

## CHAPTER 3





# CREATING PANEL APPLICATIONS

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## 3.1. Setting up the Panel Application

You can set up the panel application with the General Setup dialog box. There are five ways to open the dialog box:

- 1) In the Project Manager window, double-click the panel application node (  ).
- 2) In the Project Manager window, right-click the panel application node (  ) to bring up the pop-up menu and select General Setup.
- 3) In the Project Manager window, double-click the General Setup node (  ) under Setup node of the panel application
- 4) In the Project Manager window, right-click the General Setup node (  ) under Setup node of the panel application to bring out the pop-up menu and select Properties.
- 5) In the menu bar, click Panel | Setup | General Setup....

The General Setup dialog box contains the following pages. Some of the pages appear only when they are needed.

- **General**

Described in [Section 3.1.1.](#)

- **Custom**

Described in [Section 3.1.2.](#)

- **Keys**

Described in [Section 3.2.1.](#)

- **Startup Macro / Main Macro / Event Macro / Time Macro**

Described in [Section 14.2.6.](#)

### 3.1.1. General Settings

This section describes how to define the general settings for a panel application. The following is an example of the General page of the General Setup dialog box.

**General Setup**

Event Macro #3   Time Macro #1   Time Macro #2   Time Macro #3   Time Macro #4  
 General   Custom   Startup Macro   Main Macro   Event Macro #1   Event Macro #2

Application Name: PV104

Model: PV104-VNT (Ethernet)   Battery Backed RAM: 128 KB   Flash ROM: Standard

**Start Up**

Screen: 25   Operator   Delay Time: 3 second(s)   ☒ Display Countdown  
 Language: English   ☐ Login Required   Default User Level: 8

**Idle Processing**

☒ Display Idle Screen   Idle Time: 60 minutes  
 Idle Screen: 30   Screen Saver   ☒ Change User Level   Idle User Level: 0  
 Screen Saver Time: 8 minutes

Buzzer Sounding Time: 0.5 seconds

**Macro**

☒ Startup Macro  
☒ Main Macro   Delay Time: 250 milli-second(s)  
☒ Event Macro #1 : Trigger bit : #0  
☒ Event Macro #2 : Trigger bit : #5  
☒ Event Macro #3 : Trigger bit : #7  
☐ Event Macro #4 :  
☒ Time Macro #1 : Time Interval : 0.5 second  
☒ Time Macro #2 : Time Interval : 15 seconds  
☒ Time Macro #3 : Time Interval : 10 minutes  
☒ Time Macro #4 : Time Interval : 8 hours

**Print**


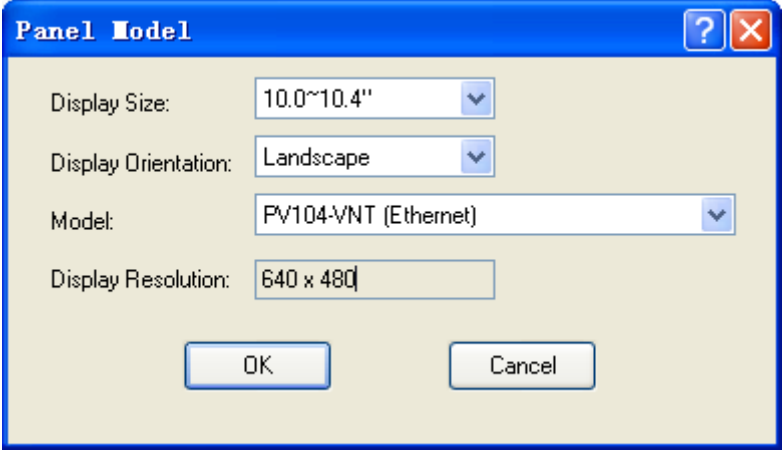
Printer: Siupo SP Series (COM: 9600,8,E,1)   Port: COM1   Settings...

☒ Overlapped buttons can be activated in sequence by one touch

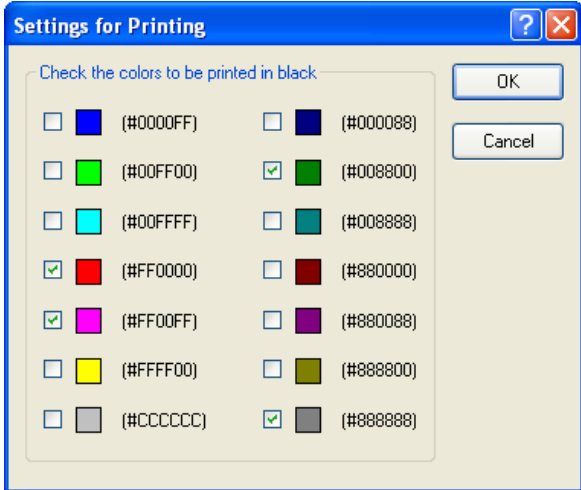
Note:  
 This is an example.

OK   Cancel   Help

The following table describes each item in the General page.

Item		Description
Application Name		The name of the panel application.
Model		<p>The model of the target panel.</p> <p>Click  to bring up the Panel Model dialog box which helps you to select a model by specifying the size, resolution and orientation of the display.</p> <p>The following is a sample of Panel Model dialog box</p> 
Battery Backed RAM		Specifies the size of the battery backed RAM installed in the target panel.
Flash ROM		Specifies the size of the flash ROM installed in the target panel.
Use External Keypad		Available if the target panel supports the custom designed external keypad. Select this option if the application uses a custom designed external keypad.
Start Up	Screen	Specifies the first screen of the application that the target panel will display after powering up.
	Delay Time	Specifies the time that the target panel will delay to run the application.
	Display Countdown	Check this option if you want the target panel to display countdown while it is waiting for the expiry of the Delay Time.
	Language	Specifies the language the application will display the text in after power up.
	Login Required	Check this option if you want the target panel to get a valid password from the operator before it displays the first screen.
	Default User Level	Available when Login Required is not selected. Specifies the initial user level for the application.
Idle Processing	Display Idle Screen	Check this option to display the Idle Screen when the target panel has idled for the specified amount of time.
	Idle Time	The length of time used to determine when the idle screen is displayed.
	Idle Screen	Specifies the screen that will be displayed as the idle screen.
	Change User Level	Check this option to change the current user level when the idle screen is displayed.
	Idle User Level	Available when the Change User Level is selected. Specifies the user once the idle screen is displayed.
	Screen Saver Time	Specifies the screen saver time. The target panel will turn off its backlight when it has not been operated by the operator for the specified amount of time.

Continued

Item		Description														
Buzzer Sounding Time		Specifies the length of the beep sounded by the buzzer when a touch operation is activated.														
Overlapped buttons can be activated in sequence by one touch		Check this option if you want the application to have the overlapped buttons can be activated in sequence by one touch feature. This allows the operator to issue multiple data settings or commands with one touch. There are some constraints with using this feature. See <a href="#">Section 3.1.3</a> for details.														
Note		You can type a note for the panel application.														
Macro	Startup Macro	Check this item if you want the application to have the Startup macro. The Startup macro is only run once when the application starts. The target panel will not display the start-up screen until the macro terminates. You can use Startup macro to initialize global data and settings for your application.														
	Main Macro	Check this item if you want the application to have the Main macro. The Main macro runs concurrently with the application. The target panel runs the Main macro cyclically, i.e. it will delay preset time to run Main macro starting from the first command each time after processing the last command of the macro, or when it encounters an END command in the middle of the macro.														
	Event Macro #1~#4	An Event macro is run whenever the associated trigger bit changes from 0 (Off) to 1 (On). An application can have up to four Event macros. If the application needs an Event macro for a certain event, check one of the items that are available and specify the associated trigger bit for the corresponding Event macro.														
	Time Macro #1~#4	<p>A Time macro is run periodically with a preset time interval. An application can have up to four Time macros. Each Time macro has a different set of time intervals that can be chosen to specify how often it runs. The following table describes the available time intervals for each Time macro.</p> <table border="1"> <thead> <tr> <th>Time Macro</th><th>Available Time Intervals</th><th>Remark</th></tr> </thead> <tbody> <tr> <td>#1</td><td>0.5 and 1 second</td><td></td></tr> <tr> <td>#2</td><td>1, 2, 3, ... and 59 seconds</td><td></td></tr> <tr> <td>#3</td><td>1, 2, 3, ... and 59 minutes</td><td>The macro is run at 0 second.</td></tr> <tr> <td>#4</td><td>1, 2, 3, ... and 24 hours</td><td>The macro is run on the clock.</td></tr> </tbody> </table> <p>If the application needs a Time macro, check the item of an appropriate Time macro and specify the time interval for that Time macro.</p>	Time Macro	Available Time Intervals	Remark	#1	0.5 and 1 second		#2	1, 2, 3, ... and 59 seconds		#3	1, 2, 3, ... and 59 minutes	The macro is run at 0 second.	#4	1, 2, 3, ... and 24 hours
Time Macro	Available Time Intervals	Remark														
#1	0.5 and 1 second															
#2	1, 2, 3, ... and 59 seconds															
#3	1, 2, 3, ... and 59 minutes	The macro is run at 0 second.														
#4	1, 2, 3, ... and 24 hours	The macro is run on the clock.														
Print	Printer	Specifies the type of printer that the application will use.														
	Port	Specifies the port of the target panel that will connect to the printer.														
	Settings...	<p>If the printer is a mono printer, you can click it to bring up the “Settings for Printing” dialog box which helps you to select the colors to be printed in black. The following is a sample of Settings for Printing dialog box.</p> 														

### 3.1.2. Custom Settings

This section describes how to define the customization settings for a panel application. The following is an example of the Custom page of the General Setup dialog box.

**General Setup**

General Custom

**Decimal Number Keypad**

☒ Use custom keypad

Window Screen: 21 My Numeric Keypad

**Hexadecimal Number Keypad**

☐ Use custom keypad

**Octal Number Keypad**

☐ Use custom keypad

**Character Keypad**

☒ Use custom keypad

Window Screen: 22 My Character Keypad

**Password Keypad**

☒ Use custom keypad

Window Screen: 24 PSW Keypad

**Touch Operation Disabled Sign**

☒ Use custom sign

Pic.: stop\_g

☒ Transparent

T. Color: [Color Picker]

**CSV/Text Files**

Date Format: YY-MM-DD

Time Format: HH:MM:SS

Separator: Tab

**User Level Required In Panel Setup**

Set Time/Date: Any

☐ Prohibit uploading and copying of the panel application stored in the HMI unit

**Communication Error Mark**

Numeric Objects: (As is)

Character Objects: (As is)

☐ Reduce CPU frequency

OK Cancel Help

The following table describes each item in the Custom page.

Item		Description										
Decimal Number Keypad	Use custom keypad	Check this item if you want the application to use the custom keypad instead of the built-in keypad for the entry of decimal numbers.										
	Window Screen	Specify the window screen that is designated as the decimal number keypad.										
Hexadecimal Number Keypad	Use custom keypad	Check this item if you want the application to use the custom keypad instead of the built-in keypad for the entry of hexadecimal numbers.										
	Window Screen	Specify the window screen that is designated as the hexadecimal number keypad.										
Octal Number Keypad	Use custom keypad	Check this item if you want the application to use the custom keypad instead of the built-in keypad for the entry of octal numbers.										
	Window Screen	Specify the window screen that is designated as the octal number keypad.										
Character Keypad	Use custom keypad	Check this item if you want the application to use the custom keypad instead of the built-in keypad for the entry of characters.										
	Window Screen	Specify the window screen that is designated as the character keypad.										
Password Keypad	Use custom keypad	Check this item if you want the application to use the custom keypad instead of the built-in keypad for the entry of passwords.										
	Window Screen	Specify the window screen that is designated as the password keypad.										
Default Folder for File I/O		This field is available only for Windows-based panels. There are 4 kinds of default folder that you can select for your application. They are Same as Application File, Pre-assigned, New Per Day, New Per Month. Please see <a href="#">Section 3.1.4</a> for details										
Touch Operation Disabled Sign	Use custom sign	Check this item if you want the application to display the custom sign instead of the built-in sign when the touch operation of an object is disabled.										
	Picture	Specify the picture that is to replace the built-in sign.										
	Transparent	Select this item if you want parts of the custom sign to be transparent.										
	T. Color	Specify the transparent color.										
CSV/Text Files	Date Format	The date format that the target panel will use to output date information to text files.										
	Time Format	The time format that the target panel will use to output time information to text files.										
	Separator	Select desired delimiter that can be TAB, semicolon, or comma of CSV files.										
User Level Required in Panel Setup	Set Time/Date	The minimum user level that is required to set the time and date of the target panel through the target panel's Panel Setup menu.										
Prohibit uploading and copying of the panel application stored in the HMI unit		Check this option if you want to prohibit uploading and copying of the panel application stored in the HMI unit.										
Communication Error Mark		Specify what to display for the Numeric Objects (including Numeric Entry and Numeric Display) and Character Objects (including Character Entry and Character Display) when their monitored data are unavailable due to communication errors. You can select the following options as the error mark.										
		<table><tr><th>Mark</th><th>Description</th></tr><tr><td>(As is)</td><td>No communication error mark for the object. Leaves the display unchanged.</td></tr><tr><td>(Blank)</td><td>Clears the display of the object.</td></tr><tr><td>?</td><td>Displays a string of character '?'.</td></tr><tr><td>#</td><td>Display a string of character '#'. </td></tr></table>	Mark	Description	(As is)	No communication error mark for the object. Leaves the display unchanged.	(Blank)	Clears the display of the object.	?	Displays a string of character '?'.	#	Display a string of character '#'.
		Mark	Description									
		(As is)	No communication error mark for the object. Leaves the display unchanged.									
		(Blank)	Clears the display of the object.									
		?	Displays a string of character '?'.									
#	Display a string of character '#'.											



### 3.1.3. Activating Multiple Overlapped Buttons by One Touch

To enable the feature of activating multiple overlapped buttons by one touch, open the Panel General Setup dialog box and check the option of “Activate multiple overlapped buttons by one touch” on the General page. With this feature, the overlapped underlying buttons will be activated sequentially from top to bottom when the top-most button is pressed. The following are the constraints of applying this feature.

1. The types of buttons that support this feature include: Bit Button, Toggle Switch, Screen Button, Function Button, Word Button, Multi-state Switch, and Keypad Button.
2. The first button, i.e. the top-most button, can only be a bit button, a toggle switch, a word button, a multi-state switch, or a keypad button. The button cannot have the optional property of Minimum Hold Time or Operator Confirmation. If the button is a bit button, a toggle switch, or a keypad button, it cannot have any macro. If the button is a word button, it cannot be configured for Enter Value or Enter Password. If the button is a multi-state switch, it cannot be configured as a List or Drop-down List.
3. The underlying buttons that have the optional property of Minimum Hold Time or Operator Confirmation will not be activated.
4. An underlying bit button that is configured for Momentary ON or Momentary OFF will not be activated. However, if that bit button is the second button and the first button is a keypad button, it can be activated. An underlying bit button that has any macro will not be activated.
5. An underlying toggle switch that has any macro will not be activated.
6. An underlying multi-state switch that is configured as a List or Drop-down List will not be activated.
7. A function button can only be the last button, i.e. the bottom-most button. All the buttons that are under a function button will not be activated.
8. A screen button can only be the last button. All the buttons that are under a screen button will not be activated.
9. A word button that is configured for Enter Value or Enter Password can only be the last button. All the buttons that are under such a button will not be activated.
10. The maximum number of buttons that can be indirectly activated by one touch is 10.

### 3.1.4. Specifying Default Folder for File I/O

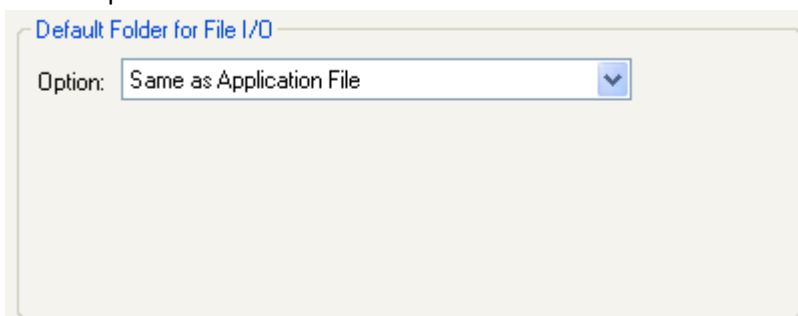
The default folder will be used for a file I/O operation when one of the following two conditions exists:

- 1) The command issued for the operation does not require a specific filename.
- 2) The command issued for the operation requires a filename and the specified filename contains no path information.

To specify the default folder, access the “Custom” page of the “Panel General Setup” dialog box. Select “General Setup” and “Panel” in the submenu to get the dialog box, then click the “Custom” tab. Another way to access the dialog box is to double-click the “Panel General Setup” node on the project tree.

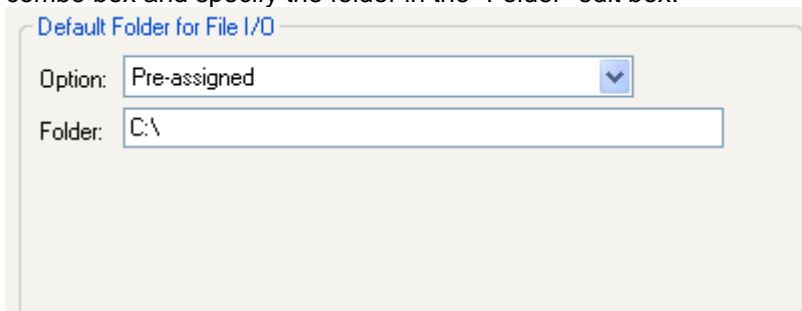
On the “Custom” page, you can specify the desired default folder in the “Default Folder for File I/O” group according to the following rules:

- 1) If you want the folder of your application file (.pe2 or .pl2 file) to be the default folder, select “Same as Application File” in the “Option” combo box.



For applications with this selection running on HMI units, because the applications are not stored in any file or under any directory, the root directory of the USB memory stick will be used as the default folder instead.

- 2) If you want to use a specific folder that will exist at run-time as the default folder, select “Pre-assigned” in the “Option” combo box and specify the folder in the “Folder” edit box.



**Note** that the specified folder must exist at run-time or the file I/O operations will fail.

- 3) If your application needs a new default folder every day, select “New Per Day” in the “Option” combo box, and specify the following 3 items:
- A) Folder Path: The path for the new folder. The system will create a new default folder under the specified path every day.
  - B) Folder Name Format: The format to create a default folder name.
  - C) <Prefix>: The string to be used as the prefix of the new default folder names. Note that only ASCII characters are allowed.

Default Folder for File I/O

Option:

Folder Path:

Folder Name Format:  <Prefix>:

e.g.: C:\\081231

Example:

Folder Name Format	Folder Path	<Prefix>	Date	Default Folder Name
<Prefix>yymmdd	C:	ABC	December 19, 2008	C:\ABC081219
<Prefix>yyyymmdd	D:\NEO	ABC_	December 19, 2008	D:\NEO\ABC_20081219
<Prefix>yyMMMdd	C:	XYZ	January 10, 2009	C:\XYZ09JAN10
<Prefix>yyyyMMMdd	D:\123	XYZ_	January 10, 2009	D:\123\XYZ_2009JAN10

- 4) If your application needs a new default folder every month, select “New Per Month” in the “Option” combo box and specify the following 3 items:
- A) Folder Path: The path for the new folder. The system will create a new default folder under the specified path every month.
  - B) Folder Name Format: The format to create a default folder name.
  - C) <Prefix>: The string to be used as the prefix of the new default folder names. Note that only ASCII characters are allowed.

Default Folder for File I/O

Option:

Folder Path:

Folder Name Format:  <Prefix>:

e.g.: C:\\0812

Example:

Folder Name Format	Folder Path	<Prefix>	Date	Default Folder Name
<Prefix>yymm	C:	ABC	December 19, 2008	C:\ABC0812
<Prefix>yyyymm	D:\NEO	ABC_	December 19, 2008	D:\NEO\ABC_200812
<Prefix>yyMMM	C:	XYZ	January 10, 2009	C:\XYZ09JAN
<Prefix>yyyyMMM	D:\123	XYZ_	January 10, 2009	D:\123\XYZ_2009JAN

## 3.2. Working with Keys

Some of the target panels are key type. Those key type panels carry external keys that you can press to perform the defined operations.

To assign or change the operation of the keys in the panel application, you can use the following two ways:

- **Default Settings for the Panel Application**  
Described in [Section 3.2.1.](#)
- **Settings for a Screen**  
Described in [Section 3.2.2.](#)

### 3.2.1. Default Settings for the Panel Application

The default settings are settings that can be used by all screens in the panel application. With the default settings of the keys, all the screens in the panel application can share the common usages of keys and do not have to keep and maintain the same usages in each screen.

You can change the default settings of keys for the panel application in the General Setup property sheet. To open the General Setup property sheet, please see [Section 3.1 Setting up the Panel Application](#) for details. The General Setup property sheet provides you with the Keys page to set up the default keys.

The following is an example of the Keys page and Usage Setup dialog in the General Setup property sheet.

The screenshot shows the 'General Setup' dialog box with the 'Keys' tab selected. It contains a 'Key Usage Table' and a 'Usage Setup Dialog' for key K22.

**Key Usage Table:**

Key	Usage	Usage(Esc +)
UP	None	None
DOWN	None	None
F1	None	None
F2	None	None
F3	None	None
F4	None	None
F5	None	None
F6	None	None
K20	None	None
K21	None	None
K22	Bit Button	None
K23	None	None
K24	None	None
K25	None	None
K26	None	None
K27	None	None
K30	None	None
K31	None	None
K32	None	None

**Usage Setup Dialog (K22):**

Usage: Bit Button

Function:

☐ Set ON ☐ Set OFF ☐ Momentary ON ☐ Momentary OFF ☒ Invert

Write Address: 1\M238

Advanced:

☐ Enabled by Bit

☐ Enabled by User Level

☐ Operator Confirmation

☐ Notification

Buttons: OK, Cancel, Help

**Annotation:** If all the screens use the default settings of the key named K22, the K22 key will perform just like the bit button when it is pressed. That means in any screen at runtime, the state of 1\M238 bit will be inverted when the K22 Key is pressed.

There are two parts in the above illustration: Key Usage Table and Usage Setup Dialog.

#### ■ Key Usage Table

A table lists all the keys of the target panel and their default usages. The key usage table is initially empty (Usages for key and key combination are none) after the panel application is created. For details about Key Usage Table, please see [Section 3.2.3](#).

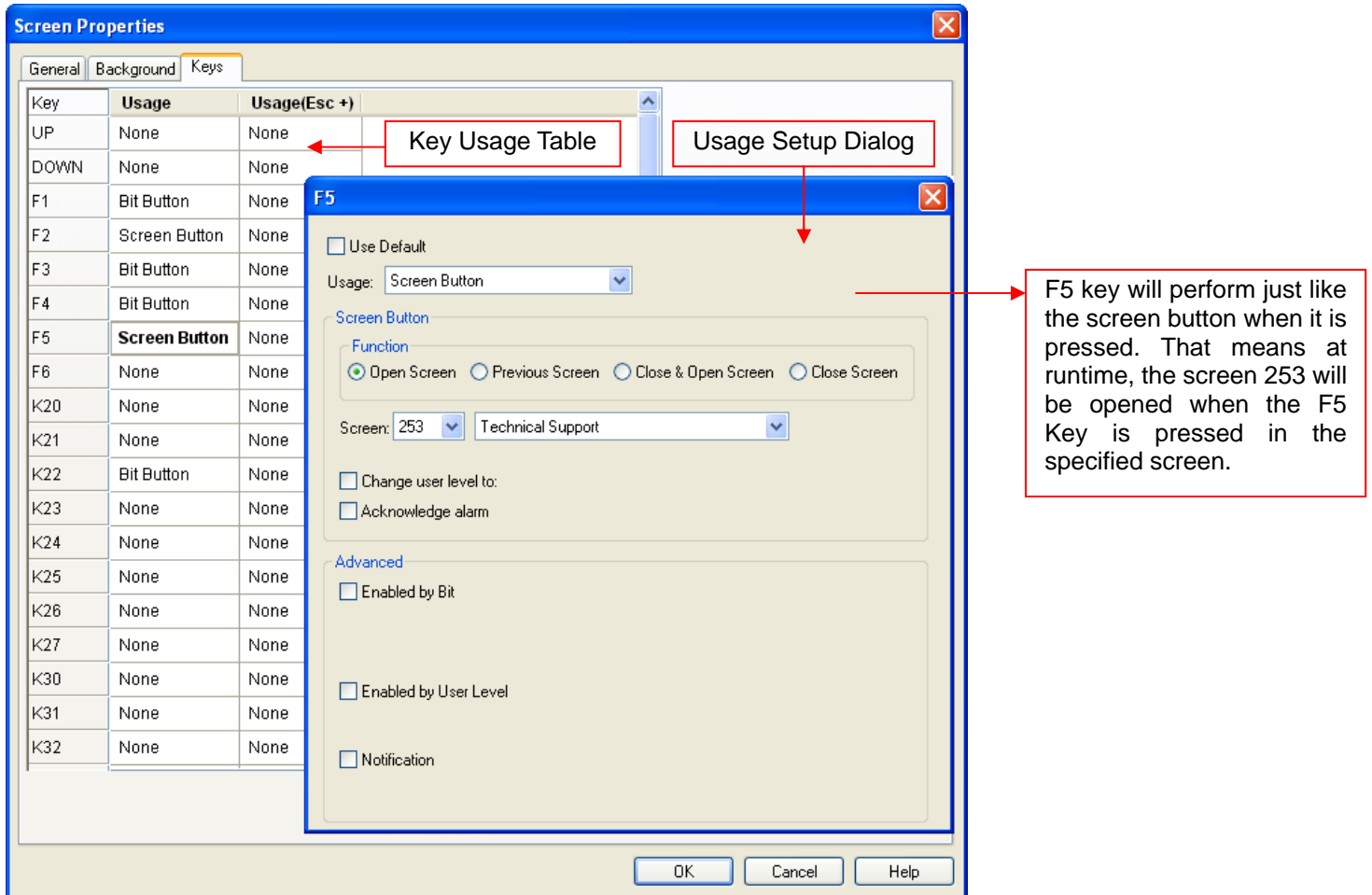
#### ■ Usage Setup Dialog

A floating dialog box allows you to specify the usage of the selected key or key combination. Left-click the cell in the key usage table to bring up the dialog. For details about Usage Setup Dialog, please see [Section 3.2.4](#).

### 3.2.2. Settings for a Screen

Each screen can have its own key operation. You can allow a key to perform an operation only in the specified screen by changing the settings of the screen keys in the Screen Properties property sheet. To open the Screen Properties property sheet, please see [Section 3.9.3 Setting up a Screen](#) for details. The Screen Properties property sheet has the Keys page to set up the keys for the screen.

The following is an example of the Keys page and Usage Setup dialog in Screen Properties property sheet.



There are two parts in the above illustration: Key Usage Table and Usage Setup Dialog.

#### ■ Key Usage Table

A table lists all the keys of the target panel and their usages. The key usage table is the same as the one in the Keys page of the General Setup property sheet when the screen is created. For details about Key Usage Table, please see [Section 3.2.3](#)

#### ■ Usage Setup Dialog

A floating dialog box allows you to specify the usage for the selected key or key combination. Left-click the cell in the key usage table to bring up the dialog. The Use Default option is checked by default. Uncheck the Use Default option to assign a usage for the selected cell that will only be available in the specified screen. For details about Usage Setup Dialog, please see [Section 3.2.4](#).

### 3.2.3. Key Usage Table Settings

The key usage table is located in the Keys page of the General Setup property sheet or Screen Properties property sheet. It lists all the keys of the target panel and their default usages. The Keys page is only displayed for target panel with keypads.

The following is an example of a key usage table in the Keys page.

Keys		
Key	Usage	Usage(Esc +)
UP	None	None
DOWN	None	None
F1	Bit Button	None
F2	Screen Button	None
F3	Bit Button	None
F4	Bit Button	None
F5	Screen Button	None
F6	None	None
K20	None	None
K21	None	None
K22	Bit Button	None
K23	None	None
K24	None	None
K25	None	None
K26	None	None
K27	None	None
K30	None	None
K31	None	None
K32	None	None

There are three columns in the key usage table.

Column	Description
Key	Available keys of the target panel.
Usage	Displays how the key will be used when it is pressed.
Usage (Esc+)	Displays how the key combination (ESC+Key) will be used when it is pressed. This column exists only when the target panel supports the key combination.

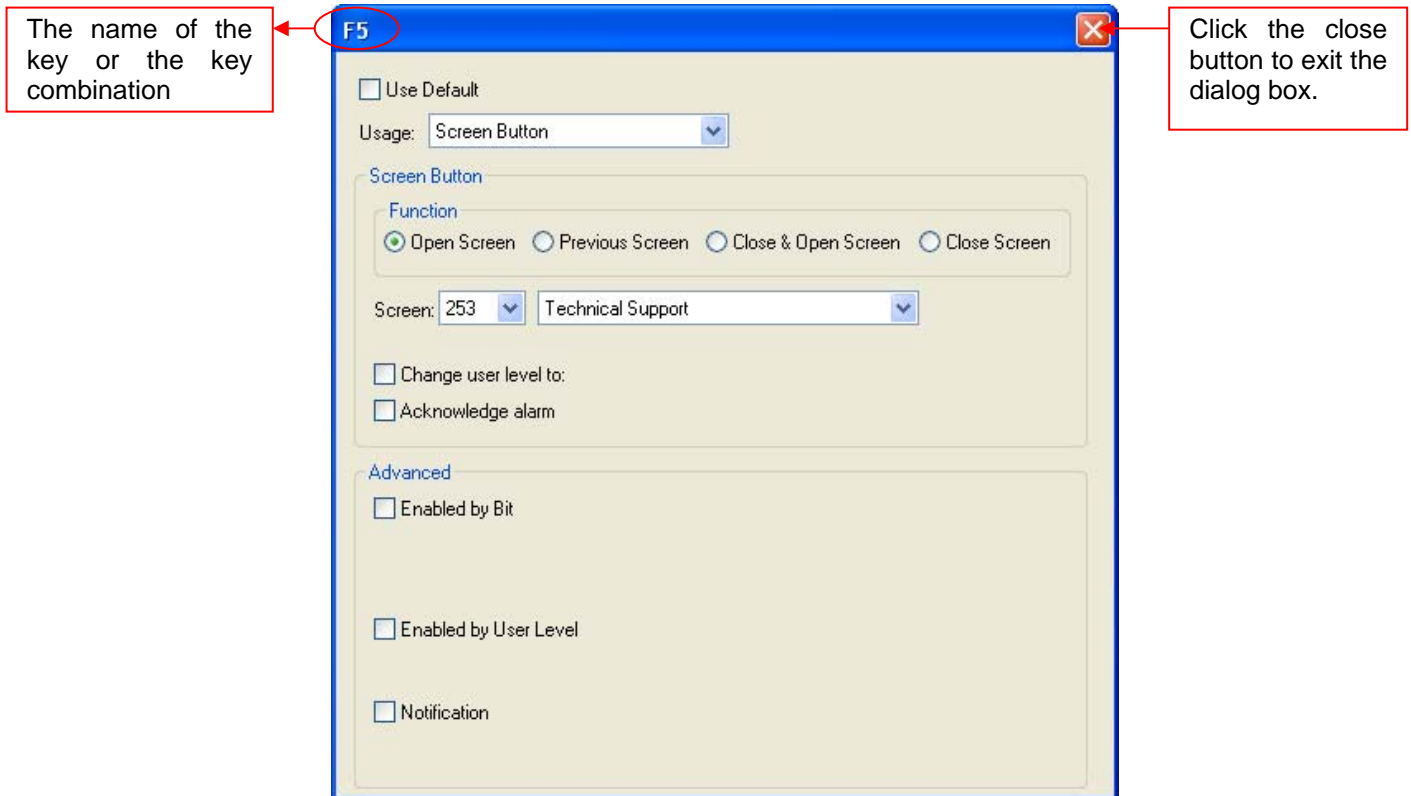
**Note:** Left-click the cell brings up the Usage Setup Dialog which sets up the usage of the selected cell. For details about Usage Setup Dialog, please see [Section 3.2.4.](#)

### 3.2.4. Usage Settings for a Key

You can assign or change the usage for the key or the key combination with the Usage Setup Dialog. The Usage Setup Dialog is a floating dialog box that can be freely moved.

To open the Usage Setup Dialog, left-click the cell in the key usage table. If the selection in the key usage table is changed, the dialog box remains open and displays the settings related to the new selection.



The following is an example of usage setup dialog.









Property	Description										
Use Default	Check this option if you want to use the default setting in the Keys page of the General Setup property sheet. The field is only available in the Keys page of the Screen Properties property sheet.										
Usage	Select a usage for the key or key combination. There are 7 options: None, Bit Button, Function Button, Keypad Button, Multistate Switch, Screen Button and Word Button.										
Bit Button	<p>If the usage is Bit Button, specify the following properties:</p> <table> <tr> <th>Property</th><th>Description</th></tr> <tr> <td>Function</td><td>Select the operation of the bit button. There are 5 options: Set ON, Set OFF, Momentary ON, Momentary OFF, and Invert. For details, see <a href="#">Section 5.1.1 Basic Operations</a></td></tr> <tr> <td>Write Address</td><td>Specifies the bit variable to be operated. Click  to enter an address for this field. Click  to select a tag for this field.</td></tr> <tr> <td>ON Macro</td><td>Check this option for the button to have an ON macro. Select a macro from the dropdown list. This option is available when the bit button operation is Set ON, Momentary ON, or Momentary OFF.</td></tr> <tr> <td>OFF Macro</td><td>Check this option for the button to have an OFF macro. Select a macro from the dropdown list. This option is available when the bit button operation is Set OFF, Momentary ON, or Momentary OFF.</td></tr> </table>	Property	Description	Function	Select the operation of the bit button. There are 5 options: Set ON, Set OFF, Momentary ON, Momentary OFF, and Invert. For details, see <a href="#">Section 5.1.1 Basic Operations</a>	Write Address	Specifies the bit variable to be operated. Click  to enter an address for this field. Click  to select a tag for this field.	ON Macro	Check this option for the button to have an ON macro. Select a macro from the dropdown list. This option is available when the bit button operation is Set ON, Momentary ON, or Momentary OFF.	OFF Macro	Check this option for the button to have an OFF macro. Select a macro from the dropdown list. This option is available when the bit button operation is Set OFF, Momentary ON, or Momentary OFF.
Property	Description										
Function	Select the operation of the bit button. There are 5 options: Set ON, Set OFF, Momentary ON, Momentary OFF, and Invert. For details, see <a href="#">Section 5.1.1 Basic Operations</a>										
Write Address	Specifies the bit variable to be operated. Click  to enter an address for this field. Click  to select a tag for this field.										
ON Macro	Check this option for the button to have an ON macro. Select a macro from the dropdown list. This option is available when the bit button operation is Set ON, Momentary ON, or Momentary OFF.										
OFF Macro	Check this option for the button to have an OFF macro. Select a macro from the dropdown list. This option is available when the bit button operation is Set OFF, Momentary ON, or Momentary OFF.										

Continued





Property	Description		
Function Button	If the usage is Function Button, specify the following properties:		
	Property	Description	
	Function	Specifies the operation for the function button to perform. About the available operations, see <a href="#">Section 5.4.1 Basic Operation</a> .	
Keypad Button	If the usage is Keypad Button, specify the following properties:		
	Property	Description	
	Enter Character	Select this item if the button is used to input specified character to the keypad buffer.	
	Character	Available when Enter Character is selected. Specifies the character to be entered in the keypad buffer.	
	Enter Command	Select this item if the button is used to issue the specified command to the keypad buffer.	
	Command	Available when the Enter Command is selected. Specifies the command issued to the keypad buffer. There are 4 commands available:	
		Command	Description
		Enter	Completes the data entry and sends the input string to the associated object or the system.
		Escape	Cancels the data entry operation.
		Clear	Clears the keypad buffer.
Backspace		Removes the last character in the keypad buffer.	
Multistate Switch	If the usage is Multistate Switch, you need to specify the following properties:		
	Property	Description	
	State Type	The state type of the monitored variable. There are 2 options: Value and LSB. For details, see <a href="#">Section 4.4.1.1 State Types</a>	
	Data Type	The data type of the variables specified in this page.	
	Write Address	Specifies the variable to be controlled.	
		Click  to enter an address for this field. Click  to select a tag for this field.	
	Total State	Specifies the number of valid states that the monitored variable has. <b>Note:</b> The last state is state N-1 when the Total States is N.	
	Next State	Specifies the method of calculating the next state. +1 means the next state is the current state plus one, when the current state is not the last state. When the current state is the last state, the next state is state 0. -1 means the next state is the current state minus one, when the current state is not state 0. When the current state is state 0, the next state is the last state.	
Screen Button	If the usage is Screen Button, specify the following properties:		
	Property	Description	
	Function	Specifies the operation for the screen button to perform. There are 4 options: Open Screen, Previous Screen, Close and Open Screen, and Close Screen. For details, see <a href="#">Section 5.3.1 Basic Operations</a> .	
	Screen	Specifies the screen to be opened.	
	Change user level to	Check this option for the button to change the current user level. Specify the new user level to replace the current user level.	
	Acknowledge alarm	Check this option for the button on the alarm-associated screen to acknowledge the alarm.	

Continued

Property	Description																																																		
Word Button	<p>If the usage is Word Button, you need to specify the following properties:</p> <table><tr><th>Property</th><th>Description</th></tr><tr><td>Function</td><td>Specifies the operation that the word button performs. For details, <a href="#">see Section 5.6.1 Basic Operations.</a></td></tr><tr><td>Data Type</td><td>The data type of the variable to be controlled.</td></tr><tr><td>Write Address</td><td>Specifies the variable to be controlled.  Click  to enter an address for this field. Click  to select a tag for this field.</td></tr><tr><td>Constant</td><td>The constant for the specified operation.</td></tr><tr><td>Minimum</td><td>The minimum for the specified operation.</td></tr><tr><td>Maximum</td><td>The maximum for the specified operation.</td></tr><tr><td>Total Digits</td><td>The number of digits to be displayed for the Minimum and the Maximum on the numeric keypad.</td></tr><tr><td>Fractional Digits</td><td><p>When the Data Type is 32-bit Floating Point, this property specifies the number of fractional digits to be displayed for the Minimum and the Maximum on the numeric keypad.</p><p>When the Data Type is not 32-bit Floating Point, this property specifies not only the number of fractional digits to be displayed, but also the number of least significant digits to be displayed as the fractional part. With this feature, an integer can be shown and entered as a fixed point number. When the Fractional Digits is nonzero, say N, the entered value will be converted to an integer according to the following formula before being output.</p><p>OutputValue = EnteredValue * (Nth power of 10)</p><p><b>Example:</b></p><table><tr><th>Display Type</th><th>Total Digits</th><th>Fractional Digits</th><th>Entered Value</th><th>Output Value</th></tr><tr><td>32-bit Floating Point</td><td>4</td><td>2</td><td>12.34</td><td>12.34</td></tr><tr><td>32-bit Floating Point</td><td>4</td><td>2</td><td>123.4</td><td>Error!</td></tr><tr><td>16-bit Signed Decimal</td><td>5</td><td>2</td><td>123.45</td><td>12345</td></tr><tr><td>16-bit Signed Decimal</td><td>5</td><td>2</td><td>-0.05</td><td>-5</td></tr><tr><td>16-bit Signed Decimal</td><td>5</td><td>2</td><td>3</td><td>300</td></tr></table></td></tr><tr><td>Activation</td><td>Select Button Down item so the touch operation will be activated when the button is touched. Select Button Up item so the touch operation will be activated when the button is released.</td></tr></table>	Property	Description	Function	Specifies the operation that the word button performs. For details, <a href="#">see Section 5.6.1 Basic Operations.</a>	Data Type	The data type of the variable to be controlled.	Write Address	Specifies the variable to be controlled.  Click  to enter an address for this field. Click  to select a tag for this field.	Constant	The constant for the specified operation.	Minimum	The minimum for the specified operation.	Maximum	The maximum for the specified operation.	Total Digits	The number of digits to be displayed for the Minimum and the Maximum on the numeric keypad.	Fractional Digits	<p>When the Data Type is 32-bit Floating Point, this property specifies the number of fractional digits to be displayed for the Minimum and the Maximum on the numeric keypad.</p> <p>When the Data Type is not 32-bit Floating Point, this property specifies not only the number of fractional digits to be displayed, but also the number of least significant digits to be displayed as the fractional part. With this feature, an integer can be shown and entered as a fixed point number. When the Fractional Digits is nonzero, say N, the entered value will be converted to an integer according to the following formula before being output.</p> <p>OutputValue = EnteredValue * (Nth power of 10)</p> <p><b>Example:</b></p> <table><tr><th>Display Type</th><th>Total Digits</th><th>Fractional Digits</th><th>Entered Value</th><th>Output Value</th></tr><tr><td>32-bit Floating Point</td><td>4</td><td>2</td><td>12.34</td><td>12.34</td></tr><tr><td>32-bit Floating Point</td><td>4</td><td>2</td><td>123.4</td><td>Error!</td></tr><tr><td>16-bit Signed Decimal</td><td>5</td><td>2</td><td>123.45</td><td>12345</td></tr><tr><td>16-bit Signed Decimal</td><td>5</td><td>2</td><td>-0.05</td><td>-5</td></tr><tr><td>16-bit Signed Decimal</td><td>5</td><td>2</td><td>3</td><td>300</td></tr></table>	Display Type	Total Digits	Fractional Digits	Entered Value	Output Value	32-bit Floating Point	4	2	12.34	12.34	32-bit Floating Point	4	2	123.4	Error!	16-bit Signed Decimal	5	2	123.45	12345	16-bit Signed Decimal	5	2	-0.05	-5	16-bit Signed Decimal	5	2	3	300	Activation	Select Button Down item so the touch operation will be activated when the button is touched. Select Button Up item so the touch operation will be activated when the button is released.
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Continued

Property	Description	
Advanced	The following table describes each Advanced property. Not all properties are available for each object.	
	<b>Property</b>	<b>Description</b>
	Enabled by Bit	Check this option so the operation of the object will be enabled and disabled by the specified bit.
	Bit	Specifies the bit that enables and disables the touch operation. Click  to enter a bit address. Click  to select a bit tag.
	Enabling State	Specifies the state (On or Off) that enables the touch operation.
	Enabled by User Level	Check this item so the touch operation of the object will be enabled and disabled by the current user level.
	Lowest Enabling User Level	Specifies the lowest user level that is required to enable the touch operation.
	Operator Confirmation	Check this option if you want the operator to confirm the operation. The Confirmation box will be displayed when the object performs the operation. If the operator selects "Yes" in the Confirmation box, the operation will be performed. If the operator selects "No" or the operator does not respond within the specified time period (Maximum Waiting Time), the operation will be cancelled.
	Maximum Waiting Time	Specifies the maximum time that the object will wait for the operator's confirmation. The operation will be cancelled if the operator does not respond within this time.
	Notification	Check this option so the object will notify the specified bit after it finishes the operation.
	Bit	Specifies the bit that receives the notification.
	State	Specifies the state (On or Off) that is used for the notification.

## 3.3. Internal Memory

This section describes how to set up and use the internal memory for the panel application.

### 3.3.1. Types of Internal Memory

The following table describes the types of memory space that can exist or always exist in the internal memory.

Type	Address Format	Description
Regular user memory	Word: \$Un Bit: \$Un.b; b: 0~f	The size of this memory space is settable.
Battery backed user memory	Word: \$Nn Bit: \$Nn.b; b: 0~f	This memory space is available when the target panel is equipped with battery backed RAM. The size of this memory space is settable.
System memory	Word: \$Sn Bit: \$Sn.b; b: 0~f	This memory space keeps the system's required data and information. See <a href="#">Section 3.3.3</a> for details.
Index registers	Word: \$In Bit: \$In.b; b: 0~f	The index registers are provided to support indirect addressing. To know how to specify indirect address by using index registers, please see <a href="#">Section 3.3.2</a> for details.
Command block	Word: \$CBn Bit: \$CBn.b; b: 0~f	This memory space is allocated for storing the data read from the specified command block.

### 3.3.2. Index Registers

The index registers are battery backed if the panel has battery backed memory. The index registers are cleared to zero when the panel application is updated.

You can use the index registers to specify the indirect address. With the support of indirect addressing, an object or macro can be designed to access different sets of data at run time.

#### Examples

- 1) The word address W[\$I30] is equivalent to W2000 when the value of \$I30 is 2000.
- 2) The word address \$U[\$I0+123] is equivalent to \$U223 when the value of \$I0 is 100.
- 3) The bit address \$U[\$I2].a is equivalent to \$U0.a when the value of \$I2 is 0.
- 4) The word address [\$I2]:W100 is equivalent to 3:W100 when the value of \$I2 is 3.
- 5) The bit address [\$I0]: W[\$I1+10].f is equivalent to 5:W20.f when the values of \$I0 and \$I1 are 5 and 10 respectively.

#### Notes:

- 1) It is your responsibility to make sure that values in the index registers will result in valid addresses at runtime. The software has no way of checking the validity of the use of index registers.
- 2) The offset values must be a positive number, and the maximum offset value is 65535.
- 3) Only \$I0~\$I15 can be used for the node address (PLC address), and no offset value is allowed.
- 4) Make sure the PLC driver you are using supports indirect addressing.

### 3.3.3. System Memory

The following table lists the system maintained data and information in the system memory of the target panels that may be useful for your application.

**Note** that in any case do not modify the system memory for any purpose, or the system may malfunction or crash.

Address	Length	Content
\$S0~\$S25	26	Keypad input buffer for keypads \$S0: Command code for keypad display \$S1~\$S24: Null terminated ASCII character string up to 48 characters
\$S42	1	The second and minute of the current time in BCD format Bit 0~7: Second (0x00~0x59) Bit 8~15: Minute (0x00~0x59)
\$S43	1	The hour of the current time in BCD format and the RTC adjustment parameter Bit 0~7: Hour (0x00~0x23) Bit 8~15: RTC adjustment value
\$S44	1	The day and month of the current date in BCD format Bit 0~7: Day (0x01~0x31) Bit 8~15: Month (0x01~0x12)
\$S45	1	The year and the day-of-week of the current date in BCD format Bit 0~7: Year (0x00~0x99) Bit 8~15: Day of week (0x00~0x06); 0 represents Sunday
\$S46	1	The second of the current time in binary format (0~59)
\$S47	1	The minute of the current time in binary format (0~59)
\$S48	1	The hour of the current time in binary format (0~23)
\$S49	1	The one tenth of a second of the current time in binary format (0~9) 9 represents 0.9 second
\$S50	1	The date of the current day in binary format (0~30) 0 represents the first day of a month
\$S51	1	The month of the current day in binary format (0~11) 0 represents January
\$S52	1	The year of the current day in binary format (0~99)
\$S53	1	The day of week of the current day in binary format (0~6) 0 represents Sunday
\$S219	1	Current user level (0~9); 9 indicates that the user logged in with the developer password
\$S230~\$S241	12	The ASCII character string, up to 24 characters, to show the allowable input range for numeric keypads
\$S297	1	The lowest user level that can be accepted by the current password keypad. When the value is 0, any user level is accepted. When the value is 9, only the developer password is accepted.
\$S300~\$S301	2	500ms timer
\$S302~\$S303	2	1 second timer
\$S304	1	20 Hz sine wave (-1000 ~ 1000)
\$S305	1	20 Hz cosine wave (-1000 ~ 1000)
\$S306	1	20 Hz triangle wave (0~1000)

Continued

Address	Length	Content																																																								
\$S307	1	System signals \$S307.0: always 0 when ready \$S307.1: always 1 when ready																																																								
\$S315	1	System status \$S315.0: 1 indicates that the data in battery backed RAM is good																																																								
\$S317	1	Current language number (0~9); 0 represents language #1																																																								
\$S319	1	Status bits of USB memory sticks \$S319.0: Drive C (1:OK; 0:None) \$S319.1: Drive D (1:OK; 0:None) \$S319.2: Drive E (1:OK; 0:None)																																																								
\$S654	1	Link enabled bits for Link 1~16 \$S654.0 is for Link 1; 0: Disabled; 1: Enabled \$S654.1 1 is for Link 2; ... \$S654.f is for Link 16																																																								
\$S662~\$S677	32	Communication status words for Link 1~16 \$S662 is for Link 1 \$S663 is for Link 2 ... \$S677 is for Link 16  Communication Status <table><tr><th>Value</th><th>Meaning</th><th>Value</th><th>Meaning</th></tr><tr><td>0</td><td>OK</td><td>13</td><td>Invalid request</td></tr><tr><td>1</td><td>Overflow error</td><td>14</td><td>Device busy</td></tr><tr><td>2</td><td>Break error</td><td>15</td><td>Unknown error</td></tr><tr><td>3</td><td>Parity error</td><td>16</td><td>Link disabled</td></tr><tr><td>4</td><td>Framing error</td><td>17</td><td>Initialization failure</td></tr><tr><td>5</td><td>No response</td><td>18</td><td>Failed to send data</td></tr><tr><td>6</td><td>Unrecognized response</td><td>19</td><td>Failed to receive data</td></tr><tr><td>7</td><td>Timeout</td><td>20</td><td>Failed to open connection</td></tr><tr><td>8</td><td>Inactive CTS</td><td>21</td><td>Connection not ready</td></tr><tr><td>9</td><td>Checksum error</td><td>22</td><td>Invalid sub-link</td></tr><tr><td>10</td><td>Command rejected</td><td>23</td><td>Invalid COM port</td></tr><tr><td>11</td><td>Invalid address</td><td>24</td><td>Error</td></tr><tr><td>12</td><td>Invalid range</td><td>255</td><td>Uncertain</td></tr></table>	Value	Meaning	Value	Meaning	0	OK	13	Invalid request	1	Overflow error	14	Device busy	2	Break error	15	Unknown error	3	Parity error	16	Link disabled	4	Framing error	17	Initialization failure	5	No response	18	Failed to send data	6	Unrecognized response	19	Failed to receive data	7	Timeout	20	Failed to open connection	8	Inactive CTS	21	Connection not ready	9	Checksum error	22	Invalid sub-link	10	Command rejected	23	Invalid COM port	11	Invalid address	24	Error	12	Invalid range	255	Uncertain
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10	Command rejected	23	Invalid COM port																																																							
11	Invalid address	24	Error																																																							
12	Invalid range	255	Uncertain																																																							
\$S838	1	The ID of the current recipe block (0~15)																																																								
\$S839~\$S854	16	The current recipe numbers of recipe block 0~15 \$S839 is for recipe block 0 \$S840 is for recipe block 1 ... \$S854 is for recipe block 15																																																								

### 3.3.4. Setting up Internal Memory

You can use the Internal Memory dialog box to define the size of the regular user memory and the battery backed user memory. To open the Internal Memory dialog box, do one of followings:

- 1) In the Project Manager window, double-click the Internal Memory node (🔌) under Links node of the panel application.
- 2) In the Project Manager window, right-click the Internal Memory node (🔌) under Links node of the panel application to bring out the pop-up menu and select Properties.

The following is an example of the Internal Memory dialog box.

**Internal Memory**

**Regular User Memory**

Number of words: 5000

Bit address range: \$U0.0 - \$U4999.f

Word address range: \$U0 - \$U4999

**Battery Backed User Memory**

Number of words: 40

Bit address range: \$N0.0 - \$N39.f

Word address range: \$N0 - \$N39

**System Memory**

Number of words: 1024

Bit address range: \$S0.0 - \$S1023.f

Word address range: \$S0 - \$S1023

OK Cancel

Specify the size of regular user memory. The size must be between 0 and 131072 words. By default, it is 5000.

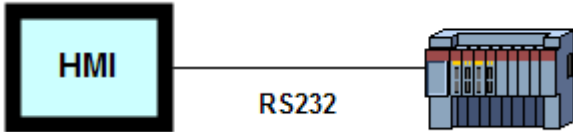
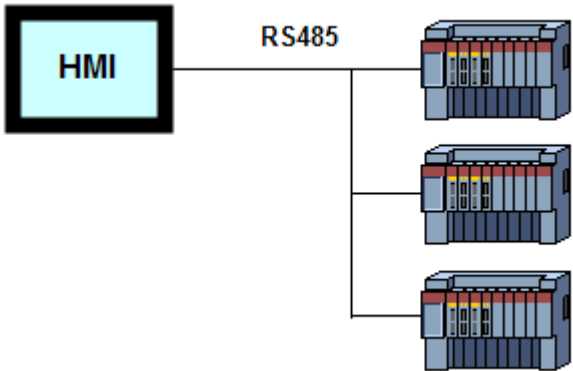

Specify the size of battery backed user memory. The size must be between 0 and 131072 words. By default, it is 0.

## 3.4. Communication Links

This section describes how to set up communication links to allow the panel application to access the data of external devices.

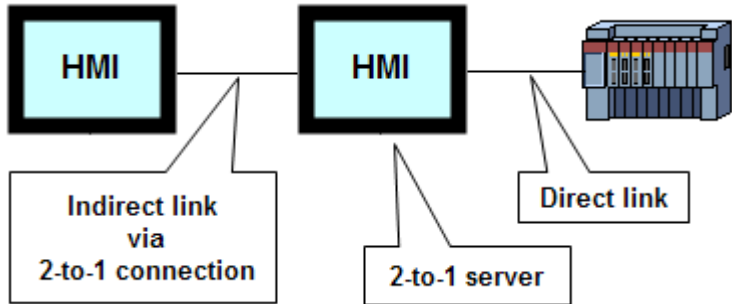
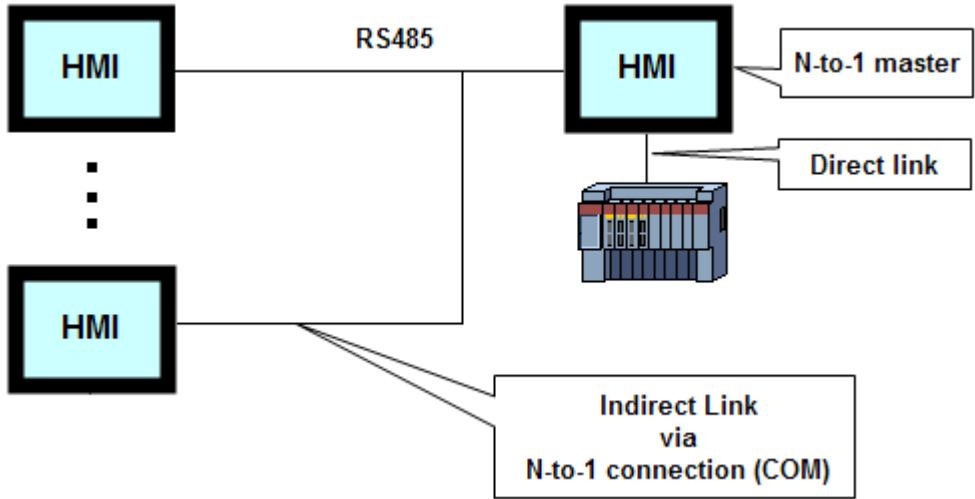
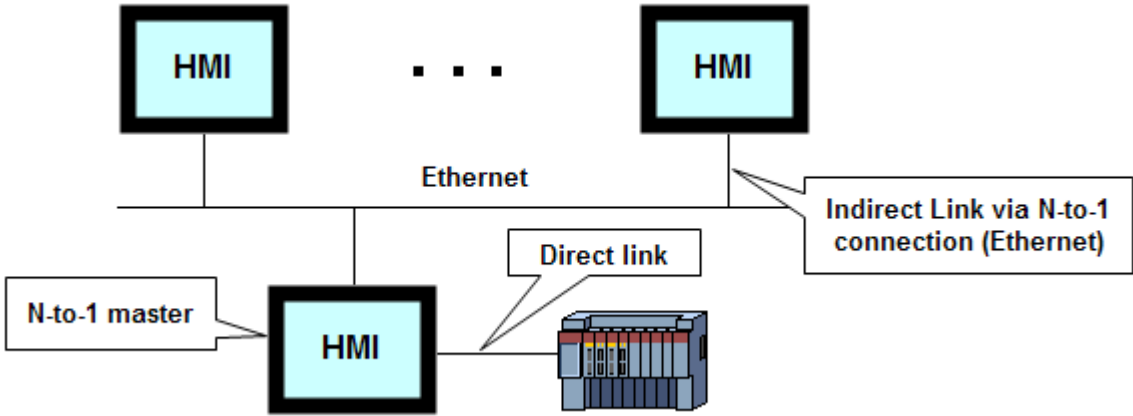
### 3.4.1. Types of Communication Links

The following table describes the three types of communication links that the panel application can have.



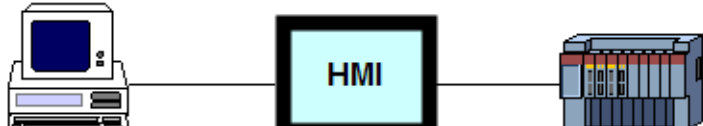


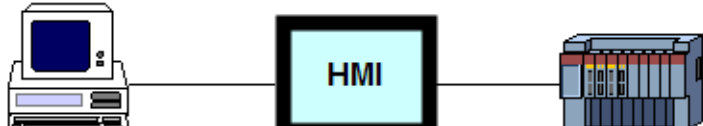


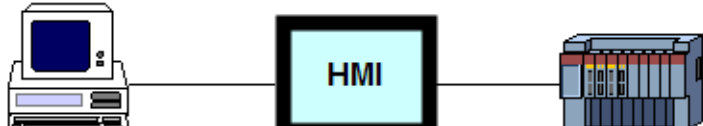
Link Type	Description
Direct link	<p>Directly connects the panel with the specified device(s). The following are examples of direct links.</p> <p><b>[Example 1]</b> The panel uses an RS232 direct link to talk with the specified device directly.</p>  <p><b>[Example 2]</b> The panel uses an RS485 direct link to talk with the specified devices directly.</p>  <p><b>[Example 3]</b> The panel uses an Ethernet direct link to talk with the specified device directly.</p> 

Continued



Link Type	Description
Indirect link	<p>Allow the panel to talk with a device that is not directly connected to it. An indirect link connects the panel with a specified indirect link server. The indirect link server is the target panel of a panel application in the same project and is directly connected to the specified device.</p> <p><b>[Example 1] Indirect Link via 2-to-1 Connection</b></p>  <p><b>[Example 2] Indirect Link via N-to-1 Connection (COM)</b></p>  <p><b>[Example 3] Indirect Link via N-to-1 Connection (Ethernet)</b></p> 

Continued

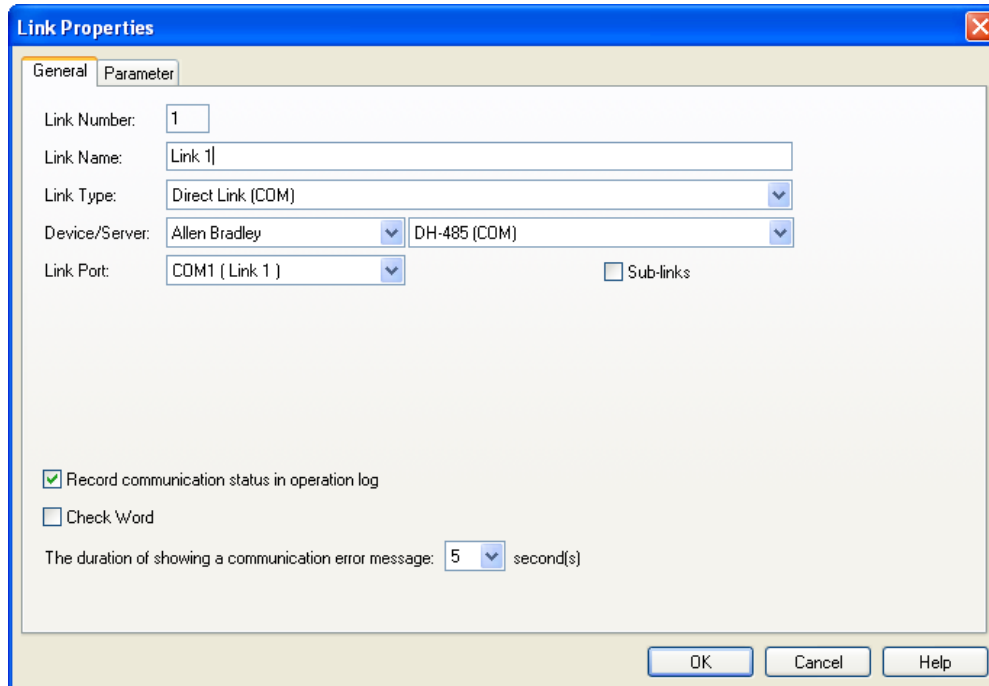
Link Type	Description										
Communication service	Add an appropriate communication service link to the application to allow other panels to communicate with the device directly connected to the target panel. The following table describes the available communication services.										
	<table><tr><th>Communication Service</th><th>Description</th></tr><tr><td>2-to-1 Server (COM)</td><td>You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows two panels to talk with one device, and only one communication port is required on that device.</td></tr><tr><td>2-to-1 Transparent Server (COM)</td><td><p>This communication service makes the target panel a gateway for another computing device, such as, a PC, another target panel, or a panel of another brand, to access the associated controller. See the following diagrams for the possible applications.</p><div><div><p>PM HMI      2-to-1 Transparent Server</p></div><div><p>HMI      2-to-1 Transparent Server</p></div><div><p>PC      2-to-1 Transparent Server</p></div><p>Any kind of controller whose communication protocol is of the request-reply type can be supported by this communication service. Ask your local representative to check if your controller is supported. Note that the communication parameters (baud rate, number of data bits, number of stop bits, and type of parity check) of the computing device and the communication parameters of the 2-to-1 Transparent Server must be identical.</p></div></td></tr><tr><td>N-to-1 Master (COM)</td><td>You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows up to 16 panels to talk with one device, and only one communication port is required on that device.</td></tr><tr><td>N-to-1 Master (Ethernet)</td><td>You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows up to 16 panels to talk with one device, and only one communication port is required on that device.</td></tr></table>	Communication Service	Description	2-to-1 Server (COM)	You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows two panels to talk with one device, and only one communication port is required on that device.	2-to-1 Transparent Server (COM)	<p>This communication service makes the target panel a gateway for another computing device, such as, a PC, another target panel, or a panel of another brand, to access the associated controller. See the following diagrams for the possible applications.</p> <div><div><p>PM HMI      2-to-1 Transparent Server</p></div><div><p>HMI      2-to-1 Transparent Server</p></div><div><p>PC      2-to-1 Transparent Server</p></div><p>Any kind of controller whose communication protocol is of the request-reply type can be supported by this communication service. Ask your local representative to check if your controller is supported. Note that the communication parameters (baud rate, number of data bits, number of stop bits, and type of parity check) of the computing device and the communication parameters of the 2-to-1 Transparent Server must be identical.</p></div>	N-to-1 Master (COM)	You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows up to 16 panels to talk with one device, and only one communication port is required on that device.	N-to-1 Master (Ethernet)	You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows up to 16 panels to talk with one device, and only one communication port is required on that device.
	Communication Service	Description									
	2-to-1 Server (COM)	You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows two panels to talk with one device, and only one communication port is required on that device.									
	2-to-1 Transparent Server (COM)	<p>This communication service makes the target panel a gateway for another computing device, such as, a PC, another target panel, or a panel of another brand, to access the associated controller. See the following diagrams for the possible applications.</p> <div><div><p>PM HMI      2-to-1 Transparent Server</p></div><div><p>HMI      2-to-1 Transparent Server</p></div><div><p>PC      2-to-1 Transparent Server</p></div><p>Any kind of controller whose communication protocol is of the request-reply type can be supported by this communication service. Ask your local representative to check if your controller is supported. Note that the communication parameters (baud rate, number of data bits, number of stop bits, and type of parity check) of the computing device and the communication parameters of the 2-to-1 Transparent Server must be identical.</p></div>									
N-to-1 Master (COM)	You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows up to 16 panels to talk with one device, and only one communication port is required on that device.										
N-to-1 Master (Ethernet)	You need to specify the data link, i.e. the associated direct link, for this communication service. This service allows up to 16 panels to talk with one device, and only one communication port is required on that device.										

Continued

Link Type	Description			
Gateway service	<p>Allows an application program running on any computing device, such as a PC, to access the data of the controllers that are connected to the HMI with Gateway Server. The following table describes the available gateway services.</p>			
	<table> <tr> <th data-bbox="328 360 624 400">Gateway Service</th><th data-bbox="624 360 1485 400">Description</th></tr> <tr> <td data-bbox="328 400 624 1384">TCP/IP Gateway Server (Ethernet)</td><td data-bbox="624 400 1485 1384"> <p>This gateway service makes the target panel a gateway for another computing device, such as, a PC, another target panel, or a panel of other brand, to access the associated controller through Ethernet. See the following diagram to know the possible applications.</p> <div data-bbox="651 555 1426 1115"> </div> <p>The blue, green, and red lines in the above figure indicate the different data blocks flowing on the Ethernet with the target panel acting as a gateway server.</p> <p>The gateway server makes the HMI behave as a Modbus device. Your application program can use the Modbus protocol to access the transfer memory of the gateway server. To use the gateway server, please see <a href="#">Section 3.4.8</a> for details.</p> </td></tr> </table>	Gateway Service	Description	TCP/IP Gateway Server (Ethernet)
Gateway Service	Description			
TCP/IP Gateway Server (Ethernet)	<p>This gateway service makes the target panel a gateway for another computing device, such as, a PC, another target panel, or a panel of other brand, to access the associated controller through Ethernet. See the following diagram to know the possible applications.</p> <div data-bbox="651 555 1426 1115"> </div> <p>The blue, green, and red lines in the above figure indicate the different data blocks flowing on the Ethernet with the target panel acting as a gateway server.</p> <p>The gateway server makes the HMI behave as a Modbus device. Your application program can use the Modbus protocol to access the transfer memory of the gateway server. To use the gateway server, please see <a href="#">Section 3.4.8</a> for details.</p>			

### 3.4.2. General Settings

This section describes how to define the general settings for the communication links using the General page of the Link Properties dialog box. The following is an example of the General page that defines a direct link.

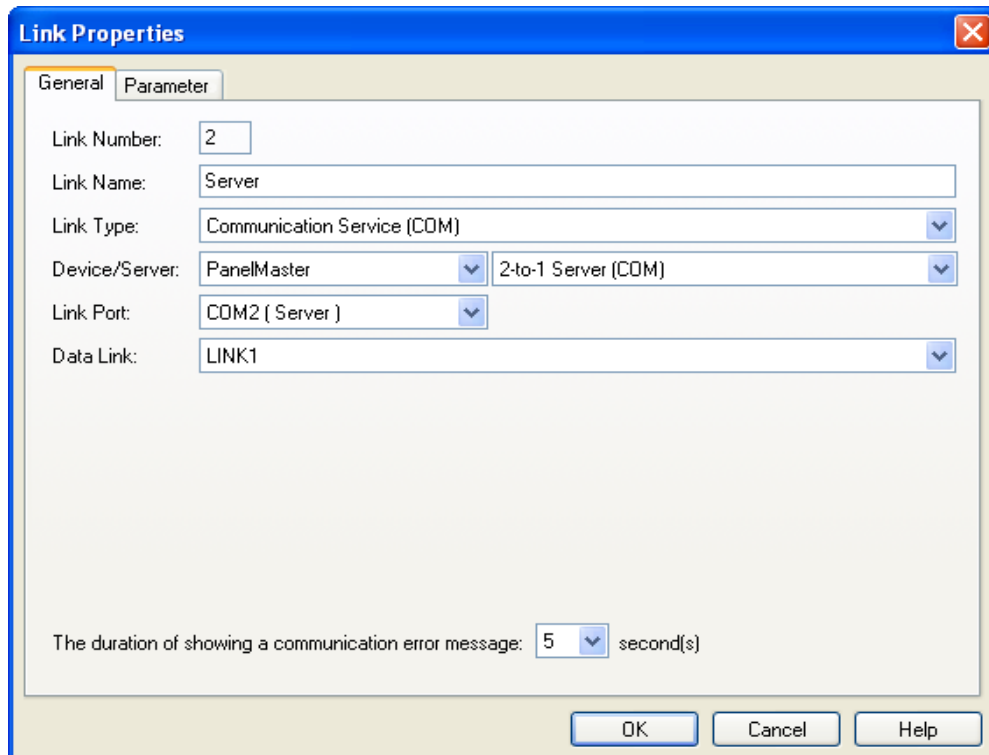


The screenshot shows the 'Link Properties' dialog box with the 'General' tab selected. The settings are as follows:

- Link Number: 1
- Link Name: Link 1
- Link Type: Direct Link (COM)
- Device/Server: Allen Bradley (dropdown), DH-485 (COM) (dropdown)
- Link Port: COM1 (Link 1) (dropdown), ☐ Sub-links
- ☒ Record communication status in operation log
- ☐ Check Word
- The duration of showing a communication error message: 5 (dropdown) second(s)

Buttons at the bottom: OK, Cancel, Help.

The following is an example of the General page that defines a communication service link.



The screenshot shows the 'Link Properties' dialog box with the 'General' tab selected. The settings are as follows:

- Link Number: 2
- Link Name: Server
- Link Type: Communication Service (COM)
- Device/Server: PanelMaster (dropdown), 2-to-1 Server (COM) (dropdown)
- Link Port: COM2 (Server) (dropdown)
- Data Link: LINK1 (dropdown)
- The duration of showing a communication error message: 5 (dropdown) second(s)

Buttons at the bottom: OK, Cancel, Help.

The following table describes each property in the General page of the Link Properties dialog box.

Property	Description																		
Link Number	The sequence number of the communication link. It is assigned when the link is created and reassigned when any other link of the same application is removed.																		
Link Name	Specifies the name of the communication link.																		
Link Type	<p>Select one of the following link types for the link:</p> <table> <tr> <th>Link Type</th><th>Description</th></tr> <tr> <td>Direct Link (COM)</td><td>The link connects to the specified device directly through the specified serial (COM) port.</td></tr> <tr> <td>Direct Link (Ethernet)</td><td>The link connects to the specified device directly through the specified Ethernet port.</td></tr> <tr> <td>Communication Service (COM)</td><td>The link connects to one or more other target panels through the specified serial (COM) port and provides the communication service specified in the Device/Server field to the connected target panels. See the description of the Device/Server field to know the available communication services.</td></tr> <tr> <td>Communication Service (Ethernet)</td><td>The link connects to one or more other target panels through the specified Ethernet port and provides the communication service specified in the Device/Server field to the connected target panels. See the description of the Device/Server field to know the available communication services.</td></tr> <tr> <td>Gateway Service(Ethernet)</td><td>The link connects to a target panel that provides gateway service as a gateway server through the specified Ethernet port. The target panel allows an application program running on any computing device, such as a PC, to access the data of the controllers through that target panel.</td></tr> <tr> <td>Indirect Link via 2-to-1 Connection (COM)</td><td>The link connects to a target panel that provides the communication service as a 2-to1 server through the specified serial (COM) port. The target panel can communicate with the associated device indirectly through that target panel.</td></tr> <tr> <td>Indirect Link via N-to-1 Connection (COM)</td><td>The link connects to a target panel that provides the communication service as an N-to1 master through the specified serial (COM) port. The target panel can communicate with the associated device indirectly through that target panel.</td></tr> <tr> <td>Indirect Link via N-to-1 Connection (Ethernet)</td><td>The link connects to a target panel that provides the communication service as an N-to1 master through the specified Ethernet port. The target panel can communicate with the associated device indirectly through that target panel.</td></tr> </table>	Link Type	Description	Direct Link (COM)	The link connects to the specified device directly through the specified serial (COM) port.	Direct Link (Ethernet)	The link connects to the specified device directly through the specified Ethernet port.	Communication Service (COM)	The link connects to one or more other target panels through the specified serial (COM) port and provides the communication service specified in the Device/Server field to the connected target panels. See the description of the Device/Server field to know the available communication services.	Communication Service (Ethernet)	The link connects to one or more other target panels through the specified Ethernet port and provides the communication service specified in the Device/Server field to the connected target panels. See the description of the Device/Server field to know the available communication services.	Gateway Service(Ethernet)	The link connects to a target panel that provides gateway service as a gateway server through the specified Ethernet port. The target panel allows an application program running on any computing device, such as a PC, to access the data of the controllers through that target panel.	Indirect Link via 2-to-1 Connection (COM)	The link connects to a target panel that provides the communication service as a 2-to1 server through the specified serial (COM) port. The target panel can communicate with the associated device indirectly through that target panel.	Indirect Link via N-to-1 Connection (COM)	The link connects to a target panel that provides the communication service as an N-to1 master through the specified serial (COM) port. The target panel can communicate with the associated device indirectly through that target panel.	Indirect Link via N-to-1 Connection (Ethernet)	The link connects to a target panel that provides the communication service as an N-to1 master through the specified Ethernet port. The target panel can communicate with the associated device indirectly through that target panel.
Link Type	Description																		
Direct Link (COM)	The link connects to the specified device directly through the specified serial (COM) port.																		
Direct Link (Ethernet)	The link connects to the specified device directly through the specified Ethernet port.																		
Communication Service (COM)	The link connects to one or more other target panels through the specified serial (COM) port and provides the communication service specified in the Device/Server field to the connected target panels. See the description of the Device/Server field to know the available communication services.																		
Communication Service (Ethernet)	The link connects to one or more other target panels through the specified Ethernet port and provides the communication service specified in the Device/Server field to the connected target panels. See the description of the Device/Server field to know the available communication services.																		
Gateway Service(Ethernet)	The link connects to a target panel that provides gateway service as a gateway server through the specified Ethernet port. The target panel allows an application program running on any computing device, such as a PC, to access the data of the controllers through that target panel.																		
Indirect Link via 2-to-1 Connection (COM)	The link connects to a target panel that provides the communication service as a 2-to1 server through the specified serial (COM) port. The target panel can communicate with the associated device indirectly through that target panel.																		
Indirect Link via N-to-1 Connection (COM)	The link connects to a target panel that provides the communication service as an N-to1 master through the specified serial (COM) port. The target panel can communicate with the associated device indirectly through that target panel.																		
Indirect Link via N-to-1 Connection (Ethernet)	The link connects to a target panel that provides the communication service as an N-to1 master through the specified Ethernet port. The target panel can communicate with the associated device indirectly through that target panel.																		

Continued

Property		Description								
Device/Server		When the Link Type is Direct Link, specify the link's connected device.								
		When the Link Type is Communication Service (COM), select one of the following servers.								
		<table><tr><th>Server</th><th>Description</th></tr><tr><td>2-to-1 Server</td><td>In the Data Link field, specify a direct link of the application as the data link for the server. The 2-to-1 server is a bridge between another panel and the device connected to the specified data link. Another panel/application of the project can now use an indirect link to access the device connected to the server through the specified data link.</td></tr><tr><td>2-to-1 Transparent Server</td><td>In the Data Link field, specify a direct link of the application as the data link for the server. The service link connects to a computing device, and allows the device to indirectly communicate with another device through the data link. The computing device can be a target panel, a panel of another brand, or a PC. If the computing device is a target panel, it must use a direct link to accept the service.</td></tr><tr><td>N-to-1 Master</td><td>In the Data Link field, specify a direct link of the application as the data link for the server. The link can connect up to 8 target panels, and allow these panels to indirectly communicate with the device connected to the specified data link. The panels served by the link must use an indirect link to accept the service.</td></tr></table>	Server	Description	2-to-1 Server	In the Data Link field, specify a direct link of the application as the data link for the server. The 2-to-1 server is a bridge between another panel and the device connected to the specified data link. Another panel/application of the project can now use an indirect link to access the device connected to the server through the specified data link.	2-to-1 Transparent Server	In the Data Link field, specify a direct link of the application as the data link for the server. The service link connects to a computing device, and allows the device to indirectly communicate with another device through the data link. The computing device can be a target panel, a panel of another brand, or a PC. If the computing device is a target panel, it must use a direct link to accept the service.	N-to-1 Master	In the Data Link field, specify a direct link of the application as the data link for the server. The link can connect up to 8 target panels, and allow these panels to indirectly communicate with the device connected to the specified data link. The panels served by the link must use an indirect link to accept the service.
		Server	Description							
		2-to-1 Server	In the Data Link field, specify a direct link of the application as the data link for the server. The 2-to-1 server is a bridge between another panel and the device connected to the specified data link. Another panel/application of the project can now use an indirect link to access the device connected to the server through the specified data link.							
		2-to-1 Transparent Server	In the Data Link field, specify a direct link of the application as the data link for the server. The service link connects to a computing device, and allows the device to indirectly communicate with another device through the data link. The computing device can be a target panel, a panel of another brand, or a PC. If the computing device is a target panel, it must use a direct link to accept the service.							
		N-to-1 Master	In the Data Link field, specify a direct link of the application as the data link for the server. The link can connect up to 8 target panels, and allow these panels to indirectly communicate with the device connected to the specified data link. The panels served by the link must use an indirect link to accept the service.							
When the Link Type is Communication Service (Ethernet), select one of the following servers.										
<table><tr><th>Server</th><th>Description</th></tr><tr><td>N-to-1 Master</td><td>In the Data Link field, specify a direct link of the application as the data link for the server. The link can connect up to 8 target panels, and allow these panels to indirectly communicate with the device connected to the specified data link. The panels served by the link must use an indirect link to accept the service.</td></tr></table>	Server	Description	N-to-1 Master	In the Data Link field, specify a direct link of the application as the data link for the server. The link can connect up to 8 target panels, and allow these panels to indirectly communicate with the device connected to the specified data link. The panels served by the link must use an indirect link to accept the service.						
Server	Description									
N-to-1 Master	In the Data Link field, specify a direct link of the application as the data link for the server. The link can connect up to 8 target panels, and allow these panels to indirectly communicate with the device connected to the specified data link. The panels served by the link must use an indirect link to accept the service.									
When the Link Type is Indirect Link and the Indirect Link Server Location is specified, the indirectly connected device is shown here.										
Link Port		Select a port for this link.								
Sub-links		When an RS485 communication line has many devices connected to it, the logical connection of a device on the link with the target panel is called a sub-link. This field is available when the Link Type is Direct Link (COM). Select this option if this link will connect to many devices, and you want to identify, monitor, or control the communication with each connected device.								
Data Link		Select a direct link of the application as the data link for the communication service when the Link Type is Communication Service.								
Indirect Link Server Location	Panel Application	Select the panel application that provides the communication service for this indirect link.								
	Link	Select the communication service link that provides the communication service for this indirect link.								
Record communication status in operation log		Check this option if you want the communication status of the link or the link's sub-links to be recorded in the operation log. The recordable types of status include: Enabled, Disabled, Failed, and Recovered. The operation log display can show the logged communication status.								
Check Word		The panel will read the specified word periodically to check the status of the link's connection.								
The duration of showing a communication error message		The communication error message box will hide and show according to the specified duration. If the duration is 0, the error message box will not show.								

### 3.4.3. Parameter Settings (Serial Port)

This section describes how to set up the communication parameters for the serial communication links using the Parameter page of the Link Properties dialog box.

The following is an example of the Parameter page for a serial direct link.

The screenshot shows the 'Parameter' tab of the Link Properties dialog box for a serial direct link. It is divided into two main sections: 'Transmission' and 'Others'. The 'Transmission' section includes settings for Baud Rate (19200), Data Bits (8), Parity (Even), and Stop Bits (1). The 'Others' section includes settings for Panel Address (0), PLC Address (1), Timeout Time (0 x 0.1 Sec.), Command Delay (0 x 0.1 Sec.), and Retry Count (0).

The following is an example of the Parameter page for an N-to-1 master.

The screenshot shows the 'Parameter' tab of the Link Properties dialog box for an N-to-1 master. It includes the same 'Transmission' and 'Others' sections as the direct link example, but with different values: Baud Rate (57600), Data Bits (8), Parity (Even), Stop Bits (1), and Panel Address (1). Additionally, there is an 'N-to-1 Connection' section at the bottom with a button labeled 'Specify N-to-1 Connection Slave Panels...'.

The following table describes each property in the Parameter page of the Link Properties dialog box for a serial link.

Property	Description
Baud Rate	The baud rate used.
Data Bits	The number of data bits used.
Parity	The scheme of parity used.
Stop Bits	The number of stop bits used.
Panel Address	The address of the target panel.
PLC Address	The address of the connected device.
Timeout Time	The maximum time allowed for the communication driver to wait for a reply from the connected device. When the elapsed time exceeds the Timeout Time, the communication driver assumes the communication failed.
Command Delay	If the Command Delay is 0, the communication driver immediately sends the next request to the connected device when it receives a reply from the last request. If the Command Delay is nonzero, the communication driver delays for the specified amount of time before sending the next request to the connected device.
Retry Count	The number of times the communication driver will retry for each request to get a successful reply from the connected device. If the number is zero, the communication driver will use the default retry count.
Specify N-to-1 Connection Slave Panels	This button is available when the link is an N-to-1 master. Click this button to bring up the N-to-1 Connection Slave Panels dialog box. You can define the slave panels of the N-to-1 connection in the dialog box.
Specify Other Data Sharing Panels	This button is available when the link is a direct link and the connected device is Data Sharer (RS485). Click this button to bring up the Other Data Sharing Panels dialog box. You can define the other data sharing panels in the dialog box.

### 3.4.4. Parameter Settings (Ethernet Port)

This section describes how to set up the communication parameters for Ethernet links using the Parameter page of the Link Properties dialog box. The following is an example of the Parameter page for an Ethernet direct link.

The screenshot shows the 'Parameter' tab of a dialog box. It contains the following settings:

- IP Address:** 192.168.10.33
- Use Default Port:** ☐ (unchecked)
- Port:** 502
- Node Address:** 1
- Timeout Time:** 1 (x 0.1 Sec.)
- Command Delay:** 1 (x 0.1 Sec.)
- Retry Count:** 3

The following table describes each property in the Parameter page of the Link Properties dialog box for an Ethernet link.

Property	Description
IP Address	The IP address of the connected device.
Use Default Port	Check this option if the default IP port is used
Port	Specifies the IP port used
Node Address	Specifies the node address of the connected device.
Timeout Time	The maximum time allowed for the communication driver to wait for a reply from the connected device. When the elapsed time exceeds the Timeout Time, the communication driver assumes the communication failed.
Command Delay	If the Command Delay is 0, the communication driver immediately sends the next request to the connected device when it receives a reply from the last request. If the Command Delay is nonzero, the communication driver delays for the specified amount of time before sending the next request to the connected device.
Retry Count	The number of times the communication driver will retry for each request to get a successful reply from the connected device. If the number is zero, the communication driver will use the default retry count.



### 3.4.5. Sub-link Settings

An RS485 link can have many slave devices connected to it. The HMI uses the same communication protocol to talk with all the slave devices. The connection between the HMI and each of the slave devices is a sub-link. With the Sub-link table, the operator can enable or disable a sub-link at any time.

This section describes how to define the sub-links within a direct link using the Sub-link page of the Link Properties dialog box. The following is an example of the Sub-link page.

General Parameter **Sub-link**

Number of sub-links: 6

	Name	Node	State	Show
1	TC1	10	On	Yes
2	TC2	20	On	Yes
3	TC3	30	On	Yes
4	TC4	40	On	Yes
5	TC5	50	Off	Yes
6	TC6	60	Off	Yes

Language: English

**Sub-link**

Name: TC6

Node Address: 60

Initial State: Off

☒ Show error message

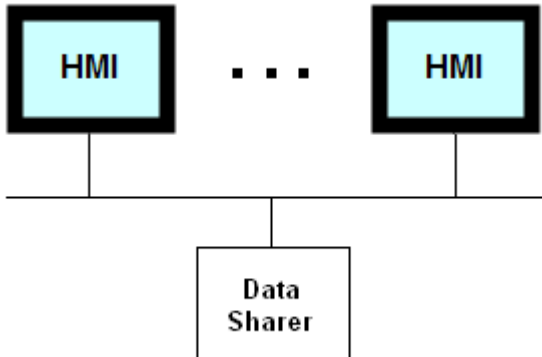
Alt+Up: Move item up      Alt+Down: Move item down

The following table describes each property in the Sub-link page of the Link Properties dialog box for a direct link.

Property	Description
Number of sub-links	Specifies how many devices the link will connect as sub-links.
Language	Specifies the current language for the Name field.
Name	The name of the selected sub-link for the language specified in the Language field.
Node Address	The address of the selected sub-link. The address must be a unique number within all the sub-links.
Initial State	The initial communication state for the selected sub-link. If the state is On, the panel will communicate with the sub-link after running the application. If the state is Off, the panel will not communicate with the sub-link until the communication state is turn On in a sub-link table.
Show error message	If this option is checked, the communication error message will be shown when the selected sub-link encounters communication errors. If this option is unchecked, no error message will be shown for any communication errors.

### 3.4.6. Sharing Data among Panels Using Data Sharer

The data sharer is a virtual device. It allows data sharing among up to 16 target panels on an Ethernet or an RS485 network. Each of the target panels can have up to 256 words of data to share.



To set up the communication for data sharing, create a direct link and select Data Sharer (UDP) or Data Sharer (RS485) as the connected device. The panel address that you can set in the Parameter page of the Link Properties dialog box must be unique for each sharing panel as it is used to identify the shared data.

The communication driver for the link connecting to Data Sharer is responsible for broadcasting the panel's shared data on the network. For example, if the panel address of a panel is 10 and the number of the link connecting to Data Sharer is 2, the following Macro command will cause the communication driver to broadcast the corresponding data on the network.

```
2\P10.0 = MOV($u300, 30)
```

The communication driver receives the broadcasted shared data on the network automatically. It has a block of memory to store the shared data. To access a word, use the following address, where *m* is the panel address and *n* is the word number of that panel's shared data.

*Pm.n*            *m*=1~16; *n*=0-255

To access a bit, use the following address, where *b* is a hexadecimal number representing the bit number in the specified word.

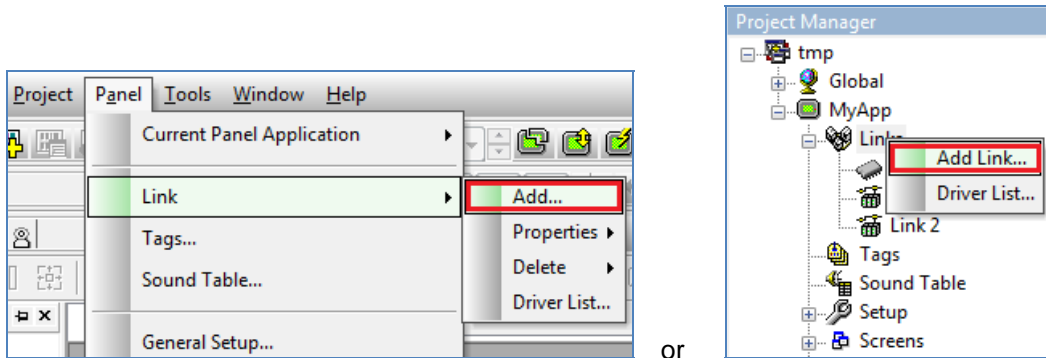
*Pm.n.b*            *m*=1~16; *n*=0-255; *b*=0~f

The UDP is used for the data sharing on Ethernet.

### 3.4.7. Writing Communication Programs Using Macro Commands

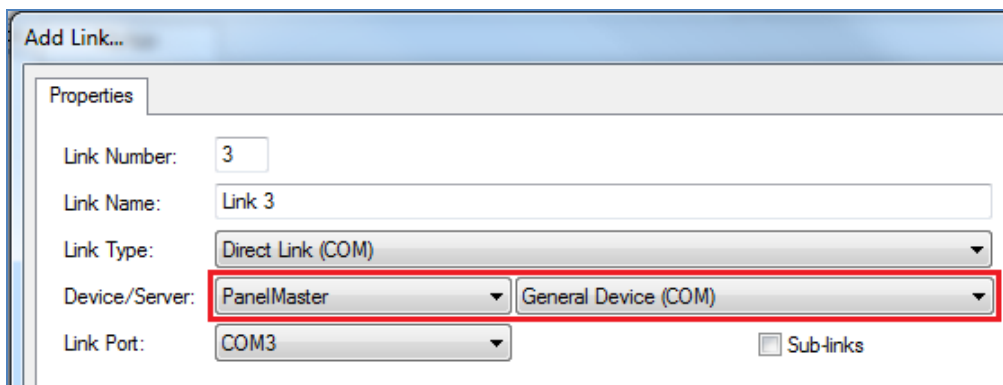
You can write a macro program to let your HMI communicate with a computing device through a serial port. For simplicity, we will use Device in the following sections to refer to the target computing device.

1. Create a communication link for the application to connect the panel and Device.

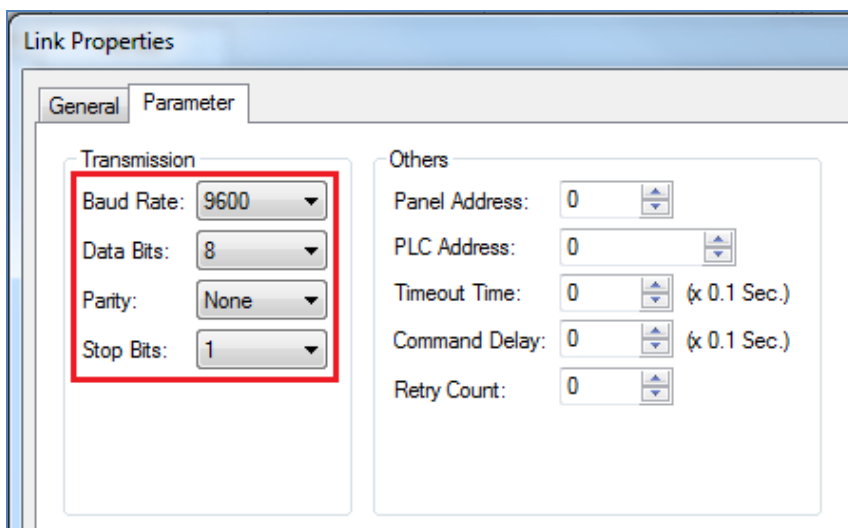


or

2. Specify the general settings for the link. You need to select PanelMaster - General Device (COM) as the device to be connected.



3. Specify the parameters of the communication.



4. Understand the key words that are available for composing the communication macro programs.

Key Word	Type	R/W	Function								
TX	Word	Write Only	<p>Writing a block of words to TX transmits the low bytes of that block of words to Device. The write operation is done when the transmission starts or is cancelled.</p> <p><i>Example:</i></p> <p><code>\$U10 = "ABC"</code> <code>\$U20 = B2W(\$U10, 3) // Convert the byte array to a word array</code> <code>TX = MOV(\$U20, 3) // Transmit "ABC" to Device</code></p> <p><i>Operation rules:</i></p> <ol style="list-style-type: none"><li>1) The transmission cannot start until the previous transmission has finished.</li><li>2) The word TX_STS will be set to 1 when the transmission starts.</li><li>3) When the hardware flow control is enabled (Bit EN_HS is set to 1), the transmission will not start until the device allows the panel to send data (The CTS signal on the port is asserted).</li><li>4) When the RTS/CTS flow control is enabled (Bit EN_HS is set to 1), the RTS signal on the serial port will be negated when the transmission starts and it will be asserted when the transmission ends.</li><li>5) The transmission will be cancelled if it cannot start after waiting a time specified by the word TO_TIME. The word TX_STS will be set to 2 when the timeout condition occurs.</li></ol>								
TX_W	Word	Write Only	<p>TX_W provides the same functionality as TX, except that the write operation is done after all the bytes are transmitted. It is recommended to use TX_W to transmit data as the macro program will not waste time to wait for the completion and the CPU of the panel will be utilized more efficiently.</p>								
TX_STS	Word	Read Only	<p>Reading this word gets the status of the last transmission.</p> <table><tr><th>Value</th><th>Status</th></tr><tr><td>1</td><td>Succeeded</td></tr><tr><td>2</td><td>Timeout</td></tr><tr><td>255</td><td>In progress</td></tr></table>	Value	Status	1	Succeeded	2	Timeout	255	In progress
Value	Status										
1	Succeeded										
2	Timeout										
255	In progress										
RX	Word	Read Only	<p>Reading this word copies a specified number of word values from the receive buffer. The receive buffer is a word array. The bytes received from Device are stored in the low bytes of the buffer. The high bytes of the buffer are always 0. Once the received data are copied, they are removed from the receive buffer. The read operation is executed whether or not there are enough bytes received in the buffer.</p> <p><i>Example:</i></p> <p><code>\$U10 = MOV(RX, 3) // Receive 3 words from the receive buffer.</code> <code>// \$U10 gets the value of the first received byte.</code> <code>// \$U11 gets the value of the second received byte.</code> <code>// \$U12 gets the value of the third received byte.</code></p> <p><i>Operation rules:</i></p> <p>Assume the number of words to be read from the buffer is n and the number of available words in the buffer is m.</p> <ol style="list-style-type: none"><li>1) If there are enough data received in the buffer, the read operation does the following 4 things: copies the first n words in the buffer to the destination, sets RX_CNT to n, sets RXB_CNT to (m-n), and sets RX_STS to 1.</li><li>2) If there are not enough data received in the buffer, the read operation does the following 4 things: copies all the available data to the destination, sets RX_CNT to m, sets RXB_CNT to 0, and sets RX_STS to 1.</li></ol>								

Continued

Key Word	Type	R/W	Function								
RXB_CNT	Word	Read Only	Reading this word gets the number of words that are available in the receive buffer. Note that one word of the receive buffer contains one received byte.								
RX_CNT	Word	Read Only	Reading this word gets the number of words that were actually taken out of the receive buffer by the last receive operation. Note that one word of the receive buffer contains one received byte.								
RX_STS	Word	Read Only	<div>Reading this word gets the status of the last receive operation.<table><tr><th>Word Value</th><th>Description</th></tr><tr><td>1</td><td>Succeeded</td></tr><tr><td>2</td><td>Timeout</td></tr><tr><td>Others</td><td>Failed</td></tr></table></div>	Word Value	Description	1	Succeeded	2	Timeout	Others	Failed
Word Value	Description										
1	Succeeded										
2	Timeout										
Others	Failed										
RX_W	Word	Read Only	<div>Reading this word copies a specified number of word values from the receive buffer. The receive buffer is a word array. The bytes received from Device are stored in the low bytes of the buffer. The high bytes of the buffer are always 0. Once the received data are copied, they are removed from the receive buffer. If there are not enough data received in the buffer, the read operation will wait a time specified by TO_TIME. The read operation will not complete until all the required data are received or the timeout occurs.</div> <div>Example: \$U10 = MOV(RX_W, 3) // Receive 3 words from the receive buffer. // Wait for the data if they are not received from Device yet. // \$U10 gets the value of the first received byte. // \$U11 gets the value of the second received byte. // \$U12 gets the value of the third received byte.</div> <div>Operation rules: Assume the number of words to be read from the buffer is n and the number of available words in the buffer is m 1) If there are enough data received in the buffer, the read operation does the following 4 things: copies the first n words in the buffer to the destination, sets RX_CNT to n, sets RXB_CNT to (m-n), and sets RX_STS to 1. 2) If there are not enough data received in the buffer, the read operation will wait a time specified by TO_TIME for the required data to come. When enough data are received, the read operation performs rule 1 above. When timeout occurs, the read operation is cancelled and RX_STS is set to 2.</div>								
FLUSH	Bit	Write Only	Writing 1 to this bit flushes the receive buffer that is used to receive data from Device.								
RESET	Bit	Write Only	Writing 1 to this bit resets the UART that is used for the communication between the panel and Device.								
TO_TIME	Word	Read/Write	<div>Writing the timeout time to this word sets the timeout time for the communication. The unit is 0.1 second.</div> <div>Example: TO_TIME = 20 (U) // Set the timeout time to 2 second</div>								
EN_HS	Bit	Read/Write	<div>Writing 1 to the bit enables the RTS/CTS flow control.<table><tr><th>Bit Value</th><th>Function</th></tr><tr><td>0</td><td>Disables the hardware flow control.</td></tr><tr><td>1</td><td>Enables the hardware flow control.</td></tr></table></div> <div>Example: EN_HS = 1 (B) // Enable the flow control</div>	Bit Value	Function	0	Disables the hardware flow control.	1	Enables the hardware flow control.		
Bit Value	Function										
0	Disables the hardware flow control.										
1	Enables the hardware flow control.										

Continued

Key Word	Type	R/W	Function									
CTS_STS	Bit	Read Only	Reading the bit gets the status of the CTS signal from the device.									
			<table><tr><th>Bit Value</th><th>CTS Signal</th><th>Comment</th></tr><tr><td>0</td><td>Asserted</td><td>The panel is allowed to send data to Device</td></tr><tr><td>1</td><td>Negated</td><td>The panel is not allowed to send data to Device</td></tr></table>	Bit Value	CTS Signal	Comment	0	Asserted	The panel is allowed to send data to Device	1	Negated	The panel is not allowed to send data to Device
			Bit Value	CTS Signal	Comment							
			0	Asserted	The panel is allowed to send data to Device							
			1	Negated	The panel is not allowed to send data to Device							
<i>Example:</i>												
IF !CTS_STS (B) // Do the following when the CTS is asserted												
TX = MOV(\$U100, 10) // Send 10 bytes to Device												
ENDIF												
RTS	Bit	Read/ Write	Writing 0 to the bit asserts the RTS signal on the port.									
			<table><tr><th>Bit Value</th><th>Function</th></tr><tr><td>0</td><td>Asserts the RTS signal. The Device is allowed to send data to the panel.</td></tr><tr><td>1</td><td>Negates the RTS signal. The Device is not allowed to send data to the panel.</td></tr></table>	Bit Value	Function	0	Asserts the RTS signal. The Device is allowed to send data to the panel.	1	Negates the RTS signal. The Device is not allowed to send data to the panel.			
			Bit Value	Function								
			0	Asserts the RTS signal. The Device is allowed to send data to the panel.								
			1	Negates the RTS signal. The Device is not allowed to send data to the panel.								
<i>Example:</i>												
RTS = 1 (B) // Disallow Device to send data to the panel												

- Understand the communication protocol.
- Write the program. The following is an example:

Macro - General Device

```

0 $U10 = "ABCDE" // $U10 = 4241H, $U11 = 4443H, $U12 = 4500H
1 $U20 = B2W($U10, 5) // $U20 = 0041H, $U21 = 0042H, $U22 = 0043H
2 // $U23 = 0044H, $U24 = 0045H
3 TX_W = MOV($U20, 5) // Send 5 words("ABCDE") in $U20 to TX
4 // and wait until all datum are sent
5
6 $U25 = 0DH // 0DH is ASCII code for return charater
7 TX_W = MOV($U20, 6) // Send 6 words("ABCDE<CR>") in $U20 to TX
8 // and wait until all datum are sent
9
10 TX = MOV($U20, 5) // Send 5 words in $U20 to TX
11
12 $U100 = MOV(RX,5) // Read 5 words from RX to $U100
13 $U100 = MOV(RX_W,5) // Read 5 words from RX to $U100
14 // and wait until all datum are received
15
16 RESET = 1 (B) // Reset TX UART and clear RX buffer
17 FLUSH = 1 (B) // Clear RX buffer
18
19

```

Properties

TX\_W = MOV(\$U20, 5) // Send 5 words("ABCDE")

Command: P1 = MOV(P2, P3)

Data Type: (U) 16-bit Unsigned

Par. P1: TX\_W

Par. P2: \$U20

Par. P3: 5

Operation:

Copies P3 words of P2 to P1.

Parameters:

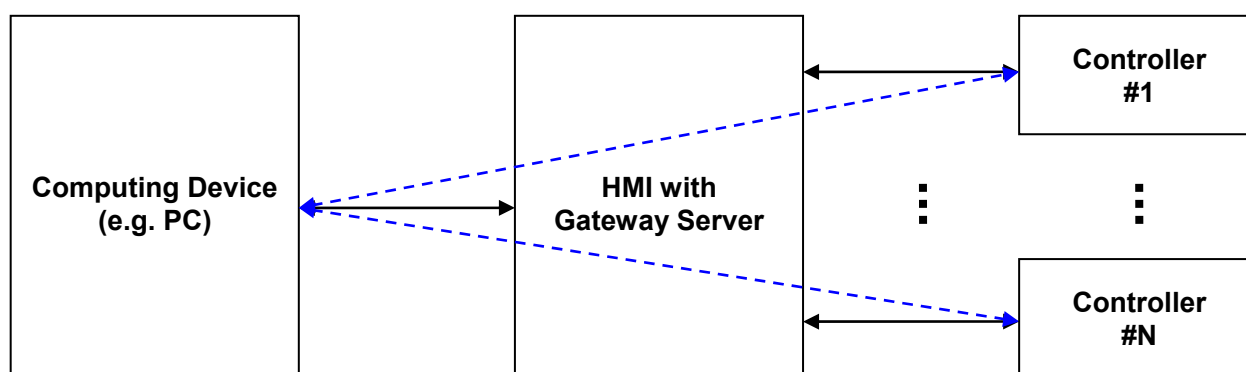
	Type	Description
P1	I/E	The starting location of the memory to receive the copy.
		The starting location

### 3.4.8. Using Gateway Server of the Target Panel

A gateway server in a HMI allows an application program running on any computing device, such as a PC, to access the data of the controllers that are connected to that HMI. The HMI behaves as a Modbus device. Your application program can use the Modbus protocol to access the transfer memory provided by the gateway server.

There are two gateway servers available to be selected for your application. The Serial Gateway Server is for the serial port connection, and the TCP/IP Gateway Server is for the Ethernet port connection.

Gateway Server	Protocol Used	Link Type
TCP/IP Gateway Server	Modbus TCP/IP	Ethernet
Serial Gateway Server	Modbus RTU	RS-232/422/485

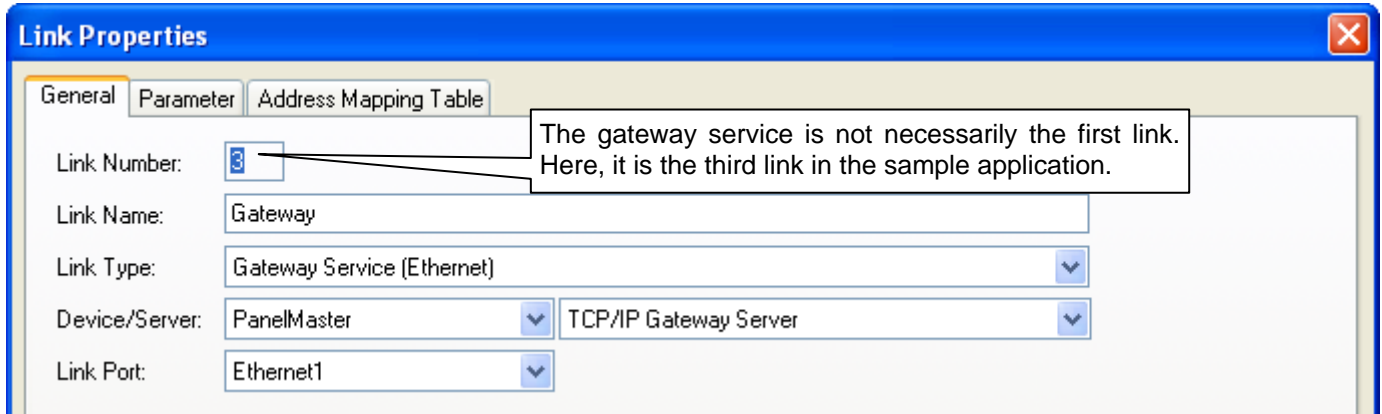


The blue dashed lines shown in the above figure indicate that the PC can access the data of Controller #1 and Controller #N through the HMI with the help of the gateway server.

### 3.4.8.1. Setting up Gateway Service

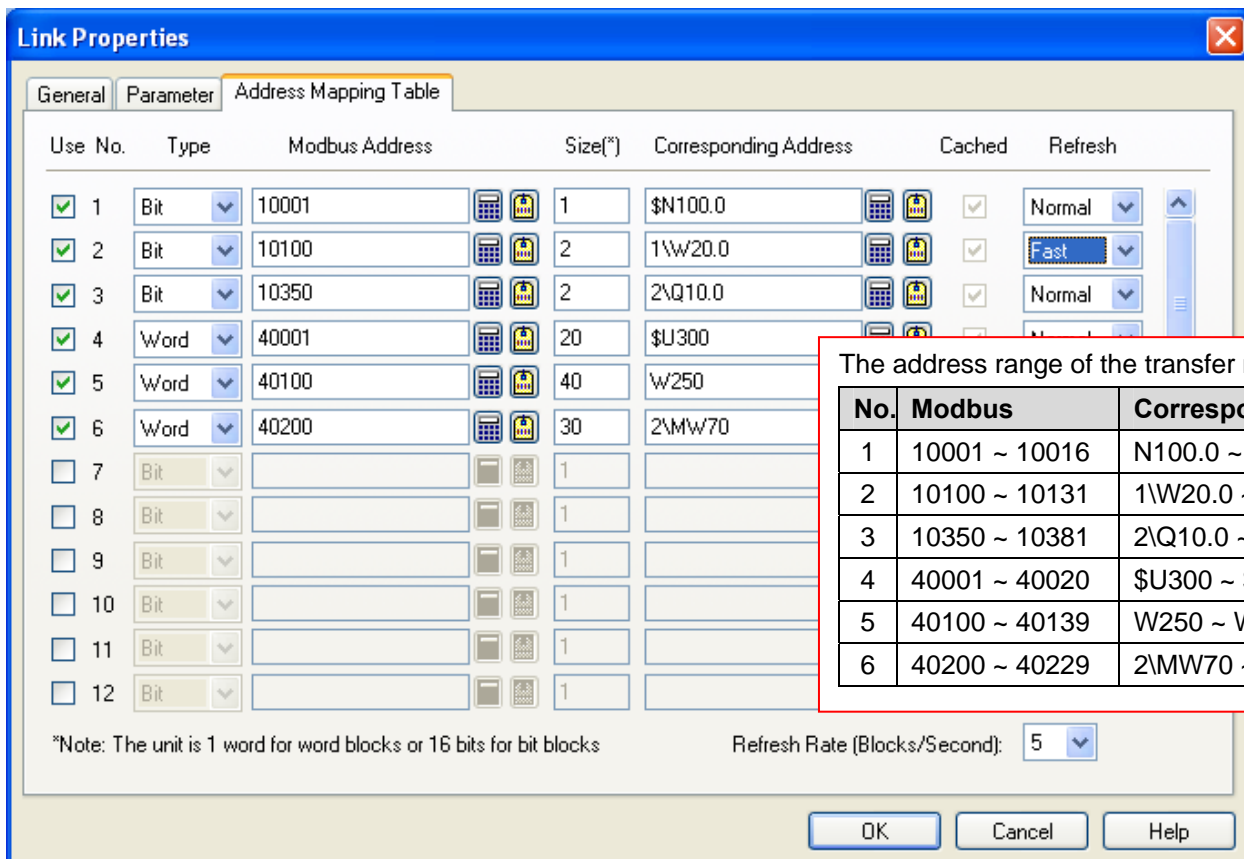
Suppose that the application has two links: One direct link that connects the target panel and PanelMaster->Null PLC device through COM1; the other direct link that connects the target panel and Siemens AG->Simatic S7-300(MPI Port) device through COM2. To use the gateway service, you may do the followings:

1. Create a new link and select Gateway Service (Ethernet) as the Link Type and PanelMaster->TCP/IP Gateway Server as the Device/Server in Link Properties dialog box.



2. You need to define the address mapping table for the gateway server because:
  - When your application writes a block of data to the transfer memory of the gateway server, the gateway server knows the real destination of that block of data, and writes the data to the real destination for your application.
  - When your application program reads a location of the transfer memory of the gateway server, the gateway server knows the real data source of the read operation, and retrieves the data from the real data source for your application.

To define the address mapping table, click the Address Mapping Table tab in the Link Properties dialog. The following is an example of the Address Mapping Table page.





The following table describes each property in the Address Mapping Table page of the Link Properties dialog box for a Gateway Service (Ethernet) link.

Property	Description																				
Use	Check this option if you want to use mapping block #n.																				
No	The mapping block's number.																				
Type	Select location type for the mapping block. Bit indicates a bit block, and Word indicates a word block.																				
Modbus Address	The starting address in the computing device that is using the Modbus protocol. The address ranges and the location types of the transfer memory are shown in the table.																				
	<table><tr><th>Address Range</th><th>Location Type</th><th>Max. Size of Block Read/Write</th><th>Note</th></tr><tr><td>1~9999</td><td>Bit</td><td>256 bits</td><td>Read Only</td></tr><tr><td>10001~19999</td><td>Bit</td><td>256 bits</td><td></td></tr><tr><td>30001~39999</td><td>Word</td><td>128 words</td><td>Read Only</td></tr><tr><td>40001~49999</td><td>Word</td><td>128 words</td><td></td></tr></table>	Address Range	Location Type	Max. Size of Block Read/Write	Note	1~9999	Bit	256 bits	Read Only	10001~19999	Bit	256 bits		30001~39999	Word	128 words	Read Only	40001~49999	Word	128 words	
	Address Range	Location Type	Max. Size of Block Read/Write	Note																	
	1~9999	Bit	256 bits	Read Only																	
	10001~19999	Bit	256 bits																		
	30001~39999	Word	128 words	Read Only																	
40001~49999	Word	128 words																			
Size	The block size. If the location type is Word, the unit is 1 word. If the location type is Bit, the unit is 16 bits. For example: The size of the mapping bit block, 3, is 2 words and 32 bits.																				
Corresponding Address	The starting address of the corresponding controller or the target panel with gateway server.																				
Cached	Check this option to save data into the memory devoted to high-speed retrieval of requested data.																				
Refresh	Available only when the Cached option is checked. Select Fast to refresh data in the memory every second. Select Normal to refresh data in the memory every 3 seconds.																				

#### Limitations:

1. At most, 32 mapping blocks can be defined.
2. At most, 12 mapping blocks can be cached.
3. At most, 4 of the cached mapping blocks can have fast refresh rate.
4. When reading a block of words or bits, the words or bits must be within a single mapping block, or the read operation will fail.



### 3.5. Sound Table

The sound table contains all the sounds used by the panel application. The sound table is empty when the panel application is initially created.

In the application, you can use the function button with the play sound operation to play a specified sound.

Before using the sound in a panel application, import or add a sound into the Sound Table.

To open the Sound Table dialog box, please do one of the following:

- 1) In the Project Manager window, double-click the Sound Table (  ) node of the panel application.
- 2) In the Project Manager window, right-click the Sound Table (  ) node to bring out the pop-up menu and select Properties.
- 3) On the Panel menu, click Sound Table...

The following is an example of the Sound Table dialog box.



The following table describes how to read or use each of the items in the dialog box.

Item	Description								
Sounds	<p>Lists the sounds for the panel application. Select a sound as the current selection, or make multiple selections. To select a sound, click the row of the header column of the sound on the list. To select multiple rows, click the row of the header column and use Ctrl + Click to add a row to the selection.</p> <p>The following table describes each column in the sound list.</p> <table> <tr> <th>Column</th><th>Description</th></tr> <tr> <td>Number</td><td>The number of the sound in the sound list. The number is an unsigned integer starting from 0. It must be unique in the panel application. The number can be edited by clicking the cell.</td></tr> <tr> <td>Name</td><td>The name of the sound. Click the cell to select a predefined sound in the Sound Database from the drop down list. To know how to predefine sounds in the Sound Database, please see <a href="#">Section 2.2.4</a>.</td></tr> <tr> <td>Type</td><td>Displays the type of sound.</td></tr> </table>	Column	Description	Number	The number of the sound in the sound list. The number is an unsigned integer starting from 0. It must be unique in the panel application. The number can be edited by clicking the cell.	Name	The name of the sound. Click the cell to select a predefined sound in the Sound Database from the drop down list. To know how to predefine sounds in the Sound Database, please see <a href="#">Section 2.2.4</a> .	Type	Displays the type of sound.
Column	Description								
Number	The number of the sound in the sound list. The number is an unsigned integer starting from 0. It must be unique in the panel application. The number can be edited by clicking the cell.								
Name	The name of the sound. Click the cell to select a predefined sound in the Sound Database from the drop down list. To know how to predefine sounds in the Sound Database, please see <a href="#">Section 2.2.4</a> .								
Type	Displays the type of sound.								
OK	Close the dialog box and accept all changes to the sound table.								
Cancel	Close the dialog box and discard all changes to the sound table.								
Import...	Import a sound from a sound file. The types of importable sound files include: WAV only.								
Add	Add a sound from the Sound Database to the end of the sound table. To know how to use the Sound Database, please see <a href="#">Section 2.2.4</a> .								
Insert	Insert a sound from the Sound Database before the selection. To know how to use Sound Database, please see <a href="#">Section 2.2.4</a> . This button is available when the selection is made.								
Delete	Delete all the selections. This button is available when the selection is made.								
Move Up	Move the selection one item down in the list. This button is available when the selection is made.								
Move Down	Move the selection one item up in the list. This button is available when the selection is made.								

## 3.6. Command Block and Status Words

You can command the panel to do a variety of things using the command block. The command block is a block of words in the controller or the internal memory. The panel scans the control block periodically and performs the specified operations according to the contents of the control block. You can decide the size of the command block, the command words that are required in the command block, and the rate of scanning the command block, so the overhead of reading the command block is minimized.

The panel can provide its status information by writing status values to the status words. The status words are in the controller or the internal memory. You can decide the status words that are required for your application so the panel will not waste time to output useless status values.

### 3.6.1. Types of Command Block and Status Words

There are three types of control blocks and status words that can be chosen for your application.

#### 3.6.1.1. Type A

##### ■ Type A Command Block

The following command words for the application and their order in the command block are adjustable.

##### Screen Switching Register

You can command the panel to change the main screen or display a window screen by setting this word to the number of the desired screen.

##### Command Flag Word (Command Flags #0 - #15)

The following table describes the function of each bit in the Command Flag Word.

Bit	Function	Description
0	(reserved)	
1	Switch Language	Change the language that the panel displays. Parameter One Register: Specifies the number of the desired language
2	Set Current Recipe Number	Set the current recipe number of the recipe block to the specified recipe number. Parameter One Register: Specifies the recipe number Parameter Two Register: Specifies the recipe block <b>Note:</b> You do not need to specify the recipe block if the application has only one recipe block.
3	Read Recipe From PLC	Read a recipe from the specified address defined in the Recipe Block dialog box, and use that recipe to replace the specified recipe of the specified recipe block. Parameter One Register: Specifies the recipe number Parameter Two Register: Specifies the recipe block <b>Note:</b> You do not need to specify the recipe block if the application has only one recipe block.
4	Write Recipe To PLC	Write the specified recipe of the specified recipe block to the specified address defined in the Recipe Block dialog box. Parameter One Register: Specifies the recipe number Parameter Two Register: Specifies the recipe block <b>Note:</b> You do not need to specify the recipe block if the application has only one recipe block.
5	Clear Alarm History	Clear the alarm history.

Continued

Bit	Function	Description												
6	Clear Alarm Count	Clear the alarm counts.												
7	Sound Buzzer	<div>Sound buzzer. Parameter One Register: Specifies the sound type.</div> <table><tr><th>Sound Type Value</th><th>Description</th></tr><tr><td>0</td><td>Continuous beep</td></tr><tr><td>1</td><td>500ms beeps</td></tr><tr><td>2</td><td>200ms beeps</td></tr><tr><td>3</td><td>100ms beeps</td></tr><tr><td>4</td><td>50ms beeps</td></tr></table>	Sound Type Value	Description	0	Continuous beep	1	500ms beeps	2	200ms beeps	3	100ms beeps	4	50ms beeps
Sound Type Value	Description													
0	Continuous beep													
1	500ms beeps													
2	200ms beeps													
3	100ms beeps													
4	50ms beeps													
8	Print Screen	<div>Print the specified screen.</div> <table><tr><th>Parameter One Register</th><th>Operation</th></tr><tr><td>(Undefined)</td><td>Prints the top screen.</td></tr><tr><td>0</td><td>Prints the top screen.</td></tr><tr><td>The number of the screen to be printed</td><td>Prints the specified screen. <b>Note:</b> This operation is not supported by PL035/037/057/058</td></tr></table>	Parameter One Register	Operation	(Undefined)	Prints the top screen.	0	Prints the top screen.	The number of the screen to be printed	Prints the specified screen. <b>Note:</b> This operation is not supported by PL035/037/057/058				
Parameter One Register	Operation													
(Undefined)	Prints the top screen.													
0	Prints the top screen.													
The number of the screen to be printed	Prints the specified screen. <b>Note:</b> This operation is not supported by PL035/037/057/058													
9	Backlight On	Turn the backlight on.												
10	Backlight Off	Turn the backlight off.												
11	Set Current User Level	Set the current user level to the specified level. Parameter One Register: the user level												
12	Close All Window Screens	Close all window screens.												
13	(reserved)													
14	(reserved)													
15	Execute General Command	See the <a href="#">section 3.6.7 Using General Commands</a> for details.												

**Note:** To activate any of the above functions, change the corresponding command bit from Off to On. The panel does not reset the command bit, so you have to reset the command bit before commanding the panel to perform the same function again. Keep the state of the command bit long enough so the panel can detect the change. The best way is to use the corresponding acknowledge bit in the Command Status Word. The panel turns on the acknowledge bit when it detects the change. It is safe to reset the command bit when the acknowledge bit turns on. The panels turns off the acknowledge bit when it sees the command bit turn off.

### Low Trigger Word (Trigger Bits #0 - #15), High Trigger Word (Trigger Bits #16 - #31)

You can use the trigger bits to initiate the following operations:

- 1) Asking the associated data loggers to collect data
- 2) Asking the associated data loggers to clear their logging buffers
- 3) Executing event macros
- 4) Increasing the clock by one hour
- 5) Decreasing the clock by one hour
- 6) Logging in
- 7) Logging out
- 8) Asking the associated line charts to read and draw a new set of data.
- 9) Asking the associated line charts to clear its content.
- 10) Asking the associated scatter charts to read and draw a new set of data.
- 11) Asking the associated scatter charts to clear its content.

### Enabling Word (Enabling Bits #0 ~ #15)

You can use the enabling bits to enable the following operations:

- 1) The data collection of data loggers

### Parameter One Register

This word specifies parameter #1 for the specified operation.

### Parameter Two Register

This word specifies parameter #2 for the specified operation.

### Parameter Three Register

This word specifies parameter #3 for the specified operation.

### Parameter Four Register

This word specifies parameter #4 for the specified operation.

### ■ Type A Status Words

You can have the following status words for the application.

Status Word	Description
Command Status Word (Command Flag Ack. Bits #0 - #15)	Stores the acknowledge bits of the command bits #0 - #15.
Low Trigger Ack. Word (Trigger Ack. Bits #0 - #15)	Stores the acknowledge bits of the trigger bits #0 - #15.
High Trigger Ack. Word (Trigger Ack. Bits #16 - #31)	Stores the acknowledge bits of the trigger bits #16 - #31.
Current Screen Number Word	Stores the current main screen number.
Current Recipe Block ID Word	Stores the current recipe block number.
Current Recipe Number Word	Stores the current recipe number of the current recipe block.
Current User Level Word	Stores the current user level.
Current Language Word	Stores the current language number.

### 3.6.1.2. Type H (Binary)

#### ■ Type H (Binary) Command Block

You can have the following command words for the application.

#### Screen Number Register

You can command the panel to change the main screen or display a window screen by setting this word to the number of the desired screen. Use this word to request the panel to 1) change the language, 2) turn on the backlight, and 3) turn off the backlight. The following table describes how to program this word.

Bit	Description
0-9	Specifies the screen to be displayed.
11-13	Specifies the language that the panel displays for. 000: The panel does nothing. 001: The panel changes the language to language 1. 010: The panel changes the language to language 2. ... 111: The panel changes the language to language 7.
14	If this bit is On, the panel turns off the back light of the display.
15	If this bit is On, the panel turns on the back light of the display.

#### Command Flag Register

The following table describes the function of each bit in the Command Flag Register.

Bit	Function
0	Clears the alarm history.
1	Clears the alarm counts.
2	(reserved)
3	(reserved)
4	Writes the current recipe of recipe block #0 to the address defined in the Recipe Block dialog box of recipe block #0.
5	Sets the current recipe number of recipe block #0 to the number specified in Recipe Number Register.
6	Reads the recipe from the address defined in the Recipe Block dialog box of recipe block #0, and use it to replace the current recipe of recipe block #0.
7	Turns on the buzzer.
8	Used as trigger bit #4.
9	Used as trigger bit #5.
10	Used as trigger bit #6.
11	Used as trigger bit #7.
12	Used as trigger bit #0.
13	Used as trigger bit #1.
14	Used as trigger bit #2.
15	Used as trigger bit #3.

**Note:** To activate any of the above functions, change the corresponding command bit from Off to On. The panel does not reset the command bit, so you have to reset the command bit before commanding the panel to perform the same function again. Keep the state of the command bit long enough so the panel can detect the change. The best way is to use the corresponding acknowledge bit in the Command Status Word. The panel turns on the acknowledge bit when it detects the change. It is safe to reset the command bit when the acknowledge bit turns on. The panels turns off the acknowledge bit when it sees the command bit turn off.

### Recipe Number Register

The number in this word will be used as the current recipe number of recipe block #0 when bit 5 of Command Flag Register changes from Off to On.

#### ■ Type H (Binary) Status Words

You can have the following status words for the application.

Status Word	Description
Screen Status Word	Whenever the panel switches the main screen, it sets this word to the number of the current main screen.
Command Flag Ack. Word	Contains the acknowledge bits for the command flags of Command Flag Register.
Current Recipe Number Word	Stores the current recipe number of recipe block #0.

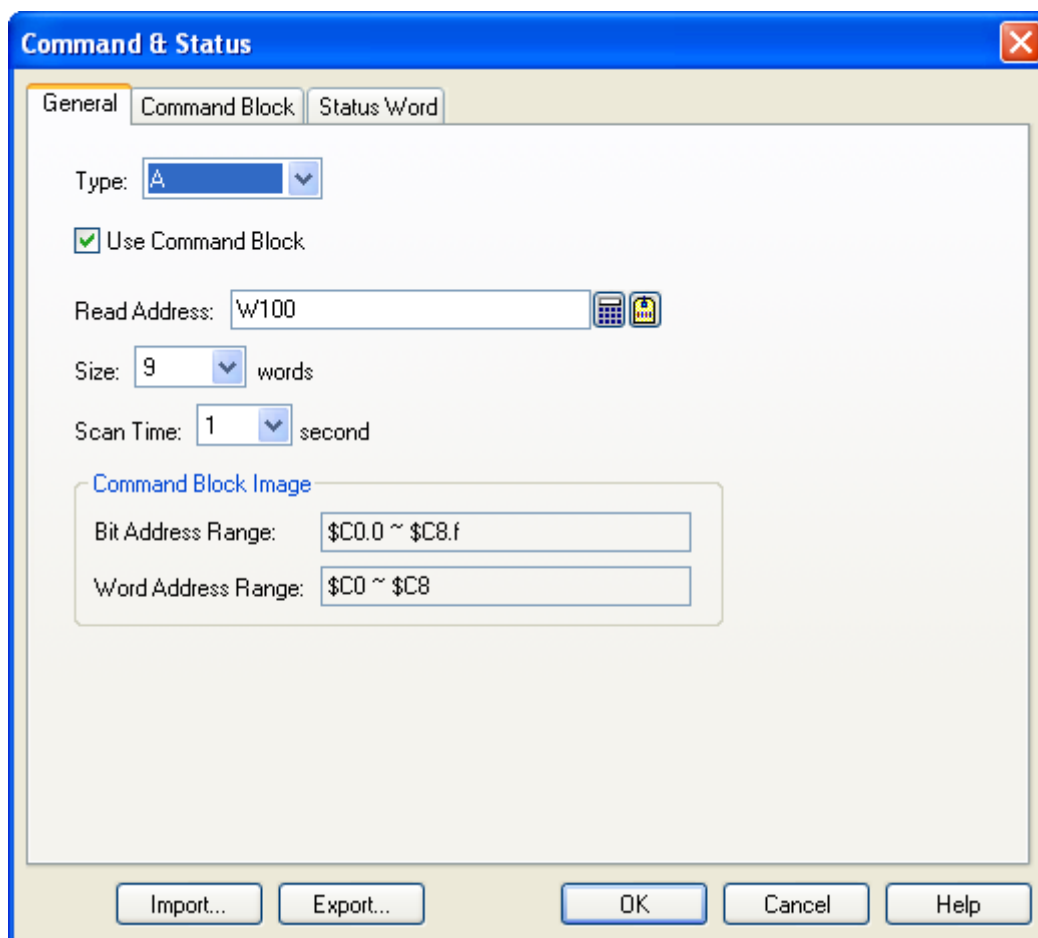
#### 3.6.1.3. Type H (BCD)

The command words and status words you can have for the application are the same as the H (Binary) type. However, the values in the following words must be in BCD format: Screen Number Register, Recipe Number Register, Screen Status Word, and Current Recipe Number Word.



### 3.6.2. General Settings

This section describes how to define the general settings for the command words and the status words using the General page of the Command & Status dialog box. The following is an example of the General page.



The following table describes each property in the General page.

Property		Description
Type		Select one of the following three types of control block and status words for your application: A, H (Binary), H (BCD)
Use Command Block		Check this item if the application needs any of the command words.
Read Address		Specify the address of the command block.
Size		Specify the size of the command block.
Scan Time		Select one of the following rates for the panel to scan the command block: 1 second, 0.5 second, 0.25 second
Command Block Image	Bit Address Range	Show the valid address range of the bits in the command block. Note that the application can only read the bits.
	Word Address Range	Show the valid address range of the words in the command block. Note that the application can only read the words.

### 3.6.3. Command Block Settings (Type A)

This section describes how to configure the type A command block using the Command Block page of the Command & Status dialog box. The following is an example of the Command Block page.

The following table describes each property in the Command Block page.

Property		Description
Command Word	Arrangement	Select <b>Default</b> for the command words to be in the default order in the command block. Select <b>Custom</b> to arrange each command word in the command block by yourself.
	Screen Switching Register	Check this option to use the word to change the main screen, or display a window screen by setting the word to the number of the desired screen.
	Reset SSR to Zero	If this option is selected, the panel always resets the Screen Switching Register to zero when it detects a nonzero value in the word. If this option is not selected, the panel resets the Screen Switching Register to zero only when the specified screen is valid and not yet displayed.
	Parameter One Register	Check this option to use this word to specify the No. 1 parameter for the specified operation.
	Command Flags #0 - #15 (Command Flag Word)	Check this option to use the command flags to request the panel to perform the specified operations.
	Trigger Bits #0 - #15 (Low Trigger Word)	Check this option if any of the trigger bits in the word are needed for your application.
	Parameter Two Register	Check this option to use this word to specify the No. 2 parameter for the specified operation.
	Trigger Bits #16 - #31 (High Trigger Word)	Check this option if any of the trigger bits in the word are needed for your application.

Continued

Property		Description											
Command Word	Enabling Bits #0 - #15 (Enabling Word)	Check this option if any of the enabling bits in the word are needed for your application.											
	Parameter Three Register	Check this option to use this word to specify the No. 3 parameter for the specified operation.											
	Parameter Four Register	Check this option to use this word to specify the No. 4 parameter for the specified operation.											
Command Flag	Switch Language (#1)	Check this option to use command flag #1 to request the panel to display the specified language. Specify the following: 1) Parameter One Register: the number of the desired language											
	Set Current Recipe Number (#2)	Check this option to use command flag #2 to request the panel to set the current recipe number of the specified recipe block to the specified recipe number. Specify the following: 1) Parameter One Register: The recipe number 2) Parameter Two Register: The recipe block <b>Note:</b> You do not need to specify the recipe block if the application has only one recipe block.											
	Read Recipe From PLC (#3)	Check this option to use command flag #3 to request the panel to read a recipe from the specified address defined in the Recipe Block dialog box, and use that recipe to replace the specified recipe of the specified recipe block. Specify the following: 1) Parameter One Register: The recipe number 2) Parameter Two Register: The recipe block <b>Note:</b> You do not need to specify the recipe block if the application has only one recipe block.											
	Write Recipe To PLC (#4)	Check this option to use command flag #4 to request the panel to write the specified recipe of the specified recipe block to the specified address defined in the Recipe Block dialog box. Specify the following: 1) Parameter One Register: The recipe number 2) Parameter Two Register: The recipe block <b>Note:</b> You do not need to specify the recipe block if the application has only one recipe block.											
	Clear Alarm History (#5)	Check this option to use command flag #5 to request the panel to clear the alarm history.											
	Clear Alarm Count (#6)	Check this option to use command flag #6 to request the panel to clear the alarm counts.											
	Sound Buzzer (#7)	Check this option to use command flag #7 to request the panel to sound its buzzer in the specified manner. Specify the following: 1) Parameter One Register: The sound type. The following table describes the sound type value. <table><tr><th>Sound Type Value</th><th>Description</th></tr><tr><td>0</td><td>Continuous beep</td></tr><tr><td>1</td><td>500ms beeps</td></tr><tr><td>2</td><td>200ms beeps</td></tr><tr><td>3</td><td>100ms beeps</td></tr><tr><td>4</td><td>50ms beeps</td></tr></table>	Sound Type Value	Description	0	Continuous beep	1	500ms beeps	2	200ms beeps	3	100ms beeps	4
Sound Type Value	Description												
0	Continuous beep												
1	500ms beeps												
2	200ms beeps												
3	100ms beeps												
4	50ms beeps												

Continued

Property		Description
Command Flag	Print Screen (#8)	Check this option to use command flag #8 to request the panel to print the specified screen. Specify the following: 1) Parameter One Register: the number of the screen to be printed <b>Note 1:</b> The top screen is printed if the number is zero or if there is no Parameter One Register. <b>Note 2:</b> The operation of printing a screen that is not the top screen is not supported by PL035/037/057/058
	Backlight On (#9)	Check this option to use command flag #9 to request the panel to turn its backlight on.
	Backlight Off (#10)	Check this option to use command flag #10 to request the panel to turn its backlight off.
	Set Current User Level (#11)	Check this option to use command flag #11 to request the panel to set the current user level to the specified one. Specify the following: 1) Parameter One Register: the user level
	Close All Window Screens (#12)	Check this option to use command flag #12 to request the panel to close all window screens.
	Execute General Command (#15)	Check this option to use command flag #15 to request the panel to perform the specified operation. See the <a href="#">section 3.6.7 Using General Commands</a> for details.

### 3.6.4. Status Word Settings (Type A)

This section describes how to configure the type A status words for your application using the Status Word page of the Command & Status dialog box. The following is an example of the Status Word page.

The screenshot shows the 'Status Word' tab of the 'Command & Status' dialog box. It contains a list of status words with checkboxes and corresponding word variables. The checked status words are: Command Flag Ack. Bits #0 ~ #15 (R100), Trigger Ack. Bits #0 ~ #15 (R101), Current Screen Number Word (R102), Current User Level Word (R103), and Current Language Word (R104). The unchecked status words are: Trigger Ack. Bits #16 ~ #31, Current Recipe Block ID Word, and Current Recipe Number Word.

In the Status Word page, check the needed status words for your application, and specify a word variable that will receive the status value for each checked status word.

The following table describes when and what the panel will write to each status word.

Status Word	Description
Command Flag Ack. Bits #0 - #15	The states of all the effective command flags to this word whenever a state change occurs on the effective command flags.
Trigger Ack. Bits #0 - #15	The states of trigger bits #0 - #15 to this word whenever a state change occurs on trigger bits #0 - #15.
Trigger Ack. Bits #16 - #31	The states of trigger bits #16 - #31 to this word whenever a state change occurs on trigger bits #16 - #31.
Current Screen Number Word	The number of the current main screen to this word whenever the main screen changes.
Current Recipe Block ID Word	The current recipe block ID to this word whenever a different recipe block becomes the current recipe block.
Current Recipe Number Word	The current recipe number of the current recipe block to this word whenever a different recipe becomes the current recipe of the current recipe block.
Current User Level Word	The current user level to this word whenever the current user level changes.
Current Language Word	The current language number to this word whenever it changes the language.

### 3.6.5. Command Block Settings (Type H)

This section describes how to configure the type H command block using the Command Block page of the Command & Status dialog box. The following is an example of the Command Block page.

The following table describes each property in the Command Block page.

Property		Description										
Command Block	Screen Number Register	Use the word to change the main screen, or display a window screen by setting the word to the number of the desired screen. You can also use this word to request the panel to do the following operations: 1) Change the language, 2) Turn on the backlight, and 3) Turn off the backlight. The following table describes how to program this word.										
		<table><tr><th>Bit</th><th>Description</th></tr><tr><td>0-9</td><td>Specifies the screen to be displayed.</td></tr><tr><td>11-13</td><td>Specifies the language that the panel displays for. 000: The panel does nothing. 001: The panel changes the language to language 1. 010: The panel changes the language to language 2. ... 111: The panel changes the language to language 7.</td></tr><tr><td>14</td><td>If this bit is On, the panel turns off the back light of the display.</td></tr><tr><td>15</td><td>If this bit is On, the panel turns on the back light of the display.</td></tr></table>	Bit	Description	0-9	Specifies the screen to be displayed.	11-13	Specifies the language that the panel displays for. 000: The panel does nothing. 001: The panel changes the language to language 1. 010: The panel changes the language to language 2. ... 111: The panel changes the language to language 7.	14	If this bit is On, the panel turns off the back light of the display.	15	If this bit is On, the panel turns on the back light of the display.
		Bit	Description									
		0-9	Specifies the screen to be displayed.									
		11-13	Specifies the language that the panel displays for. 000: The panel does nothing. 001: The panel changes the language to language 1. 010: The panel changes the language to language 2. ... 111: The panel changes the language to language 7.									
		14	If this bit is On, the panel turns off the back light of the display.									
		15	If this bit is On, the panel turns on the back light of the display.									

Continued

Property		Description
	Reset SNR to Zero	If this option is selected, the panel always resets the Screen Number Register to zero when it detects a nonzero value in the word. If this option is not selected, the panel resets the Screen Number Register to zero only when the specified screen is valid and not displayed yet.
	Command Flag Register	Use the command flags to request the panel to do the specified operations.
	Recipe Number Register	Use command flag #5 to set the current recipe number for recipe block #0, specify the recipe number in this word.
Command Flag	Clear Alarm History (#0)	Check this option to use command flag #0 to request the panel to clear the alarm history.
	Clear Alarm Counts (#1)	Check this option to use command flag #1 to request the panel to clear the alarm counts.
	Write Recipe To PLC (#4)	Check this option to use command flag #4 to request the panel to write the current recipe of recipe block #0 to the specified address defined in the Recipe Block dialog box.
	Set Current Recipe Number (#5)	Check this option to use command flag #5 to request the panel to set the current recipe number for recipe block #0. Specify the following: 1) Recipe Number Register: the recipe number
	Read Recipe From PLC (#6)	Check this option to use command flag #6 to request the panel to read a recipe from the specified address defined in the Recipe Block dialog box, and use that recipe to replace the current recipe of recipe block #0.
	Sound Buzzer (#7)	Check this option to use command flag #7 to request the panel to sound its buzzer.
	Trigger Bit #4 (#8)	Check this option so command flag #8 will be used as trigger bit #4.
	Trigger Bit #5 (#9)	Check this option so command flag #9 will be used as trigger bit #5.
	Trigger Bit #6 (#10)	Check this option so command flag #10 will be used as trigger bit #6.
	Trigger Bit #7 (#11)	Check this option so command flag #11 will be used as trigger bit #7.
	Trigger Bit #0 (#12)	Check this option so command flag #12 will be used as trigger bit #0.
	Trigger Bit #1 (#13)	Check this option so command flag #13 will be used as trigger bit #1.
	Trigger Bit #2 (#14)	Check this option so command flag #14 will be used as trigger bit #2.
	Trigger Bit #3 (#15)	Check this option so command flag #15 will be used as trigger bit #3.

### 3.6.6. Status Word Settings (Type H)

This section describes how to configure the type H status words for your application using the Status Word page of the Command & Status dialog box. The following is an example of the Status Word page.

The screenshot shows the 'Status Word' tab of a dialog box. It features three configuration options:

- ☒ Screen Status Word: R100
- ☒ Command Flag Ack. Word: R101
- ☐ Current Recipe Number Word

In the Status Word page, check the needed status words for your application and specify a word variable that will receive the status value for each checked status word.

The following table describes when and what the panel will write to each status word.

Status Word	Description
Screen Status Word	The panel will write the number of the current main screen to this word whenever the main screen changes.
Command Flag Ack. Word	The panel will write the states of all the effective command flags to this word whenever there a state change occurs on the effective command flags.
Current Recipe Number Word	The panel will write the current recipe number of recipe block #0 to this word whenever a different recipe becomes the current recipe of recipe block #0.



### 3.6.7. Using General Commands

This section describes how to use the general commands provided by the type A command block. To issue a general command, specify necessary parameters in the parameter registers and then turn on command flag #15 in Command Flag Register.

You can request the panel to perform the following file operations using the General Command and the default filename:

Operation	Parameter One Register (Operation code)	Parameter Two Register (Data ID)	Default Filename Format
Save logged data to TXT file	1	ID of the data logger (0-15)	DL<ID>_<Date>_<Time>.txt
Save logged data to CSV file	14	ID of the data logger (0-15)	DL<ID>_<Date>_<Time>.csv
Save logged alarms to TXT file	2	(Not required)	AL_<Date>_<Time>.txt
Save logged alarms to CSV file	15	(Not required)	AL_<Date>_<Time>.csv
Save alarm counts to TXT file	3	(Not required)	AC_<Date>_<Time>.txt
Save alarm counts to CSV file	16	(Not required)	AC_<Date>_<Time>.csv
Save recipe data to TXT file	4	ID of the recipe block (0-15)	RB<ID>.txt
Save recipe data to CSV file	17	ID of the recipe block (0-15)	RB<ID>.csv
Save recipe data to DAT file	5	ID of the recipe block (0-15)	RB<ID>.dat
Print screen to BMP file (256 colors) If the target panel is PE, the color resolution follows the setting of the PC	6	Number of the screen	S<ID>_<Date>_<Time>.bmp
Print screen to BMP file (64K colors) If the target panel is PE, Print screen to JPG file	7	Number of the screen	S<ID>_<Date>_<Time>.bmp
Save logged operations to TXT file	9	(Not required)	OL_<Date>_<Time>.txt
Save logged operations to CSV file	18	(Not required)	OL_<Date>_<Time>.csv
Save logged data to LDF file	10	ID of the data logger (0-15)	DL<ID>_<Date>_<Time>.ldf
Take picture and save it to BMP file	12	ID of the USB camera (0-3)	CAM<ID>_<Date>_<Time>.bmp
Take picture and save it to JPG file	13	ID of the USB camera (0-3)	CAM<ID>_<Date>_<Time>.jpg

**Note for default filename format:**

<ID>: ID of the data logger, ID of the recipe block, ID of the USB camera, or number of the screen

<Date>: date when saving the data; format is YYMMDD

<Time>: time when saving the data; format is hhmmss

You can request the panel to perform the following file operations using the General Command and the specified filename:

Operation	Parameter One Register (Operation code)	Parameter Two Register (Data ID)	Parameter Three Register (Specified filename)
Save logged data to TXT file	31	ID of the data logger (0-15)	Specifies the address in the internal memory \$U that stores the specified filename or full pathname. The name must be a valid Windows pathname with ASCII characters only. The character string must be null terminated and each character occupies one byte. The maximum length of the string is 127. All the folders stated in the full pathname must already exist or the file operation will fail. For example, if the number stored in this register is 400, it means the specified filename is stored in \$U400.
Save logged alarms to TXT file	32	(Not required)	Same as above
Save alarm counts to TXT file	33	(Not required)	Same as above
Save recipe data to TXT file	34	ID of the recipe block (0-15)	Same as above
Save recipe data to DAT file	35	ID of the recipe block (0-15)	Same as above
Save logged operations to TXT file	39	(Not required)	Same as above
Save logged data to LDF file	40	ID of the data logger (0-15)	Same as above
Take picture and save it to BMP file	42	ID of the USB camera (0-3)	Same as above
Take picture and save it to JPG file	43	ID of the USB camera (0-3)	Same as above

### 3.7. Setting up Clock Operations

This section describes how to define Clock Operations for the panel application using the Clock dialog box. The following is an example of the Clock dialog box.

The following table describes each property in the Clock dialog box.

Property		Description																										
Write	Write Time/date to PLC	Select this option so the panel will write time and date information to the specified variable.																										
	Time/date Data Type	Select one of the following data types for the output time and data information.																										
	6 BCD bytes	<table border="1"> <thead> <tr> <th colspan="2">Data Type</th><th>Description</th></tr> </thead> <tbody> <tr> <td colspan="2"></td><td>The following shows the data structure.</td></tr> <tr> <th>Byte No.</th><th colspan="2">Content</th></tr> <tr> <td>0</td><td colspan="2">Minute; 0-59</td></tr> <tr> <td>1</td><td colspan="2">Hour; 0-23</td></tr> <tr> <td>2</td><td colspan="2">Day; 1-31</td></tr> <tr> <td>3</td><td colspan="2">Month; 1-12</td></tr> <tr> <td>4</td><td colspan="2">Year; 00-99</td></tr> <tr> <td>5</td><td colspan="2">Day-of-week; 0(Sunday)-6(Saturday)</td></tr> </tbody> </table> <p><b>Note:</b> All the values are in BCD format.</p>	Data Type		Description			The following shows the data structure.	Byte No.	Content		0	Minute; 0-59		1	Hour; 0-23		2	Day; 1-31		3	Month; 1-12		4	Year; 00-99		5	Day-of-week; 0(Sunday)-6(Saturday)
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Property		Description																																																																	
Write	Time/date Data Type	<table><tr><th>Data Type</th><th>Description</th></tr><tr><td rowspan="9">8 BCD bytes</td><td>The following shows the data structure.</td></tr><tr><td><table><tr><th>Byte No.</th><th>Content</th></tr><tr><td>0</td><td>Minute; 0-59</td></tr><tr><td>1</td><td>Hour; 0-23</td></tr><tr><td>2</td><td>Day; 1-31</td></tr><tr><td>3</td><td>Month; 1-12</td></tr><tr><td>4</td><td>Year; 00-99</td></tr><tr><td>5</td><td>Day-of-week; 0(Sunday)-6(Saturday)</td></tr><tr><td>6</td><td>Second; 0-59</td></tr><tr><td>7</td><td>0</td></tr></table></td></tr><tr><td colspan="2"><b>Note:</b> All the values are in BCD format.</td></tr><tr><td rowspan="9">7 BCD words</td><td>The following shows the data structure.</td></tr><tr><td><table><tr><th>Word No.</th><th>Content</th></tr><tr><td>0</td><td>Second; 0-59</td></tr><tr><td>1</td><td>Minute; 0-59</td></tr><tr><td>2</td><td>Hour; 0-23</td></tr><tr><td>3</td><td>Day; 1-31</td></tr><tr><td>4</td><td>Month; 1-12</td></tr><tr><td>5</td><td>Year; 00-99</td></tr><tr><td>6</td><td>Day-of-week; 0(Sunday)-6(Saturday)</td></tr></table></td></tr><tr><td colspan="2"><b>Note:</b> All the values are in BCD format.</td></tr><tr><td rowspan="9">7 binary words</td><td>The following shows the data structure.</td></tr><tr><td><table><tr><th>Word No.</th><th>Content</th></tr><tr><td>0</td><td>Second; 0-59</td></tr><tr><td>1</td><td>Minute; 0-59</td></tr><tr><td>2</td><td>Hour; 0-23</td></tr><tr><td>3</td><td>Day; 1-31</td></tr><tr><td>4</td><td>Month; 1-12</td></tr><tr><td>5</td><td>Year; 00-99</td></tr><tr><td>6</td><td>Day-of-week; 0(Sunday)-6(Saturday)</td></tr></table></td></tr></table>	Data Type	Description	8 BCD bytes	The following shows the data structure.	<table><tr><th>Byte No.</th><th>Content</th></tr><tr><td>0</td><td>Minute; 0-59</td></tr><tr><td>1</td><td>Hour; 0-23</td></tr><tr><td>2</td><td>Day; 1-31</td></tr><tr><td>3</td><td>Month; 1-12</td></tr><tr><td>4</td><td>Year; 00-99</td></tr><tr><td>5</td><td>Day-of-week; 0(Sunday)-6(Saturday)</td></tr><tr><td>6</td><td>Second; 0-59</td></tr><tr><td>7</td><td>0</td></tr></table>	Byte No.	Content	0	Minute; 0-59	1	Hour; 0-23	2	Day; 1-31	3	Month; 1-12	4	Year; 00-99	5	Day-of-week; 0(Sunday)-6(Saturday)	6	Second; 0-59	7	0	<b>Note:</b> All the values are in BCD format.		7 BCD words	The following shows the data structure.	<table><tr><th>Word No.</th><th>Content</th></tr><tr><td>0</td><td>Second; 0-59</td></tr><tr><td>1</td><td>Minute; 0-59</td></tr><tr><td>2</td><td>Hour; 0-23</td></tr><tr><td>3</td><td>Day; 1-31</td></tr><tr><td>4</td><td>Month; 1-12</td></tr><tr><td>5</td><td>Year; 00-99</td></tr><tr><td>6</td><td>Day-of-week; 0(Sunday)-6(Saturday)</td></tr></table>	Word No.	Content	0	Second; 0-59	1	Minute; 0-59	2	Hour; 0-23	3	Day; 1-31	4	Month; 1-12	5	Year; 00-99	6	Day-of-week; 0(Sunday)-6(Saturday)	<b>Note:</b> All the values are in BCD format.		7 binary words	The following shows the data structure.	<table><tr><th>Word No.</th><th>Content</th></tr><tr><td>0</td><td>Second; 0-59</td></tr><tr><td>1</td><td>Minute; 0-59</td></tr><tr><td>2</td><td>Hour; 0-23</td></tr><tr><td>3</td><td>Day; 1-31</td></tr><tr><td>4</td><td>Month; 1-12</td></tr><tr><td>5</td><td>Year; 00-99</td></tr><tr><td>6</td><td>Day-of-week; 0(Sunday)-6(Saturday)</td></tr></table>	Word No.	Content	0	Second; 0-59	1	Minute; 0-59	2	Hour; 0-23	3	Day; 1-31	4	Month; 1-12	5	Year; 00-99	6	Day-of-week; 0(Sunday)-6(Saturday)
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<b>Note:</b> All the values are in BCD format.																																																																			
7 binary words	The following shows the data structure.																																																																		
	<table><tr><th>Word No.</th><th>Content</th></tr><tr><td>0</td><td>Second; 0-59</td></tr><tr><td>1</td><td>Minute; 0-59</td></tr><tr><td>2</td><td>Hour; 0-23</td></tr><tr><td>3</td><td>Day; 1-31</td></tr><tr><td>4</td><td>Month; 1-12</td></tr><tr><td>5</td><td>Year; 00-99</td></tr><tr><td>6</td><td>Day-of-week; 0(Sunday)-6(Saturday)</td></tr></table>	Word No.	Content	0	Second; 0-59	1	Minute; 0-59	2	Hour; 0-23	3	Day; 1-31	4	Month; 1-12	5	Year; 00-99	6	Day-of-week; 0(Sunday)-6(Saturday)																																																		
	Word No.	Content																																																																	
	0	Second; 0-59																																																																	
	1	Minute; 0-59																																																																	
	2	Hour; 0-23																																																																	
	3	Day; 1-31																																																																	
	4	Month; 1-12																																																																	
	5	Year; 00-99																																																																	
6	Day-of-week; 0(Sunday)-6(Saturday)																																																																		
Write Address		Specifies the variable that will receive the output time and date information.																																																																	
Write Operation	Timed	When this item is selected, the panel writes time and date information to the specified variable periodically at a rate specified in the Interval field. Specify an interval between 1 and 255 minutes.																																																																	
	Triggered	When this item is selected, the panel writes time and date information to the specified variable whenever the specified trigger bit changes from Off to On.																																																																	

Continued

Property		Description
Read	Synchronize Panel with PLC	Select this option so the panel will read time and date information from the specified variable and adjust its clock accordingly.
	Time/date Data Type	Specifies the data type for the input time and data information. For details, see the description of the Time/date Data Type field of the Write group.
	Read Address	Specifies the variable that the panel will read the time and date information.
	Do not run panel application until the restart synchronization is done successfully	Select this option so the panel application does not run until the restart synchronization is done successfully.
	Read Operation	<div>Timed</div> <div>Triggered</div> When this item is selected, the panel reads time and date information from the specified variable periodically at a rate specified in the Interval field. Specify an interval between 1 and 255 minutes.
Increase Hour		Select this option to increase the panel's clock by one, by changing the specified trigger bit from Off to On.
Decrease Hour		Select this option to decrease the panel's clock by one, by changing the specified trigger bit from Off to On.

### 3.8. Setting up Passwords

This section describes how to set up passwords for the panel application using the Passwords dialog box. The following is an example of the Passwords dialog box.

User Level	Password	Comment
1	1	Operator
2	22	
3	333	
4	4444	
5	55555	
6	666666	
7	7777777	Maintenance
8	88888888	Executive
<input checked="" type="checkbox"/> 9		Use developer password

☒ Automatic login for operations requiring a higher user level  
 Login Trigger Bit: #7  
 Logout Trigger Bit: #8  
 Login Timeout: 30 seconds

The following table describes each property in the Passwords dialog box.

Property	Description
Password	The Password column contains 8 fields. Specify the password for a user level in the corresponding field. A password is a positive integer up to 8 digits. A password must be unique within the application.
Comment	The Comment column contains 8 editable fields. You can type the comment for a password or user level in the corresponding field.
9	Check this item if you want the developer password to be the password with the highest privilege.
Automatic login for operations requiring a higher user level	The password keypad will be displayed to enter a password for a higher user level when the operator touches an object that requires a higher user level than the current one in order to perform the programmed operation.
Login Trigger Bit	When the specified trigger bit changes from Off to On, the password keypad will be displayed to enter a password. The operator can enter a valid password or cancel the password keypad.
Logout Trigger Bit	When the specified trigger bit changes from Off to On, the current user level is reset to 0.
Login Timeout	The password keypad will close automatically when it gets no input from the operator for the specified time.

## 3.9. Screens

### 3.9.1. Types of Screens

There are three types of screens: Normal Screen, Window Screen and Menu Screen.

To create any type of screen, you can do the following:

- 1) Create a screen. Default is a normal screen. To learn how to create a screen, please see [Section 3.9.2](#) for details.
- 2) Open Screen Properties dialog box. To learn how to open the dialog box, please see [Section 3.9.3](#) for details.
- 3) In the dialog box, select the type you would like the screen to be.

The following table describes how each type of screen opens, closes, and displays.

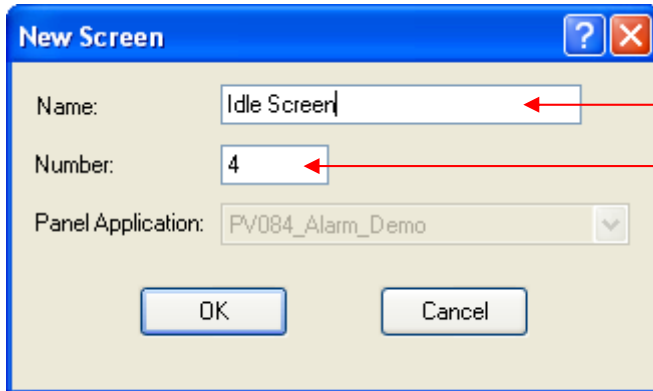
Types	Description
Normal Screen	<p>A screen that will be displayed when it is selected to be a startup screen, or when a screen button with open screen/previous screen operation is pressed.</p> <p>Usually the normal screen cannot be closed until the other normal screen is opened.</p> <p>The normal screen is also called a main screen that is only displayed one at a time in the panel. The screen size is fixed and depends on the panel model.</p>
Window Screen	<p>A screen that appears in the following situations:</p> <ul style="list-style-type: none"> <li>• Screen button with open screen operation is pressed</li> <li>• Selected to be a startup screen</li> <li>• OPEN_WS macro command is used.</li> <li>• Alarm is active or clear when the display screen option in the discrete/analog alarm block is selected</li> <li>• Page selector object is used</li> <li>• Custom keypad is needed</li> </ul> <p>Usually the window screen stays on the normal screen until the close button is pressed on the title bar or the screen button or CLOSE_WS macro command to close. It then disappears.</p> <p>The panel can display many window screens at a time.</p> <p>At runtime, the window screen will initially be displayed at the predefined position. If the window screen has the title bar, click-and-hold the title bar to move it around in the panel.</p>
Menu Screen	<p>A screen that is displayed when it is selected to be a startup screen, or when a screen button with the open screen operation is pressed.</p> <p>The menu screen remains on the normal screen or window screen, until an area outside the menu screen is pressed, or the screen button is used to close the menu screen. The menu screen then closes.</p> <p>The panel can display one menu screen at a time.</p> <p>The menu screen can slide horizontally into view from either the left or right side of the screen. It can also appear by the left or right side of the button and slide upward or downward into view. Please see <a href="#">Section 5.3.4</a> to learn how to use the screen button to set up the position of the menu screen.</p> <p>Usually the menu screen stays on the normal screen or window screen until you press anywhere outside the menu screen or use screen button to close. It then disappears.</p>

### 3.9.2. Creating and Opening Screens

#### ■ Creating Screens

To create a screen, you can do the following:

- 1) Do one of the following:
  - On the Screen menu, click New Screen...
  - In the Project Manager window, right-click the panel application > Screens item and then click New Screen... on the pop-up menu.
- 2) In the New Screen dialog box, type the name and number desired, and hit the ENTER key or click the OK button to validate your choice. The following is an example of the New Screen dialog box.



The 'New Screen' dialog box has a blue title bar with a question mark and a close button. It contains three input fields: 'Name' with the text 'Idle Screen', 'Number' with the value '4', and 'Panel Application' with a dropdown menu showing 'PV084\_Alarm\_Demo'. At the bottom are 'OK' and 'Cancel' buttons.

Specify the screen name. Screen names are case insensitive. For example, the names Startup Screen, startup screen are considered to be the same.

Specify the screen number. The screen number must be between 1 and 7999.

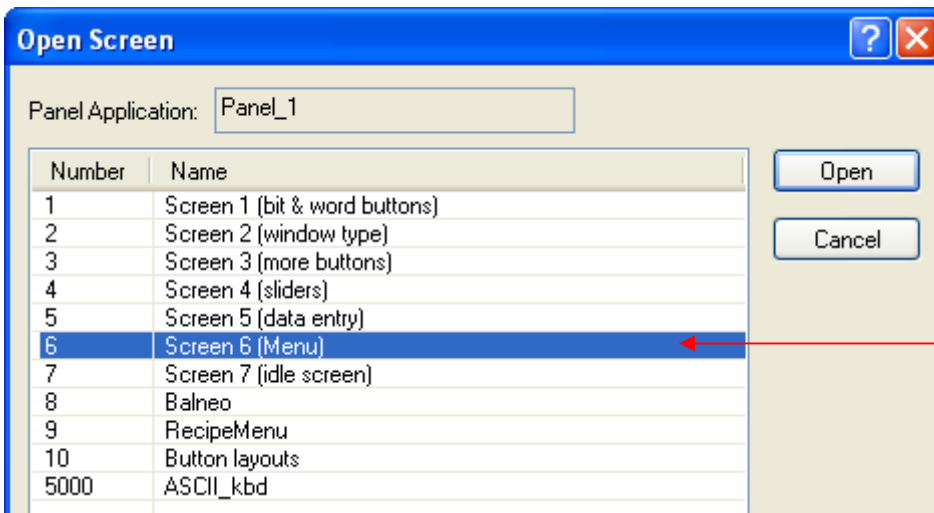
**Note:** In each panel application, both the screen name and the screen number have to be unique.

#### ■ Opening Screens

To open a screen, you can do the following:

- 1) In the Project Manager window, double click the screen you want to open
- 2) On the Screen menu, click Open Screen... In the Open Screen dialog box, select one or multiple screens and click Open button to open all the selected screens.

The following is an example of Open Screen dialog box.



The 'Open Screen' dialog box has a blue title bar with a question mark and a close button. It features a 'Panel Application' dropdown menu set to 'Panel\_1'. Below is a table with two columns: 'Number' and 'Name'. A list of screens is shown, with 'Screen 6 (Menu)' selected. To the right of the table are 'Open' and 'Cancel' buttons.

Number	Name
1	Screen 1 (bit & word buttons)
2	Screen 2 (window type)
3	Screen 3 (more buttons)
4	Screen 4 (sliders)
5	Screen 5 (data entry)
6	Screen 6 (Menu)
7	Screen 7 (idle screen)
8	Balneo
9	RecipeMenu
10	Button layouts
5000	ASCII_kbd

To select a screen, click the row of the screen in the list.

To select multiple screens, click one row and use Ctrl + Click to add additional rows to the selection.

To select continuous screens, click one row and hold the Shift key and click the last row.



### ■ Activating Screens after Opening

To uncover any screen that is partially or completely obscured by other screens, you can do the following:

- 1) In the Project Manager window, double click the screen which is not at the top.
- 2) On the Window menu, click the screen you need to activate. Or click Windows... to bring out the Windows dialog box. In the Windows dialog box, select the screen and then click Activate button.
- 3) Click anywhere on the screen. If the screens are maximized, click on the title tab of the screen.

### 3.9.3. Setting up a Screen

You can set up the screen with the Screen Properties dialog box.

To set up a screen, right click Panel Application > Screens > screen to set up in the Project Manager window, and then click Properties on the pop-up menu.

To set up a current screen (an opened screen which is at the top), do one of the following:

- 1) In the Project Manager window, double click the current screen.
- 2) Right click the blank area on the current screen, and then click Screen Properties... on the pop-up menu.
- 3) On the Screen menu, click Screen Properties...

The Screen Properties dialog box contains the following pages. Some of the pages appear only when they are needed.

#### ■ General

Described in [Section 3.9.3.1.](#)

#### ■ Background

Described in [Section 3.9.3.2.](#)

#### ■ Keys

Described in [Section 3.2.2.](#)

#### ■ Open Macro / Close Macro / Cycle Macro

Described in [Section 14.2.6.](#)

### 3.9.3.1. General Page

This section describes how to define the general settings for a screen. The following is an example of the General page of the Screen Properties dialog box.

**Screen Properties**

General Background Open Macro Close Macro Cycle Macro

Screen Number:  Screen Name:

☒ Use This Screen

**Type**

☐ Normal Screen ☒ Window Screen ☐ Menu Screen

Width:  Height:

☒ Shown on Display Center  
☐ Shown At

☒ Title Bar ☒ Close Button

Language:

Title:  **T**

☒ Base Screen

☒ OPEN Macro ☒ CLOSE Macro

☒ CYCLE Macro

Cycle Macro Delay Time:  milli-second(s)

**Print**

☐ Whole Screen

Upper-left Corner X1:  Y1:  Lower-right Corner X2:  Y2:

Position on Paper (millimeters) X:  Y:

Percentage of data scan time allocated to the fast scan:   
(Note: Use data tags to specify the fast scan)

What to show for an object's content before its corresponding data is scanned for the object?

☒ Blank  
☐ Last scanned data or blank  
☐ Last scanned data or zero

☒ Numeric keypad remains open for continuous data entry



Note:

OK Cancel Help

The following table describes each item in the General page.

Property	Description
Screen Number	The number of the screen. It must be between 1 and 7999.
Screen Name	The name of the screen.
Use This Screen	Check this option to use the screen.
Type	Specifies the type of the screen. There are three types: Normal Screen, Window Screen and Menu Screen. Please see <a href="#">Section 3.9.1</a> for details.

Continued

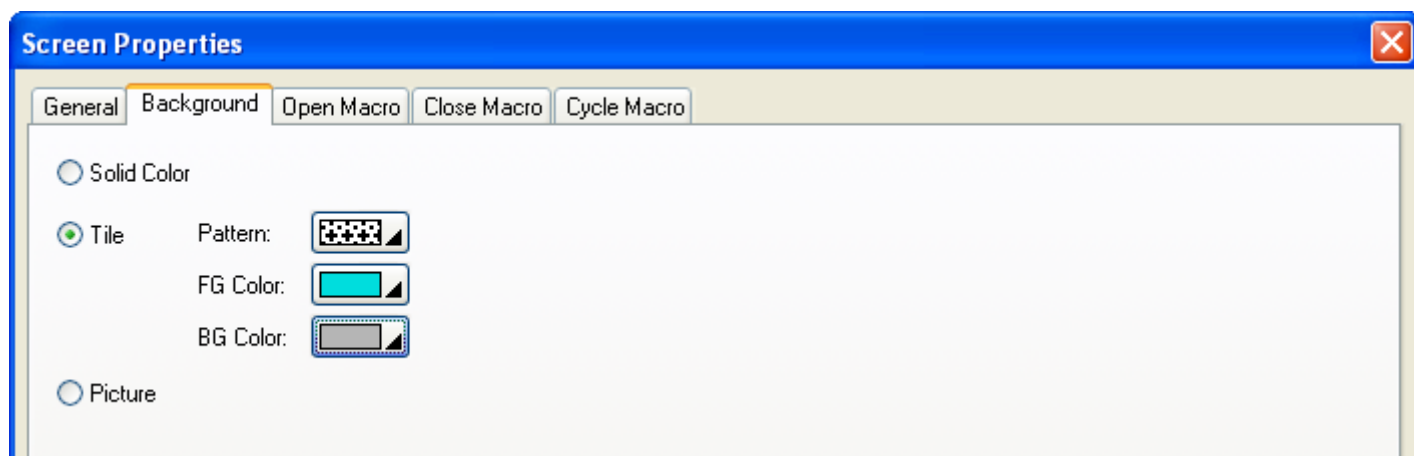
Property		Description
Width		Specifies the width (in pixels) of the screen. This field is available to edit when the Type is Window Screen and Menu Screen.
Height		Specifies the height (in pixels) of the screen. This field is available to edit when the Type is Window Screen and Menu Screen.
Shown on Display Center		Check this option to show the window screen on the display center. This field is available when the Type is Window Screen.
Shown At		Check this option to show the window screen at the specified position. This field is available when the Type is Window Screen.
	X	Specifies the X coordinate of the window screen's upper-left corner in pixels on the normal screen.
	Y	Specifies the Y coordinate of the window screen's upper-left corner in pixels on the normal screen.
Title Bar		Select this option to show a title bar with the specified title with the window screen when the Type is Window Screen.
Close Button		Select this option for the window screen to have a close Button when the Type is Window Screen and the Title Bar field is checked.
Language		Select a language to view and edit the settings of the title for that language. This field is available when the Type is Window Screen and Title Bar field is checked.
Title		Specifies the title or select the title from text database for the Title Bar. Click  to select the text from text database. Click  to edit text. This field is available when the Type is Window Screen and Title Bar field is checked.
Base Screen	<Check Box>	Check this option to have a base screen for the current screen
	<Combo Box>	Specifies the screen to be a base screen. This field is available when the Base Screen is checked.
OPEN Macro		Check this item for the screen to have the OPEN macro. An Open Macro is run once when the associated screen is being opened. The target panel will not display the screen until the Open Macro terminates. Use OPEN macro to initialize global data and settings for the screen.
CLOSE Macro		Check this item for the screen to have the CLOSE macro. A Close Macro is run once when the associated screen is being closed. The target panel will not erase the screen until the Close Macro terminates.
CYCLE Macro	<Check Box>	Check this item for the screen to have the CYCLE macro. A Cycle Macro is run continuously while the associated screen is open. The target panel runs Cycle Macros cyclically, i.e. a Cycle Macro will run beginning with the first command each time after it completes the processing of the last command of the macro, or when it encounters an END command in the middle of the macro. The cycle macro terminates immediately when the screen is closed.
	Cycle Macro Delay Time	Specifies the delay time in 0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000 millisecond for the cycle macro.
Print	Whole Screen	Check this item to print the whole screen by Command Flag or Function Button or Macro Command
	Upper-left	Specifies the X and Y coordinates in pixels for the upper-left corner of the screen's printing area. The field is available when Whole Screen item is unchecked.
	Lower-Right	Specifies the X and Y coordinates in pixels for the lower-right corner of the screen's printing area. The field is available when Whole Screen item is unchecked.
	Position on Paper	Specifies the X and Y coordinates in millimeters for the position where the specified area of the screen will print on paper.

Continued



Property		Description
Percentage of data scan time allocated to the fast scan		Select the percentage of data scan time allocated to the fast scan among 50%, 66%, 75%, 80%, 86% and 90%. Note: With a bigger percentage, the data scan time is faster to the tag with fast scan rate. However, data scan time is slower to the tag with normal scan rate.
What to show for an object's content before its corresponding data is scanned for the object?	Blank	Select this item to show blank for an object's content before its corresponding data is scanned for the object.
	Last scanned data or blank	Select this item to show last scanned data or blank for an object's content before its corresponding data is scanned for the object.
	Last scanned data or zero	Select this item to show last scanned data or zero for an object's content before its corresponding data is scanned for the object.
Operable under window screen		Check this option to make the screen operable under window screen. This field is available only when the Type is Normal Screen.
Numeric keypad remains open for continuous data entry		Check this option for numeric keypad to remain open for continuous data entry.
Note		Type a note for the screen.

### 3.9.3.2. Background Page

This section describes how to define the background of a screen. The following is an example of the Background page of the Screen Properties dialog box.



The following table describes each item in the Background page.

Property		Description
Solid Color		Check this option for the screen background to be filled with a solid color.
	<Solid Color>	Click the corresponding color button to specify the color used to fill the background. This item is available when Solid Color option is selected.
Tile		Check this option for the screen background to be filled with a pattern.
	Pattern	Specify the pattern used to fill the background. Click the corresponding Pattern icon and select a pattern from the Pattern palette. This item is available when Tile option is selected.
	FG Color	The color used to paint the black part of the pattern. When the solid white pattern is selected, this color is not used. This item is available when Tile option is selected.
	BG Color	The color used to paint the white part of the pattern. This item is available when Tile option is selected.
Picture		Check this option to have a picture background for the screen.
	<Name>	<p>The name of the picture. Use the drop-down list to select a picture from the picture database.</p> <p>Click  to select a picture file. Then, the picture of the selected file is imported and saved in the picture database.</p> <p>Click  to bring up the Select/Import from Library dialog box. Select a picture from a picture library file. Then, the selected picture is imported and saved in the picture database.</p>
	Stretch	Check this item so the picture can change its size automatically to fit the screen.

### 3.9.4. Importing/Exporting a Screen

This section describes how to export a screen and import a screen regardless of the panel model and screen size.

#### ■ Importing a screen

- 1) Right-click Panel Application > Screens item in the Project Manager window to bring out the pop-up menu and then use Import Screen...
- 2) Click the \*.snf file you want to create a new screen from. To open a screen that was saved in a different folder, locate and open the folder first.
- 3) Click Open.

#### ■ Exporting a screen

If you have screen you want to reuse, you can export the screen as a .snf file. You can do the following:

- 1) In the Project Manager window, click the screen to export
- 2) Right-click on the screen to display the screen item's "pop-up menu"; and then click Export Screen...
- 3) To save a screen in a different folder, locate and open the folder first, then click Save.

### 3.9.5. Cutting/Copying/Pasting/Deleting a Screen

#### ■ Copying or Cutting and Pasting a Screen

To copy/cut a screen which is opened and activated, right click the blank area on the screen, and then click Copy Screen/Cut Screen on the pop-up menu, or use the Copy Screen/Cut Screen command On the Screen menu.

After Copying or Cutting, you can paste the screen by right clicking the blank area on any of the screen, and then use Paste Screen on the pop-up menu or the Paste Screen command On the Screen menu.

#### ■ Deleting a Screen

To delete a screen which is opened and activated, right click the blank area on the screen, and then click Delete Screen on the pop-up menu or use the Delete Screen command on the Screen menu.

To delete a screen from Project Manager window, locate the screen to delete and right-click on the screen node to use the Delete command on the pop-up menu. Confirm the deleting operation.

### 3.9.6. Saving Screens as Pictures

This section describes how to save screens as pictures.

#### ■ Saving a screen as a picture

To save a current screen as the bmp or jpg file, you can do the following.

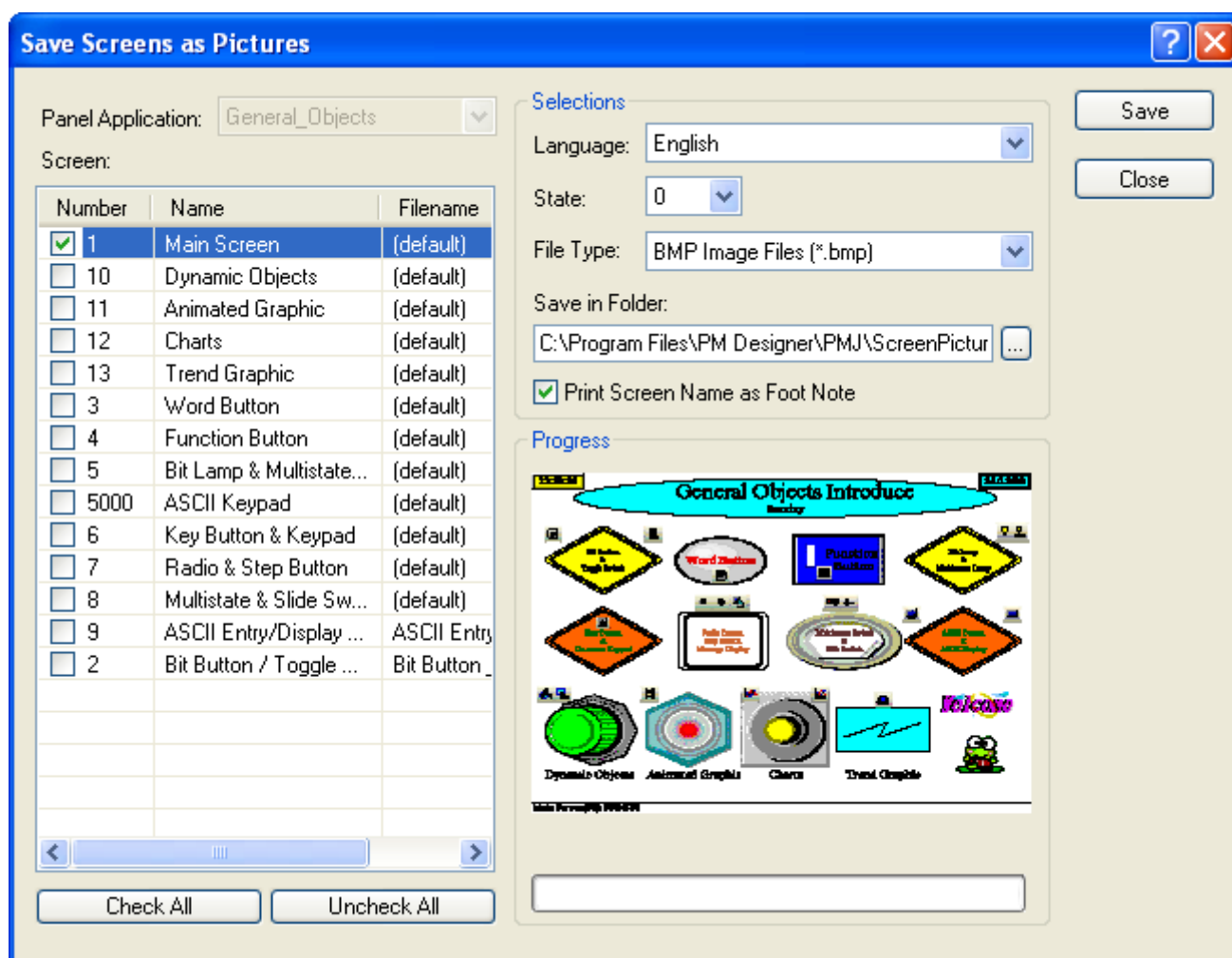
- 1) Open and activate the screen as a current screen
  - 2) Right click anywhere on the current screen, and then click Save Current Screen as Picture... on the pop-up menu.
- or -

On the Screen menu, click Save Current Screen as Picture...

#### ■ Saving multiple screens as pictures

You can also use the Save Screens as Pictures dialog box to save a screen or multiple screens as bmp or jpg files. To open the dialog box, click Save Screens as Pictures... on the Screen menu.

The following is an example of the Save Screens as Pictures dialog box.



The following table describes each item in the dialog box.

Property		Description								
Panel Application		The application Name.								
Screen		<div>The screen list shows all the screens in the panel application. Click the column header to sort the items.</div> <div>The following table describes each column in the screen list.</div> <table><tr><th>Column</th><th>Description</th></tr><tr><td>Number</td><td>The screen number. Check the box before the screen number to save the screen as a picture file.</td></tr><tr><td>Name</td><td>The screen name.</td></tr><tr><td>Filename</td><td>The Filename. The default filename is Screen Name+Language Name+S+State Number. Note: If any of the characters such as \:.*?"&lt;&gt;  in the screen name, they will be converted to underscore ( _ ).</td></tr></table>	Column	Description	Number	The screen number. Check the box before the screen number to save the screen as a picture file.	Name	The screen name.	Filename	The Filename. The default filename is Screen Name+Language Name+S+State Number. Note: If any of the characters such as \:.*?"<>  in the screen name, they will be converted to underscore ( _ ).
Column	Description									
Number	The screen number. Check the box before the screen number to save the screen as a picture file.									
Name	The screen name.									
Filename	The Filename. The default filename is Screen Name+Language Name+S+State Number. Note: If any of the characters such as \:.*?"<>  in the screen name, they will be converted to underscore ( _ ).									
Check All		Click the button to check all the screens.								
Uncheck All		Click the button to uncheck all the screens.								
Selections	Language	The language used to display the text of objects.								
	State	The state that displays the state of objects.								
	File Type	Select the file type. There are two types: bmp and jpg.								
	Save in Folder	Specifies the folder to locate the files. If the file exists in the folder, it will be replaced by the new one.								
	Print Screen Name as Foot Note	Check this option to display general screen information, such as foot note. The format of the foot note is Screen Name (#Screen Number); Screen WidthXScreen Height.								
Progress	<Screen View>	Show the selected screen or the screen which is being saved. To select a screen, click its row in the screen list.								
	<Progress Bar>	Show the saving progress after the Save button is clicked.								
Save		Click the button to save all the selections with the specified conditions.								
Close		Click the button to exit the dialog box.								