Allen-Bradley

PanelBuilder™ 1200 Configuration Software for Windows

(Cat. No. 2711-ND1W)

Reference 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.

In no event will the Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Allen-Bradley Company with respect to use of information, circuits, equipment, or software described in this manual.

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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.

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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Preface

Welcome to PanelBuilder™ 1200 Configuration Software for Windows

Welcome to Allen-Bradley's PanelBuilder™ 1200 Configuration Software for Windows. With this software you can create applications in the Microsoft® Windows™ 3.1 (or later) operating system, for use in PanelView™ 1200 terminals.

PanelBuilder 1200 Configuration Software for Windows, Version 5.0, combines the functionality of PanelBuilder DOS with the advantages of the Windows operating system. The superior graphical interface and the ability to move between several applications increases your speed and productivity. And PanelBuilder 1200 is now easier to learn than ever.

Registering Your Copy of PanelBuilder 1200

You'll find your software registration card in the front of this manual. To register your software, mail the registration card to this address:

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

Or fax the card to (216) 646-6770.

Available Documentation

Your PanelBuilder 1200 software comes with several types of documentation to meet your different needs:

- *Getting Started with PanelBuilder 1200 Configuration Software for Windows* guides you through setting up PanelBuilder 1200 and introduces you to PanelBuilder 1200 basics. It includes a tutorial to give you hands-on experience in working with a PanelBuilder 1200 application.
- The *PanelBuilder 1200 Configuration Software for Windows User Manual* explains PanelBuilder 1200 in more detail, and provides step-by-step instructions for planning, creating and working with applications.
- The *PanelBuilder 1200 Configuration Software for Windows Reference Manual* provides detailed reference information for application screen objects.

- Context-sensitive Online Help provides a reference for any procedures or commands you need explained, or problems you may encounter. To get help, press F1 or choose the Help button if you're in a dialog box.
- The *Release Note* includes any new information not included in the *User Manual.*
- README.TXT is an ASCII document that is copied to your hard disk when you install PanelBuilder 1200. Like the *Release Note,* this informs you of any software changes after the manuals were printed.
- The *PanelView 1200 Transfer Utility User Manual* explains how to transfer applications to and from the PanelView 1200 terminal, using the PanelView™ 1200 Transfer Utility Software.
- The *PanelView 1200 Operator Terminals User Manual* describes the features and specifications of PanelView 1200 operator terminals.

What's in the *Reference Manual?*

The *Reference Manual* is a guide to the objects you can create for PanelBuilder 1200 application screens. It contains a section for each of the following objects:

- Push Buttons
- Control Selectors
- Screen Selectors
- Indicators
- Numerics
- ISA Symbols
- Bar Graphs
- Time and Date Display
- ASCII Input
- Scrolling List
- Screen Print Button
- Local Message Display
- ASCII Display
- Text and Graphic Objects

Who Should Read the *Reference Manual?*

This manual is intended as a reference guide for users who are experienced with PanelBuilder 1200, and have a good knowledge of Microsoft Windows. Users who are unfamiliar with PanelBuilder 1200 should go through the *Getting Started* and the *User Manual* first.

Related Publications

These manuals provide additional information on PanelBuilder 1200 for Windows Development Software, PanelView 1200, and Microsoft Windows.

- *Getting Started with PanelBuilder 1200 Configuration Software for Windows*
  (Publication No. 2711-809)
- *PanelBuilder 1200 Configuration Software for Windows User Manual*
  (Publication No. 2711-810)
- *PanelView 1200 Operator Terminals User Manual*
  (Publication No. 2711-812)
- *PanelView 1200 Transfer Utility User Manual*
  (Publication No. 2711-811)
- *Microsoft Windows User's Guide*

Conventions Used

Information is provided in a consistent way throughout all the PanelBuilder 1200 user documentation. The documentation uses these conventions:

- PanelBuilder 1200 refers to PanelBuilder 1200 Configuration Software for Windows, Version 5.0
- Terminal refers to a PanelView 1200 terminal

Note The term "PanelView 1200" is the new name for all PanelView operator terminals, Series A and up.

Before You Begin

Before you begin, you should already be familiar with:

- a personal computer with a 386 (or higher) microprocessor and 4 megabytes (MB) of Random Access Memory (RAM)
- Microsoft Windows 3.1 operating system
- the Allen-Bradley family of programmable controllers (PLC®) you'll be monitoring and controlling
- *Getting Started with PanelBuilder 1200 Configuration Software for Windows* and *PanelBuilder 1200 Configuration Software for Windows User Manual*

Technical Support Services

If you have questions about PanelBuilder 1200, please consult the manuals or the online Help first. If you can't find the answer, contact Allen-Bradley Global Technical Support:

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

Inside USA and Canada, call 1-800-289-2279.

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

Please have the serial number for your software ready when you call. You can find this number in three places:

- on the card in the front of the *PanelBuilder 1200 Configuration Software for Windows User Manual*
- on the splash screen that appears when you start up PanelBuilder 1200
- in the main Help menu, when you choose "About"

We Want Our Manuals to Be the Best

Good manuals are essential to help you learn the system. They are also your key tool for solving problems quickly.

To ensure that our documentation meets your needs, we would like to hear from you. After you've worked with *Getting Started*, the *User Manual*, and the *Reference Manual* for a while, please fill out the survey accompanying your software and return it to us at no cost.

We appreciate all your comments!

Push Buttons

This chapter provides information about Push Buttons. It tells you:

- what Push Buttons are
- how to create Push Buttons
- how the different types of Push Buttons function
- how to configure each type of Push Button

Types of Push Buttons

Push Buttons are application screen objects that function like mechanical push buttons on industrial control panels. Operators use Push Buttons to control processes.

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 in the Terminal Setup dialog box. This "holds the button down" for a minimum preset time.

There are five types of Push Buttons:

- Momentary Normally Open Push Button
- Momentary Normally Closed Push Button
- Latched Push Button
- Maintained Push Button
- Interlocked Push Button

Note Some PanelBuilder objects contain buttons (such as the Control 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.

Important Push Buttons can be used as stop buttons but not for emergency stops. Emergency stop buttons must be hard-wired.

How do Push Buttons Function?

Each Push Button has an assigned Bit State Address on the PLC controller. When the button is pressed, this address bit changes and initiates an action.

There are two bit states:

- **Normally Open** buttons have a value of 0 as the initial push button state. Pressing the Push Button changes the value to 1.
- **Normally Closed** buttons have a value of 1 as the initial push button state. Pressing the Push Button changes the value to 0.

How do the Different Push Buttons Work?

The five different types of Push Buttons function differently according to:

- number of states
- how they respond to being pressed
- how they respond to screen changes and power cycles

The following table shows the differences between the Push Buttons:

Push Button	States	Response to button-press	Response to screen changes	Response to power cycles
Momentary Normally Open or Closed	2	State changes to open or closed. When released, the button returns to its original state.	Returns to its original state.	Returns to its original state.
Latched	2	State changes to open or closed, and remains changed when released. The button remains in its changed state until unlatched by a handshake bit or value within the controller.	Returns to its original state.	Returns to its original state.
Maintained	2	State changes to open or closed, and remains changed when released. Pressing the button a second time returns the button to its original state.	Retains its changed state.	Retains its changed state.
Interlocked	Multiple (up to 250)	An Interlocked Push Button functions as one of a group of buttons. Pushing one button cancels out the function of the previous button pressed, and sets the control address to a new value.	Retains its changed state.	Retains its changed state.

Momentary Normally Open (N/O) Push Button

You can use a Momentary Normally Open Push Button to initiate a PLC controlled process or action.

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 the button is released, the bit is reset to 0.

This object also has an Indicator State Address which controls the display state of the object. Two states are possible, 0 or 1. 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.

Attention The Momentary Normally Open Push Button is not retentive or presettable.

Attention The input bit remains in its last state and the button's input bit will not reset if a remote I/O fault occurs. The rack fault bit should be monitored when these buttons are used.

Tip To ensure that the PLC controller doesn't miss a rapid button-press between I/O scans, you can change the Minimum Push Button On Time in the Terminal Setup dialog box. This "holds the button down" for a minimum preset time.

Configuring the Momentary Normally Open (N/O) Button

Configure the button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify that you want to configure a Momentary Normally Open Push Button.

Field	Meaning
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Address	The Normally Open Momentary Push Button uses two addresses: **Button Control Address** records the status of the button: 1 when the button is pressed and 0 otherwise. 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 remains unchanged. **Indicator State Address** controls the display state of the object. This button can have 2 states. You can 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 changes to state 1 when the operator presses it, and reverts back to state 0 when the operator releases 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 Address. Program the PLC controller to turn the Indicator bit on when the Button Control bit is on, and the button will change to state 1.

Note You can assign more than one Momentary Normally Open Push Button 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.

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 the button is released, the bit is set to 1.

This object also has an Indicator State Address used to define the display state of the object. Two states are possible, 0 or 1.

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 The Momentary Normally Closed Push Button is not retentive or presettable.

Attention The button's input bit remains in its last state and the button's input bits will not reset if a remote I/O fault occurs. The rack fault bit should be monitored when these buttons are being used.

Tip To ensure that the PLC controller doesn't miss a rapid button-press between I/O scans, you can change the Minimum Push Button On Time in the Terminal Setup dialog box. This "holds the button down" for a minimum preset time.

Configuring the Momentary Normally Closed (N/C) Button

Configure the button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify that you want to configure a Momentary Normally Closed Push Button.
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Address	The Momentary Normally Closed Push Button uses two addresses: **Button Control Address** records the status of the button: 0 when the button is pressed and 1 otherwise. If you assign just the Button Control Address and assign text and attributes to state 0, the border on the button highlights when the button is pressed, but the button text remains unchanged. **Indicator State Address** controls the display state of the object. This button can have 2 states. You can 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 changes to state 0 when the operator presses it, and reverts back to state 1 when the operator releases it. To provide a visual handshake with the programmable controller, assign a PLC input address to the Button Control Address and a PLC output address to the Indicator Address. Program the PLC controller to turn the Indicator bit on when the Button Control bit is off, and the button will change to state 1.

Note You can assign two or more of these buttons to the same Button Control Address. When this is the case, Momentary Normally Closed Push Buttons will function like their hard-wired equivalents wired in parallel: pressing either button, rather than both, turns off the PLC input bit.

Latched Push Button

A Latched Push Button changes state when pressed and remains in the changed state until unlatched by the controller. It uses a "handshake" bit (usually a PLC output bit) as well as the button control and indicator bits.

Pressing the button sets 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, the PanelView 1200 terminal resets the control bit to 0. Your PLC controller must be programmed to turn the handshake bit off (to 0).

You can use a Latched 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 read the PLC input bit. 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.

Tip 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.

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.

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.

Configuring the Latched Push Button

The Latched Push Button has two display states, 0 and 1. The Push Button display state is controlled by the Indicator State Address.

Configure the Latched Push Button according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify that you want to configure a Latched Push Button.
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Address	The Latched Push Button uses three addresses: **Button Control Address** records the status of the button: 1 when the button is pressed and 0 otherwise. If you assign just the Button Control Address and assign text and attributes to state 0, the border on the button highlights when the button is pressed. The button itself remains unchanged. **Indicator State Address** controls the display state of the object. 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 immediately changes to state 1 when pressed. 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. When the PLC controller is programmed to turn the Indicator State bit on when the Button Control bit is set, the button will change to state 1. **Handshake Address** is set by the PLC controller to confirm that it has recorded the change for the button's Control Address. The PanelView 1200 terminal sets the Control bit to 1 when the operator presses the button. PLC controller logic must set the Handshake bit to 1 when the Control bit is set. When the handshake bit is set, the PanelView 1200 terminal resets the Control bit to 0. PLC controller logic must then reset the Handshake bit to 0.

Maintained Push Button

A Maintained Push Button changes state when pressed and remains in the changed state when released. Pressing the Push Button a second time changes the button back to its original state. This Push Button is also known as "Push-On, Push-Off".

Pressing a Maintained Push Button 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.

Important The Maintained Push Button is a retentive object. Thus, the PanelView 1200 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, don't 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.

Configuring the Maintained Push Button

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.

Configure the Maintained Push Button according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify that you want to configure a Maintained Push Button.
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Address	The Maintained Push Button uses two addresses: **Button Control Address** records the status of the button: 1 when the button is first pressed. It remains set until the button is pressed a second time, resetting the bit to 0. If you assign just the Button Control Address and assign text and attributes to state 0, the border on the button highlights when the button is pressed, but the button text itself remains unchanged. **Indicator State Address** controls the display state of the object. This button can have 2 states. You can 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 immediately changes to reflect the new state when the button is pressed. 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 Address. Program the PLC controller to turn the Indicator bit on when the Button Control bit is on, and the button will change to state 1.

Interlocked Push Button

An Interlocked Push Button is one of a group of Push Buttons. The buttons function 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 Interlocked Push Buttons function as a group, you must add them to the screen one at a time.

When the operator presses an Interlocked Push Button, the PanelView 1200 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. Therefore 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.

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.

The Interlocked Push Button is a retentive object. The PanelView 1200 terminal will therefore 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.

Tip A Control List Selector with Enter provides the same functionality as Interlocked Push Buttons; however, you have much more flexibility in placing Interlocked Push Buttons on your screen.

Configuring an Interlocked Push Button

Configure each Interlocked Push Button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Address	You define a series of Interlocked Push Buttons to function as a group. You must define a unique Control Value for each button in the group. When the operator presses an Interlocked button, the Control Value is written to the Control Address and the button appears highlighted. The button remains highlighted for as long as the value at the PLC controller remains the same as the Control Value.

Control Selectors

This chapter explains Control Selectors and how to use them. It tells you about:

- the different kinds of Control Selectors
- how to configure Control Selectors

About Control Selectors

Control selectors allow operators to make selections from a list of items. When the application is running, the operator can move through the list using the up and down arrow keys and select items.

The choice the operator makes is always indicated by the value at the Selector Control Address, a PLC input address.

There are three Control Selectors:

This Control Selector	Does this
Control List Selector with Enter	Allows the operator to move through a list of selections, and select an option by pressing Enter.
Control List Selector without Enter	Allows the operator to move through a list of selections. The current selection is automatically selected.
Set Bit Cursor Point (Keypad terminals only)	Points to a screen character and allows the operator to select from a list or an array of objects.

Tip You can position Control Selectors so they point at other objects on the same screen. For example, a Control List Selector could point to an adjacent list of Numeric Display objects. Values entered using the numeric keypad could be directed (by the PLC program) to the PLC storage address of the numeric value being displayed.

Control Selector Addressing

Control selectors consist of a list of entries. 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 value that will be stored in the Selector Control Address, a PLC input address.

Determining the Number of Bits Required

The number of bits required for the Control List Selector Address depends on the number of states in the selector and the data type you assign.

For example, a Control Selector with a list of ten states will need the following number of bits for the three data types listed below:

This data type	Needs this many bits
Binary	4 bits
BCD	4 bits (Top Position value = 0, States 0–9)
	8 bits (Top Position value = 1, States 1–10)
Bit	9 bits (Top Position = All Bits OFF)
	10 bits (Top Position = First Bit ON)

Choosing the Top Position Value

Top Position refers to the first item in the control list.

The data type determines the Top Position Value you can choose:

- Bit data type
  - All Bits OFF
  - First Bit ON
- BCD or binary
  - 0
  - 1

When the top position in the list is highlighted, 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).

The following table indicates the state number and the required bit pattern for each data type for 10 states, if all bits are OFF.

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, as the following table shows.

State	Binary	BCD	Bits
0	0001	0001	000000001
1	0010	0010	000000010
2	0011	0011	000000100
3	0100	0100	000001000
.	.	.	.
.	.	.	.
9	1010	00010000	1000000000

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. To make a selection, the operator presses the Enter key. When the operator presses Enter, the item is selected (it appears in reverse video). At this point the terminal updates the value at the Selector Control Address. This value corresponds to the item's position in the list.

The states, therefore, are not necessarily executed consecutively. Instead, the new state is determined by the position in the list when the Enter button is pressed.

The Control List Selector with Enter is a retentive object. Your PanelView 1200 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.

The Control List Selector with Enter consists of the following components:

This component	Does this
List	This vertical list can have up to 24 different items (12 with double-sized text).
Up Cursor	When the operator presses the Up cursor, the arrow in the list moves up by one list entry.
Down Cursor	When the operator presses the Down cursor, the arrow in the list moves down by one list entry.
Enter	When the operator presses Enter, the desired option is selected and the PLC input address is updated.

When you define the attributes for this object (color, text, etc.), your choices affect both the list and the buttons.

If an address cannot accommodate the state entered, an error message is displayed, and the PLC value is not changed. The operator must clear the fault before continuing.

Configuring a Control List Selector with Enter

Configure the Control List Selector with Enter according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Control List Type	Specify that you want to use an Enter key. When an Enter key is present, a selection in the list is selected only after the operator has pressed the Enter key. Without the Enter key, each item is selected in turn as the operator moves the highlight bar up and down.
Top Position Value	Specify which value (0 or 1) is written to the Selector Control Address when the top entry in the list is selected.
Up Cursor	Specify whether the Up Cursor is enabled, and if you have a keypad application, which function key it uses. You must have at least one of the Up and Down Cursor keys enabled.
Down Cursor	Specify whether the Up Cursor is enabled, and if you have a keypad application, which function key it uses. You must have at least one of the Up and Down Cursor keys enabled.
Enter	If you have a keypad application, specify which function key the operator will press to select the highlighted choice.
Address	The Selector Control Address records which item in the list is selected. The actual value recorded at this address depends on whether the Top Position Value is defined as 0 or as 1.

To define the number of states for the list, you must resize the list component until it shows the desired number of states. See Chapter 15, *Working with Objects* for more information.

Control List Selector without Enter

Unlike the Control List Selector with Enter, the selections in this list are continually highlighted and updated to the PLC controller. As the operator moves the cursor to each item, the item highlights and the corresponding state value is transferred to the PLC input address (the control address).

Note The Control List Selector without Enter is a retentive object. Your PanelView 1200 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. You can enter a preset value for this object.

The Control List Selector without Enter consists of these components:

This component	Does this
List	This vertical list can have up to 24 different items (12 with double-height text).
Up Cursor	When the operator presses the Up cursor, the arrow in the list moves up by one list entry. It also updates the list position number in the PLC input address. (0 = the first item in the list.)
Down Cursor	When the operator presses the Down cursor, the arrow in the list moves down by one list entry. It also updates the list position number in the PLC input address.

Tip You can build a simple two-position Control List Selector and include only the Down 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.

Attention Don't use the Control List Selector without Enter to initiate a control function.

Configuring a Control List Selector without Enter

Configure the Control List Selector without Enter according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Control List Type	Specify that you don't want to use an Enter key. When an Enter key is present, a selection in the list is selected only after the operator has pressed the Enter key. Without the Enter key, each item is selected in turn as the operator moves the highlight bar up and down.
Top Position Value	Specify which value (0 or 1) is written to the Selector Control Address when the top entry in the list is selected.
Up Cursor	Specify whether the Up Cursor is enabled, and if you have a keypad application, which function key it uses. You must have at least one of the Up and Down Cursor keys enabled.
Down Cursor	Specify whether the Up Cursor is enabled, and if you have a keypad application, which function key it uses. You must have at least one of the Up and Down Cursor keys enabled.
Address	The Selector Control Address records which item in the list is selected. The actual value recorded at this address depends on whether the Top Position Value is defined as 0 or as 1.

To define the number of states for the list, you must resize the list component until it shows the desired number of states. See Chapter 15, *Working with Objects* for more information.

Set Bit Cursor Points (Keypad Terminals Only)

A group of Set Bit Cursor Point objects allow the operator to select from a list or an array of objects.

To use the Cursor Points, the operator must press the Select button on the PanelView terminal, thereby enabling the arrow and Home keys. The arrow keys move the cursor 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).

Associated with each Set Bit Cursor Point is a cursor character, a text field, and a unique PLC input bit address. As the operator selects a Cursor Point, the PanelView 1200 terminal sets the selected Cursor Point's PLC input bit to 1 and displays the Cursor Point character highlighted and blinking. To turn the Cursor Point feature off again, and disable the keys, the operator must press the Cancel button on the PanelView 1200 terminal.

The Set Bit Cursor Point is a retentive object. Your PanelView 1200 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.

Attention Do not use the Set Bit Cursor Point to initiate a control function.

Place successive Set Bit Cursor Points above, below, or beside existing Cursor Points (any distance apart). Use the row and column indicators in the status bar 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 is downloaded to the terminal.

When you create the screen in PanelBuilder 1200, all Cursor Points are visible. However, when you display the screen on a PanelView 1200 terminal, only one Cursor Point will be visible and blinking and, on a monochrome screen, in high intensity.

Example

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 would program the PLC controller so that when you display this screen on a PanelView 1200 terminal, you could move the cursor to the desired motor and see its status displayed in a Local Message Display or Multistate Indicator on that screen.

Defining the Set Bit Cursor Point Object

The Set Bit Cursor Point object consists of a cursor point character and a text field.

By default the Set Bit Cursor Point object uses a small arrow as the cursor character. If you wish, you can change this cursor character.

To define the Set Bit Cursor Point character:

1 Create the Set Bit Cursor Point object. To create it, choose Control Selectors in the Object menu, and choose Set Bit Cursor Point. Or, choose  from the toolbar.

2 Choose Text from the Object menu, or  from the toolbar. Or simply position the pointer to the left of the cursor character and click the right mouse button so that the I-beam appears.

3 Position the I-beam to the immediate left of the arrow on the Set Bit Cursor Point. Use the DELETE key to delete the arrow.

4 If you want to use a character from the keyboard, type that character. If you want to use a character from the extended character set, press the ALT key, followed by the character's ASCII code on the keyboard's keypad. See Appendix C, *The Extended Character Set* in the *PanelBuilder 1200 Configuration Software for Windows User Manual*, for more information.

To define the Set Bit Cursor Point text box field:

1 Create the Set Bit Cursor Point object. To create it, choose Control Selectors in the Object menu, and choose Set Bit Cursor Point. Or, choose  from the toolbar.

2 Choose Text from the Object menu, or  from the toolbar. Position the I-beam in the text box field provided next to the cursor character, and click.

3 Enter the text you want to see associated with the cursor point.

If you don't want to have text with the cursor point, reduce the text box field to a single character and leave the field blank. If you want, you can also position the text field on another area of the screen, instead of next to the character.

Configuring the Set Bit Cursor Point

Configure the Set Bit Cursor Point according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Address	The Control Address records the status of the Cursor Point. When it is selected, the bit is set to 1. Otherwise it is 0.

Using the Set Bit Cursor Point on the PanelView 1200 Terminal

When the application is running, the operator can use these keys on the PanelView 1200 terminal to use the Cursor Point:

This key	Does this
Select	Enables the arrow keys and Home key.
Arrow key	Moves the cursor through the Cursor Points on the screen.
Home	Moves the cursor to the home position (the cursor position at the top left of the screen).
Cancel	Turns the Cursor Point feature off, and disables the arrow and Home keys.

When selected, the Cursor Point character is highlighted and blinking. The PLC input bit is 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 1200 terminal.

The Set Bit Cursor Point values are not changed when the Cursor Point feature is cancelled. The last bit selected remains on.

Cursor Point Default Operation

1 When a screen is selected for the first time after a download, the PanelView 1200 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 1200 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.

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 same one that was active when the screen was last displayed.

Note Immediately after the downloading or the loading of a new file from user PROMs, the Set Bit Cursor Point 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 We recommend that you don't share Set Bit Cursor Point addresses with other objects. We use it here only to explain Cursor Point operation.

Screen Selectors

This chapter shows you how to create Screen Selectors to allow operators to move between screens. It tells you about:

- the different kinds of Screen Selectors
- configuring the Screen Selectors

About Screen Selectors

Screen Selectors provide a way for an operator to move to another screen, or to return to a previously displayed screen. Every screen should have a Screen Selector, so that an operator is not stranded at a particular screen.

There are five types of Screen Selectors:

This Screen Selector	Does this
"Goto Screen" button	Displays the screen associated with the button.
"Return to Previous Screen" button	Returns to the screen displayed previously.
Screen List Selector	Allows the operator to select from a list of screens.
Screen Select Keypad (touch screen terminals only)	Allows the operator to choose the next screen to be displayed by entering its number on the screen's keypad.
Screen Keypad Enable button (keypad terminals only)	Allows the operator to choose the next screen to be displayed by entering its number on the terminal's numeric keypad.

However, under certain conditions, the operator can't use these objects to control screen changes:

- If the PLC Controlled Screen Change is enabled and the value at the associated PLC address is not zero the PLC controller has control over screen changes.
- If "Minimum Push Button On Time", "Latch Button PLC Handshakes" or "Enter Bit Handshakes" are outstanding.
- If the screen is security-coded, and the operator doesn't have authority to access it.

If the operator tries to access another screen, or if the operator selects a screen that does not exist, or is corrupted, an error message is displayed and the screen does not change.

Note Because Screen Selectors are static objects, they don't interact with the PLC controller. Therefore they don't need addresses.

"Goto Screen" and "Return to Previous Screen" Buttons


When the operator presses the "Goto Screen" button, another screen is displayed. When the operator presses the "Return to Previous Screen" button, the previously displayed screen reappears.

Tip You could include a Goto Screen button labeled "View Current Status" in a screen. You could configure the button 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. Or, you could configure a button labeled "Select New Screen" to go to a screen displaying a Screen Select Keypad (for touch screen terminals) or a Screen Keypad-Enable button (for keypad terminals). The operator could then select the desired screen by entering the screen number.

Note The PanelView 1200 terminal remembers only the last screen. You can't back up through a succession of screens with Return To Previous Screen buttons.

Important If you delete a screen that is assigned to Go to Screen buttons, you must assign a new screen to each of the affected buttons. Otherwise the application will not run properly.

Configuring the Goto Screen Button

Configure the Goto Screen button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify that you want to configure a Go to Screen button.
Go to Screen	Specify which screen will be displayed when the operator presses this button.
Function Key	Specify which function key the operator must press to activate this button (keypad terminals only).

Configuring the Return to Previous Screen Button

Configure the Return to Previous Screen button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify that you want to configure a Return to Previous Screen button.
Function Key	Specify which function key the operator must press to activate this button (keypad terminals only).

Screen List Selector

With a Screen List Selector, the operator presses Up and Down buttons to scroll through a list of screen names, then presses ENTER to switch to a selected screen. The Screen List Selector is similar to the Control List Selector with Enter, but it is used to control screen changes.

The Screen List Selector consists of the following components:

This component	Does this
List	This vertical list displays up to 24 different items (12 with double-sized text). If you include a border, you'll lose two single size or one double-size entry. The list must have a minimum of two states.
Up Cursor	Moves the arrow indicator up one entry in the list.
Down Cursor	Moves the arrow indicator down one entry in the list.
Enter	Selects the desired screen and makes the screen appear.

Note The size of the Selector List object's list component determines the number of screens you can display. To increase or decrease the number, you must resize the list. For information on resizing the list, see Chapter 15, *Working with Objects*. In this chapter you'll also find information on adding list text.

Configuring the Screen List Selector

Configure the Screen List Selector according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Up Cursor	Specify whether the Up Cursor is enabled, and if you have a keypad application, which function key it uses. You must have at least one of the Up and Down Cursor keys enabled.
Down Cursor	Specify whether the Down Cursor is enabled, and if you have a keypad application, which function key it uses. You must have at least one of the Up and Down Cursor keys enabled.
Enter	Specify which function key the operator will press to select the highlighted choice (keypad terminals only).
Screens	The list must have at least 2 lines, to a maximum of 24 (0–23 states). Assign a screen to each state in the list. The first line in the list always refers to state 0. When the cursor is on one of the lines (states) in the list and the Enter key is pressed, the terminal displays the screen associated with that state.

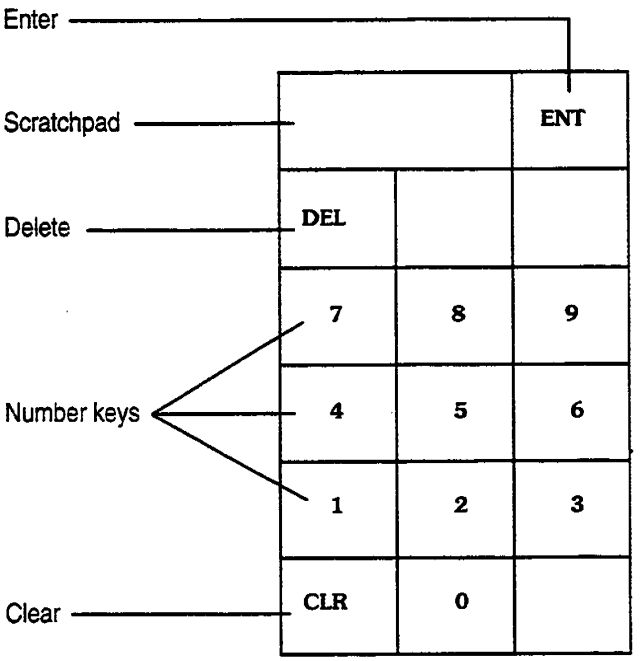
Tip To save screen space you can disable either the Up Cursor or the Down Cursor button (but not both). A button that has been disabled doesn't appear on the screen.

Screen Select Keypad (Large and Small) (Touch Screen Terminals Only)

A Screen Select Keypad is a numeric keypad that enables the operator to choose the next screen to be displayed by entering its number.

Tip You could configure a button labeled "Select New Screen" to go to a screen displaying a Screen Select Keypad. The operator could then select the desired screen by entering the screen number.

Screen Select Keypads come in two sizes: 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.



This component	Does this
Enter	Removes the screen and displays the screen with the number on the scratchpad.
Scratchpad	The scratchpad is a three-digit numeric display. It shows the screen number being entered.
Delete	Deletes the most recent entry.
Number keys	The operator presses the appropriate number keys to select the desired screen.
Clear	Clears the scratchpad.

Configuring the Screen Select Keypad

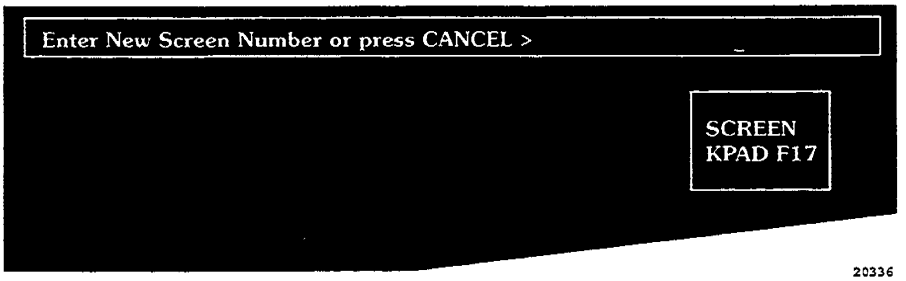
Configure the Screen Select Keypad according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Keypad Size	Specify whether you want the large or small keypad. Both keypads are 24 lines high. The large is 48 characters wide, the small is 24 characters wide.

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.

A scratchpad pops up on the top three lines of the screen. This displays the numbers the operator types. The following illustration shows how the Screen Keypad-Enable button appears on the PanelView 1200 terminal.



Tip You could configure a button labeled "Select New Screen" to go to a screen displaying a Screen Keypad-Enable button. The operator could then select the desired screen by entering the screen number.

The keys on the numeric keypad function as follows:

This key	Does this
Enter	Removes the scratchpad and displays the screen with the screen number that was in the scratchpad.
Number keys	Enter numbers in the scratchpad.
Delete	Deletes the most recent entry in the scratchpad.
Clear	Clears the scratchpad.
Cancel	Removes the scratchpad and cancels the screen change.

Note 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.

Configuring the Screen Keypad-Enable Button

Configure the Screen Keypad-Enable Button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Function Key	Specify which function key the operator must press to activate this button. When the operator presses the button, the terminal's keypad is enabled and a scratchpad appears at the top of the display. The operator enters the number of a screen and presses ENTER to display that screen.

Indicators

This chapter provides information about Indicators. It tells you about:

- the different kinds of Indicators
- how to configure each Indicator

About Indicators

PanelBuilder 1200 supports the following two types of Indicators:

- Multistate Indicator
- List Indicator

You can assign either a PLC output or input address for all Indicators to control the current state.

Multistate Indicator

The Multistate Indicator is a display object that enables the operator to display the state of a PLC operation on the screen.

You can use the Multistate Indicator for various purposes. For example, you could make a Multistate 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.

Or, you could use a Multistate Indicator to conditionally hide text or commands until they are needed or become applicable.

Configuring the Multistate Indicator

For each Multistate Indicator, you must specify the number of states (from 2 to 16), and define an Indicator State Address. The value at the Indicator State Address on the PLC controller determines the state text and attributes that will be displayed on the PanelView 1200 terminal.

Configure the Multistate Indicator according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Number of States	Specify the number of states this object will display, from 2 to 16. For each state, you should configure colors, text and other attributes.
Address	The Indicator State Address controls the state for this object. When the PLC Controller changes the value at this address, the terminal displays the appropriate state of the object.

For information on configuring each state, see Chapter 15, *Working with Objects.*

For details on choosing the data type and number of bits for the address, see the following section.

Configuring the Address

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 Multistate Indicator with 11 states, 0 to 10, you'll need the following number of bits for the three data types listed below:

- Binary: 4 bits
- BCD: 8 bits
- Bit: 10 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:

State	Binary	BCD	Bits
0	0000	0000	0000000000
1	0001	0001	0000000001
2	0010	0010	0000000010
3	0011	0011	0000000100
.	.	.	.
.	.	.	.
9	1001	1001	0100000000
10	1010	00010000	1000000000

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 blank.

List Indicator

The List Indicator displays a list of states for a particular PLC controller operation, and highlights the current state.

The List Indicator can have up to 24 items, one of which is highlighted. The operator can see all the possible states for a particular operation, and see which state is current. The size of the list component determines the number of states. For information on resizing the list and adding state text, see Chapter 15, *Working with Objects.*

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.

Configuring the List Indicator

The size of the List Indicator determines the number of states. If you want to increase or decrease the number of states, resize the list. Configure the List Indicator according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Top Position Value	Specify whether the first entry in the list is considered state 0 or state 1.
Address	The Indicator State Address controls the state for this object.

For details on choosing the appropriate data type and Top Position Value, see the following section.

Choosing the Data Types

This Indicator State Address supports three data types: binary, BCD, and Bit. Like the Control List Selector object and the Multistate Indicator, the maximum number of states is determined by the data type and the number of bits assigned. With the bit data type, if more than one bit is on at a time, the least significant bit's state is displayed.

See the table in the Multistate Indicator section for a list of valid state values for states 0 to 10.

Choosing the Top Position Value

You can choose the value associated with the top position. The data type you assign determines the Top Position Value you can choose:

- 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.

If the value indicated by the PLC address is not within range of the Indicator, no list items will be highlighted.

Numerics

This chapter provides information about Numerics. It tells you about:

- the different Numeric objects
- how to configure each Numeric object
- editing an array of Numeric values

About Numerics

There are seven Numeric objects:

- Set Value Button
- Increment Value Button
- Decrement Value Button
- Numeric Data Display (with or without scaling)
- Numeric Keypad-Enable Buttons (keypad terminals only)
- Small or Large Numeric Entry Keypads (touch screen terminals only)
- Numeric Input Cursor Points (keypad terminals only)

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).

Input Objects	Display Objects
Set Value Button	Numeric Data Display
Increment Value Button	Numeric Input Cursor Point
Decrement Value Button	Scrolling List
Numeric Entry Keypad (touch screen terminals)	
Keypad-Enable Button (keypad terminals)	
Numeric Input Cursor Point	

The following table lists the capabilities of Numeric objects:

- whether they can display the decimal point and/or the negative sign
- whether they can accept the decimal point and/or the negative sign as part of the operator's input

Numeric object	Decimal point	Polarity
Set Value Button	No	No
Increment Value Button	No	No
Decrement Value Button	No	No
Numeric Entry Keypad (touch screen terminals)	Yes	Yes
Keypad-Enable Button (keypad terminals)	Yes	Yes
Numeric Input Cursor Point (keypad terminals)	Yes	Yes
Numeric Data Display	Yes	Yes
Scrolling List*	Yes	Yes

*For information on the Scrolling List, see the Scrolling List section later in the *Reference Manual*

Note 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.

Choosing Data Types and Range of Values

For numeric objects, the object type, data type, number of bits and polarity address assignments determine the range of values that the terminal can send to or receive from the PLC controller.

The following table shows the available data types, and their respective ranges:

This data type	Supports this range of values
Binary	–65,535* to +65,535
BCD	–9,999,999* to +99,999,999
Signed Integer	–32,768 to +32,767

* You can use negative ranges only with polarity address assignments.

Set Value Button

The Set Value Button sets a PLC input address to a specific value (a control value) each time the operator presses this button.

Use this button if there is a typical set point value that an operator might want to revert to frequently.

Tip 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.

Note The Set Value Button is a retentive object. The PanelView 1200 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. Use PanelBuilder to define or change the preset value.

Configuring the Set Value Button

Configure the Set Value Button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Value	Specify a positive number. This number is transferred to the PLC Controller when the operator presses the Set Value Button. The maximum value you enter here depends on the data type and number of bits you specify for the Button Control Address: This data type — Supports this range of values Binary — 0 to 65,535 BCD — 0 to 99,999,999 Signed Integer — 0 to 32,767
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Address	The Set Value Button uses one address, the Button Control Address. Each time the operator presses the Set Value Button, the value is written to the input address you specify here. In this way, the operator can revert to a standard set point value frequently.

Increment and Decrement Value Buttons

Increment and Decrement Value Buttons enable the operator to change a current value by pressing a button. Details are in the following sections.

Increment Value Button

This object enables an operator to add a value to the current value by pressing the button.

The Increment Value Button increases the value at the assigned PLC input address (the Button Control Address) each time the operator presses the button. You can control the range by assigning an upper limit for the PLC controller.

If the operator tries to increment above the upper limit, an error message is displayed, and the number is not sent to the PLC controller.

The Increment Value Button is a retentive object. The PanelView 1200 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.

Configuring the Increment Value Button

Configure the Increment Value Button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify Increment Value Button in this field.
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Auto Repeat Rate	Specify a number between 0 and 20. When the operator holds down the Increment Button, the terminal begins increasing the value at the Button Control Address by the "Amount per Increment" value at the rate you specify. A value of 0 disables auto repeat. Pushing the button increases the value at the Button Control Address by a single increment value amount.
Auto Repeat Start Delay	Specify the time (between 0.2 and 2.5 seconds) that the operator must hold down the Increment Button before the auto repeat function starts.
Amount per Increment	Enter an integer between 1 and 10,000. The value at the Button Control Address will increase by this amount each time the operator presses the button.

Field	Meaning
Maximum Value	You can define a maximum value above which the Increment Button will stop increasing the value at the Button Control Address. If the value is already at or above the maximum you define here, pressing the Increment Button will not change the value. You can define a maximum value anywhere within the supported range for the data type and number of bits you specify for the Button Control Address. This data type — Supports this range of values Binary — 0 to 65,535 BCD — 0 to 99,999,999 Signed Integer — 0 to 32,767
Address	The Increment Button uses one address, the Button Control Address. Each time the operator presses the Increment Button, the value at this address is increased by the specified amount.

Decrement Value Button

This object allows an operator to decrease a value by pressing the button.

The Decrement Value Button decreases the value at the assigned PLC input address each time the operator presses the button. You can control the range by assigning a lower limit for the PLC controller.

If the value is already at or below the minimum, and the operator tries to decrement further, the value is not changed.

The Decrement Value Button is a retentive object. The PanelView 1200 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.

Configuring the Decrement Value Button

Configure the Decrement Value Button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Button Type	Specify Decrement Value Button in this field.
Function Key	Specify which function key the operator must press to activate this button (keypad applications only).
Auto Repeat Rate	Specify a number between 0 and 20. When the operator holds down the Decrement Button, the terminal begins decreasing the value at the Button Control Address by the "amount per decrement" value at the rate you specify. A value of 0 disables auto repeat. Pushing the button decreases the value at the Button Control Address by a single decrement amount.
Auto Repeat Start Delay	Specify the time (between 0.2 and 2.5 seconds) that the operator must hold down the Decrement Button before auto repeat function starts.
Amount per Decrement	Enter an integer between 1 and 10,000. The value at the Button Control Address will decrease by this amount each time the operator presses the button.
Minimum Value	You can define a minimum value below which the Decrement Button will stop decrementing the value at the Button Control Address. If the value is already at or below the minimum you define here, pressing the Decrement Button will not change the value. You can define a minimum value anywhere within the supported range for the data type and number of bits you specify for the Button Control Address. This data type — Supports this range of values Binary — 0 to 65,535 BCD — 0 to 99,999,999 Signed Integer — 0 to 32,767
Address	The Decrement Button uses one address, the Button Control Address. Each time the operator presses the Decrement Button, the value at this address is decreased by the specified amount.

Setting Auto-Repeat Rates

If a button is pressed for longer 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 or 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 configured to 0. If 0 is selected, pushing the Increment or Decrement Button will increase or decrease the value at the Button Control Address by a single increment or decrement amount.
- the Auto-Repeat Start Delay may be set for 0.2 to 2.5 seconds
- the Amount per Increment/Decrement is an integer value in a range of 1 to 10000. The default is 1.

Tip 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.

Numeric Data Display


The Numeric Data Display object displays PLC values such as temperature, level and speed, allowing the operator to monitor the process.

The Numeric Data Display object supports two types of Numeric displays, with or without scaling. Without scaling displays raw PLC values. With scaling converts these values into meaningful units of measure, such as temperature or RPMs.

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 Data Display object and numeric entry objects, you could see the new value as you change the value in the PLC controller.

Configuring the Numeric Data Display without Scaling

The Numeric Data Display without Scaling has two display options, a decimal point position and a polarity indicator (the negative sign). Depending on the option you choose, you have several more choices. The following table shows the formatting options, and the addressing limits for each option.

Decimal Point	Polarity	Format Options		Address Options	Data Types	Data Range
NO	NO	No of Digits		Displayed Value Address	Binary	0 to 65,535
		Fill Left With	Zeroes or Spaces		BCD	0 to 99,999,999
					Signed Integer	– 32,768 to +32,767
NO	YES	No of Digits		Displayed Value Address	Binary	–65,535 to +65,535
		Fill Left With	Zeroes or Spaces		BCD	–9,999,999 to +99,999,999
				Polarity Address	Bit	0 to 1
YES	NO	No of Digits		Displayed Value Address	Binary	0 to 65,535
		Fill Left With	Zeroes or Spaces		BCD	0 to 9,999,999
					Signed Integer	–32,768 to +32,767
YES	NO	Decimal Point	Fixed No of digits	Decimal Point Position Address	Binary	0 to 7
			PLC Controlled			
YES	YES	No of Digits		Displayed Value Address	Binary	–65,535 to +65,535
		Fill Left With	Zeroes or Spaces		BCD	–9,999,999 to +9,999,999
		Decimal Point	Fixed No of digits	Decimal Point Position Address	Binary	0 to 7
			PLC Controlled	Polarity Address	Bit	0 to 1

Configure the Numeric Data Display without Scaling according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Display Type	Choose without scaling.
Fill Left With	Choose whether the left portion of the display will be filled with zeroes or blank spaces, when fewer than the maximum number of digits is displayed.
Number of Digits	Specify the number of digits to display, up to a maximum of 8. Keep in mind that a decimal point and minus sign each take the place of one digit.
Display with Polarity	Check this box if you want to be able to display a minus sign with the value. You must then define the Polarity Address. There is only an implied relationship between the value and the minus sign. If the bit at the Polarity Address is 1, the minus sign is displayed; if it is 0, the sign is not displayed.
Display with Decimal Point	Check this box if you want the displayed value to include a decimal point. You must then specify whether you want the decimal point in a fixed position (you then configure how many digits you want after the decimal point), or controlled by the PLC. If you choose PLC Controlled, you must define the Decimal Point Position Address.
Addresses	The Numeric Data Display without Scaling can have 1 to 3 addresses, depending on whether you've defined a decimal point and/or polarity: **Displayed Value Address** identifies the location of the value to be displayed. **Decimal Point Position Address** determines the position of the decimal point. You must define this address if you specified the Decimal Point field as PLC Controlled. Use an input address if you want to control the decimal position from the terminal using a numeric input object; use an output address if you want the PLC controller to dynamically change the decimal position. You don't need to assign an address if the decimal position is fixed. **Polarity Address** is used to determine whether or not a minus sign is displayed. If the bit at the Polarity Address is 1, the minus sign is displayed; if it is 0, the sign is not displayed.

See the following sections for more detailed information on "Fill Left With", Decimal Point, and Polarity.

"Fill Left With" Display Formatting

When fewer digits than the maximum are displayed, the left portion of the display must be filled in.

You can choose to fill the display with either blank spaces or zeroes.

If the value can't 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 on the field size. If both the decimal point and polarity point are used, from 3 to 8 digits are allowed (the default is 7).

For 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 8 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:

- Using "No Polarity" and the "Signed Integer" data type automatically inserts the minus sign when the signed integer bit value is negative.
- Selecting "Polarity".

Configuring the Numeric Data Display with Scaling

The Numeric Data Display shows the raw PLC value. The Numeric Data Display with Scaling converts the PLC value into meaningful units, such as gallons, inches, PSI, or inches per second.

The following table lists the format options you can choose from:

Format	Options	Address Options	Data Types	Data Range
No. of Digits	maximum 8	Displayed Value Address	Binary	0 to 65,535
Fill Left With	Zeroes or Spaces		BCD	0 to 99,999,999
Scaling Factor	.0001 to 9999		Signed Integer	–32,768 to +32,768
Offset Value	–32,768 to +32767			
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 1200 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:

```
Displayed Value  = Mx + b

                 = (0.171 * 3000) + 0

                 = 512.821 (513 rounded)
```

When fewer digits are displayed than the maximum allowed, the left portion of the display must be filled. You can choose to fill with either spaces or zeroes.

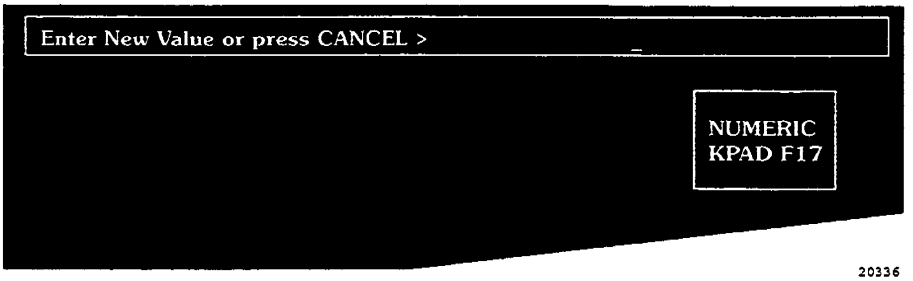
If the value can't be displayed within the number of digits specified for the object, a string of asterisks (*) is displayed instead.

Configure the Numeric Data Display with Scaling according to the following table.

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Display Type	Choose with Scaled.
Fill Left With	Choose whether the left portion of the display will be filled with zeroes or blank spaces, when fewer than the maximum number of digits is displayed.
Number of Digits	Specify the number of digits to display, up to a maximum of 8. Keep in mind that a decimal point and minus sign each take the place of one digit.
Display with Round Off	Check this button if you want the value of the scaling operation to be rounded off. You must choose either Display with Round Off or Display with Decimal.
Display with Decimal	Check this button if you want the value of the scaling operation to be displayed with a decimal point. You must choose either Display with Round Off or Display with Decimal.
Scaling Factor	Specify the scaling factor (a number between .0001 and 9999) that PanelView 1200 uses to scale the PLC value, according to this formula: Displayed Value = (Scaling Value * PLC Value) + Offset Value
Offset Value	Specify the offset value (a number between –32,768 and + 32,767) that PanelView 1200 uses to scale the PLC value, according to this formula: Displayed Value = (Scaling Value * PLC Value) + Offset Value
Addresses	The Numeric Data Display with Scaling uses only one address, the Displayed Value Address, which identifies the location of the value to be displayed.

Numeric Keypad-Enable Button (Keypad Terminals Only)

The Numeric Keypad-Enable Button object calls up the Numeric Keypad window. The operator enters a numeric value in this window.



While the Numeric Keypad window is on the 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 window clears when:

- the Cancel key is pressed
- the screen changes
- the operator cursors to a Numeric Input Cursor Point

The Numeric Keypad window can display a maximum of 8 digits. Note that 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.

Note The Numeric Keypad Enable Buttons are retentive objects. Your PanelView 1200 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.

Configuring the Numeric Keypad-Enable Button

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 the button is pressed, but the button itself remains unchanged. If you assign different attributes and text to states 0 and 1, then the button will immediately change to state 1 when pressed.

Configure the Numeric Keypad-Enable Button according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Scratch Pad	Specify whether you want the numeric data entry scratchpad to remain or disappear after the operator has pressed the Enter key. Note that the Numeric Keypad scratchpad occupies the top three lines of the screen. Keep this in mind if you want to place any objects on these lines.
Decimal Point	If you want the operator to enter a number with decimal points, specify how to determine where the decimal point will be displayed. Your choices are: **Disabled**—the operator won't be able to enter a decimal point. **Fixed Position**—you specify where the decimal point is positioned in the scratch pad display. Specify the number of digits that appear after the decimal point. **PLC Controlled** allows the PLC Controller to determine the number of digits that appear after the decimal point by specifying a value at the Decimal Point Position Address. **Decimal Key Controlled** allows the operator to enter the number and decimal point. The terminal calculates the decimal point position and writes this value to the Decimal Point Position Address. For more details, see the section following this table.

Field	Meaning
Function Key	Specify which function key the operator must press to call up the Numeric keypad window (keypad applications only).
Address	The Numeric Keypad Enable Button uses four addresses: **Keypad Control Address** identifies where the terminal writes the value. **Decimal Point Position Address** determines the position of the decimal point. You must define this address if you specified the Decimal Point field as PLC Controlled or Decimal Key Controlled. **Enter Key Control Address** and the **Enter Key Handshake Address** are used together to provide handshaking between the PLC Controller and the terminal. When the operator presses the Enter key to send the value to the programmable controller, the terminal sets the Enter Key Control Address to 1 (after a 400-ms delay). Put a rung 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. Remember that all function keys are disabled while the terminal is waiting for handshake acknowledgement.

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.

The following table shows the Numeric Keypad-Enable button's formatting and addressing options.

Format Options			Address Options	Data Types	Data Range
Decimal Point	Disabled		Keypad Control Address	Binary	0 to 65,535
	Fixed Position	No. of digits after decimal pt.		BCD	0 to 99,999,999
	PLC Controlled			Signed Integer	–32,768 to +32,767
	Decimal Key Controlled		*Decimal Point Position Address	Binary	0 to 7
Scratchpad Operation	Retain after ENTER Remove after ENTER		#Enter Key Control Address	Bit	0 to 1
			#Enter Key Handshake Address	Bit	0 to 1

*useful only with Decimal Key Controlled and PLC Controlled formats – not necessary otherwise
#optional

Formatting the Decimal Point

To allow an operator to enter numbers with decimal points, you can choose from the following options:

- **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:

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.

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 should 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.

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

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).

Note The Numeric Entry Keypads are retentive objects. Your PanelView 1200 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.

Configuring the Numeric Entry Keypad

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 Numeric Entry Keypad according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Keypad Size	Specify whether you want the large or small keypad. Both keypads are 24 lines high; the large is 48 characters wide, the small is 24 characters wide.
Decimal Point	Specify whether you want to allow the operator to enter a decimal point. Your choices are: **Disabled**—the operator won't be able to enter a decimal point. **Fixed Position**—you specify where the decimal point is positioned in the scratch pad display. Specify the number of digits that appear after the decimal point. **PLC Controlled** allows the PLC Controller to determine the number of digits that appear after the decimal point by specifying a value at the Decimal Point Position Address. **Decimal Key Controlled** allows the operator to enter the number and decimal point. The terminal calculates the decimal point position and writes this value to the Decimal Point Position Address. For more detail on configuring the decimal point, see the section following this table.
Address	The Numeric Entry Keypad uses four addresses: **Keypad Control Address** identifies where the terminal writes the value. **Decimal Point Position Address** determines the position of the decimal point. You must define this address if you specified the Decimal Point as PLC Controlled or Decimal Key Controlled. **Enter Key Control Address** and the **Enter Key Handshake Address** are used together to provide handshaking between the PLC Controller and the terminal. When the operator presses the Enter key to send the value to the programmable controller, the terminal sets the Enter Key Control Address to 1 (after a 400-ms 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 Enter Key bit has been received. When the terminal sees the Enter Key Handshake bit on, it turns off the Enter Key Control bit. If the terminal does not receive acknowledgment (transition of the Enter Key Handshake bit 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 remains 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 acknowledgment.

The following table shows the Numeric Entry Keypads formatting and addressing options.

Format Options		Address Options	Data Types	Data Range
Decimal Point	Disabled	Keypad Control Address	Binary	0 to 65,535
	Fixed Position No. of digits after decimal pt.		BCD	0 to 99,999,999
	PLC Controlled		Signed Integer	–32,768 to +32,767
	Decimal Key Controlled	*Decimal Point Position Address	Binary	0 to 7
		#Enter Key Control Address	Bit	0 to 1
		#Enter Key Handshake Address	Bit	0 to 1

*useful only with Decimal Key Controlled and PLC Controlled formats – not necessary otherwise
#optional

Formatting the Decimal Point

To allow an operator to enter numbers with decimal points, you can choose one of the following options:

- **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:

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 won't 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.

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.

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.

Using the Numeric Input Cursor Point in PanelView 1200

When the application is running, the operator can use the following keys to control the Numeric Input Cursor Point:

This key	Does this
Select	Enables the arrow and Home keys.
Arrow keys	Move the cursor to the desired cursor point in the screen.
Home	Moves the cursor to the Home position (the top left cursor point) in the screen.
Cancel	Turns off the Numeric Input Cursor Point feature, and disables the keys.

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 types in the new value, using the Numeric Keypad keys, and presses the Enter key to send the value to the Keypad Control Address.

If the operator uses the Raise or Lower buttons without entering anything in the window, the displayed value changes and the changed value is sent directly to the PLC controller without the Enter key being pressed. The Raise and Lower buttons are disabled as soon as a digit is entered into the Numeric entry window. They remain disabled until the value in the window has been entered or cleared.

The operator can enter a maximum of 8 digits in the window (default is 5). Pressing Enter validates the value. If the value entered is valid, the window clears. The new value is then 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 appears. The value remains in the window and is not sent to the PLC controller. The operator must clear the error message from the display.

Note The numeric entry window occupies the top three lines of the screen. Keep this in mind before you place any objects on these lines.

Note The Numeric Input Cursor Point is a retentive object. Your PanelView 1200 terminal will retain the current value for each of the Cursor Points even after you've powered down the terminal or switched from Run mode to Configuration mode and back. PanelBuilder 1200 allows you to set a preset value for this object.

Defining the Numeric Input Cursor Point Character

By default, the Numeric Cursor Point object uses a small arrow as the cursor character. If you wish, you can change this character to either a keyboard character or a character from the Extended character set.

To define the Numeric Input Cursor Point character:

1 Create the Numeric Input Cursor Point object.

2 Select Text from the Objects menu or choose  from the toolbar. Or position the pointer next to the cursor character and click the right mouse button so that the I-beam appears.

3 Position the I-beam to the left of the arrow, and use the DELETE key to delete the character.

4 Type the character of your choice. If the character is not available on the keyboard, press ALT. While holding down ALT, type the character's ASCII code on the keypad. See Appendix C, *The Extended Character Set*, in the *PanelBuilder 1200 Configuration Software for Windows User Manual* for the characters and their ASCII codes.

Note You may want to create a label for the Numeric Input Cursor Point object. For information on creating outer text for an object, refer to Chapter 15, *Working with Objects* in the *User Manual.*

Configuring the Numeric Input Cursor Point

Place successive Numeric Cursor Points any distance above, below, or beside existing Numeric Cursor Points. Use the row and column indicators in the status bar to make sure the Cursor Points line up.

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 1200 terminal, only one cursor point character will be blinking and highlighted.

You can assign an upper and lower limit 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.

You can choose to have the left of the Numeric Input Cursor Point value filled with blanks or zeroes. You can also add outside text such as units of measure.

Configure the Numeric Input Cursor point according to the following four tables:

Name:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.

Numeric input configuration:

Field	Meaning
Decimal Point	Specify whether you want to allow the operator to enter a decimal point. Your choices are: **Disabled**—the operator won't be able to enter a decimal point. **Fixed Position**—you specify where the decimal point is positioned in the scratchpad display. Specify the number of digits that appear after the decimal point. **PLC Controlled** allows the PLC Controller to determine the number of digits that appear after the decimal point by specifying a value at the Decimal Point Position Address. **Decimal Key Controlled** allows the operator to enter the number and decimal point. The terminal calculates the decimal point position and writes this value to the Decimal Point Position Address.
Auto Repeat Rate	When the operator holds down the RAISE or LOWER key, the terminal begins changing the value in the Keypad Numeric Input Address by the specified Amount per Increment or Decrement value, at the rate entered in this field. Specify a number between 0 and 20 (per second). A value of 0 disables auto repeat.
Auto Repeat Start Delay	Specify the time (between 0.2 and 2.5 seconds) that the operator must hold down the RAISE or LOWER key before the Auto Repeat function starts.
Amount per Increment or Decrement	Enter an integer between 1 and 10,000. The value at the Keypad Numeric Input Address will change by this amount each time the operator presses the RAISE or LOWER key.
Maximum Value	Specify a maximum value. If the operator enters a value above the value you specify, the terminal won't write the value to the PLC Controller. The range is 1 to 99,999,999.
Minimum Value	Specify a minimum value. If the operator enters a value below the value you specify, the terminal won't write the value to the PLC Controller. The range is 0 to 99,999,998.

Display configuration:

Field	Meaning
Number of Digits	Enter the number of digits that can be displayed on the screen.
Fill Left With	Choose whether the left portion of the display will be filled with zeroes or blank spaces, when fewer than the maximum number of digits is displayed.
Decimal Point	Specify how you want the number to be displayed on the screen. Your choices are: **Disabled**—the operator won't be able to enter a decimal point. **Fixed Position**—you specify where the decimal point is positioned in the numeric display. Specify the number of digits that appear after the decimal point. **PLC Controlled** allows the PLC Controller to determine the number of digits that appear after the decimal point by specifying a value at the Decimal Point Position Address.

Addresses:

Field	Meaning
Addresses	The Numeric Entry Keypad uses six addresses: **Keypad Numeric Input Address** identifies where the terminal writes the value to the PLC. **Numeric Decimal Point Position Address** determines or indicates the position of the decimal point. You must define this address if you specified the Decimal Point as PLC Controlled or Decimal Key Controlled. **Enter Key Control Address** and the **Enter Key Handshake Address** are used together to provide handshaking between the PLC Controller and the terminal. When the operator presses the Enter key to send the value to the programmable controller, the terminal sets the Enter Key Control Address to 1 (after a 400-ms 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. When the Raise or Lower button is pressed, PanelView 1200 sets the Enter Key Control bit (after a 400-ms delay) and ignores the Enter Key Handshake bit. After the button is released, PanelView 1200 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. All function keys are disabled while the terminal is waiting for handshake acknowledgement. If the terminal does not receive acknowledgment (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 remains set for the duration of the button hold time or for as long as the button is pressed, whichever is longer. **Displayed Value Address** identifies the value to be displayed in the numeric display. 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. **Displayed Decimal Point Position Address** is used to determine the position of the decimal point. You must define this address if you specified the Decimal Point as PLC Controlled. The three-bit binary code value determines the number of digits displayed to the right of the decimal point.

Formatting the Decimal Point

To allow an operator to enter numbers with decimal points, you can choose from the following options:

- **Disabled** specifies no values with decimal points can be entered.
- **Fixed Position** specifies a set number of digits to be displayed after the decimal point. For example, if the setting was for three digits after the decimal, an operator's entry would appear as follows:

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 won't 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.

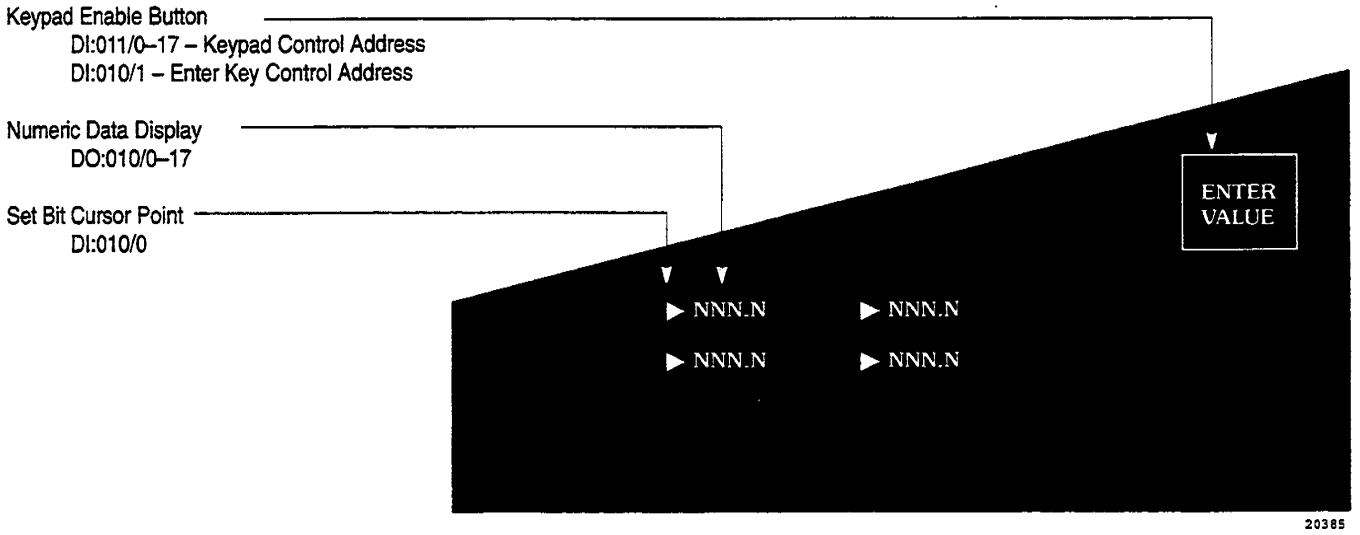
Digits Entered	Keypad Control Address Value	Decimal Point Position Address Value	Number Displayed
123	123	0	123
1.23	123	2	1.23
.12345	12345	5	.12345

To send a decimal point value to the PLC controller, define a Decimal Point Position Address. In this case, only a PLC input should 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.

Editing an Array of Numeric Values

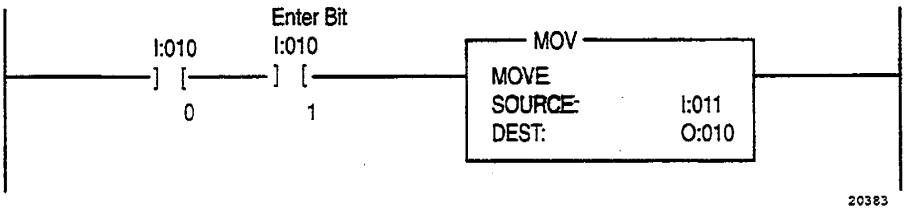
The following examples show different ways of displaying several numeric values on a screen and allowing an operator to change any of them.

Example 1: Set Bit Cursor Points (for keypad terminals)



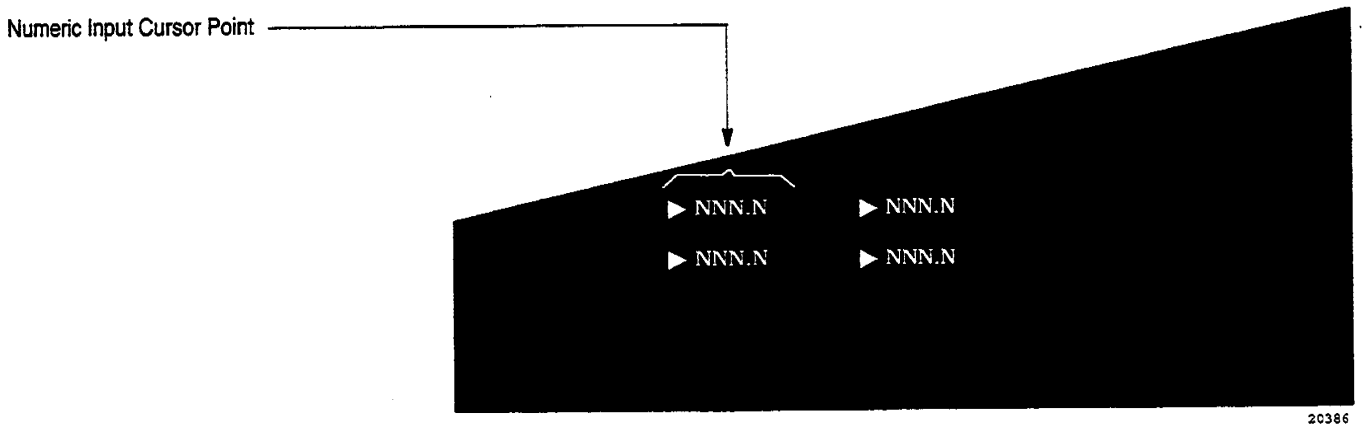
In this example, numeric values are entered using a Numeric Keypad Enable Button. Numeric Data Displays are used to display values in the PLC controller (they are assigned output addresses). Set Bit Cursor Point objects are placed next to each Numeric Data Display to provide a means of selecting which 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.



To select the value to change, press the SELECT button on the PanelView 1200 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.

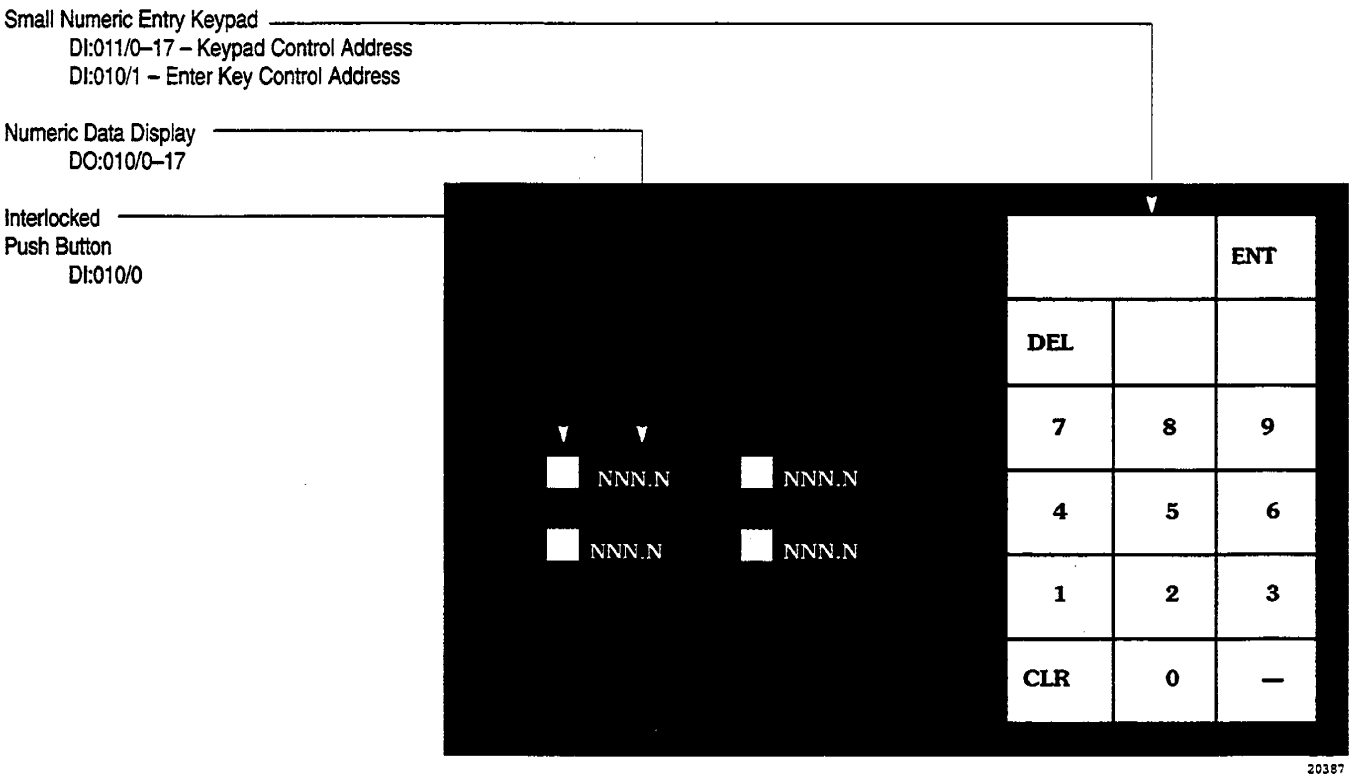
Example 2: Numeric Input Cursor Point (for keypad terminals)



In this example, Numeric Cursor Point objects are used to change an array of values.

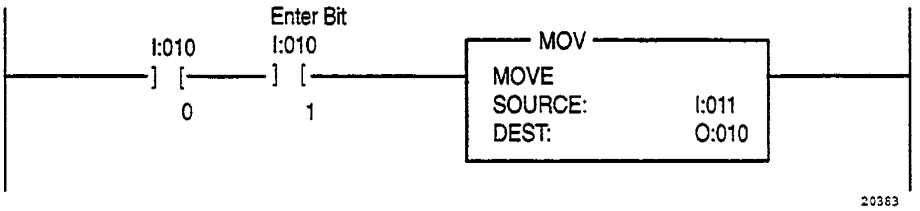
To select which value to change, press the SELECT button on the PanelView 1200 terminal to enable the Numeric Input Cursor Points and to open the scratchpad at the top of the screen. Use the arrow keys to select the value to change, then use the Numeric Keypad to enter the data into the window. Use the Enter key to send the data to the PLC controller.

Example 3: Numeric Entry Keypad (for touch screen terminals)



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.



To select which value to change, press the Interlocked Push Button beside the value, and use the Numeric Keypad to enter the new value.

ISA Symbols

This chapter provides information about ISA Symbols. It tells you about:

- available ISA symbols
- configuring ISA symbols

About ISA Symbols

You can include any of the ISA Industrial Symbols in your screen. The symbol can be single or double size.

Each symbol can have up to four different states. You can assign unique attributes (color, blink, intensity, etc.) 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 .

If the value is less than zero, state 0 is displayed. If the value is greater than state 3, state 3 is displayed.

Important All bits off displays state 0.

If a symbol's connection points are not at the center of a character cell, or if the symbol is double size, you can use the line connectors. You can use Line Connect Characters to 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 Line Connect Characters in Chapter 15, *Working with Objects* in the *PanelBuilder 1200 Configuration Software for Windows User Manual* for information on how to choose connector characters.

Available ISA Symbols

The following table shows the available ISA symbols.

ISA Symbol Name	ISA Symbol Icon
Horizontal Valve with Actuator	
Horizontal Valve with Throttling Actuator	
Horizontal Valve with Manual Actuator	
Vertical Valve with Actuator	
Vertical Valve with Throttling Actuator	
Vertical Valve with Manual Actuator	
Butterfly Valve	
Check Valve	
Relief Valve	
Liquid Filter	
Vacuum Filter	
Motor	
Transformer	
Vessel	
Reactor	
Storage Bin	
Distillation Tower	
Pressure Storage Vessel	
Weigh Hopper	

ISA Symbol Name	ISA Symbol Icon
Pump	
Turbine	
Blower	
Compressor	
Agitator	
Conveyor	
Screw Conveyor	
Inline Mixer	
Rotary Feeder	
Exchanger	
Furnace	
Rotary Kiln	
Cyclone Separator	

Configuring ISA Symbols

Configure each ISA Symbol according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application file by 1 byte per character.
Symbol Category	Choose the category of the symbol you want to create.
Symbol Type	Choose the desired ISA symbol.
Sample	This fields shows what the currently selected symbol looks like.
Addresses	Each symbol can have up to 4 different states. The Symbol State Address is used to control these states. The address can have a maximum of 3 bits. All bits off will display State 0.

The following table shows each state and the required bit pattern for each data type:

State	Binary	Bit
0	00	000
1	01	001
2	10	010
3	11	100

Bar Graphs

This chapter provides information about bar graphs. It tells you about:

- how bar graphs function
- how to configure bar graphs

About Bar Graphs

Bar graphs are useful for monitoring 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 bottom to top. Horizontal bars move from left to right.

On the PanelView 1200 terminal, bar graphs will operate at pixel resolution. Each character cell is 8 pixels wide by 10 pixels high.

Tip You can use Text to make incremental marks alongside the bar graph. The underscore character often does this best for vertical graphs.

You can group bar graphs 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.

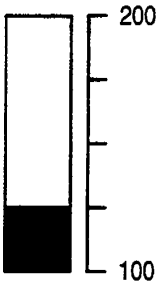
Tip To have a bar graph change color at certain values, cascade bar graphs together: place the high end of one graph at the low end of the next, and adjust each graph's data range accordingly.

Configuring the Bar Graph

After sizing the bar in PanelBuilder 1200, you assign a PLC input or output address and a "data range": a low and high value. If the value is equal to or less than the lower limit, the bar will have no size. If the value is equal to or greater than the upper limit, the bar will appear full size.

The data range that can be used 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.



Configure the bar graph according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Graph Type	Specify which type of bar graph you want to configure: **Vertical**—fills the bar graph from bottom to top **Horizontal**—fills the bar graph from left to right
Maximum Value	Specify the maximum value to be displayed in the graph. When the PLC value reaches (or exceeds) this value, the bar graph will be completely filled. The data range allowed is 1 to 99,999,999. The maximum value must be larger than the minimum value.
Minimum Value	Specify the minimum value to be displayed in the graph. When the PLC value drops to (or falls below) this value, the bar graph will be completely empty. The data range allowed is 0 to 99,999,998. The minimum must be less than maximum value.
Addresses	The Bar Graph Value Address is the address from the PLC Controller whose value will be displayed.

Time and Date Display

About Time and Date Display

You can use the Time Display and the Date Display to show time and date information on your application.

Time Display

The Time Display shows the current time at a specified location on a screen. The time is displayed in the format hh:mm:ss (hours, minutes, seconds).

Use the PanelView 1200 terminal's Configuration Menu or the PLC Controlled Time & Date option in the Global Address Options dialog box (see Chapter 8, *Configuring Global Address Options* in the *PanelBuilder 1200 Configuration Software for Windows User Manual*) to set the correct time on your PanelView 1200 terminal. Use the terminal's Configuration Menu to set the time to appear in 12-hour (AM/PM) or 24-hour format.

Date Display

The Date Display shows the current date at a specified location on a screen. The date is displayed in the format mm/dd/yy (month, day, year).

Use the PanelView 1200 terminal's Configuration Menu or the PLC Controlled Time & Date option in the Global Address Options dialog box (see Chapter 8, *Configuring Global Address Options* in the *PanelBuilder 1200 Configuration Software for Windows User Manual*) to set the correct date on your PanelView 1200 terminal.

Configuring the Time/Date Display

Configure the Time and Date Display according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Display Type	Specify whether you want to create a time display or date display.

ASCII Input Object

This chapter provides information about the ASCII Input object. It tells you about:

- how the ASCII Input object functions
- how to configure the ASCII Input object

About the ASCII Input Object


The ASCII Input object allows the operator to send an alphanumeric string (up to 64 characters) to a PLC input address.

There are two types of ASCII Input objects:

- large ASCII Input object
- small ASCII Input object

These function slightly differently on keypad and touch screen terminals.

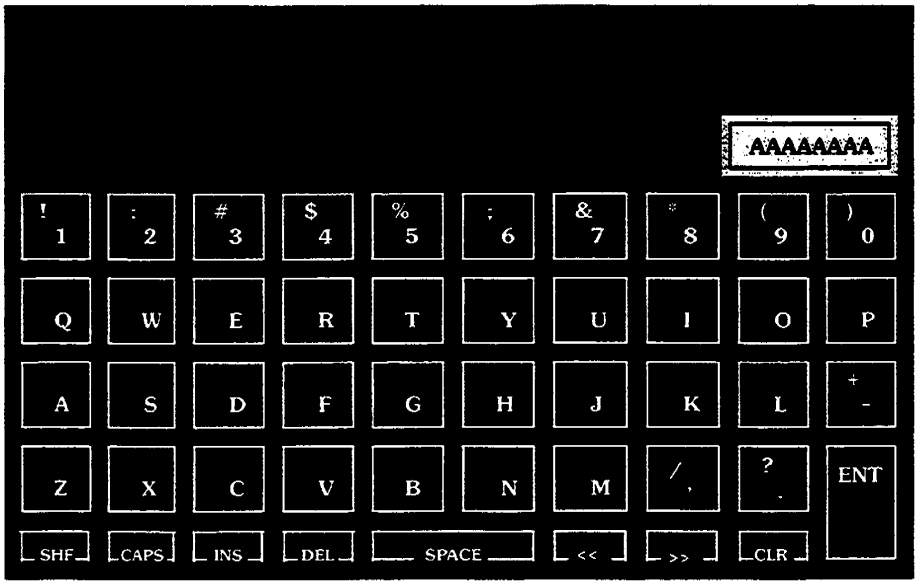
On the large ASCII Input object for a touch screen terminal, the operator selects characters by touching the keypad on the screen. The selected character appears in the scratchpad. When the string in the window is complete, the operator sends it to the ASCII Input Address by pressing the ENT key.

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. The selected character appears in the scratchpad. When the string in the window is complete, the operator sends it to the ASCII Input Address by pressing the ENT key.

The ASCII Input object is not a retentive object. You cannot assign a preset value.

ASCII Input Object Displays

The following illustration shows the large ASCII Input object for a touch screen terminal.



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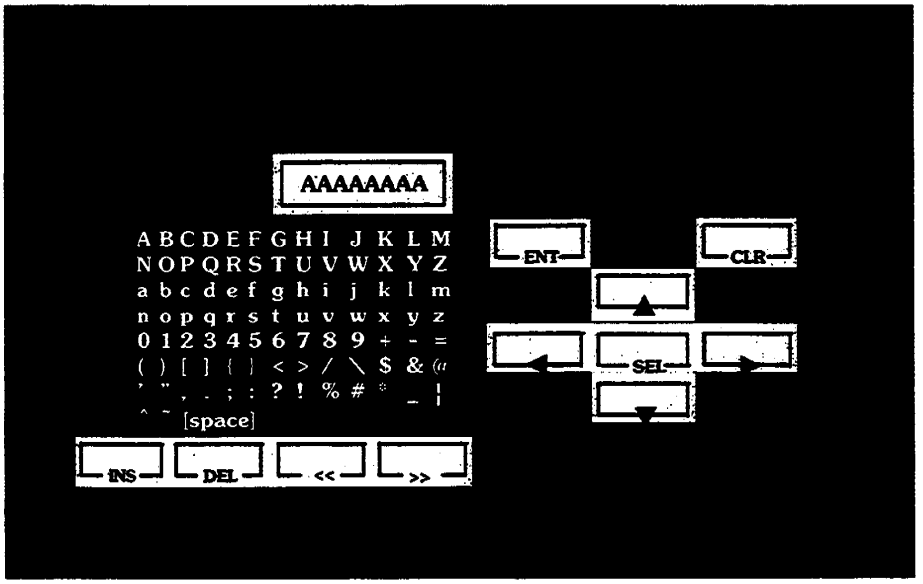
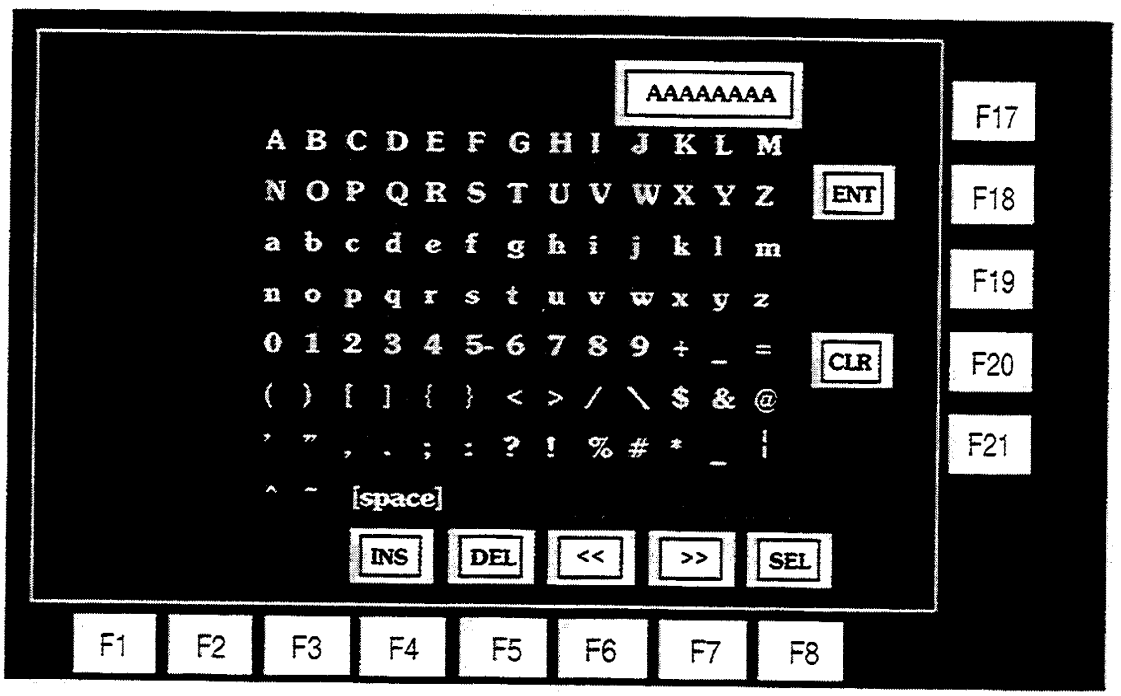
The following illustration show a Small ASCII Input Object on a touch screen terminal.

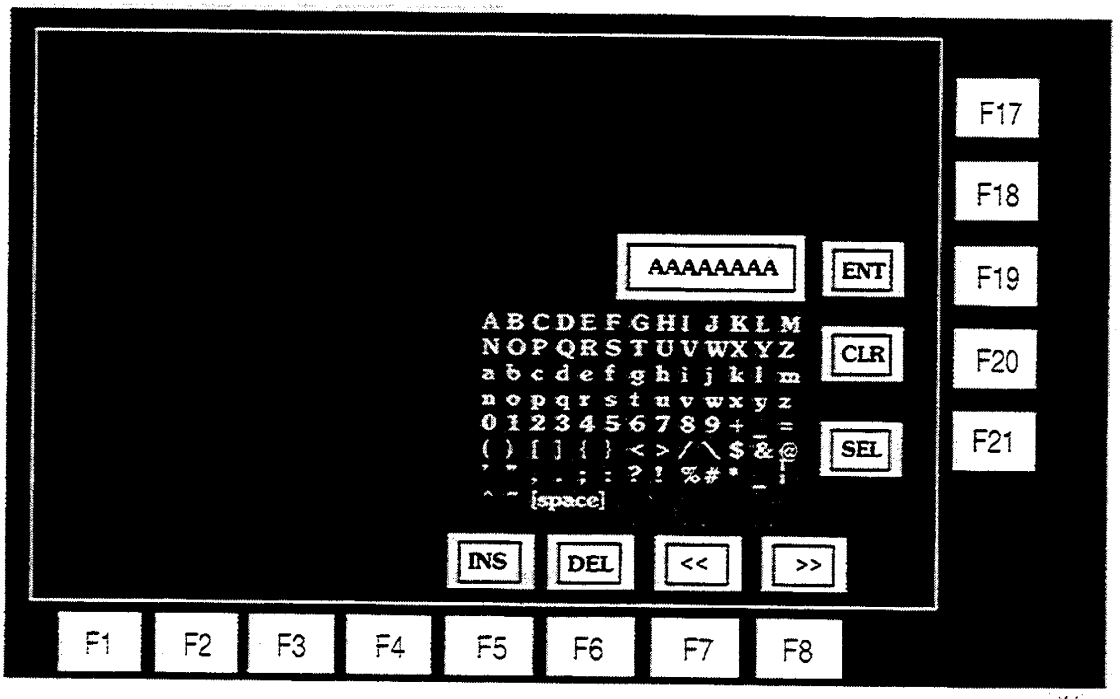


23635

The following illustration show a Large ASCII Input Object on a keypad terminal.



The following illustration show a Small ASCII Input Object on a keypad terminal.



Buttons of the ASCII Input Object

The buttons of the ASCII Input object function differently, depending on the terminal.

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)**—When the operator presses the ENT button, 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. In this case, the string is not sent to the programmable controller.

  The scratchpad is not cleared after the ENT button is pressed. If the operator selects an ASCII character immediately, the terminal clears the scratchpad and displays that character. However, if the operator presses an editing key (INS, DEL, or the cursor keys << and >>), the terminal continues to display the existing string, allowing the operator to edit it without having to retype it.

The table below also lists the buttons and their functions:

Buttons	Touch Screen Terminal		Keypad Terminal	
	Small	**Large**	**Small**	**Large**
INS button	Toggles between Insert and Overwrite modes.	Toggles between Insert and Overwrite modes.	Toggles between Insert and Overwrite modes.	Toggles between Insert and Overwrite modes.
DEL button	Deletes one character at the cursor position of the scratchpad.	Deletes one character at the cursor position of the scratchpad.	Deletes one character at the cursor position of the scratchpad.	Deletes one character at the cursor position of the scratchpad.
CLR button	Clears the scratchpad.	Clears the scratchpad.	Clears the scratchpad.	Clears the scratchpad.
ENT button	Sends the string in the scratchpad to the programmable controller.	Sends the string in the scratchpad to the programmable controller.	Sends the string in the scratchpad to the programmable controller.	Sends the string in the scratchpad to the programmable controller.
SEL button	Places highlighted character into the scratchpad at the cursor position.		Places highlighted character into the scratchpad at the cursor position.	Places highlighted character into the scratchpad at the cursor position.
SHF button		Inserts upper case character or character above number.		
CAPS button		Toggles entry of upper and lower case characters.		
Arrow keys	Use to select a character from keyboard, then press SEL to place in scratchpad.		Use to select a character from keyboard, then press SEL to place in scratchpad.	Use to select a character from keyboard, then press SEL to place in scratchpad.

Configuring the ASCII Input Object (Large or Small)

Configure the ASCII Input object according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Fill Characters	Specify which character you want the ASCII string padded with when it is less than the configured maximum length. Choices are: Spaces Zeros FF Null
Number of Characters	Specify the number of characters (from 1–64) that can be entered into the scratchpad.
Button Function Key Assignments	Specify a function key for each of the seven buttons associated with this object, to enable the operator to use them (keypad application only).
Addresses	The ASCII Input uses three addresses: **ASCII Input Address** identifies which PLC input address the terminal writes the string in the scratchpad to. **Enter Key Control Address** and the **Enter Key Handshake Address** are used together to provide handshaking between the PLC Controller and the terminal. When the operator presses the ENT button to send the value to the programmable controller, the terminal sets the Enter Key Control Address to 1 (after a 400-ms 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 acknowledgment (transition from 0 to 1) within 4 seconds, it displays an error message in the Fault Window and resets the Enter bit. If the Enter Key Handshake is unassigned, the Enter bit remains 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 screen input is disabled while the Enter Key Control Bit is set to 1.

The following table shows the Scratchpad input and contents of the 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

Configuring Display Components

The following table lists the display components for the ASCII Input object and tells you whether you can configure them.

Display Components	Touch Screen Terminal		Keypad Terminal	
	Small	**Large**	**Small**	**Large**
Keyboard characters	Not configurable	Not configurable	Not configurable	Not configurable
Keyboard	Location configurable	Vertical location configurable only	Location configurable	Location configurable
Characters within scratchpad	Size configurable	Size configurable	Size configurable	Size configurable
Scratchpad	Size configurable; location configurable	Size configurable; location configurable	Size configurable; location configurable	Size configurable; location configurable
Buttons	Size fixed Location configurable	Not configurable	Size fixed Location configurable Function keys can be assigned	Size fixed Location configurable 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

Scrolling List

This chapter provides information about the Scrolling List. It tells you about:

- the different Scrolling List components
- configuring each Scrolling List component

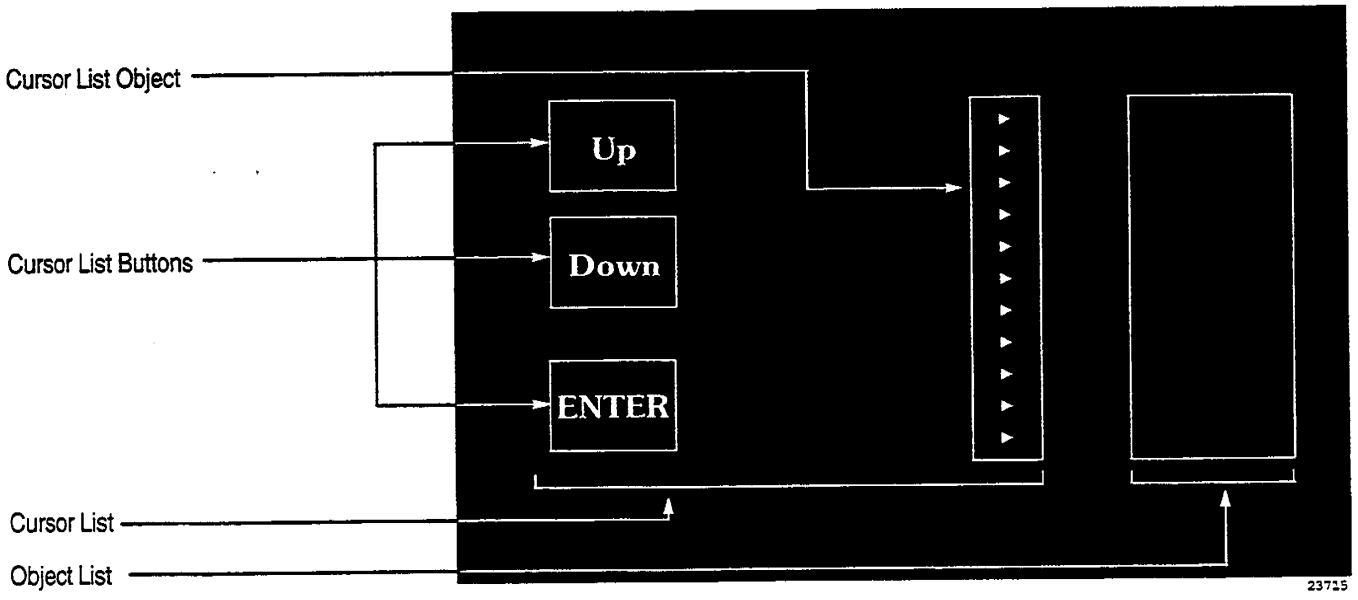
About the Scrolling List Object

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 have only one Cursor List per screen. However, you can define multiple object lists, including Local Message Object Lists, Multistate Indicator Object Lists, and Numeric Display Object Lists.

The Scrolling List addressing permits PLC output data multiplexing to PanelView 1200. This reduces PLC ladder logic and addressing typically needed to display and edit large amounts of data.

The Scrolling List consists of a Cursor List and one or more Object List(s). You can't download an application with only Object Lists and no Cursor List. The following illustration provides an example of how a completed scrolling list appears on the application screen.



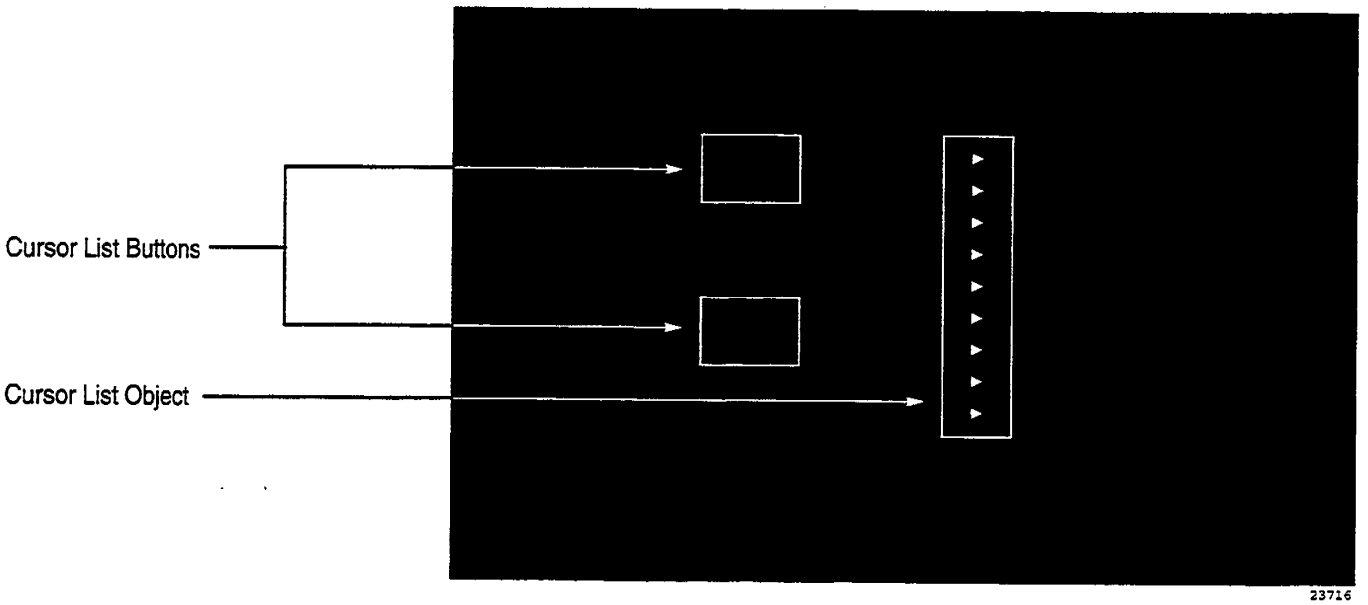
The Scrolling List is a retentive object. Your PanelView 1200 terminal will retain the current value for the Cursor List and Object List settings even after you've turned the terminal off, or switched to Configuration mode and back to Run mode. You can enter preset values for this object.

Please turn to Appendix A, *PLC Programming Considerations* 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.

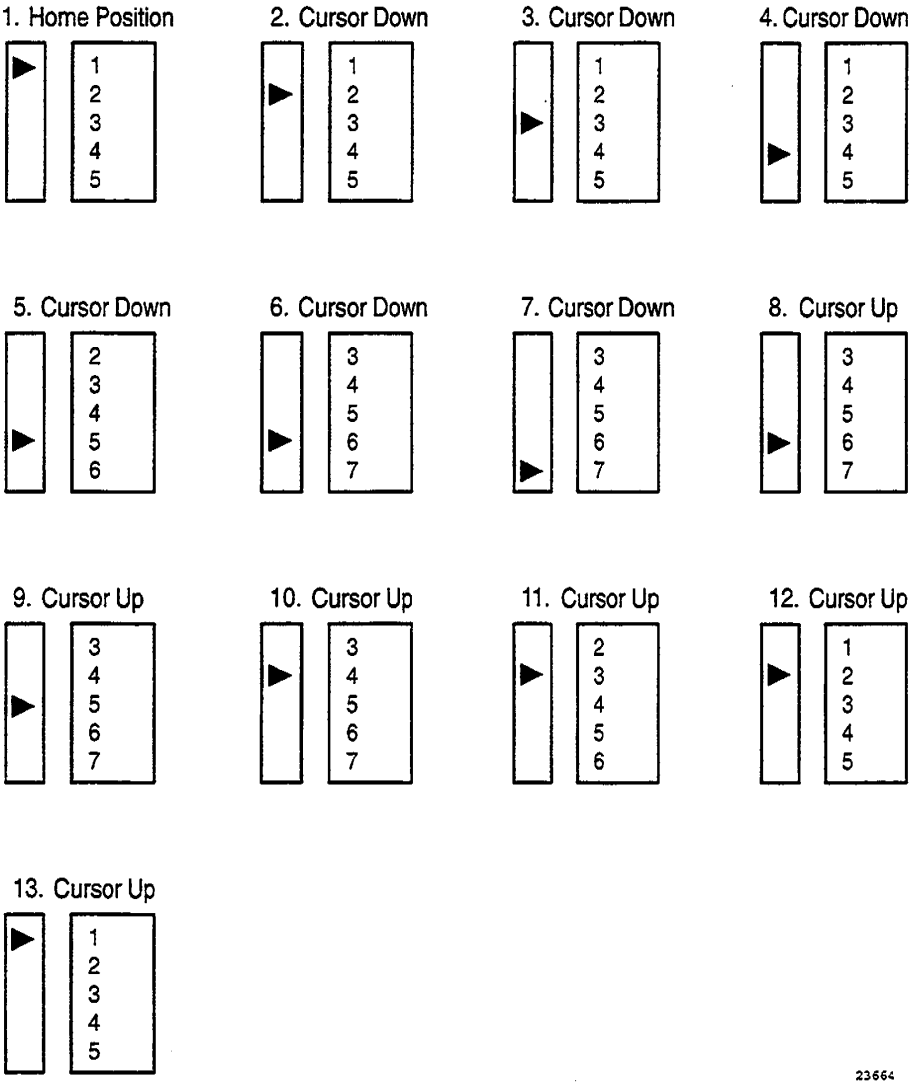


Configuring the Cursor List

Configure the Cursor List according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Up Cursor	Specify whether the Up Cursor button is enabled. 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	Specify whether the Down Cursor button is enabled. 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	Specify whether the Page Up button is enabled. 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	Specify whether the Page Down button is enabled. 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	Specify whether the Home button is enabled. Home positions the cursor at the top-most or first position in the list.
End	Specify whether the End button is enabled. End positions the cursor at the bottom-most or last position of the list.
Enter	Specify whether the Enter button is enabled. 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
Number of States	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.
Number of Visible States	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. You can also configure the number of visible states by sizing the cursor list graphically. See Chapter 15, *Working with Objects*, in the *User Manual.* for details.
Number of Preview States	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. See the following illustration for an example of how the Number of Preview States functions.

The following illustration 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.



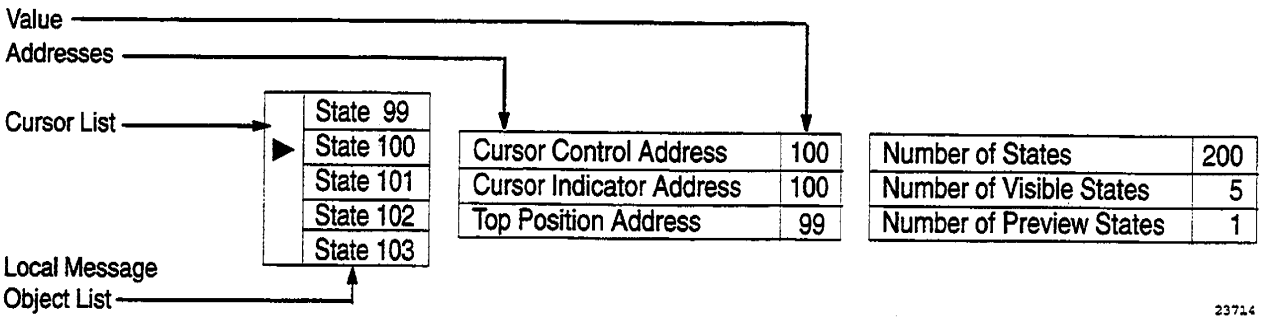
Configuring Addresses

Configure the addresses according to the following table. For more information on the Cursor Control and Indicator Addresses, and the Top Position Address, see the section following the table.

Address	What it does
Cursor Control Address	This is an output address that informs the terminal where to position the cursor in the Scrolling List. If the value is 0, the cursor list buttons control the cursor.
Cursor Indicator Address	This is an input address that 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.
Top Position Address	This 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.
Enter Key Control Address and the Enter Key Handshake Address	These two addresses are used together to provide handshaking between the PLC Controller and the terminal. When the operator presses the Enter button, 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 acknowledgment (transition from 0 to 1) within 4 seconds, 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.

- The **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 1200 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 1200 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.



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.

- The **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.

- The **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.

Object Lists

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 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.

There are three types of Object Lists that you can choose from:

- **Multistate Indicator Object List**—This Object List is a list of Multistate Indicator objects that can display different states at any given time. The Number of Visible States that you specified for the Cursor List determines the total number of multistate objects you can define in a single Object List. Defining this object is similar to defining the regular Multistate Indicator object, except that you can define only one set of state text information (16 state text strings) per Multistate 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 Visible States you specified for the Cursor List.

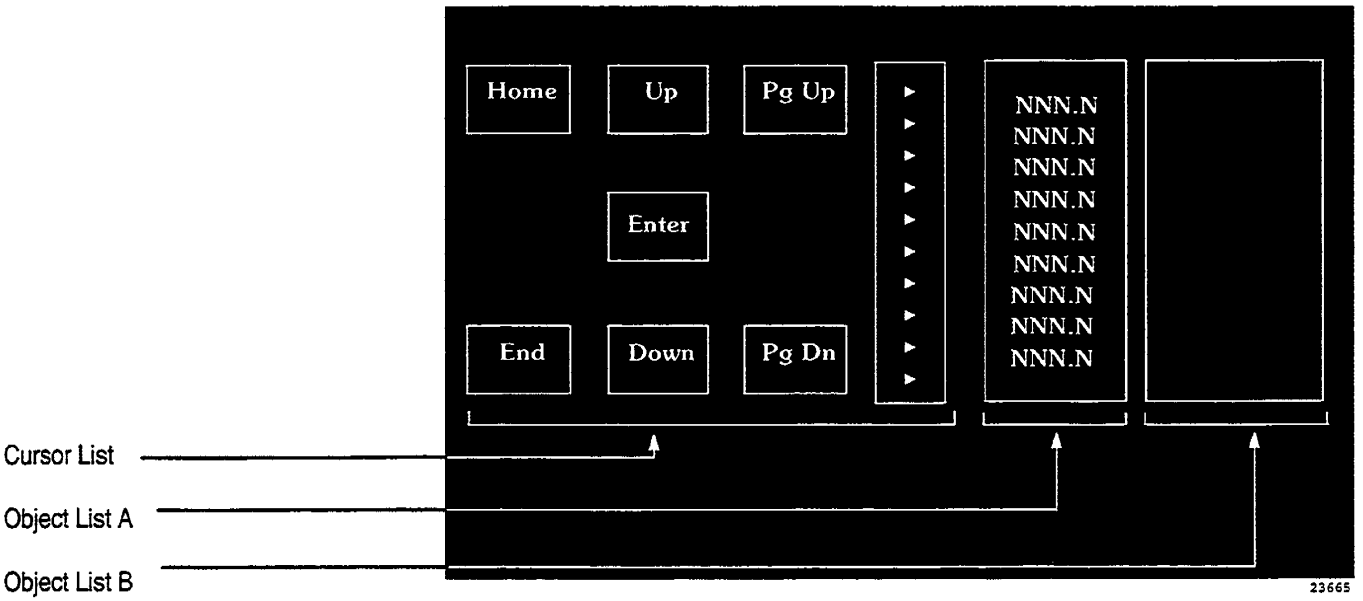
- **Numeric Data Display Object List**—This Object List allows you to configure multiple Numeric Data Display Objects in a list. If you select this option for your Object List, you can choose among the following Numeric Data Display options, similar to the single Numeric Data Display Object:

  - Numeric List (No Decimal or Polarity)
  - Numeric List (With Polarity)
  - Numeric List (With Decimal)
  - Numeric List (With Decimal and Polarity)
  - Numeric List (Scaled)

  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 Visible 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.

Important Each scrollable Object List can contain only the selected object. You can't combine different objects in the same list. The following figure shows a sample screen containing two Object Lists and a Cursor List.



The width of the Object List 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.

Multistate Indicator Object List

The Multistate Indicator Object List is a list of Multistate Indicators. Each Multistate Indicator allows the operator to view the state of a PLC operation on the screen. The Number of States you define for the Cursor List determines the total number of Multistate objects for a single list.

You can define up to 16 states. For each state, you can define unique text, colors and attributes. The PanelView 1200 terminal then monitors the address and displays the text/colors appropriate for the state.

Note How you define the state text information for the 16 states will apply to all Multistate Indicators in the Object List.

Configuring the Multistate Indicator Object List

Configure the Multistate Indicator Object List according to the following table. The section following the table provides more detailed information.

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Number of States	Specify the number of states this object will display, from 2 to 16. For each state, you should configure colors, text, and other attributes. The attributes you configure for any one state will apply to all indicators in the list.
Number of Visible States	Define the number of objects from the whole list that the operator will be able to see at any given time. This number must match the number you defined for the Cursor List. The default is the value you defined for the Cursor List. If you change this default, you must update the number defined for the Cursor List so that they match. To match the Cursor List's Number of Visible States, the font size of the two lists must also match. You can also configure the number of visible states by sizing the object list graphically. To create a valid scrolling list, the value in this field must be the same as the value in the Number of Visible States field in the Cursor List.
Highlight Bar	Select this option if you want the current state (controlled by the Cursor Control Address or cursor buttons) to appear highlighted in reverse video.
Addresses	The Visible State Address allows you to attach an individual address to each visible object or state in the list. When you define the address for the first visible state, and if your address is Output, PanelBuilder checks the amount of contiguous address space available. If there is enough space available, PanelBuilder offers to assign the remaining addresses.

Important If you change the attributes of a state by changing the Character Height of the text, you affect the height of the Object List.

Note You can't resize an Object List so that its number of visible states is less than the assigned maximum visible state address.

If you set any Object List text string associated with the Multistate Indicator to Double, the Object List height will automatically 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 the top two lines of the Object List.

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.

Note When you try to enter state text, the cursor automatically appears at the top of the list.

Note If any state contains double height text, another state can have two lines of single height text.

Local Message Object List

The total number of Local Message objects in a list is determined by the Number of Visible States you defined for the Cursor List.

Configuring the Local Message Object List

Configure the Local Message Object List according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Number of Visible States	Define the number of objects from the whole list that the operator will be able to see at any given time. The default is the value you defined for the Cursor List. If you change this default, you must update the number defined for the Cursor List so that they match. To match the Cursor List's Number of Visible States, the font size of the two lists must also match. You can also configure the number of visible states by sizing the object list graphically. To create a valid scrolling list, the value in this field must be the same as the value in the Number of Visible States field in the Cursor List.
Highlight Bar	Select this option if you want the current state (controlled by the Cursor Control Address or cursor buttons) to appear highlighted in reverse video.
Addresses	The Visible State Address allows you to attach an individual address to each visible object or state in the list. When you define the address for the first visible state, PanelBuilder checks the amount of contiguous address space available. If there is enough space available, PanelBuilder offers to assign the remaining addresses.

Note You can't resize an Object List so that its number of visible states is less than the assigned maximum visible state address.

Numeric Data Display Object List

The total number of Numeric Data Display objects in a list is determined by the Number of States you defined for the Cursor List.

Configuring the Numeric Data Display Object List

Configure the Numeric Data Display Object List according to the following table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Display Type	Choose with or without scaling.
Fill Left With	You can choose whether the left portion of the display will be filled with zeros or blank spaces, when fewer than the maximum number of digits is displayed.
Number of Digits	Specify the number of digits to display, up to a maximum of 8. Keep in mind that a decimal point and minus sign each take the place of one digit and that each decimal place in the scaling factor requires a digit if you select Display with Decimal Point.
Number of Visible States	Define the number of objects from the whole list that the operator will be able to see at any given time. The default is the value you defined for the Cursor List. If you change this default, you must update the number defined for the Cursor List so that they match. To match the Cursor List's Number of Visible States, the font size of the two lists must also match. You can also configure the number of visible states by sizing the object list graphically. To create a valid scrolling list, the value in this field must be the same as the value in the Number of Visible States field in the Cursor List.
Highlight Bar	Select this option if you want the current state (controlled by the Cursor Control Address or cursor buttons) to appear highlighted in reverse video.
Display with Polarity	Check this box if you want to be able to display a minus sign with the value. You must then define the Polarity Address. There is only an implied relationship between the value and the minus sign. If the bit at the Polarity Address is 1, the minus sign is displayed; if it is 0, the sign is not displayed.
Display with Decimal Point	Check this box if you want the displayed value to include a decimal point. You must then specify whether you want the decimal point in a fixed position (you then configure how many digits after the decimal point), or controlled by the PLC. If you choose PLC Controlled, you must define the Decimal Point Position Address.
Display with Round Off	Check this button if you want the value of the scaling operation to be rounded off. You must choose either Display with Round Off or Display with Decimal.

Field	Meaning
Scaling Factor	Specify the scaling factor (a number between .0001 and 9999) that PanelView 1200 uses to scale the PLC value, according to this formula: Displayed Value = (Scaling Value * PLC Value) + Offset Value
Offset Value	Specify the offset value (a number between –32,768 and + 32,767) that PanelView 1200 uses to scale the PLC value, according to this formula: Displayed Value = (Scaling Value * PLC Value) + Offset Value
Addresses	There are three types of addresses for this object: **Visible State Addresses** allow you to attach an individual address to each visible object or state in the list. When you define the address for the first visible state, PanelBuilder checks the amount of contiguous address space available, and if there is enough space available, PanelBuilder will offer to assign the remaining addresses. **Decimal Point Position Address** is used in numeric lists without scaling to determine the position of the decimal point. You must define this address if you specified the Decimal Point field as PLC Controlled. Use an input address if you want to control the decimal position from the terminal using a numeric input object; use an output address if you want the PLC controller to dynamically change the decimal position. You don't need to assign this address if the decimal position is fixed. **Polarity Address** is used in numeric lists without scaling to determine whether or not a minus sign is displayed. If the bit at the Polarity Address is 1, the minus sign is displayed; if it is 0, the sign is not displayed.

Note You can't resize an Object List so that its number of visible states is less than the assigned maximum visible state address.

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 400-ms 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.

Screen Print Button

This chapter tells you about:

- how the Screen Print Button works
- how to configure the Screen Print Button

About the Screen Print Button

The operator uses the Screen Print Button to print the current screen. When this button is pressed, the screen is copied to the PanelView 1200 terminal's print buffer and sent to the printer.

Screen print requests are ignored when the printer is already busy with a screen print. Enabling the Screen Print Active to PLC Controller option in the Global Address Options dialog box allows the PanelView 1200 terminal to inform the programmable controller that a screen print is in progress. For details on setting this option, as well as information about screen prints, see Chapter 8, *Configuring Global Address Options* in the *PanelBuilder 1200 Configuration Software for Windows User Manual.*

The programmable controller can also trigger screen prints. If the programmable controller is controlling the screen print and the screen change, you can have the programmable 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. See PLC Controlled Screen Number and Screen Print options in Chapter 8, *Configuring Global Address Options* in the *User Manual.*

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 shown in the following illustration.
- the first 32 characters, used for printer control, will be replaced by ASCII character 254 decimal shown in the following illustration.
- 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.

The following illustration shows ASCII characters 219 and 254 from the Alternate Character Set.

Character 219 Character 254

23615

Configuring the Screen Print Button

Configure the Screen Print Button according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Function Key	Specify which function key the operator must press to activate this button.

Local Message Display

This chapter tells you about:

- how the Local Message Display object functions
- how to configure the Local Message Display object

About the Local Message Display

The Local Message Display provides information to the operator by displaying one message from a list.

There are two components to a local message: the Local Message Display object, and the local message list. You add Local Message Display objects to screens; you define the messages in the Local Messages editor. For information about creating messages, see Chapter 12, *Creating and Editing Messages* in the *PanelBuilder 1200 Configuration Software for Windows User Manual.*

The value stored at the Message Number Address determines which message is displayed in the Local Message Display object. For example, if the PLC value is 39, then message number 39 in the Local Message List will be displayed. You can program the PLC Controller to set this value, or you can add objects to the screen so that the operator can control which message is displayed.

The Local Message Display object can be single or multiple lines. If you configure a single line display, the text will be centered automatically when the message is displayed. A multiple line display starts at the top left corner, with automatic word wrapping. If the message is longer than the display, the message is truncated to fit. A message can contain up to 72 characters.

Configuring the Local Message Display

Configure the Local Message Display according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Address	The Message Number Address stores the number of the local message to be displayed. Keep in mind that the data type you assign for this address will determine how the PLC triggers a local message. See the following section for details.

How the PLC Triggers a Local Message

How the programmable controller triggers messages depends on the data type you assign to the Local Message Display object.

Triggering Messages for the Binary or BCD Data Type

To trigger a message, the programmable controller must put a non-zero value into the designated PLC address. This number corresponds to the desired message. 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 of either 4, 8, or 12 bits (1, 2, or 3 digits), but up to 32 bits can be configured. 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 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 1200 terminal sees any bit set, the corresponding message will appear in the display area.

The PanelView 1200 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.

- **Bit**—If Bit data type is selected, the address assignment will be a contiguous bit string containing from 1 to 128 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.

Triggering Messages on Multiple Local Message Displays

PanelView 1200 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 programmable controller can write different values into each address, causing different subsets of the messages to be displayed.

ASCII Display

This chapter tells you about:

- how the ASCII Display object functions
- special characters and control sequences
- invalid control sequences
- how to configure the ASCII Display object

About the ASCII Display Object

The ASCII Display object is used to display a character string sent from a PLC controller directly on the PanelView 1200 terminal. The display is updated whenever the string changes.

An ASCII display object can be any size from one line high by one character wide, to 24 lines by 80 characters. However, the maximum string length is one block transfer write or 64 characters.

The ASCII Display object can display any character in the IBM 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. Any characters after a null character 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 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 on the following page, and the description of Invalid Control Sequences which follows it.

ASCII Display String Format

The format of the data string must be as in the following table. For more characters see the ASCII character set later in this chapter, or Appendix C, *The Extended Character Set* in the *PanelBuilder 1200 Configuration Software for Windows User Manual.*

Bit	15 8	7 0
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.

The following table lists the control sequences used by the PanelView 1200 terminal.

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	1B5Bxx3Byy48	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.
	ESC[;columnH	1B5B3Byy48	
	ESC[rowH	1B5Bxx48	
	ESC[H	1B5B48	
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.

The following table lists the ASCII character set. For characters 0 to 31, see Appendix C, *The Extended Character Set* in the *User Manual.*

Dec	Oct	Hex	Char	Dec	Oct	Hex	Char	Dec	Oct	Hex	Char
32	040	20	SP	64	100	40	@	96	140	60	\
33	041	21	!	65	101	41	A	97	141	61	a
34	042	22	"	66	102	42	B	98	142	62	b
35	043	23	#	67	103	43	C	99	143	63	c
36	044	24	$	68	104	44	D	100	144	64	d
37	045	25	%	69	105	45	E	101	145	65	e
38	046	26	&	70	106	46	F	102	146	66	f
39	047	27	'	71	107	67	G	103	147	67	g
40	050	28	(	72	110	48	H	104	150	68	h
41	051	29	)	73	111	49	I	105	151	69	i
42	052	2A	*	74	112	4A	J	106	152	6A	j
43	053	2B	+	75	113	4B	K	107	153	6B	k
44	054	2C	,	76	114	4C	L	108	154	6C	l
45	055	2D	-	77	115	4D	M	109	155	6D	m
46	056	2E	.	78	116	4E	N	110	156	6E	n
47	057	2F	/	79	117	4F	O	111	157	6F	o
48	060	30	0	80	120	50	P	112	160	70	p
49	061	31	1	81	121	51	Q	113	161	71	q
50	062	32	2	82	122	52	R	114	162	72	r
51	063	33	3	83	123	53	S	115	163	73	s
52	064	34	4	84	124	54	T	116	164	74	t
53	065	35	5	85	125	55	U	117	165	75	u
54	066	36	6	86	126	56	V	118	166	76	v
55	067	37	7	87	127	57	W	119	167	77	w
56	070	38	8	88	130	58	X	120	170	78	x
57	071	39	9	89	131	59	Y	121	171	79	y
58	072	3A	:	90	132	5A	Z	122	172	7A	z
59	073	3B	;	91	133	5B	[	123	173	7B	{
60	074	3C	<	92	134	5C	\	124	174	7C	|
61	075	3D	=	93	135	5D	]	125	175	7D	}
62	076	3E	>	94	136	5E	^	126	176	7E	~
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"

Configuring the ASCII Display Object

Configure the ASCII Display Object according to this table:

Field	Meaning
Name	Assign a name, up to 15 characters, to document the object for printed reports. Note that this increases the size of the application by 1 byte per character.
Address	The ASCII Text Address points to the location of the string that this object will display. The display is updated whenever this string changes.

Text and Graphic Objects

This chapter tells you how to use Text and Graphic objects.

Text

Text is used for creating all forms of text: inner text, outer text, and background text.

Inner text appears inside an object, such as in a List Indicator or as a button label. If you configure an object to change appearances for different states, you can also have different inner text appear for each state.

Outer text appears outside an object, but is treated by the PanelView 1200 terminal as part of the object. It doesn't change even if the object changes state.

Background text is a static object used for titles and labels on screens. It can't overlap any other objects.

You can combine different text objects into a single object by using the Combine Text command.

For step-by-step instructions about creating and editing text, and making inner and outer text, see Chapter 15, *Working with Objects* in the *PanelBuilder 1200 Configuration Software for Windows User Manual.*

The Extended Character Set

You can use PanelBuilder to create characters not found on your keyboard by pressing ALT and typing a number on the numeric keypad. See Appendix C, *The Extended Character Set* in the *User Manual.*

Line

Lines can be used for emphasis, to divide the screen, connect symbols, or to represent physical devices like pipes or conveyors. You can draw horizontal, vertical or diagonal lines.

All the lines you draw while you're in line mode connect automatically and are part of the same connected line object. If you exit line draw mode and re-enter it, the new lines you draw will become part of a second connected line object. For more information on lines and connecting lines, refer to Chapter 15, *Working with Objects* in the *User Manual.*

Diagonal Lines

The lines are drawn from one corner of the character to the other so they are not exactly 45 degrees. Diagonal lines may intersect with other diagonal lines or with vertical or horizontal lines.

For step-by-step instructions on using lines, refer to Chapter 15, *Working with Objects* in the *User Manual.*

Line Arrow Characters

You can use Line Arrow Characters to place an arrow head on the line. There are four available arrow heads: left, right, up, and down.

For step-by-step instructions on using line arrow characters, refer to Chapter 15, *Working with Objects* in the *User Manual.*

Line Connect Characters

Use Line Connect Characters to connect a line to one of the 32 ISA Symbols. You can select from among the following characters:

- horizontal to vertical
- diagonal to diagonal
- horizontal to diagonal
- vertical to diagonal

Lines are drawn through the center of the character cell while the connector for the ISA Symbol may be at one edge of the character cell. The connector allows the line to meet more closely with the ISA Symbol.

Or, use Line Connect Characters to create connector characters between horizontal, vertical and diagonal lines.

For step-by-step instructions on using line connect characters, refer to Chapter 15, *Working with Objects* in the *User Manual.*

Box

Boxes can be used to emphasize text or any other object. You can draw any sizes of boxes, and change the line appearance.

For more information about boxes, including step-by-step instructions for creating boxes, refer to Chapter 15, *Working with Objects* in the *User Manual.*

Arcs and Circles

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. When you first draw an arc, it appears as a full circle by default. This means that all four arc segments are enabled.

To turn the circle into an arc, you must disable the arc segments you don't want. 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.

When you draw a circle, it appears in the smallest size. You can change this size if you wish.

There are four sizes of arcs and circles. For details on configuring arcs, see Chapter 15, *Working with Objects* in the *User Manual.*

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