high/low byte and file size. Block transfer number 6 is reserved for the Pass-Through function.
- **PLC Baud Rate** allows you to set one of three available PLC baud rates:
  - 57.6 kilobaud, for a maximum cable length of 10,000 feet
  - 115.2 kilobaud, for a maximum cable length of 5,000 feet
  - 230.4 kilobaud, to a maximum cable length of 2,500 feet

Your terminal must be Series C Revision A or later to support 230.4 kilobaud. Some older PanelView terminals can be upgraded to support the 230K baud rate. Contact Allen-Bradley System Support Services for more information.

- **Pass-Through Configuration** allows you to configure the DH+ address defining the PanelView terminal location and save it with the application file. For a detailed discussion of this option see Chapter 6, *File Operations*.

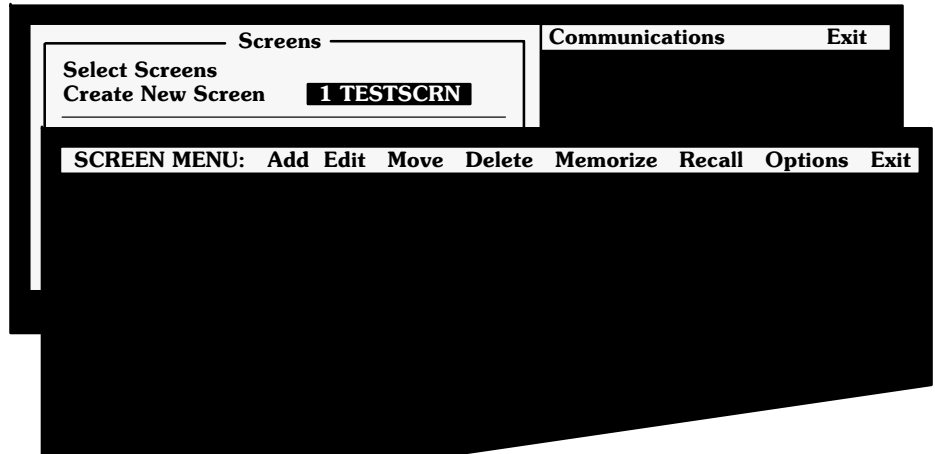
## The Screen Menu

To open the Screen menu, select *Screens* and press **Enter**, then choose *Select Screen* or *Create New Screen*. Each screen is automatically numbered when you create it; however, you may enter a new number if you wish. The number is displayed before the screen's name.

The Screen menu contains eight items—including Exit—that are used to manipulate or edit objects on any screen. Of these, the Move, Memorize, and Recall menus can be used for single objects or groups of objects.



**Figure 3.18**  
**The Screen Menu**

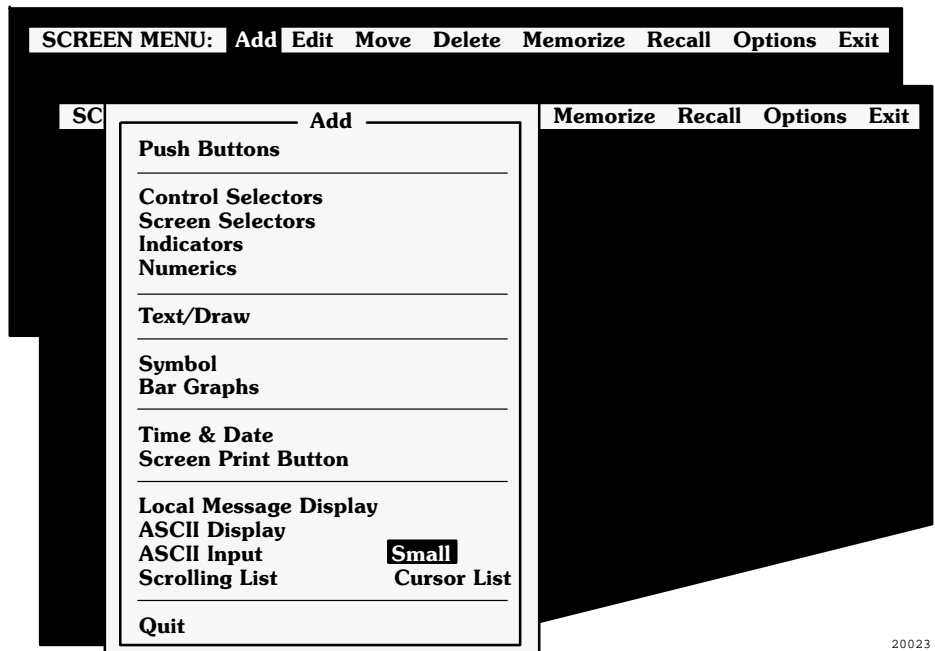


20022

## The Add Menu

To open this menu, choose *Add* from the Screen menu to display the list of available objects. Objects can only be added one at a time.

**Figure 3.19**  
**The Add Menu**



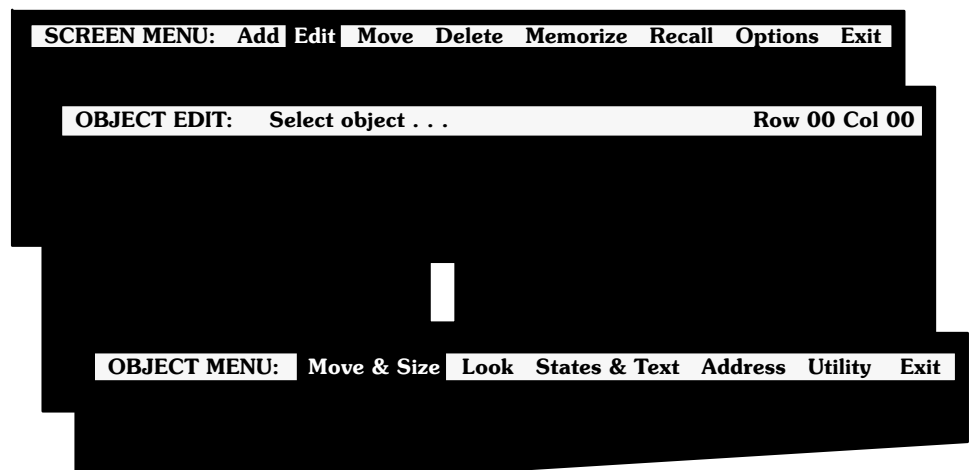
20023

## The Edit Menu

Choose *Edit* and the Object Edit screen opens. Objects may only be edited one at a time. To edit an object, select it by positioning the cursor on it, and press **Enter**. The Object menu will open for editing.

**IMPORTANT:** An object can only be edited when it is on the screen.

**Figure 3.20**  
The Object Menu



20024

## Move, Delete, and Memorize

These three menu functions can be used for single objects or groups of objects.

When you memorize an object or a group of objects, you have the option of memorizing the associated addresses as well. After choosing the object(s) to memorize, you will be prompted:

Do you want to memorize the addresses as well?

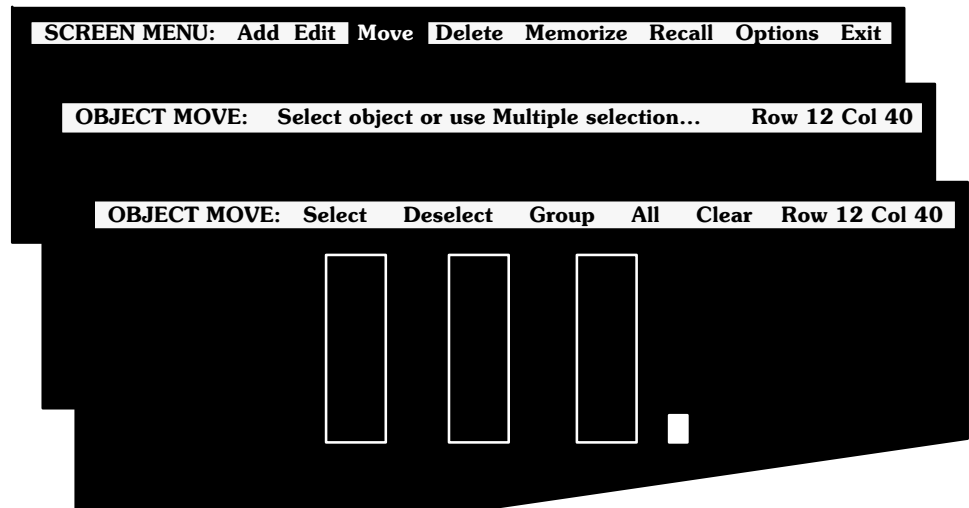
If you choose *Yes*, the object addresses will be memorized; if you choose *No*, only the screen appearance of the objects will be memorized.

The Memorize and Recall function can be used to copy the contents of an entire screen to a new screen, or to another file. See the section Copying a Screen From One Application to Another, in Chapter 8, *Screen Operations*.

The Move function is used in the following example to show how these three menu options are used with object groups.

Choose *Move* to begin the Object Move operation. “Select object or use **M**ultiple selection” is printed at the top of the screen as in the following illustration.

**Figure 3.21**  
**The Move Menu**



20138

To select a single object, use the cursor keys to move the cursor over the object and press **Enter** to activate the command.

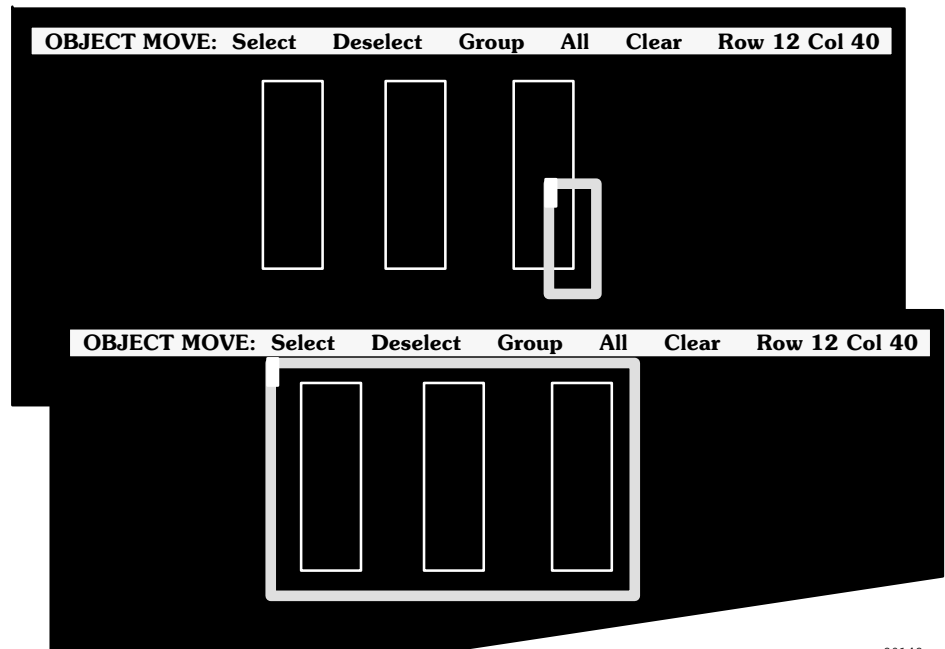
To choose several objects at once, press the **M** key. A second Object Move screen opens offering five choices described below. Activate any of these choices by typing the first letter of your choice on the keyboard. For example, if you want to select an object, type the letter **S**.

- **Select** allows you to select one object at a time from a group of objects. Use the cursor keys to move the cursor over the object, then press **Enter**. The object will start flashing to indicate it is selected. Select other objects in the group in the same way.
- **Deselect** allows you to remove one object at a time from a group of selected objects. To deselect, place the cursor on the object and press **Enter**. The object will stop flashing to indicate it is no longer selected.
- **Group** allows you to select or deselect a group of objects with a “rubber band box” that appears on the screen.

To use this option, press **G**. A third Move Object screen will appear displaying the rubber band box. Stretch or shrink the box with the cursor keys to surround the objects of your choice, then press **S** or **Enter** to select the objects, or the letter **D** to deselect.

Once you have selected an object or objects, press **Enter** to perform the actual move. The cursor will appear at the upper left corner of the object(s) selected. Use the arrow keys to move the object(s). When the desired position is reached, press **Enter**.

**Figure 3.22**  
**The Rubber Band Box**



20142

- **All** selects every object on the screen.
- **Clear** deselects all objects on the screen.

### **Recall**

Choose *Recall* to add copies of one or more memorized objects to the screen. If the recalled object(s) is on the same screen as the one that was originally memorized, the two objects will overlap and look like a single object until the recalled object(s) is moved.

If you memorize only one object, the Object menu opens for you to edit the object as soon as the object is recalled. If you memorize more than one object at a time, they will appear on the screen in Move and Size mode, ready to be moved to whatever position you choose.

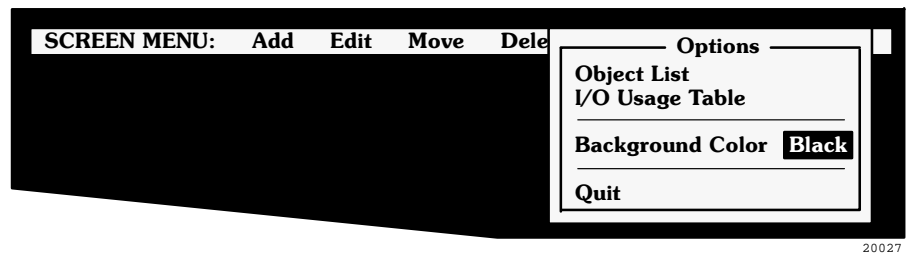
If two objects overlap, you will not be able to save the screen.

With Memorize and Recall, you can copy groups of objects—even the contents of an entire screen—to a different screen, or to a screen in another application file, as long as the files are for the same kind of terminal, Keypad or Touch Screen. See the section *Copying a Screen From One Application to Another*, in Chapter 8, *Screen Operations*.

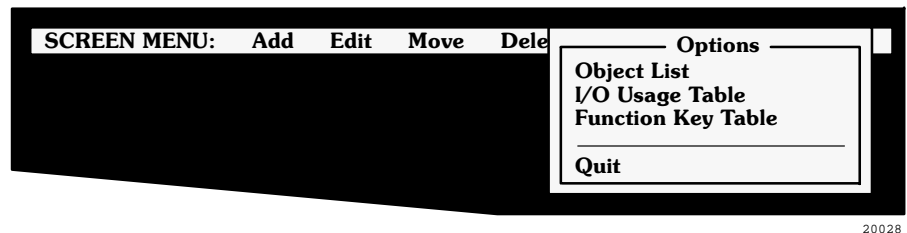
## Options

The Options menu differs slightly between color and monochrome terminals, and between keypad and touch screen terminals.

**Figure 3.23**  
**The Options Menu for Color Touch Screen Terminals**



**Figure 3.24**  
**The Options Menu for Monochrome Keypad Terminals**



- **Object List** displays a list of all the objects on a screen, along with general object information.
- **I/O Usage Table** identifies the bits allocated to addresses in the terminal rack and block transfer assignments for the application file.
- **Background Color** (Color terminals only) allows you to change the screen's background color.
- **Function Key Table** (Keypad terminals only) lists the function keys, and the object assigned to each function key on the screen.

## Exit

The Exit choices are:

- **Exit and Save screen** saves the screen and returns to the File menu
- **Save screen only** saves the screen and stays in the Screen menu
- **Don't save, just Exit** returns to the File menu without saving the screen
- **Cancel Exit** cancels the Exit

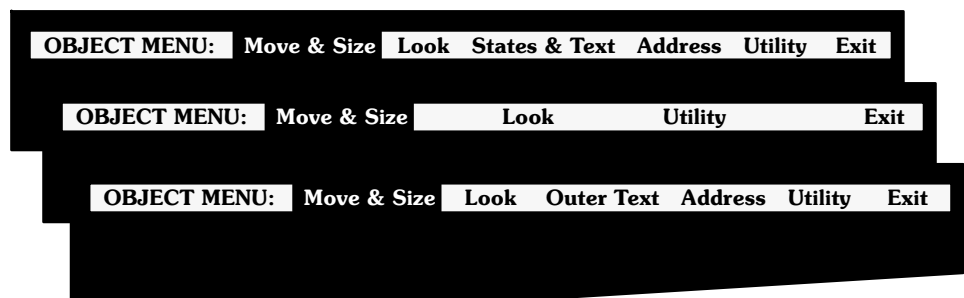
## The Object Menu

The selections offered in the Object menu allow you to precisely configure each screen object.

Depending on the type of object you are creating or editing, the selections offered in the Object menu will vary slightly.

Figure 3.25 shows three different Object menus. The menu at the top of the illustration appears when a push button is selected. The next menu appears for an arc, and the object menu at the bottom appears when a bar graph is placed on the screen. When you select an object, it is identified at the bottom of the Object menu screen.

**Figure 3.25**  
**Sample Object Menus**



20209

Press **F3** to make the object you are editing blink so you can identify it on the screen.

Press **F2** to remove the bottom status line so you can view the entire display; press it again to enable the status line.

- **Move & Size** moves an object on the screen, changes its size, and assigns it to a function key or touch cells.

- **Move & Edit** moves and edits background text or lines on the screen.
- **Look** specifies the object's color, border type, character size, and whether the object will be blinking, underlined, highlighted, or in reverse video. When adding ISA symbols, this is where you select symbol types.
- **Cursor** is used with the Numeric Input Cursor Point and Set Bit Cursor Point objects to define the cursor character. With it you can change the cursor position, size (Large or Small), foreground and background color, and the cursor display character.
- **Buttons** is used to configure one or more of the following List Selector buttons: Down Cursor button, the Enter button, and the Up Cursor button. This menu option is also used to configure the buttons of an ASCII Input and Cursor List object.
- **List** configures the list elements of a List Selector and a Cursor List object. It moves the list on the screen (independent of the buttons associated with the list). For the List Selector object, it also determines the width of the list (how many characters per line), and the number of states (how many items in the list). In addition, it enters the text and creates a border around the list. For the Cursor List object, it determines the Number of States, Number of Visible States, Number of Preview States, and the border of the Cursor List.
- **States & Text** displays the state of multi-state objects and configures text and attributes for each state. These include: adding, editing or moving text and outer text, blink, reverse video, high intensity, and color.
- **Outer Text** defines the outer text for an object (such as a label outside a button).
- **Text** is used to edit outer text and inner text.
- **Format** specifies the numeric display format.
- **Address** assigns the required PLC addresses to an object, assigns control values and minimum/maximum values for the addresses, and assigns button repeat parameters for specific objects.
- **Screen** allows you to assign a specific screen by entering the screen's number.
- **Utility** assigns a name to the object and saves the new settings as the new default for the object.

- **Exit** allows you to exit and save the object, save the object only, or exit without saving the object.

The following section describes how to use the various options.

## **Move and Size**

Use the Move and Size menu to define an object's position and size, and to assign function keys to buttons.

**IMPORTANT:** Not every Object has a Move and Size menu. For example, the Cursor List object only has a Move menu.

### **To Move an Object**

1. Choose *Move* from the Move & Size menu. The cursor blinks in the top right corner of the object.
2. Use the arrow keys to position the object. If you are designing a screen for a Touch Screen terminal, remember that push buttons only move in units that match the touch cells (by eight horizontally and by two vertically).
3. When the object is in place, press **Enter**, or press **Esc** to return to the original location on the screen.

### **To Size an Object**

1. Choose *Size* from the Move & Size menu. The cursor blinks on the object being edited, and the object's size is shown in the top right corner of the monitor.
2. Use the arrow keys to set the object's size. The bottom right corner of the object stretches or shrinks, while the top left corner stays still.

For notes on creating buttons for a Touch Screen terminal, refer to the section Buttons and Touch Screen Terminals later in this chapter.

3. When the object is the correct size, press **Enter**, or press **Esc** to restore the button to its original size.

### **Assigning Function Keys (Keypad terminals only):**

1. Choose *Function Key* from the Move & Size menu.



2. Type in the function key number that corresponds to the button you are configuring, and then press **Enter**.

If you enter 0, no key is assigned.

## Look

The options in the Look menu define the appearance of an object.

- **Border** Most objects allow you to define a rectangular border around the object. To define a border:
  1. Choose *Border* from the Look menu.
  2. Choose the desired type of border. Your options are:
    - Single
    - Double
    - None
    - Dotted
    - Outer
    - Solid (the width of a character cell)
- **Foreground Color** provides a choice of color for the lines and borders of the object. For color PanelView terminals you can assign both a foreground and background color to each object.
- **Background Color** allows you to assign a background color to each object created for color PanelView terminals.

**IMPORTANT:** You cannot use the same color for both foreground and background.

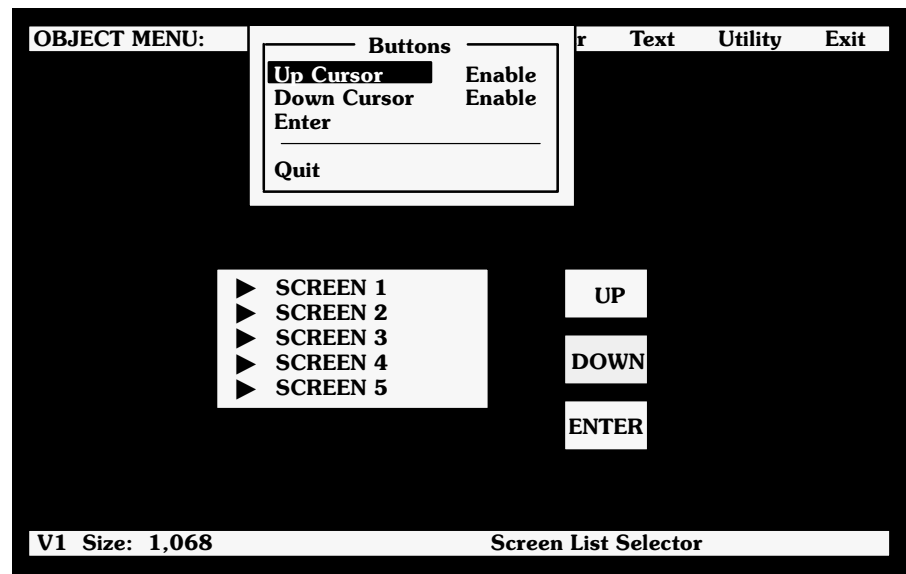
- **High Intensity** provides a choice of normal or high intensity display for objects created for monochrome PanelView terminals.
- **Reverse Video** provides a choice of normal or reverse video display (i.e., black on an amber background) for objects created for monochrome PanelView terminals.
- **Blink** causes the object to flash on the PanelView terminal screen.
- **Underline** underlines the display text on the screen on the PanelView terminal screen.
- **Character Height** sets the object's text as single or double height.
- **Character Width** sets the object's text as single or double width.

- **Symbol Type** allows you to choose the type of ISA symbol. For a complete listing of the ISA symbols and their on-screen appearance, refer to Appendix D, *ISA Symbols*.

## Buttons

Certain objects, such as the Control List Selectors and the Screen List Selector, have two or more associated buttons. Use the Buttons menu to configure these buttons.

**Figure 3.26**  
**The Buttons Menu for a Screen List Selector**



To configure a button, select the button type from the Buttons menu, and choose either *Enable* or *Disable*. Disabling the button removes it from the screen. (You can't disable both the Up Cursor and Down Cursor buttons). Enabling the button opens a menu with the following choices:

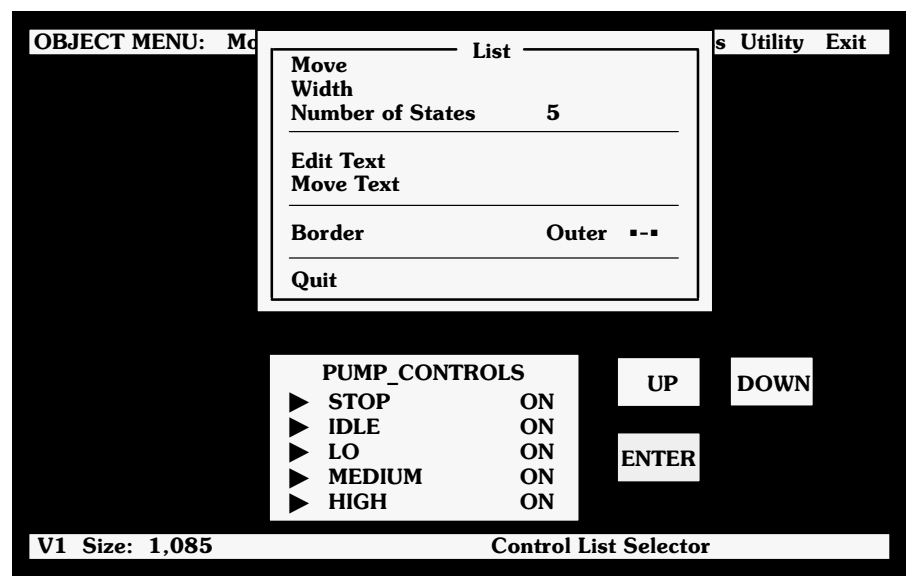
- **Move** positions the button on the screen independently of the other components of the object.
- **Size** defines the size of the button.
- **Function Key** assigns a function key number (for Keypad terminals only).
- **Margin Size** defines the display size of a margin of touch cells for the button (on Touch Screen terminals only).

- **Edit Text** allows you to add text inside the button. The text can't extend outside the button's border. To create a second line of text inside the button, use the arrow keys to move the cursor to the next line. Press **Enter** to save the new text.
- **Move Text** positions text within a button.
- **Border** sets the border for the button.

## List

Certain objects, such as the Control List Selectors and the Screen List Selector, contain a list of selections. The List menu configures the list.

**Figure 3.27**  
The List Menu, for a Control List Selector



22234

- **Move** moves the list on the screen independent of any buttons associated with the object.
- **Width** determines both the width of the list on your screen and the maximum number of characters for each list entry. Use the right arrow to increase the list's width, and the left arrow to decrease it.
- **Number of States** determines how many entries you can have in your list and, consequently, the height of the list. Each state for the object corresponds to one line in the list (two lines if Character Height is set to Double).

- **Assign Screen to State** (Screen List Selector only). For each selection in the list you must designate the screen you want to display.
- **Edit Text** allows you to type in the text for each selection. Use the arrow keys to move the cursor from one line to the next when typing; press **Enter** when you have finished entering all the text in the list.
- **Move Text** allows you to move text within the list.
- **Border** specifies the List Selector border type.
- **Highlight Bar** allows you to select a highlight bar for the Object List in the Scrolling List object. When you enable this option, the selected object in the Object List is highlighted in reverse video.

### States and Text

States & Text allows you to define text and display attributes for State 0, State 1 and Outer Text of all buttons except the Interlocked push button.

For the Multi-State Indicator, States & Text allows you to define up to 16 states. First define the number of states for the Multi-State Indicator, then define the text and display attributes for each state.

- **Display States** lets you press the space bar to view the state settings you have defined.
- **Edit Text** allows you to enter text for the object. State Text appears inside the object; Outer Text appears outside the object.
- **Move Text** moves the state text inside the object.
- **Underline** makes the state text appear underlined.
- **Blink** causes the state text to flash on the PanelView terminal.
- **Foreground Color** sets the color of the state text and border.
- **Background Color** sets the color of the object.
- **Reverse Video** sets monochrome text to Reverse Video or normal display.
- **High Intensity** sets monochrome text to High Intensity or normal display.
- **Character Height** sets the characters to single or double height.
- **Character Width** sets the characters to single or double width.

### Text and Outer Text

Any text you add with the Text menu or the Outer Text menu becomes part of an object and is moved and copied with it. Do not confuse this display text with Background Text.

For the different types of text (such as Inner Text, Outer Text and Button Text) listed in the Text menu, the following choices are available.

- **Edit Text** allows you to enter the state text for the object. State Text appears inside the object; Outer Text appears outside the object. When you enter text, remember to use the arrow keys to move from line to line, and **Enter** to save the text.
- **Move Text** moves the text.
- **Underline** will make the text appear underlined.
- **Blink** causes the text to flash on the PanelView terminal.
- **Foreground Color** sets the color of the text and border.
- **Background Color** sets the background color.
- **Reverse Video** sets monochrome text in reverse video.
- **High Intensity** sets monochrome text in high intensity.
- **Character Height** sets the characters to single or double height.
- **Character Width** sets the characters to single or double width.

### Format

Use the Format menu to define the numeric formatting in Numeric Data Displays, Numeric Cursor Points and Numeric Keypads. There are three options:

- **Number of Digits** specifies how many digits the Numeric Data Display will have. You must specify a number between 1 and 8.
- **Fill Left** specifies whether the characters to the left of the number should be padded with zeros or spaces.

- **Decimal Point** allows you to set the Numeric Data Display with a decimal point. The position of the decimal point can be Fixed or PLC controlled. If it is Fixed, set the Maximum Digits after Decimal Point (between 0 and 7). If it is PLC controlled, specify the decimal point address from the Decimal Point Position address.
- **Decimal Key Controlled** is an additional option for Numeric Keypads, Numeric Cursor Points and Numeric Keypad-Enable buttons. With this option, the PanelView terminal operator determines where to put the decimal point by using the decimal key.

### Address

Choose *Address* to assign the required PLC addresses to an object. It is also used to assign control values and minimum/maximum values for the addresses as well as objects.

To enter an address, define each of these items:

- **Data Type** defines the data type as Binary, BCD, Bit, or Integer (signed) for the object. The Data Type is set to ASCII (two characters per word) for the ASCII Display and ASCII Input objects.
- **Communications** specifies Discrete communications or Block Transfers.
- **Input/Output** specifies the address as an input or output address.
- **Rack** specifies the rack number. This option only appears for Discrete communications.
- **File** specifies the block transfer file number. This option only appears for Block Transfer communications.
- **Start Word** specifies the starting word for the address.
- **Start Bit** specifies the starting bit within the word for the address.
- **Number of Bits** specifies the number of bits in the address.
- **Number of Words** allows you to set the maximum number of characters for the ASCII Display and ASCII Input objects. The range is 1 to 32 (contiguous words of two characters each) allowing up to 64 characters.

#### Other Options in the Address Menu

- **Update Address** verifies all the values entered for the Data Type through to the Number of Bits and saves them in Address Map. Look for the new address beside “Current” at the top of the Address menu. If you made a mistake entering a new address, an error message is displayed when you choose Update Address.
- **Change Preset** sets the initial value of the PLC address that is used after PanelBuilder downloads the application file to PanelView.
- **View Address Map** displays the PLC address bits allocated for all the object, window, and PLC Control Option addresses in the application file.
- **Delete Address** removes the existing address from the file.
- **Preset** shows the object’s current preset value.

#### Utility

Use the choices in the Utility menu to name the object being edited, and to save a new set of default values for the object type.

- **Name** allows you to document an application by assigning a name to each object (with the exception of Text, Line, Box, and Symbol). To assign a name to an object:
  1. Choose *Name* from the Utility menu.
  2. When prompted, type in a name. It can be up to 15 characters long, and can include any character on your computer’s keyboard.

These names take up space in your application file. If you want to save space on large application files, use short names or omit this feature altogether.
  3. Press **Enter** to accept the name, or **Esc** to cancel the operation.
- **Default** allows you to edit each object type’s default configuration. If you want to change the default:
  1. Edit the object to give it the attributes you want for the default. These could include settings for size, shape, color, position, etc. (not text).
  2. Choose *Default* from the Utility menu.

This saves the current settings for the particular object as the new default. The PLC address can't be saved as part of the object's default settings. For background text, only colors and attributes (character height and width, underline, reverse video, blink and high intensity) are saved as the default.

### Exit

The Exit choices are:

- **Exit and Save object** saves the object and returns to the Screen menu
- **Save object only** saves the object and stays in the Object menu
- **Don't save, just Exit** returns to the Screen menu without saving the object
- **Cancel Exit** cancels Exit

### Button Concepts

#### Buttons and Keypad Terminals

When you create a button for a Keypad terminal, you are creating a “soft-key” label for the button and then linking that label with a specific key on the Keypad terminal. For example, if you want the operator to press the F21 key to go to the next screen, you would place a “Go to Screen” button on the right edge of the screen next to the F21 Key. Then you would assign F21 to that button.

To assign a function key number to the label for single button objects (Screen Selector Buttons, Push Buttons, Increment, Decrement, and Set Value Buttons):

1. Choose *Move and Size* from the Object Menu.
2. Choose *Function Key*.
3. Enter the number for the desired function key (between 1 and 21, or 0 to leave the key unassigned).

To assign a function key number for multi-button objects (the Screen List Selector, Control List Selector, and Control List Selector with Enter):

1. Choose *Buttons* from the Object Menu.
2. Choose a specific button.
3. Choose *Function Key*.



4. Enter the number for the desired function key.

If you want to hide the function key label, you can make it invisible by not assigning a border or foreground text, and by changing the background color to the screen color. You can also decrease the size of the label down to 1 character cell, and move it to an unused area of the screen.

**IMPORTANT:** If you need to use two function keys simultaneously, you must use one from the horizontal group (F1-F16) and one from the vertical group (F17-F21). Don't use two from one section.

### Buttons and Touch Screen Terminals

When you create a button for a Touch Screen terminal, you are designating those touch cells that will make up the button, and the button's label.

You must specify how big—how many touch cells wide and high—the button is supposed to be. To specify size for single button objects (Screen Selector Buttons, Control Push Buttons):

1. Choose *Move and Size* from the Object Menu.
2. Choose *Size*.
3. Use the arrow keys to shrink or stretch the touch cell.
4. Choose *Margin Size* to adjust the size of the button's border.

To specify size for multi-button objects which have Up Cursor, Down Cursor and Enter buttons all as part of one object, (the Screen List Selector, Control List Selector, Control List Selector with Enter, Cursor List and ASCII Input Object):

1. Choose *Buttons* from the Object Menu.
2. Choose a specific button.
3. Choose *Size* from the menu.
4. Use the arrow keys to shrink or stretch the touch cell.
5. Choose *Margin Size* to adjust the size of the button's border.

## **Buttons and Auto-Repeat**

Three groups of buttons can have auto-repeat settings assigned. When auto-repeat settings are changed from the default, the application will not be compatible with version 1 firmware. For more information on version control see Chapter 2, *Installing Panel Builder*.

**Group 1** objects must be individually configured for auto-repeat when each object is created. Group 1 objects include:

- Increment and Decrement Buttons
- Numeric Cursor Point Raise/Lower Function Keys

Set the Auto-Repeat Rate (per Sec.), Auto-Repeat Start Delay, and Amount per Increment (for Increment buttons) or Amount per Decrement (for Decrement buttons) under *Address* in the Object menu.

**Group 2** objects are configured for auto-repeat as a group. Group 2 objects include:

- Screen List Selector Up/Down Cursor Buttons
- Control List Selector Up/Down Cursor Buttons
- Control List Selector with Enter Up/Down Cursor Buttons
- Cursor Point Up/Down/Left/Right Function keys
- Alarm Window Up/Down Cursor Buttons/Keys
- Alarm History Screen Up/Down Cursor Buttons/Keys
- Alarm Status Screen Line Up/Down Cursor Buttons/Keys
- Cursor List Up/Down PgUp/PgDown Cursor Buttons

Set the Cursor Auto-Repeat Rate (per Sec.) and the Cursor Auto-Repeat Start Delay under *Options* in the File menu. For group 2 objects, the Amount per Increment is fixed at one.

**Group 3** objects have a preset for auto-repeat which is not configurable. Group 3 consist of the following objects in the Configuration Mode Menu and the windows accessed from it:

- Main Menu: Up/Down Cursor Buttons/Keys
- Serial Port window: Change Data Button/Key
- Serial Port window: Up/Down Cursor Buttons/Keys

- Access Codes window: Next Operator Button/Key
- Screen Alignment window: Up/Down/Left/Right Buttons/Keys

The Cursor Auto-Repeat Rate (per Sec.) for these objects is fixed at 4 per second. The Cursor Auto-Repeat Start Delay is fixed at half a second and the Amount per Increment is fixed at 1.

## Planning Your Application

This chapter is intended to help you plan a PanelView application. You should at least skim the chapter before actually creating an application file. It is important to become familiar with your PLC system configuration, and your operator interface requirements.

Before designing your screens, you should be familiar with all the objects, windows, and control options that are available. Refer to Chapter 7, *Information and Alarm Windows*, Chapter 9, *PLC Controlled Options*, and Chapter 10, *The Objects*.

Follow these steps when planning an application:

1. Consider safety regulations.
2. Determine your rack and block transfer needs.
3. Plan the appearance of each screen.
4. Complete the Object Address List.
5. Keep track of I/O usage.
6. Complete the PLC Communication Worksheet.
7. Determine the PanelView terminal firmware versions that you're designing for and adjust the planned object usage and memory requirements accordingly.

When you get to the point of actually creating an application file, you will find that the PanelBuilder makes it easy to revise your screen designs if necessary, and automatically keeps track of I/O and memory usage.

### Emergency Stops and Other Critical Controls

### Safety and PLC Programming Considerations



**ATTENTION:** Never use a PanelView terminal for emergency stops or any other controls that are critical to the safety of personnel or equipment; use separate hard-wired operator interface devices that do not depend on solid state electronics. Refer to the inside cover of this manual for more details and references to applicable standards.

### **System Response to a PanelView Terminal Failure**

The PanelView terminal stops remote I/O communication and appears as a faulted I/O rack to the host PLC controller if:

- the PanelView terminal is in configuration mode
- the PanelView terminal loses AC power
- the PanelView terminal has a major fault
- the remote I/O link fails

When any of the above situations occur, the associated rack fault bit in the PLC controller will turn on (set to 1). Also, the programmable controller's discrete input image table and any block transfer read files will maintain the last input states received from the terminal prior to the failure.

If there is no valid PLC communication with PanelView, and power is removed and re-applied to the PLC controller, the programmable controller's discrete input image table bits will be reset to zero; block transfer read files will retain their current states.

To ensure recovery from a faulted rack condition, program the PLC controller to:

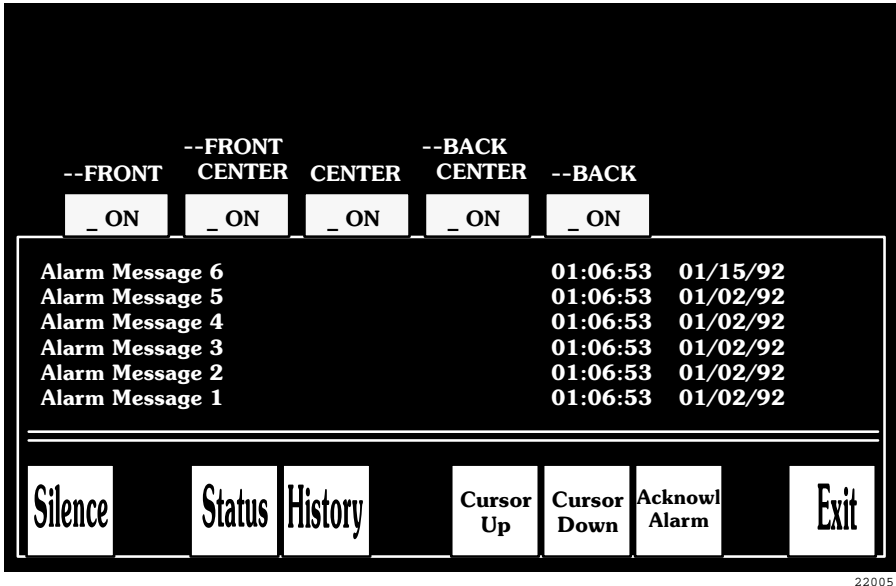
- monitor the rack fault bit associated with a PanelView terminal's rack assignment. Allen-Bradley PLC systems provide a rack fault bit table which applies to PanelView terminals as well as to standard I/O racks. Refer to your PLC documentation for specific information on this function
- return any machine, or process that it controls, to a safe state of operation in the event of any of the PanelView terminal rack fault conditions previously described

### **Button Location Considerations**

When you plan the screen positioning of push buttons, be sure to consider the following:

- Be careful not to use the same screen position for different buttons on screens that might follow one another. An operator could inadvertently press the same button position, mistaking a **Start** button on one screen for a **Stop** button on another
- Don't place important buttons on touch screens in a position where they will be blocked by a temporary window such as an Alarm window, Information window or Terminal Fault window

**Figure 4.1**  
**Screen with Alarm Window Covering Buttons**



**IMPORTANT:** As a safety feature, buttons are momentarily disabled after screen changes. Also, whenever a new screen appears, all buttons must be released before any button will respond.

### Understanding Rack and Block Transfer Assignments

Rack and block transfer assignments for a PanelView terminal follow the same basic rules as standard Allen-Bradley 1771 I/O racks. For detailed information on rack and block assignment, refer to the 1771 SN Sub I/O Scanner Data Sheet.

Any available rack number(s) can be assigned to a PanelView terminal, assuming, of course, that the assignment is valid for the type of host PLC controller and Remote I/O Scanner in the PLC System. A PanelView terminal can occupy up to eight different rack numbers and can also support fractional rack assignments.

**IMPORTANT:** Each rack assignment adds 5 to 7 milliseconds to the remote I/O scan time.

### Starting Module Groups and Fractional Racks

Each rack can support up to 8 module groups (numbered 0–7). However, PanelView can only support 1/4, 1/2, 3/4, and FULL rack sizes. Therefore, the starting module groups are 0, 2, 4, and 6. Each module group supports 16 inputs and outputs which correspond to a 16-bit PLC I/O image table word.

**Table 4.A**  
**Rack Sizes**

Starting Module Group		Valid Rack Sizes			
1st Quarter of rack	0	1/4	1/2	3/4	FULL
2nd Quarter of rack	2	1/4	1/2	3/4	
3rd Quarter of rack	4	1/4	1/2		
4th Quarter of rack	6	1/4			

The PanelView terminal can share the same rack number with other fractional Remote I/O racks and PanelView terminals. However, PanelView terminals cannot be assigned the same rack number and contain the same module group as another I/O chassis. The same rack number can be assigned to a PanelView terminal and to other PanelView terminals or I/O racks *only* if each is configured as a unique fraction of that rack number. For example, Rack #1 could be configured as shown in Table 4.B.

**Table 4.B**  
**Remote I/O Configurations**

Parameter	First Remote I/O Rack	Second Remote I/O Rack
Rack Number	1	1
Starting Module Group	0	6
Rack Size	3/4	1/4
Last Chassis	No	Yes

## Block Transfers

A PanelView terminal object, window or PLC controlled option can be assigned either a discrete or block transfer control address.

**IMPORTANT:** The SLC-5/02 and some PLC controllers do not support block transfer addressing. See individual PLC controller manuals for this information.

You can have up to five bi-directional block transfers (numbered 1–5) for each PanelView terminal. A sixth block transfer file is reserved for the pass-through function (the transfer of files between PanelView and the computer over the Data Highway + connection). The Pass-Through block cannot be used for normal block transfers. Refer to Chapter 6, *File Operations*, for more information on the Pass-Through feature.

You must determine which byte—also known as module group and slot—(in the I/O image table), will support each block transfer, and set up the PLC's block transfer instructions accordingly.

A block transfer address can be assigned to any PanelView terminal object, window or PLC controlled option. PanelView references these addresses according to block transfer file number (1–5), whether it's a read or write file, and its word (0–31) and bit number (0–15). The associated block transfer instruction in the PLC controller will determine the actual PLC address location of the read or write file. Each read or write file can contain up to 32 PLC words.

### **Determining Rack and Block Transfer Needs**

Rack size and block transfer requirements depend on the number of PanelView objects, windows and PLC controlled options that must interact with the PLC controller. The smallest size is 1/4 rack. If you require more objects or functions than can be supported by 1/4 rack, you can:

- increase the rack size (to 1/2, 3/4, or FULL)
- assign additional rack numbers
- assign block transfers

First, determine what rack numbers you have available. Next, try to estimate how many racks you will need and whether or not you'll need block transfers.

There may be certain objects, such as push buttons, that you will definitely prefer to keep in discrete I/O. Discrete I/O provides faster updates than block transfers. Similarly, you may have identified a certain category of objects or functions that you plan on grouping together using block transfer addresses.

Following is the number of discrete I/O image table words and bits available for PLC communication with each of up to 8 rack numbers assigned:

**Table 4.C**  
**I/O Image Table Words and Bits**

<b>Rack Size</b>	<b>16-Bit Input Words</b>	<b>16-Bit output Words</b>	<b>Total Input Bits</b>	<b>Total Output Bits</b>
1/4	2	2	32	32
1/2	4	4	64	64
3/4	6	6	96	96
FULL	8	8	128	128



Following is the maximum number of block transfers, data table words, and bits available for PLC communication, when you assign from one to five bi-directional block transfer files. This would be in addition to discrete I/O words and bits.

**Table 4.D**  
**Block Transfer Data Table Words and Bits**

No. of Block Transfers	16 Bit Input Words	16 Bit Output Words	Total Input Bits	Total Output Bits
1	32	32	512	512
2	64	64	1024	1024
3	96	96	1536	1536
4	128	128	2048	2048
5	160	160	2560	2560

### Reducing PLC Addressing Needs

You can reduce PLC address requirements by multiplexing—in other words, using one screen object for more than one purpose, depending on the state of a variable.

Normally you won't need to multiplex objects—PanelView provides plenty of separate I/O addresses as well as the capability for block transfers and multiple racks. However, you can multiplex momentary push buttons, numeric display data, and other objects.

Here are some examples:

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#### Examples of Multiplexed Objects

**Multiplexing a Momentary Push Button** requires a second PLC address. This is checked by the PLC program to determine how to interpret the push button's control bit. For example, you could have a List Selector's input address work as the multiplex address. The PLC program would then check this address to decide how to respond when the button is pressed.

**Multiplexing a Numeric Display and a List Selector**—the List Selector's input address would work as the multiplex address. The PLC program could check the value at the multiplex address before deciding which value to put in the Numeric Display.

**Using the same addresses for Numeric Displays on different screens**—by using the Current Screen Number to PLC Controller Option function, you can tell the PLC controller which screen is currently displayed. The PLC controller could then be programmed to display one set of values if the first screen is displayed, and a completely different set of values when the second screen is displayed.

**Using the same address to send multiple types of information to the terminal**—by allowing the PLC to use the same address to send multiple types of information to the PanelView terminal, the Scrolling List object reduces PLC ladder logic and addressing typically needed to display and edit large amounts of data.

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## Worksheets

There are six worksheets to help you plan an application. They include:

- Screen Worksheet for Keypad Terminals
- Screen Worksheet for Touch Screen Terminals
- Object Address List
- Discrete I/O Usage Worksheets
- Block Transfer I/O Usage Worksheet (2 pages)
- PLC Communications Worksheet

Two blank copies of each are included in Appendix C, *Sample Worksheets*. Included in this chapter are completed worksheets for a sample application discussed in this chapter and in Chapter 5, *Creating a Sample Application File*. This section describes the steps involved in completing the worksheets. A discussion of each worksheet follows.

## How to Complete the Worksheets

1. Determine the rack numbers you can use for your PanelView terminal. Although you won't know your exact PLC I/O address requirements until you've defined all the objects, windows and PLC controlled options, you do need to know what rack numbers are available so you can assign PLC addresses.
2. Use the appropriate screen worksheet and draw the objects for your first screen.

3. With the Object Address List, define the discrete or block transfer PLC addresses for each object on your screen.
4. Enter the object reference number and screen number on the I/O Usage Worksheets to map your PLC memory usage. Use the Discrete I/O Usage Worksheet for discrete addresses. Use both the Discrete I/O Usage Worksheet and the Block Transfer I/O Usage Worksheet for Block Transfer Files. Use the Discrete worksheet to record any block transfer control bytes in both the Input and Output sections of the image table.
5. Use a new Screen Worksheet and Object Address List for each screen. Use one Discrete I/O Usage Worksheet for each full or partial rack assignment, and two Block Transfer I/O Usage Worksheets for each block transfer file.
6. Use a separate Object Address List to record the addresses for your windows and PLC controlled options, and map these addresses onto the I/O Usage Worksheets. You may also wish to record all the messages associated with the Alarm and Information windows, and the Local Message Display object.
7. Only after you've finished assigning addresses to your objects, windows and PLC controlled options will you know exactly how many racks to assign to your PanelView terminal. Enter this information on the PLC Communications Worksheet.
8. Calculate the size of the application file: your PanelView memory requirements can't exceed the terminal's capabilities. Refer to Table 4.E and .

**Table 4.E**  
**Terminal Memory Limits (in bytes):**

Firmware	Bytes of Memory
V1 and V2 firmware	62,976
V3, V4 and V5 firmware without retained alarm data	62,976
V3, V4 and V5 firmware with retained alarm data	59,904
V3, V4 and V5 firmware with 64k extra EEPROM memory without retained alarm data	128,000
V3, V4 and V5 firmware with 64k extra EEPROM memory with retained alarm data	124,928

## Screen Worksheets

There are two types of screen worksheets: one for keypad terminals, and one for touch screen terminals.

The Screen Worksheets are helpful in planning your screens; just hand-draw the objects you want. Each screen-specific function is represented on the screen by a visible object, such as a push button, numeric display, indicator, text, etc. Based on your functional requirements, identify all objects, windows and PLC controlled options that your application requires.

A maximum of 255 objects can exist on a single screen. Objects generally occupy a rectangular group of character cells. The size of this rectangle is limited only by available screen space, since objects can't be placed on top of one another.

**IMPORTANT:** If your screen changes are not PLC controlled, include a screen select button on each screen you design so you can exit from it.

For detailed information on objects, information and alarm windows, and PLC controlled options, refer to Chapter 7, *Information and Alarm Windows*. Also, see Chapter 9, *PLC Controlled Options* and Chapter 10, *The Objects*.

### Screen Worksheet for Keypad Terminals

Use the Screen Worksheet for Keypad Terminals to specify the position and size of every object. It outlines the 24 x 80 grid available for each screen, and shows how the function buttons are aligned to character cells.

### Figure 4.2 Screen Worksheet for Keypad Terminals

## Screen Worksheet for Keypad Terminal

[illegible]

Sketch the button's label on your Screen Worksheet. You would likely place this label adjacent to its respective function button, although you could place it anywhere on the screen.

Objects can be rectangles of any size as long as they don't overlap other objects.

**IMPORTANT:** When designing a screen, remember that the Alarm window, the Information window and the Terminal Fault window can pop up and cover any objects underneath. Also, if the objects on the screen use the same buttons as the pop-up window, these buttons will be redefined until the window is cleared.

## Screen Worksheet for Touch Screen Terminals

Use the Screen Worksheet for Touch Screen Terminals to set the position and size of each object on a touch screen. It outlines the 24 x 80 grid and the actual alignment of the touch cells.

### Figure 4.3 Screen Worksheet for Touch Screen Terminals

## Screen Worksheet for Touch Screen Terminal

[illegible]

Sketch the label for each button on your worksheet. Buttons must be sized in multiples of touch cells. Other objects, such as boxes or lines, can be any size—from a one character cell to the full screen. Objects cannot overlap.

**IMPORTANT:** When designing a screen, remember that the Alarm window, the Information window and the Terminal Fault window can pop up and cover any objects underneath. On Touch Screen terminals, any buttons which are covered can't be pressed.

## Object Address List and I/O Usage Worksheets

## The Object Address List

Use the Object Address List to record details of the object you will put on a screen, including object name, type, and address information. One or more worksheets should be used for each screen.

### Figure 4.4 The Object Address List Worksheet

## Object Address List

Application File Name: \_\_\_\_\_

Screen Number: \_\_\_\_\_

[illegible]

- **Dynamic objects** interact with the PLC controller and must be assigned PLC addresses. Keep a separate list of dynamic objects for each screen.
- **Static objects** do not interact with the PLC controller, and don't need a PLC address. Text, Lines, Boxes, etc., are static and so are not listed in the Object Address List.

The Alarm window, Information window, and PLC controlled options are not screen specific. If you use them, list them on a separate Object Address List.

## The I/O Usage Worksheets

There are two I/O Usage Worksheets, one for discrete and one for block transfer addresses. Use the two I/O Usage Worksheets in conjunction with the Object Address List to keep track of free and allocated PLC I/O addresses.

The Object Address List is for all dynamic objects, and for window and PLC controlled options. Only a few objects require that you fill in all the columns.

There are certain objects or functions, such as Push Buttons, that are better kept in discrete I/O. Similarly, you may have identified a category of objects or functions that will be grouped together using block transfer addresses. Start at the beginning of each block transfer or module group.

Use the Discrete I/O Usage Worksheet and the Block Transfer File Usage Worksheet for any window and Controlled Options you include in your application.

**Figure 4.5**  
**Discrete I/O Usage Worksheet**

**Discrete I/O Usage Worksheet**

Application File Name: \_\_\_\_\_ Rack Number: \_\_\_\_\_

**PLC Output Bit Numbers**

	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
0																
1																
2																
3																
4																
5																
6																
7																

**PLC Input Bit Numbers**

	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
0																
1																
2																
3																
4																
5																
6																
7																



**Figure 4.6**  
**Block Transfer I/O Usage Worksheet**

#### Block Transfer I/O Usage Worksheet (Page 1 of 2)

Application File Name: \_\_\_\_\_

Block Transfer File Number:      1      2      3      4      5      (Circle One)

Number of Words: \_\_\_\_\_

**READ** (PLC Inp) or **WRITE** (PLC Out)      (Circle One)

	PLC Bit Numbers															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0																
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

#### Block Transfer I/O Usage Worksheet (Page 2 of 2)

Application File Name: \_\_\_\_\_

Block Transfer File Number:      1      2      3      4      5      (Circle One)

Number of Words: \_\_\_\_\_

**READ** (PLC Inp) or **WRITE** (PLC Out)      (Circle One)

	PLC Bit Numbers															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																

### Completing the Object Address List and I/O Worksheets

Fill out both the Object Address List and I/O Usage Worksheets for each dynamic object. Mark on the I/O Usage Worksheet the PLC control bit(s) that are to be assigned to that object.

#### Object

Each object must be assigned a type and reference number.

- **Object Name** identifies the object's purpose. If the object has more than one address, use the Object Name column to identify the purpose of each associated PLC address. When you use these names in the application file they take up memory, so keep them as short as possible.
- **Object Type** specifies which type of object you want, such as a Latched Input Push Button.
- **Reference Number** is used to assign a unique reference number to each object in the Object Address List. The object's PLC address bit(s) must also be indicated on the I/O Usage Worksheet.

## Address

To define the object's PLC address, you must determine whether the address is discrete or block transfer; whether it's an input or output address; the rack or file number; the word number; and the bit number, if applicable.

Some objects require additional I/O addresses. If so, use one line in the Object Address List for each PLC address and use the Name column to describe the function of the additional address.

- **Discrete or Block Transfer**—either discrete or block transfer addresses can be assigned to any object. In the D/B column, “D” refers to a discrete address, and “B” refers to a block transfer address.

To assign discrete I/O addresses to PanelView objects, use the actual PLC I/O image table address. The address must be within the range of the I/O rack number assignments being configured for the PanelView terminal.

The 1747-SN I/O subscanner module converts the I/O image table address assigned in PanelBuilder into a special format in the SLC-5/02. If you are using this scanner, see the section on SLC Addressing for PanelView Applications in Appendix A, *PLC Programming Consideration*.

With block transfer addresses, you designate Block Transfer File Number (1–5). The word number specified here is not that of any particular PLC address; it is the word offset (0–31) in the block transfer Read or Write file. The block transfer instructions in the PLC program determine where in the PLC data table the files will be read from and written to. This concept also applies to 1771 Intelligent I/O Modules that support block transfer.

The following entries are included in the Block Transfer and PLC table.

- **Input or Output** specifies whether the assigned address is an Input (I) “read” address, or an Output (O) “write” address.
- **Rack or File Number** identified in the “R/F” column to specify the Rack Number (octal) for a discrete address, or the Block Transfer File Number (1–5) for a block transfer address.

- **Word Number** specifies the word address number in the discrete rack or block transfer file. Use the “Wrd” column to specify the word number (0–7 octal) if the address is discrete. This word number is also referred to as module group number when actual 1771 I/O racks are addressed. If this is a block transfer address, the range is 0–31 (decimal). The actual PLC data table addresses will be determined by the block transfer instruction in the PLC program.
- **Bit Number**—the range is 0–17 octal for discrete (i.e., 0–7 and 10–17), and 0–15 decimal for block transfer. There are 16 bits per word.

**IMPORTANT:** Discrete addresses are octal; block transfer addresses are decimal.

### Block Transfer PLC Address

The “Blk Xfer PLC Addr” column documents the actual PLC Data Table Address. Use this column to document the actual PLC data table address. The block transfer instructions in the PLC ladder program will determine where in the PLC data table the block transfer files will be read from and written to.

You may also use this to record the actual SLC-5/02 Data Table Address in 0–31 Word/0–15 bit format vs. the PanelView 0–3 rack/0–7 word 0–7 and 10–17 bit format. Refer to Appendix A for SLC addressing example.

### Preset

Use this column to assign a preset value to an object that has a PLC input address.

### Number of States

This column is for objects that can be assigned a specific number of states. The “Number of States” column, combined with the “Data Type” column, is used to calculate the “Number of Bits” an object requires.

### Data Types

Use this column for the data type to be assigned to each object’s PLC addresses. PanelView supports 4 data types: binary, signed integer, BCD, and bit position. The bit position data type is unique to PanelView.

- **Binary**—when you select the binary data type, the object’s PLC address will be a contiguous bit string 1 to 16 bits long. The range of values you can access will depend on the number of bits you assign. You can position a binary data address anywhere within a PLC word (any “start bit”). It is possible for the binary data address to extend into the next word, but not past the end of a rack assignment or block transfer file. The remaining bits in that word, on either side of the binary data address, can be used for other PLC data types.

**Table 4.F**  
**Number of States Supported by Specific Number of Bits for Binary Data Types**

Number of Binary States	Bits Required
1-2	1
3-4	2
5-8	3
9-16	4
17-32	5
33-64	6
65-128	7
129-256	8
257-512	9
513-1024	10
1025-2048	11
2049-4096	12
4097-8192	13
8193-16384	14
16385-32768	15
32769-65536	16

- **Signed Integer** always occupies one 16-bit word. Positive integers are stored in straight binary format while negative integers are stored in two’s complement format. The range of data values is from –32,768 to +32,767.
- **BCD (Binary Coded Decimal)**—if you select the BCD data type, the object’s PLC control word will be a contiguous bit string of either 4, 8, 12, 16, 20, 24, 28, or 32 bits. The exact number of bits required will depend on the maximum value required for the object. The first bit in a BCD bit string can be aligned on any bit in a PLC word, but you would typically use bit zero. It is possible for the BCD bit string to extend into the next word, but not past the end of a rack assignment or block transfer file.

Each group of 4 bits represents the equivalent of 1 digit in a numeric value display.

---

#### Example: BCD Values or States

If you configured a BCD data value to have a maximum of 16 states (2 digits), then the assigned address would be an 8-bit contiguous string with 4 bits for each digit.

2 digits @ 4 bits each = 8 bits

If a numeric value display was configured to have a range from 00000 to 99999 (5 digits), then the assigned address would be a 20-bit contiguous string with 4 bits for each of the 5 digits.

5 digits @ 4 bits each = 20 bits

Since a PLC word can only support 16 bits, an additional word is required for the additional 4 bits.

When more than one PLC word is required to support the required number of digits, all remaining digits will extend into the next higher word. Taking another example, BCD value 123456 would be represented in two PLC words as follows.

**Table 4.G**  
**BCD Format**

Bit Numbers	17 16 15 14	13 12 11 10	7 6 5 4	3 2 1 0
Word X	3	4	5	6
Word X+1			1	2

---

shows the number of bits required for different numbers of BCD digits:

**Table 4.H**  
**Bits Required for BCD Digits**

Number of BCD Digits	Bits Required
1	4
2	8
3	12
4	16
5	20
6	24
7	28
8	32

- **Bit Position Data Type**—when you assign a bit position data type to a dynamic object or window, each state of the object will correspond to a unique bit in the assigned address (contiguous bit string).

The number of bits required is one (1) less than the maximum number of states since All Bits Off is a state in itself (state 0). This applies to objects but not message windows.

It is possible for the bit string to extend into the next word, but not past the end of a rack assignment or block transfer file.

The bit position data type can also be used for objects that are controlled by PLC outputs. For example, you could configure a Multi-State Indicator to have twelve states, each with unique text and attributes. The PLC output address would then be an eleven-bit string. Whichever bit the PLC controller set would determine which state PanelView displays.

If more than one bit is set at a time, PanelView will consider only the lowest bit set when assigned to Multi-State indicator.

The Alarm window, Local Message Display and Information window can use bit strings up to 496 bits long.

If you use the bit position data type with the Alarm window, PanelView will monitor all the bits in the bit string. Thus, the PLC controller can set any number of bits simultaneously, and the Alarm window will scroll through all the alarms with bits set, time-stamped and in lowest bit to highest bit order.

### Number of Bits

Use the “Number of Bits” column to document the specific number of bits required by an object’s address assignment. The number of bits is determined by the number of states and the data type.

### PLC Communications Worksheet

After assigning addresses to all objects, windows and PLC controlled options, you can determine your I/O requirements. Record this information on the PLC Communications Worksheet.

**Figure 4.7**  
**PLC Communications Worksheet**

**PLC Communications Worksheet**

Application File Name: \_\_\_\_\_

PLC/Scanner Type: \_\_\_\_\_

Baud Rate:                      57.6K (10,000 Ft)                      115.2K (5,000 Ft)                      230.4K (2,500 Ft)

**Note:**                      You must make at least one rack assignment. Additional rack assignments (up to a maximum of 8) are optional. Write in the Rack Number and circle appropriate Rack Size, Starting Module Group, and Last Rack designation.

**Rack Assignments**

Rack Number	Rack Size				Starting Module Group				Last Rack	
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N

**Note:**                      Block Transfers are optional. Circle the Block Transfer File Number, write in one of the rack numbers from above, circle the appropriate Module Group and Byte, and fill in the Block Transfer file size.

**Block Transfer Assignments**

Block Transfer File Number	Rack Number	Module Group	Byte	No. Words
1		0 1 2 3 4 5 6 7	Hi      Lo	
2		0 1 2 3 4 5 6 7	Hi      Lo	
3		0 1 2 3 4 5 6 7	Hi      Lo	
4		0 1 2 3 4 5 6 7	Hi      Lo	
5		0 1 2 3 4 5 6 7	Hi      Lo	
Pass-Through				30

## PLC/Scanner Type

For the PLC/Scanner Type field, use one of the following combinations.

**Table 4.1**  
**PLC Controller and Scanner Types**

PLC Controller	Scanner Type
PLC-2/20 or PLC-2/30	1772-SD/SD2
PLC-3	1775-S4A/B
PLC-3	1775-S5
PLC-3/10	1775-SR5
PLC-5/11	Built in
PLC-5/15	Built in
PLC-5/20	Built in
PLC-5/25	Built in
PLC-5/30	Built in
PLC-5/40	Built in
PLC-5/60	Built in
PLC-5/250	5150-RS
SLC 500	1747-SN
Other	1771-SN Sub Scanner
IBM PC	6008-SI
VME Bus	6008-SV
DEC Q-Bus	6008-SQ

## Baud Rate

The cable length determines the baud rate you can select.

- 230.4 kilobaud to a distance of 2,500 feet (with PanelView terminals of Series C rev A or later)
- 115.2 kilobaud to a distance of 5,000 feet
- 57.6 kilobaud to a distance of 10,000 feet

## Rack Assignments

For each assignment indicated in your Object Address lists, define the following:



- **Rack Number**—choices are limited according to the type of PLC controller you defined as PLC Type.
- **Rack Size**—may be specified as 1/4, 1/2, 3/4 or FULL. Circle the size of your choice.
- **Starting Module Group**—may be specified as 0, 2, 4, or 6. Circle the starting module group of your choice.
- **Last Rack**—Circle *Y* (yes) if there are no other fractional PLC rack assignments that have the same rack number and a higher starting module group number. Otherwise circle *N* (no).

### Block Transfer Assignments

For each block transfer file, the block transfer file and the block transfer control address in the PLC discrete I/O must be defined. Refer to your Object Address List to define the following:

- **Block Transfer File Number**—circle the block transfers you are using (1–5).
- **Rack Number**—the available rack numbers used in the block transfer assignments are determined by the rack assignments described previously.
- **Module Group**—you assign the module group (16-bit word) which will contain the block transfer control byte (high or low byte). This applies to both the discrete input and output image table words for the applicable rack number. The Module Group must correspond to the module group and rack size boundaries of the rack in the rack assignment table with the same rack number.
- **Byte**—circle *Hi* or *Lo* to designate the high or low control byte. You cannot enter the same rack number, module group and control byte for more than one block transfer assignment.

**IMPORTANT:** The 1771-SN and 1747-SN Modules do not support block transfers to a remote I/O device. Block transfer assignments are only applicable if you are using one of the other remote 1771 I/O Scanner Devices.

- **Number of Words**—document the specific number of words required by a block transfer assignment

#### Estimating PanelView Terminal Memory Requirements

As you develop your application, the amount of PanelView memory that the file will require is displayed in the lower left corner of the screen.

You can estimate the size of an application file before you create it, by calculating the memory requirements of each element. To calculate an application file's size:

1. Start with the approximate size of an empty application file:

V1	909 bytes
V2	1001 bytes
V3	967 bytes
V4	959 bytes
V5	962 bytes
2. If the application file will have Information Messages, add: (2 bytes x Largest Message Number), plus  
1 byte per message, plus  
1 byte per character in each message.
3. If your application file will have Alarm Messages, add:  
(2 bytes x Largest Message Number), plus  
1 byte per message, plus  
1 byte per character in each message.  
If options are defined for each alarm message such as activate audio, print message, energize relay, add  
(1 byte x Largest Message Number with defined flags).
4. If the application file will have Local Messages, add:  
(2 bytes x Largest Message Number), plus  
1 byte per message, plus  
1 byte per character in each message.
5. For application screens, add:  
(2 bytes x Largest Screen Number), plus  
26 bytes per screen, plus  
1 byte for each character in the Screen Name.
6. For each object on each screen, add:  
the object's memory size specified on the next page, plus  
1 byte for each character in the Object Name.
7. For the first background object on each screen (excluding Arcs) add 2 bytes.
8. For all text including Background Text object and text associated with an object on each screen, such as button text, state text, outer text, and list text, add:  
8 bytes for each text element, plus  
1 byte for each character.

Spaces within a text element, as between words, are shown as underline characters on the development system.

## Object Memory Usage

Following is a list of all the object types, and the minimum number of bytes each one will use in your application file. The values listed do not include an Object Name or descriptive text.

**Table 4.J**  
**Objects and their Byte Requirements**

This Object:	Firmware Version Number	Uses this many bytes:
Momentary Push Button – Normally Open	All	24
Momentary Push Button – Normally Closed	All	24
Latched Input Push Button	All	26
Maintained Push Button	All	24
Interlocked Push Button	All	20
Control List Selector	V1/V2 V3/V4/V5	30 31
Control List Selector w/ Enter	V1/V2 V3/V4/V5	37 38
Set Bit Cursor Point	All	18
Screen List Selector	All	37 (plus 1 byte/selection)
Go To Screen Button	All	13
Return To Screen Button	All	12
Screen Keypad-Enable Button	All	11
Screen Print Button	All	12
Small Keypad Screen Selector	All	6
Large Keypad Screen Selector	All	6
Multi-State Indicator	All	16 (plus 4 bytes/state)
List Indicator	V1/V2 V3/V4/V5	16 27
Set Value Button	All	20
Increment Value Button	V1 V2/V3/V4/V5	20 24
Decrement Value Button	V1 V2/V3/V4/V5	20 24
ASCII Display	All	16
ASCII Input:	Large, Touch Screen Small, Touch Screen Small or large, Keypad	V4/V5 V4/V5 V4/V5
		27 106 78
Numeric Data Displays	All	19

This Object:	Firmware Version Number	Uses this many bytes:
Numeric Keypad-Enable Button	All	26
Numeric Keypad-Enable Button w/ Enter	All	30
Small Numeric Keypad	All	16
Small Numeric Keypad w/ Enter	All	20
Large Numeric Keypad	V1 V2/V3/V4/V5	16 20
Large Numeric Keypad w/ Enter	All	20
Numeric Input Cursor Point	V1 V2/V3 V4/V5	19 31 49
Background Text	All	0 (see previous page)
Arc	All	14
Line	All	9 per segment
Box	All	9
Symbol	All	24
Vertical Bar Graph	All	24
Horizontal Bar Graph	All	24
Time Display	All	10
Date Display	All	10
Local Message Display	All	16
Scrolling List	V5	82

Each horizontal segment, vertical segment, corner and intersection constitutes one line segment.

The Scrolling List object uses a minimum of 82 bytes. As shown in the following table, the components you choose to use in the Scrolling List use different amounts of memory.

**Table 4.K**  
**Scrolling List Components and their Byte Requirements**

This Scrolling List Component:	Uses this many bytes:	Plus this many bytes per visible state:	Plus this many bytes per state:
Cursor List	82		
Multi-State Object List	16	4	4
Local Message Object List	12	4	
Numeric Display Object List	19	4	

## **Reducing Memory Requirements**

To save application memory, consider the following options:

- when creating spaces between words in object text, use the space bar instead of the right arrow key. The space character will appear as an underscore in PanelBuilder, but will be a space on the PanelView terminal screen. When the right arrow is used, each word becomes a separate text element requiring 8 bytes of memory, whereas the space character requires one byte
- when using the Multi-State Indicator, delete all states not being used—four states is the default
- when drawing rectangles, use the Box object instead of drawing each side with a Line object. Each line requires 9 bytes, whereas one Box object requires 9 bytes
- if a Multi-State indicator will have the same text for all states, use outer text and a solid indicator instead of state text. Outer text requires eight bytes for each text string plus one byte per character; state text would require the same amount of memory for each state
- in general, limit the use of text when assigning screen names, messages and object text

## **Sample Application Planned with Worksheets**

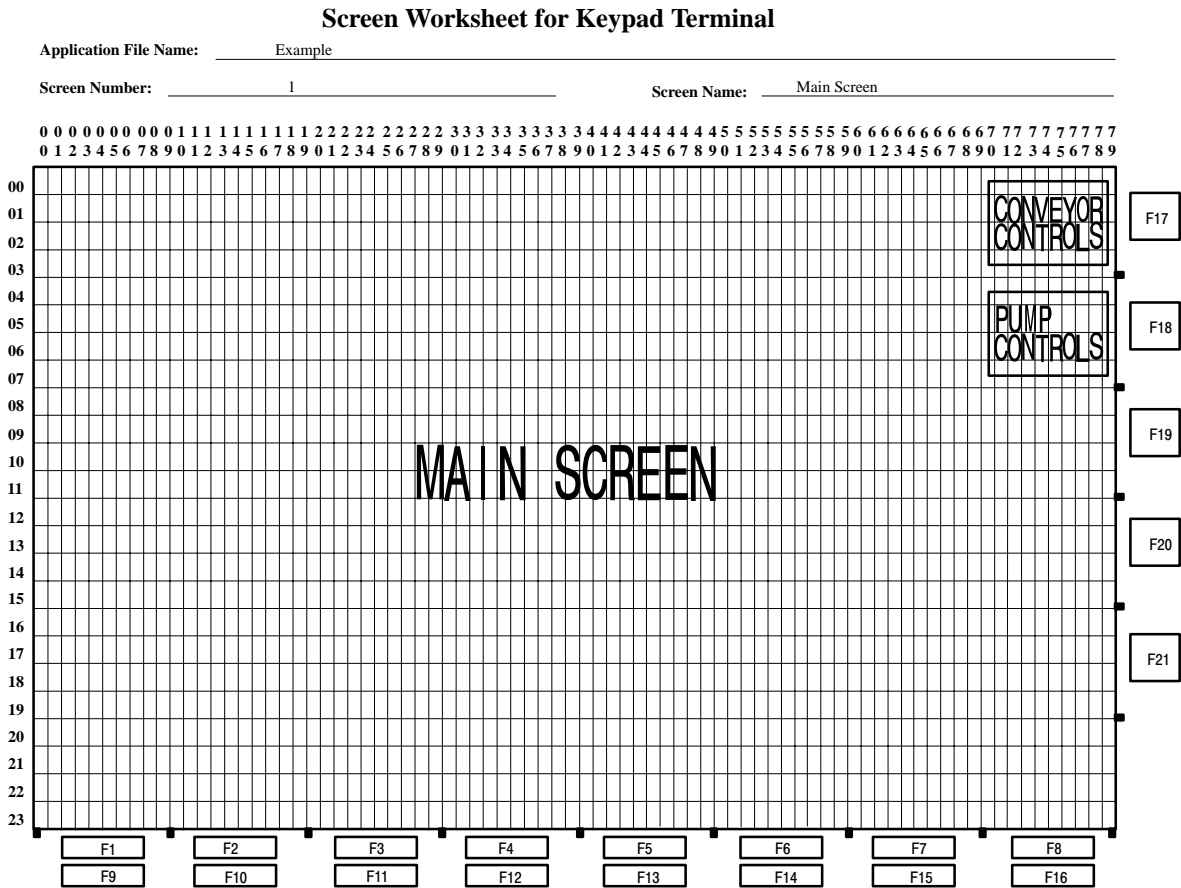
The sample application consists of three screens: a main screen, a screen to control five conveyor belts, and a screen to control five pumps and monitor the pressure in five associated vessels. The application:

- turns five conveyor belts on and off
- selects one of five pumps and turns it on or off. The pumps maintain the pressure (PSI) in associated vessels. The operator can monitor the pressure of each vessel

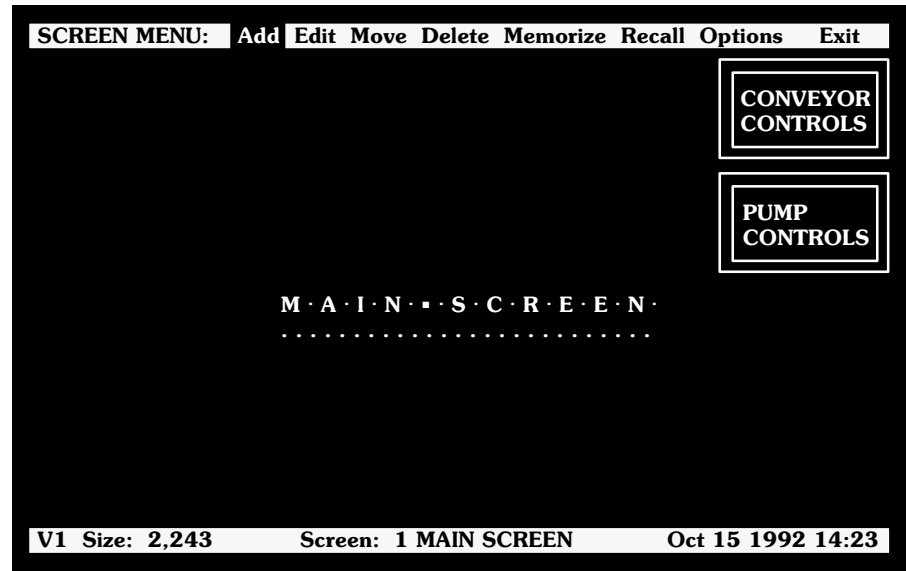
The Sample Application is designed for:

- a color keypad terminal
- a PLC 5/15
- a quarter rack space

**Figure 4.8**  
**The Main Screen, as designed with the Screen Worksheet**



**Figure 4.9**  
**Screen 1 The Main Screen on the Development Computer**



22062

Screen 1 consists of:

- one Text object, titled MAIN SCREEN. Each character is 2 character cells high by 2 character cells wide
- two “Go To Screen” Buttons. The first one, labeled CONVEYOR CONTROLS, calls screen 2 and is assigned to the F17 button. The second, labeled PUMP CONTROLS, calls screen 3 and is associated with the F18 button

**IMPORTANT:** Screen 1 contains only static objects, so they are not assigned to PLC addresses. Consequently, you won’t find an Object Address List for this screen.

Figure 4.10  
The Conveyor Controls Screen Worksheet

**Screen Worksheet for Keypad Terminal**

Application File Name: Example

Screen Number: 2      Screen Name: Conveyor

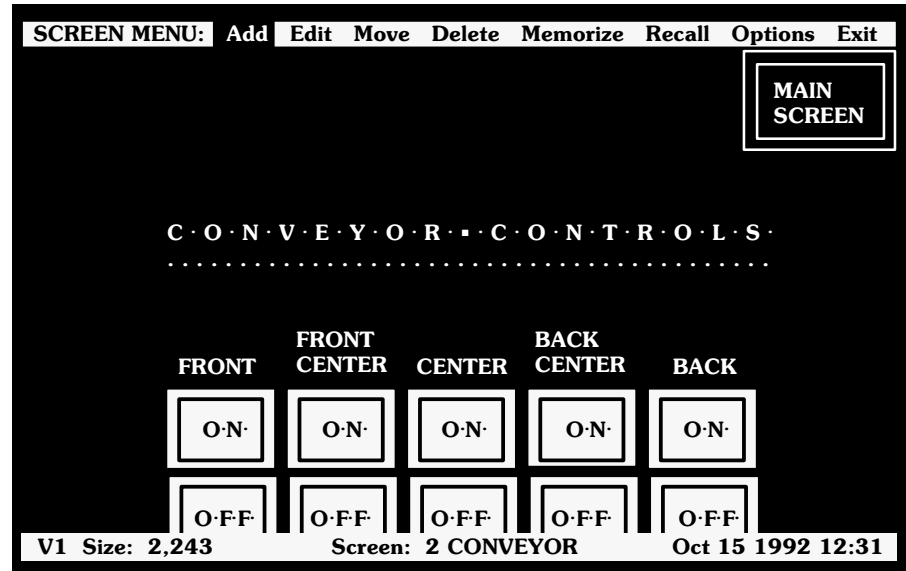
0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7  
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9

00																	MAIN SCREEN		F17
01																			
02																			
03																			
04																			
05																			F18
06																			
07																			
08																			
09																			F19
10																			
11																			
12																			F20
13																			
14																			
15																			
16																			
17																			F21
18																			
19																			
20																			
21																			
22																			
23																			

F1	F2	F3	F4	F5	F6	F7	F8
F9	F10	F11	F12	F13	F14	F15	F16



**Figure 4.11**  
**Screen 2 The Conveyor Controls Screen**



22089

Screen 2 consists of:

- one Text object with the screen title CONVEYOR CONTROLS.
- one “Return To Previous Screen” Button labeled MAIN SCREEN.
- five Momentary Push Buttons—Normally Open with indicator state text inside the buttons and “outer text” above the buttons
- five Momentary Push Buttons—Normally Closed with indicator state text inside the buttons

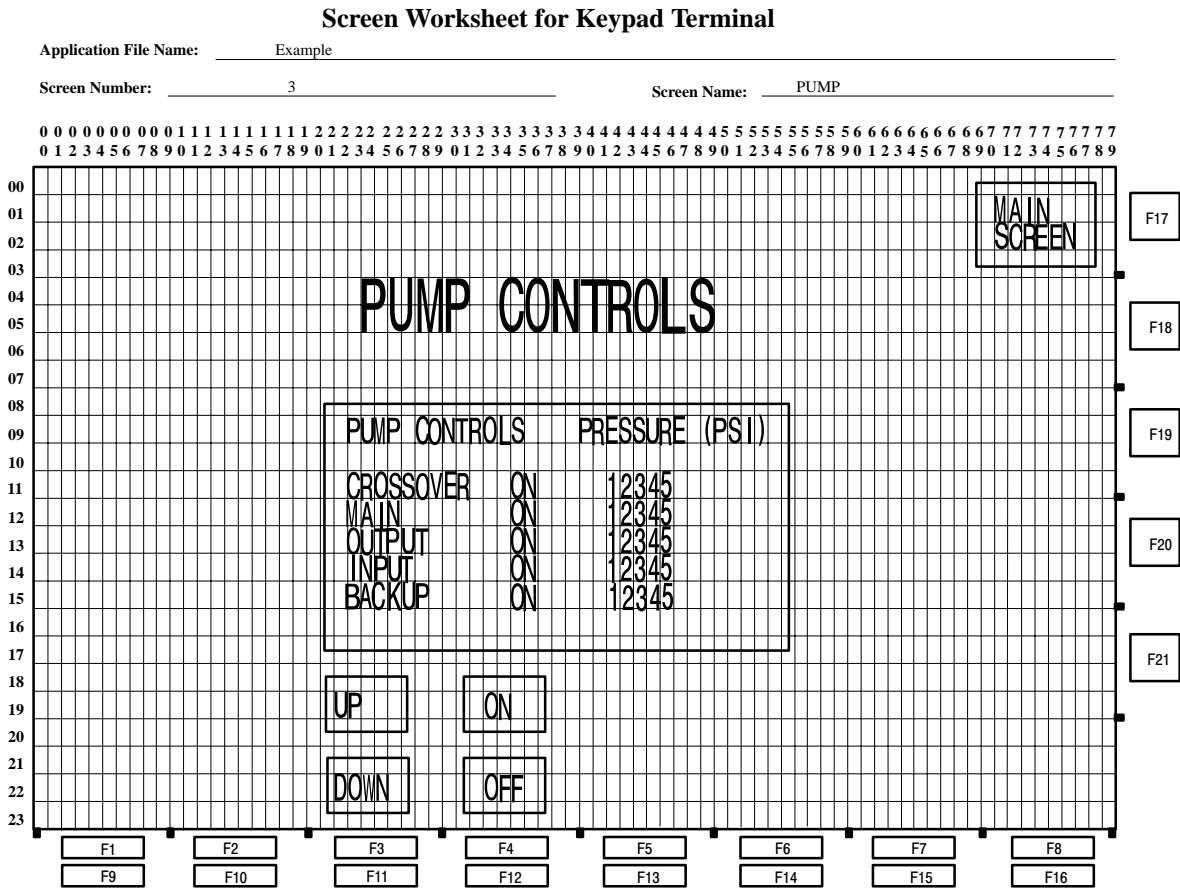
Each push button has two possible states to which different text and attributes will be assigned.

Each of the ten push buttons on this screen has a unique PLC input bit address. You will program your PLC controller to turn on a conveyor when its respective Momentary Push Button (Normally Open) is pressed, and to turn it off again when its respective Momentary Push Button (Normally Closed) is pressed.

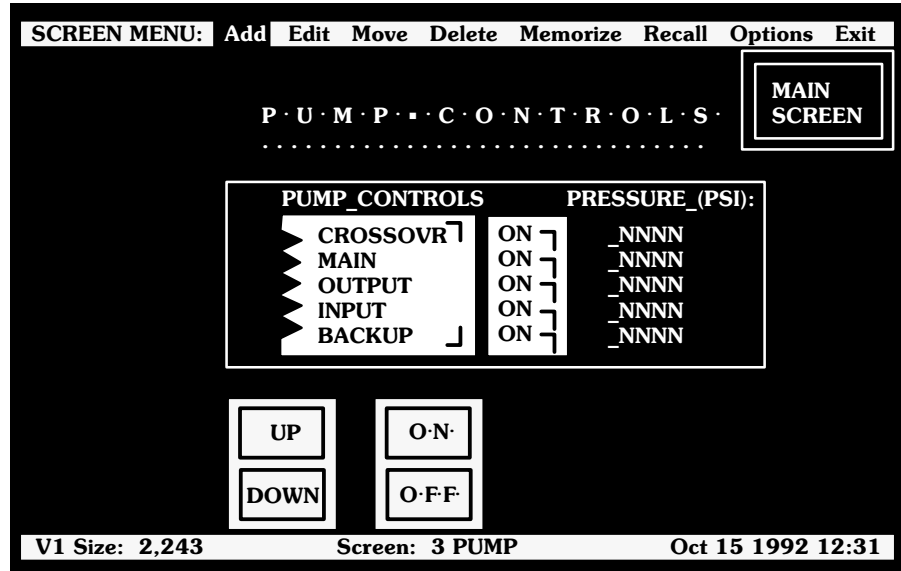
Each of the ten buttons also has a unique PLC output bit address. These are referred to as the “Indicator Control Bits”. Your PLC program should include the logic to set the appropriate Indicator Control Bits to show that the conveyor is on or off.

The Text objects and the “Return To Previous Screen” Button are static objects, and therefore are not included on the completed Object Address List or the I/O Usage Worksheet.

**Figure 4.12**  
**The Pump Controls Screen Worksheet**



**Figure 4.13**  
**Screen 3 The Pump Controls Screen**



22109

Screen 3 consists of:

- three Text objects including the screen title: PUMP CONTROLS, and the two text labels: PUMP CONTROLS and PRESSURE (PSI)
- one Control List Selector Without Enter with five selections labeled CROSSOVER, MAIN, OUTPUT, INPUT, and BACKUP. The Control Selector's two cursor control buttons are assigned to F3 and F11 and are labeled UP and DOWN
- five Multi-State Indicators positioned immediately to the right of the Control List Selector Without Enter Button. Each Multi-State Indicator has been assigned two states. One state is labeled ON, the other OFF. More states could be assigned
- five Numeric Display Objects positioned to the right of the Control List Selector Without Enter Button and Multi-State Indicators
- one Box object surrounding the Control List Selector Without Enter Button, the Multi-State Indicators, the Numeric Displays, and two of the text objects
- two Momentary Push Buttons (Normally Open) labeled ON and OFF assigned to F4 and F12
- one Return to Previous Screen button labeled MAIN SCREEN, assigned to F17

The Control List Selector Without Enter Button has been defined as a five-state object using the bit position data type. Thus, there is a string of four bits that the PLC controller uses to determine the current selection. When the operator uses the UP and DOWN buttons, the PanelView terminal turns off the current bit; turns on the next higher or lower bit in this bit string; and scrolls the highlight bar up or down through the selections.

When the operator presses the ON or OFF button, the PLC program checks which of the five Control Selector bits is on. It then turns the related pump on or off.

Each Multi-State Indicator has a PLC output bit associated with it. The PLC program sets the bit on when the pump is on, and sets the bit off when the pump is off. The PanelView terminal monitors these bits, and displays the ON or OFF label depending on the state of each bit.

Now for the five Numeric Displays. In this sample application we've restricted ourselves to using one quarter rack. Each Numeric Display requires a full PLC word. If you were restricted to discrete addressing, a quarter rack wouldn't be adequate; at least a 3/4 rack would be necessary. The quarter rack limitation can be met by using a block transfer file.

In defining the block transfer file, a control byte was assigned in both the Input and Output section of the image table. This is noted in the Discrete I/O Usage Worksheet. You can't use this control byte for any other purpose. Program your PLC block transfer instruction to use this control byte.

The Text objects, the Box, and the Return to Previous Screen button don't change state or communicate with the PLC controller. Therefore, they are not included on the completed Object Address List or the I/O Usage Worksheet.

**Figure 4.14**  
**Object Address List Worksheet for Screen 2**

### Object Address List

Application File Name: Sample Application

Screen Number: 2

Object			Address					Blk Xfer PLC Addr	Preset	No. of states	Data Type	No. of Bits
Ref No.	Type	Name	D/B	I/O	R/F	Wrđ	Bit					
1	Momentary N/O PB	FRONT ON	D	I	1	0	0			2	Bit	1
	Momentary N/O PB	INDICATOR	D	O	1	0	0			2	Bit	1
2	Momentary N/C PB	FRONT OFF	D	I	1	0	1			2	Bit	1
	Momentary N/C PB	INDICATOR	D	O	1	0	1			2	Bit	1
3	Momentary N/O PB	FRONT CENTER ON	D	I	1	0	2			2	Bit	1
	Momentary N/O PB	INDICATOR	D	O	1	0	2			2	Bit	1
4	Momentary N/C PB	FRONT CENTER OFF	D	I	1	0	3			2	Bit	1
	Momentary N/C PB	INDICATOR	D	I	1	0	3			2	Bit	1
5	Momentary N/C PB	CENTER ON	D	I	1	0	4			2	Bit	1
	Momentary N/C PB	INDICATOR	D	O	1	0	4			2	Bit	1
6	Momentary N/C PB	CENTER OFF	D	I	1	0	5			2	Bit	1
	Momentary N/C PB	INDICATOR	D	O	1	0	5			2	Bit	1
7	Momentary N/O PB	BACK CENTER ON	D	I	1	0	6			2	Bit	1
	Momentary N/O PB	INDICATOR	D	O	1	0	6			2	Bit	1
8	Momentary N/C PB	BACK CENTER OFF	D	I	1	0	7			2	Bit	1
	Momentary N/C PB	INDICATOR	D	O	1	0	7			2	Bit	1
9	Momentary N/O PB	BACK ON	D	I	1	0	10			2	Bit	1
	Momentary N/O PB	INDICATOR	D	O	1	0	10			2	Bit	1
10	Momentary N/C PB	BACK OFF	D	I	1	0	11			2	Bit	1
	Momentary N/C PB	INDICATOR	D	O	1	0	11			2	Bit	1

**Figure 4.15**  
**Object Address List Worksheet for Screen 3**

Object			Address					Blk Xfer PLC Addr	Preset	No. of states	Data Type	No. of Bits
Ref No.	Type	Name	D/B	I/O	R/F	Wrđ	Bit					
11	Control Selector	PUMP CONTROLS	D	I	1	0	12			5	Bit	5
12	Momentary N/C PB	PUMP ON	D	I	1	1	0			2	Bit	1
	Momentary N/C PB	INDICATOR	D	O	1	1	0			2	Bit	1
13	Momentary N/C PB	PUMP OFF	D	I	1	1	1			2	Bit	1
	Momentary N/C PB	INDICATOR	D	O	1	1	1			2	Bit	1
14	Numeric Display	CROSSOVER PUMP	B	O	2	0	0				Binary	16
15	Numeric Display	MAIN PRESSURE	B	O	2	1	0				Binary	16
16	Numeric Display	OUTPUT PRESSURE	B	O	2	2	0				Binary	16
17	Numeric Display	INPUT PRESSURE	B	O	2	3	0				Binary	16
18	Numeric Display	BACKUP PRESSURE	B	O	2	4	0				Binary	16
19	Multi-State Indicator	CROSSOVER PUMP	D	O	1	0	12			2	Bit	1
20	Multi-State Indicator	MAIN PUMP	D	O	1	0	13			2	Bit	1
21	Multi-State Indicator	OUTPUT PUMP	D	O	1	0	14			2	Bit	1
22	Multi-State Indicator	INPUT PUMP	D	O	1	0	15			2	Bit	1
23	Multi-State Indicator	BACKUP PUMP	D	O	1	0	16			2	Bit	1

**Figure 4.16**  
**Discrete I/O Usage Worksheet for the Sample Application**

**Discrete I/O Usage Worksheet**

Application File Name: Sample Application Rack Number: 1

**PLC Output Bit Numbers**

	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	b	b	b	b	b	b	b	b							*	*
2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

**PLC Input Bit Numbers**

	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	b	b	b	b	b	b	b	b							*	*
2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	The Words from 2 to 7 are empty as illustrated in Word 2															
4																
5																
6																
7																

**Figure 4.17**  
**Block Transfer Worksheet for the Sample Application—only page 1 is shown, page 2 is left empty**

**Block Transfer I/O Usage Worksheet (Page 1 of 2)**

Application File Name: Sample Application  
Block Transfer File Number: 1 ☒ 3 4 5 (Circle One)  
Number of Words: 5  
READ (PLC Inp) or **WRITE (PLC Out)** (Circle One)

PLC Bit Numbers																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	From Word 5 to 31 is unused as illustrated in Word 5 & 6															
8																
9																
10																
11																
12																
13																
14																
15																



**Figure 4.18**  
**PLC Communications Worksheet for the Sample Application**

**PLC Communications Worksheet**

Application File Name: Sample Application

PLC/Scanner Type: PLC 2/30 1771 – SD2

Baud Rate: 57.6K (10,000 Ft)      115.2K (5,000 Ft)      230.4K (2,500 Ft)

**Note:** You must make at least one rack assignment. Additional rack assignments (up to a maximum of 8) are optional. Write in the Rack Number and circle appropriate Rack Size, Starting Module Group, and Last Rack designation.

**Rack Assignments**

Rack Number	Rack Size				Starting Module Group				Last Rack	
	<u>1/4</u>	1/2	3/4	1	<u>0</u>	2	4	6	Y	<u>N</u>
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N

**Note:** Block Transfers are optional. Circle the Block Transfer File Number, write in one of the rack numbers from above, circle the appropriate Module Group and Byte, and fill in the Block Transfer file size.

**Block Transfer Assignments**

Block Transfer File Number	Rack Number	Module Group	Byte	No. Words
1		0 1 2 3 4 5 6 7	Hi Lo	
2		0 1 2 3 4 5 6 7	Hi Lo	
3		0 1 2 3 4 5 6 7	Hi Lo	
4		0 1 2 3 4 5 6 7	Hi Lo	
5		0 1 2 3 4 5 6 7	Hi Lo	
Pass-Through				30

#### After Planning the Application, Create the Application File

Once the application is planned, the next step is to use PanelBuilder to create the application file. For a detailed description of the steps involved in creating the application file, see Chapter 5, *Creating a Sample Application*. The steps, in general, are the following:

1. Start the PanelBuilder program and create a new (empty) application file. Name the file and select the PanelView terminal type.

**IMPORTANT:** Be sure to specify the correct PanelView terminal type (monochrome/color; keypad/touch screen). The menu selections are different for each type of terminal. Also Keypad terminal files cannot be converted to Touch Screen files and vice versa.

2. Specify the PLC controller and I/O Scanner type.
3. Define the rack and block transfer assignments.

**IMPORTANT:** PanelBuilder checks your rack and block transfer assignments against your choice of PLC controller and I/O Scanner. It also checks the PLC addresses assigned to your objects, windows, and PLC controlled options, against your rack and block transfer assignments.

4. Configure the windows.
5. Create your screens.
6. If you plan on creating a password security system, assign security levels to your screens.
7. Define any PLC controlled options that you want to include.
8. Specify the Powerup screen.
9. Download the application file to the PanelView terminal.
10. Modify your PLC program so that it recognizes the PanelView terminal application.
11. Verify the operation of the PanelView terminal before using it to control your process.

## Creating A Sample Application File

This chapter illustrates and describes the steps involved in creating an application file. It follows from the worksheets developed in Chapter 4, *Planning Your Application*, which allow an operator to:

- turn five conveyor belts on and off
- select one of five pumps and turn it on or off. The pumps maintain the pressure (PSI) in the associated vessels. The operator can monitor the pressure of each vessel

This chapter is written as a tutorial. Read it in sequence even if you don't follow every instruction. It is important to understand each step, and the sequence, when creating application files.

### Start up PanelBuilder

Power up the computer. The AUTOEXEC file on the development computer may be set to switch to the PanelBuilder directory and start the program. If not, you'll have to do it manually. If you installed PanelBuilder on drive C, as described in Chapter 2, *Installing PanelBuilder*, type:

**C:** *press Enter*

**CD PDS** *press Enter*

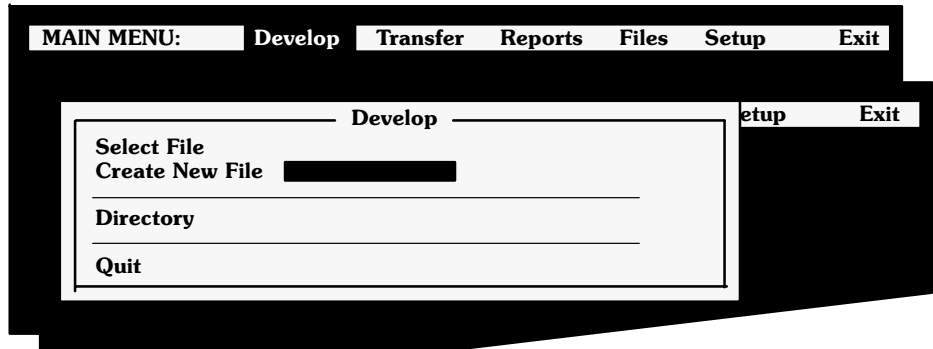
**PDS** *press Enter*

### Step 1: Create the Application File

The first step is to create an empty application file.

1. Choose *Develop* from the Main menu.
2. Highlight *Create New File*, and press **Enter**.

**Figure 5.1**  
**The Develop Menu**



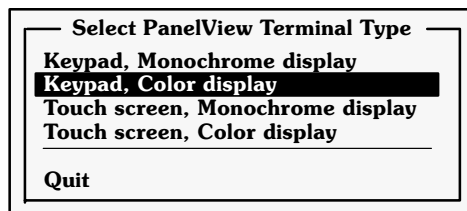
21031

3. Type the name for the new file, *EXAMPLE* and press **Enter**.

PanelBuilder automatically adds the file extension CFG to names of application files.

4. Now specify the type of PanelView terminal that will run your application. For this sample file, specify a color keypad terminal. Press **Enter** to make the choice.

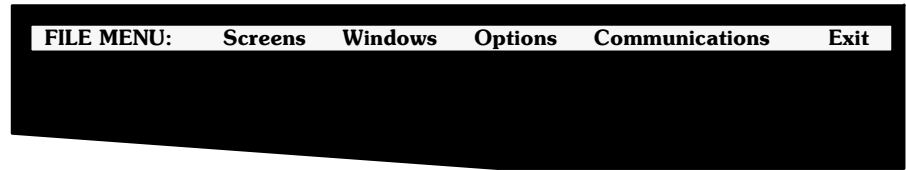
**Figure 5.2**  
**Selecting the Type of Terminal**



20033

An Information Window will appear, advising you that you've created a new application file for a keypad terminal. Press any key to clear the window, and you'll see the File menu.

**Figure 5.3**  
**The File Menu**



20034

**IMPORTANT:** The file size of the application file is displayed in the lower left corner of the screen. This is not the DOS file size on disk: it's the amount of memory the file will require in the PanelView terminal. As you add and edit screens, objects and messages, this number will change to reflect the current file size.

## **Step 2: Configure PLC Communications**

The application file has been created; now define your PLC communication requirements. PanelBuilder needs this information to calculate I/O addresses for each object. If you filled out the worksheets, all the information you need is in the PLC Communication Worksheet.

For this sample application you'll set up for a PLC-5/15, using a quarter of a rack. It will be rack number 1, starting module 0. As well, you'll define one block transfer file.

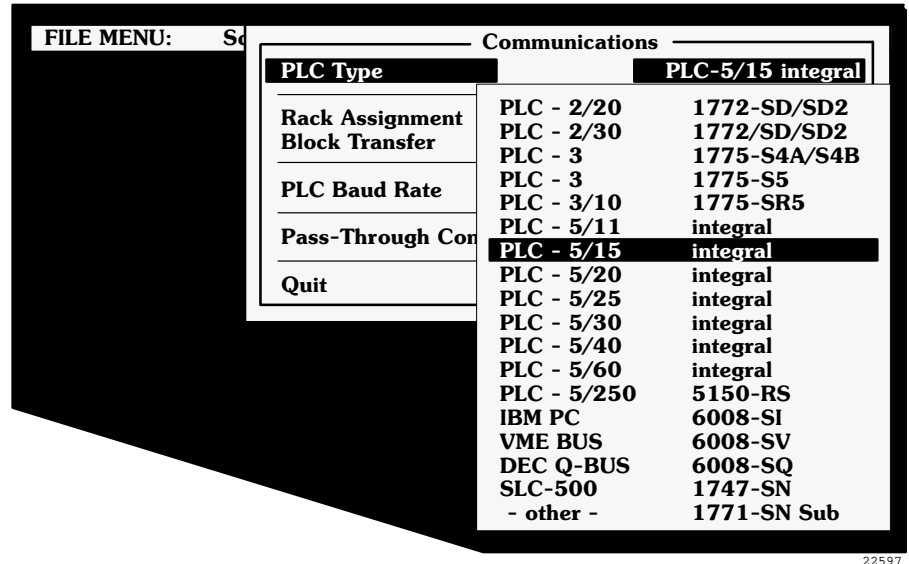
### **Define PLC Type**

1. Select *PLC Type* from the Communications menu, and press **Enter**.

A list of PLC and scanner types appears.

2. Choose *PLC-5/15 integral* from the list.

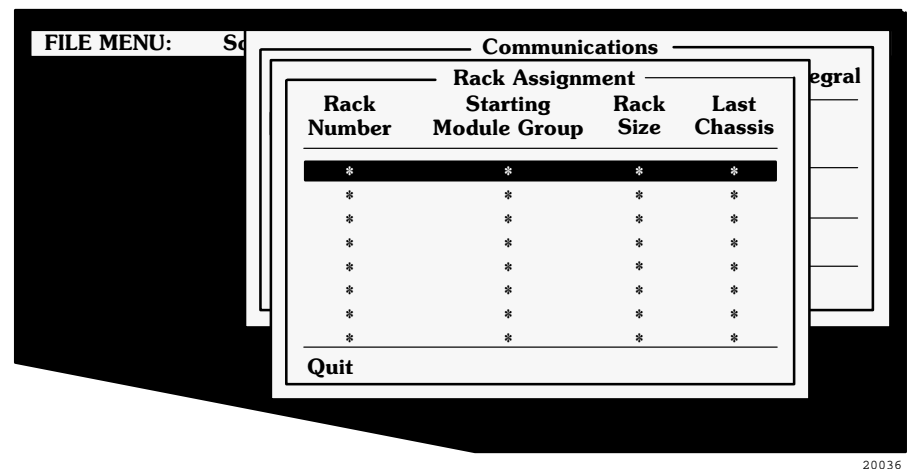
**Figure 5.4**  
Selecting PLC Type



## Define Rack Assignments

1. Choose *Rack Assignment* from the Communications menu to open the Rack Assignment window.

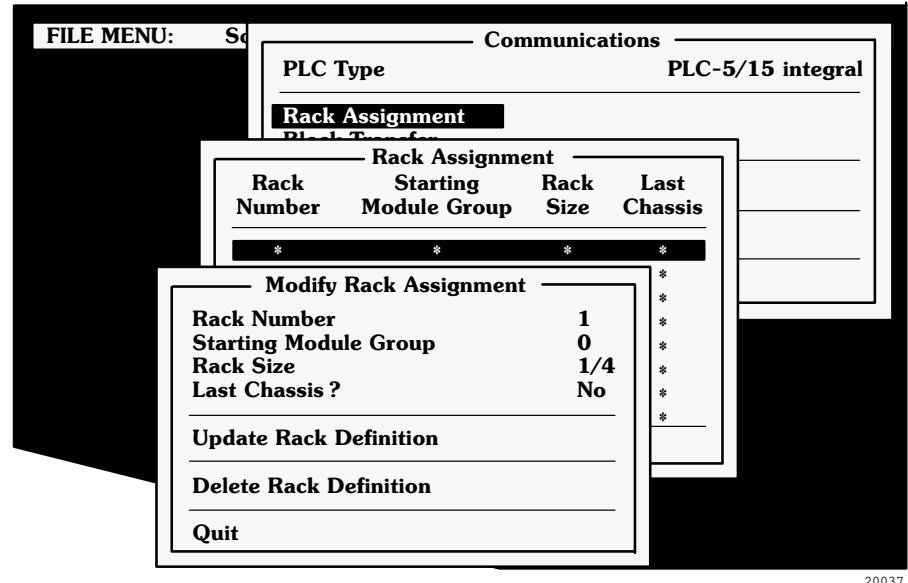
**Figure 5.5**  
Rack Assignments



2. The first rack will be highlighted. Choose it by pressing **Enter**.

The Modify Rack Assignment window will appear.

**Figure 5.6**  
**Modify Rack Assignments**



20037

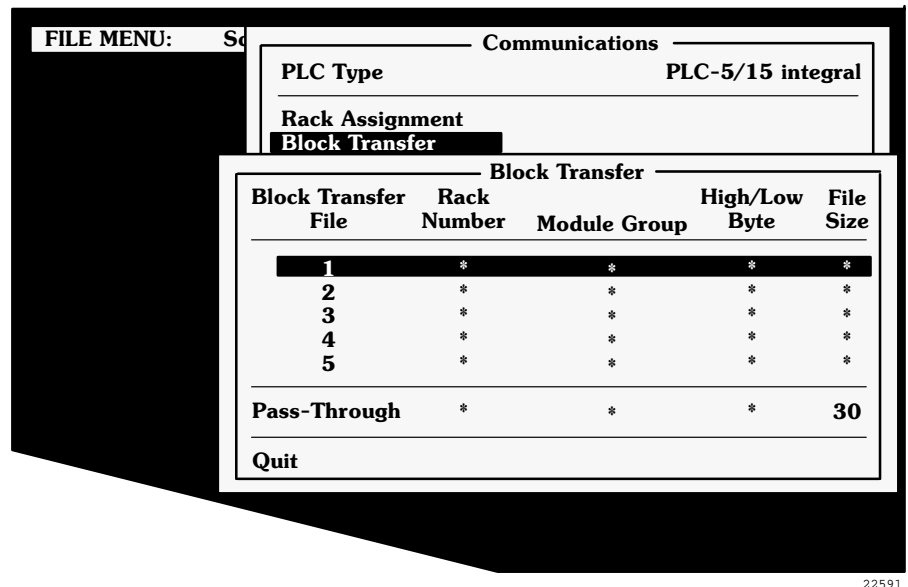
3. Go through each option, and make the following settings:
  - a. Set *Rack Number* to 1.
  - b. Set *Starting Module Group* to 0.
  - c. Set *Rack Size* to 1/4.
  - d. Set *Last Chassis?* to No.
4. Save the settings: press **Enter** on *Update Rack Definition*.

Since you only want to assign one rack, choose *Quit* from this window to return to the Communications menu where *Block Transfer* will be highlighted.

## Define Block Transfer Files

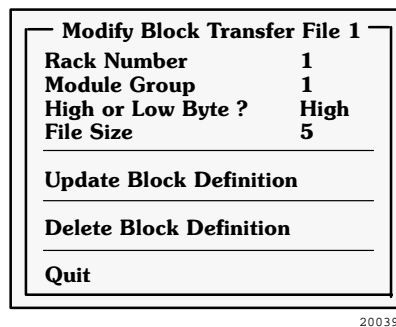
1. Choose *Block Transfer* in the Communications menu. The Block Transfer window opens with the first block transfer file highlighted.

**Figure 5.7**  
The Block Transfer Window



2. While 1 is highlighted, press **Enter**. The Modify Block Transfer window opens, set for File 1.

**Figure 5.8**  
Modify Block Transfer Window



3. Go through each option, setting them as follows:
  - a. Set *Rack Number* to 1.

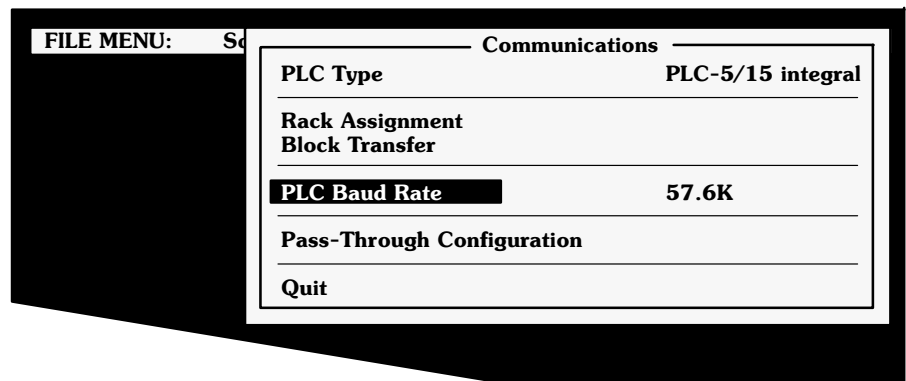


- b. Set *Module Group* to *1*.
  - c. Set *High or Low Byte* to *High*.
  - d. Set *File Size* to *5*. This sets the size of the block transfer to 5 words.
4. When the parameters are set, select *Update Block Definition* and press **Enter** to save the changes and return to the Block Transfer window.
5. Choose *Quit* to return to the Communications menu.

### Set the Baud Rate

1. Choose *PLC Baud Rate* from the Communications menu to set the baud rate for PLC communication.

**Figure 5.9**  
**Communications Menu**



22040

2. Set PLC Baud Rate to *57.6K*, and press **Enter**.
3. Choose *Quit* to save the setting and return to the File menu.

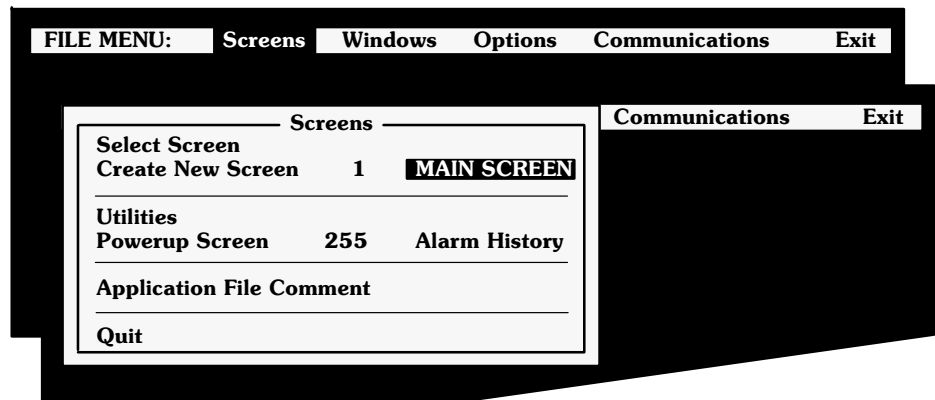
### Step 3: Create the Screens

With the communications set up, you can create the screens that were planned in the worksheets in Chapter 4, *Planning Your Application*.

#### Screen 1: MAIN SCREEN

1. The first screen automatically becomes Screen 1. To create it, choose *Screens* from the File menu.

**Figure 5.10**  
The Screens Menu



20041

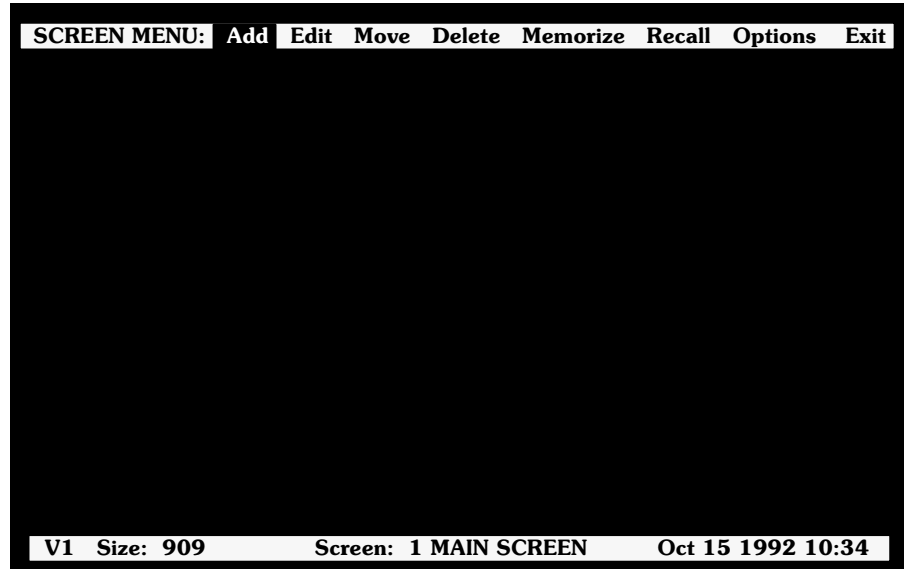
2. Choose *Create New Screen* and press **Enter** to open the screen number field.
3. Press **Enter** to open the screen name field.
4. Type in the name MAIN SCREEN and press **Enter** again.

**IMPORTANT:** Each screen is automatically numbered, but any unused screen number can be entered.

Once the screen is named, the Screen menu appears. The screen is empty because no objects have been defined yet. The name of the screen is displayed at the bottom.

**IMPORTANT:** As you add or edit screens and objects, PanelBuilder updates the “Size” display, which shows the amount of memory the application will require in a PanelView terminal. As you add screens and objects, this number increases. The version compatibility is also shown: a lower version application file runs only on the same or higher version terminal. For example, a version 3 application will run on version 3, 4 or 5 terminals, but not on version 1 or 2 terminals. (See .)

**Figure 5.11**  
**Screen Menu**



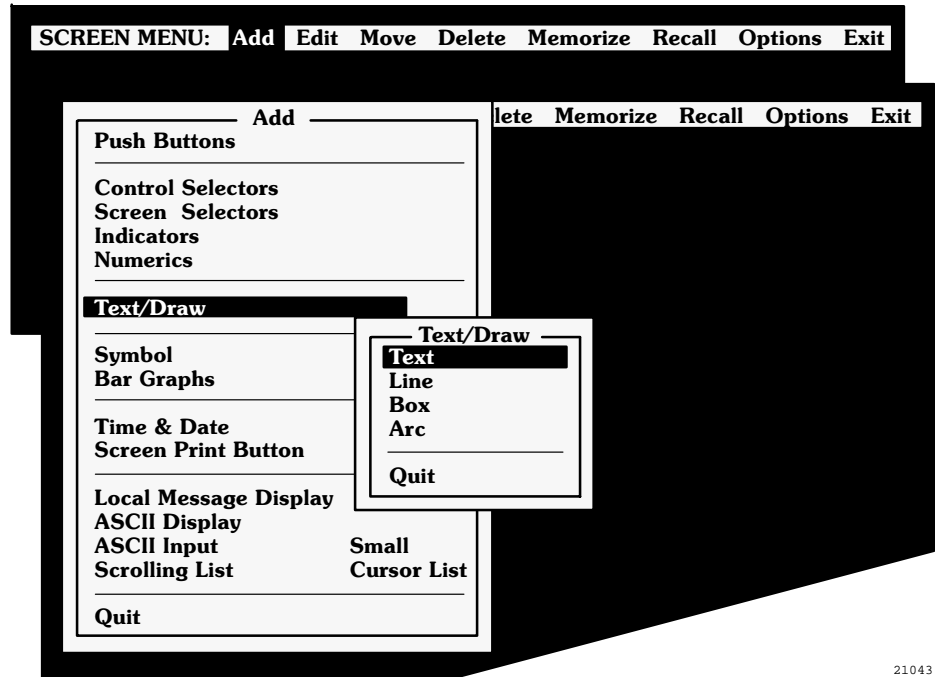
22042

### **Make the Title**

First, create a title on the screen. This will be a Text object since it will be used to identify the screen. The title will not be part of a button, selector, or the like.

1. Choose *Add* from the Screen menu,
2. Then choose *Text/Draw* from the Add menu.

**Figure 5.12**  
**The Text/Draw Menu**

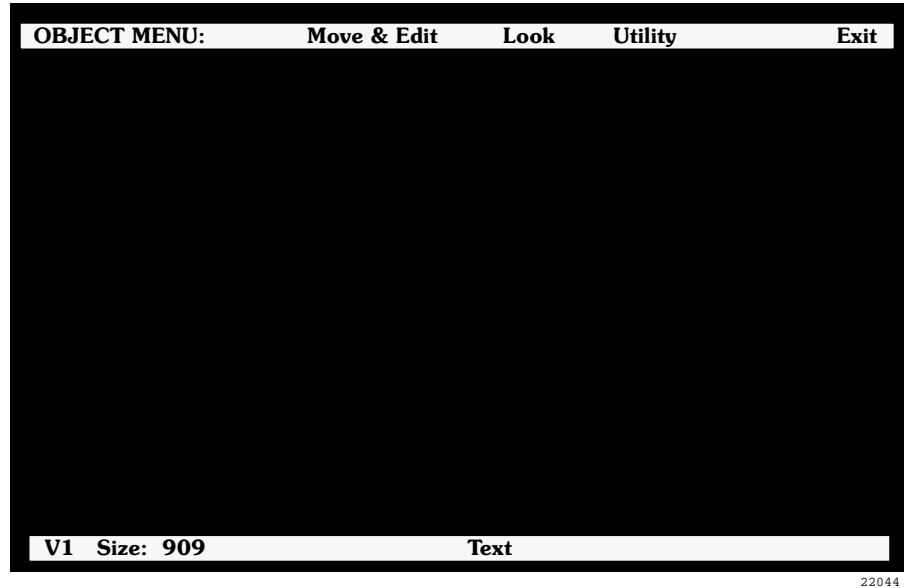


21043

3. Text /Draw lists the four objects available in this menu. Choose *Text* from the list.

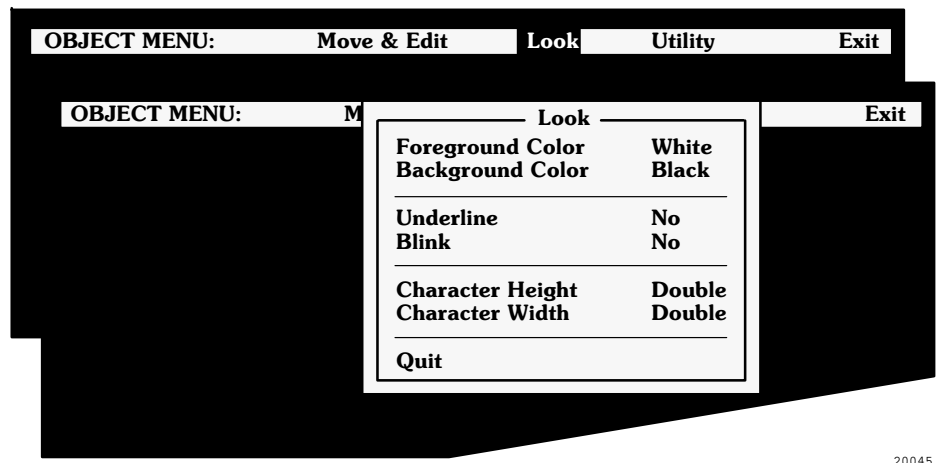
The Object menu appears, with the name of the object you're working on shown at the bottom.

**Figure 5.13**  
The Object Menu for Text



4. Set the attributes for the text before you type the title itself. Choose *Look* from the Object menu and set the parameters as detailed below.

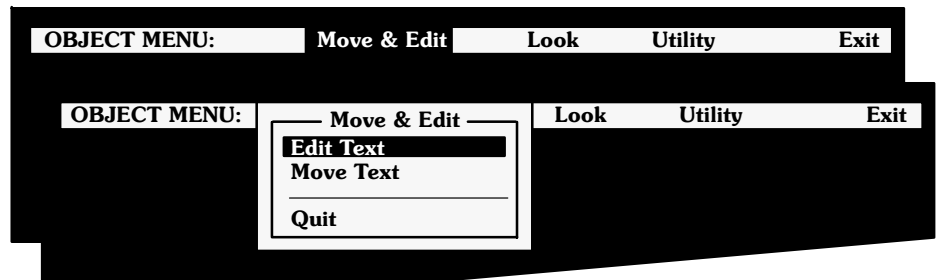
**Figure 5.14**  
The Look Menu



- a. Set the Foreground Color to *White*.
- b. Set the characters to double height and width.
- c. Choose *Quit* (or press **Esc**) to save the settings and return to the Object menu.

5. Now, type the text for the title:
  - a. Choose *Move & Edit* from the Object menu.
  - b. Then choose *Edit Text* from the Move & Edit menu.

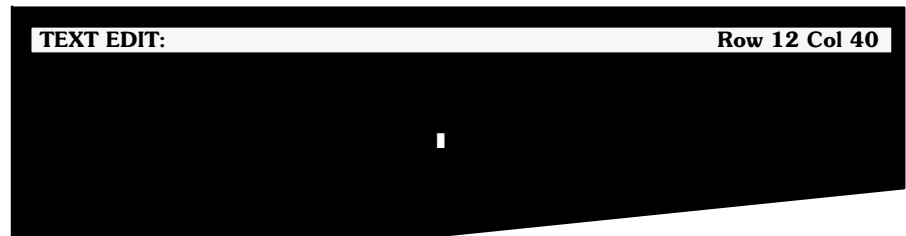
**Figure 5.15**  
The Move & Edit Menu



20046

The empty screen you're working on appears, with the title "TEXT EDIT" at the top, and a flashing cursor in the center.

**Figure 5.16**  
Text Edit Mode



20047

- c. Type the title *MAIN SCREEN*. It appears at the flashing cursor in the middle. The dots under and beside the characters indicate that they are double height and double width.

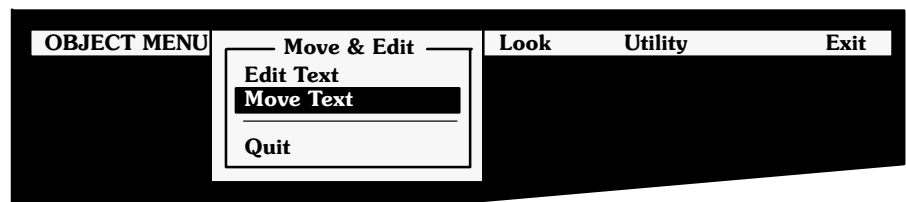
Figure 5.17  
Text Edit Mode with Title



20048

Press **Enter** when the title has been typed and the Move & Edit menu will reopen.

Figure 5.18  
Move & Edit Menu



22049

6. Choose *Move Text* to position the title. According to the worksheet, the title should be placed at Row 10, Column 28.

The exact screen position of the first character in the line is indicated at the top right of the screen. Press the arrow keys to move the title into place.

Figure 5.19  
Moving The Title Text



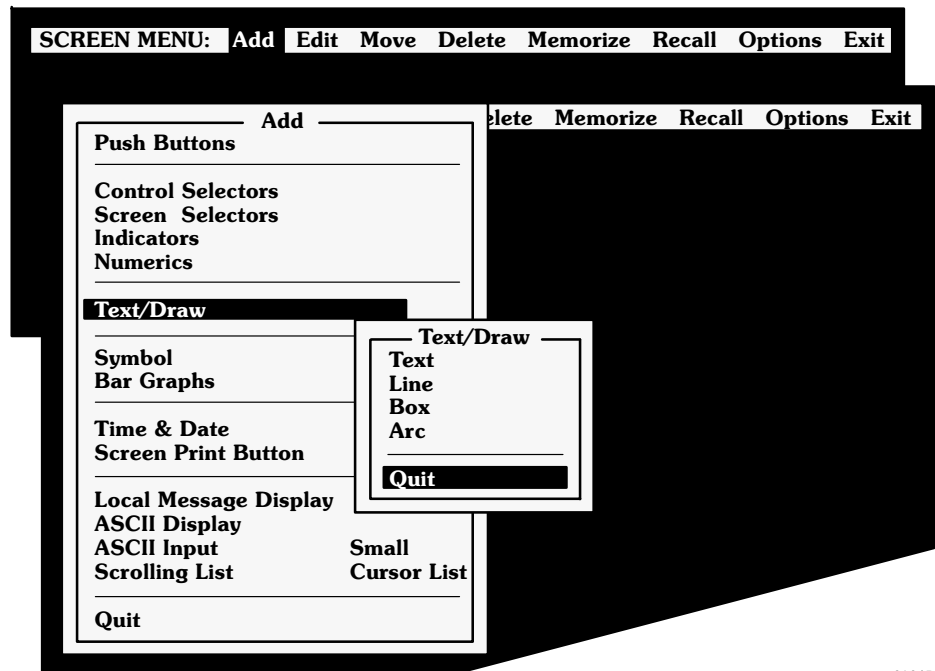
22050

When the title is in position, press **Enter**.

7. Choose *Quit* (or press **Esc**) to close the Move & Edit menu and return to the Object menu.

8. Choose *Exit* from the Object menu, and choose *Exit and Save Object*, to return to the Text/Draw menu.
9. Choose *Quit* (or press **Esc**) to get back to the Add menu, so you can add more objects to the screen.

**Figure 5.20**  
The Text/Draw Menu



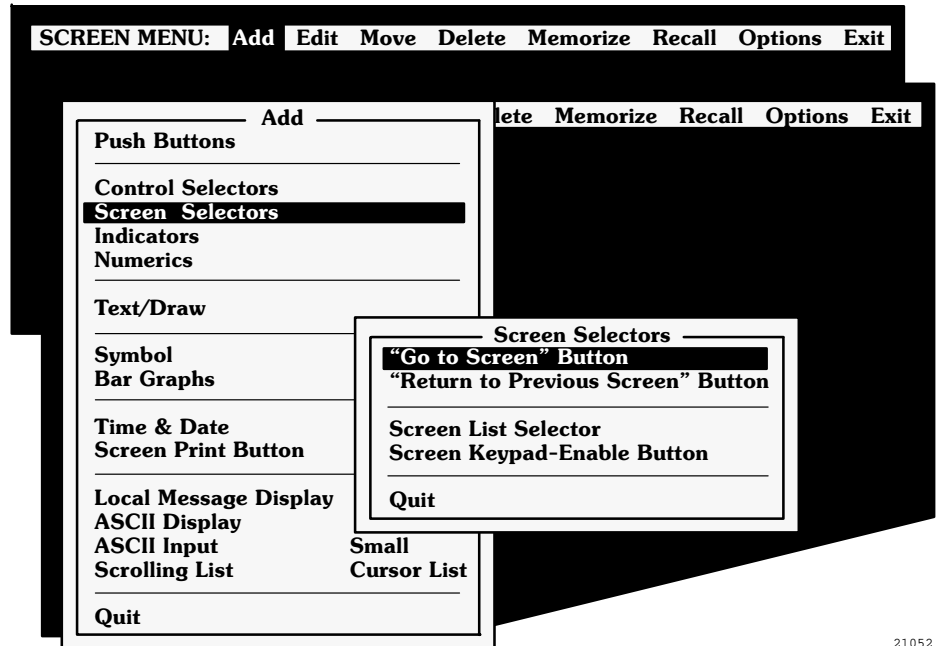
21245

### Add Two “Go To Screen” Buttons

1. Choose *Screen Selectors* from the Add menu, then “*Go to Screen*” Button.



**Figure 5.21**  
The Add Menu and Screen Selectors



21052

Once you have selected the "Go To Screen" button, the Object menu opens for editing.

**Figure 5.22**  
Editing the Go To Screen Button

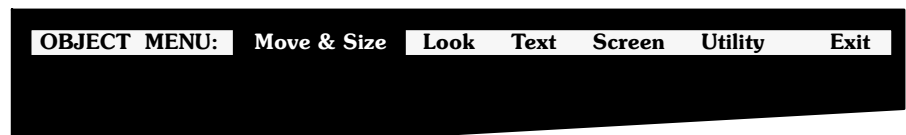


22054

In the center of the screen is what appears to be an empty box. This is the “Go To Screen” Button, which hasn’t yet been given any attributes. It’s partially covering the title, so move it out of the way; two objects cannot overlap.

2. Choose *Move & Size* from the Object menu to place the object, to size it to the required dimensions, and to link it to a function key.

**Figure 5.23**  
**Move and Size**



20055

3. Choose *Move* to position the button. The cursor is at the top left corner of the button—the position identified at the top of the screen. According to the worksheet, the top left corner of the button should be at Row 0, Column 69 (see Figure 4.8). Move the object with the arrow keys. When it is in place, press **Enter**.
4. Choose *Size* and use the arrow keys to stretch the button’s height and width. Set the button to a width of 11 and a height of 4, then press **Enter**.
5. Choose *Function Key* to link the button to one of the function keys on the PanelView terminal. The worksheet indicates this button should be linked to function key number 17. Type in the number and press **Enter**.

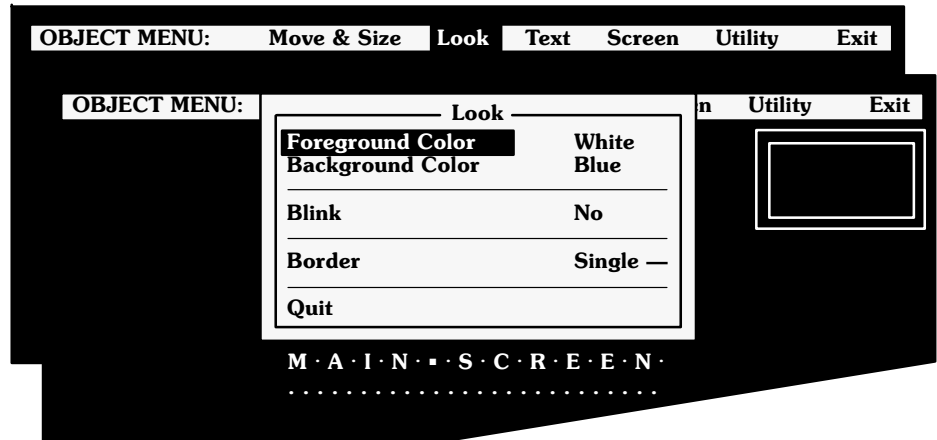
**IMPORTANT:** These instructions are for setting up a Keypad terminal. The Touch Screen terminal has no menu item corresponding to the Function Key item .

6. Choose *Quit* to save your work and close the Move & Size menu.

The button is now in position, but needs an identifying label, as well as color and a border.

7. Choose *Look* from the Object menu.

**Figure 5.24**  
The Look Menu

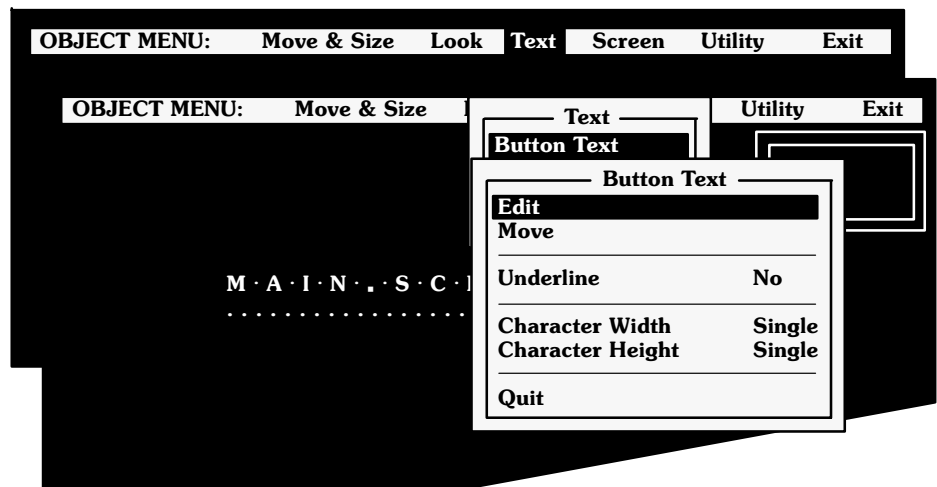


22056

Once the Look menu is open, make the following settings:

- a. Choose *Background Color* and set it to *Black*.
  - b. Choose *Border* and set it to *Double*.
  - c. Choose *Quit* to save the settings and leave the Look menu.
8. For the button's label, choose *Text* and then *Button Text*.

**Figure 5.25**  
The Text Menu

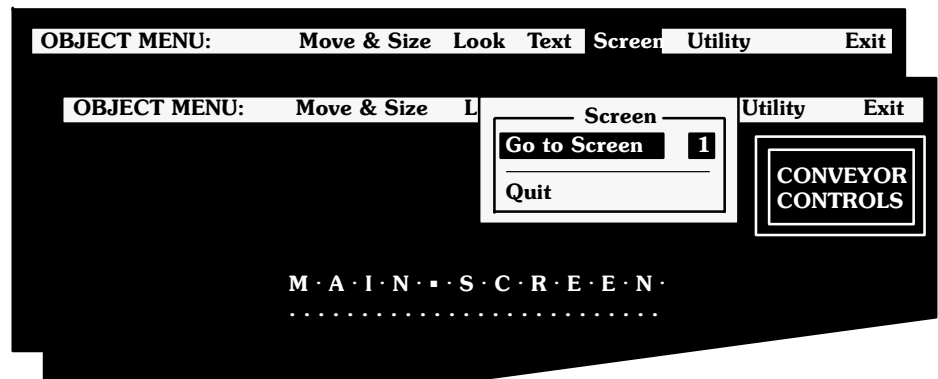


20057

9. Choose *Edit*. The cursor appears on the screen, inside the button.

10. The label takes up two lines inside the button. Type the first word, *CONVEYOR*. Then use the arrow keys to move the cursor back to the beginning of the second line and type *CONTROLS*. Press **Enter** after both lines are typed.
11. Choose *Quit* to close the Button Text menu. Choose *Quit* again to close the Text menu. The button is now positioned and labeled. The next step is to set the function by naming the screen that the button will call.
12. Open the Screen menu, and choose *Go To Screen*.

**Figure 5.26**  
The Screen Menu



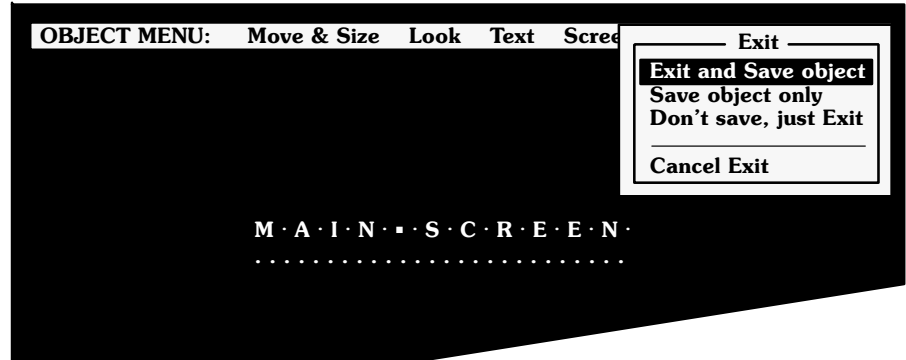
20058

13. The CONVEYOR CONTROLS screen—which is not yet created—is screen 2. Type the number 2 beside Go to Screen, and press **Enter**.

The first “Go To Screen” button is now defined.

14. Choose *Quit* (or press **Esc**) to close the Screen menu and return to the Object menu. Choose *Exit* from the Object menu, then choose *Exit and Save Object*.

**Figure 5.27**  
**The Exit Menu**



22059

### **Add the Second “Go To Screen” Button**

Use the same steps to create the second button—with the following changes:

1. Position the button at Row 5, Column 69.
2. Link function key 18 to the button.
3. Label the button *PUMP CONTROLS*.
4. Set the button to call Screen 3.
5. Exit and save the object.

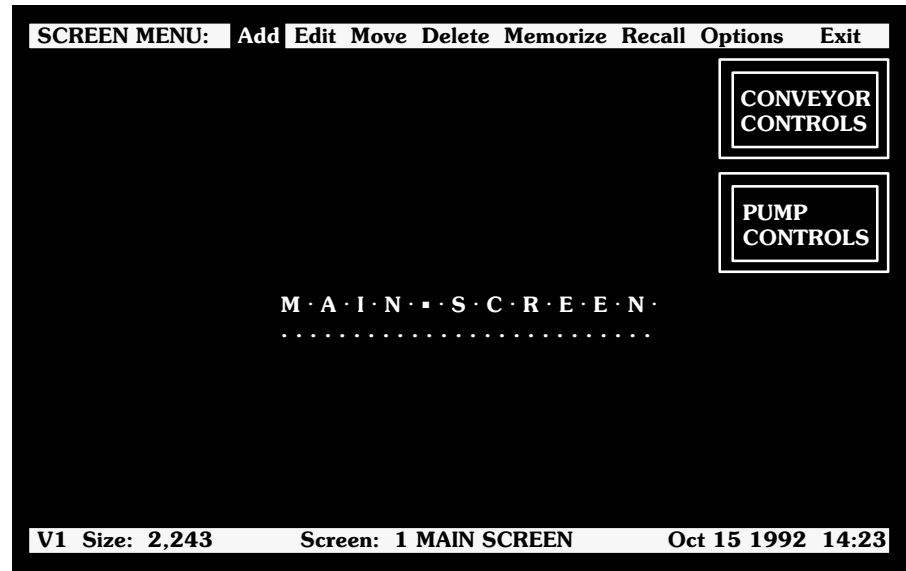
### **Save the Screen**

The screen now has a title and two buttons. To save it in the application file:

1. Choose *Quit* in both the Screen Selectors and the Add menus.
2. Then choose *Exit and Save Screen* from the Exit menu.

The completed screen should look like the one below.

**Figure 5.28**  
The Main Screen (Screen 1) with Two Buttons and Title



22062

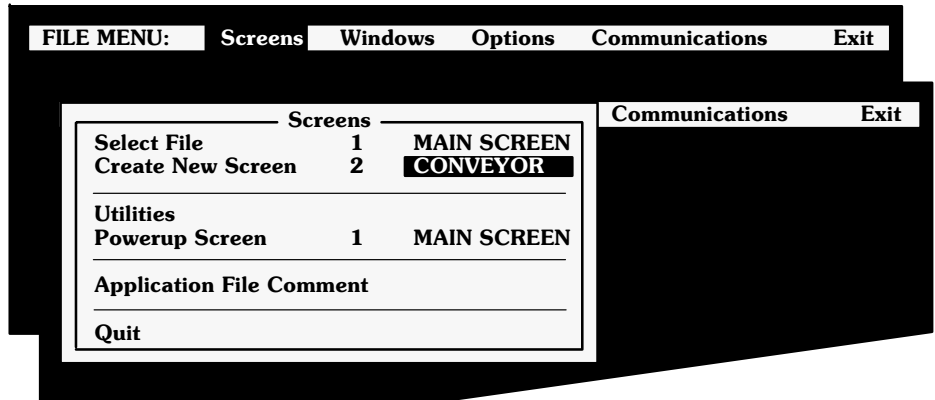
3. Choose *Exit* from the Screen menu.
4. Choose *Exit and Save Screen* from the Exit menu. You will return to Screens in the File menu.

## Screen 2: CONVEYOR CONTROLS

Creating the second screen follows many of the steps used to create Screen 1.

1. Choose *Create New Screen*.
2. Type in the the screen number **2** and press **Enter**.
3. Type the name **CONVEYOR** and press **Enter**.

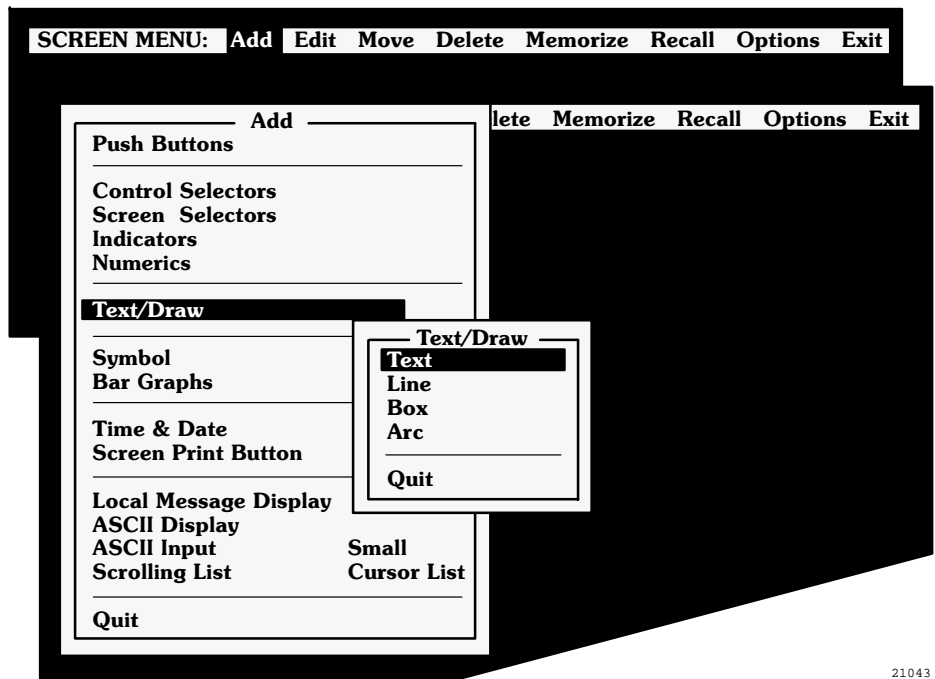
**Figure 5.29**  
The Screens Menu



20061

4. Next, place a title on the screen.
  - a. Choose *Text/Draw*.
  - b. Then choose *Text* from the Text/Draw menu.

**Figure 5.30**  
The Text/Draw Menu



21043

5. Use the Look menu to set the text's attributes.

- a. Set the Foreground text to *White*.
- b. Set Character Height and Character Width both to *Double*.

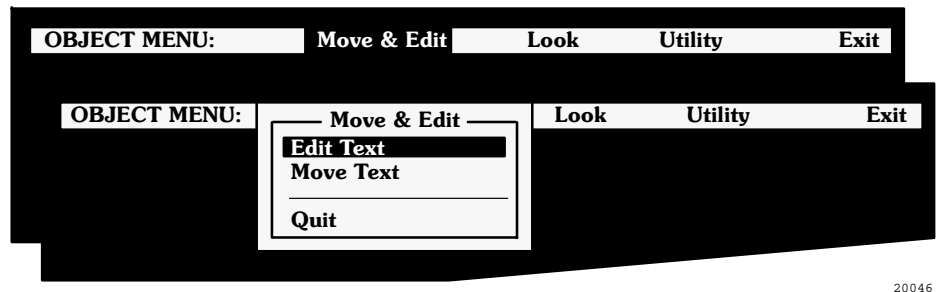
**Figure 5.31**  
**The Look Menu**

Look	
Foreground Color	White
Background Color	Black
Underline	No
Blink	No
Character Height	Double
Character Width	Double
Quit	

20065

6. Open the Move & Edit menu and choose *Edit Text*.

**Figure 5.32**  
**Move and Edit Menu**



7. Type the title. It will appear on the screen with dots representing its double height and width. Press **Enter**.

**Figure 5.33**  
**Screen Title Text Object**





8. Choose *Move Text*, then use the arrow keys to move the title into position. The worksheet indicates that the title's top left corner should be at Row 11, Column 17. Press **Enter**.
9. Once the title is in place, go to the Exit menu and choose *Exit and Save Object*.
10. Then choose *Quit* in the Text/Draw menu. This returns you to the Add menu.

### Add One Momentary (Normally Open) Push Button

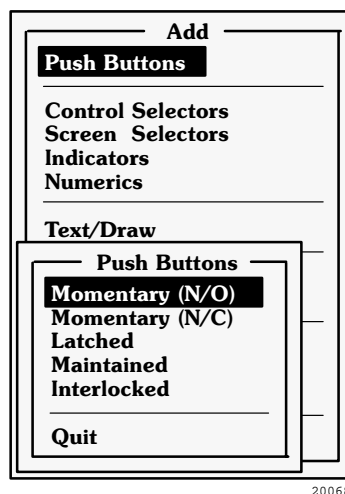
Screen 2 has ten push buttons: five Momentary (Normally Open) push buttons, and five Momentary (Normally Closed) push buttons. Follow these steps to create one Momentary (Normally Open) push button. Then make the others in the same way. Check the worksheets for the different attributes of the various buttons you are creating.

The Momentary (Normally Open) push button is the On button for the front conveyor.

To add it to the screen:

1. Choose *Push Buttons* from the Add menu.
2. Choose *Momentary (N/O)* from the Push Buttons menu.

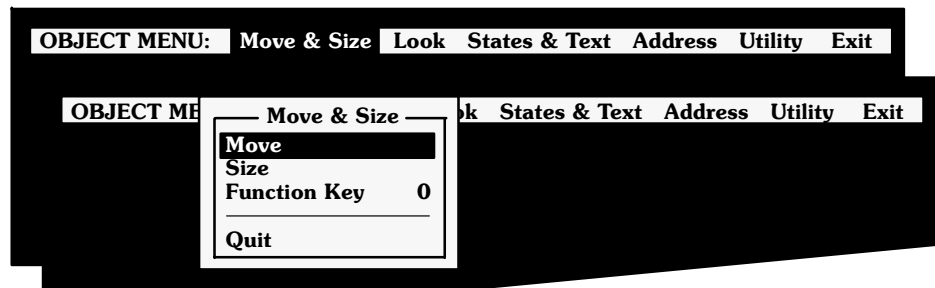
**Figure 5.34**  
**The Push Buttons Menu**



Once the button is selected, it appears on the screen as an empty square.

Open the Move & Size menu and set the parameters as follows:

**Figure 5.35**  
**The Move and Size Menu**



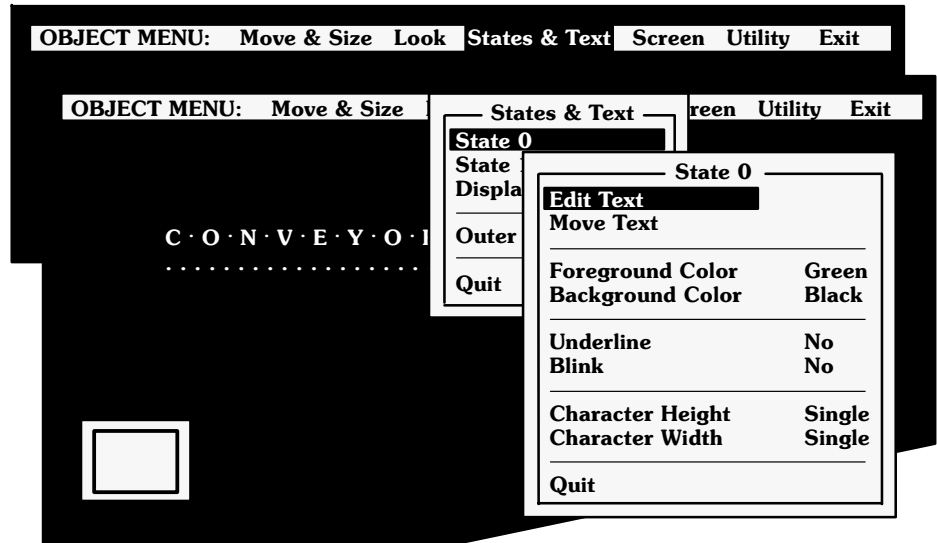
20077

1. Choose *Move* from the Move & Size menu and use the arrow keys to place the button at *Row 16, Column 11*.
2. Choose *Size*, and use the arrow keys to shrink the button to *Width 8, Height 3*.
3. Choose *Function Key* and link the button to *Function Key 2*.

The next step is to open the *States & Text* menu to label the button. This button has two states:

- State 0 indicates the Front Conveyor is Off
- State 1 indicates the Front Conveyor is On

**Figure 5.36**  
The States and Text Menu



20069

Set the parameters for the button's two states.

#### Set State 0

1. Choose *State 0* to open the State 0 menu.
2. Set the *Character Width* to *Double*.
3. Choose *Edit Text* and type the label for the state, *OFF*. Press **Enter**.
4. Set the *Foreground Color* to *Green*. (This option is available in color terminals only. )
5. Choose *Quit* to return to the States & Text menu.

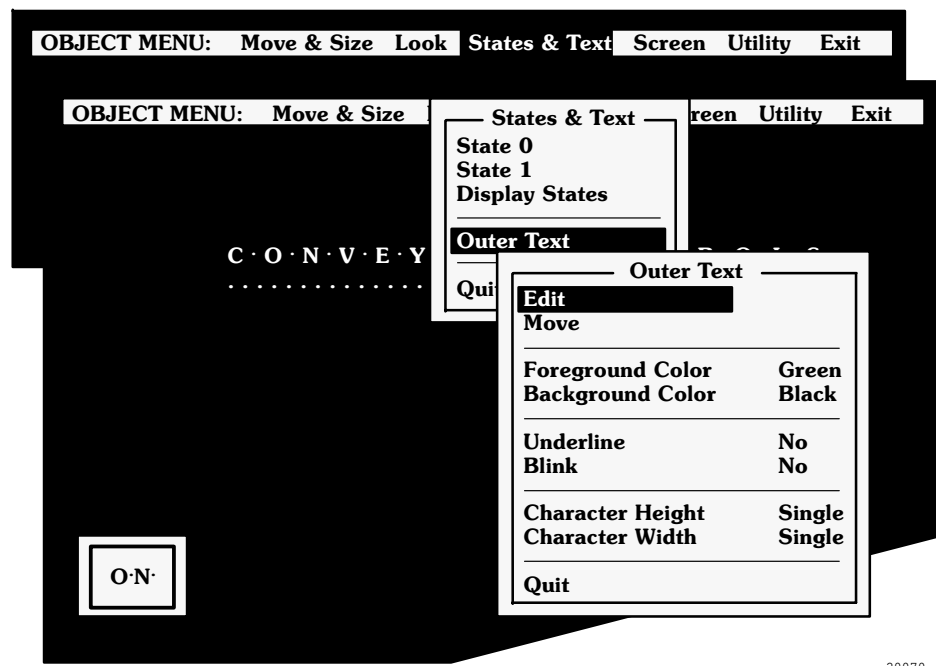
#### Set State 1

1. Choose *State 1* to set the second state for the button.
2. Set the *Character Width* to *Double*.
3. Choose *Edit Text* and type the label *ON*.
4. Set the *Background Color* to *White* so the button turns white when the conveyor is in the On state.
5. Choose *Quit* to return to the States & Text menu.

Indicate that the button is for the front conveyor. Since this label is an identifier and not part of the button's On/Off state, use Outer Text—it is linked to the button, but not inside it.

1. Choose *Outer Text* from the States & Text menu. The Outer Text menu will appear.

**Figure 5.37**  
Outer Text Menu




20070

2. Choose *Edit* and type *FRONT*, then press **Enter**.
3. Choose *Move* and center the legend above the button.
4. Choose *Foreground Color* and set it to *White*.

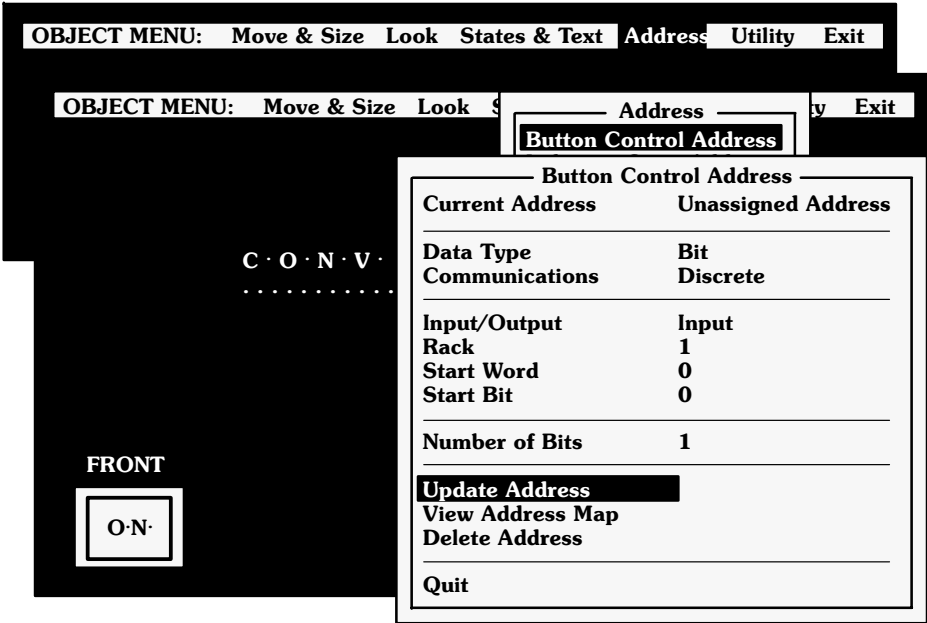
Once the parameters are set, define the PLC addresses for this push button.

1. Open the Address menu.
2. Choose *Button Control Address*.

The addresses for this push button are in the Object Address list shown in Figure 4.14, Chapter 4, *Planning Your Application*.

Set the Button Control Address window as illustrated in , then choose *Update Address*.

**Figure 5.38**  
**The Address Menu**

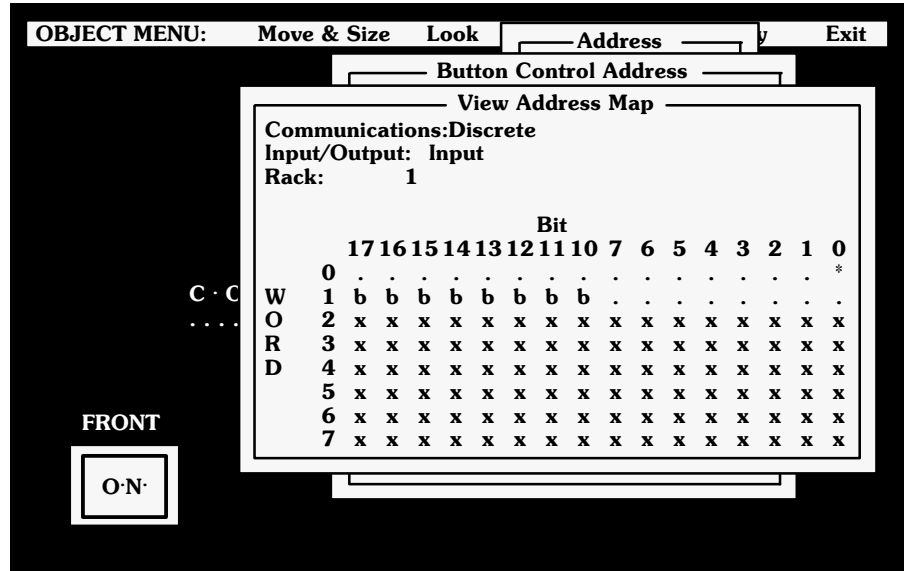


20071

You may have noticed that the cursor skipped over some selections in the menu. The Data Type, Input/Output designation, and Number of Bits are fixed for Push Buttons.

Choose *View Address Map* from the Button Control Address menu; the following screen will appear.

**Figure 5.39**  
**Setting the Address Map for Rack 1**



The Address Map indicates the amount of space you've allocated in the Input Image Table for rack 1. Table 5.A explains the different symbols used in the Address Map.

### Table 5.A Symbols Used in the Address Map

<b>This symbol:</b>	<b>means:</b>
<b>x</b>	the bits are outside the available address range. They show the modules that were NOT allocated to the PanelView terminal
<b>.</b>	the bits are still available
<b>*</b>	the bits that have been allocated to Objects, Windows, and PLC Control Options
<b>b</b>	the bits that have been used as a block transfer control byte

In the Address Map, you can see the one bit that was allocated for the push button in the Input Image Table.

Press **Esc** to remove the Address Map from the screen, then choose *Quit* to close the Button Control Address menu.

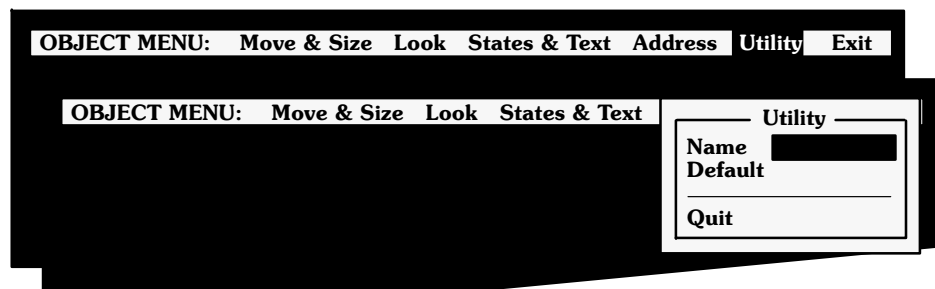
From the Address menu, choose *Indicator State Address*. You'll find the addresses on the Object Address List shown in Figure 4.14, Chapter 4, *Planning Your Application*.

To define the address:

1. Choose *Communications* and then *Discrete*.
2. Choose *Input/Output*. For the Indicator State Address, you have the choice of selecting either an input or output address. Choose *Output*.
3. Choose *Rack* and then *1*.
4. Choose *Start Word* and type *0*.
5. Choose *Start Bit* and type *0*.
6. Choose *Update Address*. You'll see the current address displayed on the top line of the Indicator State Address window. Choose *Quit* to close the Indicator State Address and Address menus.

Open the *Utility* menu, and choose *Name*.

**Figure 5.40**  
**The Utility Menu**



20074

Type the name *FRONT ON*. The name identifies the object for documentation purposes—it is printed at the bottom of the screen when you select the object for editing, and it is included in the object's listing in printed reports.

When you're finished, choose *Quit*, then *Exit*, then *Exit and Save Object*. You are now at the Push Buttons menu.

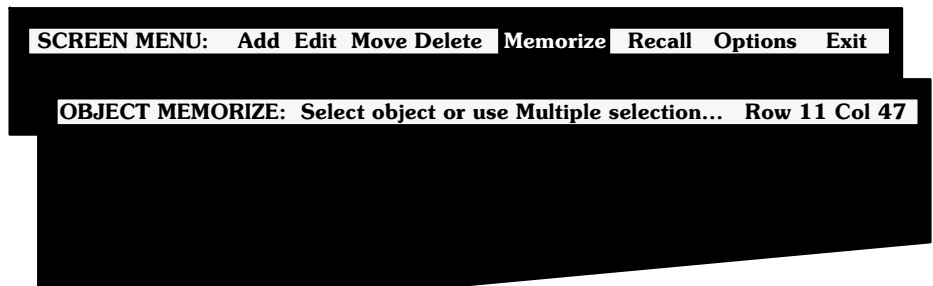
### **The Remaining Momentary (Normally Open) Push Buttons**

Use the Memorize and Recall functions to create the remaining four Momentary (Normally Open) Push Buttons.

1. Close both the Push Buttons menu and the Add menu to go back to the Screen menu.

2. Choose *Memorize* to begin the memorize operation.

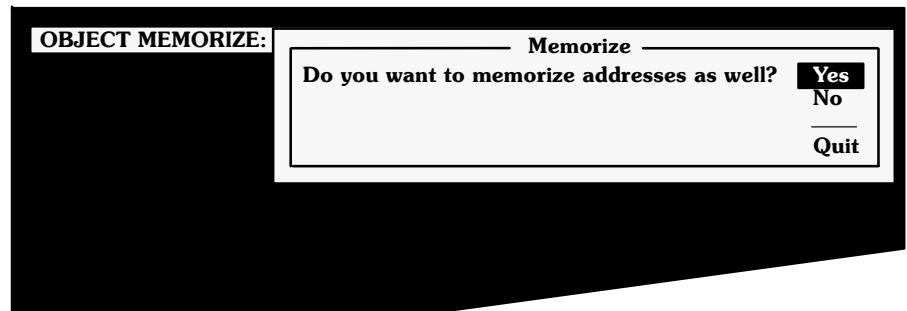
**Figure 5.41**  
**Object Memorize Screen**



20075

3. Use the arrow keys to position the flashing cursor over the Momentary (Normally Open) Push Button you just created, and press **Enter**.

**Figure 5.42**  
**The Memorize Prompt**



20244

4. The memorize prompt will appear asking if you want to memorize the button's address as well. Choose *No* and press **Enter**.
5. The button, its labels and all its attributes (except its address) are copied into the computer memory. Now choose *Recall*.

**Figure 5.43**  
**Recall Option**



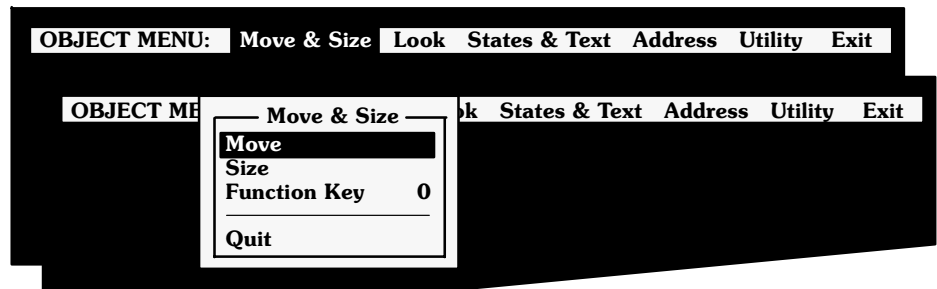
20076



- A copy of the push button is placed on the screen, but at first it can't be seen since it's directly on top of the original one. To see the new button, you have to move it aside.

Choose *Move & Size* and then *Move*.

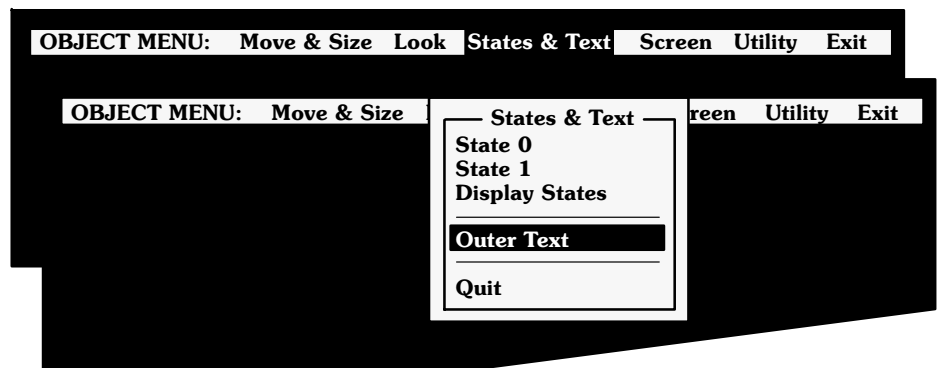
**Figure 5.44**  
The Move and Size Menu



20077

- Position the new button to the right of the previous one.
- Choose *Function Key* and enter the appropriate function key number (see ).
- Choose *Quit* or press **Esc** to close the menu.

**Figure 5.45**  
States and Text Menu

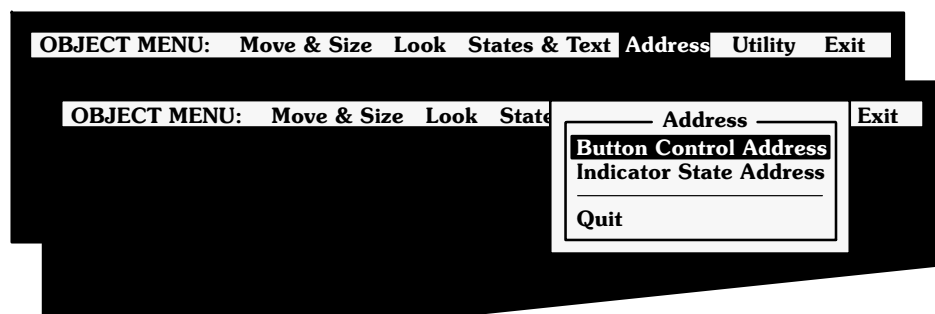


20192

- Choose *States & Text* from the Object menu.
- Choose *Outer Text*.
- Change the text above the button to match the plan in the worksheet in Chapter 4 (see ).

13. Choose *Quit* to close the States & Text menu.
14. Choose *Address* from the Object menu.
15. Change the *Button Control Address*.
16. Change the *Indicator State Address*.

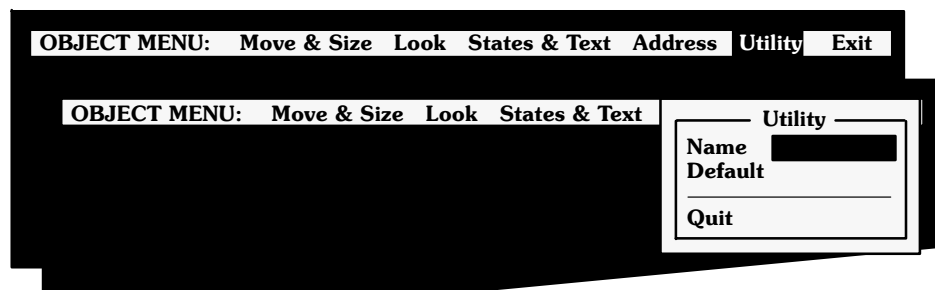
**Figure 5.46**  
The Address Menu



20079

17. Choose *Utility* from the Object Menu, and then choose *Name*.

**Figure 5.47**  
The Utility Menu



20074

18. Type the button's name.
19. Choose *Exit* from the Object menu.
20. Then choose *Exit and Save Object*.

You now are at the Screen menu.

### Make the Rest of the Momentary (Normally Open) Push Buttons

Repeat the above steps for each Momentary (Normally Open) Push Button on the worksheet. Table 5.B shows the values to enter for each push button:

**Table 5.B**  
**Values Assigned to the Push Buttons for Screen 2**

Position: Row, Col	Function Key	Outer Text	Addresses	Name
16, 21	3	FRONT CENTER	D I 1 0/2 & D O 1 0/2	FRT CENTER ON
16, 31	4	CENTER	D I 1 0/4 & D O 1 0/4	CENTER ON
16, 41	5	BACK CENTER	D I 1 0/6 & D O 1 0/6	BCK CENTER ON
16, 51	6	BACK	D I 1 0/10 & D O 1 0/10	BACK ON

### Make Five Momentary (Normally Closed) Push Buttons

As above, you'll start by making one button, and then follow the same steps to make the others.

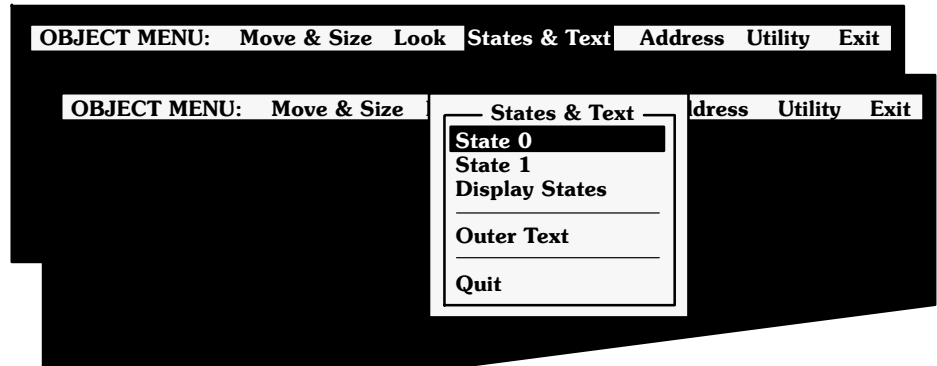
The first Normally Closed button you'll add is the Off button for the "Front Conveyor". To add this button:

1. Choose *Push Buttons* from the Add menu and choose *Momentary (N/C)* from the Push Buttons menu.

An empty, square button is placed in the center of the screen.

2. Choose *Move & Size* from the Object menu and set the following parameters for the button:
  - a. Choose *Size* from the Move & Size menu. With the arrow keys, shrink the button to Width 8, Height 3.
  - b. Choose *Move* from the Move & Size menu. Use the arrow keys to place the button at Row 21, Column 11.
  - c. Choose *Function Key* and assign this button to Function Key 10.
3. Open the *States & Text* menu to label the button. This button has two states:
  - State 0 indicates the Front Conveyor is Off
  - State 1 indicates the Front Conveyor is On

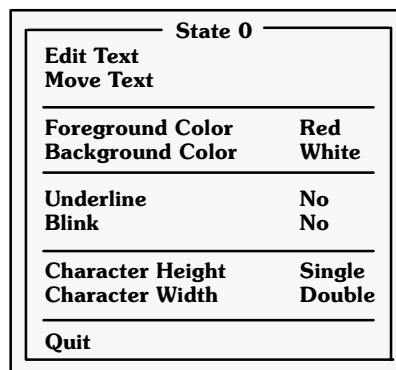
**Figure 5.48**  
The States & Text Menu



20082

4. Choose *State 0* to see the State 0 menu, and make the label as follows:
  - a. Set *Character Width* to *Double*.
  - b. Set *Foreground Color* to *Red*.
  - c. Set *Background Color* to *White*.

**Figure 5.49**  
State 0



20194

**IMPORTANT:** PanelBuilder will not let you set the Foreground and Background Color to the same color. To switch Foreground Color from white to red and Background Color from red to white, change the Foreground Color to a temporary color, say yellow, change Background from red to white, and then change Foreground to red.

- d. Choose *Edit Text* and type the *OFF* label inside the button. Press **Enter**.
- e. Choose *Quit* or press **Esc** to save the State 0 setting.

5. Choose *State 1* to see the State 1 menu, and make the label as follows:

**Figure 5.50**  
**State 1**

State 1	
Edit Text	
Move Text	
Foreground Color	Red
Background Color	White
Underline	No
Blink	No
Character Height	Single
Character Width	Double
Quit	

20195

- a. Set *Character Width* to *Double*.
  - b. Set *Foreground Color* to *Red*.
  - c. Set *Background Color* to *White*.
  - d. Choose *Edit Text* and make the *ON* label for the inside of the button.
  - e. Choose *Quit* or press **Esc**.
6. Open the Address menu and choose *Button Control Address*.

**Figure 5.51**  
**The Address Menu**

OBJECT MENU: Move & Size Look States & Text Address Utility Exit

OBJECT MENU: Move & Size Look States & Text Address Utility Exit

Address

Button Control Address

Indicator State Address

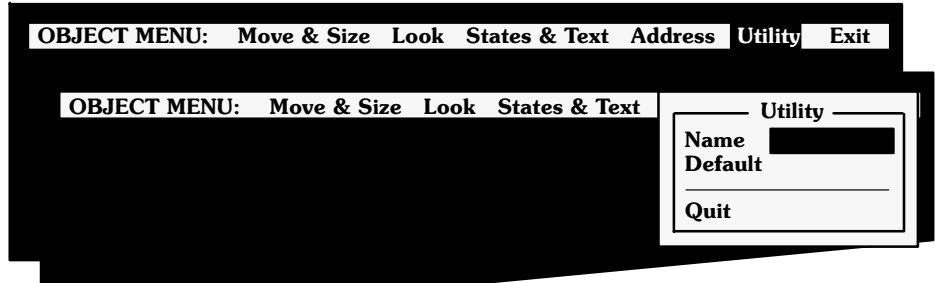
Quit

20083

The addresses for this push button are on the Object Address List shown in Chapter 4 (see [Figure 4-1](#)). To define the Button Control Address:

- a. Choose *Communication* and then *Discrete*.
  - b. Choose *Rack* and then *1*. You'll notice that "1" was your only choice in the option list. This is because you only defined the one rack when you defined Rack Assignments at the beginning of this tutorial.
  - c. Choose *Start Word* and type *0*.
  - d. Choose *Start Bit* and type *1*.
  - e. Choose *Update Address*. You'll see the current address displayed on the top line of the Button Control Address window.
  - f. Choose *Quit* or press **Esc** to close the Button Control Address menu.
7. Choose *Indicator State Address*. These addresses are in the Object Address List shown in Chapter 4 (see [Figure 4-1](#)). To define the address:
- a. Choose *Communication* and then *Discrete*.
  - b. Choose *Input/Output* and choose *Output*.
  - c. Choose *Rack* and then *1*.
  - d. Choose *Start Word* and type *0*.
  - e. Choose *Start Bit* and type *1*.
  - f. Choose *Update Address*. You'll see the current address displayed on the top line of the Button Control Address window.
  - g. Choose *Quit* or press **Esc** to return to the Object menu.
8. Open the Utility menu, and choose *Name*.

**Figure 5.52**  
**The Utility Menu**



20074

9. Type the name *FRONT OFF*.
10. Choose *Quit* or press **Esc** to return to the Object menu.
11. Then open the *Exit* menu and choose *Exit and Save Object*. This will return you to the Push Buttons menu.

### **The Four Remaining Momentary (Normally Closed) Push Buttons**

For each of the remaining four buttons, follow the steps shown earlier to make copies of screen objects:

1. Back up to the Screen menu.
2. Choose *Memorize*. Position the cursor inside the Momentary (Normally Closed) Push Button which you just created, and press **Enter**.
3. Choose *Recall*. A copy of the push button is placed directly over the top of the original push button, so that it looks as if there is only one. An message will appear indicating that you have two buttons assigned to the same function key. Press any key and proceed.
4. Move the copied button to the right of the original button.
5. Assign the correct function key to the button and choose *Quit* to close the Move & Size menu.
6. Choose *Address* from the Object menu and type in the Button Control Address and the Indicator State Text.
7. Choose *Utility* from the Object menu, then choose *Name*, and enter the button's name.
8. *Exit* from the Object menu, and then choose *Exit and Save Object*. You are returned to the Screen menu.

These eight steps allow you to add a second Momentary (Normally Closed) Push Button. To add the remaining three, recall and assign the memorized button three times.

The table below shows the values you must enter for each push button:

**Table 5.C**  
**Values Assigned to the Push Buttons for Screen 2**

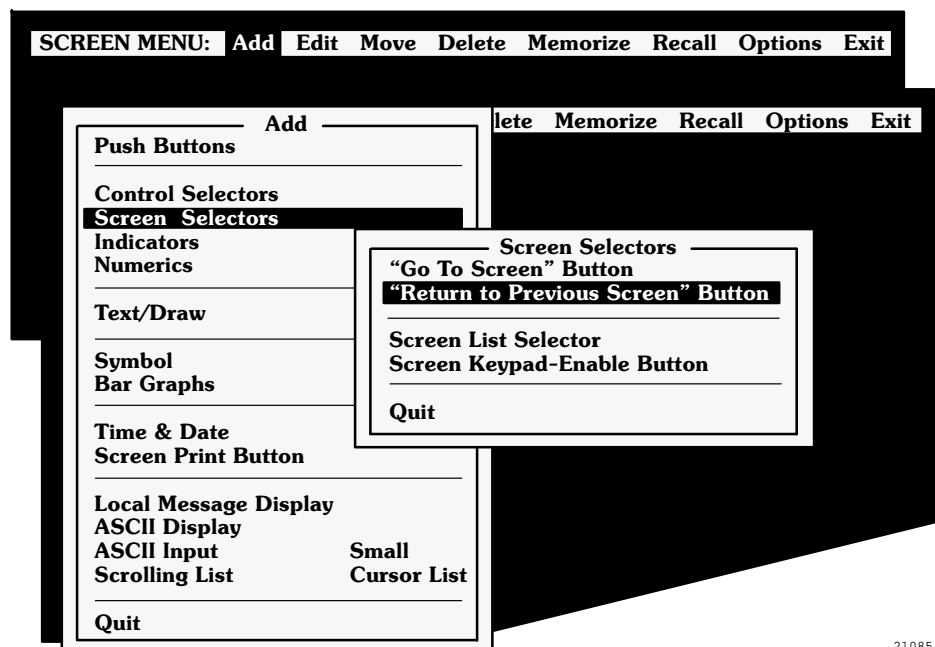
Position Row, Column	Function Key	Addresses	Name
21, 21	11	D I 1 0/3 & D O 1 0/3	FRT CENTER OFF
21, 31	12	D I 1 0/5 & D O 1 0/5	CENTER OFF
21, 41	13	D I 1 0/7 & D O 1 0/7	BCK CENTER OFF
21, 51	14	D I 1 0/11 & D O 10/11	BACK OFF

You have defined all ten push buttons. To complete the screen, add one “Return To Previous Screen” button.

#### Add the “Return To Previous Screen” Button

1. Choose *Screen Selectors* from the Add menu and choose “Return To Previous Screen” Button from the Screen Selectors menu.

**Figure 5.53**  
**The Screen Selectors Menu**



21085

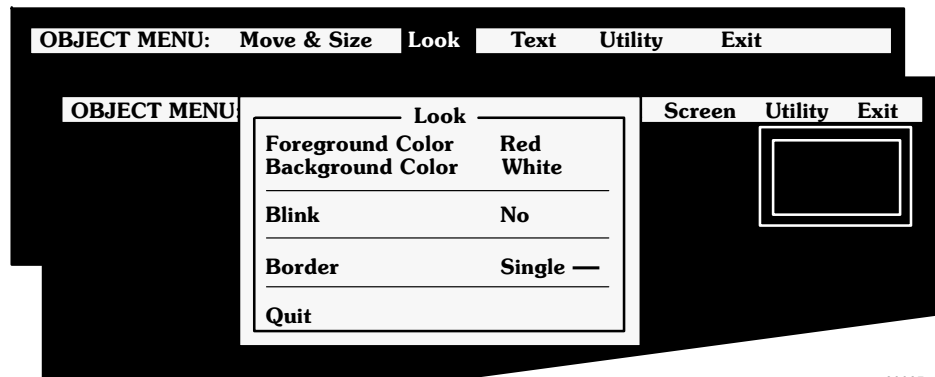


2. Choose *Move & Size* from the Object menu.

Edit the button in the following way:

- a. Move the button to Row 0, Column 69.
  - b. Size the button to be Width 11 and Height 4.
  - c. Choose *Function Key* and link the button to function key 17.
  - d. Choose *Quit* to save your work and close the Move & Size menu.
3. Open the *Look* menu and set the background color and border.
  - a. Set *Background Color* to *White*.

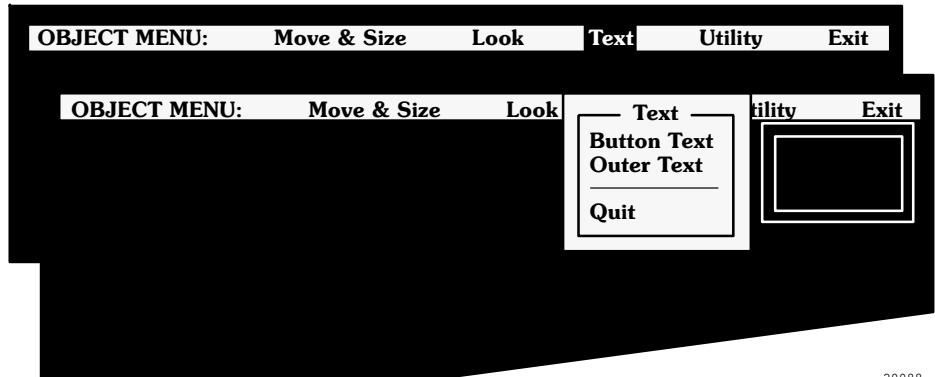
**Figure 5.54**  
**The Look Menu**



20087

- b. Choose *Border* and set it to *Double*.
4. Press the right arrow key and choose *Button Text* from the Text menu.

**Figure 5.55**  
The Text Menu

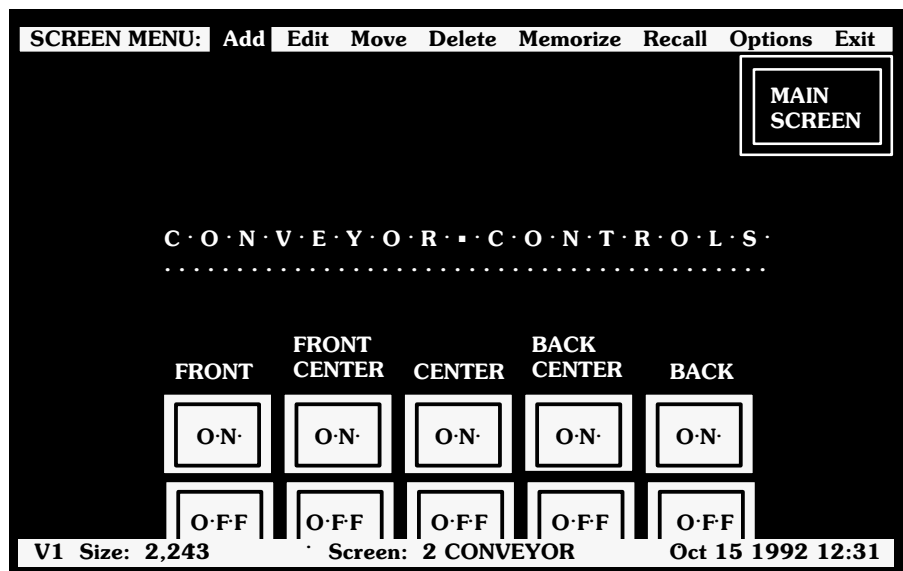


20088

- a. Choose *Edit* from the Button Text to label the button.
  - b. Enter the text *MAIN SCREEN* and press **Enter**.
  - c. Press the right arrow key twice and choose *Exit and Save Object* from the Exit menu. You are back at the Screen Selectors menu.
5. Press **Esc** twice to close the Screen Selectors and Add menus, and return to the Screen menu.

You've now finished the second screen. It should look like this:

**Figure 5.56**  
Screen 2



22089

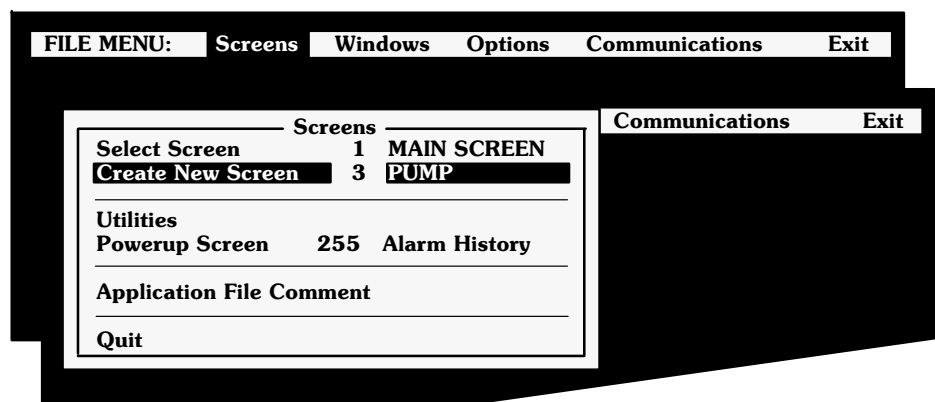
6. Save this screen by choosing *Exit* from the Screen menu and then choosing *Exit and Save Screen*.

You will be returned to the Screens menu. At this point, the Screens menu should be open and the Select Screen option should be highlighted.

### Screen 3: PUMP CONTROLS

1. To create the third screen, choose *Create New Screen*. The cursor moves to the next field where you enter the screen's number.
2. Press **Enter** to accept the suggested screen number and type the name for the screen, *PUMP*.

**Figure 5.57**  
**The Screens Menu**



20090

You've just created the third screen. Its name is in the status line at the bottom of the screen, with the Screen menu across the top. The next step is to start adding the objects.

If you refer back to Chapter 4 ( ), you'll see that Screen 3 consists of:

- three Background Text objects
- one five-position Control List Selector
- five Multi-State Indicators
- five Numeric Data Displays
- one Box

- two Momentary (Normally Open) push buttons
- one “Return To Previous Screen” button

### **Add Background Text**

You’ve already seen how to add Background Text to a screen. Those step-by-step instructions are not repeated here, just the parameters you need to define the text. If you’re not sure how to proceed, use the instructions for Screen 2.

1. Text item 1 is the main title “PUMP CONTROLS”:
  - double-height, double-width text
  - located at Row 4, Column 24
  - white foreground with black background
2. Text item 2 is the selector label “PUMP CONTROLS”:
  - single-height, single-width text
  - located at Row 9, Column 24
  - white foreground with black background
  - text is underlined (the underline option is found in the Look menu)
3. Text item 3 is the numeric indicator label “PRESSURE (PSI)”:
  - single-height, single-width text
  - located at Row 9, Column 41
  - white foreground with black background
  - text is underlined

### **Add the Control List Selector**

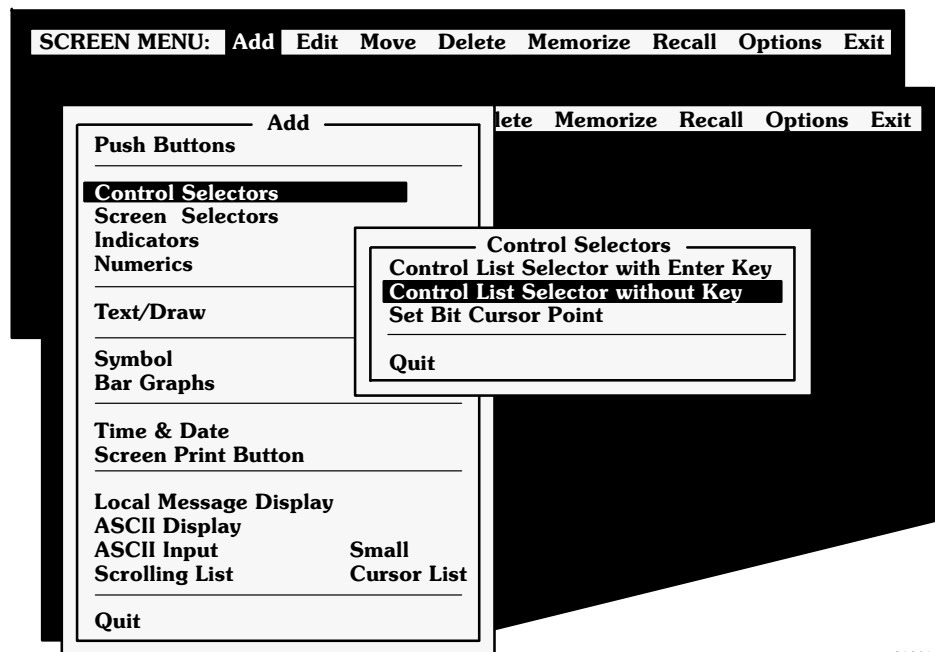
The Control List Selector is an object with three different components: the list of selections, the Up Cursor button, and the Down Cursor button.

When an operator uses the Up or Down Cursor buttons, the PLC records which of the five selections is highlighted. When the operator presses one of the Momentary (Normally Open) buttons, the PLC will either start or stop the associated pump.

To add the Control List Selector:

1. Choose *Control Selectors* from the Add menu.
2. Choose *Control List Selector without Enter Key* from the Control Selectors menu.

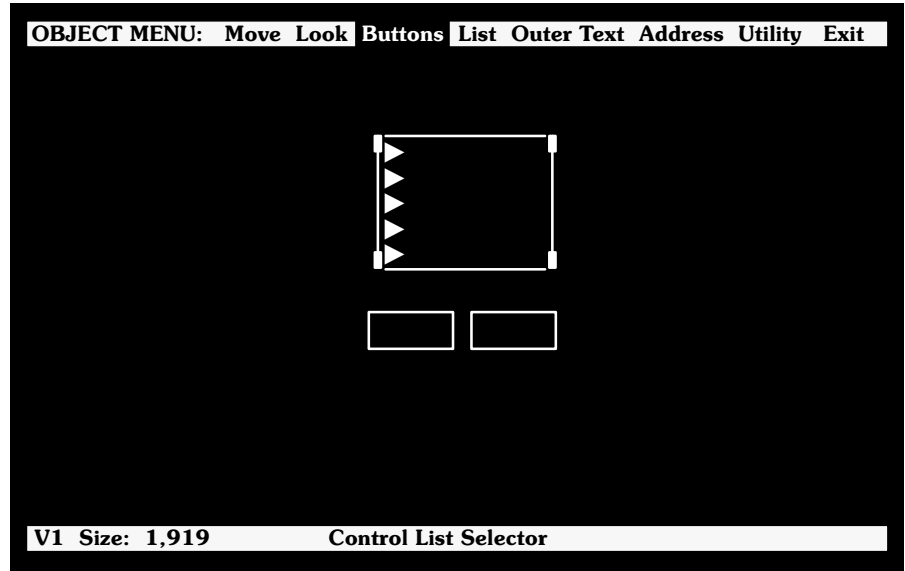
**Figure 5.58**  
**The Control Selectors Menu**



21091

You'll see all three components of the selector in the center of the monitor and the Object menu at the top of the screen.

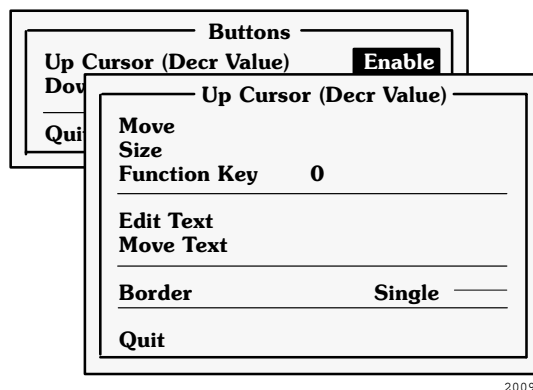
**Figure 5.59**  
**Control List Selector**



22233

3. Choose *Buttons* from the Object menu and then choose *Up Cursor (Decr Value)* (*Decr Value*).
4. Choose *Enable*, and the Up Cursor (Decr Value) menu appears.

**Figure 5.60**  
**The Buttons Menu**



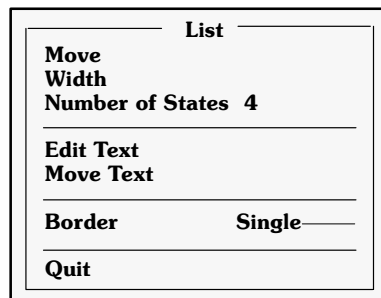
20092

From this menu:

- a. Move the cursor to Row 18, Column 23.

- b. Size the button to Width 6, Height 3.
  - c. Link the button to Function Key 3.
  - d. Edit the text so the button is labeled *UP*.
  - e. Choose *Quit* or press **Esc** to return to the Buttons menu.
5. Choose *Down Cursor (Incr Value)* and then choose *Enable*. You are presented with the Down Cursor (Incr Value) menu. From this menu:
  - a. Move the cursor to Row 21, Column 23.
  - b. Size the button to Width 6, Height 3.
  - c. Link the button to Function Key 11.
  - d. Edit the text so the button is labeled *DOWN*.
6. Choose *Quit* or press **Esc** to return to the Buttons menu.
7. Choose *Quit* or press **Esc** to return to the Object menu.
8. Choose *List* from the Object menu.

**Figure 5.61**  
**The List Menu**



20094

From the List menu:

- a. Move the list to Row 11, Column 24.
- b. Set the *Border* to *None*.
- c. Set the *Width* to *11*. You define the width of a list by using the right arrow and left arrow, just as you'd size any other object. However, you set the height of the object by specifying the number of states.

- d. Set the *Number of States* to 5.
- e. Choose *Edit Text* and define the five lines of text for:
  - CROSSOVER
  - MAIN
  - OUTPUT
  - INPUT
  - BACKUP

Remember to use the arrow keys to move the cursor to the next line, and only press **Enter** when you've typed in all five lines of text.

9. Choose *Quit* or press **Esc** to return to the Object menu.
10. Choose *Address* from the Object menu.
11. Choose *Selector Control Address* from the Address menu.

**Figure 5.62**  
**The Selector Control Address Menu**

Selector Control Address	
Current Address	Unassigned Address
Current Preset	
<b>Data Type</b>	<b>Binary</b>
<b>Communications</b>	<b>Discrete</b>
<b>Input/Output</b>	<b>Input</b>
<b>Rack</b>	<b>1</b>
<b>Start Word</b>	<b>0</b>
<b>Start Bit</b>	<b>1</b>
<b>Number of Bits</b>	<b>1</b>
<b>Top Position Value</b>	<b>0</b>
<b>Update Address</b>	
<b>Change Preset</b>	
<b>View Address Map</b>	
<b>Delete Address</b>	
<b>Quit</b>	

22095

The addresses for the Control List Selector are on the Object Address List in Chapter 4 (see ). It is a four-bit bit-position address.

**IMPORTANT:** Remember that all bits off is a valid state (state 0).

- a. Choose *Data Type* and then *Bit*.
- b. Choose *Communication* and then *Discrete*.



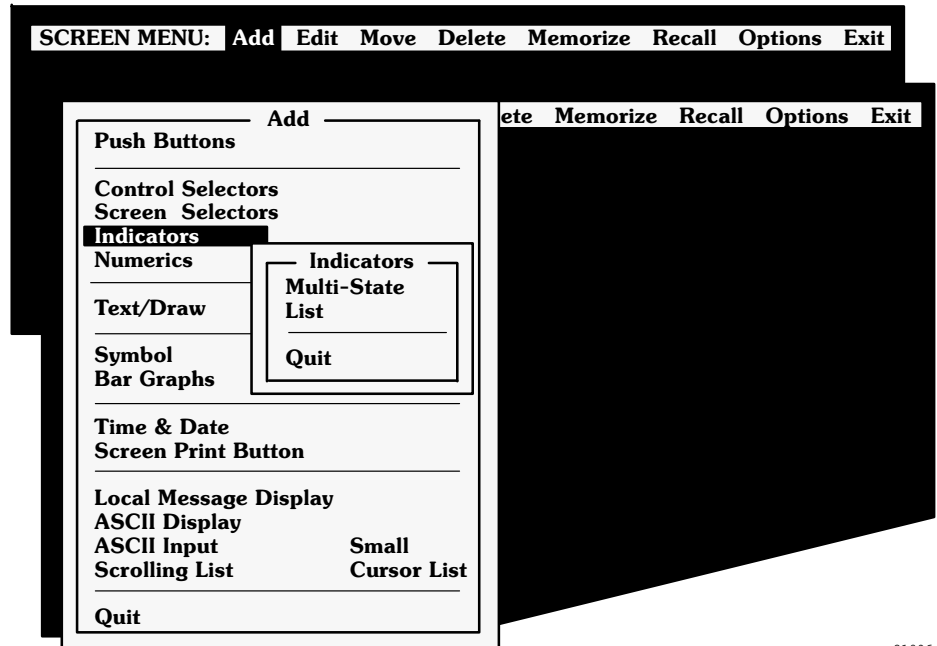
- c. Choose *Rack* and then *1*.
  - d. Choose *Start Word* and type *0*.
  - e. Choose *Start Bit* and type *12*.
  - f. Choose *Number of bits* and type *4*.
  - g. Choose *Top Position Value* and choose *ALL BITS OFF*.
  - h. Choose *Update Address*. The current address will be displayed on the top line of the Button Control Address window.
12. Choose *Quit* to close the Selector Control Address menu.
  13. Choose *Quit* to close the Address menu.
  14. Open the Exit menu. Choose *Exit and Save Object*.
  15. Choose *Quit* or press **Esc** to close the Control Selectors menu and return to the Add menu.

### **Add the Multi-State Indicators**

The five Multi-State Indicators allow the operator to see the current state for each of the pumps listed in the Control List Selector.

1. To define the first Multi-State Indicator, choose *Indicators* from the Add menu; then choose *Multi-State* from the Indicators menu.

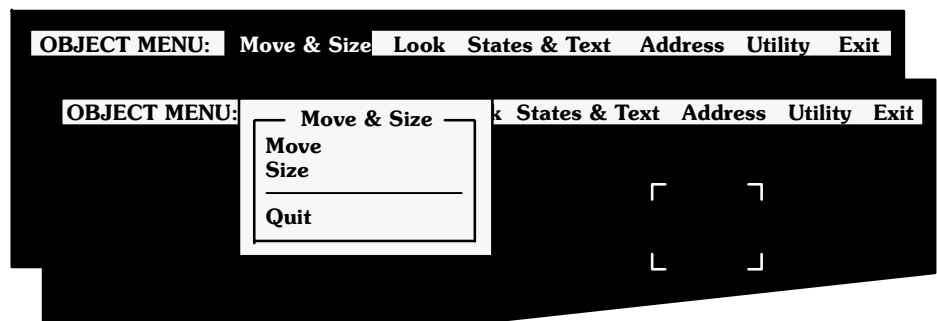
**Figure 5.63**  
**The Indicators Menu**



21096

You'll see the object on the screen and the Object menu displayed across the top of the screen.

**Figure 5.64**  
**The Move and Size Menu**

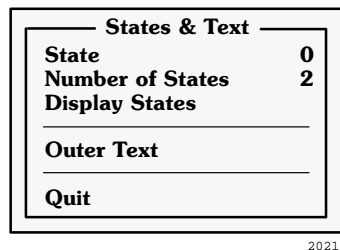


20097

2. Choose *Move & Size* and:
  - a. Move the indicator to Row 11, Column 36.
  - b. Set the size for the indicator to Height 1, Width 6.
  - c. Choose *Quit* to close the Move & Size menu.

3. Choose *Look* and set the border to *None*.
4. Press the right arrow key to close the Look menu and open the States & Text menu.

**Figure 5.65**  
**States and Text Menu**



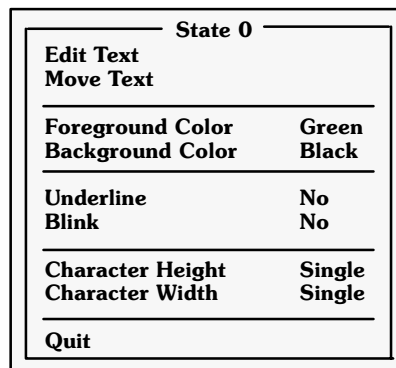
20214

From this menu define:

- a. The *Number of States* as 2.
- b. The *State* as 0.

The State 0 menu appears.

**Figure 5.66**  
**The State 0 Menu**



20098

From this menu:

- a. Choose *Edit Text* and type: *OFF*.
- b. Choose *Foreground Color* and choose *Red*.
- c. Choose *Background Color* and choose *White*.

- d. Choose *Quit* or press **Esc** to return to the States & Text menu.

**Figure 5.67**  
**States and Text Menu**

States & Text	
State	1
Number of States	2
Display States	
Outer Text	
Quit	

20196

- e. From this menu choose *State* and type *1*.
- You'll see the State 1 menu. From this menu, choose:
- Edit Text* and type *ON*.
  - Foreground Color* and choose *Green*.
  - Background Color* and choose *White*.
5. Press the right arrow key to open the Address menu. Choose *Indicator State Address* and define each element as indicated in Figure 5.68.

**Figure 5.68**  
**The Indicator State Address Menu**

Indicator State Address	
Current Address	Unassigned Address
Current Preset	
Data Type	Binary
Communications	Discrete
Input/Output	Output
Rack	1
Start Word	0
Start Bit	12
Number of Bits	1
Update Address	
Change Preset	
View Address Map	
Delete Address	
Quit	

20099

6. Choose *Update Address*. You'll see the current address displayed on the top line of the Indicator State Address menu.
7. Choose *Quit* to close the Indicator State Address window.
8. Choose *Quit* to close the Address menu.
9. Open the Exit menu and choose *Exit and Save Object*.

### Create the Remaining Four Multi-State Indicators

1. Press **Esc** twice to close the Indicators and Add menus. You'll return to the Screen menu.

**Figure 5.69**  
The Screen Menu



20100

2. Choose *Memorize*. Position the cursor over the existing Multi-State Indicator and press **Enter**.
3. Choose *Recall*. A copy of the Multi-State Indicator is placed directly on top of the existing Indicator. (You can't see it since it's exactly on top of the existing one.)
4. Choose *Move & Size* from the Object menu and then choose *Move*. Position the new indicator one row below the previous Indicator and press **Enter**. The correct positions for the remaining four Multi-State Indicators are:
  - Row 12, Column 36
  - Row 13, Column 36
  - Row 14, Column 36
  - Row 15, Column 36
5. Choose *Address* from the Object menu and define the address for each Multi-State Indicator. The correct addresses are:
  - D O 1 0/13 with the Binary Data Type
  - D O 1 0/14 with the Binary Data Type

- D 0 1 0/15 with the Binary Data Type
  - D 0 1 0/16 with the Binary Data Type
6. Choose *Exit* from the Object menu and choose *Exit and Save Object*. You are returned to the Screen menu.

You have now defined two Multi-State Indicators. To add the other three, repeat the last three steps (recalling, moving and sizing, and addressing) as described above, using the correct position and address for each one.

### Adding Momentary (Normally Open) Push Buttons

You've already seen how to add Momentary (Normally Open) Push Buttons on Screen 2. Refer to Table 5.D for the parameters you'll need to define the two buttons. If you're not sure how to proceed, look at the step-by-step instructions given for Screen 2.

**Table 5.D**  
**Values for the Buttons on Screen 3**

Parameters	Button 1	Button 2
Location	Row 18, Column 31	Row 21, Column 31
Width	Width 8, Height 3	Width 8, Height 3
Function Key	4	12
State 0 Text	OFF	OFF
State 0 Colors	Green on White	Red on White
State 1 Text	ON	ON
State 1 Colors	Red on White	Green on White
Character Height	Single height	Single height
Character Width	Double width	Double width
Button Control Addr.	D 1 1 1/0	D 1 1 1/1
Indicator State Addr.	D 0 1 1/0	D 0 1 1/1
Name	PUMP ON	PUMP OFF

### Add Numeric Data Displays

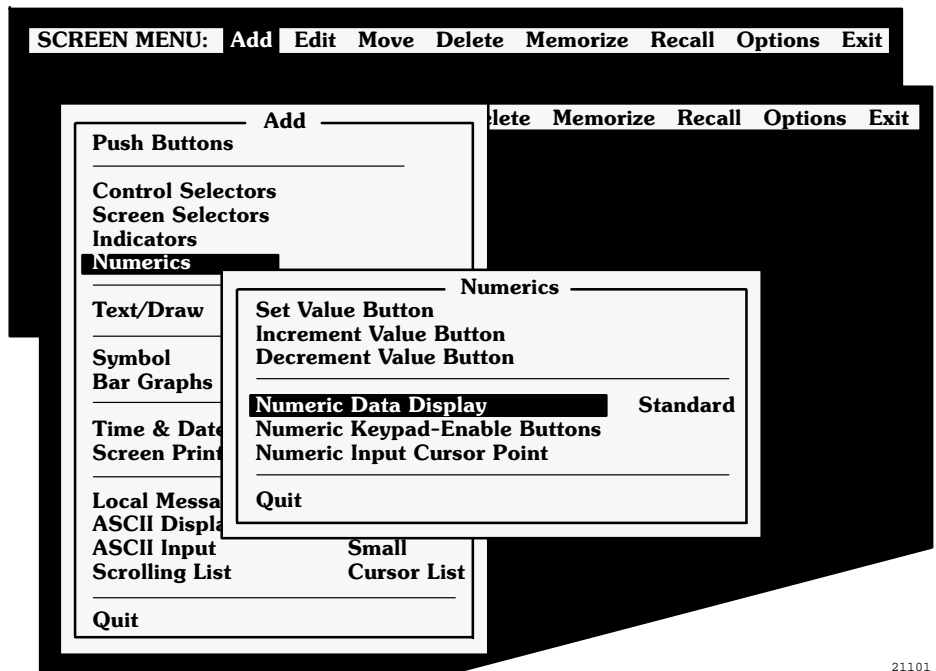
The Numeric Data Displays show the operator the current pressure within the five tanks monitored by this screen.

Before you begin this section, make sure you are back at the Screen menu.

To add the Numeric Data Displays:

1. Choose *Add* from the Screen menu, and then *Numerics* from the Add menu.

**Figure 5.70**  
The Numerics Menu



21101

2. Choose *Numeric Data Display* from the Numerics menu. You then have the choice of Standard or Scaled.
3. Choose *Standard*. From here, you choose the type of numeric display you want.

**Figure 5.71**  
Numeric Data Display

Numeric Data Display	
with Decimal Point	with Polarity
No	No
No	Yes
Yes	No
Yes	Yes
Quit	

20197

You want a Numeric Data Display with neither Decimal Point nor Polarity, so select *No / No* and press **Enter**.

You may want to look at Chapter 10, *The Objects* for more information, but briefly, there are five different types of Numeric Data Displays:

- the standard Numeric Data Display
- Numeric Data Display with Decimal
- Numeric Data Display with Polarity
- Numeric Data Display with Decimal and Polarity
- Numeric Data Display with Scaling

The object is placed in the center of the monitor, and the Object menu is displayed across the top of the monitor.

4. Choose *Move & Size* and move the Numeric Data Display to Row 11, Column 43.
5. Choose *Look* from the Object menu and turn the border off (i.e., choose *Border* and then choose *None*).
6. There are no other settings to be changed in the Look menu, so press **Esc**.

The next step is to define the PLC address.

Choose *Address* and then *Displayed Value Address*. To define this address:

1. Choose *Data Type* and then *BCD*.
2. Choose *Communication* and then *Block Transfer*.
3. Choose *Input/Output* and then *Output*.
4. Choose *File* and then *I*.
5. Choose *Start Word* and type 0, press **Enter**.
6. Choose *Start Bit* and type 0, press **Enter**.
7. Choose *Number of Bits* and type 16, press **Enter**.
8. Choose *Update Address*. You'll see the current address displayed on the top line of the Displayed Value Address window.
9. Choose *Quit* to close the Displayed Value Address menu.
10. Choose *Quit* to close the Address menu.

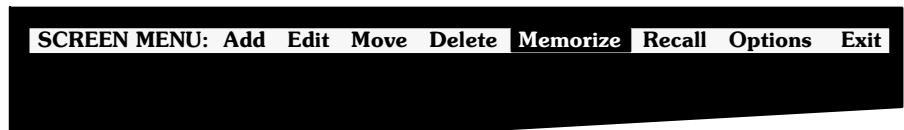


11. Open the Exit menu, and choose *Exit and Save object*. You are returned to the Numeric Data Display menu.

### Create the Remaining Four Numeric Data Displays

1. Press **Esc** three times to close the Numeric Data Display, Numerics and Add menus.
2. Choose *Memorize*. Put the cursor on the Numeric Data Display and press **Enter**.

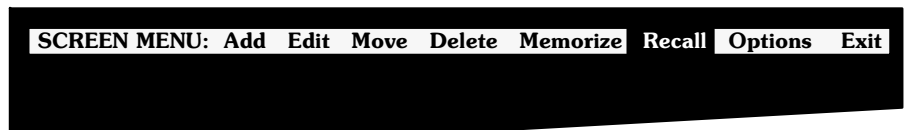
**Figure 5.72**  
**Memorize**



20102

3. Choose *Recall*. A copy of the Numeric Data Display is placed directly on top of the existing Numeric Data Display.

**Figure 5.73**  
**Recall**



20103

4. Choose *Move & Size*, then choose *Move*. Position the Numeric Data Display one row below the previous Display and press **Enter**. The correct positions for the remaining four Numeric Data Displays are:
  - Row 12, Column 43
  - Row 13, Column 43
  - Row 14, Column 43
  - Row 15, Column 43
5. Choose *Address* from the Object menu and define the address for each Numeric Data Displays. The correct addresses are:
  - B O 1 1/0 thru 1/15 with the BCD Data Type

- B O 1 2/0 thru 2/15 with the BCD Data Type
  - B O 1 3/0 thru 3/15 with the BCD Data Type
  - B O 1 4/0 thru 4/15 with the BCD Data Type
6. Choose *Exit* from the Object menu and choose *Exit and Save Object*. You are returned to the Screen menu.

You have now defined two Numeric Data Displays. To add the other three, repeat the above steps using the correct position and address for each one.

### **Add the “Return To Previous Screen” Button**

The “Return To Previous Screen” button that you created on Screen 2 is identical to the one you need for this screen. Rather than recreating the button on this screen, you can call up Screen 2 and memorize the existing button. Here’s how to do it:

1. You should be at the Screen menu. Choose *Exit* then *Exit and Save Screen*. You are returned to the Screens menu of the File menu.
2. Choose *Select Screen* and choose 2 *CONVEYOR*.

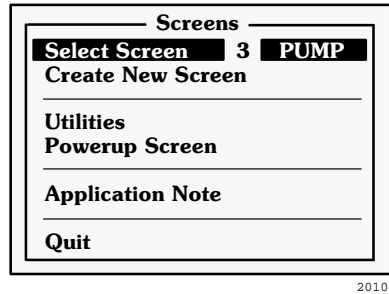
Screen 2 is displayed and the Screen menu appears across the top of the monitor.

3. Choose *Memorize* from the Screen menu, move the cursor to the “Return To Previous Screen” button in the top right corner of the screen, and press **Enter**.

The button is now memorized, ready to be recalled in Screen 3.

4. Choose *Exit* then *Don’t save, just Exit* and finally *Yes*. This returns you to the File menu.
5. Choose *Select Screen* and choose 3 *PUMP*. Screen 3 is again displayed.

**Figure 5.74**  
**Select Screen**



6. Choose *Recall*. The “Return To Previous Screen” button is displayed in the top right corner, and the Object menu appears across the top of the monitor.
7. Choose *Exit* then *Exit and Save Object*. You are once again back at the Screen menu.

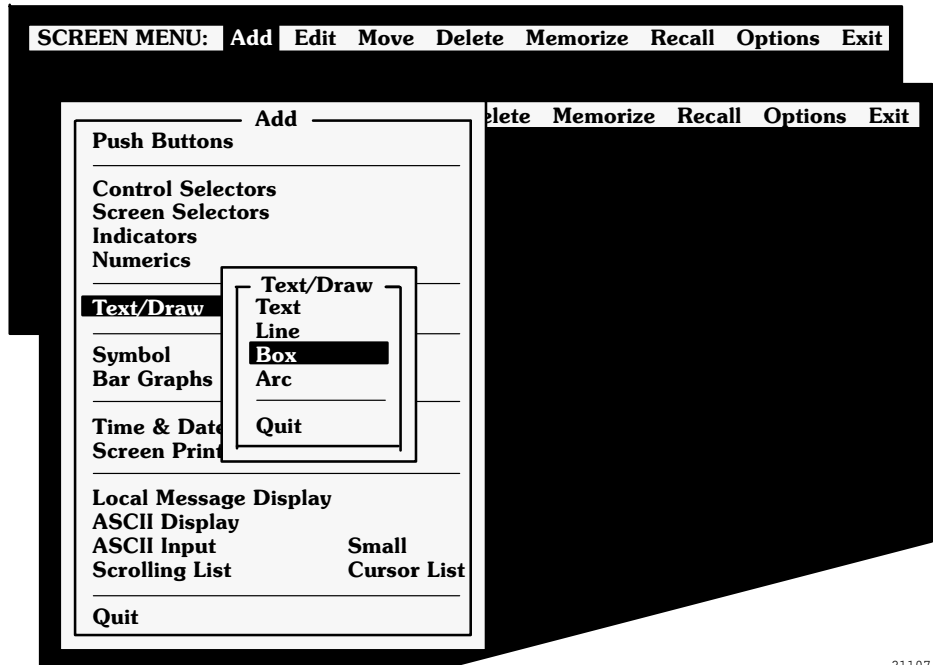
There is one more object to add and you’ll be finished creating your screens.

### **Add a Box**

To add the box to your screen:

1. Choose *Add from* the Screen menu.
2. Then choose *Text/Draw* from the Add menu.
3. Finally, choose *Box* from the Text/Draw menu.. You’ll see a small box drawn in the center of the screen.

**Figure 5.75**  
**The Add Menu**



21107

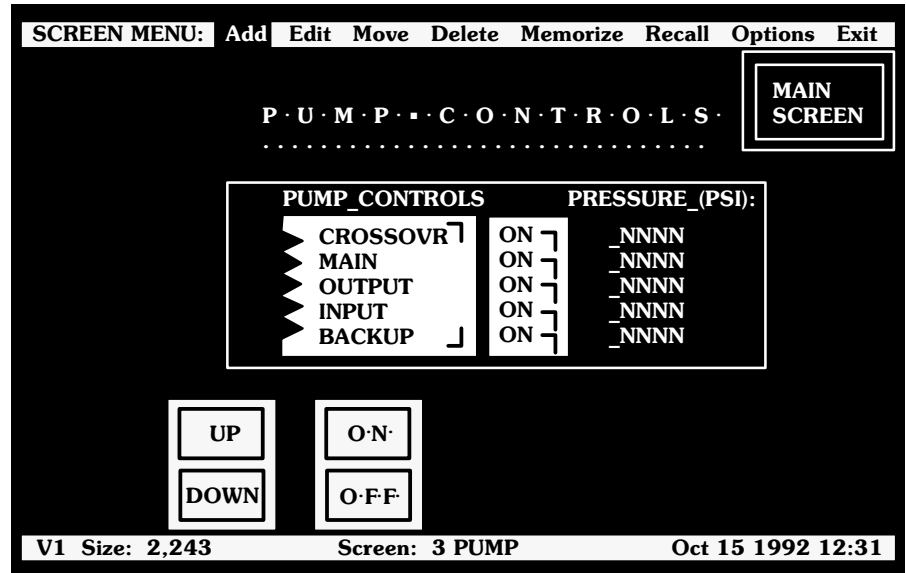
4. Choose *Move & Size*.
5. Move the box to Row 8, Column 22.
6. Size the box so that it has Width 35, Height 10.
7. Choose *Exit* from the Object menu and then *Exit and Save object*.

### Save the Screen

1. Press **Esc** twice to close the Text/Draw and Add menus. This returns you to the Screen menu.

You have just finished the final screen. It should look like this:

**Figure 5.76**  
**Screen 3**



22109

2. Choose *Exit* and then *Exit and Save Screen*. This takes you back to the Screens menu.
3. Press **Esc** to close the Screens menu and return to the File menu.

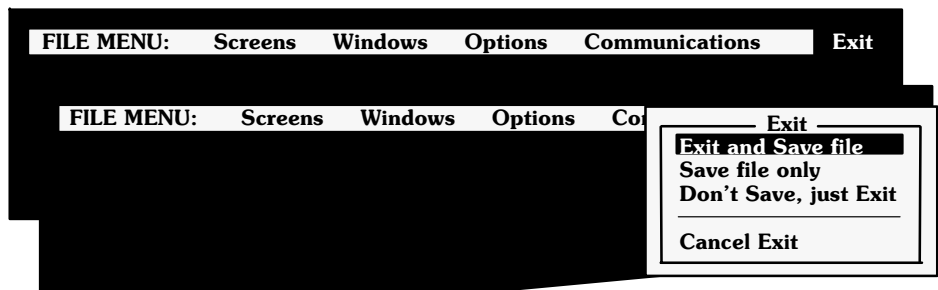
There is one more step to go before you've finished the sample application.

### Save the Application File

Once you've finished your screens, you should save the file to disk.

1. Choose *Exit* from the File menu.

**Figure 5.77**  
**The Exit Menu**



20110

2. Choose *Exit and Save File* and you will return to the Develop menu.
3. Press **Esc** to close the Develop menu and return to the Main menu.

## File Operations

This chapter describes the various operations that can be performed on application files created with PanelBuilder. Application files can be:

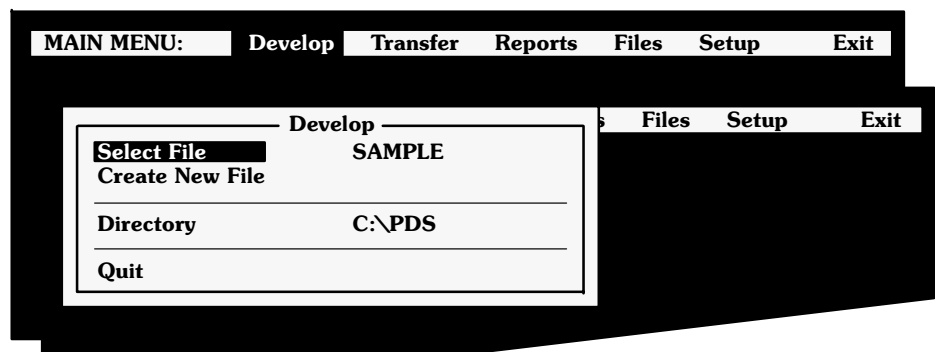
- stored and retrieved
- renamed or erased on the development computer's disk
- downloaded and uploaded to and from PanelView terminals
- downloaded and uploaded over an Allen-Bradley Data Highway + using the Pass-Through feature of the PLC-5
- stored (burned) in EPROMs or EEPROMs
- documented with printed reports

### Basic File Operations

#### Loading Files

To load an application file into PanelBuilder for editing or viewing, choose *Select File* in the Develop menu.

**Figure 6.1**  
The Develop Menu

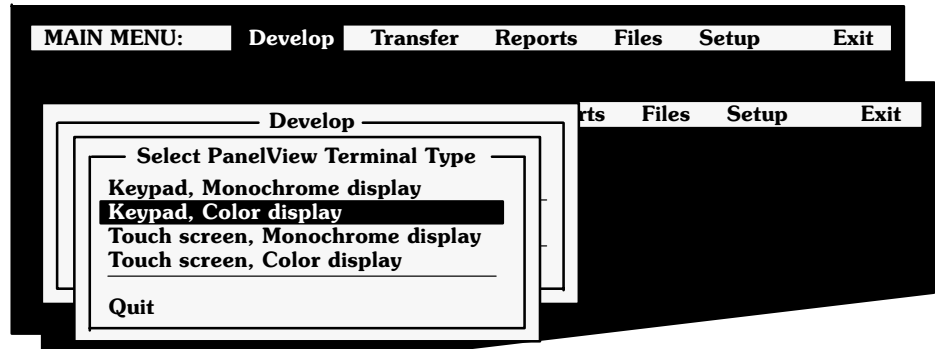


20111

You can find a file in any available directory by choosing *Directory* and typing the directory's pathname.

To make a new application file, choose *Create New File*. Enter a new file name. The Select PanelView Terminal Type window will open.

**Figure 6.2**  
**The Select PanelView Terminal Type Window**



20031

Select the appropriate terminal type and press **Enter**. The new file will be created.

## **Saving Files**

The application file is saved whenever you exit from the File menu, unless you choose *Don't Save, just Exit* from the Exit menu. Frequent saving is recommended.

**IMPORTANT:** It is possible for the development computer to run out of memory when saving an application file, if the file contains a very large number of long messages (information messages, alarm messages, and/or local messages). This can be remedied by deleting some messages, especially those which were recently created. When creating application files which require a great number of long messages, it is advisable to save the application file every 100 messages.

## **Copying, Deleting and Renaming Files**

To copy, delete or rename files, choose *Files* in the Main menu. The options available in the File menu are the same for Application Files, Hex Files, and All Files.

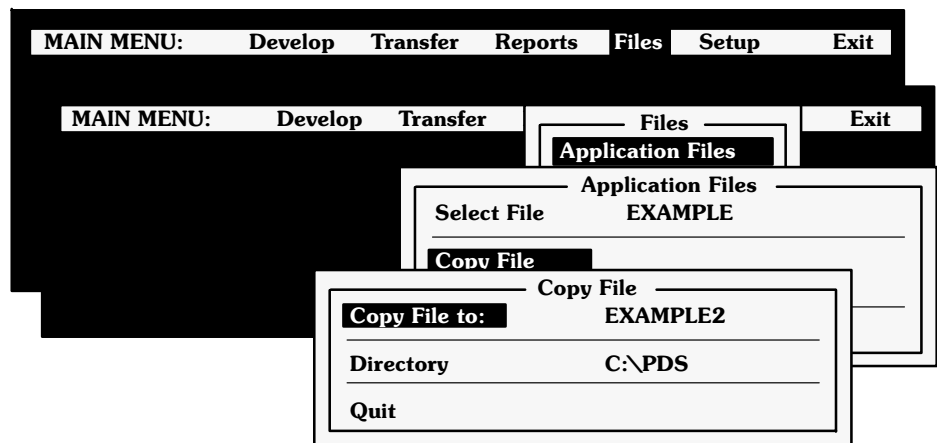
- **Application Files** are DOS files which end in CFG.
- **Hex Files** are application files which have been converted into Intel Hex format for transfer to EPROMs.
- **All Files** refers to all DOS files, including application files, Hex files and any other files.



#### To Copy a File:

1. Select the file in the Application Files menu.
2. Choose *Copy File* and press **Enter**. The Copy File menu will open.
3. To change the destination directory, choose *Directory* and type the directory name.
4. Choose *Copy File to:*, then type the name of the new file and press **Enter**.

**Figure 6.3**  
**The Files Menu**



Choose *Delete* from the Application Files menu to delete the selected file. To rename a file, choose *Rename File to:* and type in the new name.

## Printing Reports

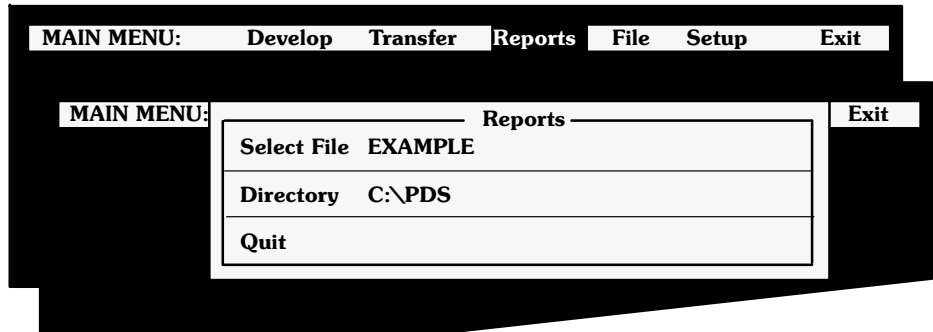
You can print reports to document the screens, objects and functions in the application file you are developing. You can print these reports on a printer or send them to a disk file.

If you want printouts of the graphic images on your screens, your printer must be able to print the IBM extended character set.

To print a report:

1. Choose *Reports* in the Main Menu.
2. In the Reports menu choose *Select File* to display the list of application files.

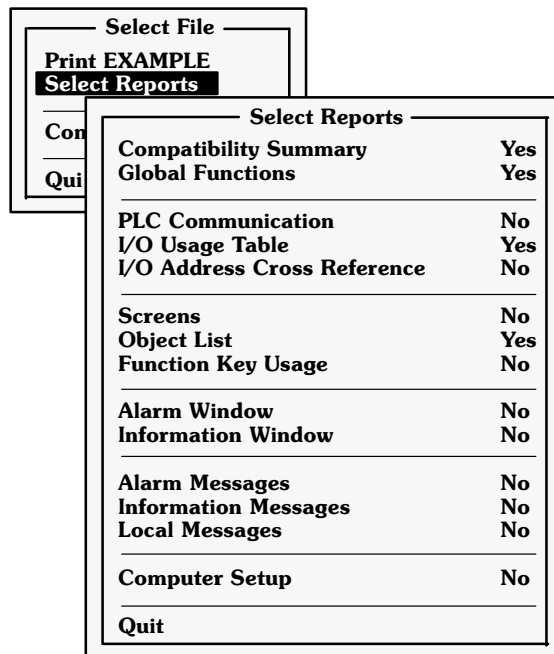
**Figure 6.4**  
The Reports Menu and Options



20114

3. Cursor to the file of your choice and press **Enter**. The Select File menu opens.
4. Choose *Select Reports* to view the available options, and select *Yes* for those options you want documented. By default, Compatibility Summary, Global Functions, I/O Usage Table and Object List are selected as the report options to be printed.

**Figure 6.5**  
The Select Reports Menu



21115

Some of the options in the Select Reports menu—like PLC Communication and Alarm Window—will document the entire application file. Other options, such as Screens or Alarm Messages, allow you to specify a range of screens or messages to be printed.

- **Compatibility Summary** prints the firmware version compatibility of each screen within the entire application, the firmware version compatibility of the application itself, and the enabled global features of the application.
- **Global Functions** allows you to print the status of various functions that are not related to specific screens. For example, global functions may include the Time and Date to PLC Controllers setting and screen number transfers, or may indicate PLC controlled screens. See [Figure 6-1](#) for an illustration of this report.
- **PLC Communication** prints all the configuration settings for PLC type, baud rate, push button input hold time, rack assignments, and block transfer assignments.
- **I/O Usage Table** prints both the assigned and free address bits. Two tables are printed: an Output Table for each rack assignment in numerical order by rack number, and an Input Table. Any block transfer assignments will also be listed in numerical order by file number.
- **I/O Address Cross Reference** prints a report showing the addresses used in the application file. The report will show all the objects (choose *All Addresses*) or all objects with addresses within a range that you define in the Starting Address and Ending Address menus. The default Starting Address will be the lowest defined address for the application; the default Ending Address is the highest defined address for the application. The address range can include inputs, outputs, discretes and block transfers.

Addresses are sorted as follows in the report:

- Block Transfer addresses before discrete addresses
- within discretes or block transfers:
  - Input addresses before Output addresses
  - File#/Rack# in numerically increasing order
- Start Word in numerically increasing order (0–31)
- Start Bit in numerically increasing order (0–17)

- addresses with the same starting address, by their ending address, in numerically increasing order

PanelBuilder will verify that the addresses specified are within the allowable range, and that the starting address is less than the ending address.

- **Screens** allows you to print the image of one specific screen, or a range of screens, within the application.

**IMPORTANT:** When printing a screen print, all special graphic characters with an ASCII code of less than 20 (32 decimal) are represented by blanks. In addition, arrow heads (such as those used in cursor points) are printed as ASCII character 254. Refer to Appendix E, *The Extended Character Set*.

- **Object List** allows you to list objects and associated information for the entire application or for a range of screens within the application. In the Object List menu, you can choose between two Object List reports, a brief report that summarizes the key information, and the full report. (See [Figure 6.6](#) for an illustration of these reports.) Another option also allows you to disable printing of background text objects.

**Figure 6.6**  
**Object List Menu**

The screenshot shows a menu titled "Object List" with a double-line border. Inside the menu, the following options are listed from top to bottom: "All Screens", "Starting Screen", "Ending Screen", "Include Background Text Objects?" (with "Yes" and "Brief" as sub-options), and "Quit".

23629

- **Function Key Usage** (Keypad terminals only) allows you to print a list of the function keys and associated objects names and type assigned to each screen. Unassigned function keys will be included, but the Object Name and Type fields will be blank.
- **Alarm Window** prints all the configuration settings for the Alarm Window.
- **Information Window** prints all the configuration settings for the Information Window.

- **Alarm Messages** prints the entire list of alarm messages entered for the Alarm List Window, or a range of messages.
  - **Information Messages** prints the entire list of messages entered for the Information Window, or a range of messages.
  - **Local Messages** prints the entire list of messages created for the Local Message Display objects, or a range of messages.
  - **Computer Setup** prints all the configuration settings for the PanelView terminal type, printer port, PanelView terminal port, and EPROM burner port.
5. Once you have chosen the options you want to document, choose *Quit* to return to the Select File menu.
  6. Choose *Report Destination* to specify where you want the report to be printed. To send the report to a printer, choose the port (*COM1* or *COM2*) your printer is attached to. To save the report as an ASCII text file, choose *File*. The File window will open, showing the name and path of the file to be saved. The default file name is the name of the application file, and the default directory is the application file directory. The file extension is .RPT. You can change the name and the path, but not the extension.

**Table 6.A**  
**Printer Communication Port Settings Available in PanelBuilder**

Port	COM1	COM2	LPT1 not configurable			LPT2 not configurable		
Baud Rate	110	300	600	1200	2400	4800	*9600	19200
Parity	odd		even		*none			
Data bits	7		*8					
Stop bits	*1		2					

\*default settings

7. Choose *Print FILENAME* (where *FILENAME* is the name of the application file you selected in step 3) to print the specified reports.

If you try to print when the printer is off-line or out of paper, there may be long delays, and PanelBuilder may not respond to attempts to abort printing. If this occurs, put the printer back on-line (press the ONLINE button and verify the ONLINE indicator, reload the printer with paper and put it back on-line, or momentarily power-down and power-up the printer).

If you can't print, try again after following these steps:

1. Check your printer's manual to ensure that you've assigned the correct printer port setting, and that the port is correctly configured.
2. Ensure that your printer has been turned on, is on-line, and supplied with paper.
3. Ensure that you did not set all the Select Reports settings to No.

Sample reports, two Object List reports and a Global Functions report, are included on the following pages.

**Figure 6.7**  
**Full Object List Report**

Full Object List		File: KA-TEST	Oct 15 1992	20:49:12	Page 1
Screen 1: KA-SCREEN-1					
Momentary (N/C) Push Button:					
Fkey: F2	Row/Col: 5/0	Width/Height: 10/3	Border: Double	Ver:1	
Addresses	Type	Maximum	Minimum	Preset	Control
Control DI0101/10-01/13	Bit				
Indicator DI103/01	Bit				
State	Fgnd/Bgnd	Atrib	State Text		
00	Red/Blu	riubwh	State = 0		
01	Wht/Red	Riubwh	State = 1		
	Fgnd/Bgnd	Attrib	Outer Test		
	Red/Blk	riUBwh	Mom N/C PB		

21211

**Figure 6.8**  
**Brief Object List Report**

-----				
Brief Object List	File: KC-DEMO	Sep 28 1992	14:52:10	Page 1
-----				
Control List Selector:				Vers: 1
Func Keys (Incr = F9, Decr = F1)		States: 5		
Addresses:				
Control: DI0101/10-01/13 Bit				

23631

**Figure 6.9**  
**Global Functions Report**

Global Functions Report

File: BCK2

Jun 21 1993 09:22:24

Page 1

VER5: Monochrome with Function Keys

Global Functions

Terminal Version Compatibility: 5

Power-Up Screen: 1

Alarm History Screen: 255

Alarm Window Type Full

Alarm Status Screen: 0

QTY/Time Reset Button: Enable

User Memory Limit 62,976 Not Battery-Backed

Application File Comment:

Application File Size: 1148 bytes

Application Disk File Size: 29736 bytes

Pass-Through Configuration

PLC DH+ Address: Not Used

Local Bridge Address: Not Used

Remote Bridge Address: Not Used

Auto Repeat Options

Cursor Auto-Repeat Rate (per sec.): 0

Cursor Auto-Repeat Start Delay (sec.): 0.4

Miscellaneous Control Options

Option	Control	Address
PLC Controlled Audio:	Disable	Unassigned Address
PLC Controlled Alarm Relay:	Disable	Unassigned Address
PLC Controlled Screen Print:	Disable	Unassigned Address
PLC Controlled Screen Number:	Disable	Unassigned Address
Current Screen Number to PLC Controller:	Disable	Unassigned Address
Time and Date to PLC Controller:	Disable	Unassigned Address
PLC Controlled Time & Date Control	Disable	Unassigned Address
PLC Controlled Time & Date	Disable	Unassigned Address
Screen Print Active to PLC Controller	Disable	Unassigned Address
PLC Controlled Clear Alarm Window:	Disable	Unassigned Address
PLC Controlled Silence Alarms:	Disable	Unassigned Address
Clear Alarm Window to PLC Controller:	Disable	Unassigned Address
Silence Alarms to PLC Controller:	Disable	Unassigned Address
Acknowledged Alarm Number Address:	Disable	Unassigned Address
Acknowledge Button Address:	Disable	Unassigned Address
PLC Controlled QTY/Time Reset:	Disable	Unassigned Address
QTY/Time Reset to PLC Controller:	Disable	Unassigned Address
Information Acknowledge Button Address:	Disable	Unassigned Address
PLC Inhibit Bit:		Unassigned Address
Pass-Through Request Bit:		Unassigned Address
Pass-Through Status Bit:		Unassigned Address

#### Methods of Loading Application Files into PanelView Terminals

There are three ways of loading application files into PanelView terminals:

- loading application files into user PROMs and installing the user PROMs into the terminals
- direct downloading of application files through the Upload/Download cable. For installations where there are many PanelView terminals, this requires going to each terminal, connecting the cable, and downloading the application file
- downloading application files over the Data Highway + network, using the PLC-5 Pass-Through feature. Pass-Through Download Options lets you do this in two different ways. You can use the parameters of a resident application file configured for pass-through. Or you can manually configure the parameters for the Address Source. The advantage of using the PLC-5 Pass-Through feature is that the development computer doesn't have to be physically moved from terminal to terminal, and the terminals don't have to have their cabling changed

#### Direct Downloading and Uploading with the Upload/Download Cable

To send a completed application file to a PanelView terminal, choose *Download to PanelView (RS-232)* in the Transfer menu. To retrieve an application from a PanelView terminal for modification, choose *Upload from PanelView (RS-232)* in the Transfer menu.

**IMPORTANT:** Before you can download or upload, you must be sure that the communication settings on the PanelView terminal and in the PanelBuilder software are exactly the same.

#### Setting Upload/Download Communications on the PanelView Terminal

To download or upload, communications must be established between the PanelBuilder computer and the PanelView terminal. The default settings (indicated in                      and                      ) of the terminal and PanelBuilder are matched. To change the communication settings for your PanelView terminal, follow these steps:

1. Set the PanelView terminal to Configuration mode.
2. Choose *Serial Port* from the PanelView terminal Configuration menu.
3. Press *Choose List* to choose the "Upload/Download" list.
4. Use the up and down cursor keys to move through the list, then use the "Change Data" button to make your selection.



**Table 6.B**  
**Communication Settings Available on PanelView Terminals**

Baud Rate	300	600	1200	2400	4800	*9600	19200
Parity Type	odd	even	*none				
Data Bits	7	*8					
Stop Bits	*1	2					
Handshake Type	*Hardware		Software				
Auto Line Feed	*Off	On					
Auto Form Feed	*Off	On					

\*default settings

5. Press *Save & Exit*, and you return to the Configuration menu.

### Setting Upload/Download Communications on the PanelBuilder Computer

For uploading and downloading, the communication settings on the PanelBuilder computer must match those of the PanelView terminal. The default settings of the PanelBuilder software (indicated by \* in Table 6.C) are the same as the default settings of the PanelView terminal (indicated by \* in Table 6.B).

You can change the communication settings for either of the COM ports if you wish. Also, you can configure one of the COM ports for upload/download, and the other for printing (see Step 6 of Printing Reports described earlier in this chapter).

1. From PanelBuilder's Main menu, choose *Transfer*.
2. In the Transfer menu, choose *Download to PanelView Terminal (RS-232)*.
3. Select a file and press **Enter**. The Select File window opens.
4. Choose *Configure Port* from the Select File menu. The available port and communication settings are as follows:

**Table 6.C**  
**Upload/Download Communication Settings Available in PanelBuilder**

Port	COM1	COM2					
Baud Rate	300	600	1200	2400	4800	*9600	19200
Parity Type	odd	even	*none				
Data Bits	7	*8					
Stop Bits	*1	2					

\*default settings

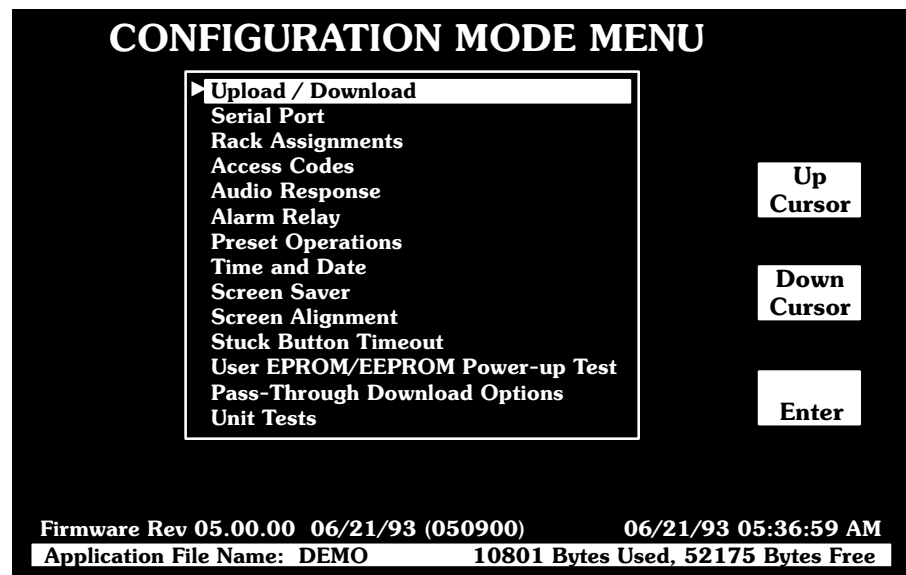
- **Application Size:** See Downloading Considerations later in this chapter.

### Downloading to PanelView

To download means to transfer an application file from the development computer to a PanelView terminal so that the application file can be run. To download:

1. Connect the PanelView terminal to the development computer with the Upload/Download cable.
2. Set the PanelView terminal to Configuration Mode and choose *Upload/Download* from the terminal's Configuration Mode Menu.

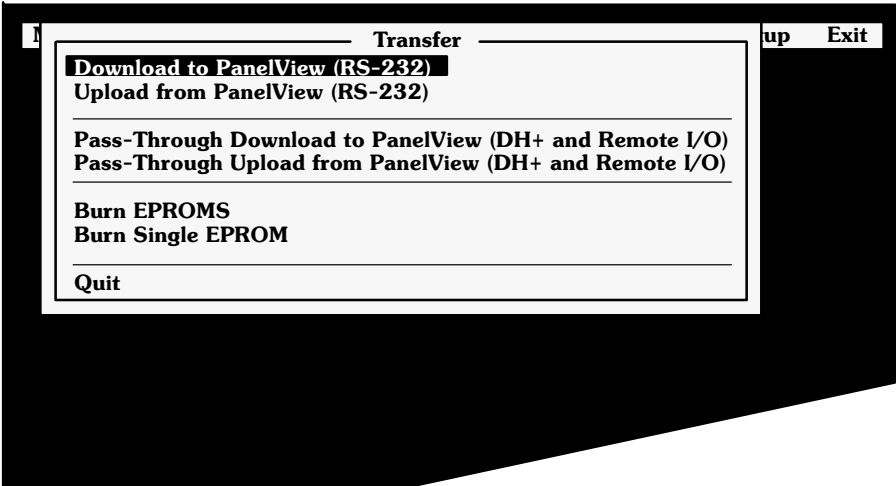
**Figure 6.10**  
**Configuration Mode Menu**



23636

3. On the development computer, choose *Download to PanelView (RS-232)* from the Transfer menu.

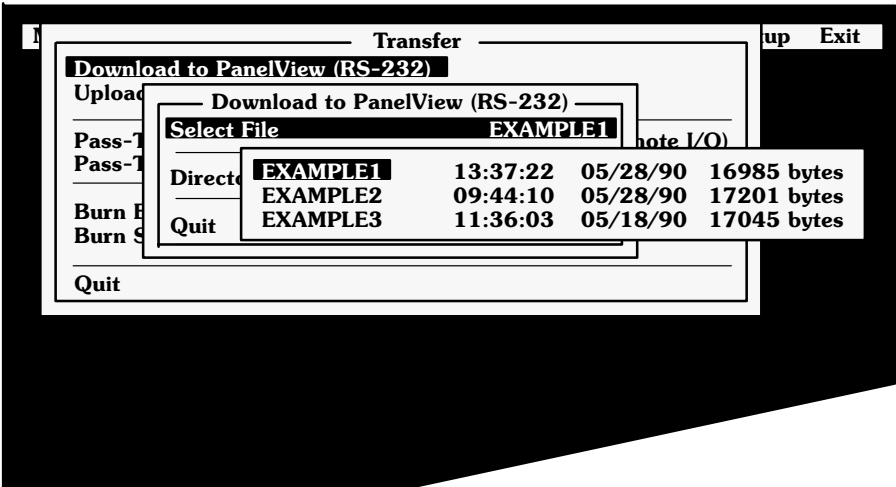
Figure 6.11  
The Transfer Menu



23639

4. Choose *Select File* to select the application file for downloading. If necessary, choose *Directory* and type in the correct disk and directory.

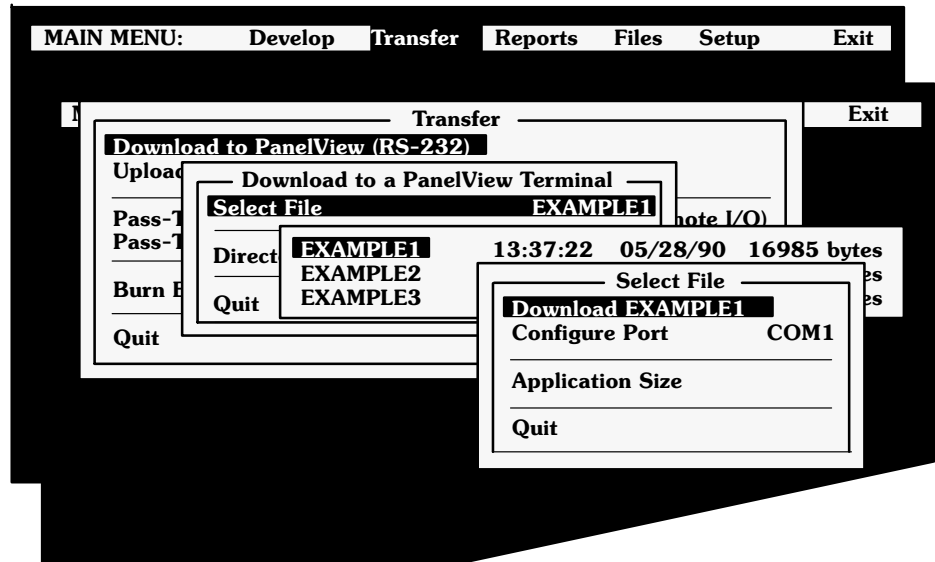
Figure 6.12  
Download to PanelView Menu



23639

5. Choose *Download FILENAME* (where *FILENAME* is the name of the selected file), and respond *Yes* when prompted to start downloading. You can cancel the transfer at any time by pressing the **Esc** key.

**Figure 6.13**  
**The Transfer Menu**



22116

**IMPORTANT:** If your terminal contains an application file in the User EPROM, you can still download a different application file, which will reside in application memory, for temporary use. The file will be erased, and replaced by the file in the User EPROM memory, at the next power-up.

If your terminal contains a user EEPROM, downloading to the terminal will also replace the existing application file in the user EEPROM with the new application file.

### Downloading Considerations

- You cannot download a Keypad terminal application file to a Touch Screen terminal, or a Touch Screen application file to a Keypad terminal.
- You cannot download an application to a terminal whose memory configuration does not match the “User Memory Limit” set in the application file, even if there is enough available memory for the file in the terminal.
- You cannot download an application which uses version 5 features to a version 1, version 2, version 3 or version 4 terminal. The same is true for all other application versions: you cannot download an application containing higher version features to a lower version terminal.

To use an application with previous release terminal firmware, you will have to edit the application to remove the newer objects and features, or upgrade the terminal's firmware.

For more information on version compatibility see Chapter 2, *Installing PanelBuilder*.

- When *Application Size* is chosen from the Select File menu within the *Download to PanelView (RS-232)* menu, the PanelBuilder software calculates the space the application file would occupy in a PanelView terminal. This is not the same as the disk space used by the application file in the development computer.

### Uploading from PanelView

To upload is to transfer a copy of an application file from a PanelView terminal to the development computer, so the file can be edited or saved on disk. The uploaded application file can then be modified and downloaded back to the PanelView terminal.



**ATTENTION:** If you upload an application file from a PanelView terminal, the file will contain the current input states or values in the terminal—not necessarily the terminal's presets for those inputs. If you want the file to contain the presets, choose *Preset Operations* from the Configuration Mode menu, and press the Load Presets button before uploading. This also resets the terminal's retentive input functions.

To upload:

1. Set the PanelView terminal to Configuration Mode and choose *Upload / Download* from the terminal's Configuration Mode menu.
2. On the development computer, choose *Upload from PanelView (RS-232)* from the Transfer menu.
3. Choose *Upload File as* and specify a filename.

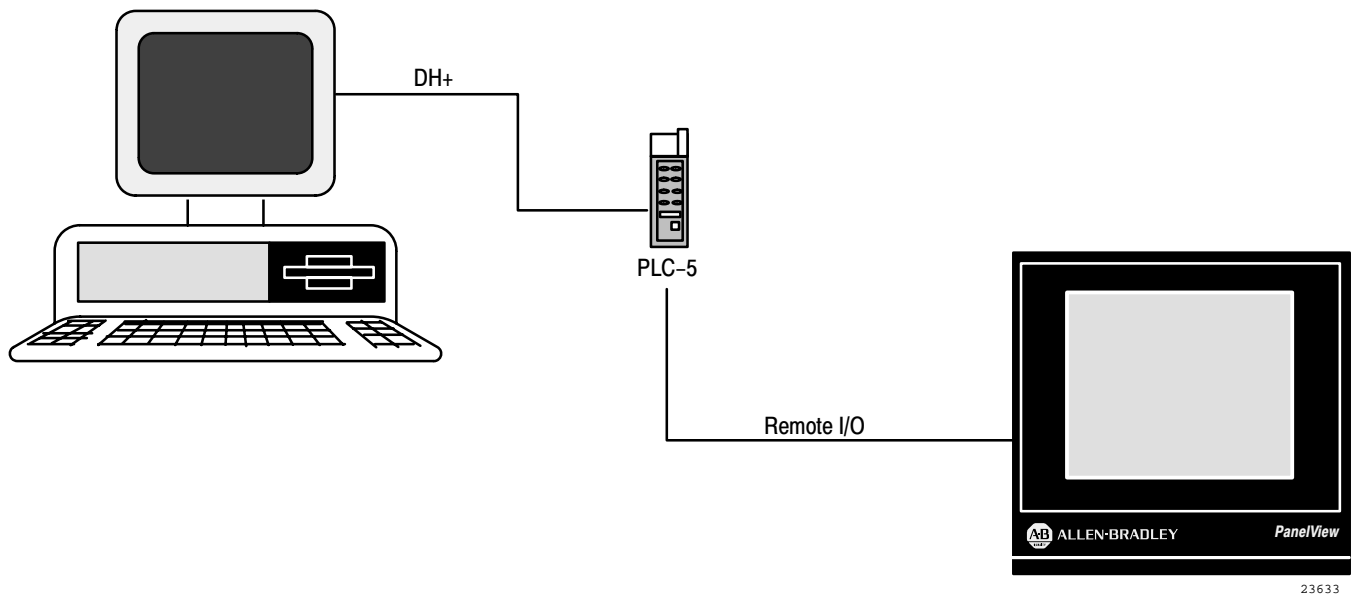
If a filename is not specified, the existing filename of the terminal's application file is used. If the filename exists within the upload directory, you are asked if the file should be overwritten.

4. Respond *Yes* when prompted to start uploading to the development computer. Screen messages inform you as the upload proceeds.

## Downloading and Uploading over the Data Highway +

PanelBuilder version 3 and later software and PanelView version 3 and later firmware support the uploading and downloading of application files over the Allen-Bradley Data Highway +, using the PLC-5 Remote I/O Pass-Through feature, with the PanelView terminal connected as a remote I/O device to the PLC-5. This feature allows you to download application files to PanelView terminals without changing cabling on the terminals, and without having to go from terminal to terminal with a PC for direct downloading.

**Figure 6.14**  
Connecting the Development Computer and PanelView Terminal through a Data Highway + and PLC-5



These PLC revisions support the Pass-Through feature:

**Table 6.D**  
PLC Series/Revision Requirements for Pass-Through File Transfer

Processor	Series	Revision
PLC-5/11	All	All
PLC-5/15	B	N or later
PLC-5/20	All	All
PLC-5/25	A	J or later
PLC-5/30	A	B or later
PLC-5/40	A B	E or later B or later
PLC-5/60	A B	E or later B or later
PLC-5/250	All	All

The PanelView hardware and firmware revisions, and PanelBuilder software revisions required are:

**Table 6.E**  
**Hardware, Firmware and Software Requirements for Pass-Through File Transfer**

PanelView Hardware	Series A, Rev B or later
PanelView Firmware	Version 3.0 or later
PanelBuilder Software	Version 3.0 or later
Pass-Through Utility	Version 3.0.1

### Configuring the Pass-Through Parameters

Before performing a file transfer with the Pass-Through feature, the appropriate parameters must be configured in both PanelBuilder and PanelView.

**IMPORTANT:** As soon as any of the Pass-Through parameters are configured, the application file becomes compatible with terminals with version 3.0 or later firmware. The file cannot be downloaded to earlier version terminals.

Once a valid file exists in the terminal, you can download to the same address via the Pass-Through feature. Alternately, you can configure the pass-through address at the terminal to match the application file's pass-through address.

Some parameters are saved in the application file. Some are configured through the Transfer window just before the download. One parameter is set in the PanelView terminal.

There are two groups of addresses to configure in the application file, the Pass-Through Download bits and the PanelView location data.

#### The Pass-Through Download Bits

The Pass-Through Download Bits are optional, but are strongly recommended. They are:

- the **PLC Inhibit Bit**. When this bit is set (to 1), PanelView will not permit a download. This bit must be reset by the PLC.
- the **Pass-Through Request Bit**. This bit is set (to 1) by PanelView when a download request is received. It is cleared (reset to 0) once the actual download starts.

The PLC can be programmed to clear the PLC Inhibit bit when this bit is set, allowing the file transfer to proceed.

- the **Pass-Through Status Bit**. This bit is set (to 1) by PanelView when the first download block transfer is received, and remains set throughout the download. It is cleared when the download is complete. When the Pass-Through Status Bit is set, the Pass-Through Request Bit is cleared.

To configure these bits, open the File Menu and select *Options* ( ). From the Options menu, select *Configure Pass-Through Download Bits*. The following window opens:

**Figure 6.15**  
**Configure Pass-Through Download Bits Window**

22588

Select one of the three options to open an address definition window like Figure 6.16, the PLC Inhibit Bit Address window.

**Figure 6.16**  
**The PLC Inhibit Bit Address Window**

Current Address	Unassigned Address
<b>Data Type</b> Communications	<b>Bit</b> Discrete
<b>Input/Output</b>	<b>Output</b>
Rack	1
Start Word	0
Start Bit	0
<b>Number of Bits</b>	<b>1</b>
Update Address View Address Map Delete Address	
Quit	

23590



The *Data Type* and *Number of Bits* fields are not configurable; the data type is always “Bit” and the number of bits is always 1. The *Input/Output* field is always set to Input for the Pass-Through Status and Pass-Through Request bits; for the PLC Inhibit bit, the default is Output, though Input is permitted.

### PanelView Location Data

These addresses locate your PanelView terminal on the communications network. The Location Data includes the Block Transfer Control Address (Rack, Group and Module); the PLC DH+ Address; and the Local and Remote Bridge Addresses, when two DH+’s are configured together.

Of these parameters, the Pass-Through Block Transfer Control Address must be configured through the Communications menu before downloading. The information is saved with the application file, and is automatically read when the download is initiated.

### Pass-Through Block Transfer Control Address

The address is configured like any other block transfer address, in the Block Transfer window of the Communications Menu. The Pass-Through feature reserves a dedicated block transfer, called Pass-Through, for its exclusive use. The file size for this block transfer is fixed at 30 words and cannot be changed.

**Figure 6.17**  
**The Block Transfer Window**

FILE MENU: Se

Communications

PLC Type PLC-5/15 integral

Rack Assignment

Block Transfer

Block Transfer File	Rack Number	Module Group	High/Low Byte	File Size
1	*	*	*	*
2	*	*	*	*
3	*	*	*	*
4	*	*	*	*
5	*	*	*	*
Pass-Through	*	*	*	30

Quit

22591

The other Location Data parameters can be configured through the Communications menu before downloading, or in the Pass-Through Download to PanelView window at the time of the transfer. Configurations defined through the Communications menu are saved with the application file and picked up automatically at the time of the download. Configurations defined at the time of download override the configurations in the application file, but they are temporary, and apply only to the current PanelBuilder session.

### PanelView/PLC DH+ Addresses

To configure the DH+ addresses defining the PanelView terminal location and save them with the application file, choose *Pass-Through Configuration* in the Communications menu.

**Figure 6.18**  
**The Pass-Through Configuration Window**

Pass-Through Configuration	
PLC DH+ Address	Not Used
Local Bridge Address	Not Used
Remote Bridge Address	Not Used
Quit	

22589

Cursor to *PLC DH+ Address* and press **Enter**. The following window opens:

**Figure 6.19**  
**PLC DH+ Address Window**

PLC DH+ Address	
Not Used	
PLC DH+ Address (0-77)	
Quit	

22615

Cursor to *PLC DH+ Address (0-77)* and press **Enter**. Type the correct address (in octal) in the small field that appears and press **Enter**.

### Local Bridge Address/Remote Bridge Address

These fields are only required when you have two DH+ networks joined by a connecting module or “bridge”. “Not Used” is the default entry in either field; otherwise, enter the correct address in octal.

**Figure 6.20**  
Local Bridge Address and Remote Bridge Address Selection

Local Bridge Address

Not Used

Bridge Address (0-77)

Quit

Remote Bridge Address

Not Used

Bridge Address (0-376)

Quit

22571

### Configuring the PanelView Terminal for Pass-Through

The Auto-Restart After Download parameter can be configured at the PanelView terminal.

Set the terminal's Mode Select Keyswitch to Configure. From the Configuration Mode Menu, choose *Pass-Through Download Options*. A window will open, slightly different on a touch screen terminal than on a keypad terminal.

**Figure 6.21**  
The Pass-Through Download Options Window (Keypad Terminal)

## PASS-THROUGH DOWNLOAD OPTIONS

> Auto Restart

Address Source

PLC Type

Baud Rate

Rack Number

Module Group

High/Low Byte

Manual Address Source

Yes

Application

PLC-5/30

115.2K

7

4

High

Up  
Cursor

Down  
Cursor

Change  
Data

Save &  
Exit

23663

If you choose *Yes* for Auto-Restart, PanelView will start executing the new application file as soon as the download is completed. If you choose *No*, PanelView will wait for operator confirmation before starting to execute the new application.

The rack assignments and PLC status will remain as per the previous application file until the moment the new application begins executing.

## Address Source

You can choose between *Application* and *Manual* for the Address Source. The first time that you enter this screen, the default is *Application*. When you re-enter the screen, the values that were previously saved appear.

When you set the Address Source to *Manual*, you invalidate the application file. When you set the Address Source back to *Application*, you revalidate the application file. It will execute normally.

**IMPORTANT:** After a successful download of an application file, via Pass-Through or serial port, the terminal automatically resets the Address Source to *Application*, uses the application file parameters, and discards the Manual Address parameters.

- **Application**—When you choose *Application*, the terminal uses the application file Pass-Through Address Source.

If the application file contains a pass-through configuration, its values are displayed in the Manual Address Source area. If the application file does not contain a pass-through configuration or there is no application file present in the terminal, you will see asterisks displayed in the Manual Address Source area. Without valid parameters in the Address Source, the Pass-Through upload or download fails.

When you choose *Application* and then choose *Save & Exit*, the terminal saves the Auto-Restart setting only.

- **Manual**—You must toggle the Address Source to *Manual* before you can change any of the Manual Address Source entries.

When you choose *Manual*, the following message pops up:

Choosing Manual Address Source will  
disable the Terminal's current application  
file. Select Application to enable

This message remains on your screen until you toggle the Address Source to *Application*.

If you toggle the Address Source to *Manual* but the current application file has no Pass-Through configuration and a manual address has not been configured and saved previously, the asterisks will be replaced by the following defaults:

- **PLC Type:** PLC-5/25
- **Baud Rate:** 57.6K

- **Rack Number:** 1
- **Module Group:** 0
- **High/Low Byte:** Low

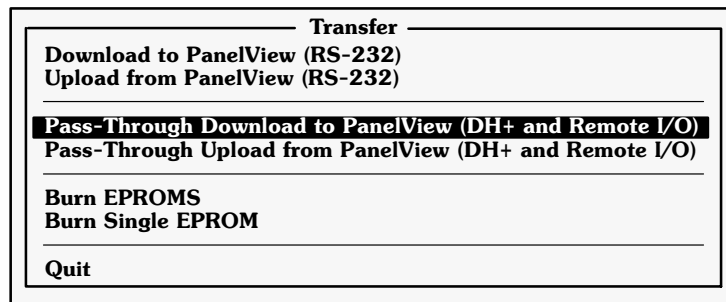
When you set the Address Source to *Manual* and choose *Save & Exit*, the terminal validates the Manual Address Source and saves the Pass-Through rack assignment setting and that of Auto-Restart. The terminal also invalidates the existing application file to ensure that the new manual Pass-Through rack assignment does not conflict with existing application file rack assignments.

### **Downloading over the Data Highway +**

To download using the PLC Pass-Through feature, both the PLC and PanelView must be active on the network and in RUN mode. However, PanelView ignores all operator and PLC inputs and outputs during the download. The rack assignments and PLC status will remain as per the previous application file until the download is complete.

Open the Transfer menu and choose *Pass-Through Download to PanelView (DH+ and Remote I/O)*.

**Figure 6.22**  
**Transfer Menu**



22558

Then use the following menu to select the file and initiate the download.

**Figure 6.23**  
**Pass-Through Download to PanelView Menu**

**Pass-Through Download To PanelView (DH+ and Remote I/O)**

**Select Application File**

Application File Comment	
Select Directory	C: \PDS

---

**Download Application File**

---

**PanelView Location Data**

Rack	
Group	
Module (High/Low Byte)	
PLC Type	PLC-5/15 integral
PLC DH+ Address (0-77)	
Local Bridge Address	Not Used
Remote Bridge Address	Not Used

---

**Programming Terminal Configuration**

---

Quit

22559



**ATTENTION:** Incorrect address selection could corrupt data in a non-PanelView device. Verify that the address entered is correct for your network.

If there are no application files in the selected directory, choose *Select Directory* to change to the directory for the file you want to download.

If there are application files in the current directory, the Select Application File field will display the name of the last file edited in this session; if none, the last file name entered or selected; if none, the first application file in the selected directory. The Application File Comment and the PanelView Location Data for that file will be automatically copied to the window.

You have the option at this point of changing some of the PanelView Location Data. The PLC DH+ Address and the Local and Remote Bridge Addresses can be configured at the time of the download. The changes will apply only to this download operation, and will not be saved with the selected application file, or replace the parameters configured in the file, if any.

**IMPORTANT:** Both the local and remote bridge addresses must be defined or both must be set to “Not Used” in order to download the application file.

### Programming Terminal Configuration

Your development computer (PC) must be configured to communicate with the DH+. This requires defining the address of the PC on the network and the type of hardware driver used.

These settings are stored in the PanelBuilder Defaults file and become the new defaults for future downloads.

**Figure 6.24**  
**Programming Terminal Configuration Menu**

Programming Terminal Configuration	
Programming Terminal DH+ Address	0
DH+ Hardware Driver	1770-KF2/1785-KE
Get 6200 Parameters	
Pass-Through Utility Directory	C:\PASSTHRU
Quit	

22573

You can use the first two menu items to enter these values manually, as follows:

- **Programming Terminal DH+ Address:** This option defines the address and parameters of the PC you will be using to download files. Enter a value (0-77 octal). The default is 0.
- **DH+ Hardware Driver:** Choose from:
  - 1770-KF2/1785-KE (choose a port, baud rate, parity, half/full duplex, and error-checking type)
  - 1784-KL (choose between multi-drop or direct connection types)
  - 1784-KT/KT2 (you will have to choose a connection type and a Driver Card Location).
  - 1784-KTK1 (choose a connection type, a Driver Card Location, and an interrupt number)
- **Get 6200 Parameters:** Alternatively, if you have the 6200 Programming software, you can choose to have the addresses and parameters loaded directly from the 6200 default file, instead of entering them manually.

You can load the parameters in the 6200 Defaults file by choosing *Get 6200 Parameters*. You will have to locate the directory path of the 6200 software drivers (by default C:\IPDS\ATTACH\). The directory setting will be saved as a PanelBuilder default. Then choosing *Get 6200 Driver Parameters* will load the parameters from the driver files.

Regardless which method you choose, the final menu item must be configured, since the Pass-Through Utility is vital to the success of any download using the Pass-Through feature.

- **Pass-Through Utility Directory:** This field identifies the directory of the pass-through utility files. By default they are located in C:\PASSTHRU.

**IMPORTANT:** You must use Pass-Through Utility Version 3.0.1.

If the programming terminal configuration and PanelView Location Data (addressing) information are correct, you can initiate the download.

1. Choose *Download Application File* from the Pass-Through Download to PanelView (DH+ and Remote I/O) menu. A message will appear, warning you that the addressing information which locates the PanelView terminal on the network must be correct. If you are sure of your settings, choose *Continue*. A further prompt will display the estimated time for the download—the download will only commence when you choose *Start Downloading*.

**IMPORTANT:** If the file in the terminal is newer than the one on disk, you will be informed and given a chance to cancel the download.

If the Inhibit bit is set, a message will appear on the status line. You can cancel the transfer by pressing **Esc**, or you can wait for the Inhibit bit to clear.

2. The status line will indicate whether the download is progressing. An information message will be displayed on the screen when the download is complete.

When the download is complete, the terminal will return to Run mode either automatically, or when the operator restarts it, depending on the terminal's Auto-Restart configuration. (See .)

**IMPORTANT:** Do not try to download application files from two development computers to the same location via the Pass-Through at the same time. The results of such a conflict are unpredictable. The first download will be terminated, but the second download may or may not be completed successfully. An unsuccessful attempt will produce an error message in both the PanelView terminal and the development computer(s).



If both operations fail, the application file in the terminal may be corrupted. The files in the computers will not be affected, so the best thing to do is to try the download again immediately, but from only one computer.

**Uploading Over the Data Highway +**

To upload, both PanelView and the PLC-5 must be active on the network and in Run mode. Unlike download, the terminal will continue to function in Run mode throughout the upload.

On the development computer, open the Transfer menu and choose *Pass-Through Upload from PanelView (DH+ and Remote I/O)*. Then use the following menu to configure the PanelView terminal location on the network, and initiate the upload.

**Figure 6.25**  
**Pass-Through Upload from PanelView Window**

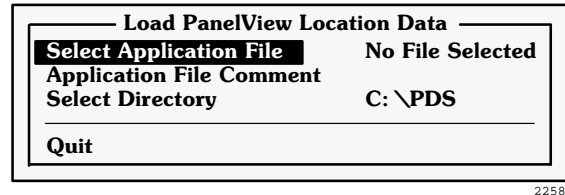
Pass-Through Upload from PanelView (DH+ and Remote I/O)	
<b>Start Upload</b>	
<b>Load PanelView Location Data</b>	
<b>PanelView Location Data</b>	
Rack	
Group	
Module (High/Low Byte)	
PLC Type	
PLC DH+ Address (0-77)	
Local Bridge Address	Not Used
Remote Bridge Address	Not Used
<b>Programming Terminal Configuration</b>	
Quit	

22584

The fields in this window are:

- **Start Upload.** If the PanelView terminal location data and programming terminal configurations are correct, the upload will begin. If an error is detected, a warning message will be displayed.
- **Load PanelView Location Data** allows you to get the location data from an application file. The following window appears:

Figure 6.26  
The Load PanelView Location Data Window



- **Select Application File** produces a pop-up file selection list.
- **Application File Comment** displays the comment for the selected file.
- **Select Directory** allows you to enter a new directory path to the application file.

**IMPORTANT:** This directory applies only to the application file selected. It does not change the default directory, i.e., the one specified in the Files menu.

- **PanelView Location Data** extracts the block transfer control address and the DH+ addressing of the target PanelView from the application file selected and places them in the PanelView Location Data fields.
- **Programming Terminal Configuration** is the same as for downloading.
- **Quit** cancels the file operation.



**ATTENTION:** Incorrect address selection could corrupt data in a non-PanelView device. Verify that the address entered is correct for your network.

If the PanelView terminal location data and programming terminal configurations are correct, choose *Start Upload*. A message will appear, warning you that the addressing information which locates the PanelView terminal on the network must be correct. If you are sure of your settings, choose *Continue*. The upload will begin.

As the upload begins, the Start Upload menu will display information about the file in the terminal, and the destination of the file on the development computer's disk.

**Figure 6.27**  
**Start Upload Window**

**Start Upload**

From PanelView	To Existing File
File Name	File Name
File Comment	File Comment
Last Edit Date	Last Edit Date
Last Edit Time	Last Edit Time

Total Estimated Upload Time      Minutes

Continue Upload  
Upload As  
Select Directory

Quit

22587

The *From PanelView* section displays file information on the application in the PanelView terminal.

The *To Existing File* section displays information about the disk file with the same name as the application file in the terminal. If the file does not exist, “To Existing File” will change to “To New File”, and all the fields except the file name will be blank.

**IMPORTANT:** Be sure that you are not about to overwrite a file on the application computer’s hard disk which is more recent than the file in the terminal.

You cannot change “From PanelView” or “To Existing File”.

You *can* change three of the selections at the bottom of the menu:

- **Continue Upload** allows the upload to proceed. If the terminal file name matches one on disk, the “Overwrite?” prompt is displayed. You will have to respond *Yes* to the prompt. If you respond *No*, the prompt disappears and the highlight bar moves to the Upload As option.
- **Upload As** allows you to change the file name of the uploaded file. If the new file name also exists on disk, the “To Existing File” information will be updated with data from the new file. If the file does not exist, the title “To Existing File” will change to “To New File”, and all the fields except the file name will be blank.
- **Select Directory** allows you to upload the file into a different directory. If changing the directory causes the file name to match one on disk, the “To Existing File” information will be updated with data from the new file. If the file does not exist, the title “To Existing File” will change to “To New File”, and all the fields except the file name will be blank.

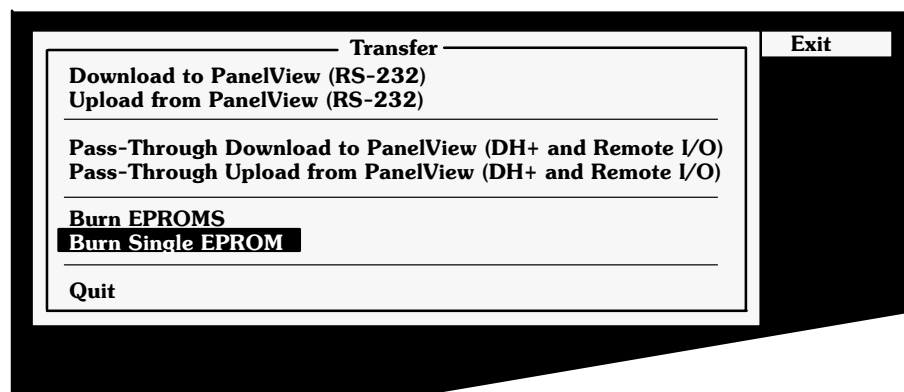
## Burning the User EPROM

Earlier PanelView terminals contained two sockets for optional PROMs. Series D and E PanelView terminals have only one socket for one optional EPROM/EEPROM.

To burn two 27C256 type EPROMs for use in a Series C or earlier terminal, choose *Burn EPROMS* from the Transfer menu.

To burn a single 27C512 type EPROM for use in a Series D or E terminal, choose *Burn Single EPROM* from the Transfer menu.

**Figure 6.28**  
**The Transfer Menu**



22013

Before you can burn an application file into the user EPROM, you must connect your computer to an EPROM burner with an RS-232 serial cable. The EPROM burner is connected to the same RS-232 port on the development computer that is used to connect the PanelView terminal. Refer to your EPROM burner user's manual for connection instructions.

**IMPORTANT:** PanelBuilder downloads the application file to the EPROM burner in Intel Hex Format. The EPROM burner must be able to accept a simple dump of Intel Hex format data and use 27C256 or 27C512 type EPROMs without special commands or operations.

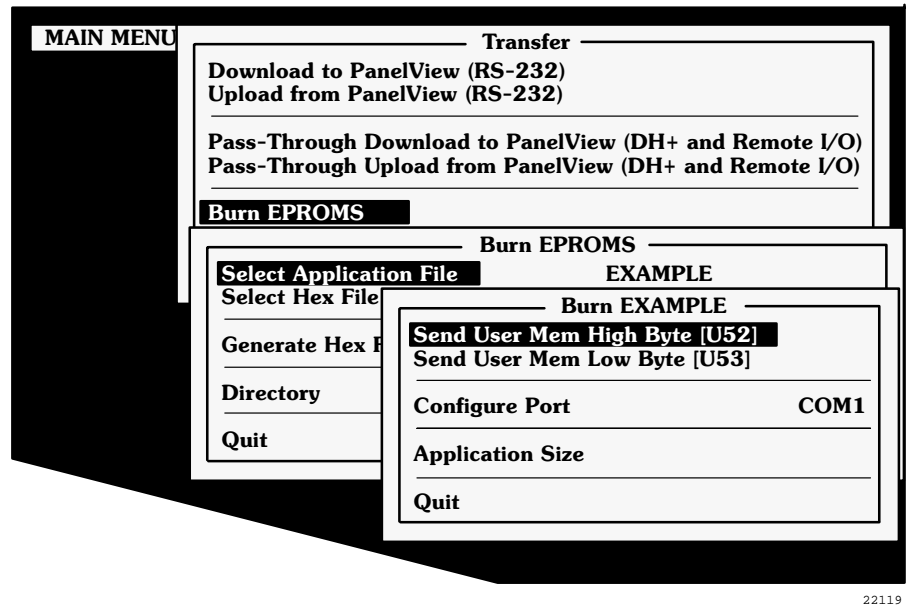
PanelBuilder can also translate your application file to a DOS file with the Intel Hex Format. This allows you to use other EPROM Burners (with their own software drivers) for the IBM PC. See the following sections *Burn EPROMS* and *Burn Single EPROM* for more information.

## Burn EPROMS

To burn EPROMs for Series C and earlier terminals, choose *Burn EPROMS* from the Transfer Menu. Then, choose *Select Application File* to select the file you will download to the EPROM burner.

After you press **Enter**, PanelBuilder takes a few seconds to generate the hex files. When the file is created, the *Burn FILENAME* menu opens, (where FILENAME is the name of the application file you selected).

**Figure 6.29**  
The Transfer Menu and Burn EPROMS Menu



The download to the burner is done in two parts, because one file is burned into two EPROM chips—the high bytes in one and the low bytes in the other. Both chips can be later installed into the PanelView terminal. In Figure 6.29, [U52] and [U53] refer to the labels on the chip sockets on the PanelView terminal’s logic board.

**Send User Mem High Byte** sends the data for EPROM chip U52 to the EPROM burner.

**Send User Mem Low Byte** sends the data for EPROM chip U53 to the EPROM burner.

**Configure Port** allows you to configure your computer’s serial port to communicate with the EPROM burner.

**Application Size** calculates the amount of memory the application file would occupy in a PanelView terminal. This is not the same as the disk space used by the application file.

To convert an application file into two hex files which can later be retrieved or sent to the EPROM burner, choose *Generate Hex Files*. The two files that are created correspond to “User Mem High Byte (U52)” and “User Mem Low Byte (U53)” and have the file extensions .U52 and .U53.

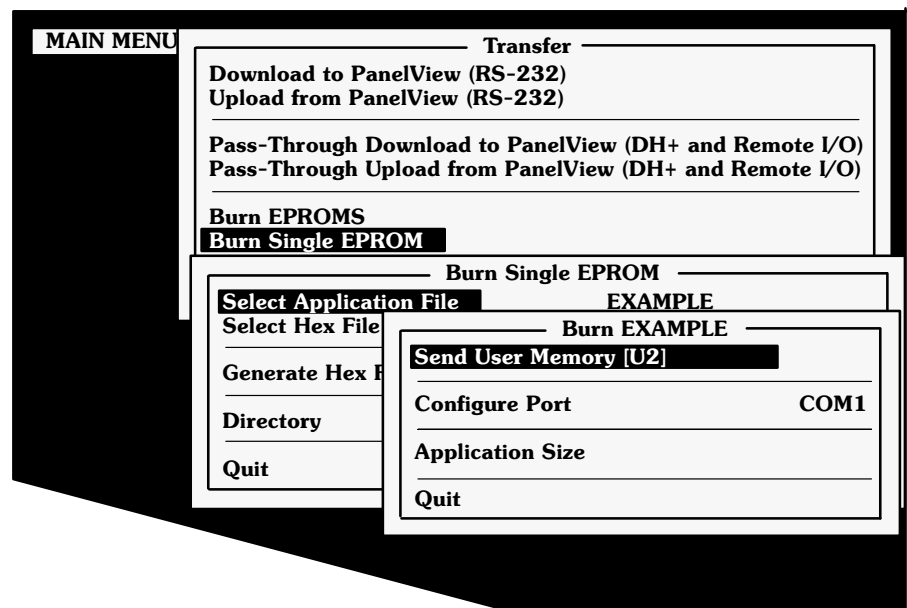
To send previously generated Hex files, choose *Select Hex File*. The Hex files will be loaded and the Burn FILENAME menu will appear as it does when using the Select Application File option.

## Burn Single EPROM

To burn a single EPROM for Series D or E terminals, choose *Burn Single EPROM* from the Transfer menu. Then, choose *Select Application File* to select the file you will download to the EPROM burner. After you press **Enter**, PanelBuilder takes a few seconds to generate the hex file. When the file is created, the *Burn FILENAME* menu opens, (where FILENAME is the name of the application file you selected).

The file must have been created with the User Memory Limit set to one of the smaller selections (59,904 or 62,976).

**Figure 6.30**  
The Transfer Menu and Burn Single EPROM Menu



23625

**Send User Memory [U2]** sends the data for the EPROM chip U2 to the EPROM burner.

**Configure Port** allows you to configure your computer's serial port to communicate with the EPROM burner.

**Application Size** calculates the amount of memory the application file would occupy in a PanelView terminal. This is not the same as the disk space used by the application file.

To convert an application file into a hex file which can later be retrieved or sent to the EPROM burner, choose *Generate Hex File*. The file that is created has the file extension .U2.

To send a previously generated Hex file, choose *Select Hex File*. The Hex files will be loaded and the Burn FILENAME menu will appear as it does when using the Select Application File option.

## Programming EEPROMs

PanelView application files can also be stored in the optional EEPROM(s) for easy installation into PanelView terminals on the factory floor.

Series C and earlier PanelView terminals contain two sockets for user PROMs. Series D and E terminals have only one socket for one user EPROM/EEPROM.

An EEPROM can be programmed two different ways.

1. If an EEPROM is installed in the empty socket in the PanelView terminal, an application file will automatically be copied into the EEPROM when it is downloaded to the terminal. This method does not require a PROM burner.
2. To program the EEPROM with a PROM burner, first convert the application file to Hex files (Intel format) using *Generate Hex Files*, as described in the previous section. The PROM burner must have its own download utility software, and must be able to program a 28C256 or 28C512 type EEPROM. Refer to the instructions furnished with your PROM burner for the download utility procedure. Once programmed, the EEPROM(s) can be installed in the empty PROM socket(s) in the PanelView terminal.

**IMPORTANT:** The user EEPROM can be used for two purposes: for application file backup (as described above) or to increase the memory available for the application file to 128K from 64K bytes. If the EEPROM is used for application memory, it can't be used to back up the application file. To make the memory option selection, open *Options* in the File menu, and choose *User Memory Limit*. To use the internal EEPROM for backup, choose one of the two smaller selections (59,904 or 62,976).

**IMPORTANT:** PanelBuilder will not allow an application file whose User Memory Limit exceeds 64K to be burned to PROMs.

## **Burn EEPROMS**

To burn EEPROMs for Series C and earlier terminals, choose *Burn EPROMS* from the Transfer Menu. Then, choose *Select Application File* to select the file you will download to the EPROM burner.

After you press **Enter**, PanelBuilder takes a few seconds to generate the hex files. When the file is created, the *Burn FILENAME* menu opens, (where FILENAME is the name of the application file you selected).

The download to the burner is done in two parts, because one file is burned into two EEPROM chips—the high bytes in one and the low bytes in the other. Both chips can be later installed into the PanelView terminal. In , [U52] and [U53] refer to the labels on the chip sockets on the PanelView terminal's logic board.

**Send User Mem High Byte** sends the data for EEPROM chip U52 to the EPROM burner.

**Send User Mem Low Byte** sends the data for EEPROM chip U53 to the EPROM burner.

**Configure Port** allows you to configure your computer's serial port to communicate with the EPROM burner.

**Application Size** calculates the amount of memory the application file would occupy in a PanelView terminal. This is not the same as the disk space used by the application file.

To convert an application file into two hex files which can later be retrieved or sent to the EPROM burner, choose *Generate Hex Files*. The two files that are created correspond to "User Mem High Byte (U52)" and "User Mem Low Byte (U53)" and have the file extensions .U52 and .U53.

To send previously generated Hex files, choose *Select Hex File*. The Hex files will be loaded and the *Burn FILENAME* menu will appear as it does when using the *Select Application File* option.



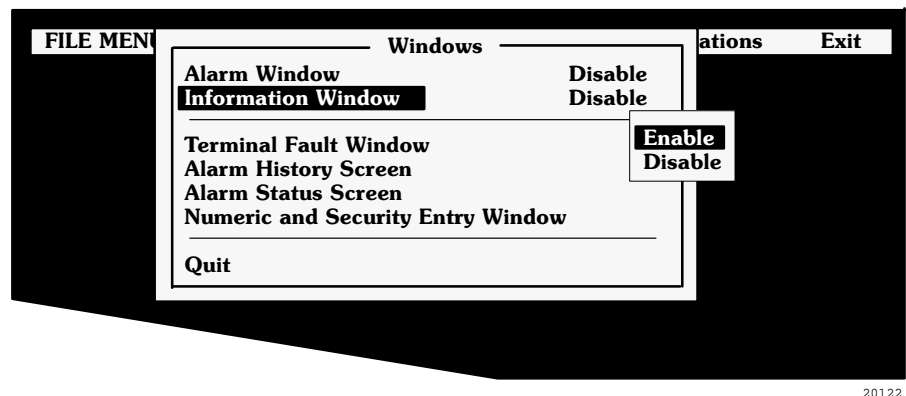
## Information and Alarm Windows

Windows differ from PanelView objects in that they are not tied to specific screens. They can appear over any screen at any time.

This chapter discusses the uses of the Information window and the Alarm window, and describes how they are configured.

To define the Alarm and Information windows, choose *Windows* from the File Menu and enable the appropriate window.

**Figure 7.1**  
**The Windows Menu**



20122

### The Information Window

The Information window is triggered to display a message stored in the PanelView terminal. The window appears over the current screen, showing the specified message.

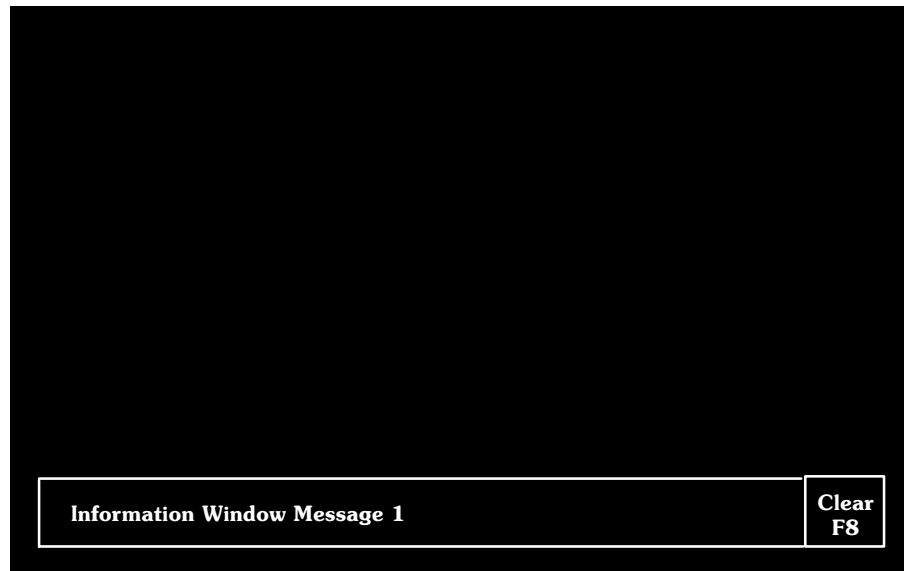
The Information window can be used to display:

- informative messages
- prompts or instructions
- warnings
- current states

The window appears in the bottom four lines of the screen until either:

- the window's **Clear** button is pressed, or
- the PLC controller instructs PanelView to clear the window by setting the window control address value back to zero

**Figure 7.2**  
**Information Window**



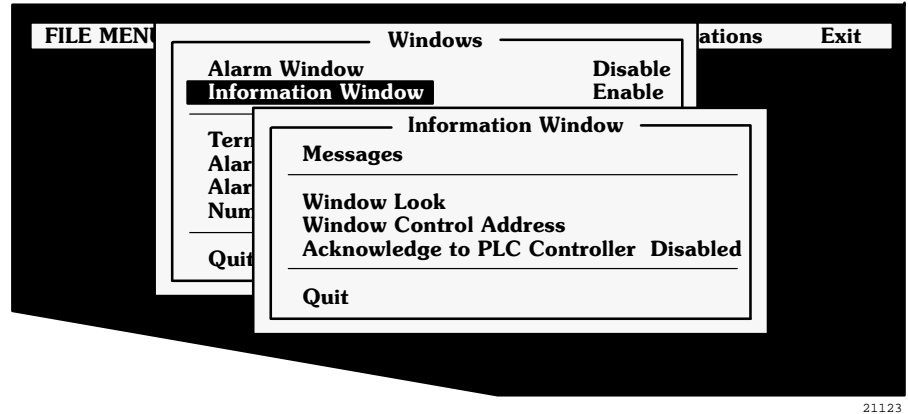
20224

If the Information window is on-screen at the moment when an alarm occurs, the Alarm window may overlap the Information window. The Information window will remain after the Alarm window is cleared.

### Configuring the Information Window

To configure the Information window, set the *Information Window* to *Enable* in the Windows menu. The Information window menu opens for you to define the required parameters.

**Figure 7.3**  
Windows and Information Window Menus

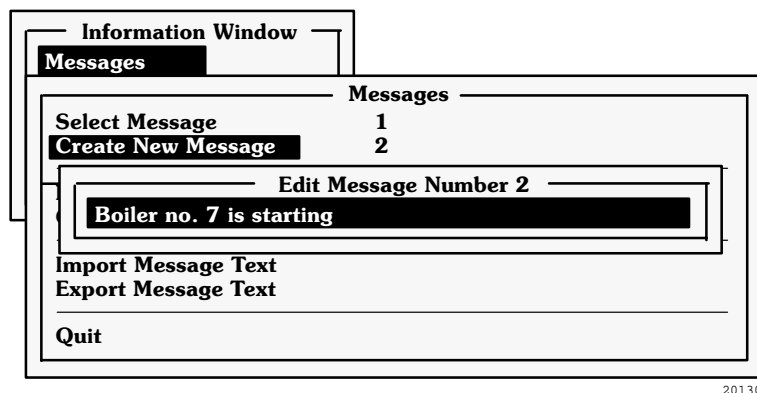


21123

## Creating Messages

Choose *Messages*, then *Create New Message* to open the Edit Message window. Type in the new message. Messages can be up to 70 characters long. Each message is assigned a number which cannot be changed. The maximum number of messages that can be entered is 496.

**Figure 7.4**  
Information Window and Messages Menu



20130

## Importing and Exporting Information Messages

You can import and export ASCII text files as text for information messages.

#### Importing Information Text

Using the text editor of your choice, create an ASCII text file of information messages in this format:

```
nnn"ttt...ttt" CR
!this is a comment
```

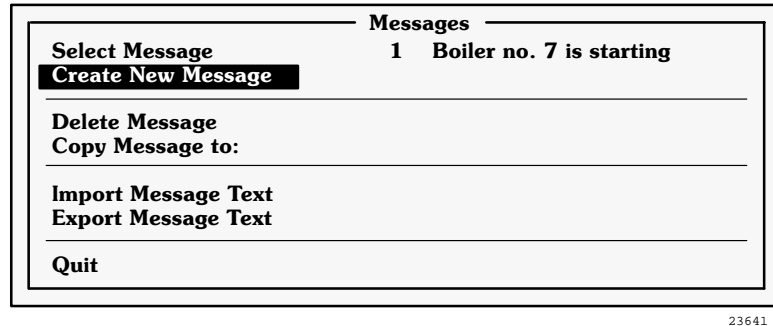
<i>nnn</i>	=	information message number (1–496)
<i>" "</i>	=	start and end of message
<i>ttt</i>	=	message text (1–70 characters)
<i>CR</i>	=	Carriage return (information record delimiter)
<i>!</i>	=	comment character

Follow these guidelines in preparing your information message text file:

- the message number must be between 1 and 496. The numbers do not have to be created in ascending order, but they must be unique, i.e., no two messages can have the same number
- the information text must be surrounded by quotation marks (")
- to include a quotation mark (") in your message, preface it with a second quotation mark (")
- PanelBuilder will ignore any spaces found outside the quotation marks
- do not use any character whose ASCII code is outside the range 32–127. See Table 10.W for details of the ASCII character set
- use the comment character (!) as the first character in the line of a comment. PanelBuilder will ignore lines that begin with !
- make sure your message text is 70 characters or less. If your character width is set to double, use 35 characters or less. If PanelBuilder detects a double width message of more than 35 characters, it will warn you and change the character width to single
- when you name your file, use the extension .IMG

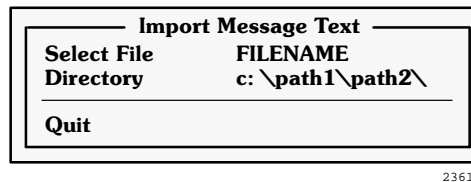
From the File menu, choose *Windows*. Then Enable the *Information Window* item. The Information window menu opens. Choose *Messages*.

**Figure 7.5**  
**The Messages Window**



Choose *Import Message Text*. A window opens.

**Figure 7.6**  
**The Import Message Text Window**



The file name in the *Select File* field will be one of the following defaults, in decreasing order of priority:

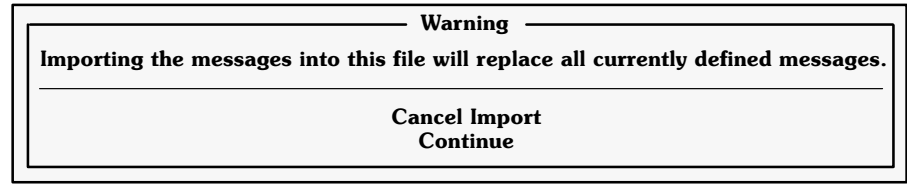
- an .IMG file with the same name as the currently edited file
- the first .IMG file in the selection list
- a blank, if no .IMG files exist in the current directory

Choose *Select File* if you need to change the file name. A list of all files with the .IMG extension in the current default directory appears. Choose the one you want.

If the file is not in the current default directory, choose *Directory* to specify the directory containing the file. The name of the specified directory will be retained between PanelBuilder sessions.

Once the file is selected, PanelBuilder checks the current application file to determine whether any information messages have already been defined. If any messages are found, PanelBuilder displays this message:

**Figure 7.7**  
**Import Error Message**



Choose *Cancel Import* or *Continue*. If you choose to continue, PanelBuilder checks each record in the message file to make sure its format is valid.

An error message will be displayed if any errors are found. The import will be cancelled and the messages currently defined in the file will remain unchanged.

If no errors are found, all the information messages in the application file will be deleted and replaced by the imported ones.

### **Exporting Text**

Choose *Export Message Text* from the Information window's Messages menu. The Export Message Text window will open. This window is the same as the Import Message Text window, except for the title.

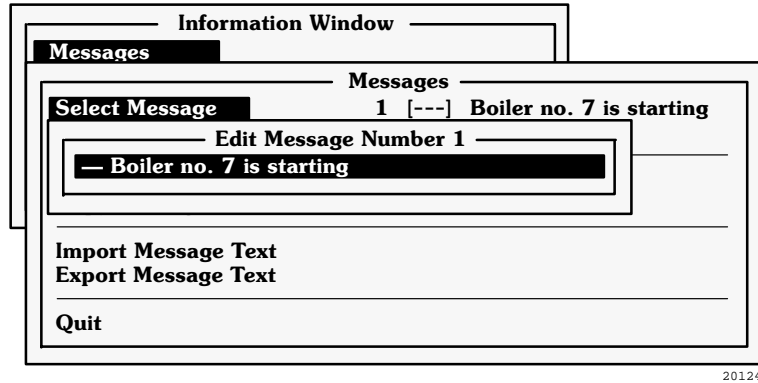
When the window opens, the *Select File* field will default to the name of the application file currently being edited. You can keep the default or change the name to any valid DOS file name. Once *Select File* is chosen the filename area will be highlighted. If the displayed name is acceptable, press **Enter**. An export of messages will be performed. You will be informed if the file already exists in the current directory; the export will not be performed until you choose *Continue* and answer *Yes* to "Overwrite the Existing File?" PanelBuilder appends the .IMG extension when it exports the file.

You can modify the export destination directory by selecting *Directory* from the Export Message Text menu.

### **Editing Messages**

Choose *Messages* from the Information window menu, then choose *Select Message* to select a message for editing. Change the text in the Edit Message window.

**Figure 7.8**  
Information Window and Messages Menu



## Copying Messages

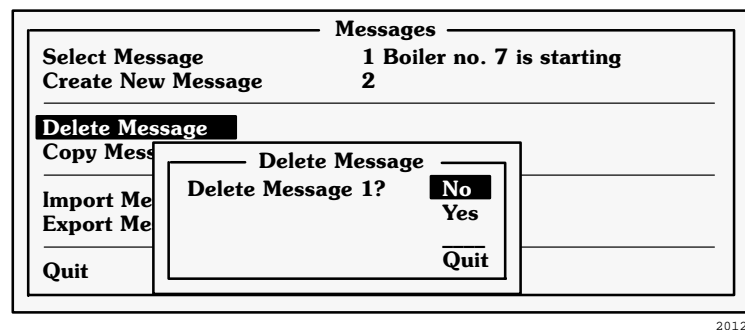
To copy a message, choose *Messages* from the *Information* window menu. Choose *Select Message* to identify the message you want to copy. Then choose *Copy Message to:*

The number shown in the *Copy Message to:* field is always the next unused message number. You can type in another number if you choose. The selected message will be copied to the message number in the *Copy Message to:* field when you press **Enter**. Choose *Select Message* again to see the copied text against the new message number.

## Deleting Messages

To delete a message, choose *Messages* from the *Information* window menu. Then choose *Select Message* to identify the message you want to delete. The message will be deleted when you choose *Yes* in the *Delete Message* window.

**Figure 7.9**  
Delete Message Window

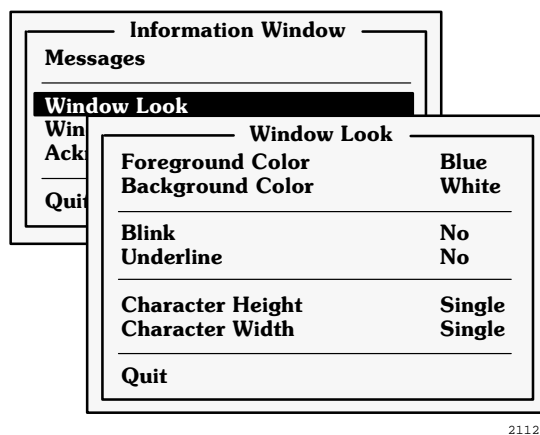


Once the operation is complete, press **Esc** or choose *Quit*.

## Setting the Window's Appearance

To define the appearance of the Information window, choose *Window Look* in the Information window menu. This will open the Window Look menu.

**Figure 7.10**  
The Window Look Menu



**IMPORTANT:** For monochrome terminals, you can select Reverse Video and Intensity for the characters that appear, instead of the Foreground Color and Background Color settings.

If you have defined a message that is longer than 35 characters, PanelBuilder will not allow you to select Double for *Character Width*.

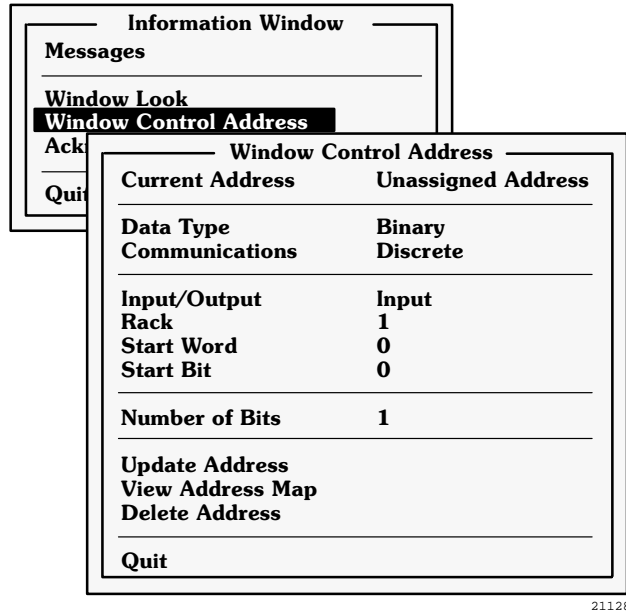
## Address Assignment for the Information Window

To define the PLC address for the Information window, choose *Window Control Address* from the Information window menu. The following menu appears with a list of options described below.

**IMPORTANT:** Remember that the appropriate addresses for both the Information and Alarm windows should be determined when the screens are designed. For more information see Chapter 4, *Planning Your Application*.



**Figure 7.11**  
**Window Control Address Menu**



21128

- **Data Type** defines the data type for the Information or Alarm window. Valid data types are: Binary, BCD, and Bit. (For more information on Data Type, see the next section on Address Assignment and PLC Information Message Triggering.)
- **Communications** specifies Discrete or Block Transfer.
- **Input/Output** specifies whether this is an input or output address (typically output).
- **Rack** specifies the rack number. This option only appears on the menu if you have specified the address as Discrete.
- **File** specifies the block transfer file number. This option only appears on the menu if you have specified this address as a Block Transfer.
- **Start Word** specifies the word or starting word for the address.
- **Start Bit** specifies the starting bit within the word for the address.
- **Number of Bits** specifies the number of bits used in the address.
  - if binary data type is specified, the address assignment will be a contiguous bit string containing from 1 to 16 bits. For the maximum number of messages allowed (496) you would need 9 bits

- if BCD data type is specified, the address assignment will be a contiguous bit string of 4, 8 or 12 bits (that is, 1, 2, or 3 digits). For 496 messages you would need 12 bits
- if bit is specified, the address assignment will always be a contiguous bit string containing from 1 to 496 bits. For 496 messages you would need 496 bits

**IMPORTANT:** The data type, together with the number of bits, determines the maximum number of messages that can be triggered from the PLC controller. See the following section on Address Assignment and PLC Information and Alarm Message Triggering for more information.

- **Update Address** updates the application file with the values entered for the Data Type through to the Number of Bits. The new address is displayed at the top of the menu. If you make a mistake entering a new address, an error message will appear when you choose Update Address.
- **View Address Map** shows you the address map of the bits allocated so far for all the objects, windows and PLC Control Options.
- **Delete Address** removes the existing address from the file.
- **Quit** closes the Window Control Address menu and returns you to the Information Window menu.

### Address Assignment and PLC Information Message Triggering

How the PLC controller triggers messages depends on the data type that is selected. The data types are discussed below.

#### Binary Data Type

If binary data type is specified, the address assignment will be a contiguous bit string containing from one to 16 bits. The bit string can be positioned anywhere within the same PLC rack (even crossing word boundaries) by designating the desired start bit (the default is zero which is the typical choice). Together, the number of bits and the data type dictate the number of messages you can trigger for the Information window.

#### BCD Data Type

If you specify BCD data type, the address assignment will be a contiguous string of 4, 8 or 12 bits (that is, 1, 2, or 3 digits.)

#### Triggering Information Messages for the Binary or BCD Data Type

To trigger a message, the PLC controller must put a non-zero value which corresponds to the desired message number into the designated PLC address. For example, a “trigger value” of 19 would cause the Information window to appear, displaying message number 19 from the Information Message List. If the PLC controller changed the trigger value to 27, PanelView would replace the message with message number 27. The operator can clear the window by pressing the **Clear** button. The window will also be cleared whenever the PLC controller sets the trigger value to zero. If the operator presses the **Clear** button while a valid trigger value is still in the PLC address, the window will clear until the trigger value changes to another non-zero value or until the screen changes. If the PLC controller places an invalid (out of range) trigger value into the PLC address, PanelView fills the Information window with question marks.

#### Bit Position Data Type

If bit data type is assigned, the address assignment will be a contiguous bit string containing from 1 to 496 bits. Each bit in the string has a corresponding message number in the Information Message List. For example, the first bit corresponds to message number one, the second bit corresponds to message number two, etc. When more than one PLC word is required, the next higher word numbers will be used. When you specify the number of bits for this function, you determine the maximum number of messages that you can trigger for the Information window.

#### Triggering Information Messages for Bit Position Data Type

To trigger a message, the PLC program must set the PLC output bit that corresponds to the desired message number in the Information Message List. If PanelView sees any bit set, it displays the Information window with the respective message.

PanelView ranks the message bits. If PanelView sees more than one bit set to on at the same time, the message associated with the least significant bit will be displayed. The operator clears the message by pressing the **Clear** button. The message will also be cleared whenever the PLC controller sets the associated message bits to zero.

If the least significant bit turns off, the message associated with the next active bit is displayed. If there are no active bits, the Information window is cleared.

### Information Window Acknowledgement

If your application requires that the Information window stay on the screen until it is acknowledged, choose *Enable* for the menu item *Acknowledge to PLC Controller*. An address definition window opens.

When this option is enabled, the message window is displayed on the PanelView terminal with an **ACK** button instead of a **Clear** button. The window will stay on the screen until the window control address is set to zero. If the screen changes, the message window will still be displayed until the window control address is set to zero. To remove the window, the PLC controller must detect the ACK bit and then reset the window control address using ladder logic.

If the Acknowledge to PLC Controller address is assigned, the information window will function as follows:

- When the user acknowledges an information message via the **ACK** button, the terminal sets the “Acknowledge to PLC Controller” bit. The bit stays on for up to 3 seconds, or until the window control bit resets to 0.

### The Alarm Window

Use an Alarm window when you want the PLC controller to trigger the display of an important message such as:

- alarm condition messages
- warnings
- informative messages

There are two types of Alarm window:

- a “single-line” Alarm window without buttons which displays the most recent alarm, while leaving the current screen’s buttons active for operator input
- a “Full” Alarm window with a set of buttons for operator response to alarms. When the Full Alarm window is on the screen, all other buttons on a keypad terminal are temporarily inoperative, until the operator responds to the alarm. On a touch screen terminal, only those touch cells that are covered by the Alarm window are disabled

**IMPORTANT:** Do not confuse the Alarm window with the Alarm History Screen.

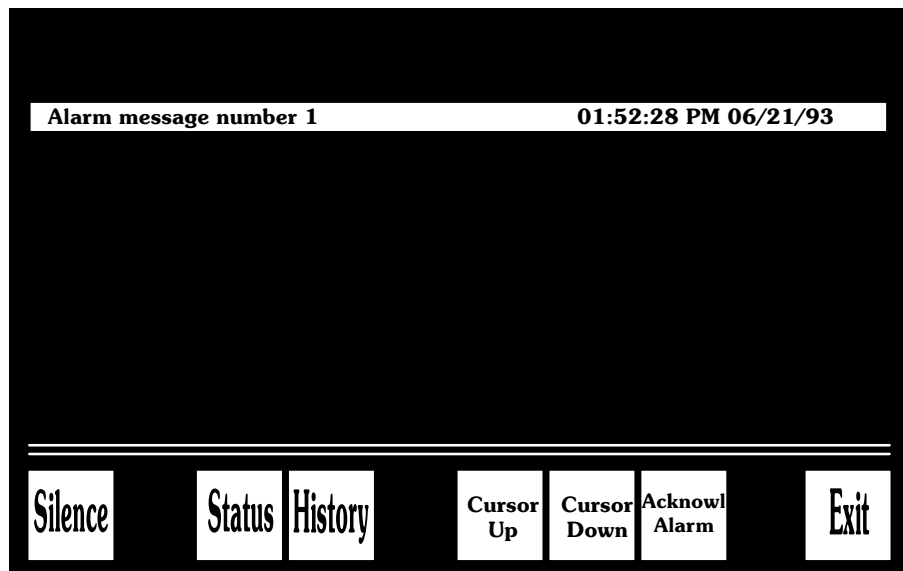


**ATTENTION:** Do not use your PanelView terminal as a primary warning device or indicator of a critical or dangerous situation. An operator's response to a critical or dangerous situation must never depend on software or solid state electronics. All critical alarm indications and any critical host controller responses must employ redundant and hard wired or mechanical interlocks. "Critical" means any situation that could result in physical injury, product damage or significant process down time.

## Alarm Messages

When the PLC controller triggers an alarm message, PanelView displays the alarm message in the Alarm window. Time and date of occurrence are displayed with the alarm message.

**Figure 7.12**  
**The Full Window with one Alarm Message**



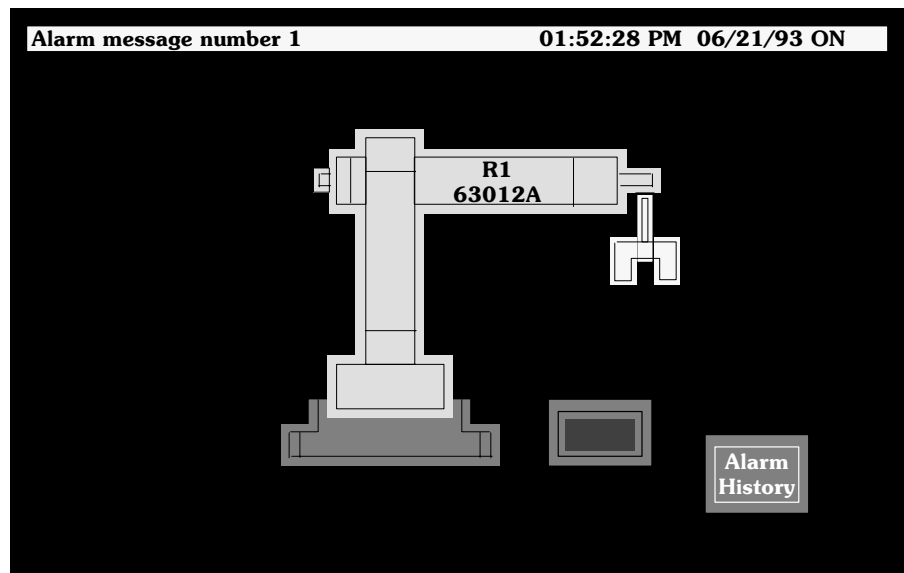
20225

The Full Alarm window can display up to 19 single-height messages. If the PLC controller triggers more alarm messages before you clear the window, the existing message shifts down, and the new messages are added to the top of the list.

If more messages occur than fit in the window, PanelView shifts the oldest messages into the Alarm History screen and displays a message telling you what it has done. You can view the Alarm History screen by pressing the Alarm History button provided by the Full Alarm window.

The single-line Alarm window displays the alarm message, time and date of occurrence and on/off status of the most recent alarm. The status of all other alarms can be viewed in the Alarm History screen or the Alarm Status screen. Since there are no buttons on the single-line Alarm window, you should include a “Go To Screen” button on your operator screens to call up the Alarm History screen.

**Figure 7.13**  
**Screen with Single-line Alarm Window**



22610

The single-line Alarm window can only be removed from the screen by:

- acknowledgement of the alarm in the Alarm History screen
- a PLC-controlled clear alarm window

If the alarm displayed in the single-line Alarm window becomes inactive, it still remains in the window. If the screen changes, the alarm display remains on the new screen unless it is cleared by the PLC controller.

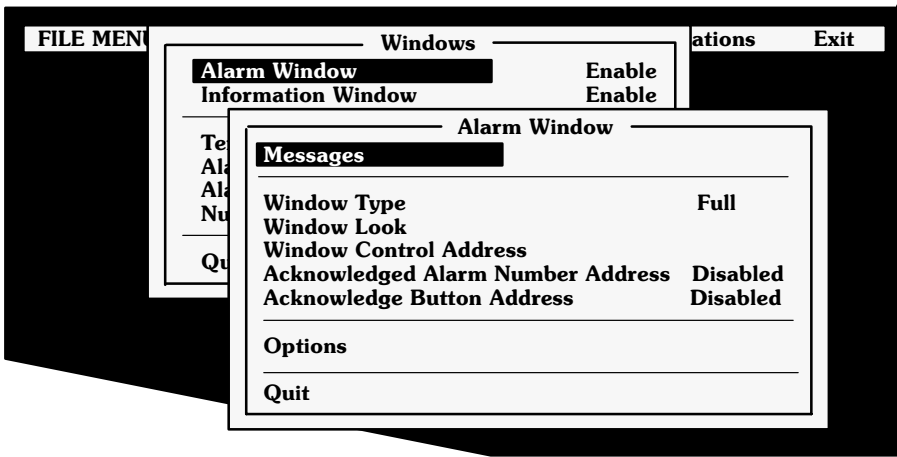
### Background Alarms

If the Alarm window is disabled, alarms will continue to be triggered in the background. They will still cause audio alarms, trip the alarm relay, and send alarm messages to the printer and the Alarm History screen, but the Alarm window will not pop up over the current screen.

### Configuring the Alarm Window

In the File menu, open the Windows menu and set the Alarm window to *Enable*. The Alarm Window menu opens for you to define the required parameters.

Figure 7.14  
The Alarm Window Menu



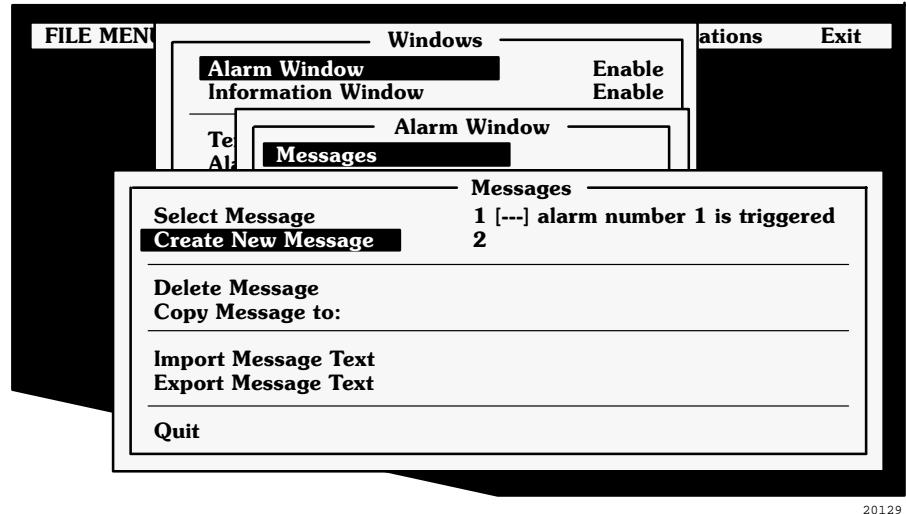
23146

### Creating Messages

Choose *Messages* to create or edit alarm messages. To make a message, choose *Create New Message*. Press **Enter** and the message area is highlighted and censored awaiting message number entry (1–496). The maximum number of alarm messages is 496.

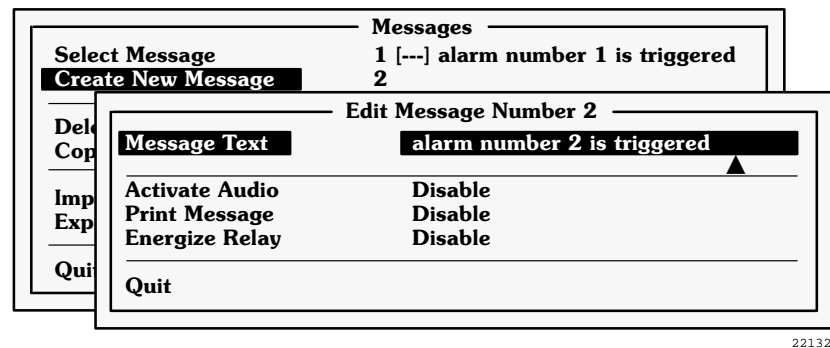
**IMPORTANT:** The maximum number of messages for Versions 1 and 2 firmware is 256. When you create an alarm message with a message number higher than 256, you will be warned that the application's compatibility has changed—the new application will run only on terminals with Version 3 and later firmware.

**Figure 7.15**  
The Messages Menu



Once the number is assigned, press **Enter**; the Edit Message menu opens with three alarm message options and a line for the message. The options can be set differently for each message. Type the message and set the options of your choice.

**Figure 7.16**  
Edit Message Menu



**IMPORTANT:** The maximum length of Alarm Messages in Version 3, 4 and 5 is 50 characters; and in Version 1 and Version 2 it is 36 characters. The first time you create a message with a length of more than 36 characters, you will be warned that the application's compatibility has changed—the new application will only run on terminals with release 3.0 and later firmware.

The Alarm window has more features than the Information window and greater priority as well.



The options are:

- **Activate Audio**—when the alarm is triggered, a continuous audio alarm will sound.
- **Print Message**—when the alarm is triggered, the alarm message text will be sent to a printer. If “Acknowledge Button Address” is enabled, the alarm message will be printed again with the acknowledge time and date when it is acknowledged. The printer prints each alarm message on a single line, with the time and date when the alarm occurred. The printer’s form feeds and line feeds are configurable through the Serial Port screen of the PanelView terminal. See Chapter 2, *PanelView Terminal Functions*, in the *PanelView Operator Terminal User Manual*.
- **Energize Relay**—when the alarm is triggered, the alarm relay is energized—switching on whatever device is connected to the relay, such as a warning light or remote audio alarm.

## Importing and Exporting Messages

You can import and export ASCII text files as text for alarm messages.

### Importing Alarm Text

Using the text editor of your choice, create an ASCII text file of alarm messages in this format:

```
FFFnnn"ttt...ttt" CR
!this is a comment
```

FFF	=	alarm flag
		A = Audio
		P = Print
		R = Relay
nnn	=	alarm message number (1–496)
" "	=	start and end of message
ttt	=	message text (1–50 characters)
CR	=	carriage return (alarm record delimiter)
!	=	comment character

Follow these guidelines in preparing your alarm message text file:

- specify one or more alarm flags at the beginning of the line. These can be in any order, but define no more than three flags, and do not duplicate any flag. If you don’t want any flags, leave this field blank

- the message number must be between 1 and 496. The numbers do not have to be created in ascending order, but they must be unique, i.e., no two messages can have the same number

**IMPORTANT:** Importing an alarm message whose number is greater than 256 will make the application compatible with Version 3 and later terminals only.

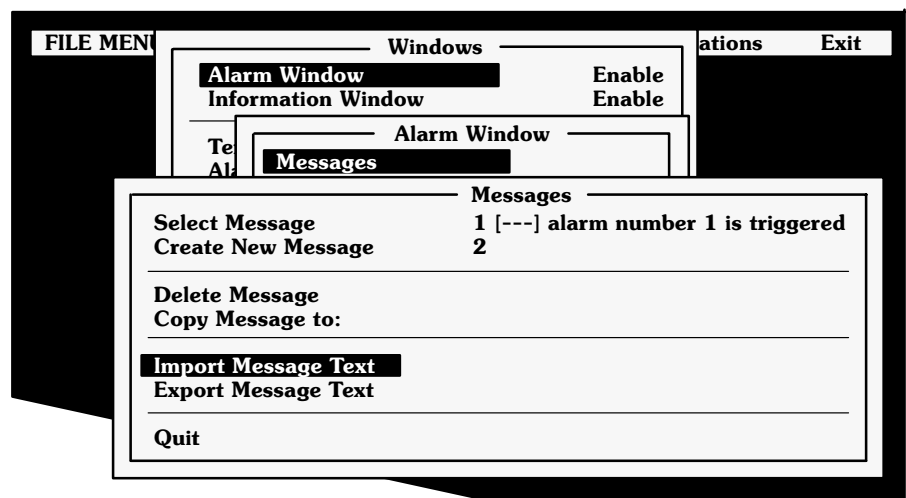
- the alarm text must begin and end with quotation marks
- PanelBuilder will ignore any spaces found outside the quotation marks
- PanelBuilder will ignore any character whose ASCII code is outside the range 32–127. See Table 10.U for details of the ASCII character set
- use the comment character (!) as the first character in the line of a comment. PanelBuilder will ignore lines that begin with the !
- make sure your message text is 50 characters or less.

**IMPORTANT:** Importing an alarm message whose length is greater than 36 characters will make the application compatible with Version 3 and later terminals only.

- when you name your file, use the extension .AMG

From the File menu, choose *Windows*. Then enable the *Alarm Window* item. The Alarm Window menu opens. Choose *Messages*.

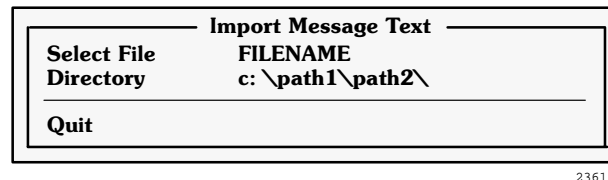
**Figure 7.17**  
**The Messages Window**



23645

Choose *Import Message Text*. A window opens.

**Figure 7.18**  
**The Import Message Text Window**



The file name in the *Select File* field will be one of the following defaults, in decreasing order of priority:

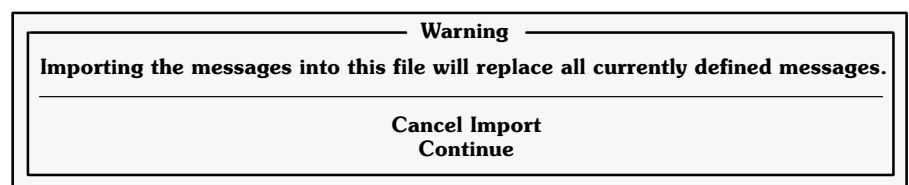
- an .AMG file with the same name as the currently edited file
- the first .AMG file in the selection list
- a blank, if no .AMG files exist in the current directory

Choose *Select File* if you need to change the file name. A list of all .AMG files in the current default directory appears. Choose the one you want to change.

If the file is not in the current default directory, choose *Directory* to specify the directory containing the file. The name of the specified directory will be retained between PanelBuilder sessions.

Once the file is selected, PanelBuilder checks the current application file to determine whether any alarm messages have already been defined. If any messages are found, PanelBuilder displays this message:

**Figure 7.19**  
**Alarm Import Warning Message**



Choose *Cancel Import* or *Continue*. If you choose to continue, PanelBuilder checks each record in the message file to make sure its format is valid. If any errors are found, an error message will be displayed, the import will be cancelled and the currently defined messages will remain intact.

If no errors are found, all the alarm messages in the application file will be deleted and replaced by the imported ones.

### Exporting Text

Choose *Export Message Text* from the Alarm window's Messages menu. The Export Message Text window will open. This window is the same as the Import Message Text window, except for the title.

When the window opens, the Select File field will show the name of the application file currently being edited. The operator can keep the default or change the name to any valid DOS file name. Once *Select File* is chosen the filename area will be highlighted. If the displayed name is acceptable, press **Enter**. An export of messages will be performed. You will be informed if the file already exists in the current directory; the export will not be performed until you choose *Continue* and answer *Yes* to "Overwrite the Existing File?" PanelBuilder appends the .AMG extension when it exports the file.

### Editing Messages

Choose *Messages* from the Alarm window menu, then *Select Message* to select a message for editing.

The messages you create are numerically ordered, and will appear in order on the Messages screen. Each message has a 3 letter code in square brackets after the number and before the first few words of the message. The code is A for audio, P for printer, and R for relay, in that order. The letters for the enabled functions appear, while disabled functions are represented by a hyphen.

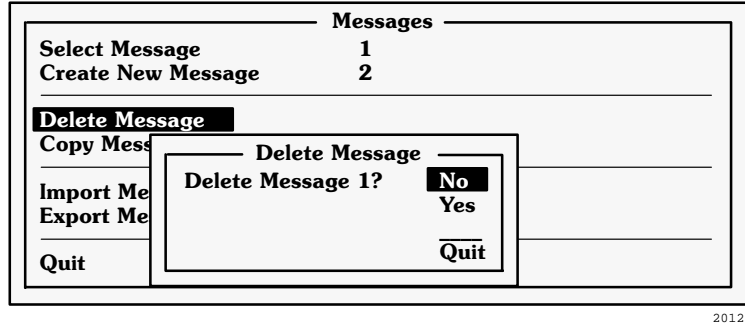
A message with audio and relay enabled would have the code [A-R], for example, while a message with only the printer enabled would have the code [-P-].

Alter the text or any parameter, in the Edit Message menu.

### Deleting Messages

Choose *Messages* from the Alarm window menu, then choose *Select Message* and the message to be deleted.

**Figure 7.20**  
**Delete Message**

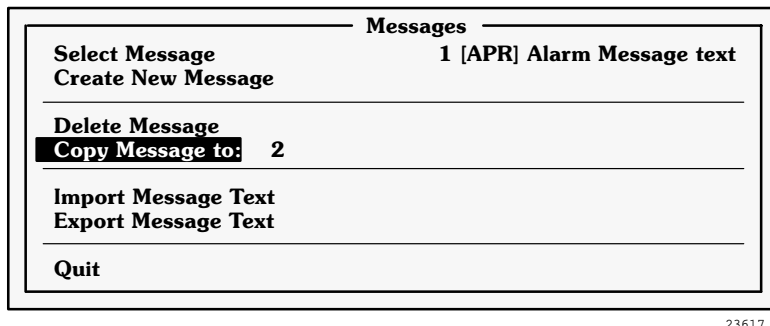


To complete the operation choose *Quit* or press **Esc** to return to the Messages menu; then choose *Delete Message* to remove the message from the list.

### Copying Messages

Choose *Messages* from the Alarm window menu, then choose *Select Message* and the message to be copied. Then choose *Copy Message to:*

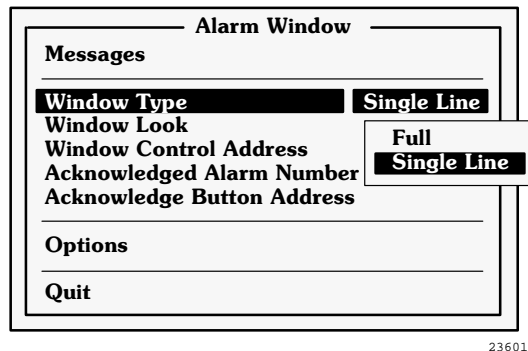
**Figure 7.21**  
**Copy Message**



The number shown in the *Copy Message to:* field is always the next unused message number. You can type in another number if you choose. The selected message will be copied to the message number in the *Copy Message to:* field when you press **Enter**. Choose *Select Message* again to see the copied text against the new message number.

## Choosing the Window Type

**Figure 7.22**  
**Window Type**



Window Type allows you to choose either a Full or Single Line Alarm window. The Full Alarm window includes buttons to silence the alarm, acknowledge the alarm or view the Alarm Status display or Alarm History Screen (see ). The single line display has no buttons, and allows operator access to any buttons on the current screen (see ).

**IMPORTANT:** With the single line Alarm window, the operator can only acknowledge alarms in the Alarm History Screen. (Alarm windows can be cleared by the PLC controller—see PLC Controlled Clear Window, at the end of this chapter.) When you design your operator screens, be sure to include a way for the operator to access the Alarm History Screen.

## Setting the Window's Appearance

Choose *Window Look* in the Alarm Window menu to define the appearance of the Alarm window. Both Full and Single Line Alarm windows allow foreground and background color, blink, and underline choices.

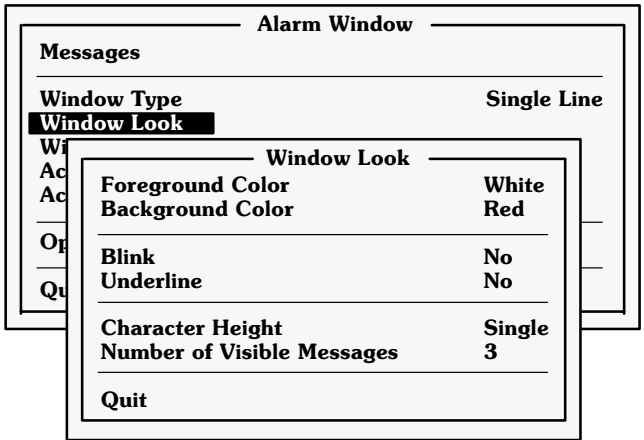
For the Full Alarm window you can also define:

- character height; (either single and double)
- how many messages will be visible (1 to 19 single height, 9 double height). This also defines how large the window will be on the screen

With the single line Alarm window, you can choose whether the window will appear at the top of the screen or the bottom of the screen. Be sure that the single line window will not block operator access to important buttons when it appears.

You can only change the location of the single line alarm window immediately after choosing *Single Line* from the Window Type menu. To change the location of an existing single line window, choose *Window Type*, then *Single Line*. The Window Location menu will open.

**Figure 7.23**  
**The Window Look Menu for the Full Alarm Window**



**IMPORTANT:** For monochrome terminals, you can select High Intensity, instead of the Foreground Color and Background Color settings.

### Address Assignment for the Alarm Window

#### Window Control Address

To define the PLC address for the Alarm window, choose *Window Control Address* in the Alarm window. The following menu appears with a list of options described below.

**IMPORTANT:** Remember that the appropriate addresses for the Alarm window should be determined when the screens are designed. For more information see Chapter 4, *Planning Your Application*.

**Figure 7.24**  
**Window Control Address**

The screenshot shows the 'Alarm Window' interface. A 'Window Control Address' dialog box is open, displaying configuration settings for the alarm window. The dialog box has a title bar 'Window Control Address' and a 'Single Line' button. It contains a table with two columns: 'Current Address' and 'Unassigned Address'. The table has three rows: 'Data Type', 'Communications', and 'Input/Output'. The 'Data Type' row shows 'Input' for 'Discrete'. The 'Communications' row shows '1' for 'Discrete'. The 'Input/Output' row shows '0' for 'Discrete'. Below the table, there are fields for 'Rack' (set to 1), 'Start Word' (set to 0), and 'Start Bit' (set to 0). There is also a 'Number of Bits' field set to 496. At the bottom, there are buttons for 'Update Address', 'View Address Map', 'Delete Address', and 'Quit'.

Window Control Address	
Current Address	Unassigned Address
Data Type	Bit
Communications	Discrete
Input/Output	Input
Rack	1
Start Word	0
Start Bit	0
Number of Bits	496
Update Address	
View Address Map	
Delete Address	
Quit	

- **Data Type** defines the data type for the Alarm window. Valid data types are: Binary, BCD, and Bit. (For more information on Data Types, see the next section on Address Assignment and PLC Alarm Message Triggering.)
- **Communications** specifies Discrete or Block Transfer.
- **Input/Output** specifies whether this is an input or output address (typically output).
- **Rack** specifies the rack number. This option only appears on the menu if you have specified the address as Discrete.
- **File** specifies the block transfer file number. This option only appears on the menu if you have specified this address as a Block Transfer.
- **Start Word** specifies the start word for the address.
- **Start Bit** specifies the start bit within the word for the address.
- **Number of Bits** specifies the number of bits used in the address. The number of bits together with the data type determines the maximum number of alarm messages that can be triggered from the PLC controller.



- if Binary is specified, the address assignment will be a contiguous bit string containing from 1 to 16 bits, depending on the number of alarm messages defined. For example, for 256 alarm messages, you would use 8 bits.
- if BCD is specified, the address assignment will be a contiguous bit string of 4, 8 or 12 bits (that is, 1, 2, or 3 digits), depending on the number of messages defined. For example, for 256 alarm messages, you would use 12 bits.
- if Bit is specified, the address assignment will be a contiguous bit string containing from 1 to 496 bits, depending on the number of messages defined. For example, for 256 alarm messages, you would use 256 bits.

**IMPORTANT:** See the following section on Address Assignment and PLC Alarm Message Triggering for more information.

- **Update Address** updates the application file with the values entered for the Data Type through to the Number of Bits. The new address is displayed at the top of the menu. If you make a mistake entering a new address, an error message will appear when you choose Update Address.
- **View Address Map** shows you the address map of the bits allocated so far for all the objects, windows and PLC Control Options.
- **Delete Address** allows you to remove the existing address from the file.
- **Quit** closes the Window Control Address and returns you to the Alarm Window menu.

### Address Assignment and PLC Alarm Message Triggering

How the PLC controller triggers messages depends on which data type is selected.

#### Binary Data Type

If you specify Binary, the address assignment will be a contiguous bit string containing from 1 to 16 bits. The bit string can be positioned anywhere within the same PLC word (even crossing word boundaries) by designating the desired start bit (the default is zero which is the typical choice).

### **BCD Data Type**

If you specify BCD, the address assignment will be a contiguous string of either 4, 8, or 12 bits (that is, 1, 2, or 3 digits). For 496 Alarm messages 12 bits are required (4 bits for each of the 3 digits).

### **Triggering Alarm Messages for Binary or BCD Data Types**

To trigger a message, the PLC controller must put a non-zero value which corresponds to the desired message number, into the designated PLC address. For example, a “trigger value” of 19 would cause the Alarm window to appear, displaying message number 19 from the Alarm Message List. If the trigger value changed to 27, message number 27 would be added to the list in the Alarm window. Any time the trigger value changes to any other non-zero value, it is considered a message trigger. Unlike the Information window function, a trigger value of zero will not make the Alarm window disappear.

To clear the Alarm window, the operator presses the **EXIT** button or acknowledges all alarms. The Alarm window will also be cleared if the PLC Controlled Clear Window bit is enabled and the bit set to one. PLC Controlled Clear Window is discussed in the next section of this chapter.

If an invalid (out of range) trigger value is put into the PLC address, the Alarm window message will be filled with question marks.

### **Bit Position Data Type for the Alarm window**

The address assignment is a contiguous bit string from 1 to 496 bits. Each bit in the string has a corresponding message number in the alarm message list. For example, the first bit corresponds to message 1, the second bit corresponds to message 2, etc. When more than one PLC word is required, the next higher word number(s) are used. When you specify the number of bits for this function, you determine the maximum number of messages that you can trigger for the Alarm window.

**IMPORTANT:** The Alarm Status screen can only be accessed if the Alarm Window address is set to Bit data type.

### Triggering Alarm Messages for Bit Position Data Type

To trigger a message, the PLC program must set the PLC bit that corresponds to the desired message number in the Alarm Message List. If the PanelView terminal detects any bit change from 0 to 1, the Alarm window appears, containing the defined message. If the Alarm window is not cleared by the operator, and additional alarm bits change from 0 to 1, they will be listed in the order of occurrence. If more than one bit changes from 0 to 1 during a single PLC I/O scan, the alarms will be listed in order from lowest to highest message number. Avoid situations in which the same alarm bit can keep toggling rapidly. The Alarm window would be triggered repeatedly and the same message repeatedly listed.

### Acknowledged Alarm Number Address

When you enable the Acknowledged Alarm Number Address, an address definition window opens. You can define a PLC Input address that PanelView will use to indicate to the PLC controller which alarms have been acknowledged.

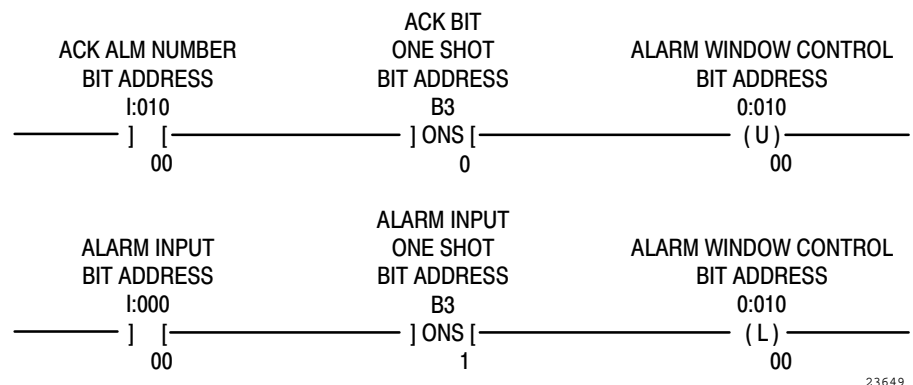
- **Data Type** can be Binary, BCD or Bit
  - for Bit: When the user acknowledges an alarm from the Alarm window or the Alarm History screen, the acknowledge bit corresponding to the alarm (the first bit or start bit corresponds to alarm 1; the 496th bit corresponds to alarm 496) is set to 1. This acknowledged bit will remain on until the corresponding alarm is triggered again, which in turn will reset the acknowledge bit to 0.
  - for Binary or BCD: When the user acknowledges an alarm from the Alarm window or the Alarm History screen, the number of the acknowledged alarm is put into the Acknowledged Alarm Number Address. Pressing the **Acknowl Alarm** button on the Alarm History screen when there are no unacknowledged alarms resets the value of this address.
- **Number of Bits** varies with the Data Type:
  - for Bit data type, the number of bits that can be assigned ranges from 1 to 496
  - for Binary data type, the number of bits assigned can be from 1 to 16
  - for BCD data type, the number of bits must be a multiple of 4, from 4 to 32

If the user acknowledges an alarm that is outside the specified acknowledged alarm number address, the PanelView terminal does not send or change the current alarm acknowledge input value to the PLC controller and does not set the acknowledge button address bit to a one when the acknowledge button is pressed.

### Example: Sample PLC Logic to Clear Alarm Messages Using Ack Alarm Number Address Bit

To clear the alarm message using the Acknowledged Alarm Number Address, the following PLC logic is recommended when using the Bit data type.

**Figure 7.25**  
**Sample Ladder Logic to Clear Alarm Message**



23649

The second rung latches the Alarm Window Control Bit Address, which triggers the PanelView terminal's alarm message. The ONS instruction only allows this trigger on a false to true transition of the Alarm Input Bit.

Upon the terminal's acknowledgment of this alarm message, the corresponding Acknowledged Alarm Number Address Bit in the first rung will become true, unlatching the Alarm Window Control Bit Address, and clearing the alarm message. The ONS instruction in rung 2 ensures that the Alarm Window Control Bit will stay unlatched even if the Alarm Input Bit is on. The Alarm Input Bit must make another false to true transition to trigger another PanelView Alarm Message. The Ack Bit ONS instruction in rung 1 is used because the Acknowledged Alarm Number Bit Address remains on until the same alarm message is triggered again.

It is important to place the unlatch rung before the latch rung to ensure proper alarm message triggering if both the alarm acknowledgment and new alarm input trigger occur in the same PLC program scan.

Acknowledge Button Address

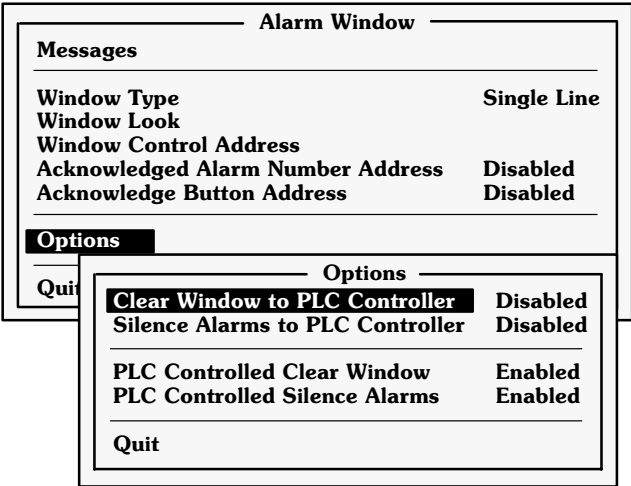
When you enable the Acknowledge Button address from the Alarm Window menu, an address definition window opens. You can define a PLC Input address that PanelView will use to tell the PLC controller that the **Acknowl Alarm** button on the Alarm History screen or Alarm Window is pressed.

The Acknowledge Button Address bit is set to 1 for as long as the button is pressed, or for the duration of the button hold time, whichever is longer.

Remote Window Processing

When configuring the alarm system, you can enable several options allowing the PLC controller to process alarms. To set the system for Remote Window Processing, choose *Options* from the Alarm window menu to open the Options menu.

Figure 7.26  
Remote Processing Options



23125

To enable any of these four options, move the cursor to it and press **Enter**. A menu will pop up allowing you to choose *Enable* or *Disable*. Once *Enable* has been chosen, a second menu will pop up where you assign an address. For any of these options to work, it must be enabled *and* assigned an address.

- **Clear Window to PLC Controller**—A single input bit must be assigned to this function. This bit is set to 1 for 3 seconds whenever the Alarm Window **EXIT** button is pressed, or whenever all the alarms in the Alarm window are acknowledged. After 3 seconds, the terminal will reset this bit to 0.

**IMPORTANT:** Only the Full Alarm window contains an **Acknowledge Alarm** button or **Exit** button. This Clear Window bit will only operate when using a Full Alarm window.

- **Silence Alarms To PLC Controller**—When an input bit is assigned to this function and this option is enabled, this assigned bit is set to 1 for 3 seconds each time the Full Alarm window's **Silence** button is pressed. After 3 seconds, the terminal resets the bit to 0.

**IMPORTANT:** Only the Full Alarm window contains a **Silence** button. The Silence Alarms To PLC Controller bit will only operate when using a Full Alarm window.

- **PLC Controlled Clear Window**—This option will clear the Alarm window, the alarm beeper, and the alarm relay, when a 0 to 1 transition is detected on the assigned PLC address bit.

Subsequent alarm triggers are processed even if the bit remains at 1.

- **PLC Controlled Silence Alarms**—This option works the same way as the Full Alarm window's **Silence** button: it silences the beeper and deactivates the alarm relay when a 0 to 1 transition is detected on this bit.

Subsequent alarm triggers are processed even if the bit remains at 1.

- **Assigning the PLC Address**—When you enable any of these options, the address menu will pop up, with the following selections:

**Figure 7.27**  
**Address Assignment Menu**

**Alarm Window**

**Messages**

Window Type	Single Line
Window Look	
Window Control Address	
Acknowledged Alarm Number Address	Disabled
Acknowledge Button Address	Disabled

**Options**

Quit

**Options**

Clear Window to PLC Controller	Disabled
Silence Alarms to PLC Controller	Disabled
<b>PLC Controlled Clear Window</b>	<b>Enabled</b>

**PLC Controlled Clear Window**

PLC

Quit

<b>Current Address</b>	<b>Unassigned Address</b>
<b>Current Preset</b>	
<b>Data Type</b>	<b>Bit</b>
<b>Communications</b>	<b>Discrete</b>
<b>Input/Output</b>	<b>Input</b>
<b>Rack</b>	<b>1</b>
<b>Start Word</b>	<b>0</b>
<b>Start Bit</b>	<b>0</b>
<b>Number of Bits</b>	<b>1</b>
<b>Update Address</b> <b>Change Preset</b> <b>View Address Map</b> <b>Delete Address</b>	
<b>Quit</b>	

23136

- **Data Type** is automatically set to Bit for the Alarm window options.
- **Communications** specifies whether you want a Discrete or Block Transfer.
- **Input/Output** specifies whether this is an input or output address.
- **Rack** specifies the rack number. This option only appears on the menu if you have specified that this is a Discrete address.
- **File** specifies the block transfer file number. This option only appears on the menu if you have specified that this is a Block Transfer address.
- **Start Word** specifies the starting word for the address.
- **Start Bit** specifies the starting bit within the word for the address.
- **Number of Bits** is automatically set to 1 for all remote Alarm window processing options.

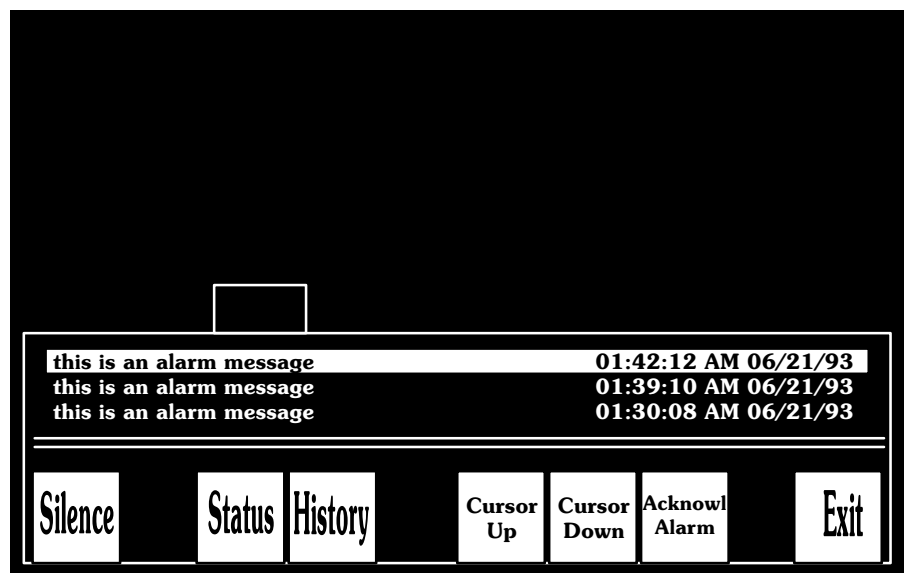
- **Update Address** takes all the new values and writes them to the application file. The new address is displayed at the top of the menu. If you made a mistake entering a new address, you'll see an error message when you choose *Update Address*.
- **Change Preset** allows you to assign a preset value to these options. PanelBuilder software allows you to preset the initial values or states of certain retentive objects including Control Selectors, Interlocked Push Buttons, Numeric Input objects and other multi-state objects. These values are PLC input states that are initially transferred to the PLC controller and remain unchanged until altered by the operator. For more information on retentive objects, see Chapter 10, *The Objects*.
- **View Address Map** shows the bits allocated for objects, windows and PLC Control Options.
- **Delete Address** allows you to remove the current address from the file.

### Buttons on the Full Alarm Window

The buttons on the Full Alarm window control the alarm system.

**IMPORTANT:** If the single line Alarm window is used, the operator can only acknowledge and clear alarms through the Alarm History screen. Single line alarm windows can also be cleared by the PLC controller.

**Figure 7.28**  
**Buttons on the Full Alarm Window**



22602



- **Silence** silences the audio indicator and unlatches the alarm relay if either was triggered by an alarm message. If the alarm message has audio and relay flags enabled, pressing **EXIT** or **Acknowl Alarm** will also silence these alarms. Pressing **Silence** silences alarms without clearing the Alarm window or acknowledging individual alarms.

This button will also set the “Silence Alarms to PLC Controller” bit to a 1 for 3 seconds, if the Silence Alarms to PLC Controller option is enabled. This applies only to Version 2 firmware and later.

- **Status** brings up the Alarm Status screen which displays active and inactive alarm states.
- **History** displays the Alarm History screen.
- **Cursor Up/Cursor Down** buttons move the cursor bar up or down the list of alarms, so you can acknowledge a specific message. When the PLC controller triggers an alarm message that appears in the Alarm window, the message appears highlighted by the Cursor Bar. As new alarm messages are added to the list, the cursor bar shifts down, along with the first message that was triggered.
- **Acknowl Alarm** acknowledges the highlighted alarm message and removes it from the Alarm window. If the acknowledged alarm has the audio flag enabled, the alarm beeper is then silenced. If the acknowledged alarm has the relay flag enabled, the relay is deactivated. The alarm message acknowledgement is then time stamped. If the acknowledged alarm has the print flag enabled, the alarm will be printed again, with the acknowledgment time stamp.

Pressing the **Acknowl Alarm** button will have no effect on the audio beeper if the PLC Controlled Audio bit is set at 1. (See Chapter 9, *PLC Controlled Options*).

Pressing the **Acknowl Alarm** button will have no effect on the alarm relay if the PLC Controlled Relay bit is set at 1. (See Chapter 9, *PLC Controlled Options*).

- **EXIT** clears the Alarm window and will also set the Clear Window to PLC Controller bit to a 1 for 3 seconds, if the Clear Window to PLC Controller option is enabled.

## Alarm History Screen

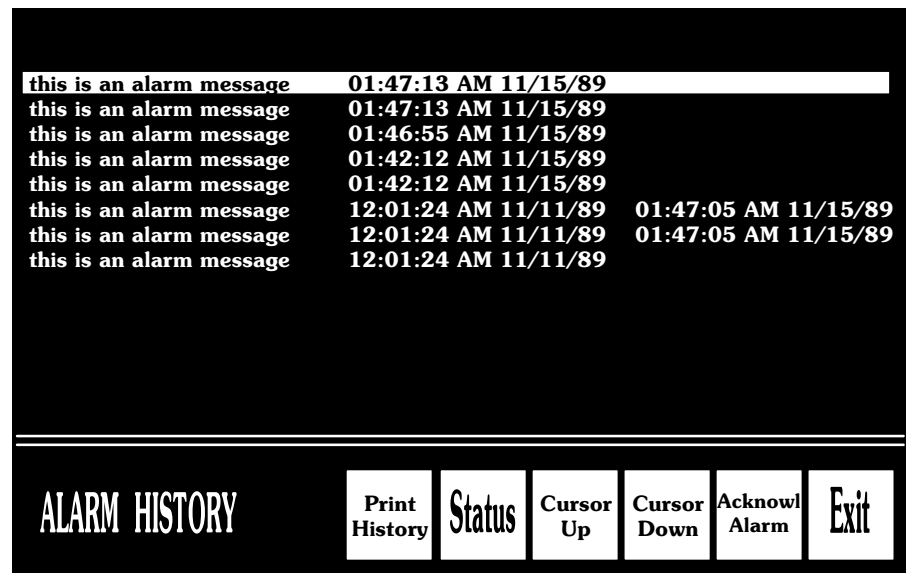
The Alarm History screen can be called up from the Full Alarm window, the Alarm Status screen, or by screen selection objects.

When it is called up by the Full Alarm window, it will overlay the Alarm window and the currently displayed screen.

When the Alarm History screen is called up by a screen selection object on another screen, it replaces that screen.

When the Alarm History screen is called up from the Alarm Status screen, it replaces that screen.

**Figure 7.29**  
**The Alarm History Screen**



this is an alarm message	01:47:13 AM 11/15/89	
this is an alarm message	01:47:13 AM 11/15/89	
this is an alarm message	01:46:55 AM 11/15/89	
this is an alarm message	01:42:12 AM 11/15/89	
this is an alarm message	01:42:12 AM 11/15/89	
this is an alarm message	12:01:24 AM 11/11/89	01:47:05 AM 11/15/89
this is an alarm message	12:01:24 AM 11/11/89	01:47:05 AM 11/15/89
this is an alarm message	12:01:24 AM 11/11/89	

<b>ALARM HISTORY</b>	<b>Print History</b>	<b>Status</b>	<b>Cursor Up</b>	<b>Cursor Down</b>	<b>Acknowl Alarm</b>	<b>Exit</b>
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22604

The Alarm History screen provides a record of the last 21 alarms that have occurred. If more than 21 occur, the oldest alarm records will be lost, unless the messages have been sent to a printer.

The Alarm History screen is pre-assigned screen number 255, although that number can be reassigned. To view it, use any screen selection object. For example, you could place a “Go To Screen” button, configured to call Screen 255, on any screen. The operator could then view the Alarm History screen even if the Alarm window wasn’t displayed.

**IMPORTANT:** The Alarm History screen is pre-assigned screen number 255. In Version 1, the screen number is fixed at 255; in later versions this can be changed. Changing the number makes an application file incompatible with Version 1 terminal firmware.

The Alarm History screen contains the following buttons:

- **Print History** sends the Alarm History information to a printer
- **Status** opens the Alarm Status screen

- **Cursor Up/Cursor Down** move the cursor bar through the list of alarms, allowing you to highlight the appropriate alarm
- **Acknowl Alarm** acknowledges the highlighted alarm

**IMPORTANT:** Alarms unacknowledged in the Alarm window can still be acknowledged in the Alarm History screen.

- **EXIT** takes you back to whatever screen you entered the Alarm window from.

### The Alarm Status Screen

The Alarm Status screen displays active and inactive alarm states from the PLC controller, as well as the number of times a point has gone into alarm (the alarm count) and the total amount of time a point has been in-alarm.

The Alarm Status screen is called up by:

- pressing the **Status** button on the full sized Alarm window
- pressing the **Status** button on the Alarm History screen
- executing a screen selector object, i.e., Go To Screen button, that calls up the Status screen's screen number
- a PLC controlled screen change

The Alarm Status screen can be viewed in three different modes: viewing all alarms (All Messages mode), active alarms only (Active Alarms mode) and previous alarms (Past Alarms mode). The Alarm Status Screen Buttons section later in this chapter supplies more details.

The three modes of the Alarm Status screen display the same columns of information:

- **Msg #**—the alarm message number
- **Qty**—the number of times the alarm has gone into alarm.
- **Accum Time**—the total amount of time the alarm has been in the in-alarm state.
- **Alarm State**—this shows ON or OFF (with ON flashing). In the Display Active Alarms mode, only alarms which are ON are shown
- **Message**—the alarm message associated with the alarm

**Figure 7.30**  
**Alarm Status Screen (in Display Active Alarms Mode)**

Msg #	Accum Qty	Time HH:MM:SS	Alarm State	Message	06/22/93 03:44:52 PM Mode: <u>Display Active Alarms</u>
1	5	00:02:18	ON	This is alarm message 1	
<div> <div>ALARM STATUS</div> <div>Additional alarms: Use Page-Up or Page-Down to view Last QTY/TIME Reset occurred at: 06/21/93 14:07:35</div> <div> <div>Change Mode</div> <div>Reset Qty/Time</div> <div>Print Status</div> <div>History</div> <div>Page Up</div> <div>Page Down</div> <div>Line Down</div> <div>Exit</div> </div> </div>					

22603

### Notes on the Alarm Quantity (Qty) and Accumulated Time (Accum Time)

The Alarm Quantity (Qty) field shows the number of times the alarm has gone into the alarm state. The field can display a maximum number of 9999. When the number of alarm transitions exceeds that, asterisks are displayed: \*\*\*\*

The Accumulated Time (Accum Time) field keeps a record of how much time each alarm has been on, i.e., in-alarm. The Accum Time field can display an accumulated alarm time up to one second less than 100 hours (99:59:59). When the accumulated time exceeds that maximum, asterisks are displayed: \*\*:\*:\*\*.

The Quantity and Accumulated Time fields for all alarm messages are reset to zero when any one of the following occurs:

- the PanelView terminal powers up (only when the Alarm Status information is NOT battery-backed—see the section on the Files/Options Menu in Chapter 3, *Using PanelBuilder*, for details on User Memory Limits)
- an application file is downloaded to the terminal
- the **QTY/TIME Reset** button on the Alarm Status Screen is enabled, pressed, and confirmed

- PLC Controlled QTY/Time Reset is enabled, and the PLC controller resets the counts. The reset occurs when the PLC Controlled Reset bit changes from 0 to 1. Alarm monitoring continues even though the bit is on

When off-line to the PLC controller, the PanelView terminal stops monitoring alarm time and quantity. In this case, “off-line” means:

- the PanelView terminal is disconnected
- the PanelView terminal is in Configuration mode
- the PLC controller is not in Run mode
- the PLC controller has the PanelView terminal Remote I/O racks disabled

When the terminal goes back on-line, the alarm counts are increased by one for those alarms already listed that are currently in-alarm, and the times continue accumulating.

The Alarm Status screen can hold up to 496 alarm messages, but only 16 messages can fit on the screen. Use the **PgUp** and **PgDn** buttons to scroll through the alarm messages.

**IMPORTANT:** In order to be displayed in the Alarm Status screen, alarms must have messages defined, and be of the bit data type.

### Configuring the Alarm Status Screen

To configure the Alarm Status screen, choose *Windows* in the File menu, then choose *Alarm Status*, and set the required parameters.

You can define its screen number, its colors, and whether the alarm count (QTY) and total time in-alarm (TIME) of all messages can be reset to 0 by the PLC controller and/or the Alarm Status screen’s **QTY/TIME Reset** button. You can also enable the **QTY/TIME Reset to PLC Controller** button to indicate when an Alarm Status QTY/TIME Reset has occurred.

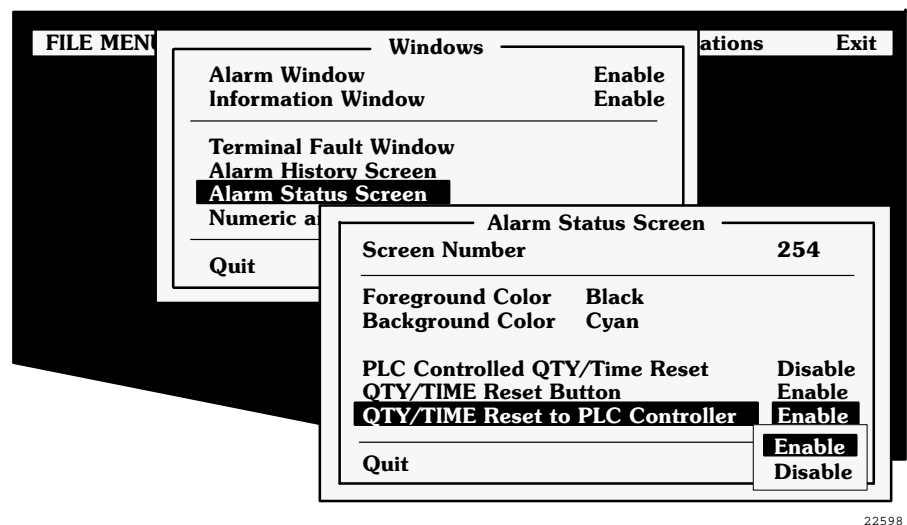
You must assign the Alarm window control address to the bit data type, otherwise the Alarm Status screen will not be displayed. For more information, see the section on bit position data type for the Alarm Window earlier in this chapter.

The Alarm Status screen can be accessed via:

- a “Go to Screen” button

- a Screen Selector
- a PLC controlled screen change
- the Alarm History screen
- the Full Alarm Window

**Figure 7.31**  
**The Alarm Status Screen Menu**



22598

### Alarm QTY/TIME Reset to PLC Controller

The QTY/TIME Reset to PLC Controller is available in PanelBuilder Version 5 and later.

To activate the Alarm QTY/TIME to PLC Controller Reset, select the **QTY/TIME Reset to PLC Controller** option in the Alarm Status Screen Menu. This option allows you to define a PLC address that indicates to the PLC when an Alarm Status QTY/TIME reset has occurred.

To define the PLC address, select *Enable*. An address definition window pops up (see Figure 7.32). In this window you define the PLC Input address that is set when the Alarm Status QTY/TIME is reset. The options are described below.

**Figure 7.32**  
QTY/TIME Reset to PLC Controller Address Assignment Menu

Windows	
Alarm Window	Enable
Information Window	Enable
Terminal Fault Window	
Alarm History Screen	
Alarm Status Screen	
Numeric a	
Quit	

Alarm Status Screen	
Screen Number	254
Foreground Color	Black
Background Color	Cyan
PLC Controlled QTY/Time Reset	Disable
QTY/TIME Reset Button	Enable
QTY/TIME Reset to PLC Controller	Enable
Quit	

QTY/TIME Reset to PLC Controller	
Current Address	Unassigned Address
Data Type	Bit
Communications	Discrete
Input/Output	Input
Rack	1
Start Word	0
Start Bit	0
Number of Bits	1
Update Address	
View Address Map	
Delete Address	
Quit	

22598

- **Data Type** is fixed at Bit.
- **Communications** specifies whether you want a Discrete or Block Transfer.
- **Input/Output**—only a single Input address is permitted.
- **Rack** specifies the rack number. This option appears on the menu only if you have specified that this is a Discrete address.
- **File** specifies the block transfer file. This option appears on the menu only if you specified that this is a Block Transfer Address.
- **Start Word** specifies the starting word for the address.
- **Start Bit** specifies the starting bit within the word for the address.
- **Number of Bits** is fixed at 1.

- **Update Address** takes all the new values and writes them to the application file. The new address is displayed at the top of the menu. If you made a mistake entering a new address, you'll see an error message when you choose *Update Address*.
- **View Address Map** shows the bits allocated for objects, windows and PLC Control Options.
- **Delete Address** allows you to remove the current address from the file.

When the PLC or a user resets the Alarm Status, the terminal automatically sets the Alarm Status QTY/TIME Reset to PLC Controller bit. It resets this bit 3 seconds after detecting the Alarm Status reset, regardless of whether or not the Reset QTY/TIME button is still being pressed or the PLC controlled QTY/Time Reset Bit is still active.

The Reset QTY/TIME button (or the PLC Controlled QTY/TIME Reset bit) must make another 0 to 1 transition before the Alarm Status QTY/TIME Reset to PLC Controller bit is set.

**IMPORTANT:** While the Alarm Status QTY/TIME Reset to PLC Controller bit is enabled, any subsequent Alarm Status QTY/TIME resets will have no effect on the state of this bit.

When the QTY/TIME is reset, the Alarm Status Window displays the Alarm Status Reset Time/Date Stamp.

**Figure 7.33**  
**The Last Reset Time/Date Stamp Screen**

Msg		Accum Time		Alarm	06/22/93 03:44:52 PM	
#	Qty	HH:MM:SS	State	Message	Mode: <b>Display Past Alarms</b>	
1	5	00:02:18	ON	This is alarm message 1		
4	2	00:00:00	OFF	This is alarm message 4		
<b>ALARM STATUS</b>				Additional alarms: Use Page-Up or Page-Down to view Last QTY/TIME Reset occurred at: 06/21/93 14:07:35		
Change Mode		Reset Qty/Time		Print Status		History
						Page Up
						Page Down
						Line Down
						Exit

22607



Downloading an application to the terminal resets the Alarm Status information. The Alarm Status Reset Time/Date Stamp shows the date and time of the download completion. How the application is configured also affects the Time/Date Stamp:

- For applications configured to retain Alarm Status information, the Time/Date stamp is retained between power cycles.
- If the application is not configured to retain Alarm Status Information, the Time/Date stamp is reset to show the time and date of power-up.

### Alarm Status Screen Buttons

- **Change Mode** allows you to choose from three ways of viewing the screen: viewing all alarms (All Messages), active alarms only (Active Alarms) and previous alarms (Past Alarms).
- **Reset Qty/Time** (if enabled) resets the Qty (alarm count) field to 0, and the Accum Time (accumulated time in-alarm) field to 00:00:00. If you press this button, you will be prompted for confirmation before the values are actually reset.

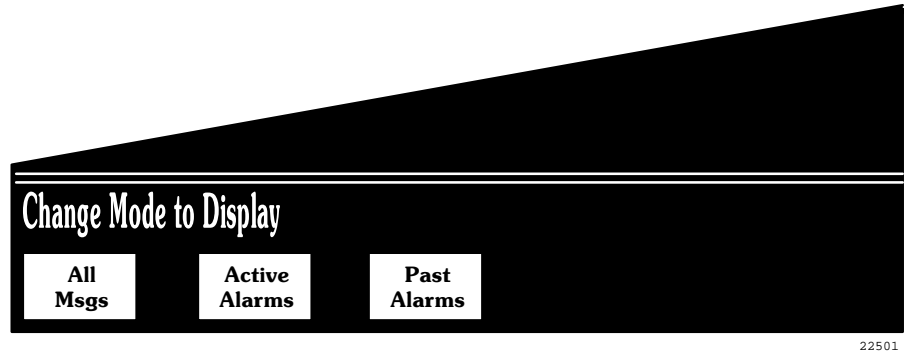
**IMPORTANT:** The Alarm Quantity and Accumulated Time counts can be reset from the Alarm Status Screen and from the PLC controller, depending on your choices when configuring the Alarm Status screen.

- **Print Status** prints out the alarm status (all alarm messages, active alarms or previous alarms, depending on the screen mode). You will be prompted for confirmation before printing begins.
- **History** opens the Alarm History screen.
- **Page Up** displays the previous page of alarms.
- **Page Down** displays the following page of alarms.
- **Line Down** scrolls to the first message of the next page (unless there are no following messages).
- **EXIT** returns you to the Alarm History screen.

### Viewing the Display

Choosing *Change Mode* brings up the Change Mode To Display selection of three buttons. Choose one of the three display modes.

**Figure 7.34**  
**Selecting Display Modes**



### **Active Alarms (Display Active Alarms Mode)**

The Alarm Status screen first opens in Display Active mode (see ). This mode shows, in numerical order, all alarm bits that are ON, along with the alarm's Quantity, Accumulated Time, and Message information.

If you enter Display Active Alarms mode from Display All Alarms or Display Past Alarms mode, the display starts with the first active alarm from the current screen, and displays the next 15 active alarms. If there are no active alarms from the current screen to the end, the search will go backward until 16 active alarms are found, or until the beginning of the list is reached.

The first alarm in the Display Active screen acts as an anchor to the screen of alarm messages. If this alarm changes to Off or is deleted, all the alarms on the screen shift upwards. If this same alarm becomes active again, it will reappear at the top of the list, and the other alarms will shift down.

As new alarms are entered on the screen, the alarms below the new entry shift downwards. If an alarm becomes active which is before the first alarm on the screen, or after the last alarm on the screen, the list of alarms will not change. Instead a message "Additional Alarms: Use Page-Up to View" or "Additional Alarms: Use Page-Down to View" appears to show that there is information above or below the alarms which are displayed.

If all the alarms displayed on a screen turn Off, and there are no higher alarm numbers On, the display will scroll to the previous screen of alarms.

### All Msgs (Display All Alarms Mode)

All alarms are listed in the Display All Alarms mode, whether they are in-alarm or not—including those alarms which have never been in-alarm since the Accum Time and Qty were last reset. The Alarm Status column displays ON or OFF to indicate whether an alarm is active.

When you switch modes from Display Active Alarms or Display Past Alarms, to Display All Alarms, the alarm at the top of the screen stays in place and the next 15 alarms are displayed.

**Figure 7.35**  
**Alarm Status Screen (Display All Alarms Mode)**

Msg #	Qty	Accum Time HH:MM:SS	Alarm State	Message	06/22/93 03:44:52 PM Mode: <u>Display All Messages</u>
1	5	00:02:18	ON	This is alarm message 1	
2	0	00:00:00	OFF	This is alarm message 2	
3	0	00:00:00	OFF	This is alarm message 3	
4	2	00:00:00	OFF	This is alarm message 4	
5	0	00:00:00	OFF	This is alarm message 5	
6	0	00:00:00	OFF	This is alarm message 6	
7	0	00:00:00	OFF	This is alarm message 7	

ALARM STATUS

Additional alarms: Use Page-Up or Page-Down to view  
Last QTY/TIME Reset occurred at: 06/21/93 14:07:35

Change Mode

Reset Qty/Time

Print Status

History

Page Up

Page Down

Line Down

Exit

22608

To help you differentiate between active and inactive alarms, the Alarm State text flashes on active alarms.

### Past Alarms (Past Alarms Mode)

The Past Alarms display mode shows all alarms that are active or have been active since the Qty/Accum Time was reset. The Alarm Status column shows ON or OFF to indicate those alarms which are currently in-alarm.

The first alarm shown will be the first in the current or subsequent pages with a quantity or accumulated time of greater than 0. The first alarm in the Past Alarms screen acts as an anchor to the screen of alarm messages. When a new alarm (an alarm with has not been active since the last reset) is entered on the screen, the alarms below the new entry shift downwards. If a past alarm becomes active which is before the first alarm on the screen, or after the last alarm on the screen, the list of alarms will not change. Instead a message “Additional Alarms: Use Page-Up to View” or “Additional Alarms: Use Page-Down to View” appears to show that there is information above or below the alarms which are displayed.

**Figure 7.36**  
**Alarm Status Screen (Past Alarms Mode)**

<b>Msg</b>	<b>Accum Time</b>	<b>Alarm</b>	<b>06/22/93 03:44:52 PM</b>
#	Qty	HH:MM:SS	State      Message      Mode: <b>Display Past Alarms</b>
1	5	00:02:18	ON      This is alarm message 1
4	2	00:00:00	OFF      This is alarm message 4

<b>ALARM STATUS</b>	<b>Additional alarms: Use Page-Up or Page-Down to view Last QTY/TIME Reset occurred at: 06/21/93 14:07:35</b>		
<b>Change Mode</b>	<b>Reset Qty/Time</b>	<b>Print Status</b>	<b>History</b>
		<b>Page Up</b>	<b>Page Down</b>
		<b>Line Down</b>	<b>Exit</b>

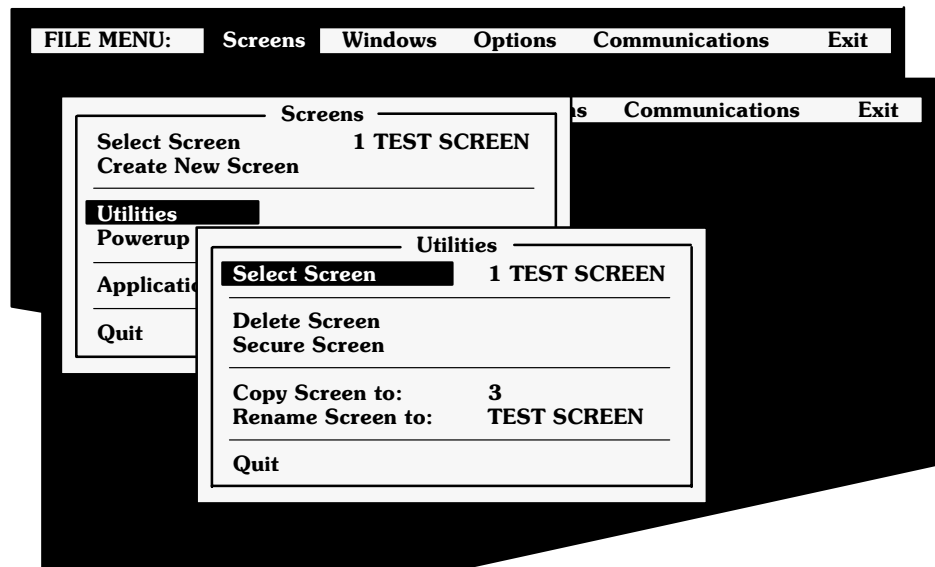
## Screen Operations

This chapter describes the operations that can be performed on screens, and the special attributes that can be assigned to them. For example, screens can have restricted access for security reasons, and one screen can be assigned as the first screen displayed when the PanelView terminal is switched on.

### Basic Utility Functions

With an application file selected, open the Screens menu and choose *Utilities* to copy, rename, or delete a screen in the application file. Security is discussed immediately following this section.

**Figure 8.1**  
The Utilities Menu



20147

**Select Screen** allows you to choose a screen for the following operations:

- **Delete Screen** removes the selected screen from the application file.
- **Secure Screen** is discussed in the Security section immediately following this section.

- **Copy Screen To:** makes a copy of the selected screen. You type in a screen number for the new screen, but the screen name remains the same. Once you have typed in the new screen number and pressed **Enter**, you are asked whether you want to copy object addresses. If you choose *Yes*, the addresses of the screen objects are copied to the new screen; if you choose *No*, you will have to assign addresses to the objects.
- **Rename Screen To:** allows you to change the name of the selected screen by typing in a new one.

**IMPORTANT:** Two screens may have the same name, but never the same number.

### **Copying a Screen from One Application File to Another**

The Copy Screen To function described above copies a screen within an application file, but not from one application to another. Copying a screen to another application file involves memorizing all of the screen objects, and then recalling them on a different screen of the other application file:

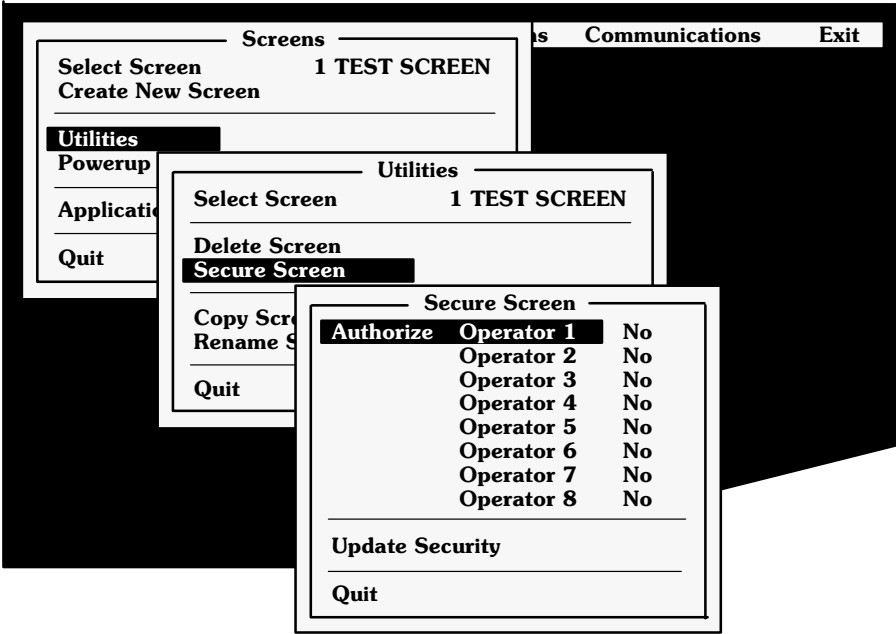
1. Open a screen for editing.
2. Choose *Memorize*, then group all of the objects on the screen into a single group.
3. Press **Enter** and then select whether to memorize the objects' addresses.
4. Leave the screen and the application file. Do not quit PanelBuilder.
5. Create or select the application file you want to copy to.
6. Create or select the screen you want to copy to, and open the screen for editing.
7. Choose *Recall*. The memorized objects will appear on the new screen.

**IMPORTANT:** You cannot copy a screen from a touch screen application file to a keypad application file or vice-versa.

Security

You can restrict access to any or all of the screens you create by assigning security. Specific operators can be restricted from specific screens, or up to eight different operators may be assigned access to each screen. Choose *Secure Screen* in the Utilities menu to set security.

Figure 8.2  
The Secure Screen Menu



20148

For each screen, specify which of eight operators are allowed access. If all operators are specified *No* (the default), then anyone can view the screen and the PanelView terminal will not request an access code.

When *Yes* is specified for one or more operators, the PanelView terminal requests an access code before the screen can be viewed. Only the access codes for those designated operators will be accepted.

The access code for each operator (1–8) is assigned on the PanelView terminal in the Configuration Mode Menu. This allows a plant floor supervisor with a mode select key to view and change access codes without changing the application file. Information on how to change access codes can be found in the *PanelView Terminal User Manual*, Chapter 2, *PanelView Terminal Functions*.

When the eight operator choices are set, choose *Update Security* to save the settings in the application file.

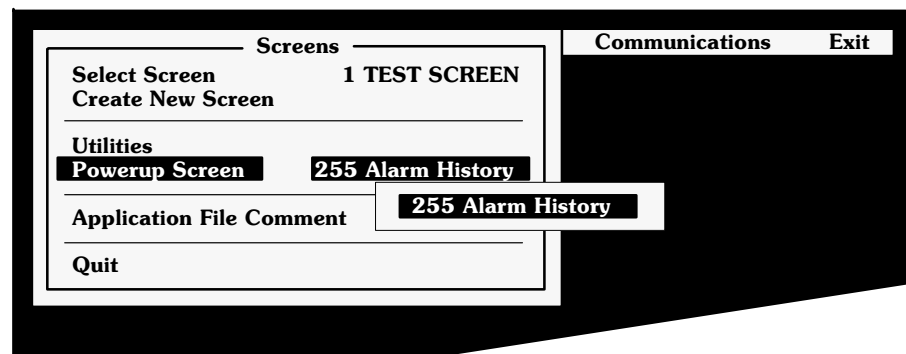
**IMPORTANT:** If a screen is triggered by the PLC controlled option, or if a screen is the Powerup screen, the screen will be displayed and no access code will be requested regardless of the assigned security selections made.

## The Powerup Screen

The Powerup screen is the first screen displayed when the PanelView terminal is switched on. You can set any screen to be the Powerup screen, including the Alarm History or Alarm Status Screens. To define this screen, choose *Powerup Screen* from the Screens menu, and select a screen from the list of defined screens.

The Powerup screen is displayed, regardless of any security that has been assigned to it.

**Figure 8.3**  
**Assigning the Powerup Screen**



20149

In an empty application file, the Powerup screen is preset to the Alarm History screen (screen 255, by default) if the Alarm History screen is enabled. The first screen you create in the application is automatically assigned as the Powerup screen. Should this screen be deleted, the Powerup screen will be reassigned to the next screen in the list. If screen number 1 is deleted, screen number 2 will become the Powerup screen.

A warning message is displayed whenever the Powerup screen is reassigned.

The Powerup screen is unassigned if there are no screens in the application file and if both the Alarm History and the Alarm Status screens have their screen numbers set to 0.



## **Application File Comment**

The Application File Comment field provides a 24 character space for documentation purposes only. This comment is displayed in the Pass-Through Upload/Download menus and in printed application file reports. This note applies to the entire application file, not any particular screen.

**Figure 8.4**  
**The Application File Comment Field**

The screenshot shows a terminal window with a dark background. On the left, there is a light gray rectangular box containing the 'Screens' menu. The menu has a title bar 'Screens' and several options: 'Select Screen' (with '1 TEST SCREEN' to its right), 'Create New Screen', a separator line, 'Utilities', 'Powerup Screen' (with '255 Alarm History' to its right), another separator line, 'Application File Comment' (which is highlighted with a black background and white text), and 'Quit'. To the right of the 'Screens' menu box, the words 'Communications' and 'Exit' are visible in the top right corner of the terminal area.

22150

To enter application file comment:

1. Choose *Application File Comment* from the Screens menu.
2. Type in the desired comment.
3. Press the **Enter** key.

## PLC Controlled Options

The PLC controller can control and monitor certain functions in the PanelView terminal if you enable and assign a control address. The value in the control address determines how the function operates on the PanelView screen.

To set PLC controlled options, choose *Options* from the File menu. There are eight options that can be enabled or disabled in this menu. The first three provide information *to* the PLC controller, while the rest are controlled *by* the PLC controller:

- Time and Date to PLC Controller
- Current Screen Number to PLC Controller
- Screen Print Active to PLC Controller
- PLC Controlled Audio
- PLC Controlled Alarm Relay
- PLC Controlled Screen Number
- PLC Controlled Screen Print
- PLC Controlled Time and Date

By default, all these options are Disabled. Highlight the option you want to configure, press **Enter**, choose *Enabled* and press **Enter** again to open the PLC address menu. Then define the PLC address for that option.

**Figure 9.1**  
Address and Communications Options for PLC Controlled Alarm Relay

Options	
Display Menus for Terminal Version	5
PanelView Display Type	Color
User Memory Limit	62,976
Minimum Push Button on Time	50 msec
Cursor Auto-Repeat Rate (per Sec.)	1
Cursor Auto-Repeat Start Delay	400 msec
Time and Date to PLC Controller	Disabled
Current Screen Number to PLC Controller	Enabled
Screen Print Active to PLC Controller	Disabled
PLC Controlled Audio	Enabled
<b>PLC Controlled Alarm Relay</b>	Disabled

PLC Controlled Alarm Relay	
Current Address	Unassigned Address
Current Preset	
<b>Data Type</b>	Bit
<b>Communications</b>	Discrete
Input/Output	Input
Rack	1
Start Word	0
Start Bit	0
Number of Bits	1
Update Address	
Change Preset	
View Address Map	
Delete Address	
Quit	

21152

## Assigning Addresses

You must define the following items to assign a PLC address. Figure 9.1 shows a typical address menu used for PLC controlled options.

**IMPORTANT:** First enter the settings described below. Then choose *Update Address*, or the settings you have entered will be lost.

- **Current Address** and **Current Preset** indicate the current address and the preset values for the feature. These fields cannot be edited. The value displayed is based on other settings entered.
- **Data Type** allows you to define the data type for the option. Valid data types will vary depending on which control option you are defining.
- **Communications** specifies whether you want a Discrete or Block Transfer. If you select Block Transfer the Rack option below changes to File.

- **Input/Output** specifies whether this is an input or output address.
- **Rack** specifies the rack number. This option only appears on the menu if you have specified a Discrete address.
- **File** specifies the block transfer file number. This option only appears on the menu if you have specified a Block Transfer in the Communications field above.
- **Start Word** specifies the starting word for the address.
- **Start Bit** specifies the starting bit within the word for the address.
- **Number of Bits** specifies the number of bits used in the address.
- **Number of Words** will appear in this menu if Time and Date to PLC Controller has been enabled. The number of words is fixed at seven and cannot be edited.
- **Update Address** saves the displayed values and writes them to the application file. The new address appears in the *Current Address* field at the top of the menu. If you made a mistake entering a new address, you'll see the error message when you choose Update Address.
- **Change Preset** sets the value that the PLC address will have when the terminal powers up.
- **View Address Map** shows the bits allocated for objects, windows and PLC Controlled Options.
- **Delete Address** removes the current address from the file.
- **Quit** exits the Address menu and returns you to the Options menu.

### **Time and Date to PLC Controller**

You can specify a file of seven 16-bit words within the PLC controller to store the current time and date from the PanelView terminal's clock. PanelView will continually transfer the time and date to the PLC controller in the format below when both the PanelView terminal and the PLC controller are in Run mode.

**Table 9.A**  
**Time and Date to PLC Controller Format**

Word	1	Year (last 2 digits)
Word	2	Day of week (1 = Sunday)
Word	3	Month
Word	4	Day of month
Word	5	Hours in 24-hour (military) format
Word	6	Minutes
Word	7	Seconds

- **Start Word** can be any block transfer PLC input address. If discrete, start word must be 0 or 1
- **Data Type** is *BCD*.

### **Current Screen Number to PLC Controller**

Enable this option to transfer the current screen number to the PLC controller. This is useful for multiplexing display data from PLC output addresses based on screen number. For more information on multiplexing, see Chapter 4, *Planning Your Application*.

Choose *Current Screen Number to PLC Controller* from the Options menu. Then enter a PLC input address. Be sure your address assignment is long enough to accommodate the longest screen number—including the screen numbers of the Alarm History Screen and Alarm Status Screen.

- **Data Type** can be *Binary* or *BCD*.

### **Screen Print Active to PLC Controller**

Screen print requests are ignored when the printer is already busy with a screen print. The Screen Print Active option allows the PanelView terminal to inform the PLC controller that a screen print is in progress.

Choose *Enabled* from the pop-up list to open the address definition window and assign a PLC input address.

### **PLC Controlled Audio**

This option allows the PLC controller to sound the terminal's built-in beeper (audio indicator).

To use this feature, first select PLC Controlled Audio and choose *Enabled*. Then define a PLC output address in the address definition window. If a PLC output address bit is assigned and this function is enabled, then, when the bit is set to 1, the beeper sounds. When the bit is set to 0, the beeper stops.

To control the beeper from the PanelView terminal, assign a PLC input bit address to a push button on one of your screens.

PLC Controlled Audio does not affect any alarm messages you may have configured to sound the audio indicator. These alarms will sound the audio indicator, regardless of whether you've enabled or disabled PLC Controlled Audio or this address bit is 1 or 0.

## **PLC Controlled Alarm Relay**

Enable this option to assign a PLC output bit address that allows the PLC controller to trigger the PanelView terminal's alarm relay.

To use this feature, first choose *PLC Controlled Alarm Relay* from the Options menu; then choose *Enabled*. Then define a PLC output address in the address definition window. When the bit is set to 1, the alarm relay is energized. When the bit is set to 0, the alarm relay de-energizes.

To control the alarm relay from the PanelView terminal, assign a PLC input bit address and control that address with a push button on one of your screens.

The PLC Controlled Alarm Relay does not affect any alarm messages you may have configured to trigger the alarm relay; these alarms will energize the relay regardless of whether you've enabled or disabled the PLC Controlled Alarm Relay or whether this address bit is a 1 or a 0.



**ATTENTION:** Do not use the Alarm Relay for control purposes.

---

## **PLC Controlled Screen Number**

Enable this option to allow the PLC controller to display specific screens. Choose *PLC Controlled Screen Number* from the Options menu, then enter a PLC output address. If a PLC output address is assigned and this function is enabled, and the PLC controller moves a screen number into this address, the PanelView terminal displays the screen, overriding the operator's selection.

Be sure your address assignment is long enough to accommodate the longest screen number—including the screen numbers of the Alarm History Screen and Alarm Status Screen.

The PLC output address must contain a 0 for the operator to have control of screen selection.

If the PLC controller moves an invalid screen number into this address, PanelView displays an “Invalid Screen” error message.

- **Data Type** can be *Binary* or *BCD*.

**IMPORTANT:** Unexpected terminal operation can occur if the PLC Controlled Screen Number function is assigned to an input address. You must assign an *output* address to this feature for it to function properly.

## **PLC Controlled Screen Print**

Enable this option and assign a PLC output address to allow the PLC controller to trigger a screen print of the current screen.

Assign a single PLC output bit. When the PLC output bit makes a transition from 0 to 1, the screen displayed on the PanelView terminal will be printed. The PLC controller must maintain the set bit long enough to ensure that it is not missed by the PanelView terminal.

**IMPORTANT:** Only the screen itself will be printed, not pop-up windows, such as Alarm or Information windows.

### **About Screen Prints**

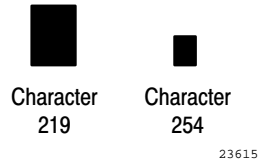
Screen prints requested by the PLC controller are processed after all data in the same PLC scan or block transfer file as the request is processed. If a screen print request is logged in the same scan or file as a request for a PLC controlled screen change, the screen displayed prior to the requests will not be printed. Instead, the requested screen will be displayed and then printed after it has been updated with the first scan of PLC data.

Some graphic characters will not be printed as they appear on the PanelView terminal screen. Instead:

- ISA symbols, bar graphs, outer borders, arcs, diagonals and line connectors will be replaced by ASCII character 219 decimal (illustrated below)
- the first 32 characters, used for printer control, will be replaced by ASCII character 254 decimal (illustrated below)
- double width/height characters will be replaced by a single normal sized character and the appropriate number of blanks

**Example:** The letter A, displayed with double height and width, occupies an area 2 characters high and 2 characters wide. Once printed, the A will occupy the top left position leaving the other three characters blank.

**Figure 9.2**  
**ASCII Characters 219 and 254 from the Alternate Character Set**



**IMPORTANT:** An application file using the PLC Controlled Screen Print feature is not compatible with Version 1 of the PanelView firmware. For more details on version control see Chapter 2, *Installing PanelBuilder*.

Screen printing can also be initiated manually by means of the Screen Print Button object. For more information on this object see Chapter 10, *The Objects*. Refer also to the *PanelView Terminal User Manual*, Chapter 2, *PanelView Terminal Functions*, for details on printer types.

### PLC Controlled Time and Date

Enable this option and assign a PLC output address to allow the PLC controller to trigger PanelView to obtain the time and date from the PLC controller and to reset its internal clock to match. This option is chiefly useful for users who have a number of PanelView terminals connected to the same PLC controller. It allows you to reset all the internal clocks in the terminals through the PLC, rather than through operator input one at a time.

Choose *Enabled*, and a menu opens, allowing you to set the Time and Date Control Address and the Time and Date Address. Each of these menu choices pops up an address definition window.

- The “Time and Date Control Address” defines the PLC address that triggers PanelView to get the time and date from the PLC controller. When this bit changes from 0 to 1, PanelView resets its internal time and date to agree with the time and date read from the PLC controller.
- The “Time and Date Address” defines the PLC address from which the PanelView will get the time and date. This must be in a 6 word block in format:



**Table 9.B**  
**Time and Date Address Format**

Word	1	Year (2 or 4 digits)	92–99, 00–25 (2 digit) or 1992–2025 (4 digit)
Word	2	Month	1–12
Word	3	Day of month	1–31
Word	4	Hours in 24-hour (military) format	0–23
Word	5	Minutes	0–59
Word	6	Seconds	0–59

- **Data Type** can be *BCD* or *Binary* (default)
- **Number of Words** must be 6
- **Start Bit** must be 0

If an error is detected in the data received from the programmable controller, the data will be discarded and the following message will be displayed.

**Figure 9.3**  
**Minor Fault Message: PLC Controlled Time and Date**



23628

### Other PLC Controlled Options

You can also enable several PanelBuilder options that allow the PLC controller to process alarms. These are discussed in Chapter 7, *Information and Alarm Windows*.

Four PLC controlled options (Clear Window to PLC Controller, Silence Alarm to PLC Controller, PLC Controlled Clear Windows and PLC Controlled Silence Alarms) appear under the section Remote Alarm Window Processing.

A further option, the Alarm Quantity/Accum Time Reset, is explained under the heading of The Alarm Status Screen.

## The Objects

This chapter defines all the objects, and describes the unique characteristics of each type. Objects specifically designed for either Keypad or Touch Screen terminals are identified as such.

### Object Characteristics

Objects are the individual components of a screen. Each object is a configurable and dynamic representation of a control panel component. Examples include push buttons, selectors, bar graphs, and numeric displays.

Certain types of objects have specific characteristics:

- **background text and graphics** don't interact with the terminal functions or the PLC controller. They are used to create titles for screens and some objects, and to draw graphics, such as frames, circles, and arrows
- **momentary push buttons** work very similarly to physical push buttons which release when no longer pressed: they have a “normal” state which they always default to, and to which they always return after being released
- **retentive objects** are given a certain setting which they retain until it is changed. Many PanelView objects are retentive, including maintained push buttons, control list selectors, scrolling list object, and buttons which increment, decrement, or set values
- **display objects** are used whenever you need to display a PLC value on the screen, perhaps to show one of several states, a numeric or text readout, or a bar graph. There are also some special display objects, such as a time and date display and a local message display, which can display preset messages when triggered by the PLC controller
- **screen selectors** are a special category; they are used to leave the current screen and go to another screen. If simple buttons are used, the operator selects a specific screen; if a screen list selector is used, the operator can have a choice of screens to select. Unless your application allows the PLC controller to control all screen changes, every screen should contain at least one screen selector; otherwise the operator will not be able to change screens

**IMPORTANT:** A maximum of 255 objects can exist on a single screen.

## **Retentive Objects**

When the power is switched off and on, retentive objects hold their values or revert to preset values, depending on whether the PanelView terminal's Preset Operations screen is configured as Last State or Preset. When the terminal is switched from Run mode to Configure mode, retentive objects hold their values.

Non-retentive objects revert to a default value when the mode is switched or the power is turned off and on.

The following objects are retentive:

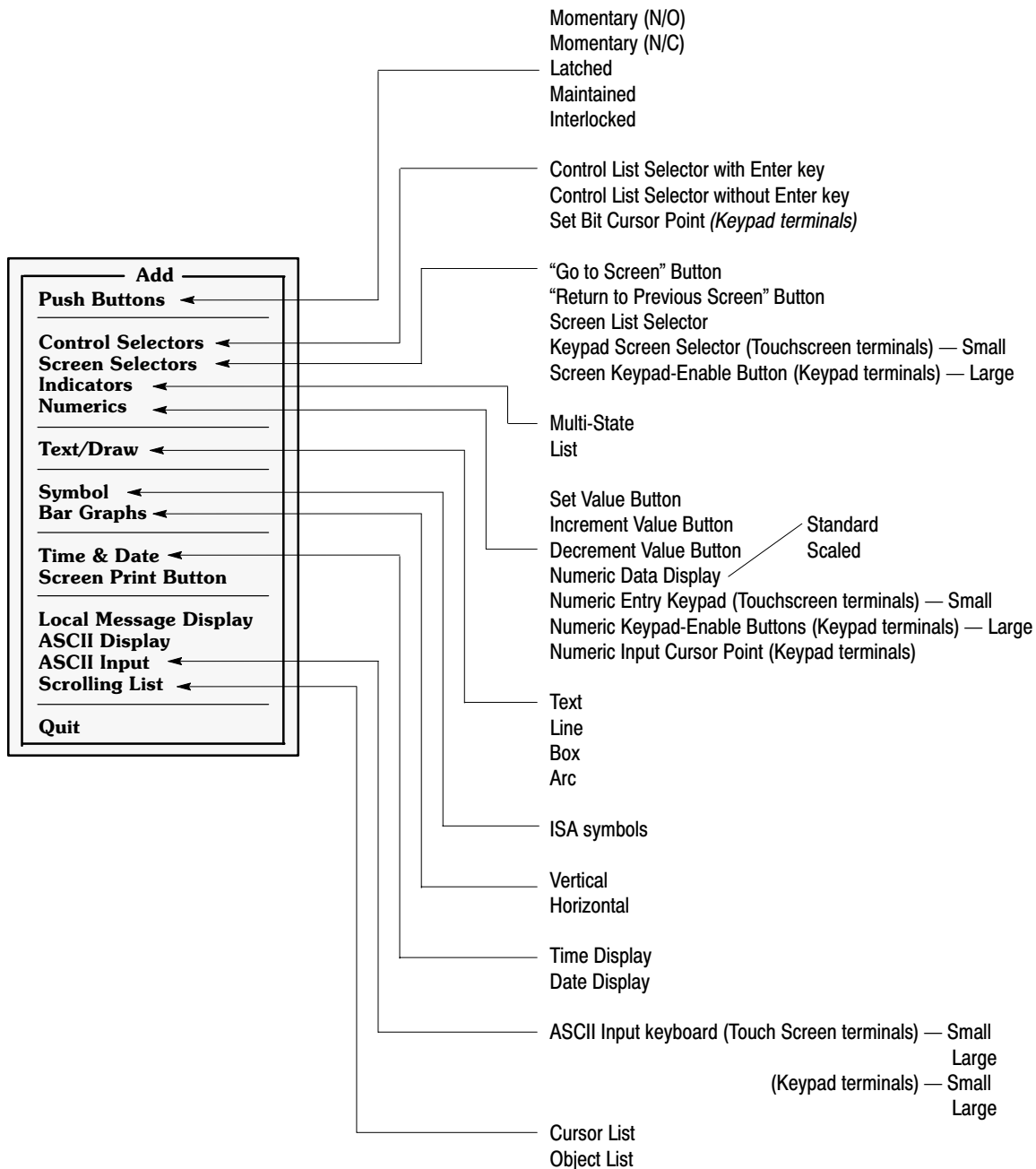
- Maintained Push Button
- Interlocked Push Button
- Control List Selector (with and without Enter key)
- Increment and Decrement Value Buttons
- Set Value Button
- Set Bit Cursor Point
- Numeric Input Cursor Point
- Numeric Keypad Entry Button
- Numeric Keypads (small and large)
- Scrolling List Object

Complete information on retentive objects, including special notes on how to use them, is in the section About Retentive Objects at the end of this chapter.

### The Add Menu

From the File Menu, choose *Screens*. From the Screens Menu, choose *Add*. All PanelView objects are listed in the Add menu. Below is a diagram showing how to access objects through the Add menu.

**Figure 10.1**  
**The Add Menu and Its Objects**



20228

In this chapter, the objects are described in the order in which they appear in the Add menu (and the secondary menus which pop out from it).

## **Push Buttons**

There are five different types of push buttons that function like their physical counterparts on an industrial control panel.

**IMPORTANT:** Some PanelView objects contain buttons (such as the list selectors, which have two or three associated buttons). These buttons are configured as part of the object which contains them, not as independent push buttons.

### **Momentary Normally Open (N/O) Push Button**

The Momentary Normally Open Push Button controls the value at the Button Control Address, a PLC input address. Normally, this bit is 0. When the button is pressed, the bit is set to 1. When you release the button, the bit is reset to 0.

You can use a Momentary Normally Open Push Button to initiate a PLC controlled process or action.

To ensure that the PLC controller doesn't miss a rapid button-press between I/O scans, you can select the Minimum Push Button On Time under Options in the File Menu. This "holds the button down" for a minimum preset time.

In addition to the Button Control Address, this object has an Indicator State Address which controls the display state of the object. Two states are possible, 0 or 1. You can configure the button in a number of ways:

- if you assign just the Button Control Address and assign text and attributes to state 0, the border on the button will highlight when you press the button. The button text itself will remain unchanged
- if you assign the same PLC input address to the Button Control Address and Indicator State Address, and assign different text and attributes to state 0 and 1, the button will immediately change to state 1 when you press it, and back to state 0 when you release it
- to provide a visual handshake with the PLC controller, assign a PLC input address to the Button Control Address and a PLC output address to the Indicator State Address. Program the PLC controller to turn the Indicator State bit on when the Button Control bit is on, and the button will change to state 1

More than one Momentary Normally Open Push Button can be assigned to the same Button Control Address. Momentary Normally Open Push buttons using the same PLC input address operate like their hard-wired equivalents wired in parallel.

**IMPORTANT:** The Momentary Normally Open Push Button is not retentive or presettable.

If the button is being pressed at the moment when a window (Information, Alarm or Fault Window) pops up on the screen, its value is reset to 0.

### Momentary Normally Closed (N/C) Push Button

The Momentary Normally Closed Push Button controls the value at the Button Control Address, a PLC input address. Normally, this bit is 1. When the button is pressed, the bit is reset to 0. When you release the button, the bit is set to 1.

This push button can be used as a stop button but not for emergency stops. Emergency stop buttons must be hard wired.

To ensure that the PLC controller doesn't miss a rapid button-press between I/O scans, you can select the Minimum Push Button On Time under Options in the File Menu. This "holds the button down" for a minimum preset time.

In addition to the Button Control address, this object has an Indicator State address used to define the display state of the object. Two states are possible, 0 or 1. You can use these features to configure the button in a number of ways:

- if you assign just the Button Control address and assign text and attributes to state 0, the border on the button will highlight when you press the button, but the button itself will remain unchanged
- if you assign the same address to the Button Control address and Indicator State address, and assign different text and attributes to state 0 and 1, the button will immediately change to state 0 when pressed and to state 1 when released
- to provide a visual handshake with the PLC controller, assign a PLC input address to the Button Control bit and a PLC output address to the Indicator State address. Program the PLC controller to turn the Indicator State bit on when the Button Control bit is off, and the button will change to state 1

When two or more of these buttons are assigned to the same Button Control address, they function like their hard-wired equivalents wired in series: pressing either button, rather than both, turns off the PLC input bit.

**IMPORTANT:** The Momentary Normally Closed Push Button is not retentive or presettable.

If the button is being pressed at the moment when a window (Information, Alarm or Fault Window) pops up on the screen, its value is reset to 1.



**ATTENTION:** For Momentary Push Buttons (Normally Open and Closed) the input bits remain in their last states and the buttons' input bits will not reset if a remote I/O fault occurs. The rack fault bit should be monitored when using these buttons.

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### Latched Push Button

The Latched Push Button uses a “handshake” bit (usually a PLC output bit) as well as the button control and indicator bits.

Pressing the button will set the Button Control bit to 1. The PLC program must set the handshake bit to 1 when the Button Control bit is set to 1. When the handshake bit is set to 1, PanelView will reset the control bit to 0. Your PLC controller must be programmed to turn the handshake bit off (to 0).

You can use a latched input push button if you have a PLC controller with long program and I/O scan times. Use the handshake bit to signal that the program has indeed read the PLC input bit. In theory you can accomplish the same thing by establishing a long enough Push Button Input Hold Time, but a Latched Input Push Button takes the guesswork out of estimating the program or I/O scan times.

You could also use this push button if you want the control bit to remain on until a particular process within the PLC controller is completed.

**IMPORTANT:** Operator screen changes are not permitted while the PLC control bit is on. If the PLC controller initiates a screen change, the control bit is reset to 0.

The Latched Push Button has two display states, 0 and 1. The push button display state is controlled by the Indicator State Address. You can use this feature to configure the button in a number of ways:

- if you assign just the Button Control Address and assign text and attributes to state 0, the border on the button will highlight when you press the button, but the button itself will remain unchanged
- if you assign the same address to the Button Control bit and Indicator State bit, and assign different text and attributes to state 0 and 1, then the button will immediately change to state 1 when you press the button
- you can provide a visual handshake with the PLC controller by assigning a PLC input address to the Button Control Bit and a PLC output address to the Indicator State Address. By programming the PLC controller to turn the Indicator State bit on when the Button Control bit is set, the button will change to state 1

**IMPORTANT:** The Latched Push Button is not retentive or presettable. It does not retain its value when power is switched off and on again, or when the terminal is switched to Configuration mode and then back to Run mode.

### Maintained Push Button

Pressing a Maintained Push Button, (also known as Push-On, Push-Off) sets the corresponding PLC Button Control bit to 1. The bit remains set even after the button is released. You must press the button a second time to reset the bit to 0.

The Maintained Push Button controls the value at the Button Control address, a PLC input address. In addition, this object has an Indicator State address used to define the display state of the object. The Maintained Push Button has two display states, 0 and 1. You can use this feature to configure the button in a number of ways:

- if you assign just the Button Control address and assign text and attributes to state 0, the border on the button will highlight when you press the button, but the button text itself will remain unchanged.
- if you assign the same address to the Button Control address and Indicator State address, and assign different text and attributes to state 0 and 1, then the button will immediately change to reflect the new state when you press the button.
- to provide a visual handshake with the PLC controller, assign a PLC input address to the Button Control address and a PLC output address to the Indicator State address. Program the PLC controller to turn the Indicator State bit on when the Button Control bit is on, and the button will change to state 1



**IMPORTANT:** The Maintained Push Button is a retentive object. Thus, the PanelView terminal will retain the current value for the button setting even after the terminal is turned off or switched to Configuration mode. For this reason, do not use a Maintained Push Button to initiate a PLC controlled machine or process. Instead use a Momentary Push Button. You can assign a preset value to the Maintained Push Button.

### **Interlocked Push Button**

The Interlocked Push Button is actually one push button in a group of push buttons. The group of buttons functions together in much the same way as the station selector buttons on a car radio: pressing one cancels the other buttons and makes a new selection. Although they function as a group, they are added to the screen individually.

Assign the same button control address, a PLC input address, to each button in the group. Then assign a unique control value to each button. The range of the value depends upon the data type and number of bits assigned to the button control address. When you press an Interlocked Push Button, the PanelView terminal places this control value at the button control address in the PLC controller and highlights the selected button.

The Interlocked button remains highlighted as long as the PLC value is the same as the value of the button. Thus only one button in the group will be active and highlighted at any given time. On monochrome terminals, highlighted buttons appear in reverse video; on color terminals they appear with the foreground and background colors interchanged.

You can accomplish the same functionality with a Control List Selector with **Enter**; however, you have much more flexibility in placing Interlocked buttons on your screen.

If two or more Interlocked Push Buttons have the same control value, both will be highlighted whenever the associated button control address contains that value.

**IMPORTANT:** The Interlocked Push Button is a retentive object. Thus, the PanelView terminal will retain the current value for the button setting even after the terminal has been turned off, or switched to Configuration mode and back to Run mode. You can assign a preset value to the Interlocked Push Button.

## **Control Selectors**

There are three different Control Selectors:

- Control List Selector with Enter
- Control List Selector without Enter
- Set Bit Cursor Point (for Keypad terminals only)

These three objects allow an operator to select from a list of choices. The current operator choice is always indicated by the value at the selector control address, a PLC input address.

The minimum size of a selector is 1 character.

Selectors can also be positioned so they point at other objects on the same screen. For example, a list selector could point to an adjacent list of numeric display objects. Values entered via the numeric keypad could be directed (by the PLC program) to the PLC storage address of the numeric value being displayed.

The Set Bit Cursor Point object is only available with Keypad terminals. Set Bit Cursor Points can be positioned on the screen in a row, column, or row and column array. The operator then uses special keys (arrow keys, Home, Select and Cancel) to make choices.

### **Control List Selector Addressing**

Consider each entry in the Control List Selector as a state, where state 0 is the first entry, state 'n' is the last entry. Each state in the list corresponds to a selector control address, (a PLC input address). The number of bits required depends upon the number of states in the Selector and the data type used. For example, if you have a List Selector with ten states, you will need the following number of bits for the three data types listed below

- Binary: 4 bits
- BCD: 4 bits (Top Position value = 0)  
8 bits (Top Position value = 1)
- Bit: 9 bits (Top Position = All Bits OFF)  
10 bits (Top Position = First Bit ON)

## Top Position Value

Top Position refers to the first item in the control list. In PanelBuilder Versions 1 and 2, when the top selector position is chosen, all bits assigned to the object are turned off. In Versions 3, 4 and 5 you can choose the value that will be written to the control address when the highlight bar is in the top position.

In the Selector Control Address menu, choose *Top Position Value* and choose from:

- Bit data type:
  - All Bits OFF
  - First Bit ON
- BCD or binary
  - 0
  - 1

When the highlight bar is in the top position, the value 1 will be written to the control address if the top position value is set to 1 (First Bit ON). Zero will be written if the top position value is set to 0 (All Bits OFF).

**Figure 10.2**  
**Selector Control Address with Bit Data Type**

Selector Control Address	
Current Address	Unassigned Address
Current Preset	
Data Type	Bit
Communications	Discrete
Input/Output	Input
Rack	1
Start Word	0
Start Bit	0
Number of Bits	1
Top Position Value	All Bits OFF
Update Address	All Bits OFF
Change Preset	First Bit ON
View Address Map	
Delete Address	
Quit	

22611

The following table indicates the state number and the required bit pattern for each data type for 10 states.

**Table 10.A**  
**Bit Patterns for Each State if All Bits OFF: Binary, BCD and Bit Data Type**

State	Binary	BCD	Bits
0	0000	0000	000000000
1	0001	0001	000000001
2	0010	0010	000000010
3	0011	0011	000000100
.	.	.	.
.	.	.	.
9	1001	1001	100000000

Each of these numbers increases by 1 if “First Bit ON” or “1” is chosen for Top Position Value.

**Table 10.B**  
**Bit Patterns for Each State if First Bit ON: Binary, BCD and Bit Data Type**

State	Binary	BCD	Bits
0	0001	0001	000000001
1	0010	0010	000000010
2	0011	0011	000000100
3	0100	0100	000001000
.	.	.	.
.	.	.	.
9	1010	1000	100000000

### Control List Selector with Enter

The Control List Selector with Enter object allows the operator to choose from items in a list. As the operator presses the Up Cursor and Down Cursor buttons, an arrow indicator moves up and down through the list, wrapping around the top and bottom of the list. The item is not actually selected until the **Enter** button is pressed; the selected item highlights in reverse video and the PLC input is updated to reflect the new state.

The states, therefore, are not necessarily executed consecutively. Rather the new state is determined by the position in the Selector when the **Enter** button is pressed.

The Control List Selector with Enter consists of the following components:

- **List** is a vertical list that can have up to 24 different items (12 with double sized text). The operator presses the Up Cursor or Down Cursor buttons to move the arrow indicator up and down through the list. When the **Enter** button is pressed, the line to the right of the arrow highlights and the PLC input address is updated.
- **Up Cursor (Decr Value) Button** moves the arrow indicator up by one list entry.
- **Down Cursor (Incr Value) Button** moves the arrow indicator down by one list entry.
- **Enter Button** selects the desired option, and updates the PLC input address.

If an address cannot accommodate the state entered, an error message is displayed, and the PLC value is not changed. Clear the fault before continuing.

**IMPORTANT:** The Control List Selector with Enter is a retentive object. Your PanelView terminal will retain the current value for the Control List Selector with Enter, even after you've turned the terminal off, or switched to Configuration mode. You can change the preset value of this object.

Choose *List* in the Object Menu to configure the selector list.

Use *Move* to position your object on the screen.

Choose *Width* to specify how many characters you can fit on a line for each state in the list.

Choose *Number of States* to define the height of the list. For single height characters, you can have up to 24 states; for double height characters you can have up to 12 states. If you include a border around your list you will lose two single size or one double size entry.

Use the *Edit Text* and *Move Text* items to create the list of names. The list is strictly for your information. The movement between screens is determined by the screen numbers you have defined for the states.

Use *Border* to select a border type for your list. If you include a border, you will lose two single size or one double size entry (state).

Use *Buttons* in the Object Menu to configure the Up Cursor, Down Cursor and Enter buttons. To save screen space you can disable either the Up Cursor or the Down Cursor button (but not both). A button that has been disabled doesn't appear on the screen.

### Control List Selector without Enter

The Control List Selector without Enter object allows the operator to choose from items in a list by means of Up Cursor and Down Cursor buttons.

Unlike the Control List Selector with Enter, the selections are continually highlighted and updated to the PLC controller. That is, as the operator moves the cursor to each item, the item highlights and the corresponding state value is transferred to the PLC input addressed by the Control address.

The Control List Selector without Enter consists of the following components:

- **List**—is a vertical list that can contain up to 24 different items (12 with double size text). The operator presses the Up Cursor or Down Cursor buttons to move through the list.
- **Up Cursor (Decr Value) Button**—moves the selection up by one list entry, and updates the list position number in the PLC input address. (0 = the first item in the list.)
- **Down Cursor (Incr Value) Button**—moves the selection down by one list entry, and updates the list position number in the PLC input address.

You can build a simple two position Control List Selector and include only the Up Cursor button. Functionally, the result is the same as a Maintained Push Button or a hard-wired two-position selector switch. However, you would also have a two position list with the current selection highlighted. You could even use Outer Text to add an extra label.

**IMPORTANT:** The Control List Selector without Enter is a retentive object. Your PanelView terminal will retain the current value for the Control List Selector without Enter even after you have turned the terminal off or switched to Configuration mode. The PanelBuilder Development Software will allow you to enter a preset value for this object.

Choose *List* in the Object Menu to configure the selector list. The Number of States you assign determines the height of the list. For single height characters, you can have up to 24 states; for double height characters you can have up to 12 states. If you include a border around your list you will lose two single size or one double size entry. Similarly, the width you specify for the list will determine how many characters you can fit on a line for each state.

Use *Buttons* in the Object Menu to configure the Up Cursor and Down Cursor buttons. To save screen space you can disable either the Up Cursor or the Down Cursor button (but not both). A button that has been disabled doesn't appear on the screen.



**ATTENTION:** Do not use the Control List Selector Without Enter to initiate a control function.

---

### Set Bit Cursor Points (Keypad terminals only)

The Set Bit Cursor Point object allows the operator to select from a list or an array of objects. Associated with each Cursor Point is a unique PLC input bit addressed by the Cursor Point Address. To use the Cursor Points, the operator must press the Select button on the PanelView terminal enabling the arrow and Home keys. The arrow keys are used to move to the desired cursor point on the terminal display. The Home key moves the cursor to the home position (the cursor position at the top left of the screen).

The selected cursor point's character will be highlighted and will blink; the PLC input bit will be set to 1. To turn the Cursor Point feature off again, and disable the keys, the operator must press the Cancel button on the PanelView terminal.

Here's an example of how you might use Set Bit Cursor Points. You want to monitor all the motors on a conveyor belt. You could draw a line to represent the belt, and then place set-bit cursor points pointing to each motor along the belt. Then you'd program the PLC controller so that when you display this screen on a PanelView terminal, you could cursor to the desired motor and see its status displayed in a Local Message Display or multi-state indicator on that screen.

**IMPORTANT:** The Set Bit Cursor Point values are not changed when the cursor point feature is cancelled. The last bit selected remains on.

Using PanelBuilder, you place successive Set Bit cursor points above, below, or beside existing cursor points (any distance apart). Use the row and column indicators at the top right of the monitor to make sure the cursor points line up: there will be no warning if the cursor points don't line up.

**IMPORTANT:** If the cursor points aren't properly lined up, the Set Bit cursor points may not work as expected when the application file is downloaded to the terminal.

When you create the screen in PanelBuilder, all cursor points are visible. However, when you display the screen on a PanelView terminal, only one cursor point will be visible and blinking and, on a monochrome screen, in high intensity.

#### Cursor Point Default Operation

1. When a screen is selected for the first time after a download, the PanelView terminal scans all Set Bit and Numeric Input Cursor Point objects in the screen from left to right, top to bottom. The first Set Bit Cursor Point object with a PLC bit set to 1 will be selected as the active Cursor Point for that screen.
2. If none are found, the PanelView terminal selects the Cursor Point object nearest the home position of the screen as the active cursor point object for that screen. If this is a Set Bit Cursor Point, its PLC bit will be set to 1.
3. All other Set Bit Cursor Point objects in the selected screen have their PLC bits reset to 0. All other numeric cursor point objects remain inactive.



**ATTENTION:** In Version 1 all other Cursor Point objects in the current screen were *not* reset in certain cases—making it possible to have more than one Cursor Point active on a screen.

---

4. When the screen is selected, and the Transfer Current Screen to PLC Controller option is enabled, both the new screen number and the new Cursor Point values will be transferred to the PLC controller in the same PLC scan.

#### Retained Set Bit Cursor Point Default Operation

1. When a screen is re-selected, the active Set Bit Cursor Point object is the Set Bit Cursor Point object active when the screen was last active.
2. The PLC bit associated with this object will be set to 1.
3. All other Set Bit Cursor Point objects in the selected screen have their PLC bits reset to 0.



### **Cursor Point Function on Power-up**

On power-up the Set Bit Cursor Point operation status, Selected or Cancelled, is retained. The active Set Bit Cursor Point object is the one active when the screen was last displayed.

**IMPORTANT:** Immediately after the downloading or the loading of a new file from user PROMs, the operation status is selected.



**ATTENTION:** The Set Bit Cursor Point object should not share addresses with objects used for control purposes. For example, if a Set Bit Cursor Point on screen 2 is assigned to the same address as a Normally Closed Push Button on screen 1, the Normally Closed Push Button will open when screen 2 is entered if the cursor point is not selected as the active point as described earlier.

---

### **Examples: Set Bit Cursor Point Operation**

1. In this example, a screen has five set bit cursor points; three in a row at the top of the screen, and two in a row below. The first two cursor points in each row are aligned in columns. Each cursor point uses a unique bit address that is not shared with any other objects in the application.

When the application is downloaded, the cursor point at the top left corner of the screen is selected as the default and its PLC input address is set to one. If the right arrow key is pressed, its PLC bit address will be set to zero and the second cursor point in the same row will be set to one.

2. In another example, the screen also has five set bit cursor points; three in a row at the top of the screen, and two in a row below. The last cursor point in the second row, however, uses the same address as a set value button with a preset value of 1. In addition, the second cursor point in the first row shares the same address with another set value button, which is also preset to 1.

When the application is downloaded and the screen is displayed, the second cursor point in the first row will be selected as the active Set Bit Cursor Point object and its associated PLC bit will be set to 1, since it is closest to the home position. All other bits in the screen will be reset to 0, including the address associated with the second Set Bit Cursor Point object in the second row. When another cursor point is selected with the Home and arrow keys, this bit will be reset to 0 and the bit for the selected cursor point set to 1.

---

**IMPORTANT:** Sharing Set Bit Cursor Point addresses with other objects is not recommended in actual applications; it is only used here to explain Cursor Point operation.

**IMPORTANT:** The Set Bit Cursor Point is a retentive object. Your PanelView terminal will retain the current value for the Set Bit Cursor Point setting even after you've turned the terminal off, or switched to Configuration mode and back to Run mode. The Set Bit Cursor Point is not presettable.

To define the Set Bit Cursor Point Character choose *Set Bit Cursor Point* from Control Selectors in the Object Add Menu. By default the Set Bit Cursor object uses a small arrow as the cursor character. This cursor character can be changed. If the cursor character you want to use appears on the computer keyboard, then:

1. Choose *Cursor Character*.
2. Type that character and press **Enter**.

To use a character from the extended character set:

1. Choose *Cursor Character*.
2. Press and hold down a **Ctrl** key combination or **Alt** followed by the character's ASCII code on the keyboard's keypad, then press **Enter**. See Appendix E, *The Extended Character Set* for more information.



**ATTENTION:** Do not use the Set Bit Cursor Point to initiate a control function.

---

## **Screen Selectors**

Screen selectors provide a way for an operator to move to another screen, or to return to a previously displayed screen. Normally, every screen should have a screen selector, so that an operator is not stranded at a particular screen.

All screens can be coded for security. If the wrong code is entered an error message is displayed and the screen does not change.

If the requested screen does not exist, or is corrupted, an error is displayed and the screen does not change.

**IMPORTANT:** If the PLC Controlled Screen Change is enabled and the value at the associated PLC address is not zero, the PLC controller, not the operator, has control over screen changes. If the operator presses a screen selector, an error message appears.

Screen selection by the operator is not allowed when “Minimum Push Button On Time”, “Latch Button PLC Handshakes” or “Enter Bit Handshakes” are outstanding. An error message will be displayed and the screen will not change.

### **“Go To Screen” Button**

The “Go To Screen” button is used to display another screen. Once you have added the object to your screen, choose *Screen* from the menu. In the window that opens, type the number of the screen you want to go to when the button is pressed. Then choose *Quit* to return to the Object menu and your screen.

For example, a button labeled “View Current Status” could be included on a screen. The button could be configured to go to a screen displaying the current status. That screen would include a “Return To Previous Screen” button, so the operator could easily return.

Another example: a button labeled “Select New Screen” could be configured to go to a screen displaying a keypad screen selector (for Touch Screen terminals) or a keypad screen select button (for Keypad terminals). The operator could then select the desired screen by entering the screen number.

### **“Return To Previous Screen” Button**

The “Return To Previous Screen” button returns to the screen previously displayed.

**IMPORTANT:** The PanelView terminal only remembers the last screen. You cannot back up through a succession of screens with “Return To Previous Screen” buttons.

If the PLC controller is controlling screen changes, the “Return To Previous Screen” button will not take you back to the intended screen.

### Screen List Selector

With a Screen List Selector, the operator presses Up Cursor and Down Cursor buttons to scroll through a list of screen names, then presses the **Enter** button to switch to a selected screen. The Screen List Selector is similar to the Control List Selector with Enter, but it is only used to control screen changes.

The Screen List Selector consists of the following components:

- **List** is a vertical list that can contain up to 24 different items (12 with double sized text). If you include a border around your list you will lose two single size or one double size entry.

The operator presses the Up Cursor or Down Cursor buttons to move the arrow indicator up and down through the list. When the **Enter** button is pressed the screen is selected.

- **Up Cursor** button moves the arrow indicator up one entry.
- **Down Cursor** button moves the arrow indicator down one entry.
- **Enter** button selects the desired screen, and makes the screen appear.

Use *Buttons* in the Object Menu to configure the Up Cursor, Down Cursor and Enter buttons in your Screen Selector. To save screen space you can disable either the Up Cursor or the Down Cursor button (but not both). A button that has been disabled doesn't appear on the screen.

Choose *List* in the Object Menu to configure the selector list.

Use *Move* to position your object on the screen.

Choose *Width* to specify how many characters you can fit on a line for each state in the list.

Choose *Number of States* to define the height of the list. For single height characters, you can have up to 24 states; for double height characters you can have up to 12 states.

Choose *Assign Screen to State*. Type in the number of the state you want to assign. The first screen in the list is State 0, the second is state 1, etc. Press **Enter**. A small window—the Assign Screen to State *n* window—will open. Type in the number of the screen that you want to go to when State *n* is chosen from the list. Repeat for each screen (state) on the list.

Use the *Edit Text* and *Move Text* items to create the list of screen names. The list is strictly for your information. The movement between screens is determined by the screen numbers you have defined for the states.

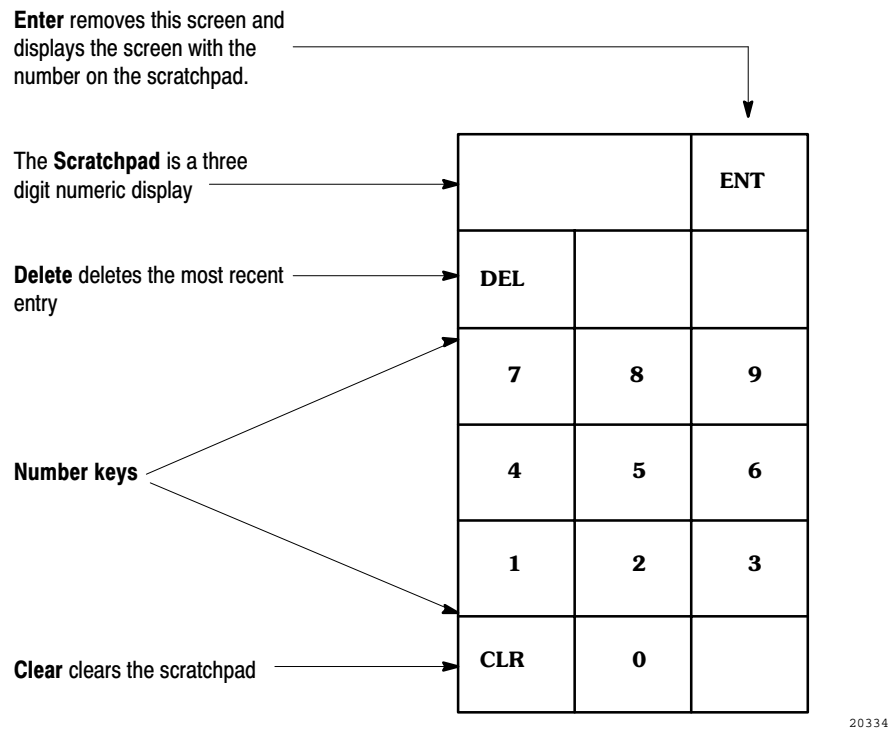
Use *Border* to select a border type for your list. If you include a border, you will lose two single size or one double size entry (state).

### **Keypad Screen Selectors (Small and Large)** **(Touch Screen Terminals Only)**

These two objects appear as numeric keypads overlaying the current screen. They allow an operator to choose the next screen to be displayed by entering its number.

The screen selector keypads differ only in size: the large keypad is 48 characters wide, while the small keypad is 24 characters wide. Both keypads are 24 lines high, and both operate in the same way.

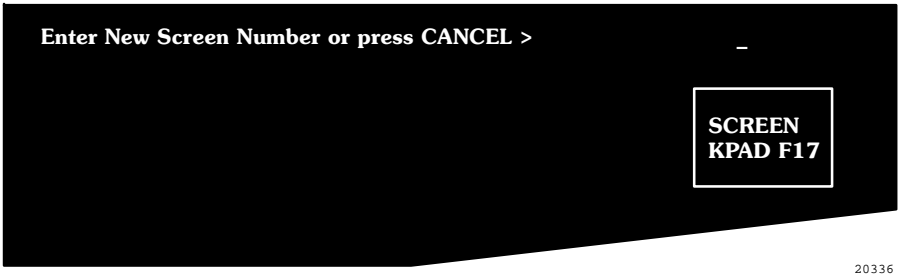
Figure 10.3  
Small Keypad Screen Selector



Screen Keypad-Enable Button  
(Keypad terminals only)

This button allows the operator to choose the next screen to be displayed by entering the screen number on the terminal’s numeric keypad.

Figure 10.4  
Screen Keypad-Enable Button



A scratchpad pops up on the top three lines of the screen. This displays the numbers the operator types.

The keys on the numeric keypad function as follows:

- the number keys enter numbers in the scratchpad
- **Enter** removes the scratchpad and displays the screen with the screen number that was in the scratchpad
- **Delete** deletes the most recent entry
- **Clear** clears the scratchpad
- **Cancel** removes the scratchpad and cancels the screen change

**IMPORTANT:** Operator input is disabled for a short time when the scratchpad is displayed. This may result in a delay before the first digit can be entered.

## Indicators

PanelView supports the following two types of indicators:

- Multi-State Indicator
- List Indicator

You can assign either a PLC output or input address for all indicators to control the current state.

### Multi-State Indicator

The Multi-State Indicator is a display object that allows you to display the state of a PLC operation on the screen. You create a display area on the screen, and then add from 2 to 16 unique states of text and attributes. The text and attributes displayed on the PanelView terminal depends upon the state number, that is, the value at the Indicator State Address.

The Multi-State Indicator can be used for a variety of purposes. For example, you could make a Multi-State Indicator one character wide, to simulate “flow” in a pipe, or to indicate the motion of an object. You could use a two-state solid rectangle to simulate an indicator light, or add descriptive text to the object.

This object supports binary, BCD and bit data types. The maximum number of states is determined by the data type and the number of bits assigned. For example, if you have a Multi-State Indicator with ten states, 0 to 9, you will need the following number of bits for the three data types listed below:

- Binary: 4 bits

- BCD: 4 bits
- Bit: 9 bits; (all bits off = state 0) if more than one bit is on at a time, the least significant bit's state is displayed

The following table indicates the state number and the required bit pattern for each data type:

**Table 10.C**  
**Bit Patterns for Each State: Binary, BCD and Bit Data Type**

State	Binary	BCD	Bits
0	0000	0000	000000000
1	0001	0001	000000001
2	0010	0010	000000010
3	0011	0011	000000100
.	.	.	.
.	.	.	.
9	1001	1001	100000000

If the value indicated by the PLC controller is not within the indicator's range, the colors and attributes of the highest numbered state will be displayed but the text inside the indicator will be blanked.

### List Indicator

The List Indicator is used to display the current status or state of a particular PLC operation. The list can have up to 24 items, one of which is highlighted to indicate that it is currently in effect. The operator can see all the possible states for a particular operation, and see which state is current. The List Indicator is similar to the Control List Selector, except that the PLC controller, rather than the operator, controls the display.

The value of the object's PLC address, the state number, and the configuration of Top Position Value determine which entry is highlighted. This object supports three data types, binary, BCD, and bit. Like the Control List Selector object and the Multi-State Indicator, the maximum number of states is determined by the data type and the number of bits assigned. See Table 10.B for a list of valid state values for states 0 to 9. If more than one bit is on at a time, the least significant bit's state is displayed.



## Top Position Value

In Versions 1 and 2 of the PanelBuilder software, the first selection in the list, state 0, corresponds to a value of 0. In Version 3 and later you can choose the value associated with the top position. In the Indicator State Address menu, choose *Top Position Value* and choose from:

- Bit data type:
  - All Bits OFF
  - First Bit ON
- BCD or binary
  - 0
  - 1

When the value at the control address is 0, and the top position value is set to 1 (First Bit ON), the highlight bar will not be visible. When the value at the control address is 1 and the top position value is set to 1 (First Bit ON), the first item in the list will be highlighted. If the top position value is set to 0 (All Bits OFF) and the control address contains 0, the first item in the list indicator will be highlighted, as in Version 2.

**Figure 10.5**  
**Indicator State Address**

Indicator State Address	
Current Address	Unassigned Address
Current Preset	
Data Type	BCD
Communications	Discrete
Input/Output	Output
Rack	1
Start Word	0
Start Bit	0
Number of Bits	2
Top Position Value	1
Update Address	0
Change Preset	1
View Address Map	
Delete Address	
Quit	

22612

If the value indicated by the PLC address is not within range of the indicator, no list items will be highlighted.

Choose *List* in the Object Menu to configure the list.

Use *Move* to position your object on the screen.

Choose *Width* to specify how many characters you can fit on a line for each state in the list.

Choose *Number of States* to define the height of the list. For single height characters, you can have up to 24 states; for double height characters you can have up to 12 states. If you include a border around your list you will lose two single size or one double size entry.

Use the *Edit Text* and *Move Text* items to create the list names. The list is strictly for your information.

Use *Border* to select a border type for your list. If you include a border, you will lose two single size or one double size entry (state).

Use *Buttons* in the Object Menu to configure the Up Cursor, Down Cursor and Enter buttons. To save screen space you can disable either the Up Cursor or the Down Cursor button (but not both). A button that has been disabled doesn't appear on the screen.

## Numerics

There are seven numeric objects:

- Set Value Button
- Increment Value Button
- Decrement Value Button
- Numeric Data Display
- Numeric Keypad-Enable Buttons (Keypad terminals only)
- Small or Large Numeric Entry Keypads (Touch Screen terminals only)
- Numeric Input Cursor Points (Keypad terminals only)

If you want to display an array of numeric values on a screen, and allow an operator to change any of the values, refer to the section Editing an Array of Numeric Values, later in this chapter.

Numeric objects can be divided into two groups: Input objects (which are used for numeric entry) and Display Objects (which display numeric values on the screen).

**Table 10.D**  
**Input and Display Objects**

Input Objects	Display Objects
Set Value Button	Numeric Data Display
Increment Value Button	Numeric Input Cursor Point
Decrement Value Button	Scrolling List
Keypad (Touch Screen Terminals)	
Keypad-Enable Button (Keypad Terminals)	
Numeric Input Cursor Point	

Table 10.E lists the capabilities of numeric objects, in terms of the decimal points and negative sign—some objects can display the decimal point and negative sign, and some cannot; some can accept the decimal point and/or negative sign as part of the operator’s input, and some cannot.

**Table 10.E**  
**Decimal Point, Polarity Capabilities, and Data Ranges of Numeric Objects**

	Decimal Point	Polarity	Data Range
Set Value Button	N	N	0 – 99,999,999
Increment Value Button	N	N	0 – 99,999,999
Decrement Value Button	N	N	0 – 99,999,999
Keypad (Touch Screen Terminals)	Y	Signed Integer	–32,768 – 99,999,999
Keypad-Enable Button (Keypad Terminals)	Y	Signed Integer	–32,768 – 99,999,999
Numeric Input Cursor Point	Y	Signed Integer	–32,768 – 99,999,999
Numeric Data Display	Y	Y	–9,999,999 – 99,999,999
Scrolling List	Y	Y	–9,999,999 – 99,999,999

## Set Value Button

The Set Value Button is used to set a PLC input address to a specific value (a control value) with a single button press. Use this button if there is a typical set point value that an operator might want to revert to frequently. You can use a Set Value Button with Numeric Data Display and the Increment and Decrement Buttons to change and monitor a value associated with the Set Value Button.

The Set Value Button supports binary, BCD and signed integer data types. This object does not support a separate sign bit, decimal point, or scaling. The data type together with the number of bits assigned determines the range of PLC values. However, PanelBuilder only allows the user to enter an 8-digit positive number. The following table shows the data types and their respective ranges:

**Table 10.F**  
**Set Value Button Data Types and Values**

This data type:	Supports this range of values:
Binary	0 - 65,535
BCD	0 - 99,999,999
Signed Integer	0 - 32,767

At the terminal, if the control value is too large, an error message will be displayed; the number will not be sent to the PLC controller.

**IMPORTANT:** The Set Value Button is a retentive object. Your PanelView terminal will retain the current value for the button setting even after you've turned the terminal off, or switched to Configuration mode and back to Run mode. A preset value can be assigned to the Set Value Button, and can be changed using PanelBuilder software.

### Increment Value Button

The Increment Value Button increases the value at the assigned PLC input address (the Button Control Address) each time the button is pressed. Use this object to allow an operator to add a value to the current value by pressing the button. You can set an upper limit for the PLC controller, a positive integer, 0 to 99,999,999.

The Increment Value Button supports binary, BCD and signed integer data types for the upper limit. This object does not support a separate sign bit or decimal point, or scaling. Although PanelBuilder allows the user to enter a positive 8-digit maximum value, the data type together with the number of bits assigned determines the range of PLC values. The following table shows the different data types and their respective ranges:

**Table 10.G**  
**Increment Value Button Data Types and Values**

<b>This data type:</b>	<b>Supports this range of values:</b>
Binary	0 – 65,535
BCD	0 – 99,999,999
Signed Integer	0 – 32,767

If the value is already at, or above the maximum, the value is not changed.

### **Auto-Repeat**

If a button is pressed for more than the time specified by the button's Auto-Repeat Start Delay, the value automatically increases by the amount specified by the Amount per Increment at the rate specified by the Auto-Repeat Rate.

- the Auto-Repeat rate may be set for 0 to 20 per second; auto-repeat is disabled if the rate is set to 0
- the Auto-Repeat Start Delay may be set for 0.2 to 2.5 seconds
- the Amount per Increment is an integer value in a range of 1 to 10000; the default is 1

**IMPORTANT:** If you change any of the Increment Value Button default settings (4 per second Auto-Repeat Rate, 400 msec Auto-Repeat Start Delay and an Amount per Increment of 1), the application file will only be compatible with Version 2 and later PanelView firmware.

Often, Increment and Decrement buttons are used together to control the same PLC address. Since the buttons don't display the value of the address, a Numeric Data Display could be used to display the value at the address as it raises or lowers.

**IMPORTANT:** The Increment Value button is a retentive object. Your PanelView terminal will retain the current PLC input address value even after you've powered down the terminal or switched to Configuration mode. Use PanelBuilder to define or change the preset value of this object.

### **Decrement Value Button**

The Decrement Value Button decreases the value at the assigned PLC input address each time the button is pressed. Use this object to allow an operator to subtract a value from the current value by pressing the button. You can set a lower limit for the PLC value, a positive integer, 0 to 99,999,999.

The Decrement Value Button supports binary, BCD and signed integer data types for the lower limit. This object does not support a separate sign bit or decimal point, or scaling. Although PanelBuilder allows the user to enter a positive 8-digit minimum value, the data type together with the number of bits assigned determines the range of PLC values.

The following table details the different data types and their ranges:

**Table 10.H**  
**Decrement Value Button Data Types and Values**

This data type:	Supports this range of values:
Binary	0 - 65,535
BCD	0 - 99,999,999
Signed Integer	0 - 32,767

If the value is already at or below the minimum, the value is not changed.

### Auto-Repeat

If a button is pressed for more than the time specified by the button's Auto-Repeat Start Delay, the value automatically decreases by the amount specified by the Amount per Decrement at the rate specified by the Auto-Repeat Rate.

- the Auto-Repeat rate may be set for 0 to 20 per second; auto-repeat is disabled if the rate is set to 0
- the Auto-Repeat Start Delay may be set for 0.2 to 2.5 seconds
- the Amount per Decrement is an integer value in a range of 1 to 10000; the default is 1

**IMPORTANT:** If you change one or more of the Decrement Value Button default settings (4 per second Auto-Repeat Rate, 400 msec Auto-Repeat Start Delay and an Amount per Decrement of 1), the application will only be compatible with Version 2 and later PanelView firmware.

Often, Increment and Decrement buttons are used together to control the same PLC address. Since they don't display the value of the address, a Numeric Data Display could be used to display the value at the same address.

**IMPORTANT:** The Decrement Value button is a retentive object. Your PanelView terminal will retain the current PLC input address value even after you've powered down the terminal or switched to Configuration mode. The preset value of this object can be defined and changed using PanelBuilder.

## Numeric Data Display

The Numeric Data Display object allows the operator to monitor PLC variables such as temperature, level and speed.

As with other display objects, you can assign a PLC output or input address to a Numeric Data Display Displayed Value Address. If you assign an output address, the value stored in the PLC data table is transferred to the terminal.

If you assign a PLC input address you will probably want to use Numeric Data Displays with other objects. For example, you could include Increment and Decrement buttons, or a Numeric Keypad (for Touch Screen terminals), or a Numeric Keypad Enable button (for Keypad terminals) on the same screen as a Numeric Data Display. If you assign the same input address to both the Numeric Display object and numeric entry objects, you could see the new value as you change the value in the PLC controller.

**IMPORTANT:** If you assign a PLC input address shared by a retentive object, your PanelView terminal will retain the current PLC input address value even after you've powered down the terminal or switched to Configuration mode.

The Numeric Data Display object supports two types of numeric displays, Standard and Scaled. Choose *Standard* to display "raw" PLC values.

### Standard Numeric Data Display

The Standard Numeric Data Display has two display options, a decimal point position and a polarity indicator (the negative sign). Several more choices arise from these two options. The following table shows the breakdown of formatting options, and the addressing limits for each option.

**Table 10.1**  
**Standard Numeric Data Display Formatting and Addressing Options**

Decimal Point	Polarity	Format Options	Address Options	Data Types	Data Range
NO	NO	No of Digits	Displayed Value	Binary	0 – 65,535
		Fill Left With      Zeroes or Spaces	Address	BCD	0 – 99,999,999
				Signed Integer	–32,768 – +32,767
NO	YES	No of Digits	Displayed Value	Binary	–65,535 – +65,535
		Fill Left With      Zeroes or Spaces	Address	BCD	–9,999,999 – +99,999,999
			Polarity Address	Bit	0 – 1
YES	NO	No of Digits	Displayed Value	Binary	0 – 65,535
		Fill Left With      Zeroes or Spaces	Address	BCD	0 – 9,999,999
				Signed Integer	–32,768 – +32,767

Decimal Point	Polarity	Format Options		Address Options	Data Types	Data Range
YES	NO	Decimal Point	Fixed      No of digits	Decimal Point	Binary	0 – 7
			PLC Controlled	Position Address		
YES	YES	No of Digits		Displayed Value	Binary	–65,535 – +65,535
		Fill Left With	Zeroes or Spaces	Address	BCD	–9,999,999 – +9,999,999
		Decimal Point	Fixed      No of digits	Decimal Point Position Address	Binary	0 – 7
			PLC Controlled	Polarity Address	Bit	0 – 1

### Display Formatting

When fewer digits than the maximum are to be displayed, the left portion of the display must be filled with either blank spaces or zeroes. You can choose either spaces or zeroes by choosing *Fill Left With*.

If the value cannot be displayed within the number of digits specified for the object, a string of asterisks (\*) is displayed instead.

### Displays with Decimal Point

The position of the decimal point can be fixed or PLC controlled.

To create a fixed decimal position, you select the number of digits that will be displayed to the right of the decimal point. The number can be 1 to 7 (the default is 1).

To create a PLC controlled decimal point, you must assign a Decimal Point Position Address, a PLC input or output address. This three-bit binary code indicates the number of digits to the right of the decimal. For example, a value of zero (000 binary) means that there will be no digits displayed after the decimal point (and the decimal itself will not be displayed); a value of three (011 binary) means there will be three digits to the right of the decimal point; a value of seven (111 binary) means that seven digits will be displayed to the right of the decimal point. The remaining bits in the word address can be assigned to other functions.

Use a PLC input address if you want to control the decimal position from the terminal using other input objects. If you want the PLC controller to dynamically change the decimal position, assign a PLC output address for the decimal point. No PLC address is needed if the decimal position is fixed.

With a decimal point but no polarity bit, this object can display 2 to 8 digits (the default is 6). The maximum PLC value depends upon the data type and number of bits assigned to the Displayed Value Address.



If you are displaying a number with a decimal point, the decimal point occupies the space of one digit. For example, if you want to display a fractional number and you specify eight digits, the Numeric Data Display will show seven numeric digits, plus the decimal point.

### Displays with Polarity

Enabling polarity extends the range of values that can be displayed. There is only an implied relationship between the numeric value and the minus sign. If the bit at the Polarity Address is 0, the minus sign is not displayed; if the bit at the Polarity Address is 1, then the minus sign is displayed.

If the object is configured with just the polarity bit, 2 to 8 digits can be configured (the default is 6), depending upon the field size. If both the decimal point and polarity point are used, from 3 to 8 digits are allowed (the default is 7).

If you are displaying negative numbers, the minus sign occupies the space of one digit. For example, if you want to display a *negative fractional* number and you specify eight digits, the Numeric Data Display will show six numeric digits plus the minus sign and the decimal point.

There are two ways to display negative values—one uses “No Polarity” and the “Signed Integer” data type. This automatically inserts the minus sign when the signed integer bit value is negative. The other way is to select “Polarity”.

### Scaled Numeric Data Display

The Numeric Data Display object supports two types of numeric displays, Standard and Scaled. Choose *Scaled* if you want to scale the PLC value (for example, convert the raw PLC value into meaningful engineering units such as gallons, inches, PSI, or inches per second).

**Table 10.J**  
**Scaled Numeric Data Display Formatting and Addressing Options**

Format Options		Address Options	Data Types	Data Range
No. of Digits		Displayed Value	Binary	0 – 65,535
Fill Left With	Zeroes or Spaces	Address	BCD	0 – 99,999,999
Scaling Factor	.0001 – 9999		Signed Integer	–32,768 – +32,767
Offset Value	–32,768 – +32,767			
Display Result with	Decimal Point or Round-off			

You have the choice of displaying the value with a decimal point, or rounding off the scaled value to the nearest whole number. For scaling, PanelView uses the formula:

**Displayed value =  $Mx + b$**

- **M** is the scaling factor
- **x** is the value in the associated PLC address. The PLC address must contain data in the BCD, binary or signed integer data format
- **b** is the offset

---

### Example: Scaling Formula

The range of values in the assigned PLC Address is from 0 to 4095. This range was determined by the specific type of analog input module being used. The actual range in engineering units is 0 to 700 gallons per minute. This range was determined by the measuring device providing the signal to the analog input module (for example, the flow meter).

Based on the above information, you would assign the following:

$$M = 700/4095 = 0.171$$

$$b = 0$$

If the PLC value was 3,000, the display would be:

$$\begin{aligned}\text{Displayed Value} &= Mx + b \\ &= (0.171 * 3000) + 0 \\ &= 512.821 \text{ (513 rounded)}\end{aligned}$$

---

When fewer digits are displayed, the left portion of the display must be filled with either blank spaces or zeroes. You can choose either spaces or zeroes by choosing *Fill Left With*.

If the value cannot be displayed within the number of digits specified for the object, a string of asterisks (\*) is displayed instead.

### Numeric Keypad-Enable Button (Keypad Terminals only)

The Numeric Keypad-Enable Button object calls up the Numeric Keypad window, which is used to enter a numeric value. While the Numeric Keypad is on screen, the Cancel key, numerics, backspace, decimal point, sign and Home/Arrow keys (if cursor points have been selected on the screen) will remain active. All other keys and buttons are disabled.

The Numeric Keypad clears when:

- the Cancel key is pressed
- the screen changes
- the operator cursors to a numeric input cursor point

**IMPORTANT:** Operator input is disabled for a short time when the keypad is displayed. This may result in a delay before the first digit can be entered.

**Table 10.K**  
**Numeric Keypad-Enable Button Formatting and Addressing Options**

Format Options			Address Options	Data Types	Data Range
Decimal Point	Disabled		Keypad Control	Binary	0 – 65,535
	Fixed Position	No. of digits after decimal pt.	Address	BCD	0 – 99,999,999
	PLC Controlled			Signed Integer	-32,768 – +32,767
	Decimal Key Controlled		*Decimal Point Position Address	Binary	0 – 7
Scratchpad Operation	Retain after ENTER Remove after ENTER		#Enter Key Control Address	Bit	0 – 1
			#Enter Key Handshake Address	Bit	0 – 1

\*only useful with Decimal Key Controlled and PLC Controlled formats – not necessary otherwise

#optional

A maximum of 8 digits can be displayed in the Numeric Keypad window; the decimal point and minus sign use one digit each. The data type together with the number of bits assigned to the Keypad Control Address, a PLC input address, determine the range of PLC values.

If the data type is a signed integer, the minus key on the terminal's keypad is functional. The minus key will toggle the polarity if there are no digits in the scratchpad.

The **Scratchpad Operation** option allows you to decide if the numeric data entry scratchpad is removed or retained after the ENTER key is pressed.

**IMPORTANT:** The Numeric Keypad scratchpad occupies the top three lines of the screen. Keep this in mind before you place any objects on these lines.

To provide feedback to the operator, the Numeric Keypad-Enable button can be configured with two states, 0 and 1. If you assign text and attributes to state 0 only, the border on the button will highlight when you press the button; the button itself will remain unchanged. If you assign different attributes and text to states 0 and 1, then the button will immediately change to state 1 when you press the button.

Configure the **Enter** key with a handshake so the PLC controller can acknowledge that a value has been received from the terminal. Define two PLC addresses: the Enter Key Control address and the Enter Key Handshake address. When the operator presses the **Enter** key to send the value to the PLC controller, the terminal sets the Enter Key Control address to 1 (after a 400 msec. delay). Put a line in your PLC program to turn on the bit at the Enter Key Handshake address, to inform the terminal that the handshake has been received. When the terminal sees this bit on, it turns off the Enter Key Control bit.

If the terminal does not receive acknowledgement (transition from 0 to 1) within 5 seconds, (or the Enter Key Handshake is unassigned), it displays an error message in the Fault Window and resets the Enter bit. If the Enter Key Handshake is unassigned, the Enter bit will remain set for the duration of the button hold time or for as long as the button is pressed, whichever is longer.

**IMPORTANT:** All function keys are disabled while the terminal is waiting for handshake acknowledgement.

### Decimal Point Format

To allow an operator to enter numbers with decimal points, choose *Format* from the Object menu. The menu item *Decimal Point* will be highlighted. Press **Enter** and choose from one of the following:

- **Disabled** specifies no values with decimal points can be entered through the Numeric Keypad
- **Fixed Position** specifies a set number of digits to be displayed after the decimal point in the window. For example, if the setting was for three digits after the decimal, an operator's entry would appear as follows:

**Table 10.L**  
**Fixed Position Decimal Point**

Digits Entered	Keypad Control Address Value	Number Displayed
1	100	.1
12	120	.12
123	123	.123
1234	1234	1.234
12345	12345	12.345

- **PLC Controlled** allows the PLC controller to set the number of digits to be displayed after the decimal point.

If you choose the PLC controlled decimal point, assign a Decimal Point Position Address, a PLC input or output address. This three-bit binary code indicates the number of digits to the right of the decimal.

For example, a value of zero (000 binary) means that there will be no digits displayed after the decimal point (and the decimal itself will not be displayed); a value of three (011 binary) means there will be three digits to the right of the decimal point; a value of seven (111 binary) means that seven digits will be displayed to the right of the decimal point. The remaining bits in the word address can be assigned to other functions.

- **Decimal Key Controlled** allows the operator to enter the number and decimal point. The terminal interprets the decimal point position in the window and sets the Decimal Point Position Address to that value.

**Table 10.M**  
**Decimal Key Controlled Decimal Position**

Digits Entered	Keypad Control Address Value	Decimal Point Position Address Value	Number Displayed
123	123	0	123
1.23	123	2	1.23
.12345	12345	5	.12345

To send a decimal point value to the PLC controller, define a Decimal Point Position Address. In this case, only a PLC input can be used. The three-bit value stored at this address determines the number of digits to the right of the decimal point. The relationship between the number and decimal point is implied; the number sent to the PLC controller does not contain a decimal point.

**IMPORTANT:** The Numeric Keypad Enable Buttons are retentive objects. Your PanelView terminal will retain the current value of Numeric Keypad Enable Buttons even after you've turned the terminal off, or switched to Configuration mode. This is true for both the Keypad Control Address and the Decimal Point Position Address. Presets can be defined for both.

### **Small or Large Numeric Entry Keypads (Touch Screen terminals only)**

The Small or Large Numeric Entry Keypads enable an operator to send numeric data to the PLC controller from a Touch Screen terminal.

The two keypads differ only in size: the large keypad is 48 characters wide; the small keypad is only 24 characters wide. Both keypads are 24 lines high, and both keypads operate in exactly the same way

**Table 10.N**  
**Numeric Entry Keypads Formatting and Addressing Options**

Format Options			Address Options	Data Types	Data Range
Decimal Point	Disabled		Keypad Control	Binary	0 – 65,535
	Fixed Position	No. of digits after decimal pt.	Address	BCD	0 – 99,999,999
	PLC Controlled			Signed Integer	-32,768 – +32,767
	Decimal Key Controlled		*Decimal Point Position Address	Binary	0 – 7
			#Enter Key Control Address	Bit	0 – 1
			#Enter Key Handshake Address	Bit	0 – 1

\*only useful with Decimal Key Controlled and PLC Controlled formats – not necessary otherwise

#optional

Both keypads include Digit keys, Enter, Delete, Clear, the decimal point (if decimal point operation is enabled) and the minus sign (if the keypad's data type is Signed Integer).

A maximum of 8 digits are displayed in the keypad's scratchpad; the decimal point and minus sign use one digit each. The data type, together with the number of bits assigned to the Keypad Control Address and a PLC input, determine the range of PLC values.

Configure the **Enter** key with a handshake so the PLC controller can acknowledge that a value has been received from the terminal. Define two PLC addresses: the Enter Key Control address and the Enter Key Handshake address. When the operator presses the **Enter** key to send the value to the PLC controller, the terminal sets the Enter Key Control address to 1 (after a 400 msec. delay). You must have a line in your PLC program to turn on the bit at the Enter Key Handshake address, to inform the terminal that the Enter Key bit has been received. When the terminal sees this bit on, it turns off the Enter Key Control bit.

If the terminal does not receive acknowledgement (transition from 0 to 1) within 4 seconds, (or the Enter Key Handshake is unassigned), it displays an error message in the Fault Window and resets the Enter bit. If the Enter Key Handshake is unassigned, the Enter bit will remain set for the duration of the button hold time or for as long as the button is pressed, whichever is longer.

**IMPORTANT:** All touch screen input is disabled while the terminal is waiting for handshake acknowledgement.

### Decimal Formatting

To allow an operator to enter numbers with decimal points, choose *Format* from the Object menu. The menu item *Decimal Point* will be highlighted. Press **Enter** to open the list of choices for Decimal Point entry and choose one of the following:

- **Fixed Position** specifies a set number of digits to be displayed after the decimal point in the window. For example, if the setting was for three digits after the decimal, an operator's entry would appear as follows:

**Table 10.0**  
**Fixed Position Decimal Point**

Digits Entered	Keypad Control Address Value	Number Displayed
1	100	.1
12	120	.12
123	123	.123
1234	1234	1.234
12345	12345	12.345

- **PLC Controlled** allows the PLC controller to set the number of digits to be displayed after the decimal point.

If you choose the PLC controlled decimal point, you must assign a Decimal Point Position Address, a PLC input or output address. This three-bit binary code indicates the number of digits to the right of the decimal.

For example, a value of zero (000 binary) means that there will be no digits displayed after the decimal point (and the decimal itself will not be displayed); a value of three (011 binary) means there will be three digits to the right of the decimal point; a value of seven (111 binary) means that seven digits will be displayed to the right of the decimal point. The remaining bits in the word address can be assigned to other functions.

- **Decimal Key Controlled** allows the operator to enter the number and decimal point. The terminal interprets the decimal point position in the window and sets the Decimal Point Position Address to that value.

**Table 10.P**  
**Decimal Key Controlled Decimal Position**

Digits Entered	Keypad Value to the PLC controller	Decimal Position to the PLC controller	Number Displayed
123	123	0	123
1.23	123	2	1.23
.12345	12345	5	.12345

To send a decimal point value to the PLC controller, define a Decimal Point Position Address. In this case, only a PLC input can be used. The three-bit value stored at this address determines the number of digits to the right of the decimal point. Thus, the relationship between the number and decimal point is implied; the number sent to the PLC controller does not contain a decimal point.

When the Enter Key Control Address and the Enter Key Handshake Address are assigned for Numeric Entry Keypads, the application file created will only be compatible with Version 2 and later firmware.

**IMPORTANT:** The Numeric Entry Keypads are retentive objects. Your PanelView terminal will retain the current value of Numeric Entry Keypads even after you've turned the terminal off, or switched to Configuration mode. This is true for both the Keypad Control Address and the Decimal Point Position Address. Presets can be set for both.



### **Numeric Input Cursor Point (Keypad Terminals Only)**

The Numeric Input Cursor Point object allows the operator to select from an array of numbers. Each Numeric Cursor Point has an associated PLC input address, the Keypad Control Address, in which the value is communicated to the PLC.

To use the Numeric Input Cursor Point, the operator must press the **Select** button on the PanelView terminal, enabling the arrow and Home keys. These keys are used to move to the desired cursor point on the terminal display. The selected cursor point's character will be highlighted. To turn the Numeric Input Cursor Point feature off and disable the keys, the operator must press the **Cancel** button on the PanelView terminal. No operator screen requests can be made if the keypad is active.

When a Numeric Input Cursor Point is selected, the numeric entry window (scratchpad) prompt *"Enter New Value or Press Cancel"* appears on the top of the display. The operator then uses the numeric keypad keys to type the new value into the window, and presses the terminal's **Enter** key to send the value to the Keypad Control Address.

If you use the Raise or Lower buttons without entering anything in the window, the displayed value will change and the changed value will be sent directly to the PLC controller without the **Enter** key being pressed. The Raise and Lower buttons are disabled as soon as you enter a digit into the numeric entry window, and they remain disabled until the value in the window has been entered or cleared.

A maximum of 8 digits can be entered in the window (default is 5). When the **Enter** key is pressed, the value is validated. If the value entered is valid, the window is cleared; the new value is sent to the PLC controller, and the previously displayed value for the selected Numeric Cursor Point is updated. If the value is invalid, an error message is displayed. The value remains in the window and is not sent to the PLC controller. The operator must clear the error message from the display.

An upper and lower limit can be assigned to the Numeric Input Cursor Point. These limits will apply whether the value is entered via the **Enter** key or via the Raise and Lower buttons.

The Numeric Input Cursor Point value can be left-filled with blanks or zeroes; outside text such as units of measure can also be added.

Using PanelBuilder, place successive Numeric Cursor Points any distance above, below, or beside existing cursor points. Use the row and column indicators at the top right of the monitor to make sure the Cursor Points line up: you will not see a warning if the Cursor Points don't line up.

**IMPORTANT:** If the Numeric Input Cursor Points aren't properly lined up, they may not work as expected when the application file is downloaded to the terminal.

When you create the screen, you'll be able to see all the cursor point characters. However, when you display the screen on a PanelView terminal, only one cursor point character will be displayed blinking and intense.

**IMPORTANT:** The numeric entry window occupies the top three lines of the screen. Keep this in mind before you place any objects on these lines.

**IMPORTANT:** The Numeric Input Cursor Point is a retentive object. Your PanelView terminal will retain the current value for each of the Cursor Points even after you've powered down the terminal or switch from Run mode to Configuration mode and back. PanelBuilder allows you to set a preset value for this object.

#### Format

Choose *Format* from the Object menu after adding a Numeric Input Cursor Point to your screen; a menu with two choices opens:

- **Numeric Input** brings up a menu allowing you to choose a Decimal Point format for your numeric inputs. If you choose anything other than *Disabled*, you can specify decimal values for the Maximum Value, Minimum Value and Amount per Increment/Decrement options.

To allow an operator to enter numbers with decimal points, choose from one of the following:

- **Fixed Position**—Specifies a set number of digits to be displayed after the decimal point in the window. For example, if the setting was for three digits after the decimal, an operator's entry would appear as follows:

**Table 10.Q**  
**Fixed Position Decimal Point**

Digits Entered	Numeric Input Address Value	Number Displayed
1	100	.1
12	120	.12
123	123	.123
1234	1234	1.234
12345	12345	12.345

- **PLC Controlled**—Allows the PLC controller to set the number of digits to be displayed after the decimal point.

For example, a value of zero (000 binary) means that there will be no digits displayed after the decimal point (and the decimal itself will not be displayed); a value of three (011 binary) means there will be three digits to the right of the decimal point; a value of seven (111 binary) means that seven digits will be displayed to the right of the decimal point. The remaining bits in the word address can be assigned to other functions.

If you choose the PLC controlled decimal point, you will have to choose *Address* in the Object menu to assign a PLC input or output address as a Decimal Point Position Address. This three-bit binary code indicates the number of digits to the right of the decimal. For further details, see the section on Address that follows this section, Format.

- **Decimal Key Controlled**—Allows the operator to enter the number and decimal point. The terminal interprets the decimal point position in the window and sets the Decimal Point Position Address to that value.

To send a decimal point value to the PLC controller, define a Decimal Point Position Address. In this case, only a PLC input can be used. The three-bit value stored at this address determines the number of digits to the right of the decimal point. The relationship between the number and decimal point is implied; the number sent to the PLC controller does not contain a decimal point.

**Table 10.R**  
**Decimal Key Controlled Decimal Position**

Digits Entered	Keypad Value to the PLC	Decimal Position to the PLC controller	Number Displayed
123	123	0	123
1.23	123	2	1.23
.12345	12345	5	.12345

- **Display** brings up a menu with the following choices:
  - **Number of Digits**—Choose a number from 1 to 8. The default is 5.
  - **Fill Left With**—Choose *Spaces* ( ) or *Zeroes* (0) from the list.

- **Decimal Point**—If Decimal Point is *Enabled*, the decimal point can be in Fixed Position or PLC Controlled. There is no Decimal Key Controlled option, because the displayed value always comes from the PLC controller, never directly from the keypad. Other than that, this option is the same as the Numeric Input option of the same name (see above).

Use a PLC *input* address if you want to control the decimal position from the terminal using other input objects. If you want the PLC controller to dynamically change the decimal position, assign a PLC *output* address for the decimal point. No PLC address is needed if the decimal position is fixed.

With a decimal point but no polarity bit, this object can display 2 to 7 digits. The default is 5. (If you want more than the default, you must configure more in the Move & Size menu.) The maximum PLC value depends upon the data type and number of bits assigned to the Displayed Value Address.

If you are displaying a number with a decimal point, the decimal point occupies the space of one digit. For example, if you want to display a fractional number and you specify eight digits, the Numeric Data Display will show seven numeric digits, plus the decimal point.

### Address

Each Numeric Input Cursor Point has:

- a Keypad Numeric Input Address: an associated PLC input address in which the value is communicated to the PLC controller
- a Displayed Value address: an associated PLC address whose value is displayed
- an optional Decimal Point Position Address: a PLC input or output address, indicating the number of digits to the right of the decimal
- an optional Enter Key Control Address
- an optional Enter Key Handshake address

If no addresses are assigned to the optional parameters, the Numeric Input Cursor Point will have no decimal point or Enter key control/handshake.

When you choose *Address* from the Object menu after adding a Numeric Input Cursor Point to your display, the Address window opens. There are two choices in the window, *Numeric Input* and *Display*.

- **Numeric Input** configures the way numbers are entered into the Numeric Input Cursor Point from the keypad, and sent to the PLC controller. The Numeric Input address menu has the following items:
  - **Auto-Repeat Rate (per Sec.)**—Enter a time number between 0 and 20. If you use the Raise and Lower buttons for editing values in Numeric Input Cursor Points, this number specifies how many times per second the values will change when the Raise or Lower button is held down. The default is 0 times per second.
  - **Auto-Repeat Start Delay**—Choose a time value from the list (200 milliseconds to 2.5 seconds). If the Raise or Lower button is held down, this is the length of time before the value in the Numeric Input Cursor Point will start to change. The default is 400 msec.
  - **Amount per Increment/Decrement**—This value is the amount the value in the Numeric Input Cursor point will change each time the Raise or Lower button is pressed. The default is 1.

Range with Decimal Point Enabled	Range with Decimal Point Disabled
0.0000001 to 10,000	1 to 10,000

If the Raise or Lower button is pressed for more than the time specified by the button's Auto-Repeat Start Delay, the value automatically increases by the amount specified by the Amount per Increment/Decrement at the rate specified by the Auto-Repeat Rate. Auto-repeat is disabled if the rate is set to 0.

- **Maximum Value**—99,999,999 is the largest value that can be entered in the Numeric Input Cursor Point. The default is 99,999,999.

Range with Decimal Point Enabled	Range with Decimal Point Disabled
0.0000001 to 99,999,999	1 to 99,999,999

- **Minimum Value**—99,999,998 is the highest value that can be entered in the Numeric Input Cursor Point. The default is 0.

Range with Decimal Point Enabled	Range with Decimal Point Disabled
0.0000000 to 99,999,998	0 to 99,999,998

**IMPORTANT:** If you change any of the above Numeric Input Cursor Point default settings, the application will only be compatible with Version 2 or later PanelView firmware. If you configure a decimal point for your Minimum and Maximum values, the application will only be compatible with Version 4 and later firmware.

- **Keypad Numeric Input Address**—opens an address definition window.

*Data Type* can be binary, BCD or signed integer data. The ranges are:

- Binary: 0 – 65,535
- BCD 0 – 99,999,999
- Signed Integer –32,768 – +32,767

**IMPORTANT:** Negative integers are only supported for version 1 compatibility level Numeric Input Cursor Points.

- **Decimal Point Position Address**—opens an address definition window.

This option is linked with the *Format* option in the Object menu. If you chose *PLC Controlled* as the decimal point format for your Numeric Input under Format, you must assign a Decimal Point Position Address, a PLC input or output address. This three-bit binary code indicates the number of digits to the right of the decimal.

- **Enter Key Control Address**

This address is linked to the Enter Key Handshake Address. They are both described under Enter Key Handshake Address, below.

- **Enter Key Handshake Address**

You can configure the **Enter** key with a handshake so the PLC controller can acknowledge a value received from the terminal. To do this, you must define two PLC addresses: the Enter Key Control address and the Enter Key Handshake address.

When the operator presses the **Enter** key to send the value to the PLC controller, the terminal sets the Enter Key Control address to 1 (after a 400 msec. delay).

Program your PLC to turn on the bit at the Enter Key Handshake address, to inform the terminal that the handshake has been received. When the terminal sees this bit on (receives acknowledgement), it turns off the Enter Key Control bit.

If the PanelView terminal does not receive acknowledgement (transition from 0 to 1) within 4 seconds, it displays a Minor Fault message in the Fault Window and resets the Enter bit. If the Enter Key Handshake is unassigned, the Enter bit will remain set for as long as the button is pressed or for the duration of the button hold time, whichever is longer.

**IMPORTANT:** When the Raise or Lower button is pressed, PanelView sets the Enter Key Control bit (after a 400 ms delay) and ignores the Enter Key Handshake bit. After the button is released, PanelView delays 400 ms and then monitors the Enter Key Handshake bit for a false to true transition. If the Enter Key Handshake bit is already set to 1 when the Raise or Lower Button is released, the minor fault will occur if the bit does not make another transition within 4 seconds.

**IMPORTANT:** All function keys are disabled while the terminal is waiting for handshake acknowledgement.

- **Display** opens a menu with two items:

- **Displayed Value Address**—opens an address definition window.

If you have not defined the Enter Key Control and Enter Key Handshake addresses, you can enter the same input address assigned to the Keypad Numeric Input. Whatever value appears in that address will be displayed.

If you are using the Enter Key Control And Enter Key Handshake addresses, you must assign an output address to have the value transferred to the terminal and displayed in the Numeric Input Cursor Point. Program your PLC to read the value at the Keypad Numeric Input Address and copy it to the Displayed Value Address.

- **Decimal Point Position Address**—this option is linked to the *Format* option in the Object menu. If you chose *PLC Controlled* as the decimal point format for your Numeric Input under Format, you must assign a Decimal Point Position Address, a PLC input or output address. This three-bit binary code indicates the number of digits to the right of the decimal.

Program your PLC to transfer the value from the Decimal Point Position Address assigned to the Numeric Input into the address assigned here.

### To Define the Numeric Input Cursor Point Character

1. Choose *Numeric Input Cursor Point* from Numerics in the Add menu to place the object on the screen. By default, the Numeric Cursor Point object uses a small arrow as the cursor character. This character can be changed. If you want to use one of the characters on the keyboard for the cursor point character, choose *Cursor* from the Object menu.
2. Type the character of your choice and press **Enter**.

If the character is not available on the keyboard, then:

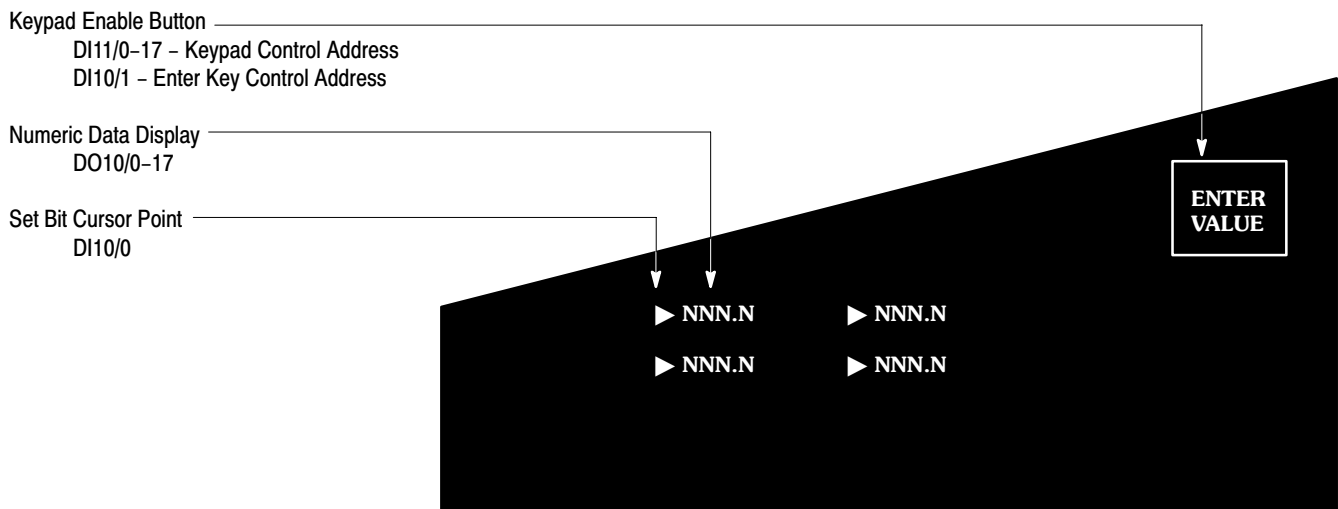
1. Choose *Cursor Character*
2. Press and hold down a Ctrl key combination or Alt and the character's ASCII code, then press **Enter**. See Appendix E, *The Extended Character Set* for more information.

### Editing an Array of Numeric Values

The following examples show different ways of displaying several numeric values on a screen and allowing an operator to change any of them.

#### Example 1 (for Keypad terminals)

**Figure 10.6**  
**Example 1**



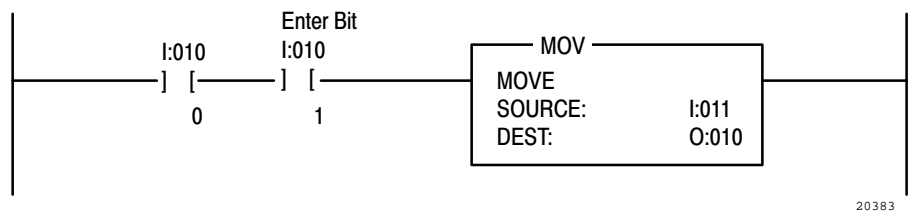
20385



In this example, numeric values are entered using a numeric Keypad Enable Button. Numeric Data Displays are used to display values in the PLC controller (they are assigned output addresses). Set Bit Cursor Point objects are placed next to each Numeric Data Display to provide a means of selecting which value to change.

The following PLC-5/15 rung shows how the data can be read into the PLC controller and transferred to the corresponding Numeric Data Display.

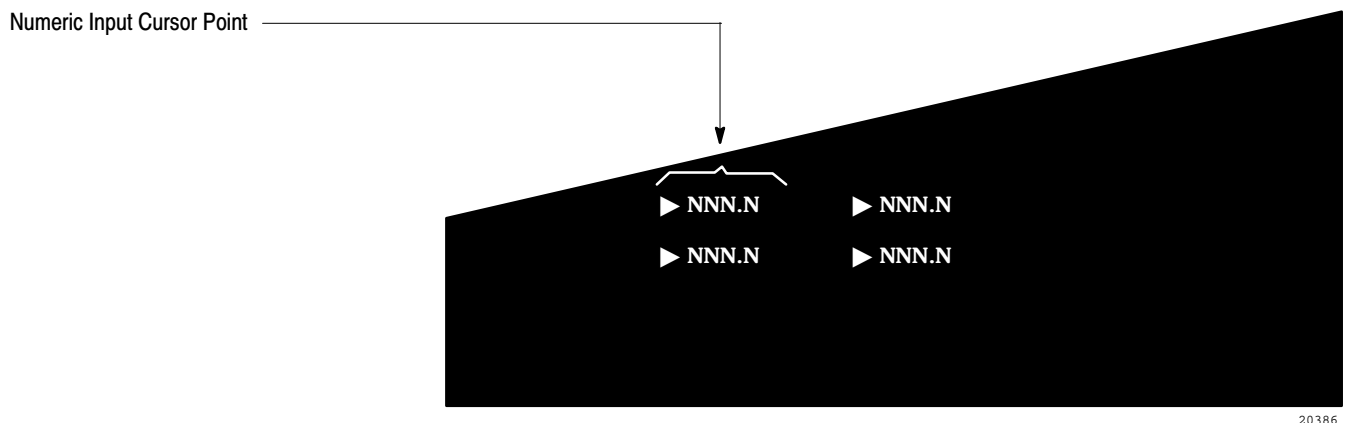
**Figure 10.7**  
**Ladder Logic Rung for Example 1**



To select the value to change, press the SELECT button on the PanelView terminal to enable the Set Bit Cursor Point object. Use the arrow keys to select the value. Then press the Numeric Keypad Enable button and enter the new value.

### Example 2 (for Keypad terminals)

**Figure 10.8**  
**Example 2**

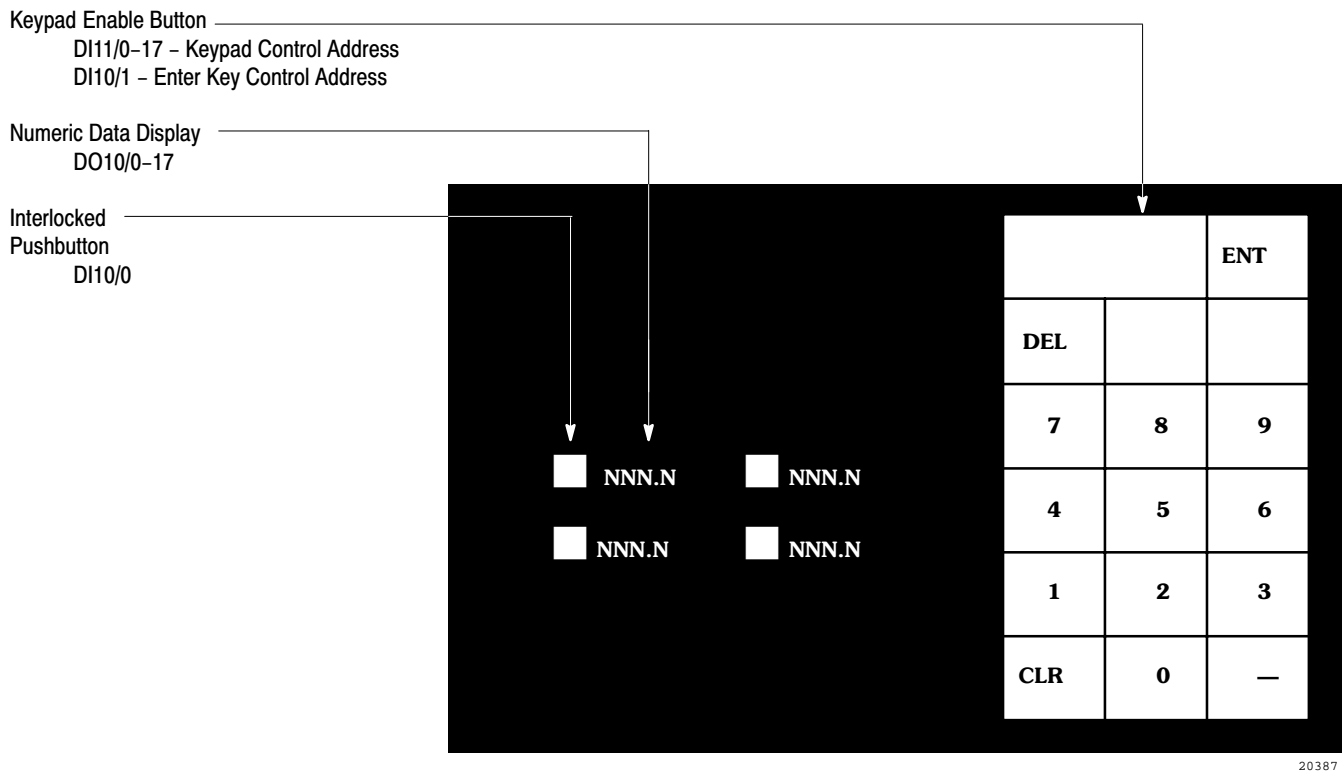


In this example, Numeric Cursor Point objects are used to change an array of values.

To select which value to change, press the SELECT button on the PanelView terminal to enable the Numeric Input Cursor Points and to open the scratchpad at the top of the screen. Use the arrow keys to select the value to change, then use the Numeric Keypad to enter the data into the window. Use the **Enter** key to send the data to the PLC controller.

Example 3 (for Touch Screen terminals)

Figure 10.9  
Example 3

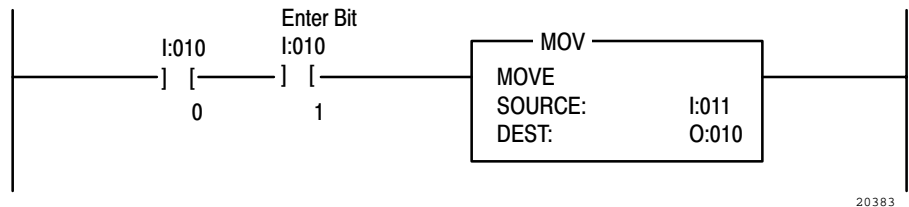


20387

In this example, all numeric values are entered using one numeric keypad. Numeric Data displays are used to display the values in the PLC controller (assigned output addresses). Interlocked Push Buttons are placed next to each Numeric Data Display to provide a means of selecting which value is to change.

The following PLC-5/15 rung shows how the data can be read into the PLC controller and transferred to the corresponding Numeric Data Display.

**Figure 10.10**  
**Ladder Logic for Example 3**



To select which value to change, press the Interlocked Push Button beside the value, and use the Numeric Keypad to enter the new value.

## Text/Draw

Text/Draw text and graphics objects are used for illustrating or labeling screens. They are not associated with PLC or terminal functions, so there are no data types or I/O addresses associated with them.

There are four Text/Draw objects.

### Text

Text/Draw text is used for labels or titles which are independent of other objects on the screen.

Do not confuse background text with object text. Object text, such as a button's label or the text in a list selector, is part of the object—if you move the object, the text moves with it. Object text is added when you are editing the object, whereas background text is an object on its own.

### Line

#### Vertical and Horizontal Lines

Lines can be used for emphasis, to divide the screen, connect symbols, or to represent physical devices like pipes or conveyors. You can draw straight lines, polylines, boxes or polygons.

To draw a line:

1. Choose *Text/Draw* from the list of objects, and then *Line*.
2. Choose *Move & Edit*.

When you choose *Edit*, the menu across the top of the monitor changes. With this menu, you can:

- **Draw** the line. Use the arrow keys on the computer keyboard to draw the lines. If you intersect part of the line, the appropriate connector or corner is drawn. If a straight line is drawn over a diagonal line, the straight line character will replace the diagonal line character. To choose Draw, press **D**. Draw will be highlighted in the menu.
- **Erase** part of an existing line. Use the arrow keys to move the cursor along the line. The line will only be erased when the cursor follows along the line; not when the cursor simply crosses it. To choose Erase, press **E**. Erase will be highlighted in the menu.
- **Relocate** the cursor on the screen without drawing a line. To choose Relocate, press **R**. Relocate will be highlighted in the menu.

In Draw mode, you can add special characters to your line:

- **Arrows** places an arrow head on the line. To add an arrow head to vertical and horizontal lines, press **A**. Choose the arrow head from the Arrows menu.
- **Connector Characters** connect a line to one of the 32 ISA Symbols. Lines are drawn through the center of the character cell while the connectors for the ISA Symbols may be at one edge of the character cell. The connectors allow the line to meet up perfectly with the ISA Symbol. To add a connector to a Line, press **C**. The Connector Characters menu will open.

### **Diagonal Lines**

Diagonal lines are selected with the same menu options as other lines, but they are drawn with the **Home**, **Pg Up**, **Pg Dn**, and **End** keys (rather than the arrow keys).

Don't try to draw diagonal lines with a mouse. You will only create a staircase line of vertical and horizontal line segments.

Diagonal lines may intersect with other diagonal lines or with vertical or horizontal lines. On the PanelView terminal, the diagonal lines are drawn with the PanelView character set. The lines are drawn from one corner of the character to the other (so they are not exactly 45 degrees). Where lines overlap, special connector characters automatically replace the diagonal lines.

The PanelBuilder character set cannot show overlapping diagonal lines, so the crossing points are represented by characters from the IBM character set, as shown in the following table.

**Table 10.S**  
**Diagonal Lines and Line Crossings on the PanelBuilder Screen**

Character		Example
\ /	diagonal lines	\ / / \
v	2-line intersection (up)	\ / v
^	2-line intersection (down)	^ / \
>	2-line intersection (left)	\ > /
<	2-line intersection (right)	/ < \
b	3-line intersection (left & down)	\ b / \
d	3-line intersection (right & down)	/ d / \
p	3-line intersection (left & up)	\ / p /
q	3-line intersection (right & up)	\ / q \
x	4-line intersection	\ / x / \

Diagonal lines are only compatible with Version 2 or later firmware. However, if you delete or erase all diagonal characters and no other Version 2 features are enabled, the application file will be compatible with Version 1 PanelView firmware. For more information on version control see Chapter 2, *Installing PanelBuilder*.

## **Box**

Boxes can be used to emphasize text or any other object. You can set the size and position of boxes using the arrow keys on the computer keyboard.

To create a box:

1. Choose *Text/Draw* from the list of object types, then choose *Box* from the Text/Draw menu.
2. Choose *Move & Size* to:
  - a. define the Size of the box
  - b. move the box into position
3. Choose *Look* to:
  - a. determine whether the box will Blink
  - b. define the Foreground Color and Background Color for the box
  - c. have the (monochrome) box appear in Reverse Video
  - d. have the (monochrome) box appear in High Intensity
  - e. change the Border used to define the box

## **Arc**

Arcs are quarter circles, which can be used to draw full circles, quarter, half, or three-quarter circles. Arcs can also be used to create rounded corners on line drawings.

Each arc segment must be separately enabled. With all four segments enabled, the object will be a circle; with the top-left and bottom-left segments enabled, the object will be the left half of a circle. The segments are enabled in the Arc's Look menu.

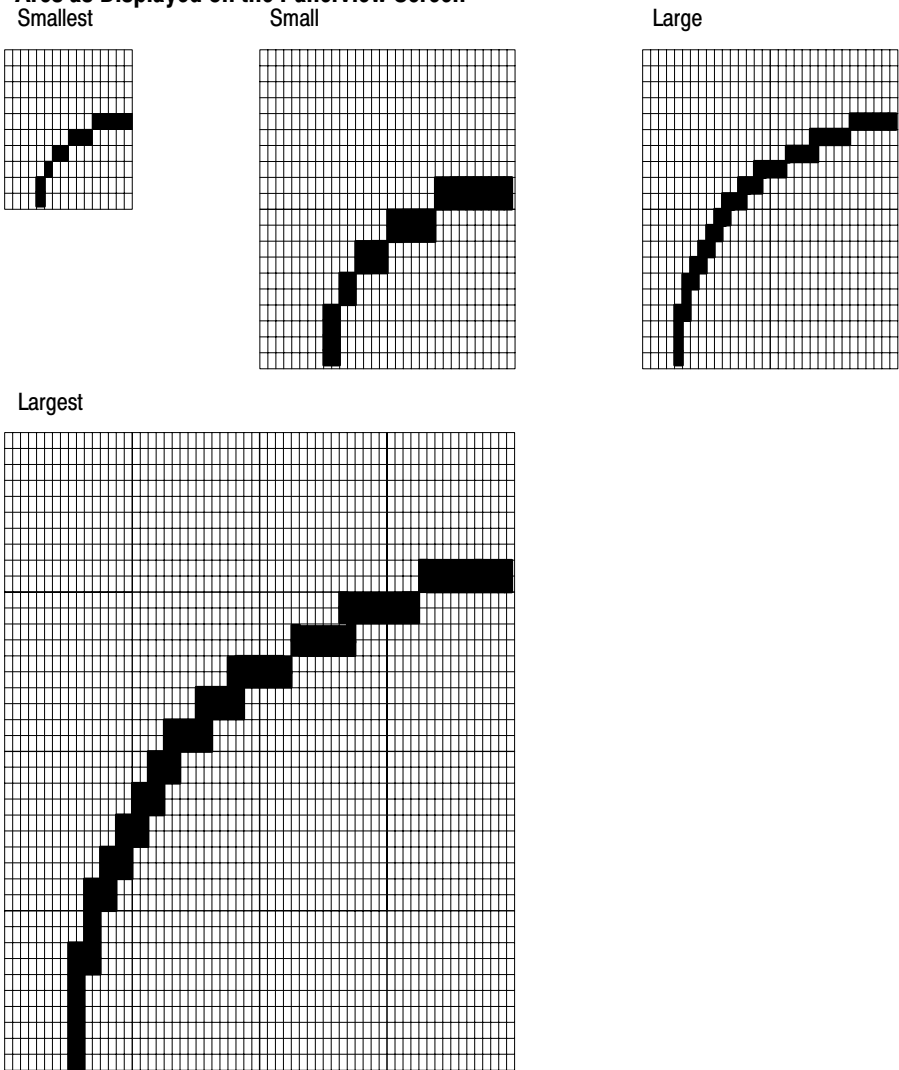
There are four sizes of arc. Since the PanelBuilder screen does not show graphics, a character representation is displayed so you can design your screens. On the PanelView terminal you see true arcs and circles.

Table 10.T  
Arc Size and Screen Representation

Arc Size	PanelBuilder Screen Representation	Character Size of Arc	Character Size of Full Circle
smallest	( -	2 wide 1 high	4 wide 2 high
small	. . — . / . .	4 wide 2 high	8 wide 4 high
large	— ( .	4 wide 2 high	8 wide 4 high
largest	. . — . / . . / . . / . .	8 wide 4 high	16 wide 8 high

The small and large arcs take the same number of character cells; the arcs that they create are different sizes, but fit within the same cell boundaries.

Figure 10.11  
Arcs as Displayed on the PanelView Screen



To draw an arc:

1. Choose *Text/Draw* from the list of objects and then *Arc*. The menu across the top of the screen changes to the Object menu; at the bottom the object is identified as an Arc.
2. Choose *Move and Size* to move the object or to set its size to Smallest, Small, Large or Largest.
3. Choose *Look* to enable or disable any of the quadrants. When the arc is first created, all quadrants are enabled. The Look menu also contains the color, blink, reverse video and high intensity settings.
4. Choose *Utility* to name the arc or to set it as a default.

## Symbols

You can include any of the ISA Industrial Symbols in your screen by opening the Add menu and choosing *Symbol*. Then, choose *Symbol Type* from the Look menu and select the symbol of your choice. The symbol can be single or double size.

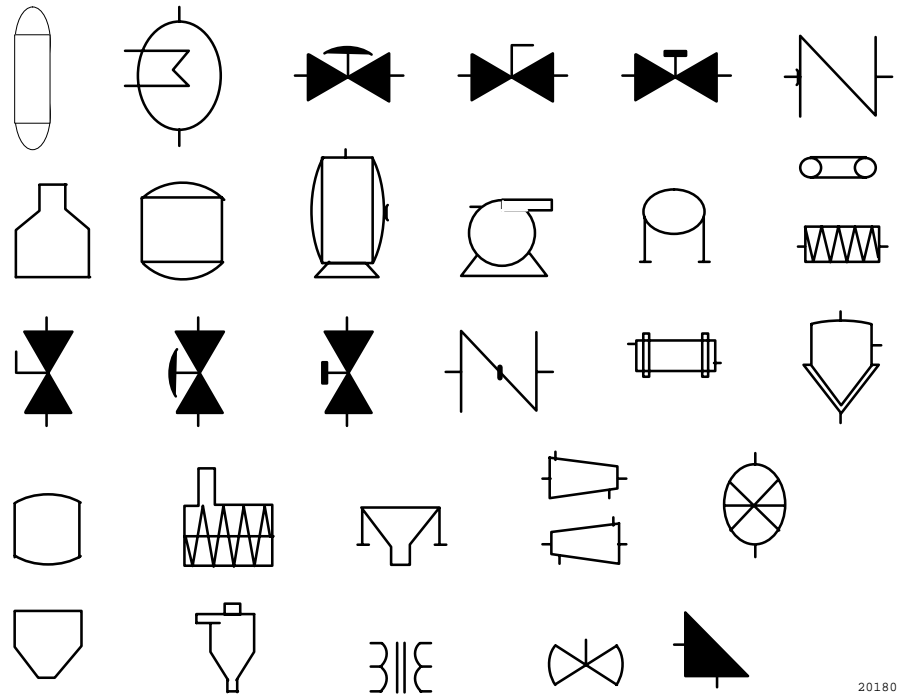
If a symbol's connection points are not at the center of a character cell, or if the symbol is double size, you will need to use the connectors. Connector characters connect a line to one of the 32 symbols. Lines are drawn through the center of the character cell while the connectors for the symbols may be at one edge of the character cell. To have the line meet up perfectly with the symbol you'll need one of the connectors. (See the section on Lines earlier in this chapter for information on how to choose connector points.)

**IMPORTANT:** The symbol you choose will appear on the PanelBuilder screen as a box. The actual symbol will be displayed on the PanelView terminal screen.

The following illustration shows the ISA symbols. The precise screen appearance of the ISA symbols can be found in Appendix D, *ISA Symbols*.



**Figure 10.12**  
**ISA Symbols**



20180

Each symbol can have up to four different states. Unique attributes can be assigned to each state. You assign a PLC address (1 – 3 bits) to control these states. The value of these bits determines which state attributes are in effect (color, blink, intensity, etc.).

If the value is less than zero, then state 0 will be displayed. If the value is greater than state 3, then state 3 will be displayed.

**IMPORTANT:** All bits off displays state 0.

## Bar Graphs

Bar graphs can be used to monitor changing conditions, such as temperature or fluid levels. You can create vertical and horizontal bar graphs up to 80 characters wide and 24 characters high.

Vertical bars move from top to bottom. Horizontal bars move from left to right.

On the PanelView terminal, bar graphs will operate at *pixel resolution*. Each character cell is 8 w x 10 h pixels.

You can use Outer Text to make incremental marks alongside the bar graph. The underscore character often does this best for vertical graphs.

Like many objects, bar graphs can be grouped together with other objects to create a fully functional “template”. For example, you can position two or three bar graphs together and put numeric display objects immediately below the bar graphs to display the process variable, set point, and control variable. You can use any of the numeric entry functions interactively with these values. You can also draw a box around the entire group of objects.

After sizing the bar in PanelBuilder, you assign a PLC input or output address and a “data range”: a low and high value is assigned. If the value is less than the lower limit, the bar will have no size. If the value is greater than the upper limit, the bar will be full size.

The data range that can be displayed is 0 to 99,999,999 but the actual value will depend on the data type and the address size. Available data types for bar graphs are BCD, bit and integer. Negative numbers will be displayed as 0 bar size.

For example, with a data range of 0 to 4095, a data value of 2047 would be at 50% of the scale. Another example: with a data range of 100 to 200, a data value of 125 would be at 25% of the scale.

The resolution of the bar movement will be 10 pixels per character vertically and 8 pixels horizontally.

To have a bar graph change color at certain values, cascade bar graphs together: place the high end of one graph at the low end of the next, and adjust each graph’s data range accordingly.

## **Time and Date**

There are two objects that allow the display of time and date information: the time display and the date display. There can be only one time display and one date display per screen.

### **Time Display**

The Time Display displays the current time at a specified location on a screen. The time is displayed in the format hh:mm:ss (hours, minutes, seconds). You can enclose the time display in a box for added emphasis.

Use the PanelView terminal’s Configuration Menu or the *PLC Controlled Time & Date* option (under Options in the File menu) to set the correct time on your PanelView terminal. The Configuration Menu can also be used to set the time to appear in 12-hour (AM/PM) or 24-hour format.

## **Date Display**

The Date Display displays the current date at a specified location on a screen. The date is displayed in the format mm/dd/yy (month, day, year).

You can enclose the date display in a border for added emphasis.

Use the PanelView terminal's Configuration Menu or the *PLC Controlled Time & Date* option (under Options in the File menu) to set the correct date on your PanelView terminal.

## **Local Message Display**

The Local Message Display consists of two components: the Local Message Display object that you can place on any screen, and the Local Message List.

For Version 5 PanelBuilder, this Local Message List can contain up to 875 messages. Versions 4 and earlier allow up to 496 messages. You can edit the messages in the list any time you are adding or editing a Local Message Display object. In other words, the Local Message List is accessible to all the Local Message Display objects through the entire application file.

Once you create the Local Message Display object, the PLC value associated with this object determines which of the messages is displayed. For example, if the PLC value is 39, then message number 39 will be displayed in the Local Message Display.

Local Messages are similar to Information Messages in that the PLC controller controls which message is displayed. An Information Message, however, is displayed in its own window on top of any screen. A Local Message is part of a screen containing a Local Message Display.

Displays can be single or multiple lines: if you configure a single line display, when a message is triggered the text will be automatically centered. A multiple line display will automatically start at the top left corner, with automatic word wrapping.

A message can have a maximum of 72 characters (or less, depending on the display area)—any additional characters won't be displayed.

## **Importing and Exporting Messages**

You can import and export ASCII text files as text for local messages.

### Importing Local Message Text

Using the text editor of your choice, create an ASCII text file of local messages in this format:

```
nnn"ttt...ttt"CR
!this is a comment
```

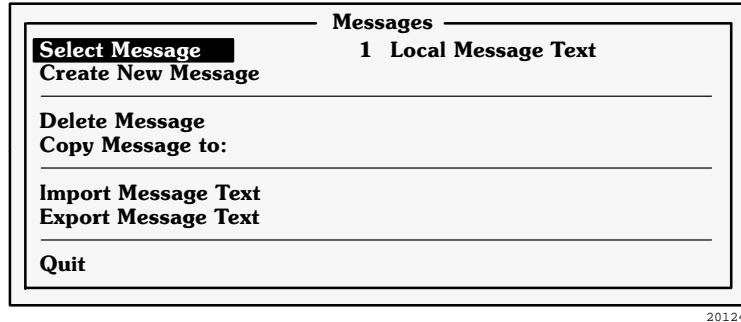
<i>nnn</i>	=	local message number (1–875)
<i>" "</i>	=	start and end of message
<i>ttt</i>	=	message text (1–72 characters)
CR	=	Carriage Return (local message record delimiter)
!	=	comment character

Follow these guidelines in preparing your local message text file:

- the message number must be between 1 and 875. The numbered messages do not have to be created in ascending order, but the numbers must be unique, i.e., no two messages can have the same number
- the local message text must begin and end with quotation marks (")
- to include a quotation mark (") in your message, preface it with a second quotation mark ("" )
- PanelBuilder ignores any white space found outside the quotation marks
- do not use any character whose ASCII code is outside the range 32–127. See Table 10.W for details of the ASCII character set
- use the comment character (!) as the first character in the line of a comment. PanelBuilder will ignore lines that begin with the !
- make sure your message text is 72 characters or less. PanelBuilder does not truncate local messages that are too long
- when you name your file, use the extension .LMG

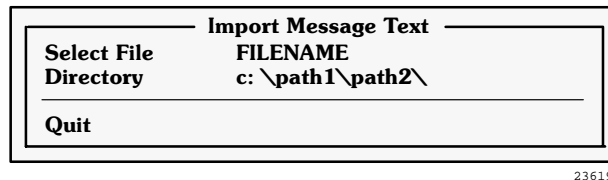
Once you have placed a Local Message Display object on your screen, choose *Text* from the Object menu, then choose *Messages*.

**Figure 10.13**  
The Messages Window



Choose *Import Message Text*. A window opens.

**Figure 10.14**  
The Import Message Text Window



The filename in the *Select File* field will be one of the following defaults, in decreasing order of priority:

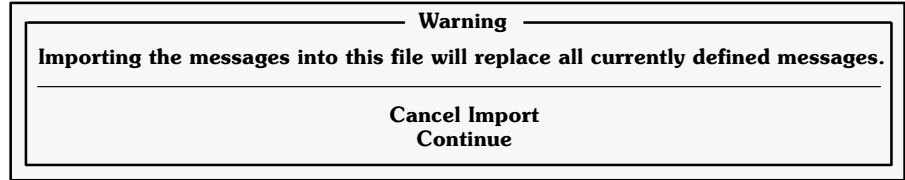
- an .LMG file with the same name as the currently edited file
- the first .LMG file in the selection list
- a blank, if no .LMG files exist in the current directory

Choose *Select File* to import a different file. A list of all .LMG files in the current default directory appears. Choose the one you want.

The *Directory* field defaults to PanelBuilder's current working directory. If the file is not in the current directory, choose *Directory* to specify the directory containing the file. The name of the specified directory will be retained between PanelBuilder sessions.

Once the file is selected, PanelBuilder checks the current application file to determine whether any local messages have already been defined. If any messages are found, PanelBuilder displays this message:

**Figure 10.15**  
**Message Import Warning**



Choose *Cancel Import* or *Continue*. If you choose to continue, PanelBuilder checks each record in the message file to make sure its format is valid. If any errors are found, an error message will be displayed, the import will be cancelled and the messages in the current file will remain intact.

If no errors are found, all the local messages in the application file will be deleted and replaced by the imported ones.

### **Exporting Local Message Text**

Choose *Export Message Text* from the Messages menu. The Export Message Text window will open.

When the window opens, the Select File field will show the name of the application file currently being edited. You can use the default or change the name to any valid DOS file name. PanelBuilder appends the .LMG extension when it saves the file.

### **Address Assignment and PLC Message Triggering**

Which data type you select determines how the PLC controller triggers messages.

#### **Triggering Messages for the Binary or BCD Data Type**

To trigger a message, the PLC controller must put a non-zero value which corresponds to the desired message number into the designated PLC address. For example a trigger value of 19 would cause message 19 from the Local Message Display List to appear in the display. If the trigger value changed to 27 message 27 would appear, replacing message 19. The window is cleared when the trigger value is 0.

- **Binary**

If the binary data type is selected, the address assignment will be a contiguous bit string containing from 1 to 16 bits. The bit string can be positioned anywhere within the same PLC word by designating the desired “start bit” (the default is zero, the typical choice). The number of bits will depend on how many messages you wish to trigger from the Local Message Display List.

- **BCD**

If the BCD data type is selected, the address assignment will be a contiguous string or either 4, 8, or 12 bits (1, 2, or 3 digits). The number of bits will depend on how many messages you wish to trigger from the Local Message Display List.

### **Triggering Local Messages for Bit Position Data Type**

To trigger a message, the PLC program must set a PLC output bit that corresponds to the desired message number in the Local Message Display List. If the PanelView terminal sees any bit set, the corresponding message will appear in the display area.

- **Bit Position**

If Bit Position data type is selected, the address assignment will be a contiguous bit string containing from 1 to 496 bits. Each bit in the string has a corresponding message number in the Local Message Display List. For example, the first bit corresponds to message number one, etc. When more than one PLC word is required, the next higher word number(s) are used. The number of messages you wish to trigger determines the number of bits you configure this string for.

The PanelView terminal prioritizes the message bits: if the terminal sees more than one bit set at the same time, the message associated with the bit with the lowest address is displayed.

### **Triggering Messages on Multiple Local Message Displays**

PanelView has one local message list but you can have several local message displays for different purposes. It is possible to trigger different messages for different displays by creating a subset of the local message list for each display.

To trigger different messages on multiple Local Message Displays, the first step is to create the display objects using non-overlapping PLC addresses. Then enter the list of all messages in the Local Message list.

The PLC controller can write different values into each address, causing different subsets of the messages to be displayed.

## Screen Print Button

The Screen Print Button prints the screen displayed on the PanelView terminal. When this button is pressed, the screen is copied to the PanelView terminal's print buffer and sent to the printer.

Screen print requests are ignored when the printer is already busy with a screen print. The Screen Print Active item in the Options menu allows the PanelView terminal to inform the PLC controller that a screen print is in progress. See Chapter 9, *PLC Controlled Options*, for more information.

Screen prints may also be triggered by the PLC controller. See Chapter 9, *PLC Controlled Options* for details.

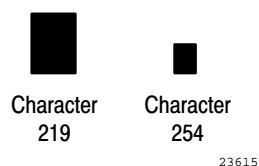
If the PLC controller is controlling the screen print and the screen change, you can have the PLC controller print any screen as soon as it is displayed. This is done by requesting the new screen as well as a screen print in the same PLC scan.

Some graphic characters will not be printed. Instead:

- ISA symbols, bar graphs, outer borders, arcs, diagonals and line connectors will be replaced by ASCII character 219 decimal illustrated in Figure 10.16
- the first 32 characters, used for printer control, will be replaced by ASCII character 254 decimal illustrated in Figure 10.16
- double width/height characters will be replaced by a single normal sized character and the appropriate number of blanks

For example, the letter A, displayed with double height and width, occupies an area 2 characters high and 2 characters wide. Once printed, the A will occupy the top left position leaving the other three characters blank.

**Figure 10.16**  
**ASCII Characters 219 and 254 from the Alternate Character Set**





An application file containing a Screen Print Button is not compatible with Version 1 firmware.

## **ASCII Display**

The ASCII Display object is used to display a character string sent from a PLC controller directly on the PanelView terminal. The display is updated whenever the string changes.

Like any other PanelView object, it is placed on the screen and then customized, given a size, character size, and color (on a color terminal) or intensity (on a monochrome terminal).

Any character in the IBM extended character set can be displayed. See Appendix E, *The Extended Character Set*.

Special control characters can be included, to affect the characters which are displayed. The characters displayed are controlled exactly as specified by the data in the string.

Characters are processed sequentially until a null character (all bits 0) is received. Null is the string termination character; any characters after a null are ignored.

The maximum string length is one block transfer write or 64 characters.

If only 10 displayable characters (not control characters) are in the string, only 10 positions on the screen will be filled. Any previously existing text anywhere within the display area will be unaffected.

Words wrap within the area defined for the ASCII Display object, but lines do not wrap. If the character string is too long to be displayed the extra characters are ignored.

For example, the display is defined as 10 characters wide by 3 characters high. The characters are single height and single width. The string to be displayed is "A long string for the ASCII display"

The object will show:

A long string for the ASCII
-----------------------------------

Note that the last word of the string is lost, because the object as defined isn't large enough for the whole string.

A second string is sent while the first one is displayed. The string is: “This shows how characters overwrite”.

```
This shows
how ng for
characters
```

Note that any character which was not directly covered by a new character remained in the display. This feature can be useful for updating portions of an ASCII display while leaving portions unchanged. If you want to clear the display, or clear a line in the display, control characters for those purposes can be embedded in the string.

To properly display the second string shown above, a “clear to end of display” control sequence, ESC[J, could have been included at the beginning of the string.

The string would then be: “ESC[J This shows how characters overwrite”, which would display:

```
This shows
how
characters
```

See the table of control sequences, Table 10.V, and the description of Invalid Control Sequences which follows it.

### **Move and Size**

An ASCII display object can be any size from one line high by one character wide, to 24 lines by 80 characters. Moving and sizing the object is identical to the “Local Message Display”.

### **ASCII Display String Format**

The format of the data string must be as in Table 10.U. Table 10.W lists the ASCII character set. For more characters, see Appendix E, *The Extended Character Set*.

**Table 10.U**  
**ASCII String Format**

Bit	158	70
1st word	1st character	2nd character
2nd word	3rd character	4th character
	...	...

## Special Characters and Control Sequences

Character 255 is used as the fill character by the ASCII Display object. The fill character is used by the PLC controller to align display strings of odd length. Fill characters are not printable and will not occupy space on the display.

Table 10.V lists the control sequences used by the PanelBuilder software.

Table 10.W lists the ASCII character set. For more characters, see Appendix E, *The Extended Character Set*.

**Table 10.V**  
**Control Sequences**

Name	Sequence	Hex	Action
Carriage Return	CR	0D	Move to the beginning of the current line
Line Feed	LF	0A	Move to the next line below the current one. If the current position is the last line, no more data from the string is displayed.
Clear to End of Display	ESC[0J or ESC[J	1B5B4A	Clear from the current display position to the end of the display.
Clear to End of Line	ESC[0K or ESC[K	1B5B4B	Clear from the current display position to the end of the line.
Position Text	ESC[row;columnH ESC[;columnH ESC[rowH ESC[H	1B5Bxx3Byy48 1B5B3Byy48 1B5Bxx48 1B5B48	Move the display position to the specified row and column number. The top left corner of the display area is row and column number 0;0. If either row or column number is omitted, the missing coordinate will be 0.
Reverse Video Text On	ESC[7m	1B5B376D	Begin displaying text in reverse video. On a color terminal this flips the foreground and background colors. On a monochrome terminal, this switches the current reverse-video setting.
Reverse Video Text Off	ESC[27m	1B5B32376D	End the reverse-video text block.

**Table 10.W**  
**The ASCII Character Set**

Dec	Oct	Hex	Char	Control Code	Dec	Oct	Hex	Char	Dec	Oct	Hex	Char	Dec	Oct	Hex	Char
0	000	00	NUL	CTRL@	32	040	20	SP	64	100	40	@	96	140	60	\
1	001	01	SOH	CTRL A	33	041	21	!	65	101	41	A	97	141	61	a
2	002	02	STX	CTRL B	34	042	22	"	66	102	42	B	98	142	62	b
3	003	03	ETX	CTRL C	35	043	23	#	67	103	43	C	99	143	63	c
4	004	04	EOT	CTRL D	36	044	24	\$	68	104	44	D	100	144	64	d
5	005	05	enq	CTRL E	37	045	25	%	69	105	45	E	101	145	65	e
6	006	06	ACK	CTRL F	38	046	26	&	70	106	46	F	102	146	66	f
7	007	07	BEL	CTRL G	39	047	27	'	71	107	47	G	103	147	67	g
8	010	08	BS	CTRL H	40	050	28	(	72	110	48	H	104	150	68	h
9	011	09	HT	CTRL I	41	051	29	)	73	111	49	I	105	151	69	i
10	012	0A	LF	CTRL J	42	052	2A	*	74	112	4A	J	106	152	6A	j
11	013	0B	VT	CTRL K	43	053	2B	+	75	113	4B	K	107	153	6B	k
12	014	0C	FF	CTRL L	44	054	2C	,	76	114	4C	L	108	154	6C	l
13	015	0D	CR	CTRL M	45	055	2D	-	77	115	4D	M	109	155	6D	m
14	016	0E	SO	CTRL N	46	056	2E	.	78	116	4E	N	110	156	6E	n
15	017	0F	SI	CTRL O	47	057	2F	/	79	117	4F	O	111	157	6F	o
16	020	10	DLE	CTRL P	48	060	30	0	80	120	50	P	112	160	70	p
17	021	11	DC1	CTRL Q	49	061	31	1	81	121	51	Q	113	161	71	q
18	022	12	DC2	CTRL R	50	062	32	2	82	122	52	R	114	162	72	r
19	023	13	DC3	CTRL S	51	063	33	3	83	123	53	S	115	163	73	s
20	024	14	DC4	CTRL T	52	064	34	4	84	124	54	T	116	164	74	t
21	025	15	NAK	CTRL U	53	065	35	5	85	125	55	U	117	165	75	u
22	026	16	SYN	CTRL V	54	066	36	6	86	126	56	V	118	166	76	v
23	027	17	ETB	CTRL W	55	067	37	7	87	127	57	W	119	167	77	w
24	030	18	CAN	CTRL X	56	070	38	8	88	130	58	X	120	170	78	x
25	031	19	EM	CTRL Y	57	071	39	9	89	131	59	Y	121	171	79	y
26	032	1A	SUB	CTRL Z	58	072	3A	:	90	132	5A	Z	122	172	7A	z
27	033	1B	ESC	CTRL [	59	073	3B	;	91	133	5B	[	123	173	7B	{
28	034	1C	FS	CTRL \	60	074	3C	<	92	134	5C	\	124	174	7C	
29	035	1D	GS	CTRL ]	61	075	3D	=	93	135	5D	]	125	175	7D	}
30	036	1E	RS	CTRL ^	62	076	3E	>	94	136	5E	^	126	176	7E	~
31	037	1F	US	CTRL -	63	077	3F	?	95	137	5F	—	127	177	7F	DEL

### **Invalid Control Sequences**

If an incorrect control sequence is detected, the invalid portion will be displayed as part of the string.

For example, in the display area shown earlier, the string: “ESC[3;0HThis sequence is invalid” would be invalid: the display is 10 characters by 3 lines, and a line specification of 3 would start printing at the fourth line.

If the current display position were 0;0, the string would display:

```
←[3;0HThis  
sequence is  
invalid
```

The left arrow character in the display represents ESC.

Other invalid sequences:

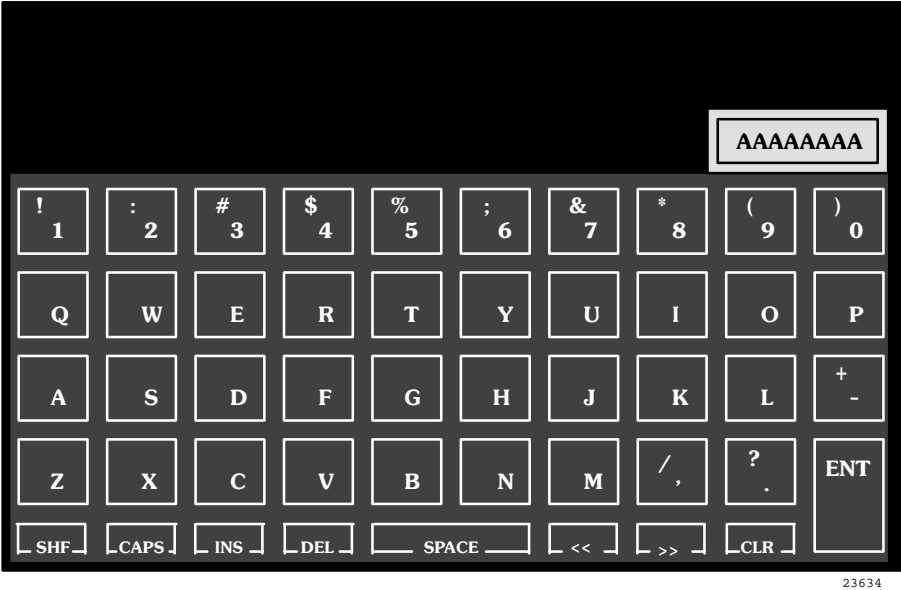
- nested Reverse Video On, for example, “ESC[7mOneESC[7mTwo” The second command is invalid and if possible will be displayed as part of the string
- nested Reverse Video Off, for example, “ESC[27mOneESC[27mTwo” The second command is invalid and if possible will be displayed as part of the string
- wrong characters in text position sequence. The text position coordinates must not contain any characters other than 0 to 9, for example, “ESC[a3;4HThe string”

### **ASCII Input Object**

The ASCII Input object allows the operator to send an ASCII string to a PLC input address.

On the Large ASCII Input object for a Touch Screen terminal, the operator selects characters by touching them on the screen. The selected character appears in the scratchpad. When the string in the window is complete, the operator sends it to a preconfigured PLC address by pressing the **ENT** key.

Figure 10.17  
Large ASCII Input Object, Touch Screen Terminal



On the other three versions of this object, the operator selects characters from the keyboard by moving the screen cursor to the desired character (with the arrow keys) and pressing the **SEL** button.

Figure 10.18  
Small ASCII Input Object, Touch Screen Terminal

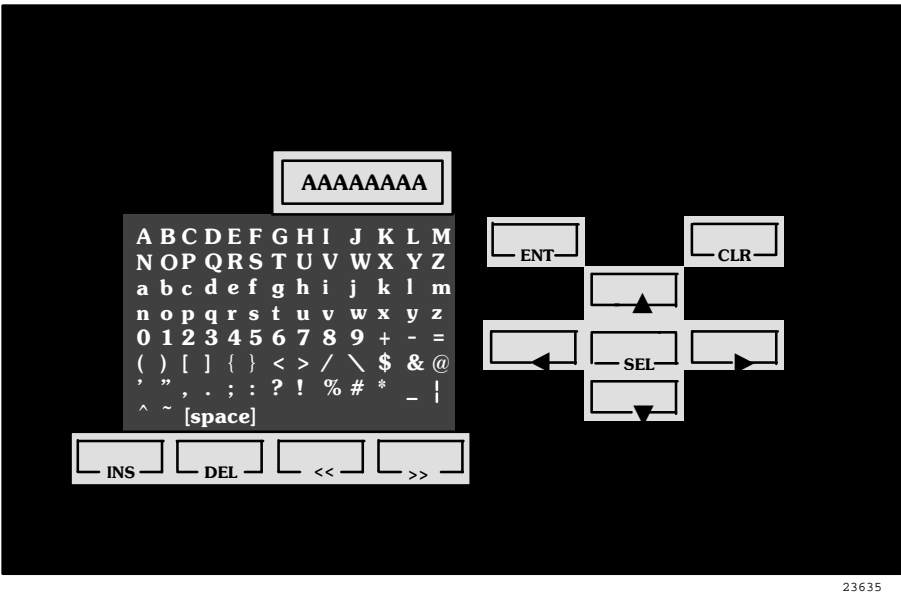
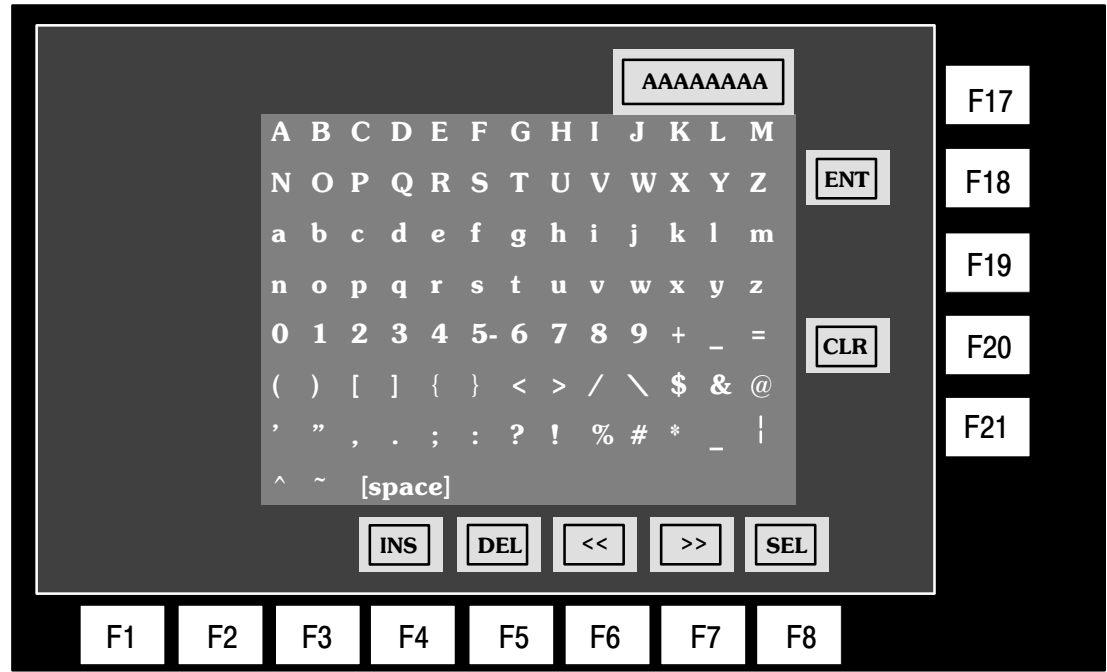
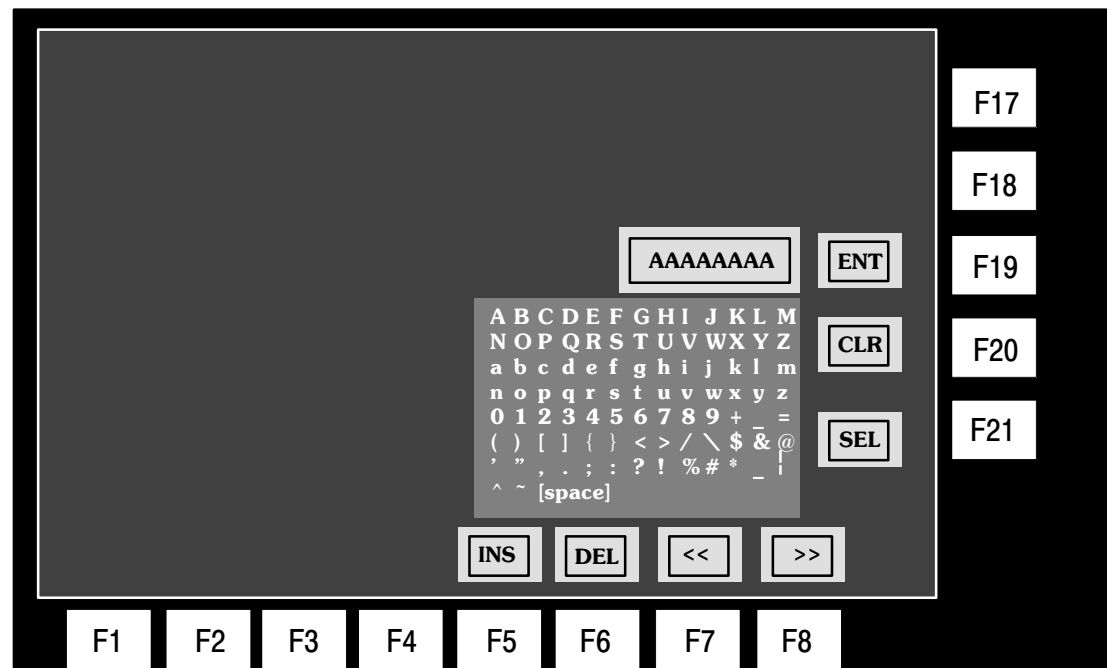


Figure 10.19  
Large ASCII Input Object, Keypad Terminal



23636

Figure 10.20  
Small ASCII Input Object, Keypad Terminal



23637

Table 10.X details the differences between the various types of displays, what parts of each can be configured and what keys are unique to each display.

To add an ASCII Input object to your screen:

1. Select *ASCII Input* from the Add menu.
2. Choose *Small* or *Large* from the list.

## Buttons

The following buttons are common to all four keyboard displays, and are used to edit the string displayed in the scratchpad:

- **INS (Insert)**—toggles the keyboard between Insert (INS) and Overstrike (OVR) modes.

When the button is “off” (default) the keyboard is in Insert mode.

New characters appear at the current cursor position. The cursor also moves one character to the right. If the scratchpad is full, the new character will not be inserted.

When the button is “on”, the keyboard is in Overstrike mode. New characters type over existing characters.

The state of the **INS** button is maintained between screen changes but not between power cycles.

- **DEL (Delete)**—deletes the character at the current scratchpad cursor position.
- **<<**—moves the cursor in the scratchpad to the left.

The button auto-repeats at the rate defined in the Options menu.

- **>>**—moves the cursor in the scratchpad to the right.

The button auto-repeats at the rate defined in the Options menu.

- **CLR (Clear)**—clears the scratchpad.



- **ENT (Enter)**—sends the string displayed in the scratchpad to the ASCII Input Address in the PLC controller. The leftmost character is placed in the high order byte of the first PLC word, the next character to the right in the low order byte, etc. If the string is too large for the configured address, the terminal displays an “out of range” message; the string is not sent to the PLC controller.

The scratchpad is not cleared after the **ENT** button is pressed. If the next key pressed is an ASCII character, the scratchpad clears and displays the character. If the key is an editing key, (**INS**, **DEL** or cursor keys), the string remains displayed in the scratchpad, allowing you to edit the string without having to retype it.

If the Enter Key Control address is defined, the terminal sets this address 400ms after the **ENT** button is pressed. If the Handshake address is defined, the Enter Bit is reset by the terminal when the Handshake address makes a 0 to 1 transition within 4 seconds of the Enter Bit being set. If the Handshake bit does not make a 0 to 1 transition, the user is informed and the Enter Bit is reset automatically. If the Handshake address is not defined for this object, the Enter bit is reset when the button hold time elapses.

**IMPORTANT:** All keypad and touch input is disabled while the Enter Key Control Bit is set to 1.

### **The SEL (Select) Button**

The **SEL** (Select) button is common to the small ASCII Input Object for the Touch Screen terminal and to both the large and small objects for the Keypad terminal. To select a character:

1. Use the keypad cursor keys to move the cursor to the desired character.
2. Press the **SEL** button.

This places the selected character into the scratchpad at the current scratchpad cursor position.

The following buttons are unique to the various types of terminal.

### **Touch Screen Terminal, Large ASCII Input Object**

The large ASCII input object has the following unique buttons:

- **CAPS**—toggles between upper case and lower case characters. When the button is “off” (default), the keyboard is in lower case mode; when the button is “on”, the keyboard is in upper case mode.

- **SHF**—shifts the next character typed to upper case, or to the special shift-key character for that key. To cancel the shift, press the **SHF** key again.

### Touch Screen Terminal, Small ASCII Input Object

The small ASCII input object has the following unique buttons:

- ▲ Up cursor: moves the keyboard cursor up
- ▼ Down cursor: moves the keyboard cursor down
- ◀ Left cursor: moves the keyboard cursor to the left
- ▶ Right cursor: moves the keyboard cursor to the right

**Table 10.X**  
**Keyboard Displays for the ASCII Input Object**

Display Components	Touch Screen Terminal		Keypad Terminal	
	Small	Large	Small	Large
Keyboard characters	Not configurable	Not configurable	Not configurable	Not configurable
Keyboard	Location configurable in the Move menu	Vertical location only configurable in Move menu	Location configurable in the Move menu	Location configurable in the Move menu
Characters within scratchpad	Size configurable in the Look menu	Size configurable in the Look menu	Size configurable in the Look menu	Size configurable in the Look menu
Scratchpad	Size configurable in Look menu; location configurable in Move menu	Size configurable in Look menu; location configurable in Move menu	Size configurable in Look menu; location configurable in Move menu	Size configurable in Look menu; location configurable in Move menu
Buttons	Size fixed Location configurable in the Buttons menu	Not configurable	Size fixed Location configurable in the Buttons menu Function keys can be assigned	Size fixed Location configurable in the Buttons menu Function keys can be assigned
Unique keys	▲ Up cursor ▼ Down cursor ◀ Left cursor ▶ Right cursor SEL – Select	CAPS – Caps Lock SHF – Shift	SEL – Select	SEL – Select
Character Selection	Move cursor to the desired character with the cursor keys and press SEL button	Press the desired character on the touch screen to place it in the data entry window	Move cursor to the desired character with the cursor keys and press SEL button	Move cursor to the desired character with the cursor keys and press SEL button

## Configuring the ASCII Input Object

Like any other PanelView object, the ASCII Input object is given a size, a foreground and background color (for color terminals) or intensity (on monochrome terminals). The Keyboard and Scratchpad are separate items and can be moved and colored (or given intensity) separately. Use the items in the Object menu to define the position and appearance of your ASCII Input object.

Once you have added an ASCII Input object to your screen, the following Object menu selections are available to you:

**Move**—the Move menu for the ASCII Input object contains the following options:

- **ASCII Input**—allows you to move the entire object as a unit
- **Scratchpad**—allows you to move the scratchpad part of the object
- **Keyboard**—allows you to move the keyboard part of the object

**Look**—the Look menu for the ASCII Input object has two items, Scratchpad and Keyboard. The submenus vary between color and monochrome applications.

**Table 10.Y**  
**The Look Submenus for ASCII Input Object, Color and Monochrome**

Scratchpad		Keyboard	
Color	Monochrome	Color	Monochrome
Size	Size	Foreground Color	Reverse Video
Foreground Color	Reverse Video	Background Color	High Intensity
Background Color	High Intensity		
Border	Border		
Character Height	Character Height		
Character Width	Character Width		

**Buttons**—the Buttons menu varies slightly between keypad and touch screen applications. It is not available at all for the large Touch Screen ASCII Input object, where the buttons are a part of the keyboard.

**Table 10.Z**  
**Button Menu Variations**

Small Touch Screen Object		Small or Large Keypad Object	
Menu	Submenu	Menu	Submenu
Move: allows you to move the buttons in relation to the keyboard	INS DEL SEL CLR ENT << >> & v < >	INS DEL SEL CLR ENT << >>	Move allows you to move the buttons in relation to the keyboard  Function Key allows you to assign a function key to the button
Background Color allows you to choose a color for the button's background	Black Blue Green Cyan Red Magenta Yellow White	Background Color allows you to choose a color for the button's background	Black Blue Green Cyan Red Magenta Yellow White
Foreground Color allows you to choose a foreground color for the button's text	Black Blue Green Cyan Red Magenta Yellow White	Foreground Color allows you to choose a foreground color for the button's text	Black Blue Green Cyan Red Magenta Yellow White
Quit		Quit	

**Outer Text**—the Outer Text menu has the following options:

- **Edit Text** allows you to enter the outer text for the object. Outer Text appears outside the object. When you enter text, remember to use the arrow keys to move from line to line, and **Enter** to save the text.
- **Move Text** moves the text.
- **Underline** makes the text appear underlined.
- **Blink** causes the text to flash on the PanelView terminal.
- **Foreground Color** sets the color of the text and border.
- **Background Color** sets the background color of the object.
- **Reverse Video** sets monochrome text in reverse video.
- **High Intensity** sets monochrome text in high intensity.
- **Character Height** sets the characters to single or double height.

- **Character Width** sets the characters to single or double width.

**Format**—the Format menu has the following options:

- **Number of Characters** specifies the number of characters that will fit in the scratchpad. The default is 8, and the maximum is 64.
- **Fill Character** determines the character with which the ASCII string is padded when the input string is less than the configured maximum length. You can choose from the following characters:
  - Spaces
  - Zeroes
  - FF
  - Null

The Fill Character is transferred to the PLC but not displayed in the scratchpad.

**Address**—the Address menu is a standard PanelBuilder menu with three items, ASCII Input Address, Enter Key Control Address and Enter Key Handshake Address. The first address must be configured, but the last two are optional.

- **ASCII Input Address** specifies the address to which the string displayed in the data entry window is sent. It is:
  - an Input address
  - Data Type: ASCII
  - Number of Words: from 1 to 32
  - Start Bit: for Discrete communications, 0 or 10;  
for Block Transfers, 0 or 8.

**Table 10.AA**  
**Scratchpad Input and Contents of ASCII Input Address**

Scratchpad Input	Address
left most character	high byte – 1st word
2nd character	low byte – 1st word
3rd character	high byte – 2nd word
4th character	low byte – 2nd word

You can also configure the **Enter** key with a handshake so the PLC controller can acknowledge a value received from the terminal. To do this, you must define two PLC addresses: the Enter Key Control address and the Enter Key Handshake address.

When the operator presses the **Enter** key to send the value to the PLC controller, the terminal sets the Enter Key Control address to 1 (after a 400 msec. delay).

Program your PLC controller to turn on the bit at the Enter Key Handshake address, to inform the terminal that the Enter Key Control Bit has been received. When the terminal sees this bit on (receives acknowledgement), it turns off the Enter Key Control bit.

If the PanelView terminal does not receive acknowledgement (transition from 0 to 1) within 4 seconds, it displays a Minor Fault message in the Fault Window and resets the Enter bit. If the Enter Key Handshake is unassigned, the Enter bit will remain set for the duration of the button hold time or for as long as the button is pressed, whichever is longer.

**IMPORTANT:** All keypad and touch input is disabled while the Enter Key Control Bit is set to 1.

Configure these two optional addresses for the Handshake functionality:

- **Enter Key Control Address** specifies the input bit PanelView sets when the **ENTER** button is pressed. It is:
  - an Input address
  - Data Type: Bit
  - Number of Bits: 1
- **Enter Key Handshake Address** specifies the bit the PLC controller sets when it detects the ENTER bit is set:
  - can be Input or Output (default)
  - Data Type: Bit
  - Number of Bits: 1.

**IMPORTANT:** The ASCII Input object is not a retentive object. You cannot assign it a preset value.

## Scrolling List Object

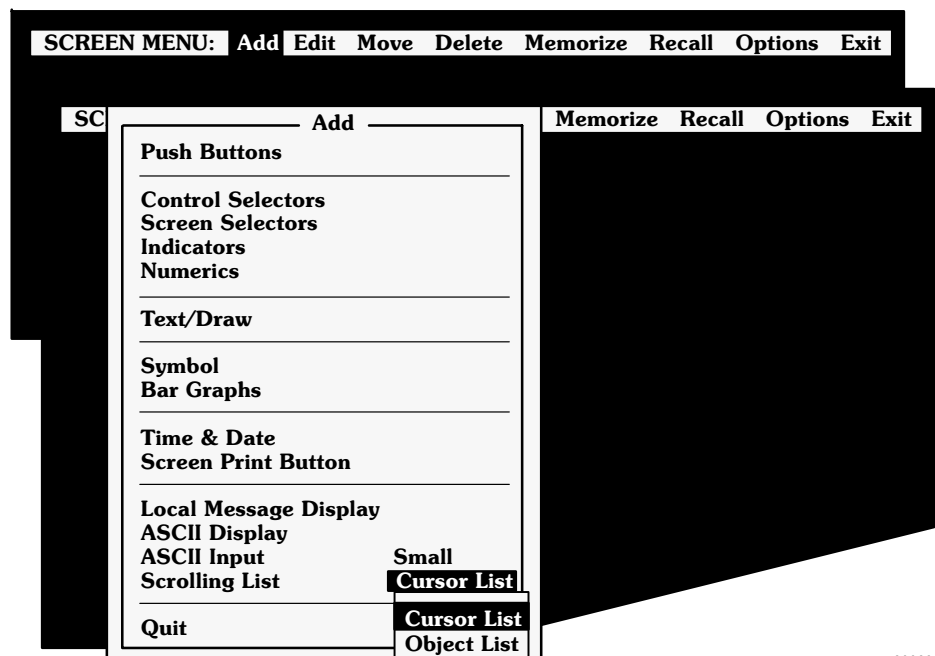
The Scrolling List object is available in PanelBuilder Version 5. The Scrolling List object allows you to define and view a list that is not limited by the size of the screen. You can use the cursor buttons to move through a maximum of 999 items within these object lists.

You can define multiple object lists, including Local Message Object Lists, Multi-State Indicator Object Lists, and Numeric Display Object Lists.

The Scrolling List addressing permits PLC output data multiplexing to PanelView. This reduces PLC ladder logic and addressing typically needed to display and edit large amounts of data.

You access the Scrolling List through the Add Menu.

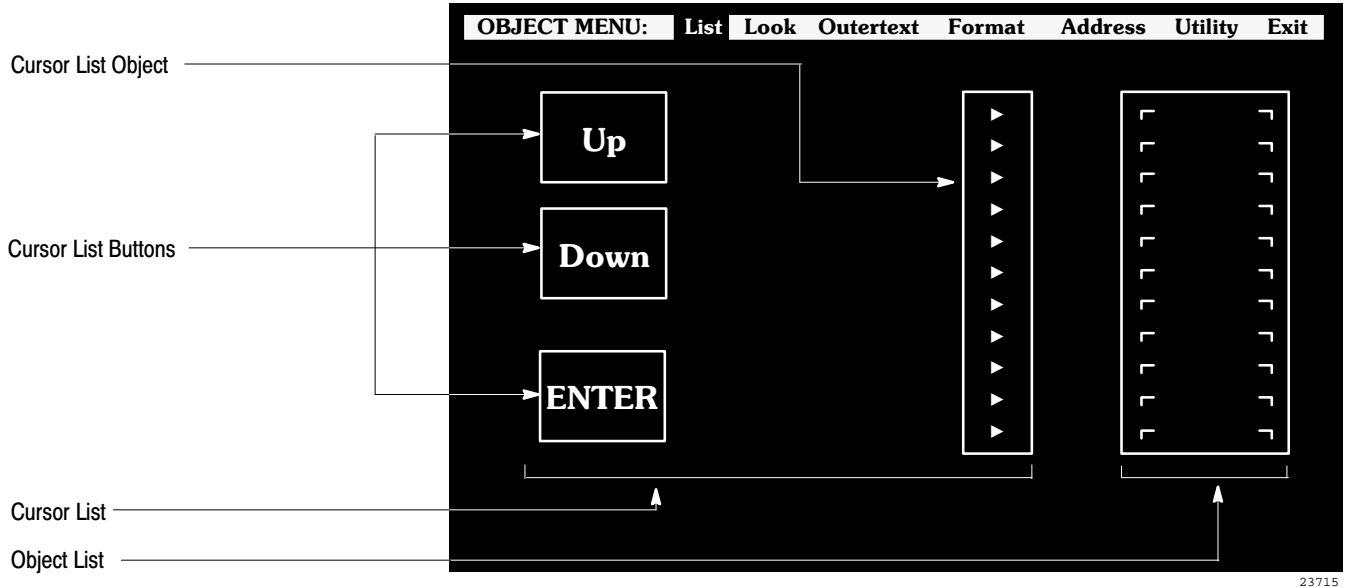
**Figure 10.21**  
**The Add Menu with the Scrolling List Selected**



20023

The Scrolling List consists of a Cursor List and one or more Object List(s). You must create the Cursor List before you can define Object Lists. The following figure provides an example of how a completed scrolling list appears on the terminal screen.

**Figure 10.22**  
**Sample Scrolling List Screen**



**IMPORTANT:** The Scrolling List is a retentive object. Your PanelView terminal will retain the current value for the Cursor List and Object List settings even after you've turned the terminal off, or switched to Configuration mode and back to Run mode. You can enter preset values for this object.

Please turn to Appendix A for a Scrolling List object example. This example defines a Scrolling List object that allows you to monitor and control the operations of an automobile luxury option assembly operation. It also includes PLC programming suggestions.

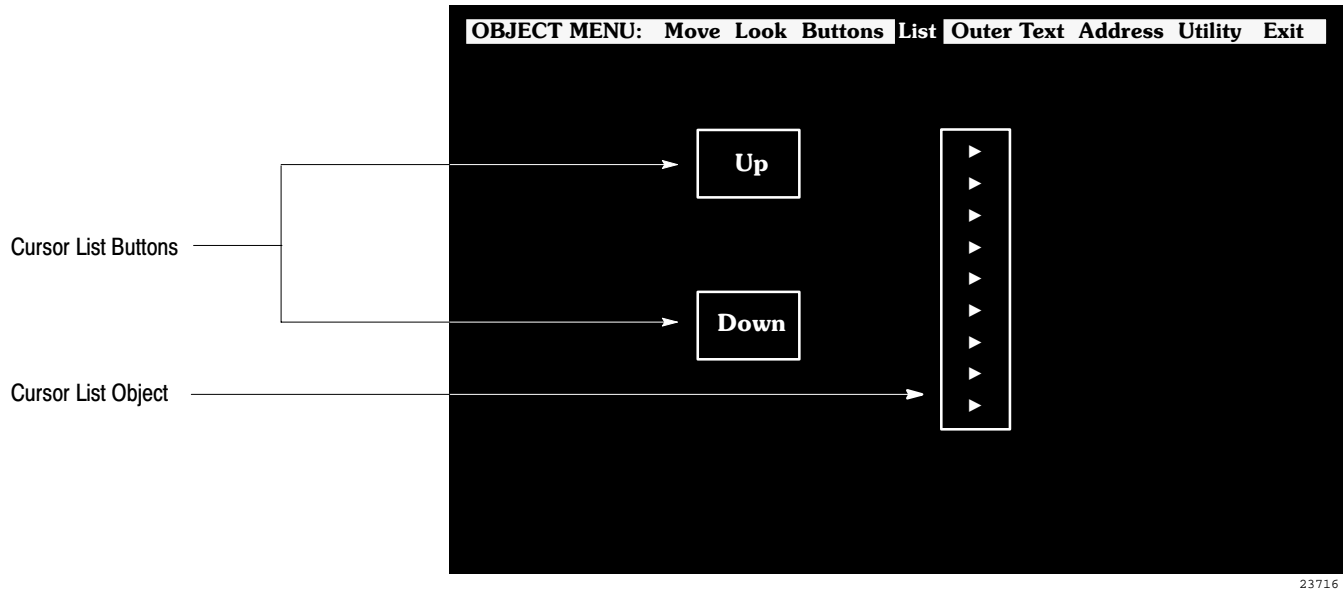
## Cursor List

In the Cursor List you define all the buttons associated with the Scrolling List, as well as the List's cursor display area.

You can enable, disable, move, and change the text for each button in the list. When you create a Cursor List, you see the object illustrated in the following figure. Only the Up and Down cursor buttons appear, because these two buttons are enabled by default. The other buttons are disabled by default. Note that the text shown for the buttons is not fixed.



**Figure 10.23**  
**The Cursor List with Up and Down Buttons Enabled**



The Object Menu allows you to move and change the text and attributes of the entire Scrolling List object (the buttons and the Cursor List). The next section briefly outlines these functions. For more detailed information on the Object Menu and its functions, please see Chapter 3, *Using PanelBuilder*.

### Move

Choose the *Move* menu, and use the *Move List* option to move all components of the Cursor List object together as a group.

### Look

Choose *Look* to change the attributes associated with the buttons and the Cursor List. These attributes include foreground and background color, underline, blink, character height and width.

**IMPORTANT:** If you change the Character Height, the height of the Cursor List changes automatically. For example, if you change the height from Single to Double, the Cursor List height will double. You cannot change the Character Height to Double if the new height exceeds the screen boundary.

## Buttons

Choose *Buttons* to enable or disable the buttons associated with the Cursor List object through the Buttons Menu.

The following table shows the buttons that you can configure for this list, as well as their default settings.

**Table 10.AB**  
**Buttons Associated with Scrolling List and Their Default Settings**

Up Cursor	Enabled
Down Cursor	Enabled
Page Up	Disabled
Page Down	Disabled
Home	Disabled
End	Disabled
Enter	Disabled

After you enable a button, you can configure it through the Button Enable sub-menu.

If you disable a button, it disappears from the screen. When you enable a button, the button appears in the middle of the screen. A menu also appears. This menu allows you to configure the button:

- Choose *Move* to move and position each button independently.
- Choose *Size* to change the button's size.
- Choose *Function Key* to assign a function key number to the button. This option is available only when you are configuring a keypad terminal application.
- Choose *Margin Size* to define the inactive region around the button. This option is available only for touch screen applications.
- Choose *Edit Text* to create text for each button. The button size limits the amount of text you can create.
- Choose *Move Text* to position the inner text associated with the button. The size of the button determines how much you can move the text.
- Choose *Border* to change the border type for each button. The default border of the function key application is Single. For a touch screen application, the default is Outer.

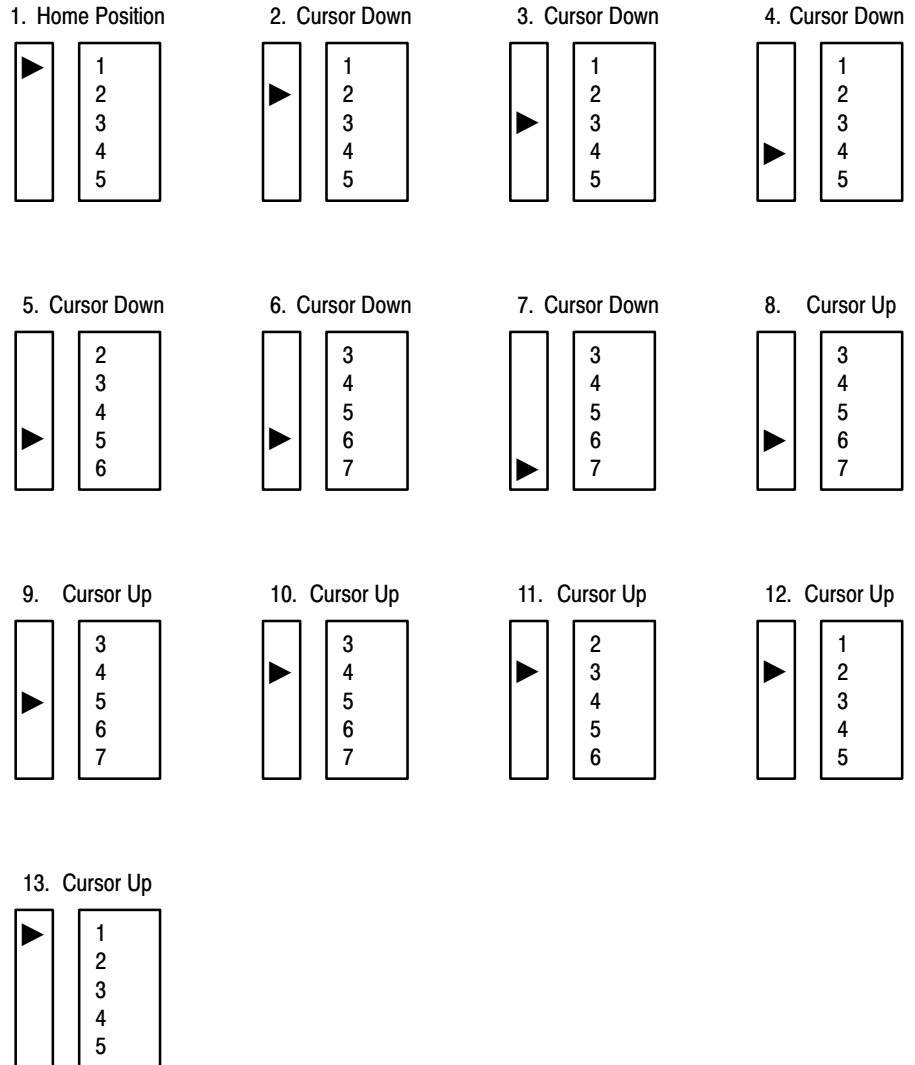
## **List**

The *List* menu allows you to move the cursor list independently from the cursor list buttons. In this menu you must also define the Number of States, Number of Visible States, and Number of Preview States for the entire Scrolling List object. This menu also lets you configure the border type for the list independently from the button.

- Choose *Move* to relocate the list part of the object. The buttons will not move. The list moves on character boundaries.
- Choose *Number of States* to specify the total number of states or items in the Scrolling List object. The default Number of States is 10. The valid range is from 2 to 999. This value cannot be less than the Number of Visible States defined for the object.
- Choose *Number of Visible States* to define the height of the scrollable list that is visible to the operator. The default Number of Visible States is 5. The valid range is from 1 to 24. The value you enter cannot be greater than the Number of States defined for the object. It must also be greater than the Number of Preview States.
- Choose *Number of Preview States* to define the minimum number of visible states above or below the cursor before the list begins to scroll. The default is 1. The minimum number you can enter is 0. The maximum is half the Number of Visible States minus 1.

The following figure shows an example of how the preview state option works when the Number of States is 7, the Number of Visible States is 5, and the Number of Preview States is 1.

**Figure 10.24**  
**Scroll List Preview State Cursor Movement Example**



23664

- Choose *Border* to configure the border type for the list independently from the border type of the buttons. The default border type is Outer.

### Outer Text

Choose the *Outer Text* menu to define and attach outer text to the Cursor List object.

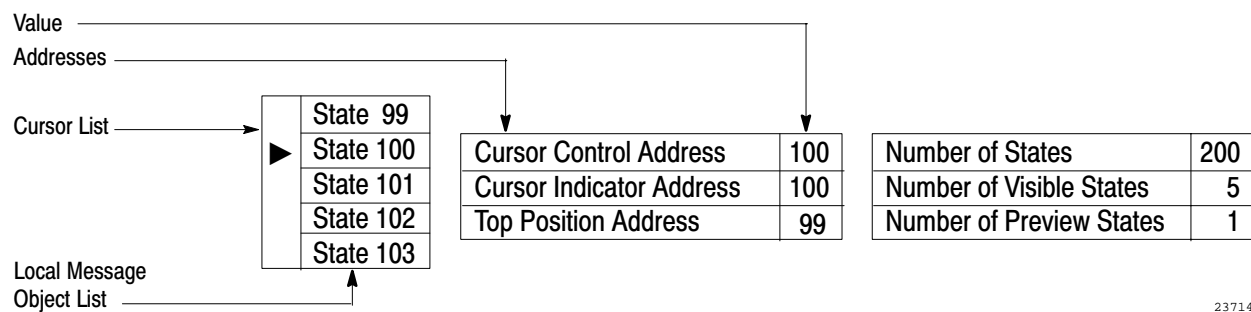
### Address

Choose the *Address* menu for the list of addresses you must configure for the Cursor List object:

- **Cursor Control Address** is an output address from the PLC that informs the terminal where to position the cursor in the Scrolling List. The address contains the value of the state to place the cursor on.

For example, if the PLC places a value of 100 in the Cursor Control Address, the PanelView terminal will place the cursor on the 100th state of the list. Based on the Number of Visible States and Preview States configured, the PanelView will scroll the visible states accordingly, and send the appropriate value to the top position address. The PLC will then use the Top Position Address value to place the appropriate top or first visible state value and consecutive values in the visible state addresses. The following figure illustrates how this works.

**Figure 10.25**  
**Cursor Control Address Functions**



23714

If the PLC sets the Cursor Control Address value to 0, the cursor list buttons control the cursor. Until a Cursor List button is pressed, the cursor will remain on the last state according to the last value that was placed in the address.

The Cursor Control Address is an Output only address. You can configure the data type to Binary, BCD or Bit.

- **Cursor Indicator Address** informs the PLC of the cursor's location in the Scrolling List. The address contains the value of the state that the cursor is pointing to. The terminal updates this value when the cursor position changes.

This address value is updated regardless of the value in the Cursor Control Address. If the Cursor Control Address value is 0, the Cursor List buttons control the Cursor Indicator Address value. If the Cursor Control Address value is not 0, the Cursor Indicator Address value reflects the Cursor Control Address value.

This is an Input only address. You can configure the data type to Binary, BCD or Bit.

**IMPORTANT:** The Cursor Indicator Address should not share its address with other objects. Overlapping objects may cause unpredictable results.

- **Top Position Address** informs the PLC of the value of the state displayed at the top of each Object List.

This value directs the PLC to what value should be placed in the first or “Top” Visible State address.

This is an Input only address. You can configure the data type to Binary, BCD or Bit.

**IMPORTANT:** The Top Position Address should not share its address with other objects. Overlapping objects may cause the PLC to display a wrong range of numbers.

- **Enter Key Control Address** indicates when the Cursor List Enter button is pressed.

This is an Input only address. The Bit and size is 1.

See the following button operation section for value and timing characteristics of this address and button.

- **Enter Key Handshake** informs the terminal that the PLC has read the Enter Key Control Address.

This is an Input/Output address.

See the following button operation section for value and timing characteristics of this address and button.

## Object List

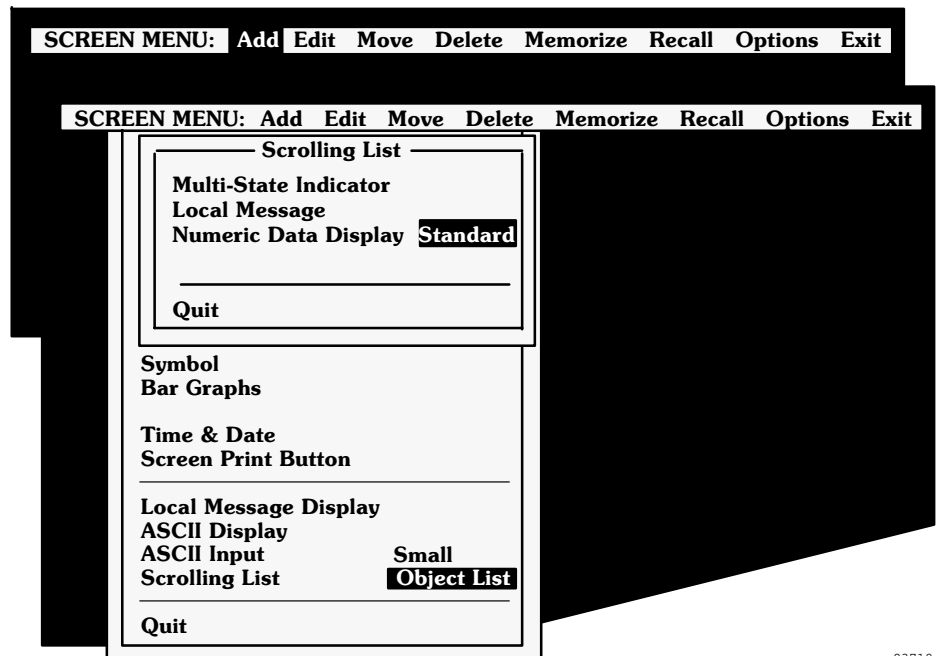
An Object List is a list of objects of the same type. These objects are displayed in accordance with the Cursor List.

The Object List(s) and the Cursor List together make up the Scrolling List. You must define the Cursor List before you can create an Object List. You can create any number of Object Lists for each screen, as long as there is sufficient space on the screen.

Although you define the Cursor List and Object List components separately, they are in fact components of a single Scrolling List object. Therefore the Cursor List’s definition—Cursor Control address, Cursor Indicator address, Top Position address, Number of States—also applies to all the Object List(s) in the Scrolling List.

To create an Object List, select *Object List* in the Scrolling List selection of the Add menu.

**Figure 10.26**  
Selecting the Object List in the Add Menu



23718

There are three types of Object Lists that you can choose from:

- **Multi-State Indicator Object List**—This Object List is a list of multi-state indicator objects that can display different states at any given time. The Number of States that you specified for the Cursor List determines the total number of multi-state objects you can define in a single Object List. Defining this object is similar to defining the regular Multi-State Indicator object, except that you can define only one set of state text information (16 state text strings) per Multi-State Object List.
- **Local Message Object List**—The Local Message Object List is a listing of individual local message display objects. The total number of Local Message objects in a single Object List depends on the Number of States you specified for the Cursor List.
- **Numeric Data Display Object List**—This Object List allows you to configure multiple Numeric Data Display Objects in a list. If you select this option for your Object List, you can choose among the following Numeric Data Display options, similar to the single Numeric Data Display Object:

- Standard Numeric Data Display
- Standard Numeric Data Display with Polarity
- Standard Numeric Data Display with Decimal Point
- Standard Numeric Data Display with Polarity and Decimal Point
- Scaled Numeric Data Display

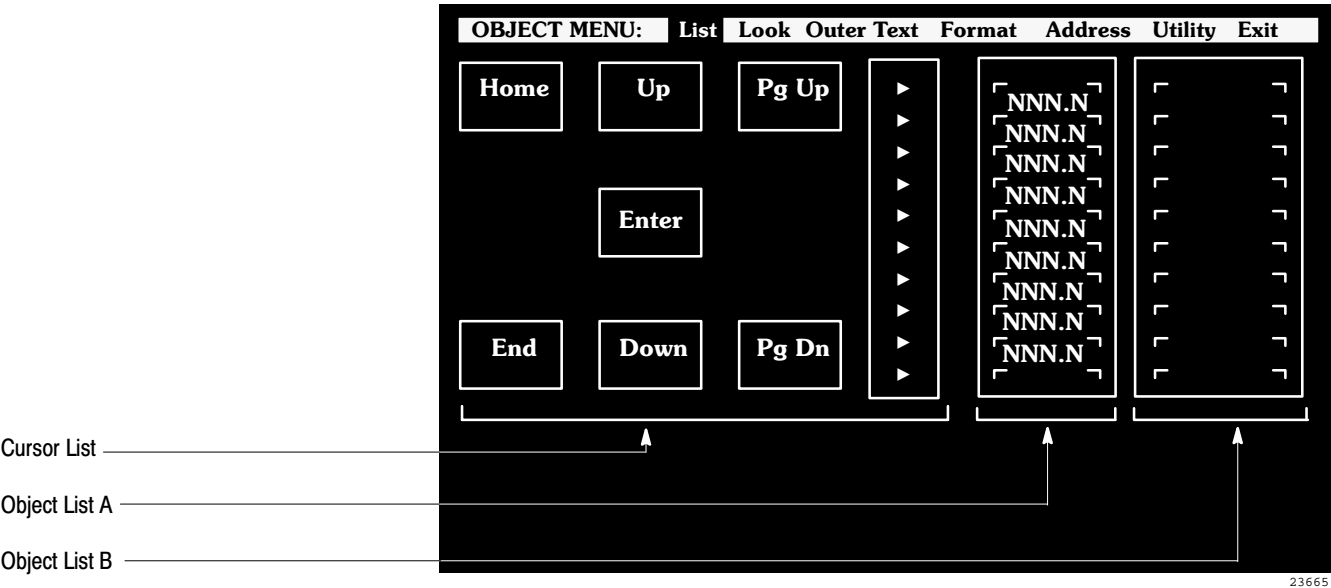
You can define only one type of numeric display for each Numeric Data Display Object List. The total number of Numeric Display objects in a single Object List depends on the Number of States you specified for the Cursor List.

You can define more than one Object List of each type for each screen, and position them in any order, on any free location on the screen. The number of Object Lists you create is limited only by the space on your screen.

For more specific information about each of the individual object types and how they function, please see the appropriate section earlier in this chapter.

**IMPORTANT:** Each scrollable Object List can contain only the selected object. You cannot combine different objects in the same list. The following figure shows a sample screen containing two Object Lists and a Cursor List.

Figure 10.27  
Two Objects Lists and a Cursor List on a Touch Screen Terminal



23665



The Object menu, shown above, allows you to configure the Object List.

**IMPORTANT:** The Object Menus for the three types of Object Lists contain many identical menus and functions. In the following section, we outline these functions and point out any differences between the types of Object Lists. For more detailed information on Object Menus and their functions, please see the appropriate section in Chapter 3, *Using PanelBuilder*.

## List

The *List* menu is present in all three Object List types.

- Choose *Move* to move and position the Object List on the screen. The default vertical position is the same as the vertical position defined for the Cursor List object. If possible, try to keep each Object List aligned with the Cursor List component.

- Choose *Border* to configure the border type for the Object List.

For color terminals you can choose the foreground and background colors. For monochrome terminals you can choose between Reverse and High Intensity.

- Choose *Width* to change the width of the Object List. The number you enter determines the size of the objects to be displayed in the list. The minimum width should be the longest state string defined for the Object List.

For Numeric Display Data Object Lists, the minimum width depends on the Number of Digits that you specified for the Numeric Displays, and whether you chose a Numeric Data Display with Decimal Point and/or Polarity Object List.

- Choose *Highlight Bar* if you want to enable the highlight bar for the Object List. If you enable the Highlight Bar, the current state controlled by the Cursor Control Address or the cursor buttons is highlighted in reverse video.
- Choose *Number of Visible States* to define the number of list objects that will appear in the visible region of the Object List on the screen. In other words, this option lets you define the number of objects that the operator will be able to see in the list.

The default is the Number of Visible States you defined for the Cursor List object. The valid range is 1 to 24.

**IMPORTANT:** You can change the value of the Number of Visible States in the Object List. However, you cannot save the Screen until the Object List's Number of Visible States is the same as that of the Cursor List. If the Number of Visible States is less than the number of defined Visible State Addresses, a message warns you that the extra Visible State addresses will be deleted.

**IMPORTANT:** If the number you enter will cause the bottom of the Object List to be off the screen, an error message appears. The Move option in the List menu allows you to place the object higher on the screen if there is enough room on the screen. This gives you room to fit more visible states on the screen.

### Look

The *Look* menu allows you to define the display attributes of the objects in the entire Object List. These attributes include foreground color, background color, underline, blink, character height, and character width. This menu is available for the Local Message Object List and the Numeric Data Display Object List.

**IMPORTANT:** When you change the Character Height of the text, you affect the height of the entire Object List. For example, if you change the Character Height from Single to Double, the Object List height will automatically be double.

### Text and Outer Text

The *Text* menu allows you to create, modify, import, and export Local Messages for the Local Message Display Object List.

The *Outer Text* menu lets you define outer text for the entire object list.

### Format

The *Format* menu is an option for the Numeric Data Display Object List types only. This menu is identical to the format menu for a single Numeric Data Display.

- **Number of Digits**—This option lets you specify the maximum number of digits that you want to be displayed in the Numeric Data display. The maximum number is limited by the Width of the Object List you defined in the List menu for the Object List, and the Character Width you defined in the Look menu.

- **Fill Left with**—This option allows you to specify the fill character for the numeric display. “Spaces” is the default. Your other choice is “Zeroes”.

If you choose a Numeric Data Display with Decimal Point, the Format menu also lets you specify how the decimal point is to be handled.

- **Fixed Position**—This option lets you fix the decimal point for the Numeric Data objects in the Object List. For this option, enter the number of digits you want after the decimal. The maximum that you can enter depends on the Number of Digits specified, and the width of the Object List.
- **PLC Controlled**—This option lets you assign the control of the decimal point to the PLC. If you select this option, you should also set the Decimal Point Position Address from the Address Menu.

If you choose a Scaled Numeric Data Display Object List, the Format menu allows you to specify the Scaling Factor, Offset Value, and how to display the results.

- **Scaling Factor**—This option lets you define how much you want the displayed value to be scaled. The valid range is from .0001 to 9999.
- **Offset Value**—This option lets you define how much you want the amount of the value to be offset. The range is from -32768 to 32767.
- **Display Results with**—This option lets you define whether you want the data displayed with a decimal point, or rounded off to the nearest whole number.

### **States and Text**

The *States & Text* menu is a Multi-State Indicator Object List menu. It allows you to define up to 16 states, and define the text and display attributes for each state.

The menus and sub-menus are identical to those of a single Multi-State Indicator object, except that how you define the state text information for the 16 states will apply to all Multi-State Indicators in the Object List. The Character Height option in the *State* menu applies to all Multi-State Indicators in the Object List, and also affects the total height or size of the entire Object List.

- **Character Height**—This option lets you set the characters to single or double height. If you change the attributes of a state by changing the Character Height of the text, you affect the height of the Object List.

If you set any Object List text string associated with the Multi-State Indicator to Double, the Object List height will automatically be double.

For example, if you define the Character Height as Single in State 1 and Double in State 2, the Object List height in State 1 changes to Double, even though the Character Height remains Single. When you define State 3, the Object List height will automatically be Double. In State 3 you can enter single height characters on every line of the Object List.

**IMPORTANT:** If you change the Character Height in State 2 to Single, the size of the Object List remains Double, because State 3 has text entered in the second line of the Object List. To change the Object List height back to Single, you must remove the text from the second line of text in State 3.

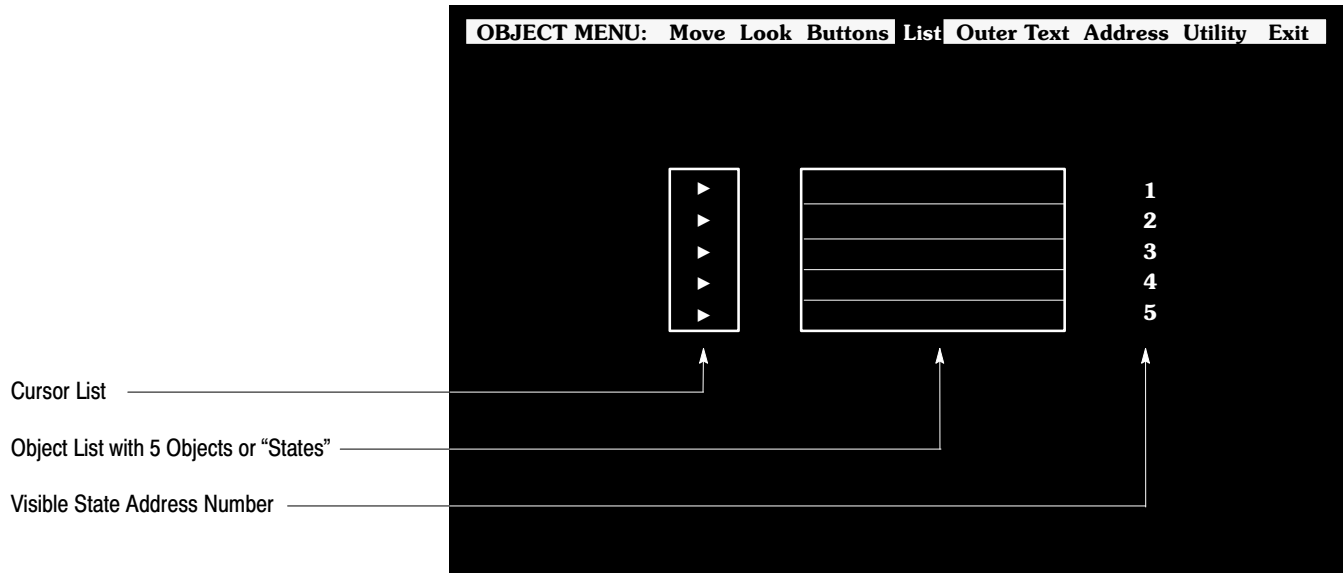
### Address

The *Address* menu is present in all three Object List types. It lets you define a Visible State Address for each object of the object list.

- **Visible State Address** allows you to attach an address to each visible object or “state” in the Object List.

To assign a Visible State Address to one of the visible objects or “states”, enter the number of the state from the list you wish to define. Define the address in the standard address menu that appears. The following figure provides an example of how the Visible State Address functions.

**Figure 10.28**  
Visible State Address



23717

- **Automatic Address Assignment**—If you define an address for Visible State 1 (the highest or top state), PanelBuilder checks the amount of contiguous address space available. If there is enough address space, you can choose to have Panel Builder automatically assign the address of each remaining Visible State.

If you choose to use the Automatic Contiguous Assignment, PanelBuilder updates all remaining addresses using the same data type and communications type of state 1, and increments the Start Word and Start Bit in a successive, sequential order.

**IMPORTANT:** Automatic Address Assignment replaces any existing addresses assigned to the Visible States. It does not check for overlaps of existing objects that already use the new addresses.

If you choose not to use the Automatic Contiguous Assignment option, or there is not enough contiguous address space, PanelBuilder updates the state 1 address only. You must update the remaining Visible State Addresses one at a time.

If you choose a Numeric Data Display Object List, you may have two more address options:

- **Decimal Point Position Address**—This address is available only for Numeric Data Display with Decimal Point and Numeric Data Display with Decimal Point and Polarity. Define this address if you want the PLC to control the decimal as defined in the Format menu. Configure this address as you would a single Numeric Data Display with Decimal Point.
- **Polarity Address**—This address is available only for Numeric Data Display with Polarity and Numeric Data Display with Decimal Point and Polarity. Define this address if you want the PLC to control the polarity of the data. Configure the address as you would a single Numeric Data Display with Polarity.

### Utility

The *Utility* menu lets you attach a name to and update the default values of the Object List.

### Exit

The *Exit* menu allows you to “Exit and Save Object”, “Save the Object Only” or “Don’t save, just Exit”.

### Button Operation

The Scrolling List object supports these buttons as defined in the Cursor List object for control of the cursor position.

Except for the Enter button, these cursor buttons are active only when the value of the Cursor Control Address for the Scrolling List is set at 0. If this value is other than 0, the PLC controls the cursor.

The Enter button is always active, regardless of the state of the Cursor Control Address.

- **Up Cursor** moves the cursor to the previous state in the scrolling list. If the cursor is at the top-most or first position in the list, pressing this button has no effect.
- **Down Cursor** moves the cursor to the next state in the scrolling list. If the cursor is at the bottom-most or last position in the list, pressing this button has no effect.
- **Page Up** scrolls the list up by the number of Visible States defined. If the cursor is at the top-most or first position in the list, pressing this button has no effect.

- **Page Down** scrolls the list down by the number of Visible States defined. If the cursor is at the bottom-most or last position in the list, pressing this button has no effect.
- **Home** positions the cursor at the top-most or first position in the list.
- **End** positions the cursor at the bottom-most or last position of the list.
- **Enter**—If the Enter Key Control Address is defined, the terminal sets this address 400ms after the Enter button is pressed. If the Enter Key Handshake address is defined, the terminal resets the Enter Bit when the Handshake address makes a 0 to 1 transition after the Enter Bit was set. If the Handshake address does not make a 0 to 1 transition within four seconds, the terminal informs the user, and automatically resets the Enter Bit. If the Handshake address is not defined for this object, the Enter bit is reset when the button hold time elapses.

## **About Retentive Objects**

Retentive Objects are those which retain their value when

- power is switched off and on
- the terminal is switched from Run mode to Configure mode and back
- the operator changes screens

The advantages of Retentive Objects are:

- PLC programming instructions are often eliminated
- PLC output addresses are often not needed

The following objects are retentive:

- Maintained Push Button
- Interlocked Push Button
- Control List Selector (with and without Enter key)
- Increment and Decrement Value Buttons
- Set Value Button
- Set Bit Cursor Point
- Numeric Input Cursor Point
- Numeric Keypad Entry Button

- Numeric Keypads (small and large)
- Scrolling List Object

A PLC Input address (discrete or block transfer) must be assigned to a Retentive Object. These objects will function even if the PanelView terminal isn't connected to a PLC controller.

More than one retentive object can be assigned to the same PLC input address. For example, control selectors on different screens could be assigned to control the same PLC input address. When one selector changes the PLC input state, the other selector will reflect this also.

### Retentive Objects and Presets

Some Retentive Objects can have a preset value. When the application file is downloaded and the terminal switched to Run mode, retentive objects will take on these input states.

**IMPORTANT:** Normally Closed Push Buttons' default states are forced by PanelView: after the download and before the PLC controller is initialized, PanelView goes through the input table and forces all normally closed PLC addresses to 1. Therefore the state of a Normally Closed Push Button overrides the state of a presettable object that shares the same address.



**ATTENTION:** Make sure that the preset values you define are the same values that the PLC program considers as the Off or default state.

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The PanelView terminal's Configuration mode allows you to:

- reset retentive objects to their preset states (which were assigned on the development system)
- specify whether retentive objects will remain in their last states, or be reset to the preset states, each time the terminal is powered up (Presets is the default)

For more information on preset operation, refer to Chapter 2, *PanelView Terminal Functions*, in the *PanelView Operator Terminals User Manual*.



**IMPORTANT:** All PLC input addresses can be preset except Time and Date Transfer, Screen Number Transfer, Alarm Window Address, Set Bit Cursor Point, Normally Open Push Button, Normally Closed Push Button, and Latched Push Button. Since addresses can overlap, it is possible to preset even these addresses, by sharing them with a presettable address.

### **Safety Considerations for Retentive Objects**

Instead of using a Retentive Object to start a machine or process, use a Momentary Input Object such as a Momentary Push Button. Also, make sure that the PLC controller is programmed to stop any machines or processes whenever the remote I/O communication is interrupted, so that a machine or process can only be restarted by an operator.



**ATTENTION:** Never use a Retentive Object to initiate a process or turn on a machine. Here's why: Let's say your PLC controller was programmed to turn a machine on whenever a Maintained Push Button was set to one. If remote I/O communication were temporarily cut while the Maintained Push Button was set to one, the machine would automatically restart as soon as communication resumed. Similarly, since the Retentive Object's value is retained even after power is removed, the machine could start up automatically when you re-applied power to the terminal, if the Maintained Push Button had been set to 1 when the terminal was powered down. In other words, the machine could start up automatically, without the operator being aware of it.

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## Testing Your Application File

This section describes how to test screens, and how to test applications with the complete system. Information is also provided on how to connect a programmable controller to the terminal.

By the time you are ready to test the system you should have:

- created an application file
- installed the PanelView terminal
- downloaded the file to the PanelView terminal

Testing an application file is a three step process that involves:

1. Testing the screens.
2. Monitoring terminal and PLC interaction.
3. Testing the application with the complete system.

### Testing the Screens

The first step in testing an application file is to download the file and set the terminal in Run mode. At this point the PLC should not be connected. You only want to ensure that the screens appear as you expected.

**IMPORTANT:** When the PLC is not connected, the terminal will display a flashing “PLC Communication Lost” message when you first switch to Run mode. This will continue during the testing until PLC communication is established.



**ATTENTION:** Do not connect a PLC to the terminal. You are simply testing your application file’s screens, and don’t want to monitor a PLC as well.

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The application file won’t run faultlessly since there’s no PLC connected. However, you will be able to confirm that your screens and objects look as you expect.

All PLC output addresses will be set to zero and, since no PLC is connected, they will remain at zero. Thus, any object controlled by an output address will always remain in state zero. Similarly, objects that monitor output addresses will never see the value change.

Objects such as Push Buttons which use a PLC input address will appear to work normally. However, if they use PLC feedback, that feedback will never be received.

Static objects that don't communicate with the PLC, such as Screen Selectors and Background Text, will operate.

## **Connecting the Programmable Controller**

Once the screens are behaving as expected, connect a programming terminal to the PLC and monitor the PLC's I/O Data Table. At this stage, you should connect the PanelView terminal to the PLC, but don't have the PLC control any machines or processes.



**ATTENTION:** Disable all the other I/O racks or modules that could be affected by the PanelView terminal.

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Once all PLC controlled machines and processes have been disabled, you can put both the PLC and PanelView terminal into Run mode. You'll need the reports that the PanelBuilder Development Software generates so you can correlate each screen and object to the correct PLC address.

Just as you would test a new control panel's inputs and outputs before starting up a new control system, so you must run through each screen in the application file. Use the programming terminal to monitor what happens inside the PLC as you use each object, and then change the values within the PLC to see how the PanelView terminal responds.

## **Test Retentive Objects**

Observe each object carefully if you are using any retentive input objects. Switch the terminal off and on again, and switch it to Configuration mode and back to Run mode. Watch the input addresses for each retentive object to ensure that the values are initialized so that the program will respond safely.

## Testing the Whole System

Once you've checked all PLC values and determined that all objects, windows, and PLC controlled functions communicate properly with the PLC, you're ready to set both the PLC and the terminal into Run mode and test your application file in action.



**ATTENTION:** If the PLC program can control any specific machine action or process that could result in unsafe or critical operation, temporarily disable these specific operations. Keep people at a safe distance from any PLC controlled machine. Finally, make sure emergency stop buttons are easily accessible in the event of unexpected operation of the control system.

Step through each screen to make sure that valid states and values are displayed. Test each object one at a time to ensure that the PLC system responds as expected.

Turn the PanelView terminal off and on and switch the terminal to Configuration mode and back to Run mode. You should also remove and re-apply power to the PLC separately, and to the entire control system to ensure that the system re-initializes as expected.

## PLC Programming Considerations

### Block Transfer Programming

PanelView objects and functions can be assigned block transfer addresses as well as discrete I/O addresses. Block transfer files should only be used when there are not enough discrete I/O image table addresses available.

When block transfer addresses are assigned to PanelView terminal objects or functions, the following must be specified:

- PLC read or PLC write (input or output)
- block transfer file (1–5)
- word number (0–31)
- bit number (0–15)

You can make up to five block transfer assignments for a terminal. Each assignment supports a PLC read and PLC write file, for a total of up to 5 read files and 5 write files. Each file's size can be from 1–32 words. Block transferring to a PanelView terminal is just like block transferring to intelligent I/O modules in I/O racks.

For each block transfer assignment (1–5), assign a Rack Number, Module Group (Word), Byte (Hi/Low), and Number of Words. The block transfer instructions in the PLC program must be configured accordingly.

### Rack Number

This can be any of the rack numbers which have been assigned to the PanelView terminal. The terminal can be more than one rack number.

### Module Group (Word)

This is also referred to as “group” or “word”. It can be any word (0–7) within a PanelView terminal's rack assignment.

### **Byte (slot)**

This is also referred to as “slot” or “module”. Low byte (module or slot = 0) or high byte (module or slot = 1) of the assigned “module group (word)” can be designated. This discrete byte address in the PLC input and output image table will be used for block transfer control, and cannot be used by other objects or functions.

### **Number of Words**

The block transfer instruction in the PLC program will dictate the number of read or write words (file size) to be transferred. If “zero” words are entered in the block transfer instruction in the PLC program, then the terminal will both read and/or write the number of words specified on the PanelBuilder development system. A read or write file can be from 1–32 words.

For each block transfer assignment configured on the development system, both a read and write file will be allocated in the terminal. Each PLC block transfer instruction can access one read or write file in the terminal, as long as the instruction’s rack number, module group and byte (slot) assignment matches that of a block transfer assignment in the terminal.

If only read data, or only write data is to be transferred, then single direction block transfers can be programmed in the PLC controller. To transfer both read and write data, program the PLC controller for bi-directional block transfer communication, as described in this section. In this case block transfer read and write instructions in the PLC program must both be assigned the same rack, module group and byte (slot), just like bi-directional block transfers to an intelligent I/O module.

Remember that each block transfer assignment in the terminal supports both a read and write block transfer file (32 words each). Do not make additional block transfer assignments unless more than this is required.

## **PLC-5/15 Block Transfer Programming Examples**

When in the “scanner mode” the PLC-5/15 can block transfer to and from connected PanelView terminals, as well as intelligent I/O modules in remote I/O racks. The PLC-5/15 processor allows block transfers to be set for either “non-continuous” or “continuous” operation. Refer to the *PLC-5/15 Processor User’s Manual* for complete details.

**IMPORTANT:** For PLC-5/15 block transfers to function properly, you must use a PLC-5/15 Series B, rev. J or later.

### **“Non-Continuous” Block Transfer Mode**

In this case, each time the block transfer instructions are complete, they are re-enabled when the next program scan occurs. The program scan time is normally short enough that block transfer timing will be more than adequate. This method guarantees that the order of queuing follows the order scanned in the PLC program.

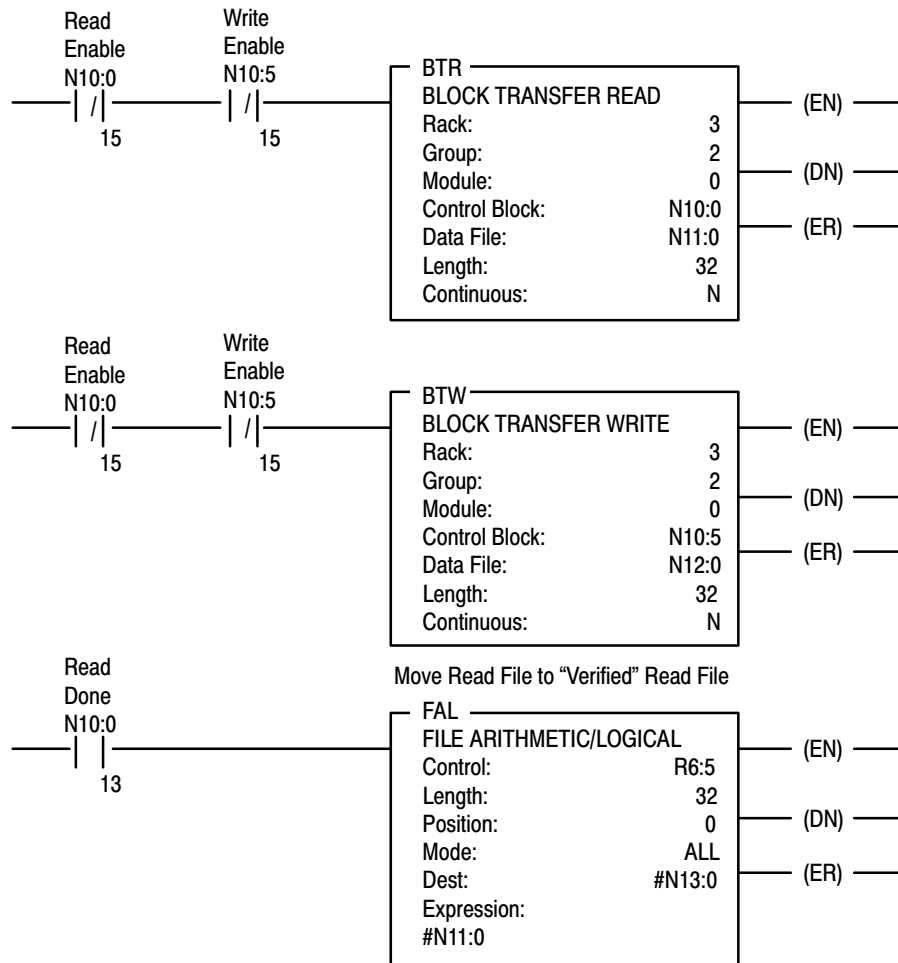
If the PLC-5/15 program requests more than one transfer to and from the same I/O chassis (or terminal) in the same program scan, the requests are placed in queue (up to 17 requests per chassis) and executed in the order requested.

Your PLC program should condition the use of block transfer data on examination of the block transfer error bit. An error may occur when the processor is switched from run mode, or when processor communications are interrupted by excessive electrical noise or by disconnection of the remote I/O cable.

### **Bi-Directional Block Transfer Example (PLC-5/15)**

Figure A.1 shows the recommended PLC programming for bi-directional block transfer communication with a PanelView terminal. The following programming method will continually execute bi-directional block transfers as quickly as the program and I/O scan allows in the non-continuous mode.

**Figure A.1**  
**Bi-Directional Block Transfer Example (PLC-5/15)**



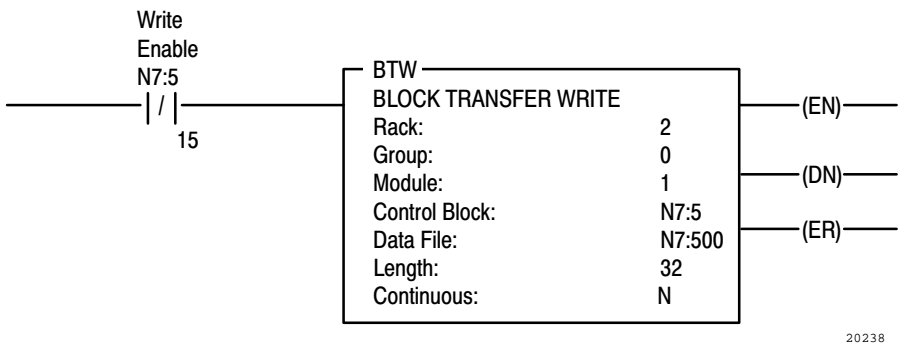
20237

Your PLC program should use the data in the “verified” read file. Because read data is presented asynchronously to the program scan, data could change during the program scan. Putting the above rungs at the beginning of the program can assure that all ladder logic sees the same data in the same program scan.



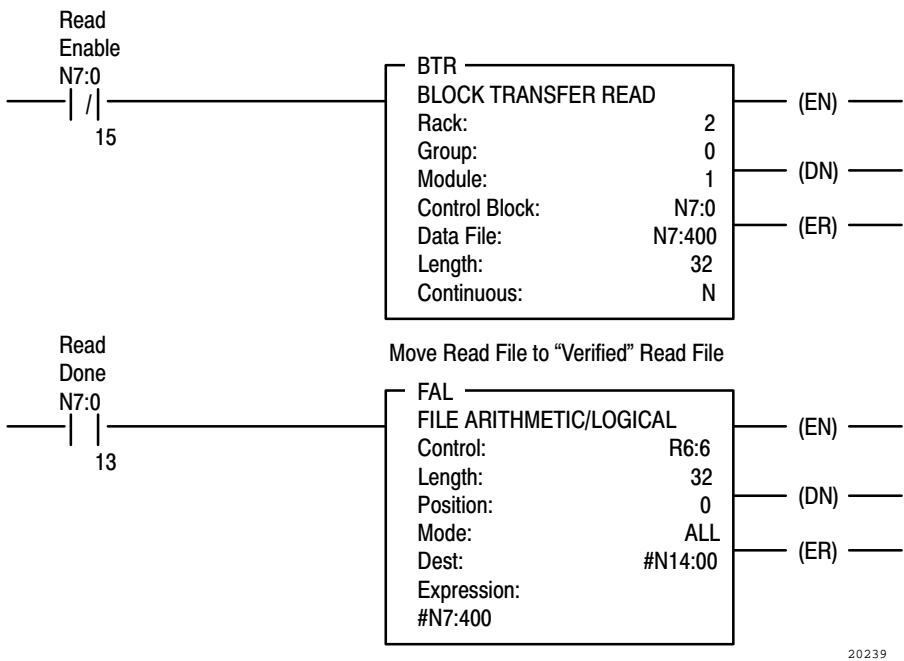
The following rung will constantly block transfer write to a PanelView terminal.

**Figure A.2**  
**Block Transfer Write Example (PLC-5/15)**



The following rung will constantly block transfer read from a PanelView terminal.

**Figure A.3**  
**Block Transfer Read Programming (PLC-5/15)**



The PLC program should use the “verified” read data.

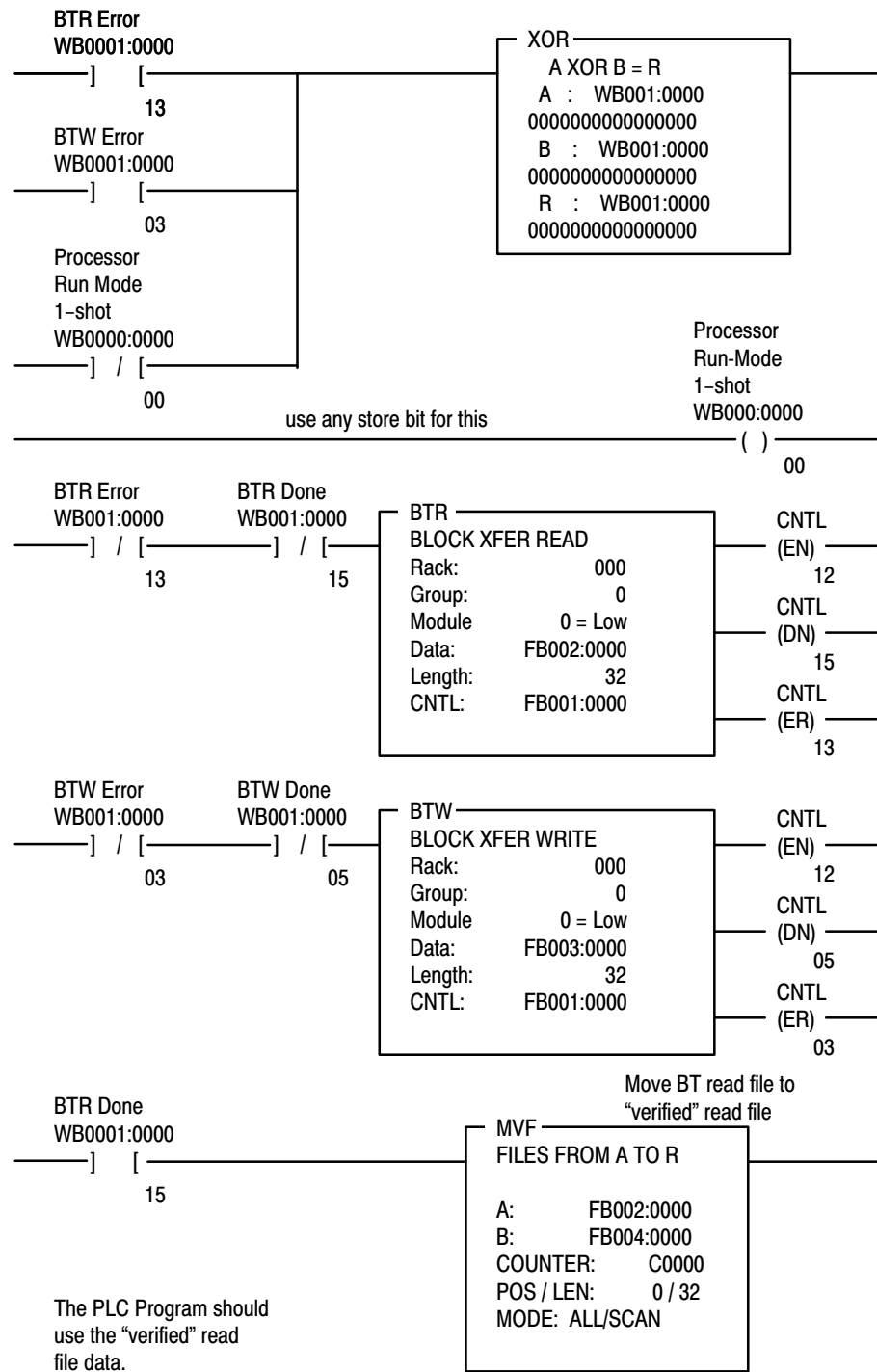
**IMPORTANT:** When moving data from one type of data table section to another, the FAL instruction will convert the data format (such as integer to Floating Point). Use the “File Copy” instruction if this is not desired.

### **PLC-3 Block Transfer Programming Examples**

The following rungs will provide constant bi-directional block transfer communication with a PanelView terminal.

**IMPORTANT:** If using a 1775-S4A Remote I/O Scanner, you must use 1775-S4A Series B or later.

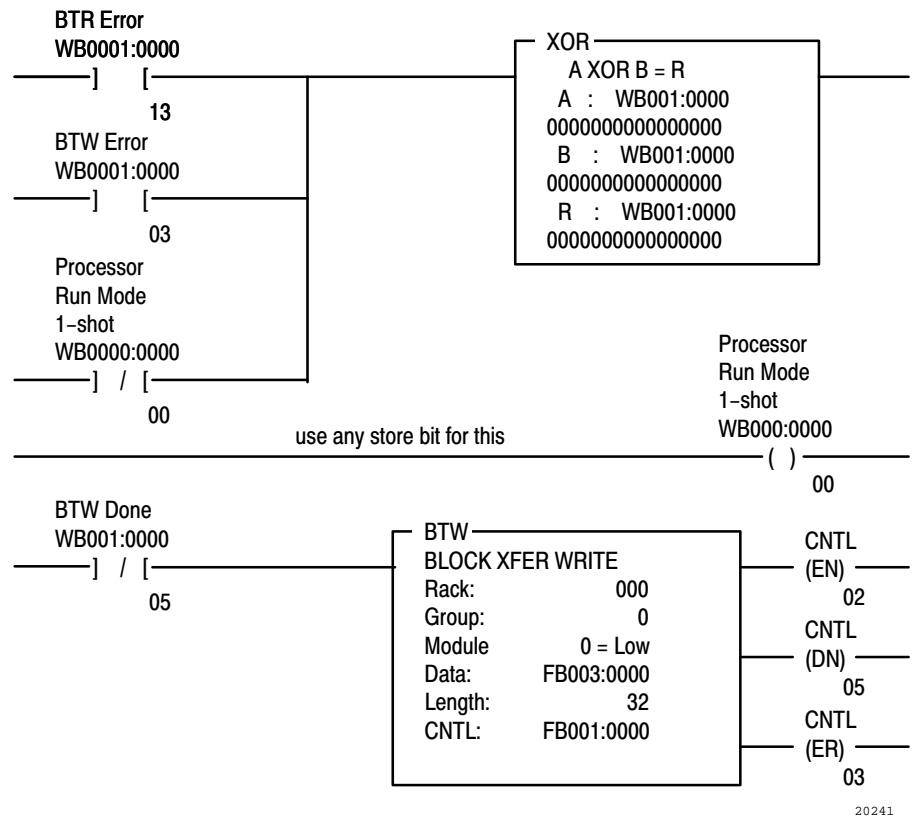
Figure A.4  
Bi-directional Block Transfer Example (PLC-3)



20240

The following rungs will constantly block transfer write to a PanelView terminal.

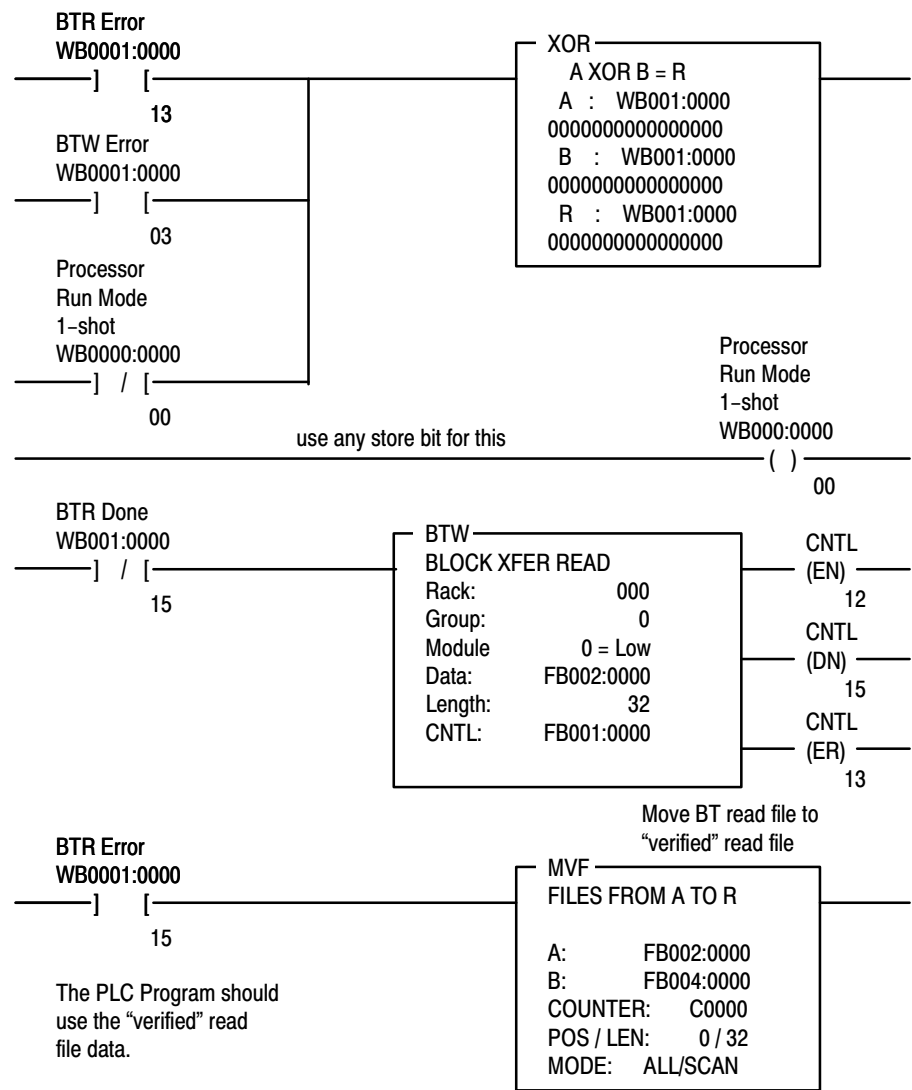
**Figure A.5**  
**Block Transfer Write Example (PLC-3)**



20241

The following rungs will constantly block transfer read from a PanelView terminal.

Figure A.6  
Block Transfer Read Example (PLC-3)

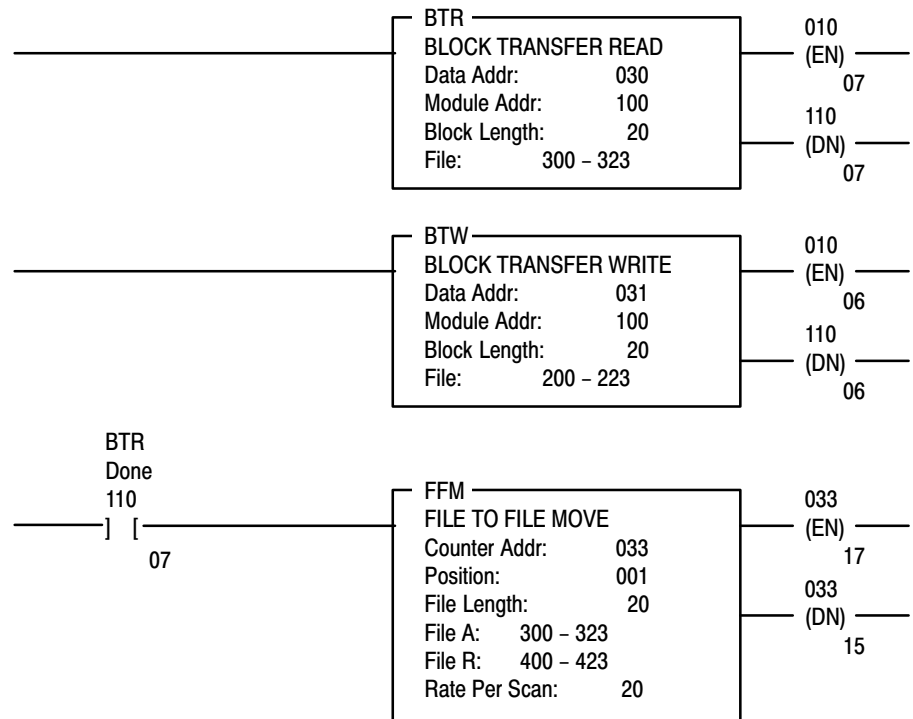


20242

### PLC-2/30 Block Transfer Programming Example

The following rung moves the block transfer read data into a “verified” block transfer read file. The PLC program should only use data from the “verified” read file.

**Figure A.7**  
**Bi-directional Block Transfer Example (PLC-2/30)**



20243

To block transfer in a single direction, program a rung similar to the corresponding block transfer rung shown above. Each block transfer read instructions data should always be “verified” with a “file to file move” as shown above.

**IMPORTANT:** If using a 1772-SD2 Remote I/O Scanner with a PLC-2/30, you must use 1772-SD2 rev. 3 or later.

### Configuring a PLC-5 for Multi-Chassis I/O Rack Addressing

Use PLC-5 6200 software to configure a PLC-5/15 or 5/25 for communication with remote I/O devices such as a PanelView terminal.

To use the following procedure your system must have this software:

- PLC-5 6200 software release 2.2 or later

As well, you must have one of these PLC controllers:

- PLC-5/15 Series B, rev. H or later

- PLC-5/25 Series A, rev. D or later

Other PLC-5 processors released after the date of this publication also support this function.

1. Put the PLC controller in the Program Mode or the Remote Program Mode.
2. From the first screen of the software, press F1—*Online Prg/Doc*.
3. Press F8—*Monitor File*.
4. Create an Integer File for I/O Status—two words are required for each rack.

Press F7—*General Utility*

Press F1—*Memory Map*

Press F6—*Create DT (data table) File*

**Example:** Entering N10:13 creates an Integer File 10 with words (0–13). This is 2 words for each of the 7 remote racks that may be connected to a PLC-5/25.

5. Assign the Integer File created in step 4 to the I/O Status.

From the General Utility screen, press F2—*Processor Status*.

Enter the Integer File number into the area called I/O Status File—located in the lower center area of the screen.

**Example:** If you created File N10:13 as in the example in step 4, you would enter 10.

6. Configure the processor to recognize all of the remote I/O devices connected to the remote I/O link.

From the Processor Status screen, press F3—*I/O Status*.

Press F1—*Autoconfigure*.

This will check all of the devices connected to the remote I/O link, set the proper bits in the I/O status file, and display the setup on the I/O status screen.

### **Using PLC-2s and a 1771-SN Subscanner with PanelView**

When using a PLC-2 (2/05, 2/15, 2/16, 2/17), the system must contain a 1771-SN subscanner module. The PLC-2 processors do not have built-in remote I/O capabilities, but the 1771-SN subscanner module can communicate with remote devices such as PanelView. The subscanner must be located in the same rack as the PLC-2, and communicate to the PLC controller by means of block transfers. The 1771-SN looks like an intelligent I/O module to the PLC controller; it monitors discrete inputs and controls discrete outputs.

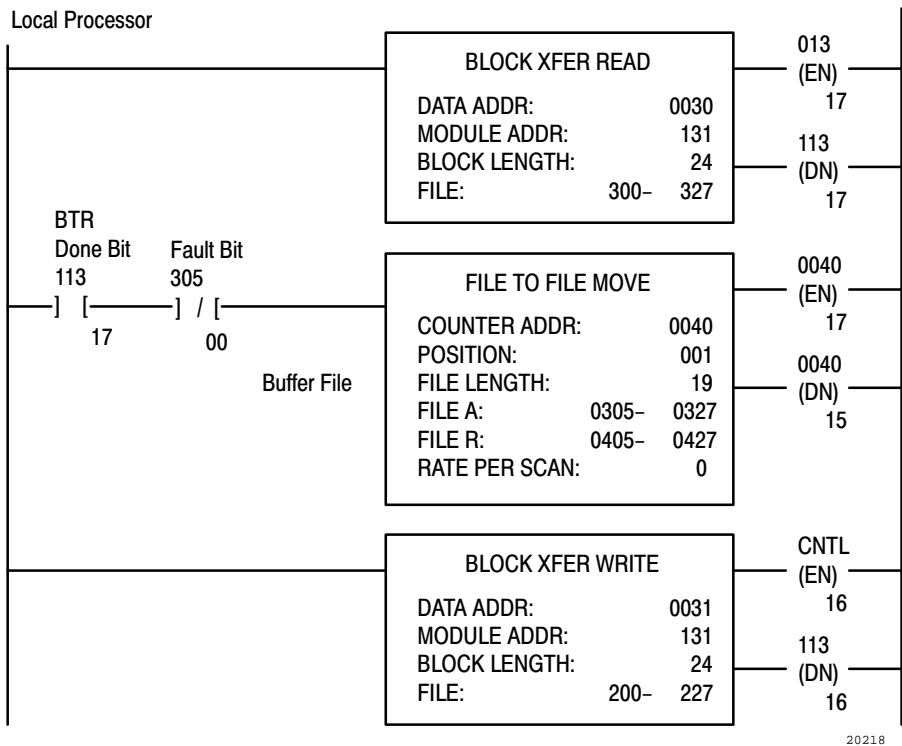
The 1771-SN requires one PLC scan to receive the output data from the output image table and another PLC scan to send discrete input data to the input image table. Any devices connected to the subscanner are scanned asynchronous to the PLC scan. The PLC controller then scans the subscanner module during the I/O portion of the PLC scan.

You can connect up to seven remote I/O racks to the 1771-SN. Set switches 1 through 7 on Switch bank 1 of the 1771-SN module to correspond with the assigned remote I/O racks.

Your ladder program instructions should include read and write block transfer instructions and a file move instruction (see Figure A.8). The block length of each block transfer instruction is 24 words (assuming remote I/O rack numbers 1 and 2). It is recommended that you select the default block length (00) for the module, which permits it to automatically select the proper number of block transfer data words. Whether or not you condition your block transfer rungs depends on your application requirements. If you enable both the read and write block transfer instructions in the same scan, the module performs bi-directional block transfers starting with a read.



**Figure A.8**  
**Block Transfer Programming Example for Local PLC-2 Family Processor**

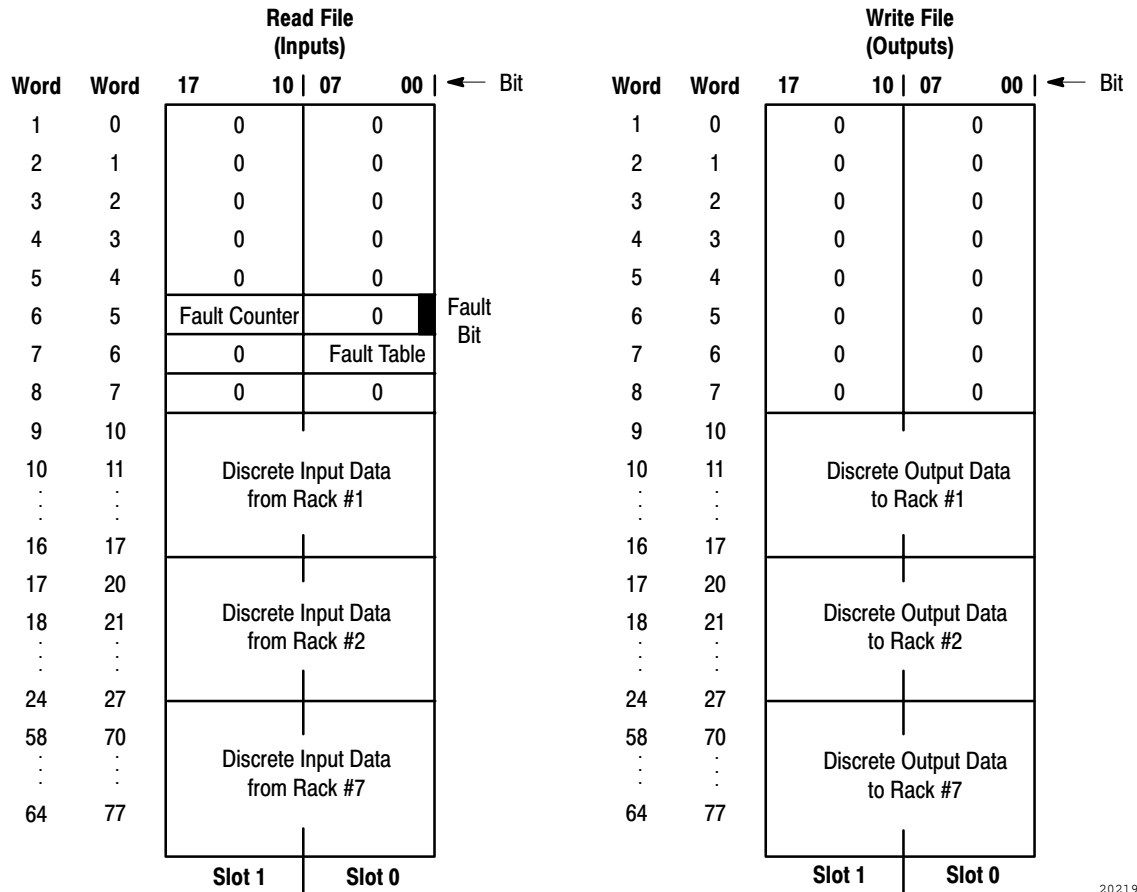


### Input Data (Block Transfer Read)

The 1771-SN formats input data received from the PanelView terminals and block transfers this data to the PLC processor when enabled by your ladder diagram program. Eight words are reserved for I/O data from each full remote I/O chassis (Figure A.9). Do not use the first eight words (0 through 7 octal) for data from input modules. The remaining words (10–77 octal) correspond to Remote I/O rack numbers 1–7. For example, word 10 (octal) corresponds to module group 0 of rack number 1. The most significant byte is slot 1, the least significant byte is slot 0.

The reason for the additional length of BTR and BTW files is addressing convenience. Word addresses for assigned rack 1 are 10–17, assigned rack 2 are 20–27, assigned rack 3 are 30–37, etc., in both files.

**Figure A.9**  
**Input and Output Data Files**



20219

## Output Data (Block Transfer Write)

Use a format similar to input data (Figure A.9). Reserve eight words of output data for each full remote I/O chassis. Do not use the first eight words. Remote I/O addresses corresponding to rack numbers 1 and 2 start at words 10 and 20 octal, respectively.

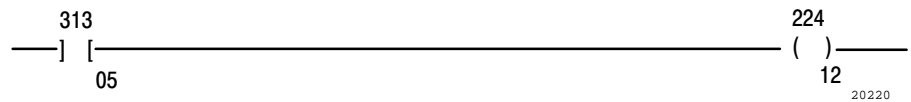
## Block Transfer Write File

Assign write block transfer file for sending output data via the 1771-SN to the PanelView terminal. Output data for rack 1 uses words 10 through 17 octal, and rack 2 uses words 20 through 27 octal. For example, you could assign a write file at 200 through 227 (octal). Choose your own method for moving output data into the BTW file.

## Ladder Program for Remote I/O

Remote I/O addresses correspond to the addresses in the block transfer read and write files, with inputs to the read file and outputs to the write file. For example, you would monitor an input in rack 1, module group 3, bit 5, and energize an output in rack 2, module group 4 bit 12, as follows, based on example block transfer files (Figure A.8) at 300 (read) and 200 (write).

**Figure A.10**  
**Ladder Program for Remote I/O**



## System Response Times

Although system response times are quite predictable, they are very application dependent. Methods for determining response times differ, depending on the type of PLC processor and the PLC system configuration.

### Discrete Data Response Time

The following formula can generally be used to determine the worst case time (in ms) required to transfer data to or from the terminal. This includes the terminal's input or display processing time:

$$\text{Program Scan Time} + \text{I/O Scan time} + \text{Terminal Process Time}$$

### Program Scan Time

This determines how quickly the PLC program can update or act on the discrete data. Subroutine and/or "immediate I/O" instructions are sometimes used to reduce the effective program scan time when necessary.

The program scan depends on the type of PLC processor and PLC program size. Refer to your programmable controller user's manual. Some typical program scan times include the following:

**Table A.A**  
**Typical Program Scan Times**

PLC-2/30	1772-LP1, LP2, LP3	5	ms/k
PLC-3	1775-L2	2.5	ms/k
PLC-3/10	1775-LP4, LP8	2.5	ms/k
PLC-5/15		2	ms/k

### **I/O Scan Time**

This depends on the type of processor/scanner and number of I/O chassis on the same scanner channel. Refer to the applicable PLC controller or I/O scanner user's manual. Typical Discrete I/O scan times are as follows :

**Table A.B**  
**Discrete I/O Scan Times**

PLC-2/30, (1772- SD, SD2) 1771-SN PLC-5/15	7 ms / chassis
PLC-3 PLC-3/10	6 ms / chassis on same channel

For the PLC-2/30, also include the synchronous “program I/O scan time” which is typically .5 ms per local I/O rack.

### **Terminal Process Time**

The terminal process time is the display update time, and it depends on which screen is being displayed. Typically, the update time will be less than 2 ms per dynamic object on the screen being displayed. If the alarm window is enabled and is scanning a large bit file, the display update time may increase slightly.

### **Block Transfer Timing Considerations**

Block Transfer timing depends on the specific processor type and I/O configuration. Refer to your PLC user's manual for specific block transfer information.

Typically, the equations provided in this section will not be necessary. However, when response time is critical, or many block transfer devices are used in an application, this section can be used as a guideline.

A typical remote I/O block transfer takes anywhere from 55 to 200 ms to complete, depending on factors such as PLC processor type, program scan time, I/O scan time, number of block transfers on the same channel, and number of block transfers in the queue. These typical times could become much greater if recommended practices are not considered.

### **Recommended Practices**

The most significant factors determining block transfer times are as follows:

#### **Number of Block Transfers on the Same Scanner Channel**

Remote I/O scanners generally will perform only one block transfer for each chassis (Rack Assignment terminal) in a given I/O scan. Remaining block transfer requests will be queued. Do not assign more PanelView terminal block transfers than necessary—in other words a 32 word block transfer is much faster than two 16 word block transfers.

If many other intelligent block transfer I/O modules are on the same channel, consider enabling them sequentially and only as often as necessary. This will improve the response times of those block transfers that are more critical. PanelView terminal block transfers are normally programmed for constant operation to meet operator interface needs.

If more than one I/O scanner channel is available, and many block transfer devices are involved, block transfer times will be improved by distributing those devices evenly among the channels. Alternatively, non-critical block transfers could be grouped separately on a less critical I/O channel.

#### **Number of I/O Chassis on the Same Scanner Channel**

I/O scan time is mainly determined by the number of chassis on the same scanner channel, and is also a significant factor in block transfer timing as well as discrete data transfer times. If more than one scanner channel is available, it may be desirable to distribute I/O chassis (or terminals) evenly among the available channels.

### **Program Scan Time**

An excessively long program scan can be a limiting factor in block transfer timing. This usually only applies to larger PLC-3 applications. In these cases, the effective program scan can be cut in half by creating a sub-routine which could be accessed from different points in the program. The effective update times of the programming within the sub-routine would be reduced.

Real time interrupt programming is another alternative.

### **PLC-5 Block Transfer Timing**

In this case, the worst case time to transfer input or display data to or from the PLC controller can be determined by the following formula:

$$IE + WQ + TT + TP$$

IE =	Instruction Execution Time
WQ =	Wait time in Queue
TT =	Transfer Time
TP =	PanelView Terminal Process Time

To determine the terminal's worst case display update time for PLC data resulting from an operator input, multiply the above result by two, and add the PLC program scan time.

### **Instruction Execution Time (in microseconds)**

$$\text{Write:} \quad 310 + 11.2Q + 5.4W$$

$$\text{Read:} \quad 250 + 11.2Q$$

Q = Number of Queued block transfer requests to the same I/O chassis (terminal) with the continuous bit set.

W = Number of Transfer Words

### **Wait Time in Queue**

This is the sum of the "transfer times" yet to occur, ahead of the subject block transfer request to the same I/O chassis/terminal.

### **Transfer Time**

The transfer time is the time required to actually transfer the data to or from the terminal. This period of time starts when the read or write block transfer instruction sets the start bit and ends when it sets the done bit. The length of transfer time depends on whether the transfer is to/from a local chassis or a remote chassis (such as a terminal).

**Table A.C**  
**Transfer Times for PLC-5/10/12/15/25 at 57.6K Baud**

Transfer	Local Chassis	Remote Chassis
Read	$0.9 + 0.1 W$ ms	$9 + 21.3 C + 0.3 W$ ms
Write	$0.9 + 0.1 W$ ms	$13 + 30 C + 0.3 W$ ms

**Table A.D**  
**Transfer Times for PLC-5/40/60 at 57.6K Baud**

Transfer	Local Chassis	Remote Chassis
Read	$0.9 + 0.1 W$ ms	$4 + 8 C + 0.3 W$ ms
Write	$0.9 + 0.1 W$ ms	$4 + 8 C + 0.3 W$ ms

C = number of remote I/O chassis  
W = number of transfer words

Some typical transfer times with no requests in the queue are as follows:

**Table A.E**  
**Typical Transfer Times**

Transfer	Number of Words	Local Chassis	Remote /w 3 Chassis on Channel
Read	10	1.9 ms	54 ms
Write	10	1.9 ms	79 ms
Read	32	4.1 ms	61 ms
Write	32	4.1 ms	86 ms

### Terminal Process Time

Terminal process time is less than 2.0 ms (typical) per dynamic object on the screen being displayed.

### Program Scan Time

The block transfer timing formula does not include the PLC program scan time (PS). The PLC-5 processor can execute block transfer instructions asynchronously to the program scan, reducing the affect of the program scan time. However, your program scan time will affect how quickly the PLC data can be updated or acted on by other parts of the PLC program. **This can be calculated by adding the program scan time to the formula ( $IE + WQ + TT + TP$ ).** Sub-routines or “immediate I/O” instructions can be used to reduce the effective program scan time.

### **PLC-3 Family Block Transfer Timing**

A typical PLC-3 application might have the following configuration:

- 3 active I/O channels on one scanner
- 4 block transfer device on each channel
- 4 I/O chassis on each active channel
- 10 dynamic objects on PanelView screen

In this case, the typical time required for block transfer data to be transferred to or from a PanelView Terminal (including terminal's display or input processing time) would be approximately 883 ms.

### **Calculating PLC-3 Block Transfer Timing**

To calculate the typical time required to transfer “block transfer data” to or from a PanelView Terminal (including terminal's input or display processing time), the following formula can be used:

$$\text{Time (read or write)} = \text{PS} + 2[\text{CT}] + \text{TP}$$

PS =	Program Scan Time
CT =	Channel Time
TP =	PanelView Terminal Process Time

The following pages explain how to determine the above parameters.

### **Program Scan Time**

The PLC-3 program scan time is typically 2.5 ms per 1K, when using a mix of examine on/off and block instructions (1 ms/K for examine on/off instructions only).

### **Channel Time**

The time required for the scanner to complete a read or write depends on the number of other block transfer devices on the same channel that are enabled simultaneously. Channel Time (CT) is the time required for the scanner to complete all block transfers on a particular channel. This will be the time intervals between block transfers. Use the following formula to determine CT—“channel time”:

$$\text{CT} = [\text{Nominal Time} \times \text{Number of BT on Channel}] + [\text{Number of Chassis in Rack List} - 1] \times 9 \text{ ms}$$



### Nominal Time

Use the table below to determine your “nominal time”. This will depend on the number of channels (1–4) supporting block transfers, and the number of active channels on the scanner.

**Table A.F**  
**Determining Nominal Time**

No. of Channels with Block Xfer Devices	1 Active Channel	2 Active Channels	3 Active Channels	4 Active Channels
1	40	52	54	58
2	--	67	68	76
3	--	--	98	99
4	--	--	--	123

### Number of BT on Channel

This is the total number of block transfer devices on the scanner channel that are enabled simultaneously.

### Number of Chassis in Rack List

This is the total number of chassis that are connected to the scanner channel.

### Terminal Process Time

Terminal process time is less than 2.0 ms (typical) per dynamic object on the screen being displayed.

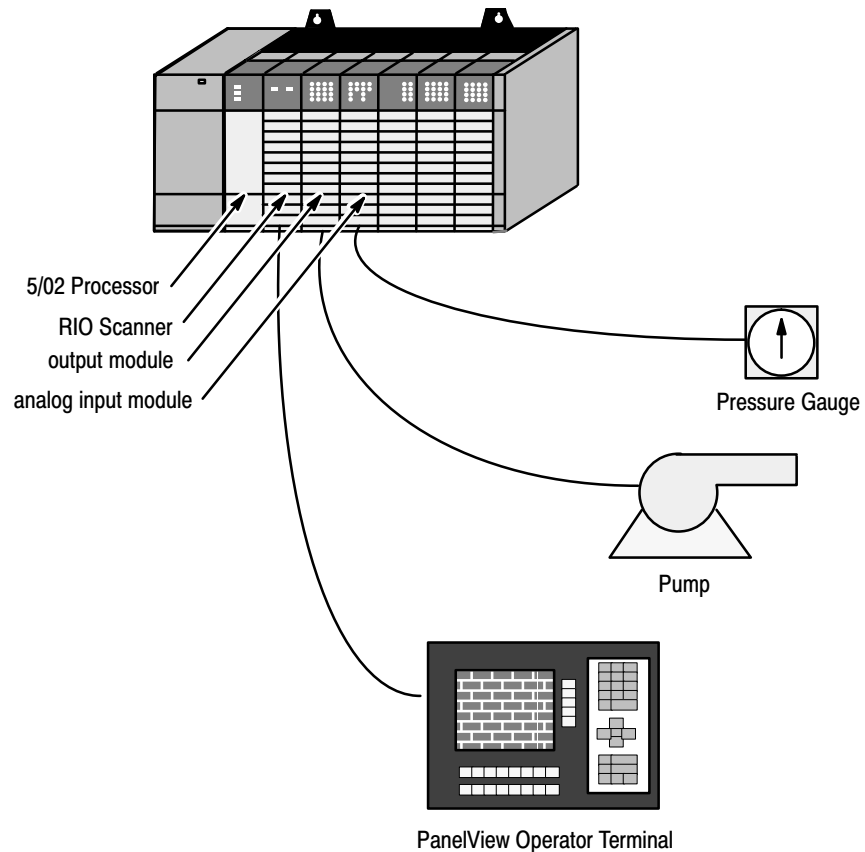
### SLC 5/02 Programming Example

In the following example, a color Keypad PanelView terminal is used to control a pump and display its ON/OFF status and pressure. The pump is connected to an output module and a pressure gauge is connected to an analog input module. The system consists of:

- a 1747–L524 processor (5/02) in slot 0
- a 1747–SN scanner (RIO Scanner) in slot 1
- an output module in slot 2
- an analog input module in slot 3

- a pump connected to the output module
- a pressure gauge connected to the input module
- a color Keypad PanelView terminal

**Figure A.11**  
**Hardware Programming Example**



- As shown in the G file, which follows, the PanelView terminal is configured as a one and three quarter device beginning at rack 2, starting group 0. The scanner addresses the PanelView terminal as if it were two devices, one full rack and another three quarter rack.

**Figure A.12**  
**G File**

	RIO Rack 3 Starting Group				RIO Rack 2 Starting Group				RIO Rack 1 Starting Group				RIO Rack 0 Starting Group			
Device Address, Word 1	6	4	2	0	6	4	2	0	6	4	2	0	6	4	2	0
Device Size, Word 2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0

- The scanner input file is shown below. The output file is similar, it is addressed O:1.16 to O:1.29.

**Figure A.13**  
**1747-SN I/O Image Table**

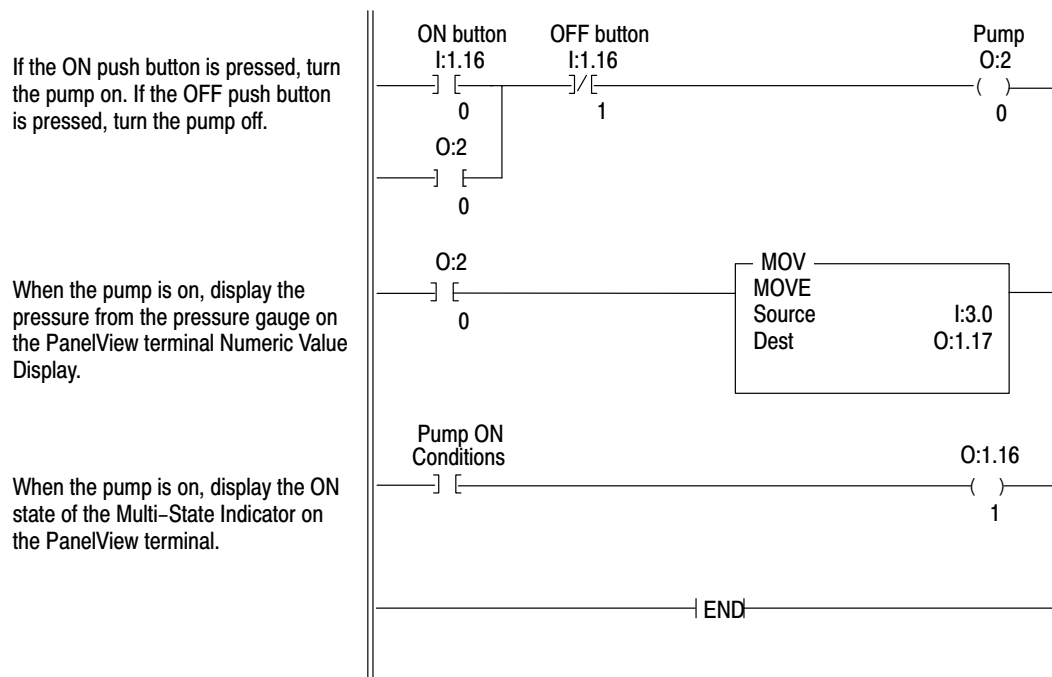
SLC Bit Number		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Input File
<b>Rack 0</b>	Rack 0 Group 0 Word 0							not used										I:1.0
	Rack 0 Group 1 Word 1							not used										I:1.1
	Rack 0 Group 2 Word 2							not used										I:1.2
	Rack 0 Group 3 Word 3							not used										I:1.3
	Rack 0 Group 4 Word 4							not used										I:1.4
	Rack 0 Group 5 Word 5							not used										I:1.5
	Rack 0 Group 6 Word 6							not used										I:1.6
	Rack 0 Group 7 Word 7							not used										I:1.7
<b>Rack 1</b>	Rack 1 Group 0 Word 8							not used										I:1.8
	Rack 1 Group 1 Word 9							not used										I:1.9
	Rack 1 Group 2 Word 10							not used										I:1.10
	Rack 1 Group 3 Word 11							not used										I:1.11
	Rack 1 Group 4 Word 12							not used										I:1.12
	Rack 1 Group 5 Word 13							not used										I:1.13
	Rack 1 Group 6 Word 14							not used										I:1.14
	Rack 1 Group 7 Word 15							not used										I:1.15
<b>Rack 2</b>	Rack 2 Group 0 Word 16																	I:1.16
	Rack 2 Group 1 Word 17																	I:1.17
	Rack 2 Group 2 Word 18																	I:1.18
	Rack 2 Group 3 Word 19																	I:1.19
	Rack 2 Group 4 Word 20																	I:1.20
	Rack 2 Group 5 Word 21																	I:1.21
	Rack 2 Group 6 Word 22																	I:1.22
	Rack 2 Group 7 Word 23																	I:1.23
<b>Rack 3</b>	Rack 3 Group 0 Word 24																	I:1.24
	Rack 3 Group 1 Word 25																	I:1.25
	Rack 3 Group 2 Word 26																	I:1.26
	Rack 3 Group 3 Word 27																	I:1.27
	Rack 3 Group 4 Word 28																	I:1.28
	Rack 3 Group 5 Word 29																	I:1.29
	Rack 3 Group 6 Word 30							not used										I:1.30
	Rack 3 Group 7 Word 31							not used										I:1.31
PanelView Bit Number (octal)		17 <sub>8</sub>	16 <sub>8</sub>	15 <sub>8</sub>	14 <sub>8</sub>	13 <sub>8</sub>	12 <sub>8</sub>	11 <sub>8</sub>	10 <sub>8</sub>	7 <sub>8</sub>	6 <sub>8</sub>	5 <sub>8</sub>	4 <sub>8</sub>	3 <sub>8</sub>	2 <sub>8</sub>	1 <sub>8</sub>	0 <sub>8</sub>	

## Scanner Configuration

- The baud rate is 115.2K. Dip switch 1 should be in the ON position, dip switch 2 should be OFF.

- The G file size is set to 3 using the *Specialty I/O Configuration* function. The M0 and M1 file sizes are set to 32 in the *Advanced Set Up* function.
- Since only the first 30 words of the input and output files contain valid information, the scanned input and output words can be set to 30. Reducing the number of scanned input and output words decreases your SLC scan time.
- Configuration information is entered in the *Modify G File* function. Word 0 is reserved and therefore cannot be modified. Word 1 indicates the starting address of the device, word 2 indicates its size.

**Figure A.14**  
**Sample SLC Ladder Logic**



#### Scrolling List Example

In this example you create a Scrolling List in a keypad terminal that allows you to monitor an automobile luxury option assembly operation. This example is part of the demonstration files that are provided with the PanelBuilder software.

The Scrolling List object allows you to control a sequential assembly operation with up to 999 individual steps. This example demonstrates an assembly operation of 57 sequential station operations.

The Scrolling List object allows you to scroll through all 57 assembly stations, five at a time. The table below lists the 57 luxury option stations.

**Table A.G**  
**Automobile Luxury Option Stations**

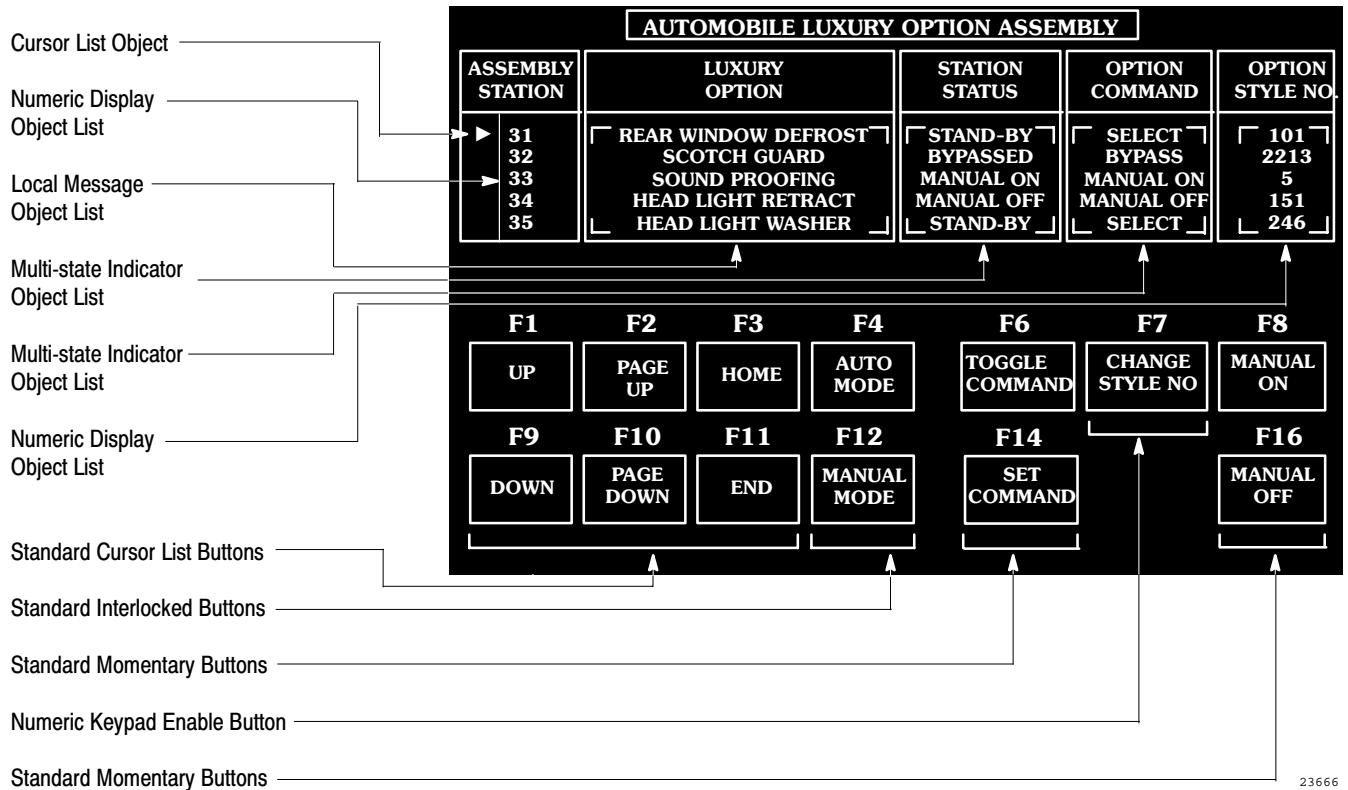
1. AM/FM Radio	20. Mahogany Dash	39. Deluxe Mud Flaps
2. Cassette Player	21. Tilt Wheel	40. Front Spoiler
3. CD Player	22. Leather Seats	41. Rear Spoiler
4. Sound Equalizer	23. Split Seats	42. Cruise Control
5. Speakers Plus	24. Bucket Seats	43. Air Ride
6. Power Antenna	25. Mileage Computer	44. Gold Trim
7. CB	26. Pin Striping	45. Door Guards
8. Phone	27. Sports Gauge	46. Password Locks
9. Television	28. Window Speedo	47. White Walls
10. Power Windows	29. Voice Computer	48. Wire Wheels
11. Power Locks	30. Glove Bar	49. Mags
12. Power Seat Driver	31. Rear Window Defrost	50. Air Scoop
13. Power Seat Passenger	32. Scotch Guard	51. Turbo Plus
14. Tint Glass	33. Sound Proofing	52. Security Plus
15. Vanity Mirror	34. Headlight Retract	53. Sun Roof
16. Vanity Lights	35. Headlight Washer	54. Party Trunk
17. Cup Caddy	36. Fog Lights	55. Luggage Rack
18. Tape Storage	37. Deer Alert	56. Trailer Package
19. Wet Bar	38. Bumper Guards	57. Search Light

Creating a Scrolling List with some additional button objects will allow you to monitor and control the entire operation, using either manual or automatic modes. To build the Scrolling List, you must first create a cursor list. Then you will create three different types of object lists:

- Multi-State Indicator Object Lists
- Numeric Data Display Object Lists
- Local Message Object List

The following illustration shows how the screen for the Automobile Luxury Option Assembly Scrolling List will appear in a keypad terminal when you have finished it.

**Figure A.15**  
**Automobile Luxury Option Assembly Scrolling List Screen**



### Step 1: Create the Cursor List

As the previous figure shows, the cursor list includes the cursor and the standard cursor list buttons.

When you define the cursor list, you also need to define the main scrolling list parameters. How you define these determines the size of the scrolling list, and how the cursor and buttons function with the object lists.

For this example, you will want to use the parameters and addresses shown in the following two tables:

**Table A.H**  
**Defining the Scrolling List Object Parameters**

Scrolling List Object Parameters	Quantity
Number of States	57
Number of Visible States	5
Number of Preview States	1

**Table A.I**  
**Defining the Cursor List Object Addresses**

Cursor List Object Addresses	Block Transfer Address	Number of Bits	PLC Address
Cursor Control Address	BO50	16	N30:10
Cursor Indicator Address	BI50	16	N30:1
Top Position Address	BI51	16	N30:2
Enter Key Control Address	Not used		
Enter Key Handshake Address	Not used		

After you have defined the Cursor List object addresses, you are ready to begin creating the object lists.

## Step 2: Create the Object Lists

To monitor and control all the stations of the Automobile Luxury Options Assembly, you will create these five object lists:

- Two Numeric Data Display Object Lists
- Two Multi-State Indicator Object Lists
- One Local Message Object List

In this application, each object list serves a different function. These functions are outlined below.

### Assembly Stations

A Numeric Display Object List displays the station number of the automobile assembly sequence. The station numbers range from 1 to 57. Because there are five visible states configured, there will always be five stations visible. The values displayed depend on where the cursor moves and the number of preview states selected.

### **Luxury Option**

The Local Message List contains the luxury option descriptions for each station from 1 to 57. The Local Message Object List for the Scrolling List Object displays the appropriate luxury option description for each of the five stations currently visible, based on the cursor position.

### **Station Status**

A Multi-State Indicator Object List displays the status of each of the five visible stations. The following table shows the eight different states that are possible for each station, and the PLC value.

**Table A.J**  
**Status States and PLC Values**

State	Message	PLC Value
0		0
1	Stand-by	1
2	On	2
3	Complete	3
4	Bypassed	4
5	Manual On	5
6	Manual Off	6
7	Alarm	7

### **Option Command**

A Multi-State Indicator Object List displays command state text for each of the five currently visible stations.

**Table A.K**  
**Command States and PLC Values**

State	Message	PLC Value
0		0
1	Select	1
2	Bypass	2
3	Manual On	3
4	Manual Off	4



In this example you can use a momentary button identified as TOGGLE COMMAND to toggle and display between “Select” and “Bypass” for the station currently selected by the cursor. Another momentary button, labeled SET COMMAND, activates the toggled command.

You can also modify the command for the station currently selected by pressing the standard momentary buttons “Manual On” or “Manual Off”. The PLC uses the Cursor Indicator Address to change the selected station’s command.

### Option Style Number

A Numeric Display Object List displays the style numbers of the currently visible stations. The values displayed in this list also depend on cursor movement.

The Numeric Keypad Enable Button allows you to modify the style number of the selected luxury option station in manual mode.

### Assigning Addresses for Object Lists

These tables list the addresses and files used in the example PLC program for each of the object lists.

The following table displays the addresses for each of the object lists.

**Table A.L**  
**Visible State Addresses for the Object Lists**

Object List	Visible State BLK Transfer Start Address	Number of Contiguous Addresses	Number of Bits per Address	Visible State PLC Start Address
ASSEMBLY STATION Numeric Display	BO51	5	16	N30:11
LUXURY OPTION Local Message	BO56	5	16	N30:16
STATION STATUS Multi-State Indicator	BO511	5	16	N30:21
OPTION COMMAND Multi-State Indicator	BO516	5	16	N30:26
OPTION STYLE NO. Numeric Display	BO521	5	16	N30:31

The following table displays the addresses for each of the additional buttons.

**Table A.M**  
**Addresses for Additional Buttons in the Object List**

Additional Buttons	Command BLK Transfer Address	Indicator State BLK Transfer Address	PLC Address
AUTO MODE	BI52/1 (Value = 1)		N30:3/1 (Value = 1)
MANUAL MODE	BI52/1 (Value = 0)		N30:3/1 (Value = 0)
TOGGLE COMMAND	BI52/3		N30:3/3
		BI52/1	N30:3/1
SET COMMAND	BI52/0		N30:3/0
		BI52/1	N30:3/1
MANUAL ON	BI52/4		N30:3/4
		BI52/1	N30:3/1
MANUAL OFF	BI52/5		N30:3/5
		BI52/1	N30:3/1
NUMERIC KEYPAD ENTER KEY FOR STYLE NUMBER	BI52/6		N30:3/6
CHANGE STYLE NO. CONTROL ADDR	BI53/0 — 3/15		N30:4

The following table displays the addresses for the Object List PLC files.

**Table A.N**  
**Addresses for Object List PLC Files**

Object List PLC Files	PLC File Addresses	PLC File Data Presets
ASSEMBLY STATION	N31:1 through N31:57	1 through 57
LUXURY OPTION	N32:1 through N32:57	1 through 57
STATION STATUS	N33:1 through N33:57	1
OPTION COMMAND	N34:1 through N34:57	1
OPTION STYLE NO.	N35:1 through N35:57	100

When you have assigned all the addresses for the Object List PLC files, you are ready to begin programming the PLC.

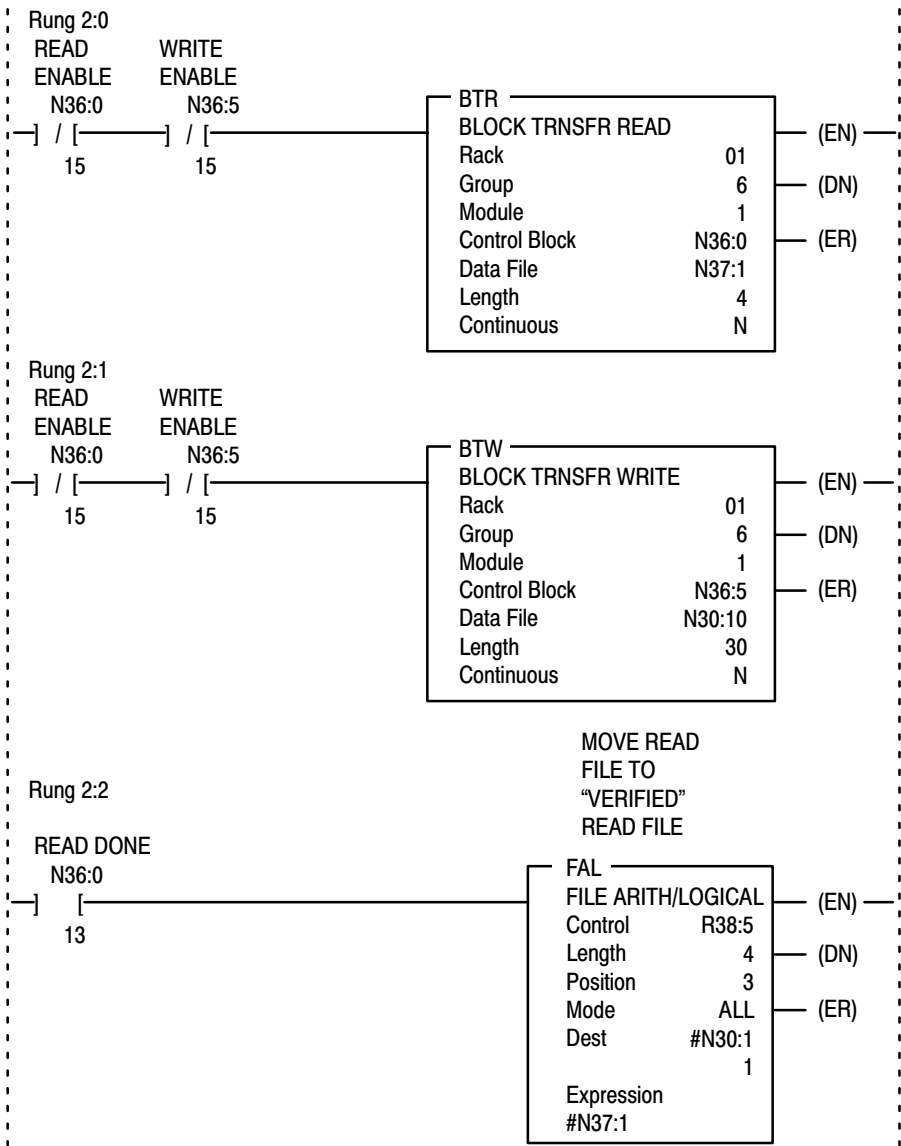
### Step 3: Program the PLC

To program the PLC, follow the ladder diagrams shown in the following pages.

Create the Block Transfer Rungs

The illustration below shows the Rungs 2:0, 2:1 and 2:2. These three rungs read and write Scrolling List data to and from the PanelView terminal. This is a bi-directional block transfer. For more information, see the Bi-Directional Block Transfer Example earlier in this chapter.

Figure A.16  
Block Transfer Rungs

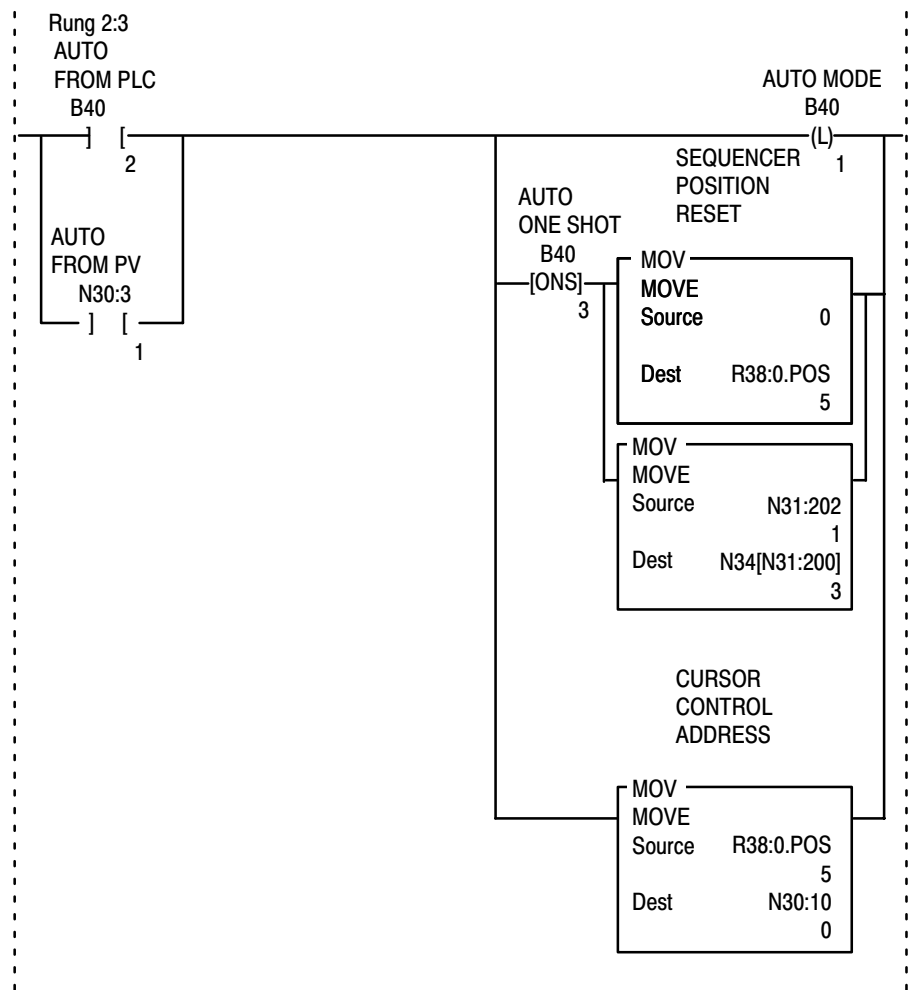


23669

### Create the Auto Mode Rung

When Rung 2:3 is energized, the Auto mode bit latches and the sequencer resets to its safe state (position 0). When the sequencer increments its position above Step 0, the Scrolling List cursor will be controlled by the PLC via the Sequencer Position Word Move to the Cursor Control Address, and the Manual Cursor List buttons are disabled automatically.

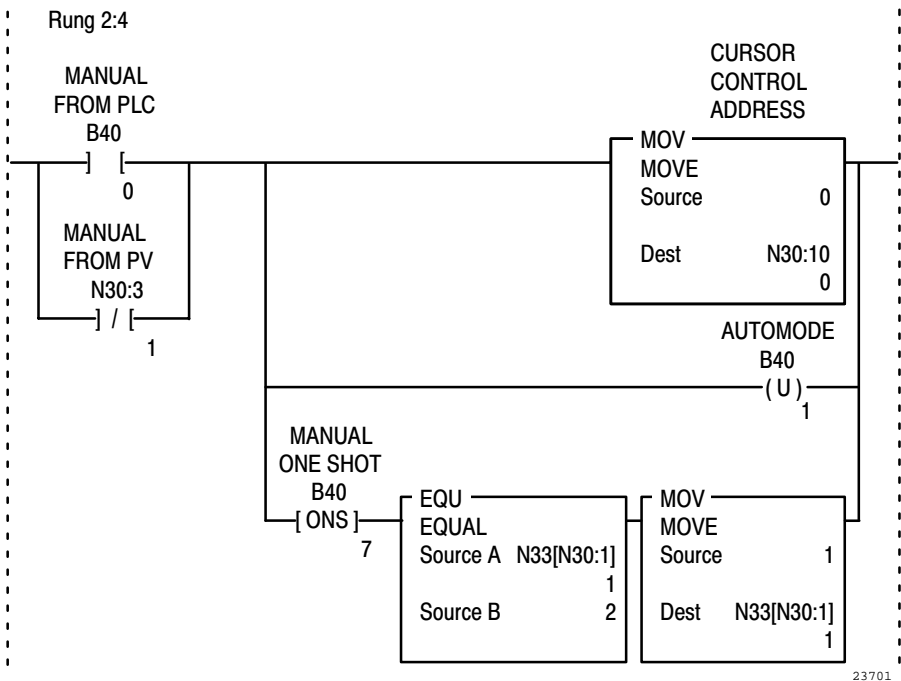
**Figure A.17**  
**Auto Mode Rung**



Create the Manual Mode Rung

Rung 2:4 places the process in Manual mode. It moves a 0 to the Cursor Control Address and permits the PanelView Cursor List buttons to control the cursor. This rung also places the currently “On” station to “Stand-By” when Auto mode is switched to Manual.

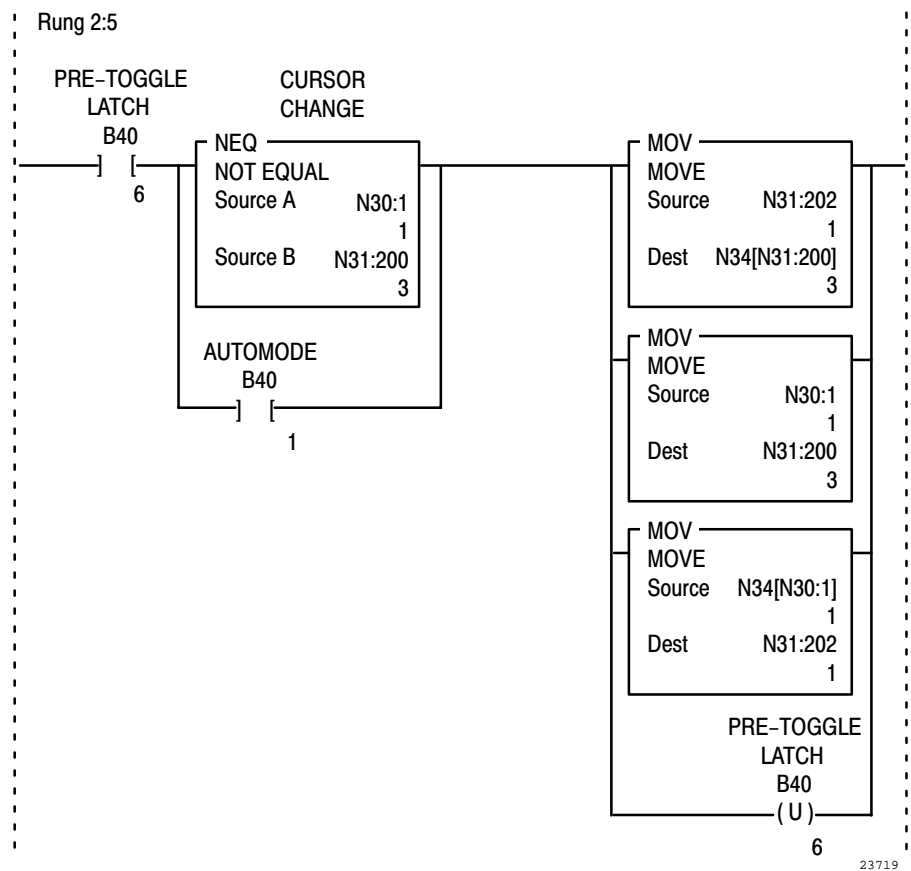
Figure A.18  
Manual Mode Rung



### Create the Toggle Command Rungs

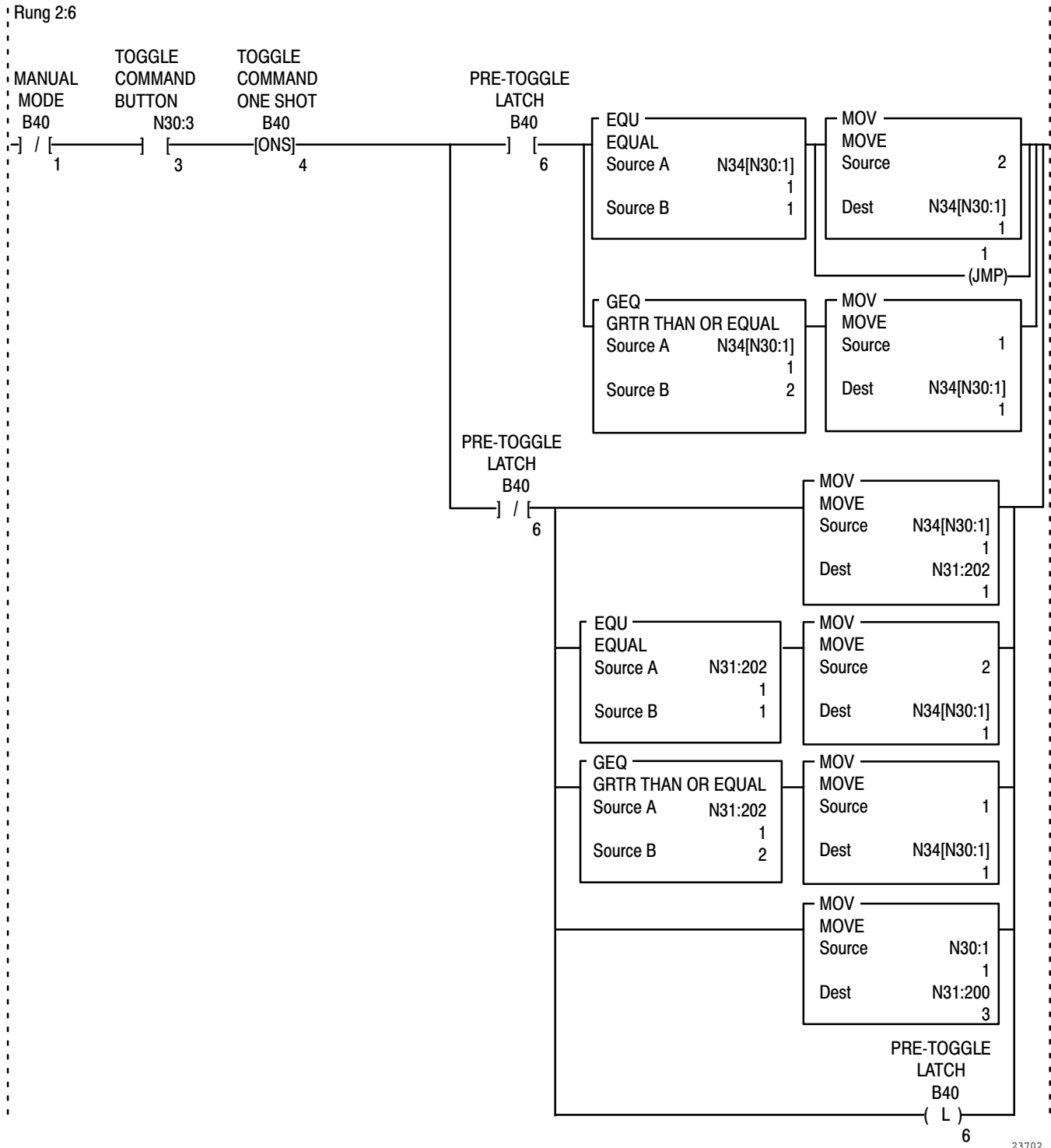
Rung 2:5 handles the toggle command variables when a cursor change or mode change occurs.

**Figure A.19**  
**Toggle Command Rung (Rung 2:5)**



Rung 2:6 toggles the command between “Select” and “Bypass” for the currently selected station.

Figure A.20  
Toggle Command Rung (Rung 2:6)

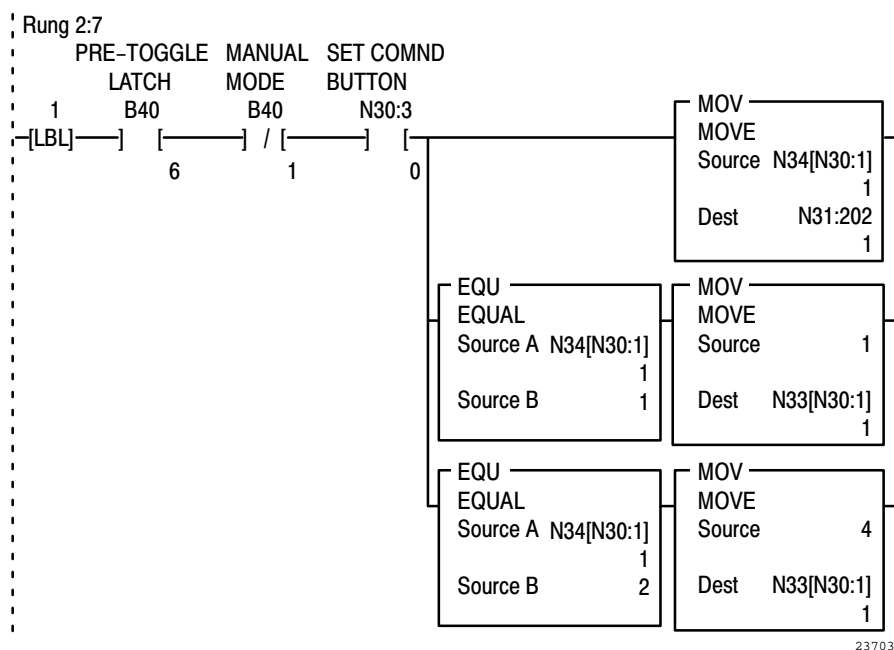


23702

### Create the Set Command Input Rung

Rung 2:7 enables the Set Command function. When the Set Command button is pressed, the currently displayed command value is placed in the command variable address. This secures the new command value when the cursor position or mode changes. This rung also sets the Station Status file according to which command is set.

**Figure A.21**  
**The Set Command Input Rung**

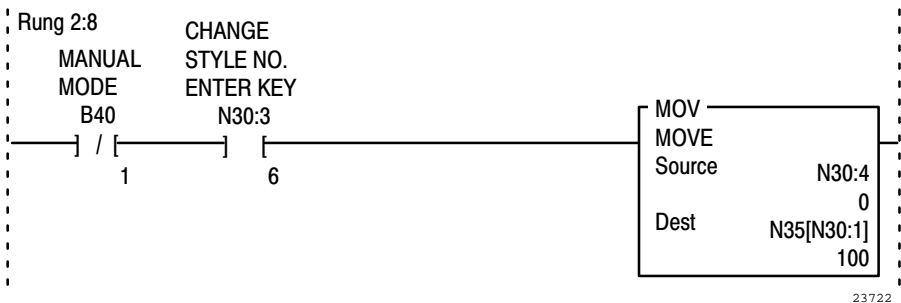




**Create the Option Style Number Input Rung**

When the operation is in Manual mode and the numeric keypad enable object Enter key is pressed, Rung 2.8 transfers the new Option style number value to the currently selected station's option style address. It uses the Cursor Indicator address as its pointer.

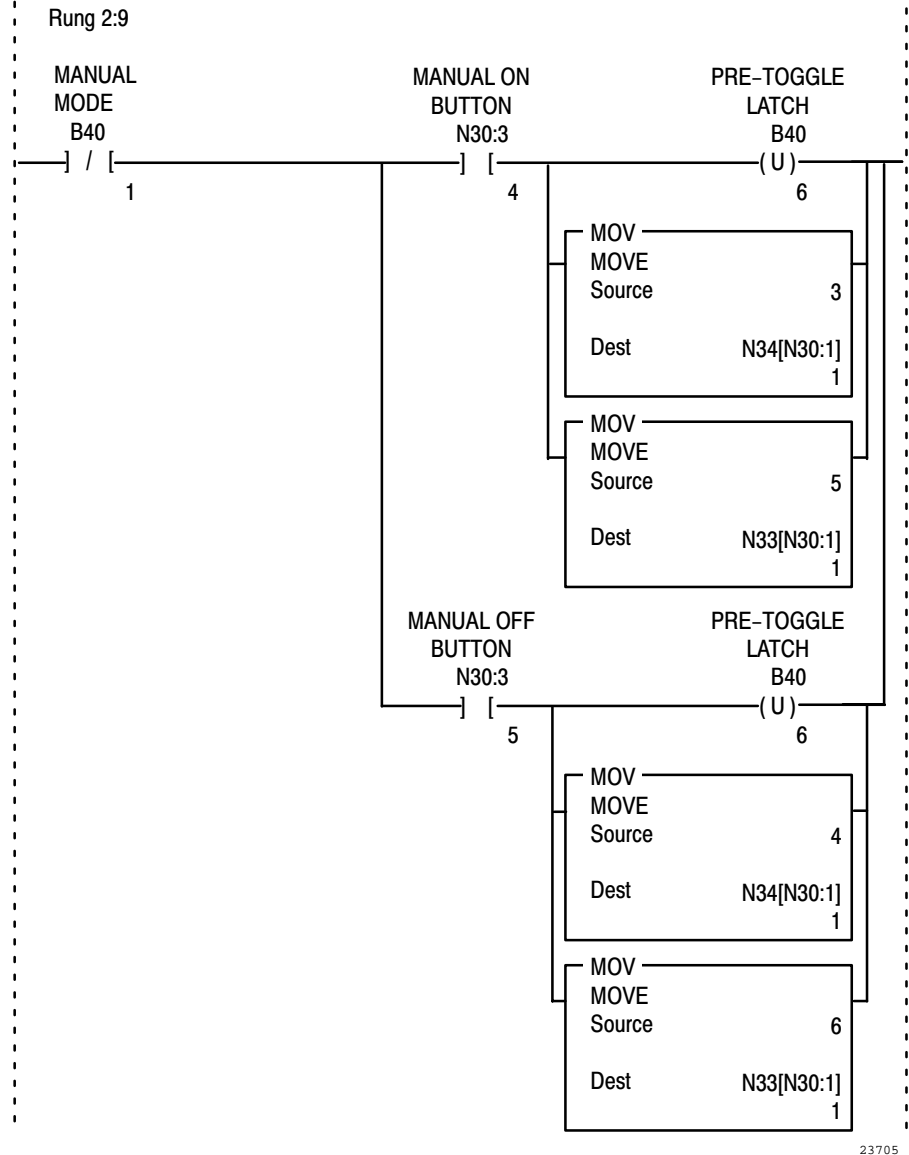
**Figure A.22**  
**The Option Style Number Input Rung**



**Create the Manual On / Manual Off Input Rung**

Rung 2:9 allows you to change the command value for the selected station to Manual On or Manual Off while in Manual mode. This rung uses the Cursor Indicator Address to place the command value in the proper command file (N34, word address 1 through 57). It also updates the Status File (N33) accordingly.

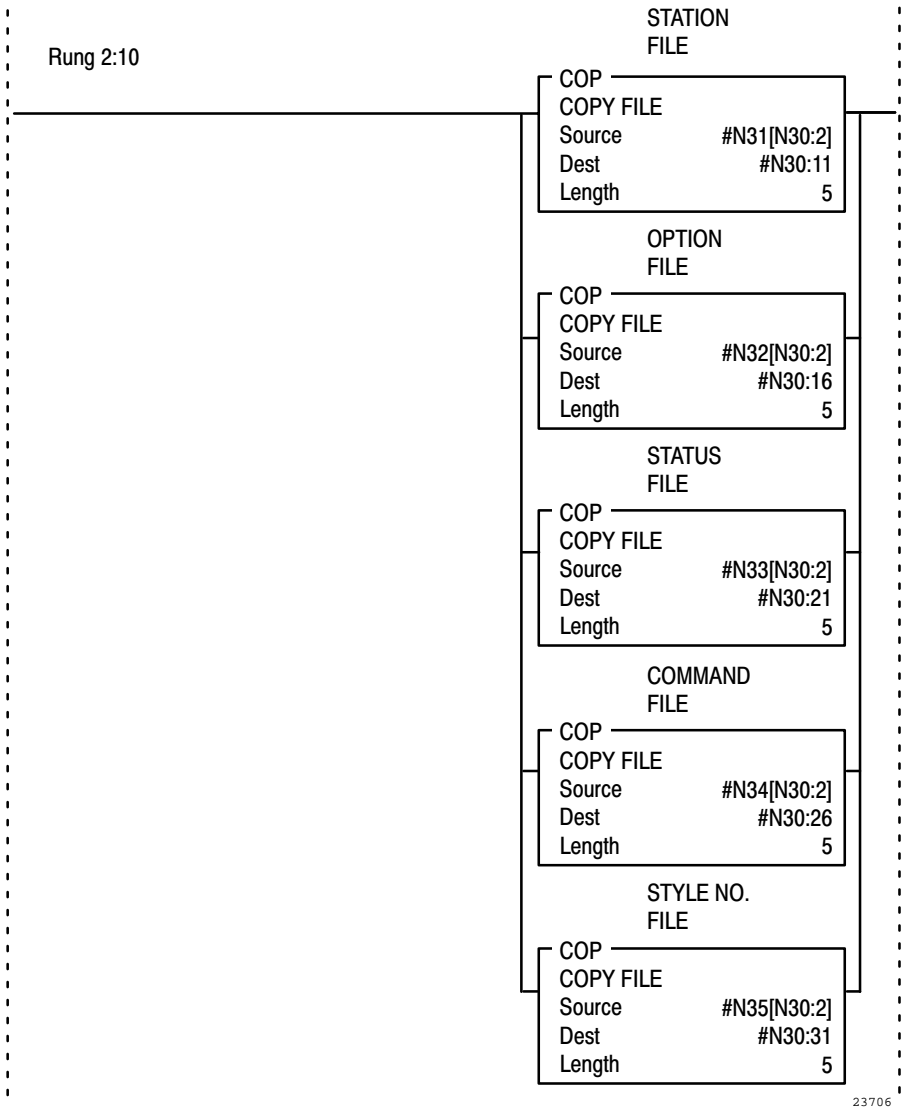
**Figure A.23**  
**The Manual On / Manual Off Input Rung**



### Create the Visible State File Copy Rung

Rung 2:10 copies appropriate file data to the visible state addresses for each object list. The data copied is based on the Top Position Address value from the PanelView Terminal.

**Figure A.24**  
**The Visible State File Copy Rung**



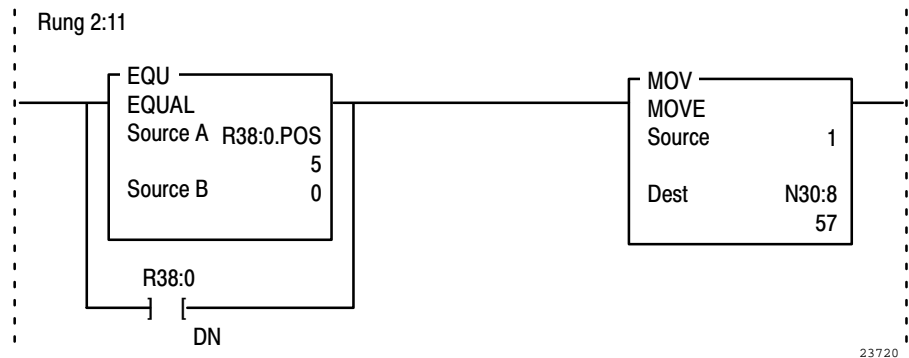
23706

### Create the Auto Mode Simulation Rungs

Rungs 2:11 through 2:14 simulate a sequential process. This is for example demonstration purposes only.

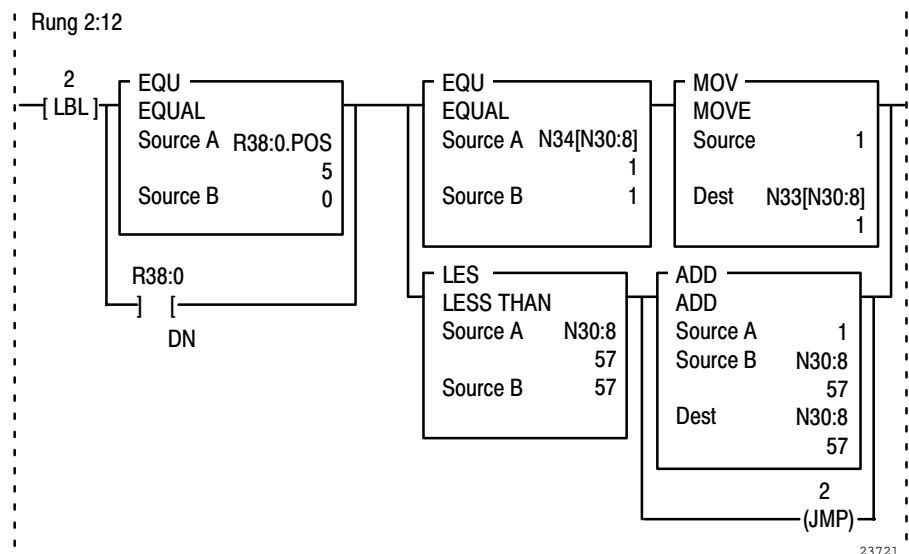
Rung 2:11 sets a variable N30:8 to 1 when an Auto mode restart occurs. This sets up a station status reset in the next rung.

**Figure A.25**  
**The Auto Mode Simulation Rungs (Rung 2:11)**



Rung 2:12 resets all STATION status indicators to “Stand-By” whose Station Commands are “Select”.

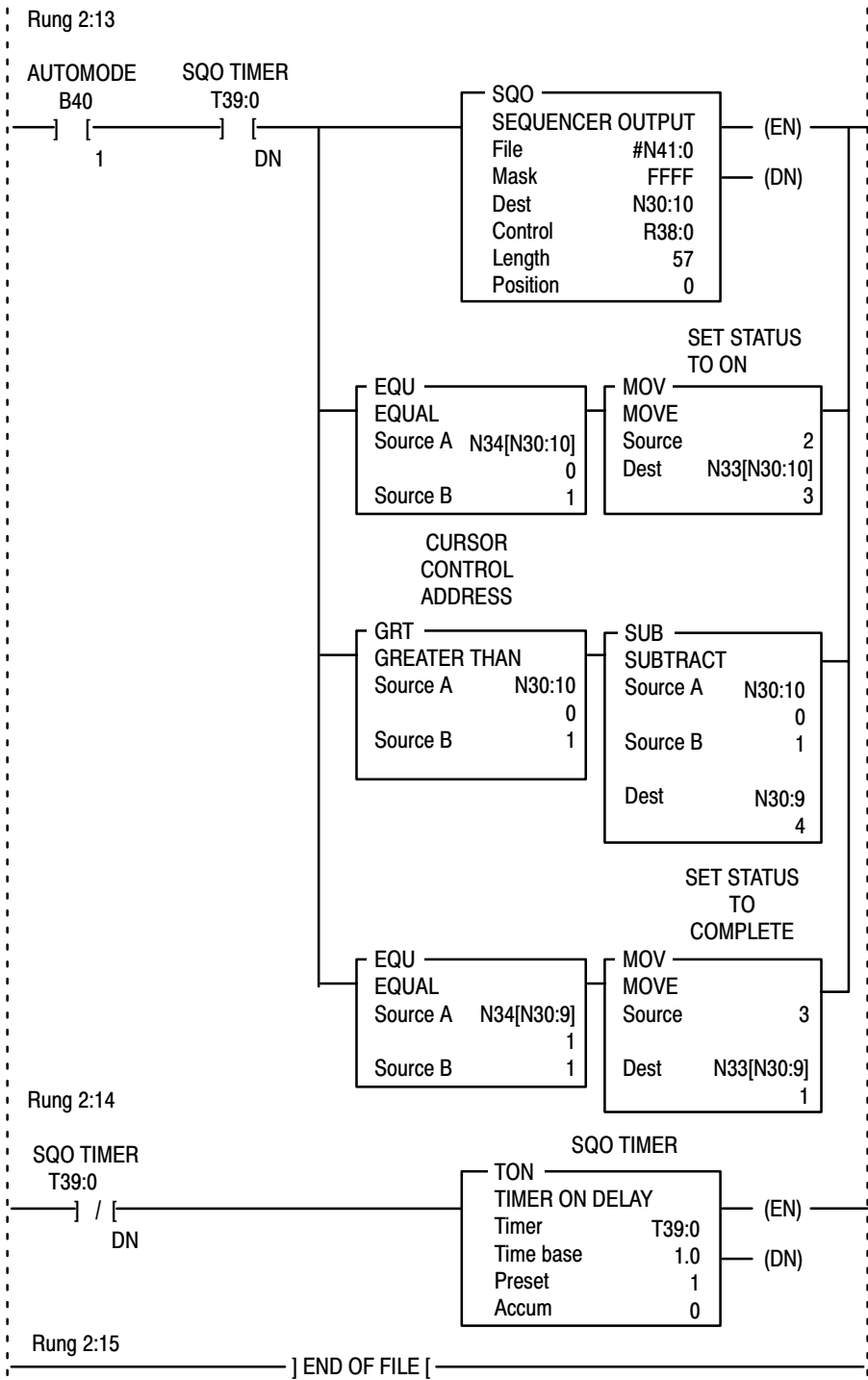
**Figure A.26**  
**The Auto Mode Simulation Rungs (Rung 2:12)**



Rung 2:13 includes the Simulation Sequencer driven by the timer in rung 2:14. Rung 2:13 also sets the currently selected station status to “On”, and the previous station status to “Complete” as the sequencer increments through the 57 steps.

Rung 2:14 includes the timer that increments the simulation sequencer each second.

Figure A.27  
The Auto Mode Simulation Rungs (Rungs 2:13 and 2:14)



## Troubleshooting

This appendix describes how to diagnose and solve problems regarding the PanelBuilder Development Software.

### Verifying Configuration Settings

You can verify the configuration settings for computer setup, PLC communication, messages, alarms, miscellaneous control options, and I/O addresses, by using PanelBuilder to print reports. The types of reports available are listed in Chapter 6, *File Operations*.

You can also view the configuration settings for I/O racks and block transfers as defined by PanelBuilder by selecting *Rack Assignments* from the PanelView terminal's Configuration Menu.

## PanelBuilder Problems

Use the checklist in Table B.A to identify various problems you may encounter using the software.

**Table B.A**  
**PanelBuilder Development Software Problems**

Problem	Cause	What to do
Program won't run.	Insufficient RAM.	Ensure the computer running PanelBuilder has a minimum of 640k RAM.
	A RAM-resident program is interfering with PanelBuilder.	Unload the RAM-resident program.
Long delay while trying to print. (PanelBuilder does not respond to Abort key.)	Printer is offline or out of paper.	Put printer back online.
		Reload paper and put printer back online.
		Switch printer power off and on again, and put printer back online.
Reports won't print.	The printer is not attached to the appropriate port.	Attach the printer to the appropriate printer port.
	The printer is not turned on, is off-line or is out of paper.	Turn on the printer, ensure the printer is on-line, and supplied with paper.
	You have not configured the printer port.	Ensure the serial port to which the printer is connected, is properly configured for printing.
Application file won't download or upload.	*You are using the wrong serial cable.	Check the serial cable.
	The application file is too large.	Ensure the memory size of the application file does not exceed the User Memory Limit (set under Options in the File Menu)
	*The computer is not connected to the PanelView terminal.	Connect the computer to the PanelView terminal.
	*The terminal's serial communication port is not configured for upload/download.	Configure the serial communication port for upload/download.
	*The PanelView terminal is turned off.	Turn on the PanelView terminal.
	*The PanelView terminal is in Run mode.	Ensure the PanelView terminal is in Configuration mode.
	You have not selected Upload/Download from the PanelView terminal's Configuration menu.	Choose Upload/Download from the Configuration menu.
	*The computer's serial port does not work.	Ensure the serial port is working by testing with another device such as a printer.
	Possible corrupt application file.	Try backup file or demo file download and upload.
	Attempting to download later version file with earlier version of PanelBuilder Software, i.e. V3 application file – V2 PanelBuilder. Application files are not downward compatible with software.	Update PanelBuilder Software to same version as application file.

\* See also , fourth error message

## PanelBuilder Error Messages

Consult Table B.B to identify and respond to some of the common error messages that can appear on the PanelBuilder screen.

**Table B.B**  
**Common PanelBuilder Error Messages**

Message	Cause	What to do
<b>PanelView Terminal Transmitting Too Fast.</b>	Upload speed too high.	Slow down baud rate.
<b>Not Enough Development System Memory.</b>	Reports too large.	Reduce report size.
	Available memory has been exceeded.	If error message occurs while memorizing and recalling objects, try using the screen-copy utility instead, or memorize and recall fewer objects.  Another option is to remove TSRs and drivers to increase available memory.
<b>Invalid Baud.</b>	May not be accessing com port.	Check other program or devices that use the com port.  If there is one, check to see that the internal modem is turned off.  Use the DOS MODE command to set up the com port.
<b>No Response from PanelView Terminal.</b>	Baud rate too high.	Reduce baud rate.
	Other possible causes are the same as the items marked * in	See solutions for items marked * in
	Possible corrupt application file.	Try backup file or demo file.
<b>Unknown Text Component.</b>	Application file may be corrupted.	Use DOS CHKDSK command, and use a backup copy of the application file.



#### PanelView Error Messages

Table B.C lists the most common messages that can appear on a PanelView terminal.

**Table B.C**  
**PanelView Major Fault Error Messages**

Major Fault Message	Cause	What to do
<b>Stuck Cell detected or Stuck Button detected.</b>	A touch cell or Keypad button has been depressed for longer than the Stuck Button Timeout setting allows.	Restart the terminal. If this problem occurs repeatedly due to an operator holding the button down for too long, increase the Stuck Button Timeout setting in the Configuration menu. If a button or cell is permanently stuck, call your A-B representative.
<b>Watchdog Test Failed. Unit is disabled.</b>	Watchdog circuit is unable to reset the machine.	Servicing by Allen-Bradley is required.
<b>System ROM corrupted. Unit is disabled.</b>	The ROM containing the system firmware is defective.	Servicing by Allen-Bradley is required.
<b>RAM TEST failed. Unit is disabled.</b>	The non-backed-up RAM used by the terminal firmware is defective.	Servicing by Allen-Bradley is required.
<b>Video hardware initialization failed. Unit is disabled.</b>	There is a video hardware problem.	Servicing by Allen-Bradley is required.
<b>Mismatched application file. Unit is disabled.</b>	1.) The application file is for the wrong type, i.e., a Keypad file on a Touch Screen terminal. 2.) The jumper settings are wrong	1.) Download an application file of the appropriate type. 2.) Check the setting of JP5 (JP4 for Series C or earlier terminals): FB = Keypad TS = Touch Screen
<b>Failed to configure the Comm card. Unit is disabled.</b>	The Communication circuitry is faulty.	Servicing by Allen-Bradley is required.
<b>Failed to stop PLC communication. Unit is disabled.</b>	The Communication circuitry is faulty.	Servicing by Allen-Bradley is required.
<b>Application file corrupted.</b>	The system has not stored the file correctly.	Download the file again or install new EEPROM.
	Excessive external power cycles, noise or voltage fluctuations.	Monitor power to terminal and take appropriate power regulation and suppression actions.

**Table B.D**  
**PanelView Minor Fault Messages**

Minor Fault Message	Cause	What to do
<b>Retentive data initialization failed.</b>	There is no valid application file.	Go off-line and download the file again.
<b>Audio hardware initialization failed.</b>	There is an audio hardware problem.	Servicing by Allen-Bradley is required.
<b>Terminal can't keep up with activity.</b>	Too much incoming data.	The operator should stop all input until the PanelView Terminal can process data.
<b>Invalid Powerup Screen.</b>	Powerup screen does not exist or is faulty.	Reassign the Powerup Screen or check the configuration data in the PanelBuilder application file.
<b>User EPROM/EEPROM is not installed or is corrupted.</b>	Optional EPROM or EEPROM was not found or is faulty.	If no user EPROM or EEPROM is installed, ignore this message. You can disable the test and the message in the Configuration Mode Menu. If a user EPROM or EEPROM is installed, replace it.
<b>Battery test failed. User RAM will be lost on power down.</b>	The battery for application file memory is dead.	Upload the application file and save it on disk. Servicing by Allen-Bradley is required.
<b>Communication Self Test failed.</b>	The communication card is defective or not installed.	Servicing by Allen-Bradley is required.
<b>Invalid Screen.</b>	The PLC controller has selected a non-existent screen number.	Reprogram the PLC controller or the application file.
<b>Unable to write downloaded data to the EEPROM.</b>	The EEPROM or user memory configuration jumpers are set incorrectly.	Check the EEPROM and user memory configuration jumper settings.
<b>Value Out Of Range.</b>	Address not sufficient for data transfer. Current screen number transfer to PLC controller is not sufficient. Numeric entry or display address length is insufficient for data.	Increase bit length of address so it's large enough for screen transfer, including Alarm History and Alarm Status screens. Increase address length for data.
<b>PLC currently controls screen change.</b>	PLC controller has control of screen change.	Disable PLC Controlled Screen Change. Clear PLC Controlled Screen Change register. Reset to 0.
<b>No screen change—Hold Time in effect or no PLC Handshake.</b>	Operator is trying to change screens while a button's hold time is still in effect or before an activated Latched Push Button has received a handshake.	Wait until hold time is finished or Latched handshake is received before trying to change screens.

## PLC Communication Problems

Consult Table B.E to identify PLC communication problems.

**Table B.E**  
**PLC Communication Problems**

Problem	Cause	What to do
<b>“PLC Communication Lost” message on PanelView terminal.</b>	PLC controller is in Program or Remote Program mode.	Change PLC controller to Run mode.
	Cable problem.	Check termination and cable pinout.
	Incorrectly defined terminal as Last Chassis.	Set Last Chassis to No for that rack assignment.
	Rack assignments in PanelView and PLC do not match.	Make sure rack assignments in PLC controller match those in PanelView.
	Terminating resistor not installed properly.	The terminating resistor must be installed at the PLC and at the end of the link: 150Ω 1/2 watt resistor for 57.6 or 115.2 kbaud 82Ω 1/2 watt resistor for 230 kbaud
	PanelView terminal and Scanners Remote I/O baud rate do not match.	Change the Remote I/O baud rate in PanelView terminal or the scanner so they match.
<b>“PLC Communication Lost” message when using PanelView terminal with PLC-5.</b>	PanelView terminal has been assigned to multiple or partial racks when firmware revision of PLC-5 does not support partial rack addressing.	Configure PanelView terminal as a single full rack. Upgrade PLC-5/15 to Series B Revision H. Upgrade PLC-5/25 to Series A Revision D.
	PLC controller is not configured to recognize the PanelView terminal's rack assignments.	Refer to your PLC-5 User's Manual regarding Auto Configuration.
<b>Periodic “PLC Communication Lost” when using 1772-SD2 scanner with PLC-2s.</b>		Must use 1772-SD2 scanner Rev. 3 or later.
<b>Rapid blinking of “PLC Communication Lost” when using 1775-S4A scanner with a PLC-3.</b>		Must use 1775-S4A scanner series B or later.
<b>“PLC Communication Lost” when using SLC 500 1747-SN Scanner Module.</b>	The 1747-SN Scanner Module is not properly configured.	Refer to 1747-RIO Scanner User's Manual regarding Specialty I/O Configuration and how to configure Mfiles and Gfiles. Verify that the PanelView terminal and the 1747-SN Scanner Module Remote I/O baud rates are set the same.
<b>Discrete I/O works but block transfer does not. No “PLC Communication Lost” message. Using PLC-5/15, partial rack addressing.</b>		Must use PLC-5/15 series B Rev. J or later.
<b>Discrete I/O works but block transfer does not. No “PLC Communication Lost” message.</b>	Block transfer assignments in PanelView do not match block transfer instructions in PLC.	Make sure PLC block transfer instruction parameters match PanelView parameters.
<b>PLC Controller rack fault on rack assigned to PanelView.</b>	Specified No for Last Chassis when the PanelView is the last chassis in that rack.	Set Last chassis to Yes for that rack assignment.
<b>“PLC Communication Lost” message and rack fault on rack assigned to PanelView.</b>	Mis-matched baud rate on PanelView and PLC controller.	Specify same baud rate for PanelView and PLC controller.
	Multiple devices configured for the same rack assignment.	Multiple remote I/O devices must have unique rack assignments.

### Pass-Through Upload/Download Problems

Table B.F identifies some problems in uploading/downloading files via the PLC-5 Pass-Through feature.

**IMPORTANT:** Only specific models and revisions of PLC controllers are capable of the Pass-Through download/upload. Refer to Table B.G for compatible models and revisions.

**Table B.F**  
**Pass-Through Upload/Download Problems**

Problem	Cause	What to do
While attempting a Pass-Through Download, a mistake window appears with the message "The Pass-Through utility was not found in the specified Pass-Through Directory."	The Pass-Through utility was not installed in the specified directory.	The Pass-Through utility is not automatically installed with PanelBuilder. It is contained in a separate disk. Verify that the utility is installed in the directory indicated in the Programming Terminal Configuration menu.
While trying to download an application file, PanelBuilder software appears to lock up, with the message "Getting Terminal Data" flashing on the screen.	"Programming Terminal Configuration" is not set up properly.	Wait a minute or two for the computer to display a PROBLEM window with an Error code number. (See below for what to do about the most common Error Codes, 180 and 208.) Then check that the Programming Terminal Configuration is correct (see Chapter 6, <i>File Operations</i> ), and try the download again. If no PROBLEM window appears, reboot the computer, then make sure your Programming Terminal Configuration is correct, and try the download again.
While trying to download an application file, a PROBLEM window appears, stating: "Error Code 180 was returned by the Pass-Through Utility".	The PLC-5 is not communicating with the PanelView terminal: the message "PLC communication lost" appears at the top of the PanelView screen.	Make sure the PLC-5 is in RUN mode and is configured to recognize the PanelView on the remote I/O link. (See "Auto Config" in the PLC-5 6200 Series software documentation).
	The Pass-Through Block Transfer assignment at the target PanelView has not been assigned or is different than the assignment in the application file selected.	If the target PanelView has no Pass-Through Block Transfer assignment, you must download the selected application file via an RS-232 Upload/Download cable connected directly between the computer and the PanelView terminal.  If the Pass-Through Block Transfer assignment at the target PanelView is different, change the assignment in the selected application file to match the assignment in the PanelView.
	The model or revision of PLC does not support Pass-Through Block Transfer.	Use a compatible model or revision of PLC.
	Data Highway Plus cable is disconnected.	Ensure that the cable is securely connected at both ends; try the download again.
While trying to upload or download with rack numbers 10 or greater, a PROBLEM window appears, stating "Error Code 163 was returned by the Pass-Through Utility."	The PLC is unable to find rack because of wrong Pass-Through Utility.	Ensure that you are using Pass-Through Utility 3.0.1.

## Appendix B

### Troubleshooting

Problem	Cause	What to do
While trying to download an application file, a <b>PROBLEM</b> window appears stating: “Error code 208 was returned by the Pass-Through Utility.”	The Pass-Through Utility has been unable to establish DH+ communications with the PLC-5.	Make sure the “Programming Terminal DH+ Address” and the “PLC DH+ Address” are properly assigned.  Make sure that you have selected the proper “DH+ Hardware Driver” for your system, and that the “DH+ Driver Card Location” code is correct.
Immediately after completing a PLC-5 Pass-Through Download, a Minor Fault Status bit is set in the PLC-5.	The rack assignment configuration of the application file downloaded to the PanelView did not exactly match the application file that was overwritten.	Use the PLC-5 6200 Series software to clear the Minor Fault; then reconfigure the PLC-5 to recognize the new rack assignment.

**Table B.G**  
**PLC Series/Revision Requirements for Pass-Through File Transfer**

Processor	Series	Revision
PLC-5/11	All	All
PLC-5/15	B	N or later
PLC-5/20	All	All
PLC-5/25	A	J or later
PLC-5/30	A	B or later
PLC-5/40	A B	E or later B or later
PLC-5/60	A B	E or later B or later
PLC-5/250	All	All

## Sample Worksheets

This appendix contains six worksheets to help you plan your application (see Chapter 4, *Planning Your Application*). Two copies of each worksheet are provided for your convenience; make copies of the worksheets as you need them and save the originals for future use.

Worksheets for both Touch Screen terminals and Keypad terminals are included for you to sketch each screen you want to create. These will show the location and size of each object on the screen.

Use the Object Address List to record the details for each dynamic object you place on a screen. Use one worksheet for each screen you develop. You should also use one Object Address List to record your Windows and PLC Control Options.

The Discrete I/O Usage Worksheets will help you keep track of the PLC addresses. Use one worksheet for each full or partial rack assignment.

The Block Transfer I/O Usage Worksheet allows you to keep track of the Block Transfer addresses. Use one worksheet for each Block Transfer file.

Use the PLC Communications Worksheet to record your exact rack and Block Transfer assignments. You'll only be able to complete the PLC Communications Worksheet after the addresses are assigned to all your objects, Windows, and Control functions. Use one worksheet for your entire application.

## ISA Symbols

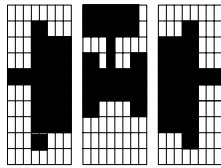
### Valves

#### Symbol

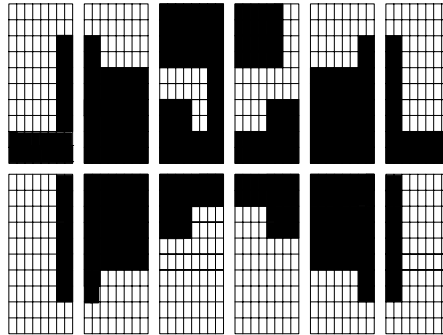
Horizontal  
Valve with  
Actuator



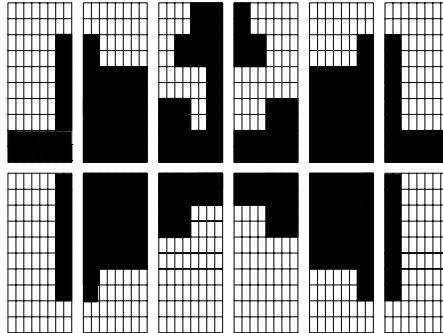
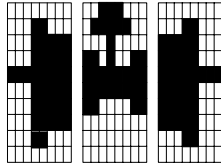
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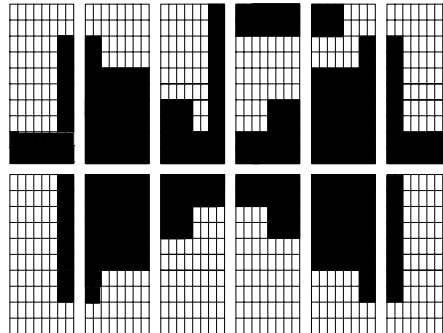
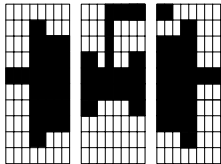
#### Double Grid Size



Horizontal  
Valve with  
Throttling  
Actuator



Horizontal  
Valve with  
Manual  
Actuator



## Appendix D

### ISA Symbols

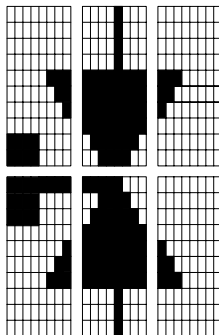
#### Symbol

Vertical  
Valve with  
Actuator

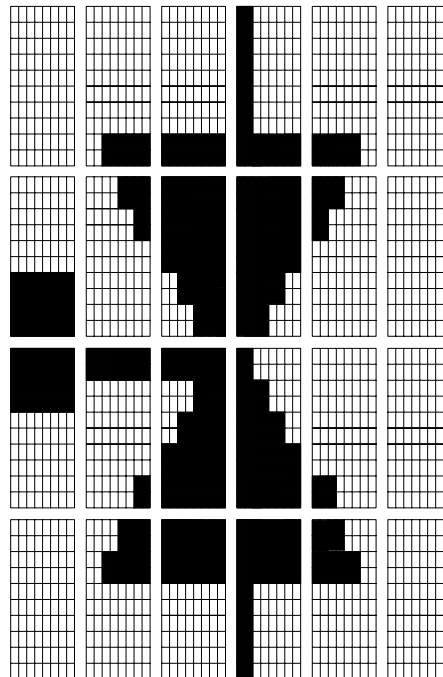
#### Appearance



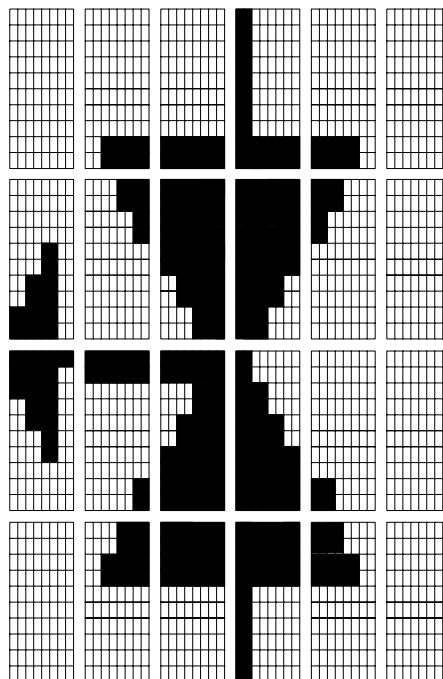
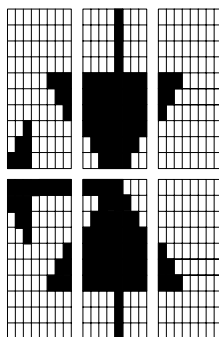
#### Single Grid Size



#### Double Grid Size



Vertical  
Valve with  
Throttling  
Actuator





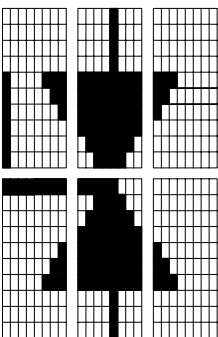
Symbol

Vertical  
Valve with  
Manual  
Actuator

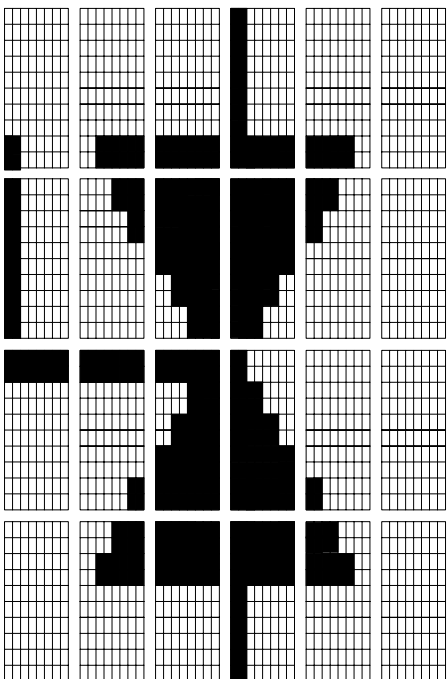
Appearance



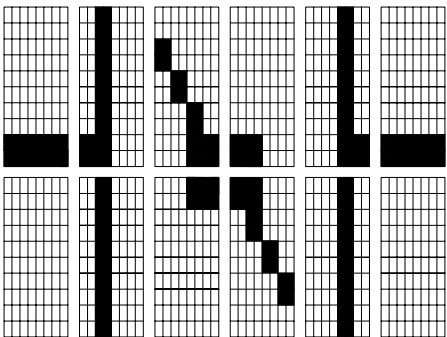
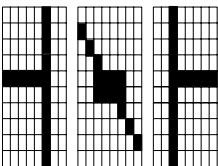
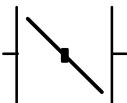
Single Grid Size



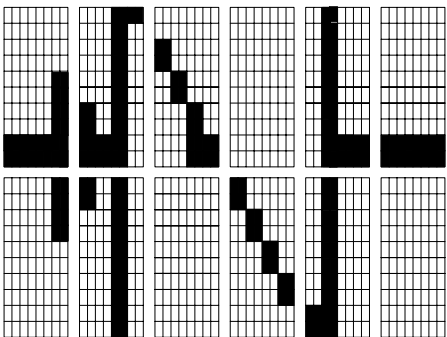
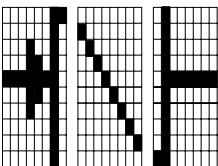
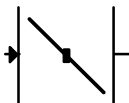
Double Grid Size



Butterfly  
Valve



Check Valve



## Appendix D

### ISA Symbols

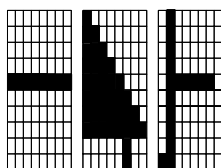
#### Symbol

Relief Valve

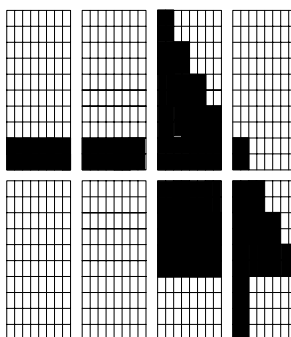
#### Appearance



#### Single Grid Size



#### Double Grid Size

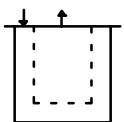


## Filters

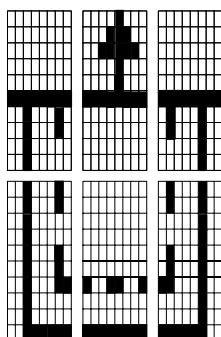
#### Symbol

Liquid

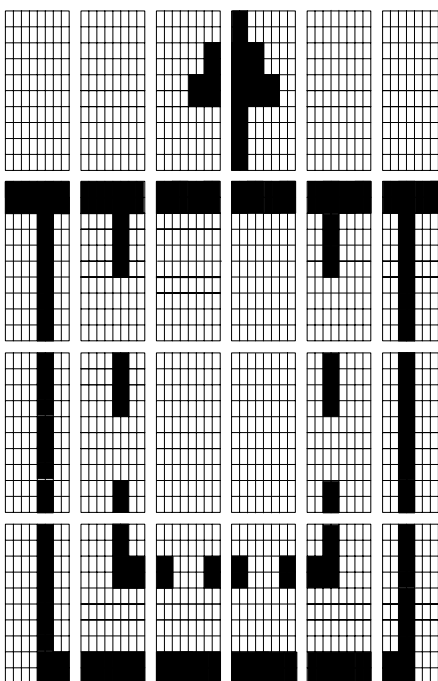
#### Appearance



#### Single Grid Size

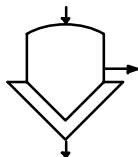


#### Double Grid Size

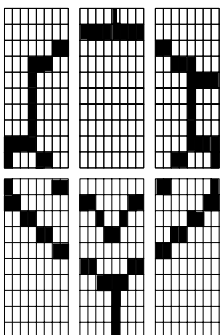


Symbol  
Vacuum

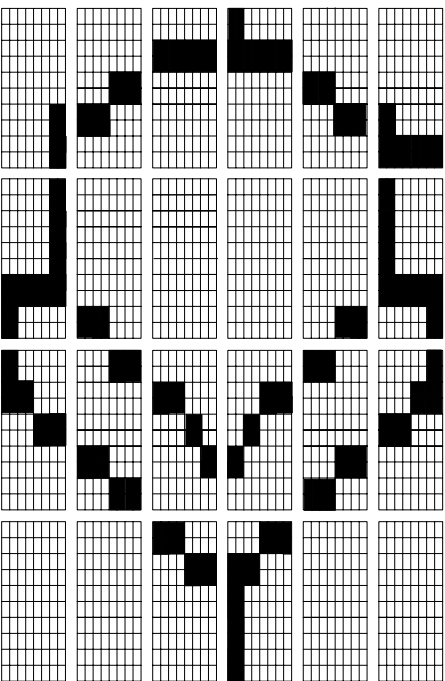
Appearance



Single Grid Size



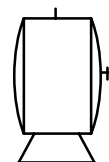
Double Grid Size



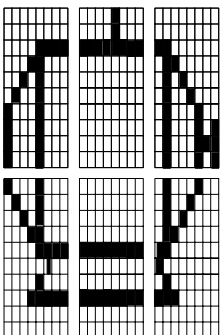
Electrical

Symbol  
Motor

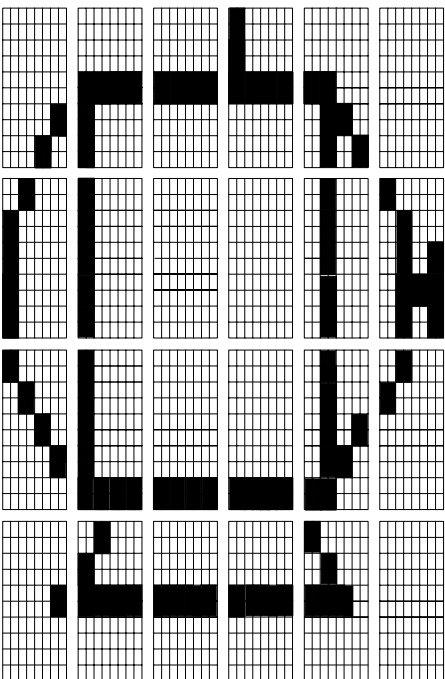
Appearance



Single Grid Size



Double Grid Size



## Appendix D ISA Symbols

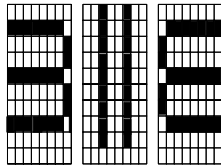
### Symbol

Transformer

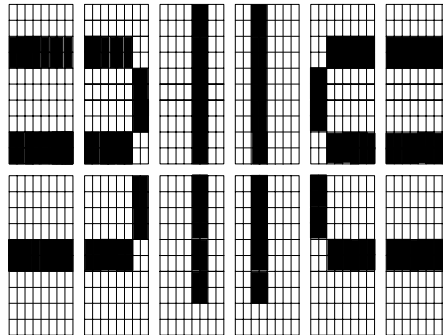
### Appearance



### Single Grid Size



### Double Grid Size

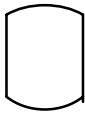


## Containers and Vessels

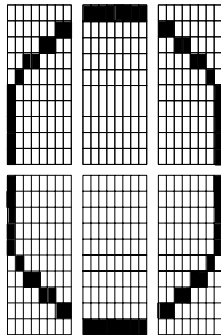
### Symbol

Vessel

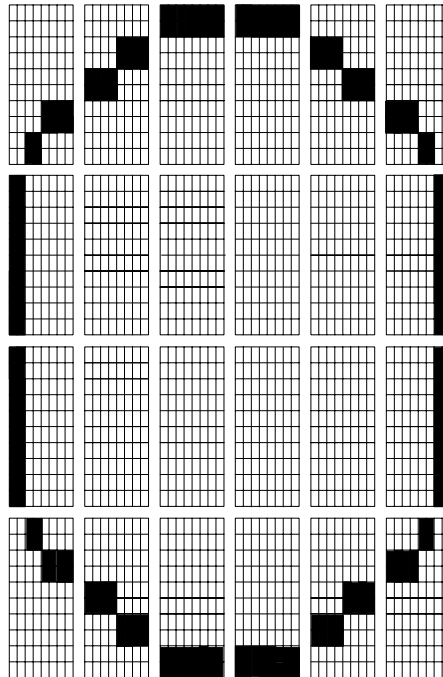
### Appearance



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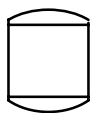


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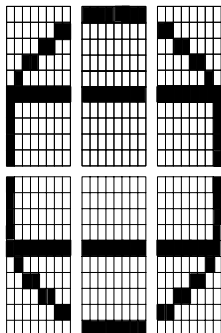


Symbol  
Reactor

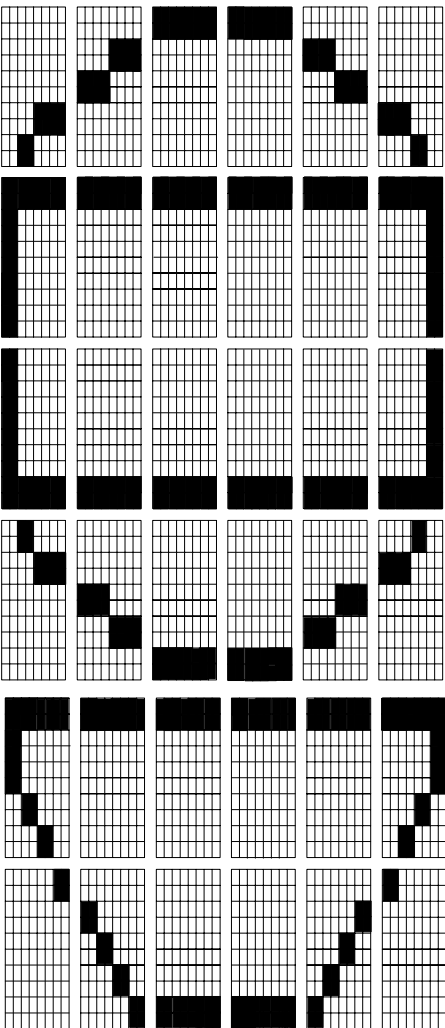
Appearance



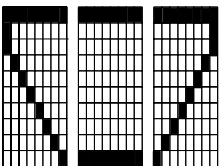
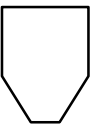
Single Grid Size



Double Grid Size



Storage Bin



# Appendix D

## ISA Symbols

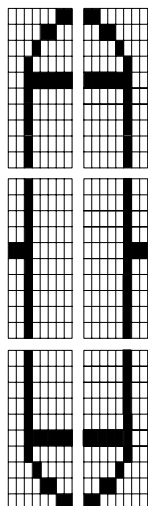
### Symbol

Distillation  
Tower

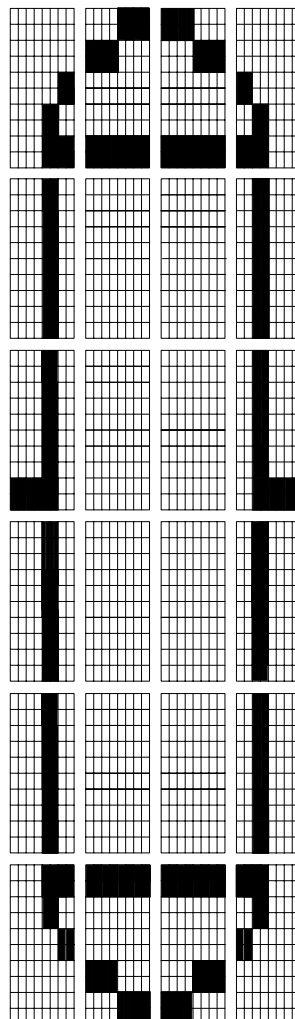
### Appearance



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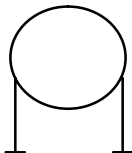


### Double Grid Size

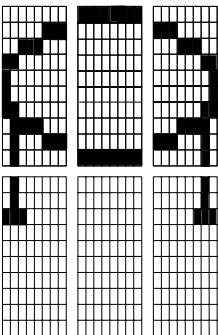


Symbol  
Pressure  
Storage  
Vessel

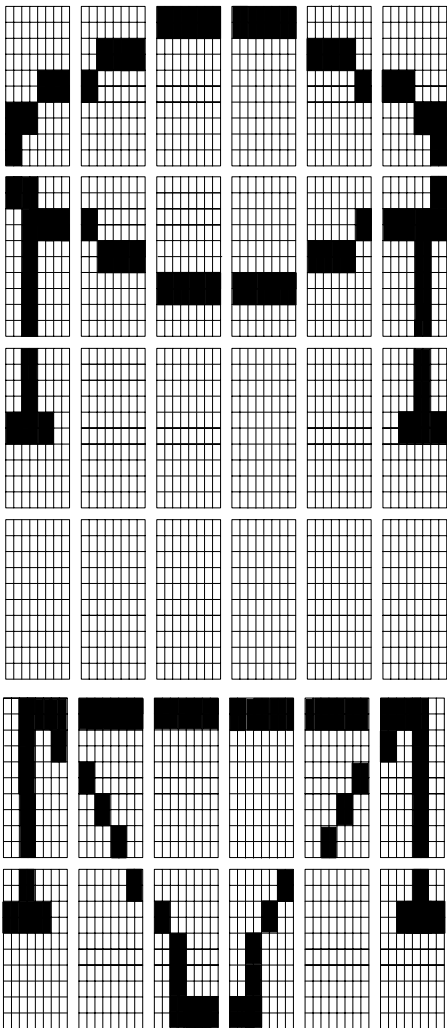
Appearance



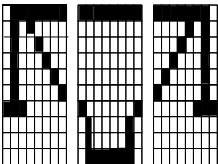
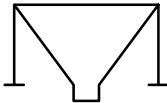
Single Grid Size



Double Grid Size



Weigh  
Hopper



## Rotating Equipment

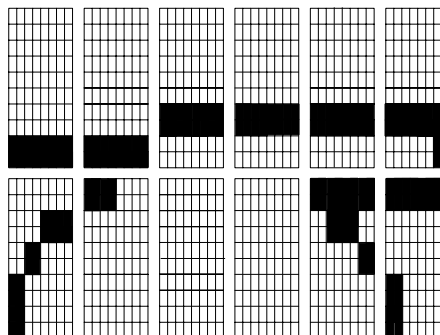
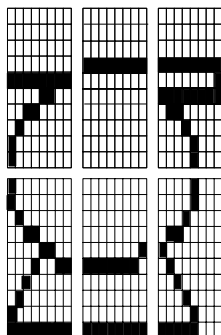
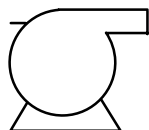
Symbol

Appearance

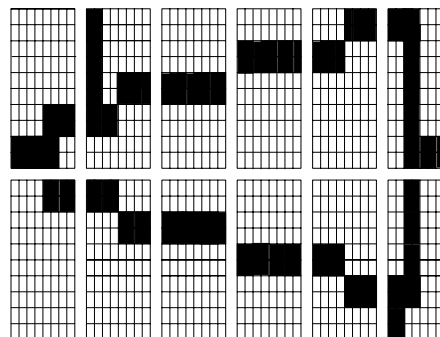
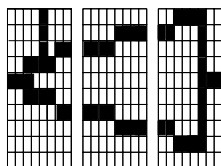
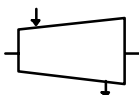
Single Grid Size

Double Grid Size

Pump



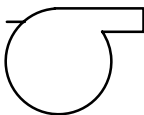
Turbine



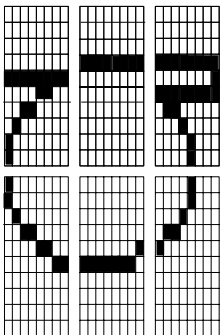


Symbol  
Blower

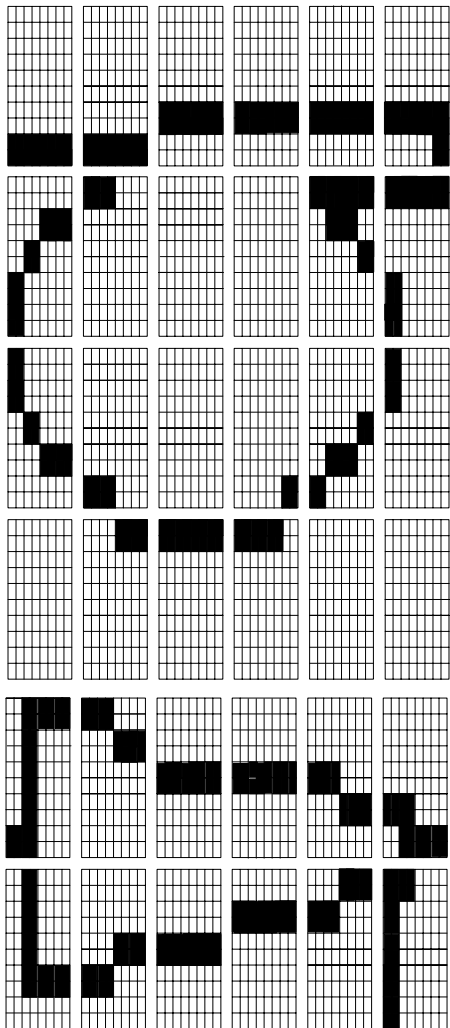
Appearance



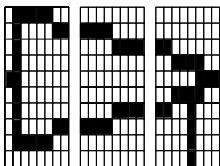
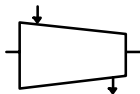
Single Grid Size



Double Grid Size

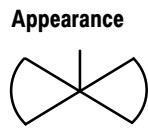


Compressor

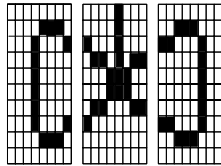


## Material Handling

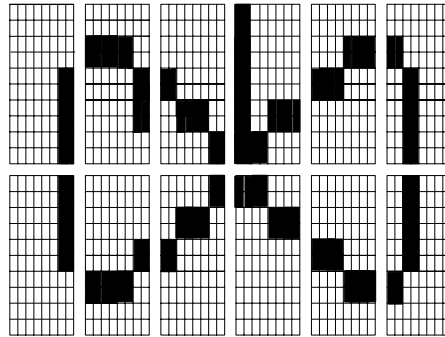
**Symbol**  
**Agitator**



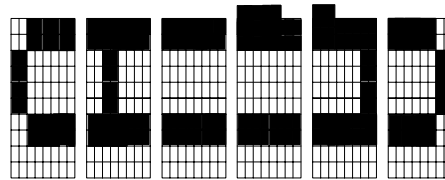
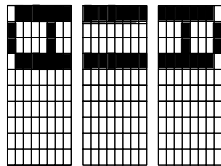
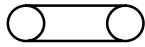
**Single Grid Size**



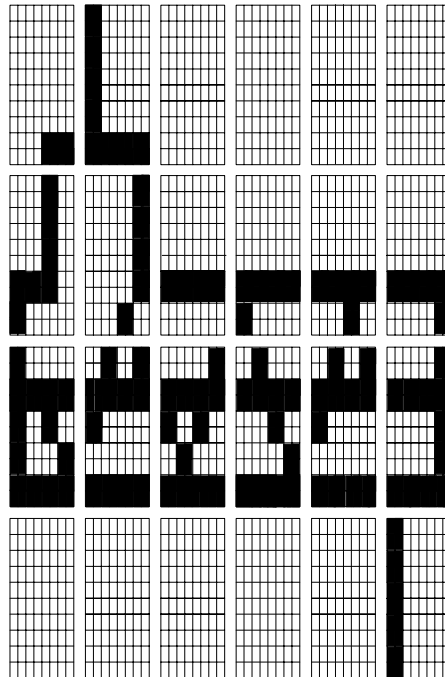
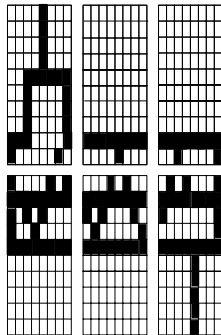
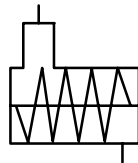
**Double Grid Size**



**Conveyor**



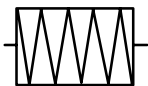
**Screw Conveyor**



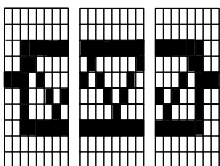
Symbol

Inline Mixer

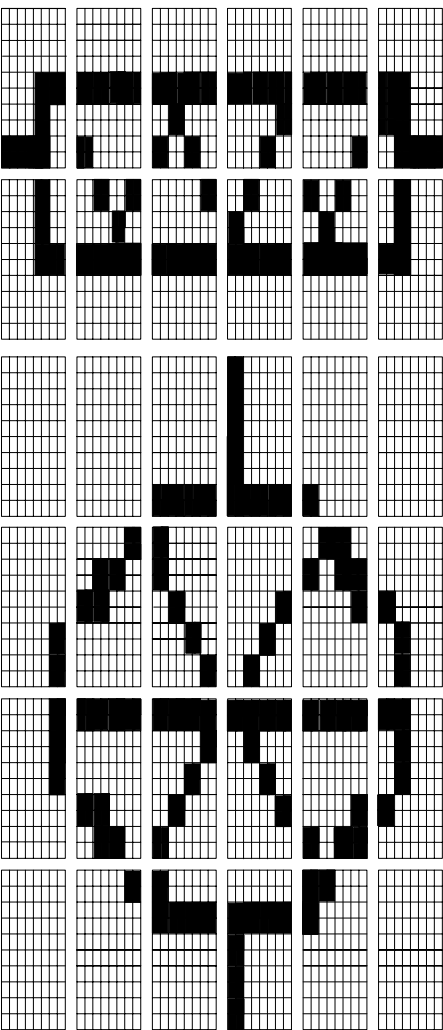
Appearance



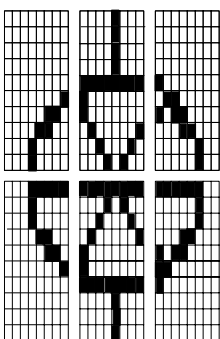
Single Grid Size



Double Grid Size

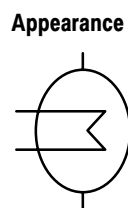


Rotary  
Feeder

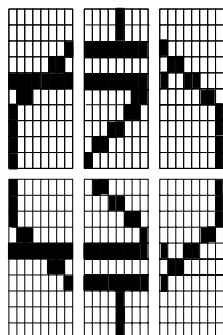


## Heat Transfer Devices

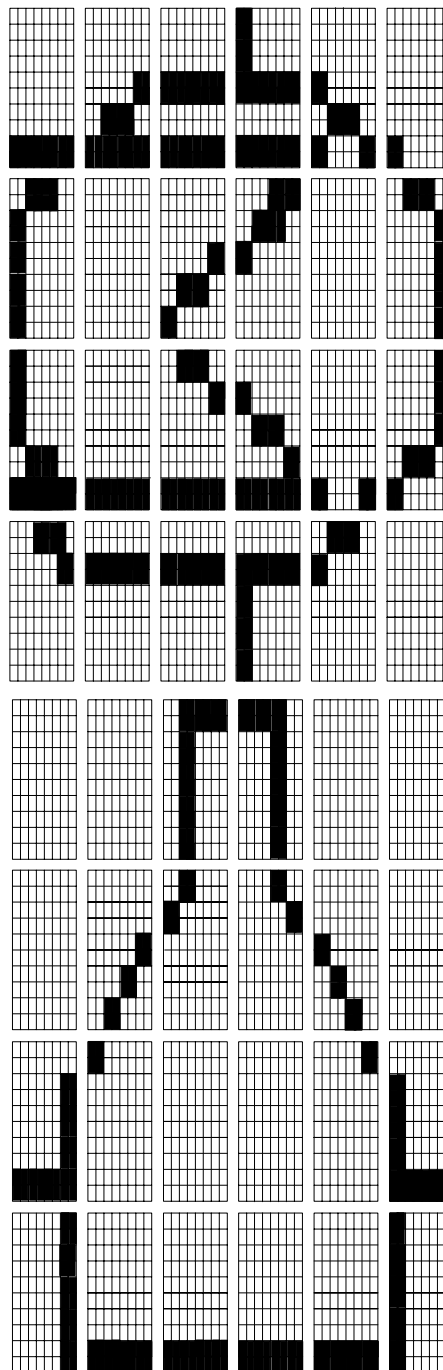
**Symbol**  
**Exchanger**



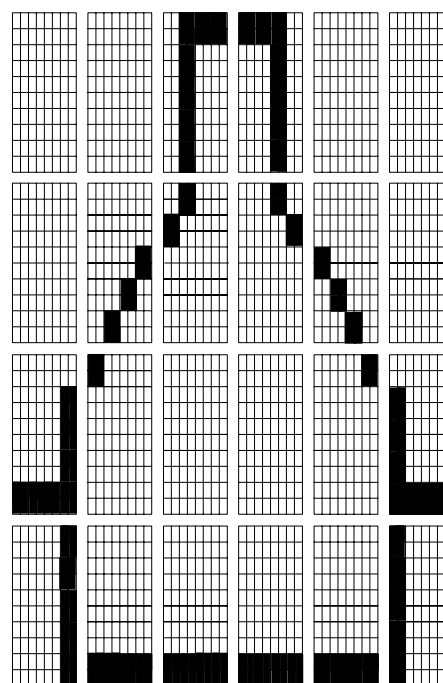
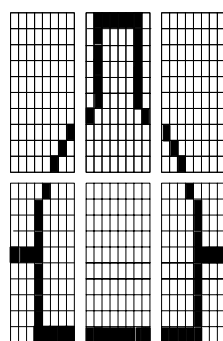
**Single Grid Size**



**Double Grid Size**



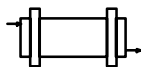
**Furnace**



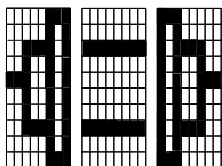
Symbol

Rotary Kiln

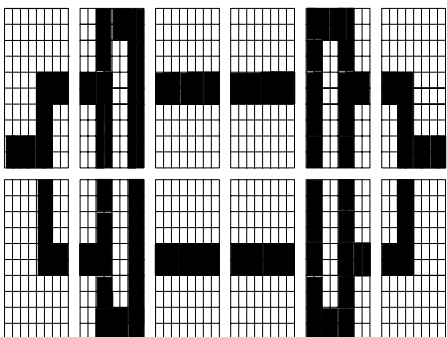
Appearance



Single Grid Size



Double Grid Size

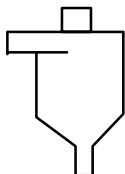


Miscellaneous

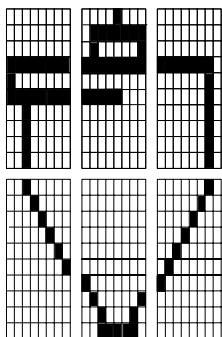
Symbol

Cyclone Separator

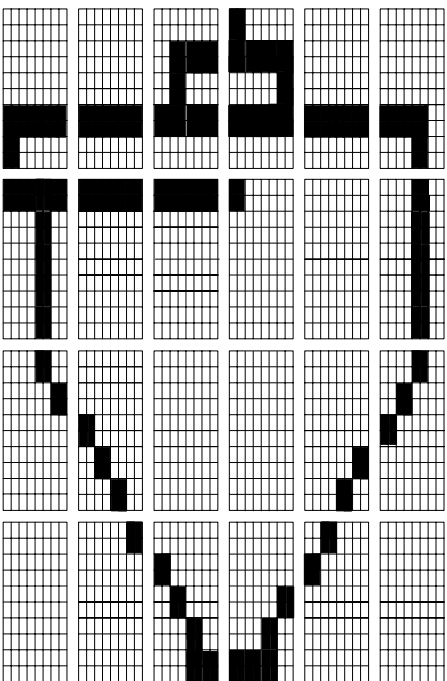
Appearance



Single Grid Size



Double Grid Size

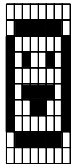
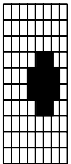
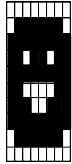
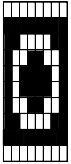
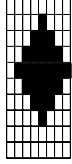
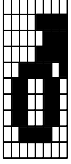
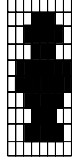
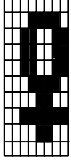
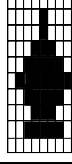
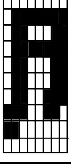

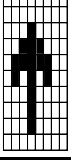


# The Extended Character Set

This appendix contains the extended character set used to create alternate text characters for display on the PanelView screen.


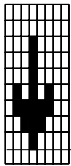
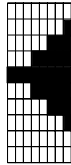
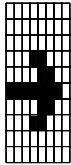
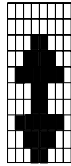
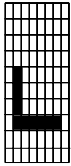

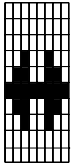
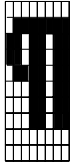
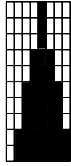
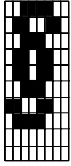
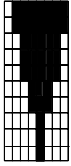
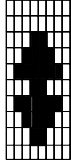
Press the **Ctrl** key and the keys specified in the next illustration to use the alternate character set for typing object text.

**Table E.A**  
**Extended Character Set for Object Text Ctrl-Key Combinations**

Key	Character	Key	Character
Ctrl-A		Ctrl-G	
Ctrl-B		Ctrl-J Ctrl-␣	
Ctrl-D		Ctrl-K	
Ctrl-E		Ctrl-L	
Ctrl-F		Ctrl-N	
Ctrl-O		Ctrl-X	

## Appendix E

### The Extended Character Set

Key	Character	Key	Character
Ctrl-P		Ctrl-Y	
Ctrl-Q		Ctrl-Z	
Ctrl-R		Ctrl-\	
Ctrl-S		Ctrl-]	
Ctrl-T		Ctrl-6	
Ctrl-U		Ctrl—	
Ctrl-W			

Press and hold the **Alt** key and type the appropriate number on the numeric keypad to print the following characters.

**Table E.B**  
**Alternate Character Set for Object Text Alt-key combinations**

Key	Character	Key	Character
Alt-128	Š	Alt-135	š
Alt-129	Û	Alt-136	ë
Alt-130	ē	Alt-137	ĕ
Alt-131	ā	Alt-138	è
Alt-132	ä	Alt-139	ï
Alt-133	â	Alt-140	î
Alt-134	à	Alt-141	í



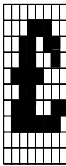

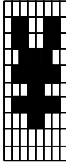
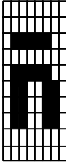

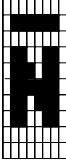
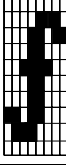
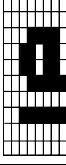

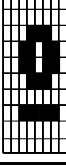
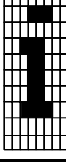
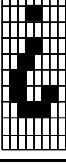
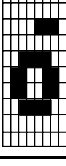
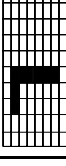
## Appendix E

### The Extended Character Set

Key	Character	Key	Character
Alt-142	À	Alt-149	ō
Alt-143	Á	Alt-150	ô
Alt-144	Ê	Alt-151	û
Alt-145	Æ	Alt-152	ÿ
Alt-146	Œ	Alt-153	ø
Alt-147	ö	Alt-154	ü
Alt-148	ö	Alt-155	ç

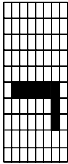
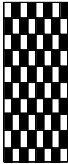
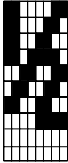
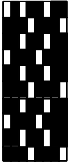
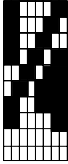
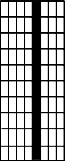
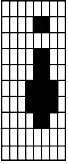
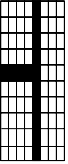
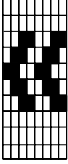
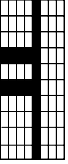
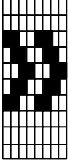
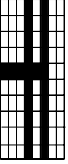
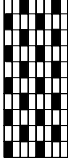
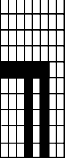
## Appendix E

### The Extended Character Set

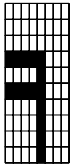
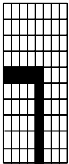
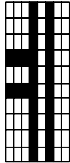
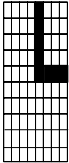
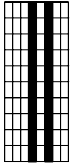
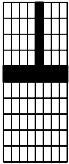
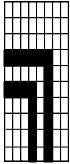
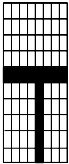
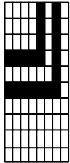
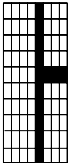
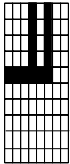
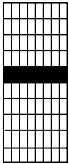
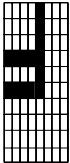
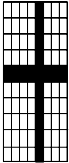
Key	Character	Key	Character
Alt-156		Alt-163	
Alt-157		Alt-164	
Alt-158		Alt-165	
Alt-159		Alt-166	
Alt-160		Alt-167	
Alt-161		Alt-168	
Alt-162		Alt-169	

## Appendix E

### The Extended Character Set

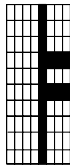

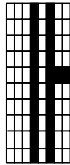

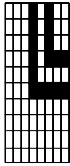


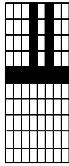
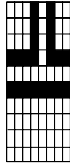
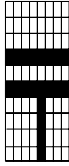

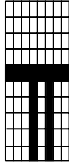

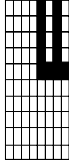
Key	Character	Key	Character
Alt-170		Alt-177	
Alt-171		Alt-178	
Alt-172		Alt-179	
Alt-173		Alt-180	
Alt-174		Alt-181	
Alt-175		Alt-182	
Alt-176		Alt-183	

**Appendix E**  
The Extended Character Set

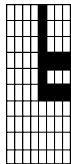


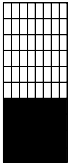

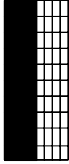
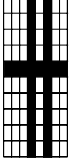
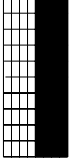

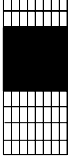
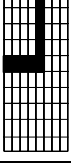
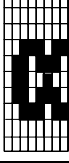
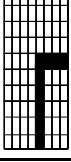
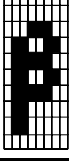
Key	Character	Key	Character
Alt-184		Alt-191	
Alt-185		Alt-192	
Alt-186		Alt-193	
Alt-187		Alt-194	
Alt-188		Alt-195	
Alt-189		Alt-196	
Alt-190		Alt-197	

## Appendix E

### The Extended Character Set

Key	Character	Key	Character
Alt-198		Alt-205	
Alt-199		Alt-206	
Alt-200		Alt-207	
Alt-201		Alt-208	
Alt-202		Alt-209	
Alt-203		Alt-210	
Alt-204		Alt-211	

**Appendix E**  
The Extended Character Set

Key	Character	Key	Character
Alt-212		Alt-219	
Alt-213		Alt-220	
Alt-214		Alt-221	
Alt-215		Alt-222	
Alt-216		Alt-223	
Alt-217		Alt-224	
Alt-218		Alt-225	

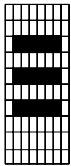
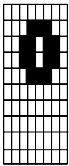
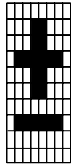
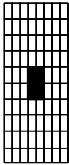
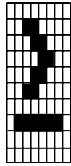
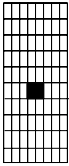
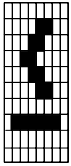

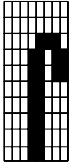
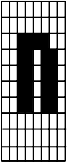
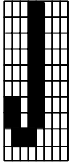
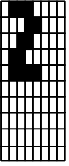
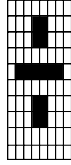
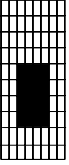
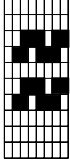
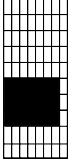
## Appendix E

### The Extended Character Set

Key	Character	Key	Character
Alt-226	Γ	Alt-233	Θ
Alt-227	Π	Alt-234	Α
Alt-228	Σ	Alt-235	Δ
Alt-229	Μ	Alt-236	Ω
Alt-230	Η	Alt-237	Φ
Alt-231	Υ	Alt-238	Ε
Alt-232	Θ	Alt-239	Π

## Appendix E

### The Extended Character Set

Key	Character	Key	Character
Alt-240		Alt-248	
Alt-241		Alt-249	
Alt-242		Alt-250	
Alt-243		Alt-251	
Alt-244		Alt-252	
Alt-245		Alt-253	
Alt-246		Alt-254	
Alt-247		Alt-255	



## Screen Worksheet for Touch Screen Terminal

**Application File Name:** \_\_\_\_\_

**Screen Number:** \_\_\_\_\_ **Screen Name:** \_\_\_\_\_

0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7  
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9

[illegible]

## Screen Worksheet for Touch Screen Terminal

**Application File Name:** \_\_\_\_\_

**Screen Number:** \_\_\_\_\_ **Screen Name:** \_\_\_\_\_

[illegible][illegible]

## Screen Worksheet for Keypad Terminal

**Application File Name:** \_\_\_\_\_

**Screen Number:** \_\_\_\_\_

**Screen Name:** \_\_\_\_\_

0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7  
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9

## Screen Worksheet for Keypad Terminal

**Application File Name:** \_\_\_\_\_

**Screen Number:** \_\_\_\_\_

**Screen Name:** \_\_\_\_\_

[illegible]

## Object Address List

**Application File Name:** \_\_\_\_\_

**Screen Number:** \_\_\_\_\_

[illegible]

## Object Address List

**Application File Name:** \_\_\_\_\_

**Screen Number:** \_\_\_\_\_

[illegible]

# Discrete I/O Usage Worksheet

**Application File Name:** \_\_\_\_\_ **Rack Number:** \_\_\_\_\_

## PLC Output Bit Numbers

[illegible]

## PLC Input Bit Numbers

[illegible]

# Discrete I/O Usage Worksheet

**Application File Name:** \_\_\_\_\_ **Rack Number:** \_\_\_\_\_

## PLC Output Bit Numbers

[illegible]

## PLC Input Bit Numbers

[illegible]



## Block Transfer I/O Usage Worksheet (Page 1 of 2)

Application File Name: \_\_\_\_\_

Block Transfer File Number:                    1                    2                    3                    4                    5                    (Circle One)

Number of Words: \_\_\_\_\_

**READ** (PLC Inp) or **WRITE** (PLC Out) (Circle One)

## PLC Bit Numbers

[illegible]

## Block Transfer I/O Usage Worksheet (Page 2 of 2)

Application File Name: \_\_\_\_\_

Block Transfer File Number:                    1                    2                    3                    4                    5                    (Circle One)

Number of Words: \_\_\_\_\_

**READ** (PLC Inp) or **WRITE** (PLC Out) (Circle One)

## PLC Bit Numbers

[illegible]

# PLC Communications Worksheet

Application File Name: \_\_\_\_\_

PLC/Scanner Type: \_\_\_\_\_

Baud Rate:                      57.6K (10,000 Ft)              115.2K (5,000 Ft)              230.4K (2,500 Ft)

**Note:** You must make at least one rack assignment. Additional rack assignments (up to a maximum of 8) are optional. Write in the Rack Number and circle appropriate Rack Size, Starting Module Group, and Last Rack designation.

## Rack Assignments

Rack Number	Rack Size				Starting Module Group				Last Rack	
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N

**Note:** Block Transfers are optional. Circle the Block Transfer File Number, write in one of the rack numbers from above, circle the appropriate Module Group and Byte, and fill in the Block Transfer file size.

## Block Transfer Assignments

Block Transfer File Number	Rack Number	Module Group	Byte	No. Words
1		0 1 2 3 4 5 6 7	Hi    Lo	
2		0 1 2 3 4 5 6 7	Hi    Lo	
3		0 1 2 3 4 5 6 7	Hi    Lo	
4		0 1 2 3 4 5 6 7	Hi    Lo	
5		0 1 2 3 4 5 6 7	Hi    Lo	
Pass-Through				30

# PLC Communications Worksheet

Application File Name: \_\_\_\_\_

PLC/Scanner Type: \_\_\_\_\_

Baud Rate:                      57.6K (10,000 Ft)              115.2K (5,000 Ft)              230.4K (2,500 Ft)

**Note:** You must make at least one rack assignment. Additional rack assignments (up to a maximum of 8) are optional. Write in the Rack Number and circle appropriate Rack Size, Starting Module Group, and Last Rack designation.

## Rack Assignments

Rack Number	Rack Size				Starting Module Group				Last Rack	
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N
	1/4	1/2	3/4	1	0	2	4	6	Y	N

**Note:** Block Transfers are optional. Circle the Block Transfer File Number, write in one of the rack numbers from above, circle the appropriate Module Group and Byte, and fill in the Block Transfer file size.

## Block Transfer Assignments

Block Transfer File Number	Rack Number	Module Group	Byte	No. Words
1		0 1 2 3 4 5 6 7	Hi Lo	
2		0 1 2 3 4 5 6 7	Hi Lo	
3		0 1 2 3 4 5 6 7	Hi Lo	
4		0 1 2 3 4 5 6 7	Hi Lo	
5		0 1 2 3 4 5 6 7	Hi Lo	
Pass-Through				30

## Numbers

1747-SN I/O Subscanner module, [4-15](#), [4-22](#)  
1747-SN I/O Subscanner module, [1-13](#)  
1770-KF2, [6-25](#)  
1771-SN I/O Subscanner Module, [1-13](#), [4-3](#), [4-22](#), [A-12](#)  
1772-SD2 Remote I/O Scanner, [1-13](#), [A-10](#)  
1775-S4A Remote I/O Scanner, [1-12](#), [A-6](#)  
1784 series industrial terminals and laptop computers, [2-1](#)  
1784-KL, [6-25](#)  
1784-KTK1, [6-25](#)  
1784-KT/KT2, [6-25](#)  
1785-KE, [6-25](#)  
6008-SI IBM PC I/O Scanner, [1-13](#)  
6008-SQ DEC Q-BUS I/O Scanner, [1-14](#)  
6008-SV VME I/O Scanner, [1-13](#)  
6120 series industrial computers, [2-1](#)  
6160 series industrial workstations, [2-1](#)  
6200 Defaults File, [6-26](#)  
6200 Programming software, [6-25](#)

## A

Accum Time, [7-35](#)  
Accumulated Time (Accum Time) field, [7-36](#)  
Acknowl Alarm button, [7-33](#), [7-35](#)  
    *See also* Acknowledge Alarm button  
Acknowledge alarm  
    full alarm window, [7-33](#)  
    single line alarm window, [7-32](#)  
Acknowledge Alarm button, [7-30](#)  
Acknowledged Alarm Number address, [7-27](#)  
Activate Audio, [7-17](#)  
Active Alarms, [7-42](#)  
Active Alarms mode, [7-35](#)  
Add Background Text, [5-42](#)  
Add Menu, [3-21](#), [5-15](#), [5-58](#), [10-3](#)

Address, [3-27](#)  
    Acknowledged Alarm Number, [7-27](#)  
    Alarm window, [7-23](#)  
    Assigning a PLC, [9-2](#)  
    block transfer, [A-1](#)  
    Block transfer control, [6-19](#)  
    Bridge  
        Local, [6-20](#)  
        Remote, [6-20](#)  
    Button Control, [10-4](#), [10-5](#), [10-7](#), [10-8](#)  
    Control List Selector, [10-9](#)  
    Cursor Point, [10-14](#)  
    Decimal Point Position, [10-31](#), [10-36](#), [10-39](#), [10-42](#), [10-45](#), [10-46](#)  
    Enter Key Control, [10-35](#), [10-38](#), [10-45](#), [10-77](#)  
    Enter Key Handshake, [10-35](#), [10-38](#), [10-45](#), [10-77](#)  
    Indicator State, [10-4](#), [10-5](#), [10-6](#), [10-7](#)  
        menu, [10-24](#)  
    indicator state, [10-24](#)  
    Information window, [7-8](#)  
    Keypad Control, [10-34](#), [10-37](#)  
    menu, [9-1](#)  
    Numeric Entry Keypads, [10-37](#)  
    Numeric Keypad-Enable Button, [10-34](#)  
    object's PLC, [4-15](#)  
    PanelView/PLC DH+, [6-20](#)  
    Rack, PLC-5, [1-12](#)  
    Scaled Numeric Data Display, [10-32](#)  
    Selector Control, menu, [10-10](#)  
    SLC-5/02, I/O image table, [4-15](#)  
    Standard Numeric Data Display, [10-30](#)  
    Time and Date, [9-7](#)  
    Time and Date Control, [9-7](#)  
    Update, [9-2](#)  
    window control, [7-8](#)  
Address Assignment menu, [7-31](#)  
Address Format, PLC Controlled Time and Date, [9-8](#)  
Address List, Object, [4-11](#)  
Address Map, [5-28](#)  
Address Menu, [3-34](#), [3-35](#), [5-27](#), [5-32](#), [5-35](#)  
Addressing and Formatting options  
    Scaled Numeric Data Display, [10-32](#)  
    Standard Numeric Data Display, [10-30](#)  
Alarm History button, [7-14](#), [7-33](#)

Alarm History screen, [3-14](#), [7-14](#), [7-33](#),  
[7-34](#), [8-4](#)

Alarm messages, [6-2](#), [7-13](#)  
report, [6-7](#)  
triggering, [7-26](#)

Alarm QTY/TIME Reset to PLC Controller,  
[7-38](#)

Alarm Quantity (Qty) field, [7-36](#)

Alarm Quantity/Accum Time Reset, [9-8](#)  
PLC Controlled, [1-11](#)

Alarm relay, [7-15](#), [7-17](#), [7-30](#), [7-33](#)  
PLC Controlled, [1-10](#)

Alarm State, [7-35](#)

Alarm Status screen, [3-14](#), [7-35](#), [7-37](#),  
[8-4](#)  
buttons, [7-41](#)  
menu, [7-38](#)

Alarm window, [1-3](#), [1-10](#), [3-14](#), [4-10](#),  
[4-11](#), [4-12](#), [7-12](#)  
appearance, [7-22](#)  
Exit button, [7-30](#)  
Full, [7-12](#), [7-13](#)  
Single-line, [7-12](#)

Alarm Window menu, [7-15](#), [7-29](#)

Alarm Window report, [6-6](#)

All Files, [3-10](#), [6-2](#)

All Messages mode, [7-35](#)

All Msgs, [7-43](#)

All option, [3-24](#)

Alternate Character Set, [10-63](#)  
Alt-Key combinations, [E-3](#)

Amount per Decrement, [10-29](#)

Amount per Increment, [3-39](#), [10-28](#)

Application file, [P-1](#), [3-10](#), [6-1](#), [6-2](#)  
application file comment, [3-13](#), [6-24](#)  
application size, [6-12](#), [6-31](#), [6-33](#),  
[6-34](#)

Arc, [1-8](#), [10-53](#)  
Size and screen representation, [10-54](#)

Arrows and lines, [10-51](#)

ASCII character, [9-6](#)  
ASCII character set, [10-67](#)  
ASCII code, [6-6](#)

ASCII Display, [1-9](#)  
control sequences, [10-66](#)  
object, [10-64](#)  
string format, [10-65](#)

ASCII Input Object, configuring, [10-74](#)

ASCII Input object, [1-9](#), [10-68](#)

Assign Screen to State, [10-20](#)

Assigning a PLC address, [9-2](#)

Assigning function keys, [3-28](#)

Assigning screen security levels, [3-13](#)

Assigning Screen to State, [3-32](#)

Audio, PLC Controlled, [1-10](#)

Audio indicator. *See* Beeper

Auto-Repeat Rate, [10-28](#), [10-29](#), [10-44](#)

Auto-Repeat Start Delay, [10-28](#), [10-29](#),  
[10-44](#)

Auto-Restart After Download, [6-21](#)

AUTOEXEC file, [5-1](#)

## B

Background Alarms, [7-15](#)

Background Color, [3-25](#), [3-29](#), [3-32](#),  
[3-33](#), [5-34](#)

Background text, [10-50](#)  
and graphics, [10-1](#)

Bar graphs, [1-8](#), [10-56](#)  
data types, [10-57](#)

Battery-Backed memory, [P-1](#)

Battery-backed memory, [3-16](#)

Baud Rate, [4-21](#), [5-7](#)

BCD Data Type, [4-17](#), [7-10](#), [7-26](#)

BCD Format, [4-18](#)

Beeper, [9-4](#)

Bi-directional block transfer, [A-3](#)

Binary Data Type, [4-17](#), [7-10](#), [7-25](#)

Bit Number, [4-16](#)

Bit pattern, [10-23](#)  
BCD, [10-11](#)  
Binary, [10-11](#)  
Bit, [10-11](#)

Bit Position Data Type, [4-19](#), [7-11](#), [7-26](#)

Bits required for BCD digits, [4-19](#)

Blink, [3-29](#), [3-32](#), [3-33](#)

Block Transfer, [3-20](#), [4-4](#), [4-5](#), [4-15](#)  
assignments, [4-3](#), [4-22](#)  
bi-directional, [A-3](#)  
byte (slot), [A-2](#)  
control address, [4-22](#), [6-19](#)  
Data Table words and bits, [4-6](#)  
file number, [3-34](#), [4-22](#)  
module group, [A-1](#)  
number of words, [A-2](#)  
Pass-Through, [4-4](#)  
PLC address, [4-16](#)  
PLC-3 family timing, [A-20](#)

PLC-5 timing, [A-18](#)  
rack number, [A-1](#)  
read, [A-13](#)  
timing considerations, [A-16](#)  
window, [5-6](#), [6-19](#)  
write, [A-14](#)

Block Transfer I/O Usage Worksheet,  
[4-14](#), [C-1](#)

Block Transfer Programming, [A-1](#)  
Local PLC-2 family, [A-13](#)  
PLC-5/15, [A-3](#)  
PLC-2/30, [A-10](#)  
PLC-3, [A-6](#)

Border, [3-29](#), [3-31](#), [3-32](#)

Box, [1-8](#), [5-57](#), [10-53](#)

Bridge Address  
Local, [6-20](#)  
Remote, [6-20](#)

Burn EPROMs, [3-9](#), [6-30](#)  
Burn EPROMs menu, [6-31](#)

Button  
Acknowl Alarm, [7-33](#)  
*See also* Acknowledge Alarm button  
Acknowledge Alarm. *See* Acknowl Alarm button  
Change Mode, [7-41](#)  
Cursor Down, [7-33](#)  
Cursor Up, [7-33](#)  
Decrement Value, [1-8](#), [10-28](#)  
Down Cursor (Incr Value), [10-12](#),  
[10-13](#)  
Enter, [10-12](#)  
Exit, [7-26](#), [7-30](#), [7-33](#)  
Go To Screen, [1-7](#), [10-18](#)  
History, [7-33](#)  
Increment Value, [1-8](#), [10-27](#)  
Interlocked Push, [1-7](#)  
Latched Input Push, [1-7](#)  
Maintained Push, [1-7](#)  
Momentary Push (Normally Closed), [1-7](#)  
Momentary Push (Normally Open), [1-7](#)  
Numeric Keypad-Enable, [1-9](#), [10-34](#)  
Return To Previous Screen, [1-7](#), [5-56](#),  
[10-18](#)  
Screen Keypad-Enable, [1-9](#), [10-21](#)  
Screen Print, [1-8](#)  
Set Value, [1-8](#), [10-26](#)  
Silence, [7-30](#), [7-33](#)  
Status, [7-33](#)  
Up Cursor (Decr Value), [10-12](#), [10-13](#)

Button Control Address, [5-36](#), [10-4](#),  
[10-5](#), [10-7](#), [10-8](#), [10-27](#)  
window, [5-26](#), [5-47](#)

Button Control bit, [10-6](#)

Button Text, [3-33](#)  
menu, [5-18](#)

Buttons, [3-27](#)  
Alarm Status screen, [7-41](#)  
and Auto-Repeat, [3-38](#)  
and Keypad terminals, [3-36](#)  
and Touch Screen terminals, [3-37](#)  
ASCII Input object  
common, [10-71](#)  
SEL, [10-72](#)  
unique, [10-72](#)  
Full Alarm window, [7-32](#)  
locating onscreen, [4-2](#)  
Scrolling List object, [10-93](#)

Buttons menu, [3-30](#), [5-44](#)

Byte, [A-2](#)

## C

Change Mode button, [7-41](#)

Change Preset, [3-35](#), [9-3](#)

Channel Time, [A-20](#)

Character Height, [3-29](#), [3-32](#), [3-33](#)

Character Width, [3-29](#), [3-32](#), [3-33](#)

Circles, [10-53](#)

Clear option, [3-24](#)

Clear Window, PLC Controlled, [1-11](#)

Clear Window to PLC Controller, [7-30](#),  
[9-8](#)

Clear Window, PLC Controlled, [7-30](#), [9-8](#)

Colors, [3-10](#)

Comment, [3-13](#)

Communication Port Settings, [6-7](#)

Communication Problems, [B-6](#)

Communication Settings, [6-11](#)

Communications, [3-34](#), [7-9](#), [7-24](#),  
[7-31](#), [7-39](#), [9-2](#)

Communications menu, [3-19](#), [5-3](#), [5-7](#)

Compatibility Reports, [2-8](#)

Compatibility Summary report, [6-5](#)

Computer Setup report, [6-7](#)

Configuration Mode Menu, [6-12](#), [6-15](#)

Configure  
Alarm Status Screen, [7-37](#)  
Information window, [7-2](#)  
Pass-Through Download Bits, [3-18](#)  
PLC Communications, [5-3](#)  
PLC-5, [A-10](#)

Port, [6-31](#), [6-33](#), [6-34](#)  
 Configure Pass-Through Download Bits Window, [6-18](#)  
 Configuring, Pass-Through parameters, [6-17](#)  
 Configuring the Alarm Window, [7-15](#)  
 Configuring the Information Window, [7-2](#)  
 Connecting the Programmable Controller, [11-2](#)  
 Connection points (Symbols), [10-55](#)  
 Connector Characters, [10-51](#)  
 Connector Characters and lines, [10-51](#)  
 Continue Upload, [6-29](#)  
 Control Byte (Hi/Low Byte), [4-22](#)  
 Control List Selector, [5-42](#), [5-44](#)  
     Addressing, [10-9](#)  
     with Enter, [1-7](#), [10-11](#)  
     without Enter, [1-7](#), [10-13](#)  
 Control Selectors, [10-9](#)  
     menu, [5-43](#)  
 Control Sequences, Invalid, [10-68](#)  
 Control Value, [10-8](#)  
 Converting an application file into hex file(s), [6-32](#), [6-33](#), [6-34](#)  
 Conveyor Controls Screen Worksheet, [4-29](#)  
 Copy a File, [6-3](#)  
 Copy Screen To, [8-2](#)  
 Copy screens, [3-13](#)  
 Copying a Screen from One Application File to Another, [8-2](#)  
 Create New File, [3-8](#)  
 Create New Screen, [3-13](#)  
 Creating Alarm Messages, [7-15](#)  
 Creating an application file, [4-39](#), [5-1](#)  
 Creating messages, [7-3](#)  
 Creating screens, [1-2](#), [5-8](#)  
 Critical Controls, [4-1](#)  
 Current Screen Number to PLC, [9-4](#)  
 Current Screen Number to PLC Controller, [3-17](#), [9-4](#)  
 Cursor, [3-27](#)  
 Cursor Auto Repeat Rate (per Sec.), [3-17](#)  
 Cursor Auto Repeat Start Delay, [3-39](#)  
 Cursor Auto-Repeat Rate, [3-39](#)  
 Cursor Auto-Repeat Start Delay, [3-17](#)  
 Cursor control address, [10-84](#)

Cursor List object, [10-79](#)  
 Cursor Point, [10-14](#)  
 Cursor Point Address, [10-14](#)  
 Cursor Points, Default operation, [10-15](#)  
 Cursor Up/Down buttons, [7-35](#)

## D

Data Entry Keys, [3-2](#)  
 Data Type, [7-9](#), [7-24](#), [7-31](#), [7-39](#), [9-2](#)  
 Data type, [3-34](#)  
     BCD, [4-17](#)  
     Bit position, [4-19](#)  
     Control List Selector, [10-9](#)  
     Decrement Value Button, [10-29](#)  
     Increment Value Button, [10-28](#)  
     List Indicator, [10-23](#)  
     Multi-State Indicator, [10-22](#)  
     Numeric Data Display, [10-32](#)  
     Numeric Keypad-Enable button, [10-34](#)  
     Numeric Input Cursor Point, [10-45](#)  
     Selector Control, [10-11](#)  
     Set Value Button, [10-27](#)  
     Signed Integer, [4-17](#)  
     Top position value, [10-10](#)  
 data type, [7-10](#), [10-9](#)  
 Data Types, [4-16](#)  
 Data types  
     bar graphs, [10-57](#)  
     Increment Value Button, [10-28](#)  
     Local Message Display, [10-61](#)  
     Set Value Button, [10-27](#)  
 Date Display, [1-8](#), [10-58](#)  
 Decimal Formatting, [10-38](#)  
 Decimal Key Controlled Decimal Position, [3-34](#), [10-36](#), [10-39](#), [10-42](#)  
 Decimal Point, [3-34](#), [10-31](#)  
 Decimal Point Format, [10-35](#)  
 Decimal Point Position Address, [10-31](#), [10-36](#), [10-39](#), [10-42](#), [10-45](#), [10-46](#)  
 Decrement Value Button, [1-8](#), [10-28](#)  
     Data Types and Values, [10-29](#)  
     Data types and values, [10-29](#)  
 Default Settings, [2-7](#)  
 DEFAULTS File, [2-3](#)  
 Define Block Transfer Files, [5-6](#)  
 Delete Address, [3-35](#), [7-10](#), [7-25](#), [7-32](#), [7-40](#), [9-3](#)  
 Delete Message window, [7-7](#)  
 Delete Screen, [8-1](#)



Delete screens, [3-13](#)  
Deleting Alarm Messages, [7-20](#)  
Deleting Information Messages, [7-7](#)  
Deselect option, [3-23](#)  
determining response times, [A-15](#)  
Develop Menu, [6-1](#)  
Develop menu, [3-7](#), [5-2](#)  
DH+, [6-20](#)  
DH+ Hardware Driver, [6-25](#)  
Diagonal lines, [10-51](#)  
Direct Downloading and Uploading, [6-10](#)  
Directory, [3-8](#), [3-9](#)  
Discrete Address, [4-15](#)  
Discrete Data Response Time, [A-15](#)  
Discrete I/O scan times, [A-16](#)  
Discrete I/O Usage Worksheet, [4-13](#), [C-1](#)  
Discrete I/O Usage Worksheet, [4-36](#)  
Display  
  ASCII, [1-9](#)  
  Date, [1-8](#)  
  Dynamic Memory, [1-2](#)  
  Local Message, [1-9](#)  
  Numeric Data, [1-8](#)  
  Time, [1-8](#)  
Display Active Alarms Mode, [7-42](#)  
Display All Alarms Mode, [7-43](#)  
Display Menus for Terminal Version, [3-15](#)  
Display Objects, [10-25](#)  
display objects, [10-1](#)  
Display States, [3-32](#)  
Documentation, printed, see also Reports, [1-2](#)  
DOS, [2-1](#)  
Down Cursor (Incr Value) Button, [10-12](#), [10-13](#)  
Down Cursor (Incr Value) menu, [5-45](#)  
Download to PanelView menu, [6-13](#)  
download to the burner, [6-31](#), [6-34](#)  
Downloading, [1-1](#), [6-12](#)  
  Downloading to Panelview Terminal, [3-8](#)  
Downloading over the Data Highway +, [6-23](#)  
Downloading to Earlier Version Terminals, [6-14](#)  
Dynamic Memory Display, [1-2](#)  
Dynamic Objects, [4-12](#)  
Dynamic objects, [1-5](#)

## E

e Application File Comment, [8-5](#)  
Edit Menu, [3-22](#)  
Edit Message Menu, [7-16](#)  
Edit Text, [3-31](#), [3-32](#), [3-33](#)  
Editing Information Messages, [7-6](#)  
Editing Alarm Messages, [7-20](#)  
Editing Numeric Values, [10-47](#)  
EEPROM, [P-2](#)  
  EPROM or EEPROM chip installation, [1-4](#)  
emergency stop buttons, [11-3](#)  
Emergency Stops, [4-1](#)  
Ending Address menu, [6-5](#)  
Energize Relay, [7-17](#)  
Enter Bit Handshakes, [10-18](#)  
Enter Button, [10-12](#)  
Enter Key Control Address, [10-39](#)  
Enter Key Control address, [10-35](#), [10-38](#), [10-45](#), [10-77](#)  
Enter Key Handshake Address, [10-39](#)  
Enter Key Handshake address, [10-35](#), [10-38](#), [10-45](#), [10-77](#)  
EPROM, [P-2](#)  
  EPROM or EEPROM chip installation, [1-4](#)  
EPROM burner users manual, [6-30](#)  
Exit, [3-28](#)  
Exit button, [7-26](#)  
Exit Menu, [5-19](#), [5-59](#)  
Exit menu, [3-12](#), [3-26](#), [3-36](#)  
Export, Message text, [10-61](#)  
Export Message Text window, [7-6](#)  
extended application memory, [3-16](#)  
Extended Character Set, Ctrl-Key combinations, [E-1](#)

## F

File, [3-34](#), [7-9](#), [7-24](#), [7-31](#), [9-3](#)  
  file comment, [3-13](#)  
  file menu, [3-12](#)  
  files menu, [3-9](#)  
file extension CFG, [5-2](#)  
File menu, [5-2](#)  
File window, [6-7](#)  
Files Menu, [6-3](#)

Fill Left, [3-33](#)  
 Firmware EPROM, [P-2](#)  
 Firmware Version, [2-7](#)  
 Fixed Position Decimal Point , [10-36](#),  
[10-38](#), [10-41](#)  
 Foreground Color, [3-29](#), [3-32](#), [3-33](#),  
[5-34](#)  
 Format, [3-27](#)  
     format menu, [3-33](#)  
 format-date, [10-58](#)  
 format-time, [10-57](#)  
 Full Alarm Window, buttons, [7-32](#)  
 Full Alarm window, [7-13](#)  
 Full alarm window, [7-12](#)  
 Function Key Table, [3-25](#)  
 Function Key Usage report, [6-6](#)  
 Function keys, [3-30](#), [5-16](#)

## G

Generate Hex Files, [6-32](#), [6-33](#), [6-34](#)  
 Get 6200 Parameters, [6-26](#)  
 Global Functions report, [6-5](#)  
 Go To Screen Button, [5-15](#)  
 Go to Screen button, [1-7](#), [10-18](#)  
 Go To Screen Buttons., [5-14](#)  
 graphic characters, [10-63](#)  
 Group 1 objects, [3-38](#), [4-10](#)  
 Group 2 objects, [3-38](#)  
 Group 3 objects, [3-38](#)  
 Group option, [3-23](#)

## H

handshake, [10-6](#)  
 Hardware Requirements, [2-1](#)  
 Hardware, Firmware and Software  
     Requirements for Pass-through File  
     Transfer, [6-17](#)  
 Help, [3-1](#)  
 Hex Files, [3-10](#), [6-2](#)  
 Hex files, [P-1](#), [6-32](#), [6-33](#), [6-34](#)  
 High Intensity, [3-29](#), [3-32](#), [3-33](#)  
 History button, [7-33](#), [7-41](#)  
 Horizontal bar graphs, [10-56](#)  
 Horizontal line, [10-50](#)

## I

I/O Address Cross Reference report, [6-5](#)  
 I/O Image Table Words and Bits, [4-5](#)  
 I/O Usage Table, [3-25](#)  
 I/O Usage Table report, [6-5](#)  
 I/O Usage Worksheets, [4-12](#)  
 IBM XT, AT, PS/2 or 100% compatible, [2-1](#)  
 Import, Information text, [10-59](#)  
 Import Message Text window, [7-5](#), [7-19](#),  
[10-60](#)  
 Import/Export Alarm Messages, [7-17](#)  
 Import/Export Information Messages, [7-3](#)  
 Importing alarm text, format, [7-17](#)  
 Increment Value Button, [1-8](#), [10-27](#)  
     Data Types and Values, [10-28](#)  
     Data types and values, [10-28](#)  
     default settings, [10-28](#)  
 Indicator  
     List, [1-8](#), [10-23](#)  
     Multi-state, [1-7](#)  
     Multi-State, [10-22](#)  
 Indicator State Address, [10-4](#), [10-6](#),  
[10-22](#), [10-24](#)  
 Indicator State address, [10-5](#), [10-7](#)  
 Indicator State Address Menu, [5-50](#)  
 Indicator State Address menu, [10-24](#)  
 Indicators Menu, [5-48](#)  
 Informatin window, menu, [7-3](#)  
 Information, [3-11](#)  
 Information Message List, [7-11](#)  
 Information messages, [6-2](#)  
 Information Messages report, [6-7](#)  
 Information Messages triggering, [7-11](#)  
 Information Window, [5-2](#), [7-1](#)  
 Information window, [1-3](#), [1-10](#), [3-14](#),  
[4-10](#), [4-11](#), [4-12](#), [7-2](#)  
     configuring, [7-2](#)  
 Information Window and Messages Menu ,  
[7-7](#)  
 Information Window report, [6-6](#)  
 Information Window's Appearance, [7-8](#)  
 Inner Text, [3-33](#)  
 Input and Output Data Files, [A-14](#)  
 Input Image Table, [5-28](#)  
 Input objects, [10-25](#)  
 Input or Output, [4-15](#)

Input/Output, [3-34](#), [7-9](#), [7-24](#), [7-31](#),  
[7-39](#), [9-3](#)  
Installing PanelBuilder on a Hard Disk, [2-4](#)  
Instruction Execution Time (in  
microseconds), [A-18](#)  
Intel Hex format, [1-4](#), [6-30](#)  
Interlocked Push Button, [1-7](#), [10-8](#)  
Invalid Screen, [9-6](#)  
ISA Industrial Symbols, [10-55](#)  
ISA Symbols, [10-51](#), [10-56](#)  
ISA symbols, [1-8](#), [3-30](#)

## K

Keypad Control Address, [10-34](#), [10-37](#)  
Keypad Screen Selector, [1-10](#), [10-20](#)  
Keypad Terminals, [1-5](#)  
Keys  
  Data entry, [3-2](#)  
  Editing, [3-3](#)  
  for Editing Objects and Lines, [3-3](#)  
  Menu, [3-1](#)

## L

Label, [5-18](#)  
Ladder Logic, [10-48](#), [10-50](#)  
Ladder Program for Remote I/O, [A-15](#)  
Last Chassis Designation, [4-22](#)  
Latch Button PLC Handshakes, [10-18](#)  
Latched Input Push Button, [1-7](#)  
Latched Push Button, [10-6](#)  
Line, [1-8](#), [10-50](#)  
Line Crossings, [10-52](#)  
Line Down button, [7-41](#)  
line Draw, [10-51](#)  
line Erase, [10-51](#)  
line Relocate, [10-51](#)  
line segment, [4-25](#)  
List, [3-27](#)  
List, [10-13](#)  
List (Control List Selector with Enter  
component), [10-12](#)  
List Indicator, [1-8](#), [10-23](#)  
List Menu, [5-45](#)  
List menu, [3-31](#)  
List Selector buttons, [3-27](#)

load an application file, [6-1](#)  
Load PanelView Location Data, [6-27](#)  
Load PanelView Location Data Window,  
[6-28](#)  
loading application files, [6-10](#)  
Local Bridge Address, [6-20](#)  
Local Bridge Address and Remote Bridge  
Address Selection, [6-21](#)  
Local Message Display, [1-3](#), [1-9](#), [10-58](#),  
[10-65](#)  
  data types, [10-61](#)  
Local Message Display List, [10-62](#)  
Local Message List, [10-58](#)  
Local Messages, [10-58](#)  
Local messages, [6-2](#)  
Local Messages object list, [10-86](#)  
Local Messages report, [6-7](#)  
Local Messages triggering for Bit Position  
Data Type, [10-62](#)  
Look, [3-27](#)  
Look menu, [3-29](#), [5-11](#), [5-17](#), [5-22](#),  
[5-39](#)

## M

Main Menu, [3-7](#)  
Main Screen, [4-27](#)  
Maintained Push Button, [1-7](#), [10-7](#)  
Margin Size, [3-30](#)  
Maximum Block Transfers on one Scanner  
Channel, [A-17](#)  
maximum cable length, [3-20](#)  
maximum length of Alarm Messages, [7-16](#)  
Maximum length of messages, [7-3](#)  
maximum message characters, [10-58](#)  
maximum number of alarm messages,  
[7-15](#)  
Maximum Number of I/O Chassis on the  
Same Scanner Channel, [A-17](#)  
maximum number of messages, [7-3](#)  
maximum number of states, [10-23](#)  
Memorize, [3-22](#), [5-55](#)  
Memorize and Recall, [5-29](#)  
Memorize Prompt, [5-30](#)  
Memory Requirements, [2-6](#)  
  estimating, [4-23](#)  
  reducing, [4-26](#)

memory requirements of each element,  
[4-23](#)

## Menu

Add, [3-21](#), [5-15](#), [5-58](#), [10-3](#)  
 Address, [3-34](#), [5-27](#), [5-32](#)  
 Address Assignment, [7-31](#)  
 Alarm, [9-8](#)  
 Alarm Status screen, [7-38](#)  
 Alarm Window, [7-15](#)  
 Burn EPROMS, [6-31](#)  
 Button Control Address, [5-27](#)  
 Button Text, [5-18](#)  
 Buttons, [3-30](#), [5-44](#)  
 Communications, [3-19](#), [5-3](#), [5-7](#)  
 Configuration Mode, [6-12](#), [6-15](#)  
 Control Selectors, [5-43](#)  
 Develop, [5-2](#), [6-1](#)  
 Download to PanelView, [6-13](#)  
 Edit, [3-22](#)  
 Edit Message, [7-16](#)  
 Ending Address, [6-5](#)  
 Exit, [3-12](#), [3-26](#), [3-36](#), [5-19](#), [5-59](#)  
 File, [3-12](#), [5-2](#), [10-3](#)  
 Files, [3-10](#), [6-3](#)  
 Format, [3-33](#)  
 Indicator State Address, [5-50](#), [10-24](#)  
 Indicators, [5-48](#)  
 Information Window, [7-3](#)  
 List, [3-31](#)  
 Look, [3-29](#), [5-11](#), [5-17](#), [5-22](#), [5-39](#)  
 Messages, [7-3](#)  
 Move & Edit, [5-13](#)  
 Move & Size, [5-24](#)  
 Move and Edit, [5-12](#), [5-22](#)  
 Move and Size, [5-31](#), [5-48](#)  
 Numerics, [5-53](#)  
 Object, [3-22](#), [3-26](#), [5-11](#), [5-15](#),  
[10-12](#), [10-13](#), [10-19](#), [10-25](#)  
 Object List, [6-6](#)  
 Object, for Text, [5-11](#)  
 Options, [3-15](#), [3-25](#)  
 Outer Text, [5-26](#)  
 Outer text, [3-33](#)  
 Pass-Through Download to PanelView,  
[6-24](#)  
 PLC address, [9-1](#)  
 PLC Controlled Alarm Relay, [9-2](#)  
 PLC Inhibit Bit Address, [3-19](#)  
 Programming Terminal Configuration,  
[6-25](#)  
 Push Buttons, [5-23](#)  
 Reports, [3-9](#), [6-4](#)  
 Screen, [3-20](#), [5-9](#), [5-18](#)  
 Screen Selector, [5-38](#)  
 Screens, [3-13](#), [5-8](#), [5-21](#), [5-41](#), [8-4](#),  
[10-3](#)  
 Select File, [6-4](#)

Select Reports, [6-5](#)  
 Selector Control Address, [5-46](#), [10-10](#)  
 Setup, [3-10](#)  
 Starting Address, [6-5](#)  
 State 0, [5-34](#), [5-49](#)  
 States & Text, [5-34](#)  
 States and Text, [5-25](#), [5-31](#), [5-49](#)  
 Text, [3-33](#), [5-17](#), [5-40](#)  
 Text/Draw, [5-10](#), [5-14](#), [5-21](#)  
 Transfer, [6-13](#), [6-14](#), [6-23](#), [6-30](#)  
 Utilities, [8-1](#)  
 Utility, [3-35](#), [5-29](#), [5-32](#)  
 Window Control Address, [7-9](#)  
 Window Look, [7-8](#)  
 Windows, [3-13](#), [7-1](#), [7-3](#)

Menu keys, [3-1](#)

Message, [7-35](#)  
 displays, [1-3](#)  
 triggering, [7-10](#)

Messages, [7-5](#)  
 creating, [7-3](#)  
 Editing, [7-6](#)  
 Import format, [7-4](#)  
 Import/Export, [7-3](#)

Messages Menu, [7-16](#)

Messages menu, [7-3](#)

Messages triggering for the Binary or BCD  
 Data Type, [10-61](#)

Messages triggering on Multiple Local  
 Message Displays, [10-62](#)

Messages window, [7-5](#), [7-18](#), [10-60](#)

Minimum Push Button On Time, [10-4](#),  
[10-5](#), [10-18](#)

Minimum Push Button on Time, [3-17](#)

Modify Block Transfer window, [5-6](#)

Modify Rack Assignment window, [5-4](#)

Module Group, [4-22](#), [A-1](#)

module group, [4-4](#)

module groups, [4-3](#)

Momentary (Normally Closed) Push Button,  
[1-7](#)

Momentary (Normally Open) Push Button,  
[1-7](#), [5-23](#)

Momentary Normally Closed Push Button,  
[10-5](#)

Momentary Normally Open Push Button,  
[10-4](#)

momentary push buttons, [10-1](#)

Momentary Push Buttons (Normally Closed)  
 , [5-33](#)

Mouse, [1-4](#), [3-11](#)  
     damping factors, [3-11](#)  
     driver software, [3-11](#)  
 Move, [3-30](#), [3-31](#)  
 Move & Edit, [3-27](#)  
 Move & Edit Menu, [5-13](#)  
 Move & Size, [3-26](#)  
 Move & Size menu, [3-28](#)  
 Move and Edit Menu, [5-12](#), [5-22](#)  
 Move and Size, [5-16](#), [10-65](#)  
 Move and Size Menu, [5-24](#), [5-31](#), [5-48](#)  
 Move Menu, [3-23](#)  
 Move Text, [3-31](#), [3-32](#), [3-33](#)  
 Moving an object, [3-28](#)  
 Moving Text, [5-13](#)  
 Msg , [7-35](#)  
 Multi-State Indicator, object list, [10-86](#)  
 Multi-state Indicator, [1-7](#)  
 Multi-State Indicator, [10-22](#)  
 Multi-state Indicators, [5-47](#)  
 multiplexing, [4-6](#)

## N

Nominal Time, [A-21](#)  
 Non-Continuous Block Transfer Mode, [A-3](#)  
 Number of Bits, [3-34](#), [4-19](#), [7-9](#), [7-24](#),  
     [7-31](#), [7-39](#), [9-3](#)  
 Number of BT on Channel, [A-21](#)  
 Number of Chassis in Rack List, [A-21](#)  
 Number of Digits, [3-33](#)  
 Number of States, [3-31](#), [4-16](#), [10-12](#),  
     [10-13](#), [10-19](#), [10-25](#)  
 Number of Words, [3-34](#), [9-3](#)  
 Numeric and Security Entry Window, [3-14](#)  
 Numeric Cursor Point, default settings,  
     [10-44](#)  
 Numeric Data Display, [1-8](#), [5-52](#), [5-53](#),  
     [10-29](#), [10-30](#)  
     Decimal Point, [10-31](#)  
     Formatting, [10-31](#)  
     object list, [10-86](#)  
     Polarity, [10-32](#)  
     Scaled, [10-32](#)  
         Formatting and Addressing, [10-32](#)  
     Standard, [10-30](#)  
         Formatting and Addressing, [10-30](#)

Numeric Data Display Displayed Value  
     Address, [10-30](#)  
 Numeric Entry Keypad  
     Formatting and Addressing Options,  
         [10-37](#)  
     Touch Screen only, [10-37](#)  
 Numeric Input Cursor Point, [1-9](#), [3-27](#),  
     [10-40](#)  
     data types, [10-45](#)  
     disable, [10-40](#)  
     enable, [10-40](#)  
 Numeric Input Cursor Point Character,  
     [10-47](#)  
 Numeric Keypad, [1-10](#), [10-34](#)  
     decimal point format, [10-35](#)  
     decimal key controlled, [10-36](#)  
     PLC controlled, [10-36](#)  
 Numeric keypad, keys, [10-22](#)  
 Numeric Keypad-Enable Button, [1-9](#),  
     [10-34](#)  
     Formatting and Addressing Options,  
         [10-34](#)  
 Numeric Keypad, Touch Screen, decimal  
     point format  
     Decimal Key Controlled, [10-39](#), [10-42](#)  
     Fixed, [10-38](#), [10-41](#)  
     PLC Controlled, [10-38](#), [10-42](#)  
 Numeric Objects, Decimal Point, Polarity  
     and Data Ranges, [10-26](#)  
 Numeric objects, [10-25](#)  
 Numerics Menu, [5-53](#)

## O

Object, [P-2](#), [4-14](#)  
 Object Address List, [4-11](#), [5-26](#), [5-46](#),  
     [C-1](#)  
 Object Address List Worksheet, [4-12](#)  
 Object Address List Worksheet for Screen  
     2, [4-34](#)  
 Object Address List Worksheet for Screen  
     3, [4-35](#)  
 Object Characteristics, [10-1](#)  
 Object List, [3-25](#), [10-85](#)  
     Local message, [10-86](#)  
     Multi-state indicator, [10-86](#)  
     Numeric data display, [10-86](#)  
 Object List menu, [6-6](#)  
 Object List report, [6-6](#)  
 Object Memorize Screen, [5-30](#)

- Object Menu, [5-11](#)
  - Object menu, [3-22](#), [3-26](#)
  - Object Name, [4-14](#)
  - Object text, [10-50](#)
  - Object Type, [4-14](#)
  - Objects, [1-2](#), [10-1](#)
    - Dynamic, [4-12](#)
    - maximum number on a screen, [10-1](#)
    - Numeric, [10-25](#)
    - numeric
      - display, [10-25](#)
      - input, [10-25](#)
      - retentive, [10-2](#)
      - Static, [4-12](#)
  - Objects and their Byte Requirements, [4-24](#)
  - Options in the Alarm Menu, [9-8](#)
  - Options menu, [3-15](#), [3-25](#)
  - Outer Text, [3-27](#), [3-33](#)
  - Outer Text Menu, [5-26](#)
  - Outer Text menu, [3-33](#)
- P**
- Page Up/Down buttons, [7-41](#)
  - PanelBuilder, [P-2](#)
  - PanelBuilder Defaults File, [6-25](#)
  - PanelBuilder Development Software, Using, [3-1](#)
  - PanelBuilder Development Software Problems, [B-2](#)
  - PanelBuilder Error Messages, [B-3](#)
  - PanelBuilder Features, [1-1](#)
  - PanelBuilder Files, [2-2](#)
  - PanelBuilder Menu Structure, [3-6](#)
  - PanelView Display Type, [3-15](#)
  - PanelView Error Messages, [B-4](#)
  - PanelView Location Data, [6-19](#)
  - PanelView Location Data, [6-28](#)
  - PanelView Objects table, [1-6](#)
  - PanelView Terminal, [P-2](#)
  - Pass-Through, [3-20](#)
    - Block transfer control address, [6-19](#)
    - Pass-Through Download Address Source, [6-22](#)
  - Pass-Through Download, [3-18](#)
  - Pass-Through Download to PanelView, [3-8](#)
  - Pass-Through Request Bit, Address, [3-18](#)
  - Pass-Through Status Bit, Address, [3-18](#)
  - Pass-Through Upload from PanelView, [3-9](#)
  - Pass-Through Configuration Window, [6-20](#)
  - Pass-Through Download Bits, [6-17](#)
  - Pass-Through Download Options Window, [6-21](#)
  - Pass-Through Download to PanelView Menu, [6-24](#)
  - Pass-Through Download to PanelView window, [6-20](#)
  - Pass-Through feature, [6-16](#), [6-23](#)
  - Pass-Through Request Bit, [6-17](#)
  - Pass-Through Status Bit, [6-18](#)
  - Pass-Through Upload from PanelView, [6-27](#)
  - Pass-Through Upload/Download Problems, [B-6](#), [B-7](#)
  - Pass-Through Utility Directory, [6-26](#)
  - Past Alarms, [7-43](#)
  - Past Alarms Mode, [7-43](#)
  - Past Alarms mode, [7-35](#)
  - pixel resolution., [10-56](#)
  - Planning an application, Steps, [4-1](#)
  - PLC address menu, [9-1](#)
  - PLC Alarm Message Triggering, [7-25](#)
  - PLC communication problems, [B-6](#)
  - PLC communication requirements, [5-3](#)
  - PLC Communication Worksheet, [5-3](#)
  - PLC Communications report, [6-5](#)
  - PLC Communications Worksheet, [4-20](#), [C-1](#)
  - PLC Communications Worksheet, [4-38](#)
  - PLC Control Options, [4-12](#)
  - PLC Controlled
    - Alarm Quantity/Accum Time Reset, [9-8](#)
    - Alarm relay, [3-18](#)
    - Audio, [3-18](#)
    - Clear Windows, [9-8](#)
    - Current Screen Number to PLC Controller, [9-4](#)
    - Screen Change, [10-18](#)
    - Screen number, [3-18](#)
    - Screen Print, [9-6](#)
    - Screen print, [3-18](#)
    - Silence Alarms, [9-8](#)
    - Time and Date, [9-7](#)
      - address format, [9-8](#)
    - Time and date, [3-18](#)
    - Time and Date to PLC Controller, [9-3](#)

- PLC Controlled Clear Window, [7-30](#)
  - PLC Controlled Decimal Point, [10-38](#), [10-41](#)
  - PLC Controlled Options, [1-10](#)
    - Alarm Quantity/Accum Time Reset, [1-11](#)
    - Alarm Relay, [1-10](#)
    - Audio, [1-10](#)
    - Clear Window, [1-11](#)
    - Screen Number, [1-11](#)
    - Screen Print, [1-11](#)
    - Silence Alarms, [1-11](#)
    - time and date, [1-11](#)
  - PLC controlled options, [9-1](#)
  - PLC Controlled Qty/Time Reset, [7-37](#)
  - PLC Controlled Silence Alarms, [7-30](#)
  - PLC DH+ Address Window, [6-20](#)
  - PLC Inhibit Bit, [6-17](#)
    - Address, [3-18](#)
    - Address menu, [3-19](#)
  - PLC Inhibit Bit Address Window, [6-18](#)
  - PLC Message Triggering, [10-61](#)
  - PLC Series/Revision Requirements for Pass-through File Transfer, [6-16](#), [B-8](#)
  - PLC Type, [3-19](#), [5-3](#)
  - PLC-2 family, [1-13](#)
  - PLC-2/05, [1-13](#)
  - PLC-2/15, [1-13](#)
  - PLC-2/30, [1-13](#)
  - PLC-2/40, [1-13](#)
  - PLC-3, [1-12](#)
  - PLC-3/10, [1-12](#)
  - PLC-5 family, rack address ranges, [1-12](#)
  - PLC-2, [A-12](#)
  - PLC-3 Family Block Transfer Timing, [A-20](#)
  - PLC-5 Block Transfer Timing, [A-18](#)
  - PLC-5 Pass-Through feature, [3-18](#)
  - PLC-5/15 Block Transfer Programming Examples, [A-2](#)
  - PLC/Scanner Type, [4-21](#)
  - PLC-5/10, [1-12](#)
  - Polarity, [10-32](#)
  - Polarity Address, [10-32](#)
  - positioning of push buttons, [4-2](#)
  - Powerup screen, [3-13](#), [8-4](#)
  - Preset, [3-35](#), [4-16](#)
  - presets, [6-15](#)
  - Print History button, [7-34](#)
  - Print Message, , [7-17](#)
  - print reports, [6-3](#), [B-1](#)
  - Print Status button, [7-41](#)
  - Printer, [1-5](#)
  - printer port setting, [6-8](#)
  - printing, [6-7](#)
  - Program Scan Time, [A-15](#), [A-17](#), [A-19](#), [A-20](#)
  - Programming EEPROMs, [6-33](#)
  - Programming Terminal Configuration, [6-25](#), [6-28](#)
  - Programming Terminal Configuration Menu, [6-25](#)
  - Programming Terminal DH+ Address, [6-25](#)
  - PROMS, user, [6-10](#)
  - Publications, [P-3](#)
  - Pump Controls Screen Worksheet, [4-31](#)
  - Push Button
    - Input Hold Time, [10-6](#)
    - Interlocked, [10-8](#)
    - Latched, [10-6](#)
    - Maintained, [10-7](#)
    - Minimum On Time, [10-4](#)
    - Momentary Normally Closed, [10-5](#)
    - Momentary Normally Open, [10-4](#)
  - Push buttons, [10-4](#)
  - Push Buttons Menu, [5-23](#)
  - Push-On, Push-Off, [10-7](#)
- ## Q
- Qty, [7-35](#)
  - QTY/Time Reset button, [7-36](#)
- ## R
- Rack, [3-34](#), [7-9](#), [7-24](#), [7-31](#), [7-39](#), [9-3](#)
  - Rack address range, [1-12](#)
  - Rack Assignment, [3-20](#)
  - Rack Assignment window, [5-4](#)
  - Rack Assignments, [4-21](#)
  - Rack assignments, [4-3](#)
    - fractional, [4-3](#)
  - Rack Assignments , [5-36](#)
  - rack fault bit , [10-6](#)
  - Rack Number, [4-22](#)
  - Rack number, [A-1](#)



Rack or File Number, [4-15](#)  
 Rack Size, [4-22](#)  
 Rack size, [4-5](#)  
 Rack Sizes, [4-4](#)  
 RAM, [P-2](#)  
 Recall, [3-24](#), [5-55](#)  
 Recall Option , [5-30](#)  
 recovery from a faulted rack condition, [4-2](#)  
 Reference Number, [4-14](#)  
 Remote Alarm Window Processing, [7-29](#)  
 Remote Bridge Address, [6-20](#)  
 remote I/O scan time, [4-3](#)  
 Rename Screen To, [8-2](#)  
 rename screens, [3-13](#)  
 Report  
     Alarm Messages, [6-7](#)  
     Alarm Window, [6-6](#)  
     Compatibility Summary, [6-5](#)  
     Computer Setup, [6-7](#)  
     function key usage, [6-6](#)  
     Global Functions, [6-5](#)  
     I/O Address Cross Reference, [6-5](#)  
     I/O Usage Table, [6-5](#)  
     Information Messages, [6-7](#)  
     Information Window, [6-6](#)  
     Local Messages, [6-7](#)  
     Object List, [6-6](#)  
     PLC Communications, [6-5](#)  
     Screens, [6-6](#)  
 Reports, [1-2](#)  
     printing, [6-7](#)  
     saving as ASCII test, [6-7](#)  
 Reports menu, [3-9](#)  
 Reports Menu , [6-4](#)  
 Reset Qty/Time button, [7-41](#)  
 Retentive, [P-2](#)  
 Retentive Objects, [10-2](#), [10-94](#)  
     and Presets, [10-95](#)  
     list of, [10-2](#), [10-94](#)  
     Safety considerations, [10-96](#)  
 Retentive objects, [10-94](#)  
 retentive objects, [10-1](#)  
 Retentive Objects and Presets, [10-95](#)  
 Return To Previous Screen Button, [5-56](#)  
 Return to Previous Screen button, [1-7](#)  
 Return To Previous Screen" button, [10-18](#)  
 Reverse Video, [3-29](#), [3-32](#), [3-33](#)  
 RS-232 Serial Port, [2-2](#)

Rubber Band Box, [3-24](#)  
 rubber band box, [3-23](#)

## S

Safety Considerations for Retentive Objects, [10-96](#)  
 sample application, [4-26](#)  
 Save the Application File, [5-59](#)  
 Save the Screen, [5-59](#)  
 Saving Application Files, [6-2](#)  
 Scaled Numeric Data Display, Formatting and Addressing Options, [10-32](#)  
 Scaling Formula- example, [10-33](#)  
 Scan time, [A-16](#)  
 scanner mode, [A-3](#)  
 Scanner types, [4-21](#)  
 Screen, [P-2](#), [3-27](#)  
     Alarm History, [3-14](#)  
     Alarm Status, [3-14](#)  
 Screen 1, The Main Screen, [4-28](#)  
 Screen 2, The Conveyor Controls Screen, [4-30](#)  
 Screen 3, The Pump Controls Screen , [4-32](#)  
 Screen Keypad-Enable Button, [1-9](#), [10-21](#)  
 Screen List Selector, [1-7](#), [10-19](#)  
 Screen Menu, [5-18](#), [5-51](#)  
 Screen menu, [3-20](#)  
 Screen Menu , [5-9](#)  
 Screen Number, PLC Controlled, [1-11](#)  
 Screen Print, [9-6](#)  
     PLC Controlled, [1-11](#)  
 Screen print, [6-6](#)  
     manual, [9-7](#)  
 Screen Print Active to PLC Controller, [3-18](#), [9-4](#), [10-63](#)  
 Screen Print Button, [1-8](#), [10-63](#)  
 Screen prints, [10-63](#)  
 Screen Selector Keypads, [10-20](#)  
 Screen Selectors, [5-15](#)  
 Screen selectors, [10-18](#)  
 screen selectors, [10-1](#)  
 Screen Selectors Menu, [5-38](#)  
 Screen Title Text Object, [5-22](#)



- Screen worksheets, [4-9](#)
- Screens Menu, [5-8](#), [5-21](#), [5-41](#)
- Screens menu, [3-13](#), [8-4](#)
- Screens Report, [6-6](#)
- Scrolling List
  - Byte Requirements, [4-25](#)
  - example, [A-25](#)
- Scrolling List object, [1-9](#), [10-78](#)
  - Cursor control address, [10-84](#)
  - Cursor List, [10-79](#)
  - example, PLC programming, [A-30](#)
  - Object list, [10-85](#)
    - local message, [10-86](#)
    - Multi-state indicator, [10-86](#)
    - numeric data display, [10-86](#)
- Scrolling list object, byte requirements, [4-25](#)
- Secure Screen, [8-1](#)
- Secure Screen Menu, [8-3](#)
- Security, [1-2](#), [8-3](#)
- Security access code, [8-3](#)
- Select Directory, [6-29](#)
- Select File, [3-7](#), [3-9](#)
- Select File menu, [6-4](#)
- Select File window, [6-11](#)
- Select option, [3-23](#)
- Select PanelView Terminal Type window, [6-2](#)
- Select Reports menu, [6-5](#)
- Select Screen, [3-13](#), [5-57](#), [8-1](#)
- Selecting Display Modes, [7-42](#)
- Selector
  - Control List, with Enter, [1-7](#)
  - Control List, without Enter, [1-7](#)
  - Keypad Screen, [1-10](#)
  - Screen List, [1-7](#)
- Selector control address, [10-9](#)
- Selector Control Address Menu, [5-46](#)
- Selector Control Address menu, [10-10](#)
- Send User Mem High Byte, [6-31](#), [6-34](#)
- Send User Mem Low Byte, [6-31](#), [6-34](#)
- Set Bit Cursor Point, [1-9](#), [10-9](#), [10-14](#)
- Set Bit Cursor Point Character, [10-17](#)
- Set State, [5-25](#)
- Set Value Button, [1-8](#), [10-26](#)
  - Data Types and Values, [10-27](#)
  - Data types and values, [10-27](#)
- Setting Upload/Download Communications on the PanelView Terminal, [6-10](#)
- Setup menu, [3-10](#)
- Signed Integer Data Type, [4-17](#)
- Silence Alarm to PLC Controller, [9-8](#)
- Silence Alarms, PLC Controlled, [1-11](#)
- Silence button, [7-30](#), [7-33](#)
- Single-line Alarm Window, [7-14](#)
- Size, [3-30](#)
- Sizing an object, [3-28](#)
- SLC 500 RIO connection, [1-13](#)
- SLC 500 via 1747-SN, [1-13](#)
- slot, [A-2](#)
- soft-key, [3-36](#)
- Software Requirements, [2-1](#)
- Special Characters, [10-66](#)
- Standard Numeric Data Display, [10-30](#)
- Start Bit, [3-34](#), [7-9](#), [7-24](#), [7-31](#), [7-39](#), [9-3](#)
- Start up PanelBuilder, [5-1](#)
- Start Upload, [6-27](#)
- Start Upload Window, [6-29](#)
- Start Word, [3-34](#), [7-9](#), [7-24](#), [7-31](#), [7-39](#), [9-3](#)
- Starting, [2-4](#)
- Starting Address menu, [6-5](#)
- Starting Module Group, [4-22](#)
- State 0 Menu, [5-49](#)
- State 0 menu, [5-34](#)
- State 1 menu, [5-35](#)
- States & Text, [3-27](#), [3-32](#)
  - menu, [3-32](#)
- States & Text Menu, [5-34](#)
- States and Text Menu, [5-25](#), [5-31](#), [5-49](#), [5-50](#)
- Static objects, [1-5](#), [4-12](#), [11-2](#)
- Status button, [7-33](#), [7-34](#)
- steps involved in creating the application file, [4-39](#)
- Symbol Type, [3-30](#)
- Symbols, [10-55](#)
  - size, [10-55](#)
  - states, [10-56](#)
  - type, [10-55](#)
- Symbols Used in the Address Map, [5-28](#)

System Response Times, [A-15](#)

## T

Terminal Failure, [4-2](#)  
 Terminal Fault window, [3-14](#), [4-10](#), [4-11](#)  
 Terminal Process Time, [A-19](#), [A-21](#)  
 Terminal Process Time , [A-16](#)  
 Testing  
   Application file, [11-1](#)  
   Retentive Objects, [11-2](#)  
   Screens, [11-1](#)  
   The whole system, [11-3](#)  
 Testing an application file, [11-1](#)  
 Testing the Screens, [11-1](#)  
 Text, [1-8](#), [3-27](#), [10-50](#)  
   Background, [3-33](#)  
   Button, [3-33](#)  
   Inner, [3-33](#)  
   Outer, [3-33](#)  
 Text Edit Mode, [5-12](#), [5-13](#)  
 Text menu, [3-33](#), [5-17](#), [5-40](#)  
 Text/Draw Menu, [5-10](#), [5-14](#), [5-21](#)  
 Text/Draw objects, [10-50](#)  
 Time & Date, [3-11](#)  
   to PLC controller, [3-17](#)  
 Time and Date to PLC Controller, [9-3](#)  
   Format, [9-4](#)  
 Time Display, [1-8](#), [10-57](#)  
 Timing, Block transfers, [A-16](#)  
 Top Position Value, [10-10](#), [10-24](#)  
 touch cells, [4-11](#)  
 Transfer Current Screen to PLC Controller, [10-15](#)  
 Transfer Menu, [6-14](#), [6-23](#), [6-30](#)  
 Transfer menu, [3-8](#), [6-10](#), [6-13](#)  
 Transfer Times, [A-19](#)  
 trigger value, [7-26](#)  
 tutorial, [5-1](#)  
 types of alarm window, [7-12](#)  
 types of Numeric Data Displays , [5-54](#)

## U

Underline, [3-29](#), [3-32](#), [3-33](#)  
 Unprintable characters, [9-6](#)  
 Up Cursor (Decr Value) Button, [10-12](#), [10-13](#)

Up/Down buttons(alarms), [7-33](#)  
 Update Address, [3-35](#), [7-10](#), [7-25](#), [7-32](#), [7-40](#), [9-2](#), [9-3](#)  
 Upload /Download Cable, [6-10](#)  
 Upload As, [6-29](#)  
 Upload/Download, [P-2](#)  
   Upload from PanelView Terminal, [3-8](#)  
 Upload/Download cable, [2-2](#)  
 Upload/Download Communication Settings  
   Available in PanelBuilder, [6-11](#)  
 Upload/Download Communications on the  
   PanelBuilder Computer, [6-11](#)  
 Uploading, [6-15](#)  
 Uploading Over the Data Highway +, [6-27](#)  
 User Memory Limit, [3-16](#)  
 User PROM, [P-2](#)  
 Utilities, [3-13](#)  
 Utilities Menu, [8-1](#)  
 Utility, [3-27](#)  
   default, [3-35](#)  
   name, [3-35](#)  
 Utility Menu, [5-29](#), [5-32](#), [5-37](#)  
 Utility menu, [3-35](#)

## V

Values Assigned to the Push Buttons, [5-33](#), [5-38](#)  
 verify the configuration settings, [B-1](#)  
 Version compatibility, [2-5](#), [2-6](#), [5-8](#)  
 Vertical bar graphs, [10-56](#)  
 Vertical line, [10-50](#)  
 Video adapters, [2-1](#)  
 View Address Map, [3-35](#), [7-10](#), [7-25](#), [7-32](#), [7-40](#), [9-3](#)  
 view the configuration settings, [B-1](#)

## W

Wait Time in Queue, [A-18](#)  
 Width, [3-31](#)  
 Window, [P-3](#)  
   Alarm, [1-10](#), [3-14](#), [4-11](#), [7-12](#)  
   Alarm History Screen, [3-14](#)  
   Alarm Status Screen, [3-14](#)  
   Block Transfer, [5-6](#), [6-19](#)  
   Button Control Address, [5-26](#), [5-47](#)

- Configure Pass-Through Download Bits, [6-18](#)
- Delete Message, [7-7](#)
- Export Message Text, [7-6](#), [10-61](#)
- Fault, [10-38](#)
- File, [6-7](#)
- Full alarm, [7-32](#)
- Import Message Text, [7-5](#), [7-19](#), [10-60](#)
- Information, [1-10](#), [3-14](#), [4-11](#), [7-2](#)
- Load PanelView Location Data, [6-28](#)
- Messages, [7-18](#), [10-60](#)
- Modify Block Transfer, [5-6](#)
- Modify Rack Assignment, [5-4](#)
- Numeric and Security Entry, [3-14](#)
- Numeric Entry, [10-40](#)
- Numeric Keypad, [10-34](#)
- Pass-Through Configuration, [6-20](#)
- Pass-Through Download Options, [6-21](#)
- Pass-Through Upload from PanelView, [6-27](#)
- PLC DH+ Address, [6-20](#)
- PLC Inhibit Bit Address, [6-18](#)
- Rack Assignment, [5-4](#)
- Select File, [6-11](#)
- Select PanelView Terminal Type, [6-2](#)
- Start Upload, [6-29](#)
- Terminal Fault, [3-14](#)
- Terminal fault, [4-11](#)
- Window Control Address, [7-9](#), [7-24](#)
- Window Look Menu, [7-8](#), [7-23](#)
- Window Type, [7-22](#)
- Windows Menu, [7-1](#)
- Windows menu, [3-13](#)
- Windows Window Menus, [7-3](#)
- Word, [A-1](#)
- Word Number, [4-16](#)
- Worksheet
  - I/O Usage
    - block transfer, [4-14](#), [4-37](#)
    - discrete, [4-13](#)
  - Object address list, [4-12](#)
  - Screen
    - for keypad terminals, [4-9](#)
    - for touch screen terminals, [4-10](#)
- Worksheets, [4-7](#)
  - Screen, [4-9](#)



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