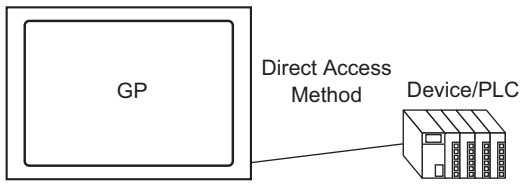
Appendix

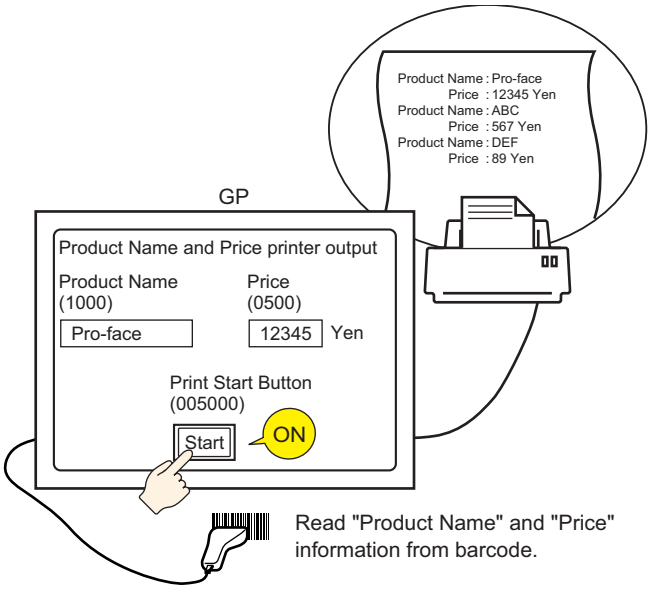
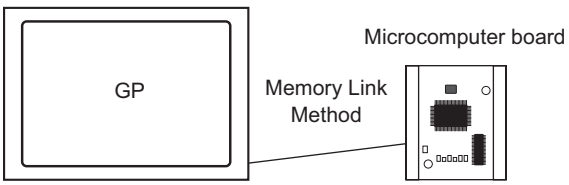
“A.1 - Communication” introduces the communication methods to connect the GP and a device/PLC. “A.2 - Executing Multiple Actions (Programs) with a Switch Operation” explains the Trigger Action part.
“A.3-Drawing Using Foreign Languages” describes how to draw switches using foreign languages, starting from the preparations needed for foreign language input, through actual switch label input. The descriptions use Chinese (Simplified) as an example.
“A. 4 Transfering Data between a CF Card and a USB Memory Device” explains how to transfer data between a CF card and a USB memory device using File Manager.
“A. 5 System Variables” explains the details of the system variables available in GP-Pro EX.

A.1 Communication

NOTE • For information about connection methods between the GP and device/PLC, please refer to the GP-Pro EX Device/PLC Connection Manual.

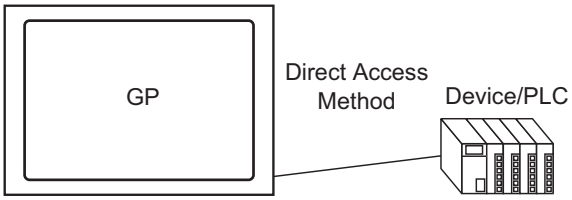
A.1.1 Settings Menu

Communicating with a Device/PLC without Burdening it (Direct Access Method)	
This is useful when connecting to a device/PLC that is supported by the GP. 	☞ Setup Procedure (page A-3) ☞ Details (page A-3)

Communicating with Unsupported Devices/PLCs (Memory Link Method)	
Create an extended script to output data read from a barcode connected to the USB to a serial printer connected to COM1. 	☞ Setup Procedure (page 20-34) ☞ Details (page 20-21)
Create and execute all programs needed to communicate on the device/PLC side (computer, microprocessor board). (Memory Link Method) 	☞ Setup Procedure (page A-5) ☞ Details (page A-5)

A.1.2 Communicating with a Device/PLC without Burdening it (Direct Access Method)

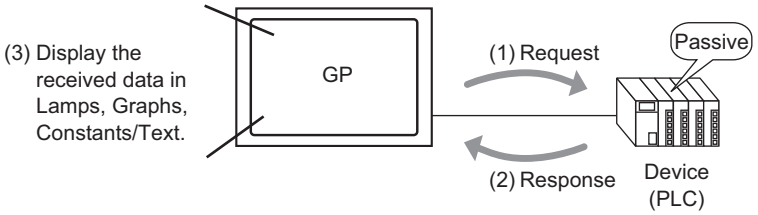
A.1.2.1 Details



In order to communicate with a device/PLC, use the communication method called “Direct Access” which puts a smaller program burden on the device/PLC.

■ Direct Access Method

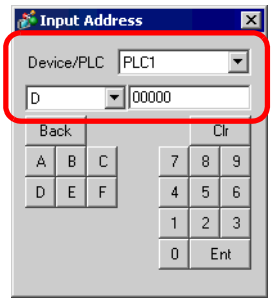
In the “Direct Access Method,” the GP makes an inquiry (request) to the device/PLC, as in the following image. The device/PLC then responds to the request from the GP.



◆ Usable Address

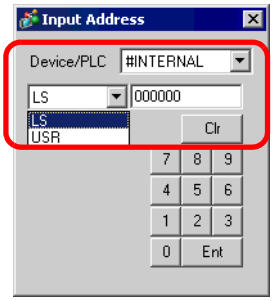
In order for the GP to be able to get the necessary display data from the device/PLC when communicating, designate an address that can reference data used for Parts and script features. There are two types of addresses which can be set as reference destinations.

- Device/PLC Addresses
  It can reference the device/PLC’s data.
  Select the device/PLC name (e.g. “PLC1”) that will communicate with the GP, and input that model’s address (e.g. “D00000”).
  (Example: An Input Address screen on a “Word Switch”)

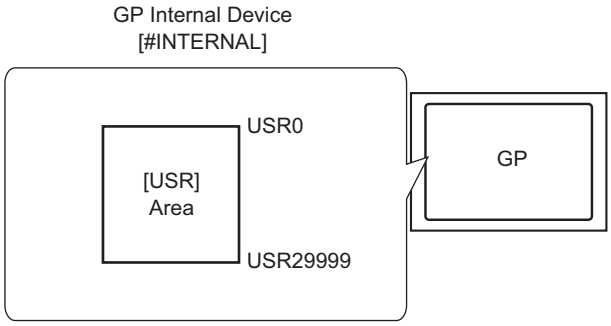


- GP Internal Device Address
  This can be used as a data storage destination, for example, when storing calculated values temporarily inside the GP, or when temporarily controlling data in the GP. When referencing that data, select [#INTERNAL] (refers to the GP internal device) as the [Device/PLC] that will communicate with the GP, and input that address (e.g. “USR0000”).

  (Example: An Input Address screen on a “Word Switch”)



The GP’s internal device [#INTERNAL], has two structured areas: the [LS] area and the [USR] are (shown below).



- [LS] Area
  This is a user area that can be used freely, and an area used for running the GP.
  ☞ “A.1.4 LS Area (Direct Access Method)” (page A-8)

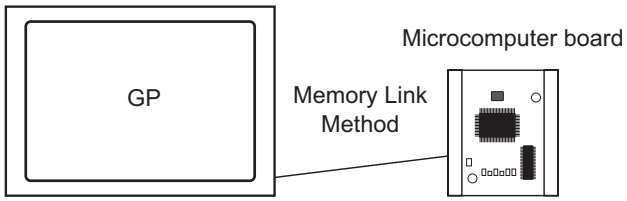
- [USR] Area
  This area has 30,000 words and can be used freely as a user area.

◆ Device Codes of GP Internal Devices (LS/USR)

Device	Device Code	Address Range
LS	0x0000	0 to 9999
USR	0x0001	0 to 29999

A.1.3 Communicating with Unsupported Devices/PLCs (Memory Link Method)

A.1.3.1 Details



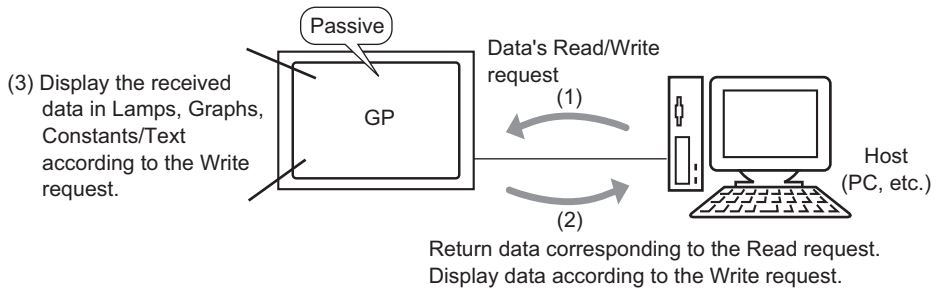
The communication method called “Memory Link” is used in order to connect with devices (here, called “hosts”) that do not contain a communication protocol, such as a computer or a microprocessor board.

■ Memory Link Method

In the “Memory Link Method,” a data read/write request occurs from the host to the GP, as in the following image. The GP displays data on a screen that was sent in response to the host’s write request. In response to a read request, the GP sends data stored inside the GP to the host.

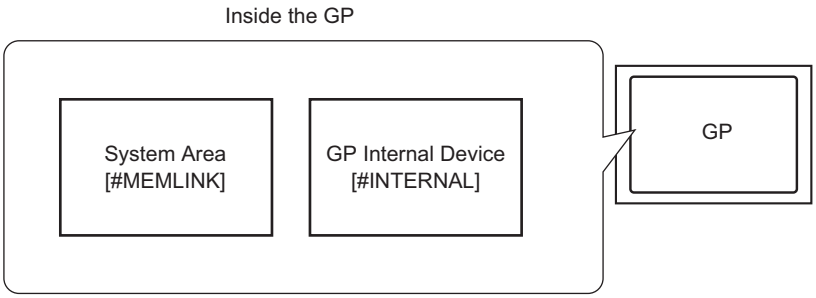
NOTE

- Communication based on the Memory Link Method is accomplished by executing a program on the host.



◆ Usable Address

In order for the GP to be able to get the necessary display data from the host when communicating, designate an address that can reference data and set the Parts or script features. There are two types of address inside the GP that can be set as a reference destination.



- Memory Link System Area Addresses

  The System Area is a medium used in order to request the host's read/write. It is the Memory Link Method's communication area.

  For details about the System Area, please refer to "A.1.5 System Area (Memory Link Area)" (page A-23) .

  For example, to set a "Word Switch"'s address settings, select [#MEMLINK] from [Device/PLC], and input that model's address (e.g. "0100").

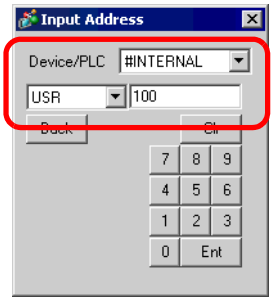
  (Example: An Input Address screen on a "Word Switch")

- GP Internal Device Address

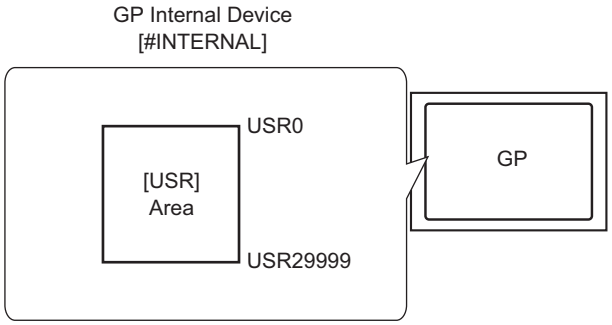
  For example, designate this when referencing the destination of a calculated value stored temporarily inside the GP.

  Select [#INTERNAL] (refers to the GP internal device) as the [Device/PLC] that will communicate with the GP, and input that address (e.g. "USR100").

  (Example: An Input Address screen on a "Word Switch")



In Memory Link Method, GP internal device [#INTERNAL] can use only [USR] area for communication.



[LS] Area

This cannot be used to communicate by Memory Link Method.

[USR] Area

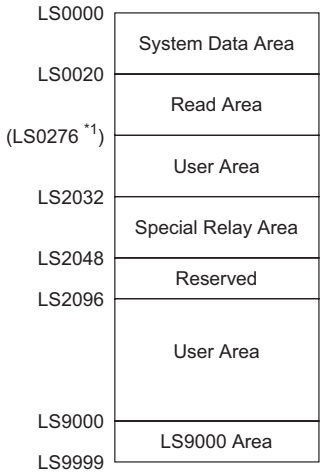
This area has 30,000 words and can be used freely as a user area.

A.1.4 LS Area (Direct Access Method)

When communicating inside the GP by Direct Access Method, the LS area is secured. This area is useful for temporarily storing control handling only within the GP without a device/PLC address (e.g. a switch's Interlock Settings), or for temporarily storing values calculated within the GP.

A.1.4.1 LS Area List

Direct Access Method's LS Area



IMPORTANT

- Please do not set addresses for Parts which span the System Data Area and Read Area, or the Read Area and User Area.
- When setting addresses for Parts in the System Data Area, please designate the data length as 16 bit.

*1 The System Data Area can exclusively use a maximum of 20 words. The Read Area can exclusively use a maximum of 256 words. The User Area's top address is the Read Area's top address (20) + Read Area's size.

Area Name	Description
System Data Area	This area stores data necessary for the system's operation, such as the GP's screen control data and error information. ☞ "A.1.4.2 System Data Area" (page A-10) When referencing a screen number displayed on the GP from a device/PLC or changing screens, to automatically reference/control the GP's data, establish an area in the device/PLC to link with this area. ☞ "A.1.4.4 Device/PLC's System Data Area Allotment Procedure" (page A-20)
Read Area	This area stores data used commonly by all screens. The area size is variable and can be set up to 256 words. When referencing a screen number displayed on the GP from a device/PLC or changing screens, to automatically reference/control the GP's data, establish an area in the device/PLC to link with this area. ☞ "A.1.4.4 Device/PLC's System Data Area Allotment Procedure" (page A-20)

Continued

Area Name	Description
User Area	This device can only be allotted inside the GP and cannot be allotted to the device/PLC. Use it for addresses that can only be processed with the GP. You cannot control it from the device/PLC.
Special Relay Area	This area stores each type of status information that occurs when the GP communicates. ☞ "A.1.4.3 Special Relay" (page A-17)
Reserved	Used inside the GP. Please do not use this area. Otherwise, it will not function normally.
LS Area9000	Stores the GP's internal operating information such as a Trend Graph's historical data and the communication scan time. There is also an adjustable portion. ☞ "7.3.2 Setup Procedure ■ Stop Communications" (page 7-12)

NOTE

- The LS Area is designated in the following way.

◆For Word Address designation
(e.g.) "LS0000"
Set from 0000 to 9999

◆For Bit Address designation
(e.g.) "LS0000 00"
Designate from 00 to 15 (Bit No.)
Designate from 0000 to 9999

A.1.4.2 System Data Area

This shows the contents of write data in each address of the System Data Area.

■ When one address is communicating with a 16 bit device/PLC

NOTE
- The following table's "Word Address" column shows the word addresses added from the System Data Area's top address in the device/PLC. (When all items are selected from the GP's LS0000 to LS0019)
- LS0000 to 0007 is the GP→PLC write-only area, and LS0008 to 0019 is read-only area.

GP Internal Address	Word Address	Description	Bit	Details	H System Variable
LS0000	+0	Current Screen No.	—	1 to 9999 (BIN) 1 to 7999 (BCD)	#H_CurrentScreenNo
LS0001	+1	Error Status	0 to 2	Unused	—
			3	Screen Memory Check Sum	
			4	SIO Framing	
			5	SIO Parity	
			6	SIO Overrun	
			7 to 9	Unused	
			10	Backup Battery Low Voltage	
			11	PLC Communication Error	
			12 to 15	Unused	
LS0002	+2	Clock's current "Year" value	—	Last 2 digits of year (2 BCD digits)	#H_CurrentYear
LS0003	+3	Clock's current "Month" value	—	01 to 12 (2 BCD digits)	#H_CurrentMonth
LS0004	+4	Clock's current "Day" value	—	01 to 31 (2 BCD digits)	#H_CurrentDay
LS0005	+5	Clock's current "Time" value	—	Hour: 00 to 23, Minute: 00 to 59 (4 BCD digits)	Time: #H_CurrentHour Minute: #H_CurrentMinute

Continued

GP Internal Address	Word Address	Description	Bit	Details	H System Variable
LS0006	+6	Status	0 to 1	Reserved	—
			2	Printing	#H_Status_Print
			3	Data Display Part Write Setting Value	—
			4 to 7	Reserved	—
			8	Data Display Part Input Error	—
			9	Display ON/OFF 0: ON, 1: OFF	#H_Status_Disp OnOff
			10	Expired backlight detected	—
			11 to 15	Reserved	—
LS0007	+7	Reserved	—	Reserved	—
LS0008	+8	Change - To Screen No.	—	<When reflecting Change-To Screen No. in the device/PLC> 1 to 9999 (BIN) 1 to 7999 (BCD)	#H_ChangeScreenNo
LS0009	+9	Screen Display ON/OFF	—	Turn Screen Display OFF with FFFFh Display screen with 0h	—
LS0010	+10	Clock's "Year" setting value	—	Last 2 digits of year (2 BCD digits) (Bit 15 is the clock data's rewrite flag)	#H_SetYear
LS0011	+11	Clock's "Month" setting value	—	01 to 12 (2 BCD digits)	#H_SetMonth
LS0012	+12	Clock's "Day" setting value	—	01 to 31 (2 BCD digits)	#H_SetDay
LS0013	+13	Clock's "Time" setting value	—	Hour: 00 to 23, Minute: 00 to 59 (4 BCD digits)	#H_SetHour #H_SetMinute
LS0014	+14	Control	0	Backlight OFF	—
			1	Buzzer ON	#H_Control_ BuzzerEnable
			2	Print Started	#H_Control_ HardcopyPrint
			3	Reserved	—
			4	Buzzer	#H_Control_Buzzer
			5	AUX Output	—
			6 to 10	Reserved	—
			11	Print Cancelled	#H_Control_ PrintCancel
			12 to 15	Reserved	—

Continued

GP Internal Address	Word Address	Description	Bit	Details	H System Variable
LS0015	+15	Reserved	—	Reserved	—
LS0016	+16	Window Control	0	Window Display 0:OFF, 1:ON	#H_ GlobalWindow Control
			1	Window overlap order change 0: Permitted, 1: Not permitted	
			2 to 15	Reserved	
LS0017	+17	Window Screen No.	—	Global Window's registration number selected by indirect designation 1 to 2000 (BIN/BCD)	#H_GlobalWindowNo
LS0018	+18	Window Display Position (X Coordinate)	—	Global Window's top-left (Bin/BCD)	#H_ GlobalWindowPosX
LS0019	+19	Window Display Position (Y Coordinate)	—		#H_ GlobalWindowPosY

IMPORTANT

- Normally, when turning OFF the Screen Display, do not use +14 (Control)'s "Backlight OFF" bit, please use +9 (Screen Display ON/OFF).

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Current Screen No.</td><td>Stores the screen number currently displayed by the GP.</td></tr>
<tr><td>Error Status</td><td>When an error occurs in the GP, the corresponding bit turns ON. After the bit turns ON and the power turns OFF, the status is maintained until it changes from offline mode back to active mode.
<table>
<tr><th>Bit</th><th>Description</th><th>Details</th></tr>
<tr><td>0 to 2</td><td>Unused</td><td></td></tr>
<tr><td>3</td><td>Screen Memory Check Sum</td><td>There is an error in the project file.
Please transfer it again.</td></tr>
<tr><td>4</td><td>SIO Framing</td><td></td></tr>
<tr><td>5</td><td>SIO Parity</td><td></td></tr>
<tr><td>6</td><td>SIO Overrun</td><td></td></tr>
<tr><td>7 to 9</td><td>Unused</td><td></td></tr>
<tr><td>10</td><td>Backup Battery Low Voltage</td><td>This turns ON when the voltage of the backup lithium battery is low. The backup battery is used by the clock and SRAM.</td></tr>
<tr><td>11</td><td>PLC Communication Error</td><td>Error in communication with device/PLC, caused by bits 4 to 6, or other cause.</td></tr>
<tr><td>12 to 15</td><td>Unused</td><td></td></tr>
</table></td></tr>
<tr><td>Clock Data (Current)</td><td>Stored as BCD. [Year] is the 2 final digits of the year, [Month] is 2 digits from 01 to 12, [Day] is 2 digits from 01 to 31, [Time] is 2 hour digits from 00 to 23 and 2 minute digits from 00 to 59 for a total of 4 digits.
NOTE
• The current value for the day is stored in LS9310. The day is calculated from the Year, Month, and Day of the GP’s on-board IC (RTC) clock.

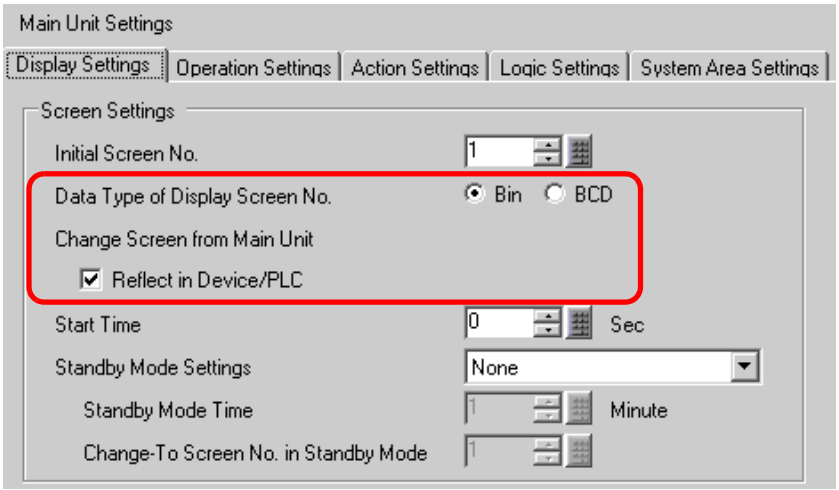
The value is stored in LS9310 as follows.
<table>
<tr><th>Numeric Value</th><th>Description</th></tr>
<tr><td>0</td><td>Sunday</td></tr>
<tr><td>1</td><td>Monday</td></tr>
<tr><td>2</td><td>Tuesday</td></tr>
<tr><td>3</td><td>Wednesday</td></tr>
<tr><td>4</td><td>Thursday</td></tr>
<tr><td>5</td><td>Friday</td></tr>
<tr><td>6</td><td>Saturday</td></tr>
<tr><td>7 or more</td><td>Unused</td></tr>
</table>
Updates are performed when the IC clock’s date is changed. Because the writes do not occur regularly, when parts change this area, this area will not be updated the next time until the IC clock’s date changes.</td></tr>
</table>

Continued

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Status</td><td>Please monitor only the necessary bits. Reserved bits are sometimes used for GP system maintenance, so do not turn them ON/OFF.
<table>
<tr><th>Bit</th><th>Description</th><th>Details</th></tr>
<tr><td>0, 1</td><td>Reserved</td><td>-</td></tr>
<tr><td>2</td><td>Printing</td><td>Turns ON during printing. While this bit is ON, there are cases when the offline screen will appear, or when output will be disturbed.</td></tr>
<tr><td>3</td><td>Write Setting Value</td><td>This bit is reversed each time a write occurs from a Data Display (Setting Value Input).</td></tr>
<tr><td>4 to 7</td><td>Reserved</td><td>-</td></tr>
<tr><td>8</td><td>Data Display Part Input Error</td><td>When Alarm Settings are set on the Data Display where you are currently inputting and you input a value outside of the alarm range, this bit turns ON.
When you input a value inside the alarm range or change screens, this bit turns OFF.</td></tr>
<tr><td>9</td><td>Display ON/OFF (0: ON, 1: OFF)</td><td>This can detect whether to turn the GP's screen display ON/OFF from the device/PLC.

This bit will change in the following cases.
1. When FFFFh is written to the System Data Area's Display ON/OFF, the display turns OFF.
2. When the standby time passes, the display will automatically turn OFF.
3. If the screen changes or is touched after the display turns OFF, the display will turn back ON.
NOTE
• This bit cannot change LS0014 "Control"'s 0 bit (Backlight OFF).</td></tr>
<tr><td>10</td><td>Expired backlight detected</td><td>When an expired backlight is detected, this bit turns ON.</td></tr>
<tr><td>11 to 15</td><td>Reserved</td><td>-</td></tr>
</table>
</td></tr>
</table>

Continued

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Change - To Screen No.</td><td>
Set the Change-to Screen No. The setting range differs depending on whether or not [Data Type of Display Screen No.] and [Change Screen from Main Unit - Reflect in Device/PLC] are set on the System Settings - [Main Unit Settings] - [Display Settings] tab.


When [Data Type of Display Screen No.] is [Bin]
<table>
<tr><th>Reflect in Device/PLC</th><th>Screen Change from Device/PLC</th><th>Screen Change from Main Unit (Switch, etc.)</th></tr>
<tr><td>Checked</td><td>1 to 9999</td><td>1 to 9999</td></tr>
<tr><td>Unchecked</td><td>1 to 9999</td><td>1 to 9999</td></tr>
</table>
When [Data Type of Display Screen No.] is [BCD]
<table>
<tr><th>Reflect in Device/PLC</th><th>Screen Change from Device/PLC</th><th>Screen Change from Main Unit (Switch, etc.)</th></tr>
<tr><td>Checked</td><td>1 to 7999</td><td>1 to 7999</td></tr>
<tr><td>Unchecked</td><td>1 to 1999</td><td>1 to 7999</td></tr>
</table>
</td></tr>
<tr><td>Screen Display ON/ OFF</td><td>Displays when the value is “0h”, hides the screen when the value is “FFFFh.” Values other than “0h” and “FFFFh” are reserved. When the screen display is hidden (when the value becomes “FFFFh”), the next touch on the screen will turn the display back ON.</td></tr>
<tr><td>Clock Data (Setting Value)</td><td>
Set as BCD. [Year] is the 2 final digits of the year, [Month] is 2 digits from 01 to 12, [Day] is 2 digits from 01 to 31, [Time] is 2 hour digits from 00 to 23 and 2 minute digits from 00 to 59 for a total of 4 digits.

■Setting Example < October 19th, 2005, 21:57>
(1) When the current Word Address “+10”’s data is “0000”,
• “Month” - Write “0010” → Word Address “+11”
• “Day” - Write “0019” → Word Address “+12”
• “Time” - Write “2157” → Word Address “+13”
(2) When you write “8005” to Word Address “+10,” bit 15 of “+10” turns ON, and clock data is rewritten. For “8005”, bit 15 is turned ON by the “8000” portion, while the “Year” is set with “05”.
</td></tr>
</table>

Continued

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Control</td><td>
NOTE

Please make sure to write this address in bit units. In some cases, writing with word data will change the value.
“Reserved” bits are sometimes used for maintenance of the GP’s system so please turn them OFF.

<table>
<tr><th>Bit</th><th>Description</th><th>Details</th></tr>
<tr><td>0</td><td>Backlight OFF</td><td>When ON, the backlight turns OFF, when OFF, the backlight turns ON. (The parts placed on the screen will still function after the LCD is lit.)
NOTE
• Normally, when turning OFF the screen display, please use Word Address “+9” (Screen Display ON/OFF).</td></tr>
<tr><td>1</td><td>Buzzer ON</td><td>0: Do not sound, 1: Sound</td></tr>
<tr><td>2</td><td>Print Started</td><td>0: Do not sound, 1: Sound
When the bit turns ON, the screen’s copying starts.
NOTE
• When Status “Bit 2” (Printing) turns ON, please turn it OFF manually.</td></tr>
<tr><td>3</td><td>Reserved</td><td>0 Fixed</td></tr>
<tr><td>4</td><td>Buzzer</td><td>The following action occurs only when Control “Bit 1” (Buzzer ON) is ON.
0: Sound, 1: Do not sound
To stop the buzzer sound, turn this bit ON.</td></tr>
<tr><td>5</td><td>AUX Output</td><td>The following action occurs only when Control “Bit 1” (Buzzer ON) is ON.
0: Sound, 1: Do not sound
To stop the AUX output, turn this bit ON.</td></tr>
<tr><td>6 to 10</td><td>Reserved</td><td>0 Fixed</td></tr>
<tr><td>11</td><td>Print Cancelled</td><td>0: Sound, 1: Do not sound
When the bit turns ON, all current printing is cancelled.
NOTE
• After printing stops, when Status “Bit 2” (Printing) turns OFF, please turn it OFF manually.
• Even when the Print Cancelled bit turns ON, data previously taken in by the printer’s memory will be printed.</td></tr>
<tr><td>12 to 15</td><td>Reserved</td><td>0 Fixed</td></tr>
</table>
</td></tr>
<tr><td>Window Control</td><td>Controls the window display.
☞ “18.7.2 Word Action” (page 18-23)</td></tr>
<tr><td>Window Screen No.</td><td>Stores the Global Window’s registration number selected by indirect designation. 1 to 2000 (BIN/BCD)</td></tr>
<tr><td>Window Display Position</td><td>Stores the Global Window’s top-left display position, selected by indirect designation. “+18” shows the X coordinate, “+19” shows the Y coordinate. The data type is BIN or BCD.</td></tr>
</table>

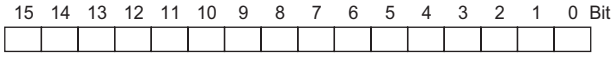
A.1.4.3 Special Relay

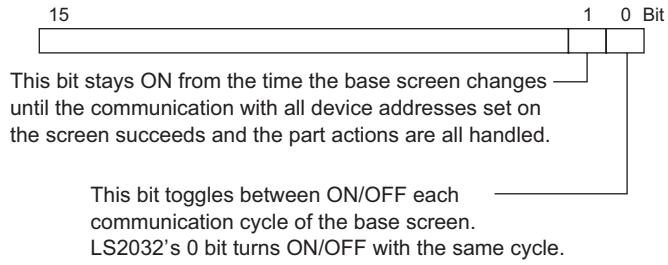
The Special Relay is not write-protected. Do not turn it ON/OFF with Parts or write words.

The Special Relay has the following structure.

Direct Access Method

Address	Description	H System Variable
LS2032	Common Relay Information	
LS2033	Base Screen Information	
LS2034	Reserved	
LS2035	1-Second Binary Counter	
LS2036	Display Scan Time	#H_DispScanTime
LS2037	Communication Cycle Time	
LS2038	Display Scan Counter	#H_DispScanCounter
LS2039	Communication Error Code	
LS2040	Reserved	
LS2041		
LS2042		
LS2043		
LS2044		
LS2045		
LS2046		
LS2047		

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Common Relay Information (LS2032)</td><td>


<table>
<tr><th>Bit</th><th>Description</th></tr>
<tr><td>0</td><td>Repeats ON/OFF every communication cycle.</td></tr>
<tr><td>1</td><td>After a screen (Base, Window) changes, turns ON until communication with all the device addresses set in the screen has succeeded and the Part operation (process) has completed.</td></tr>
<tr><td>2</td><td>Turns ON only when a communication error occurs.</td></tr>
<tr><td>3</td><td>Turns ON while the initial screen is displayed at power ON.</td></tr>
<tr><td>4</td><td>Normally ON.</td></tr>
<tr><td>5</td><td>Normally OFF.</td></tr>
<tr><td>6</td><td>Turns ON when backup SRAM data is erased.
(Only on-board backup SRAM)</td></tr>
<tr><td>7</td><td>When using D-Scripts, turns ON when a BCD error occurs.</td></tr>
<tr><td>8</td><td>When using D-Scripts, turns ON when a zero error occurs.</td></tr>
<tr><td>9</td><td>Turns ON when filing data could not be transferred to backup SRAM.</td></tr>
<tr><td>10</td><td>Turns ON when filing data transferred according to the Control Word Address could not be transferred from PLC to SRAM.
Also, if transferring between the PLC by means of a Special Data Display (filing), when there is a Transfer Completion Bit Address, turns ON when data could not be transferred from PLC → Area, or PLC → SPAM.</td></tr>
<tr><td>11</td><td>Turns ON while transferring filing data between SRAM and LS Area by means of a Special Data Display (Filing).</td></tr>
<tr><td>12</td><td>When using D-Scripts, turns ON when a communication error occurs from a memcpy ( ) or address offset designation read. Turns OFF when data finishes reading normally.</td></tr>
<tr><td>13</td><td>In [System Settings] - [Script Settings], when no [D-Script/Global D-Script] is set in the project, turns ON when the readout of the Send function, Receive function, Control, Status variable, and Received Data Size is executed in [SIO Port Operation]'s Label Settings.</td></tr>
<tr><td>14</td><td>In [System Settings] - [Script Settings], when [D-Script/Global D-Script] is set in the project, turns ON when an extended script's [Text Operation] function is executed. Also, in [System Settings] - [Script Settings], when [Extended Script] is set in the project, turns ON even when a D-Script/Global D-Script [SIO Port Operation]'s I/O function (IO_WRITE, IO_READ) is executed.</td></tr>
<tr><td>15</td><td>Reserved</td></tr>
</table>
</td></tr>
<tr><td>Base Screen Information (LS2033)</td><td>


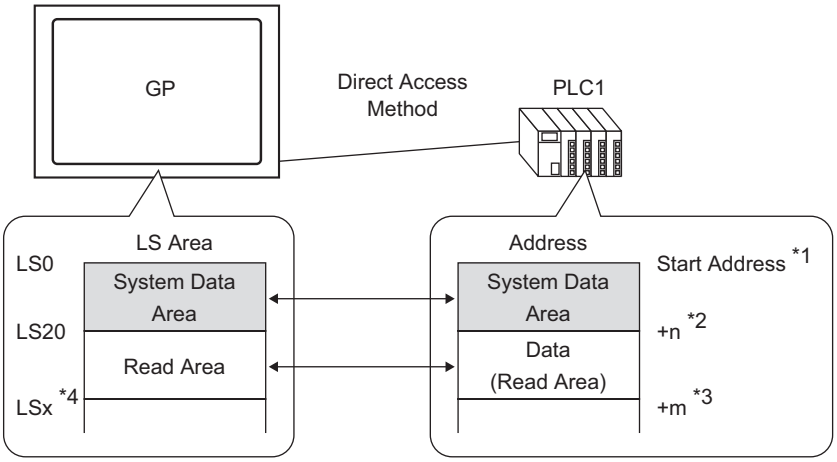
</td></tr>
<tr><td>Reserved (LS2034, LS2040 to LS2047)</td><td>The value of the reserved address is not yet specified. Please do not use it.</td></tr>
</table>

Continued

Description	Details
1-Second Binary Counter (LS2035)	Increments once every second immediately after power is turned ON. The data is binary.
Display Scan Time (LS2036)	The display time taken starting from the first Part set on the display screen to the end of the last Part. Data is stored in binary format, in ms units. The data is updated when all processing for the target Parts has finished. The data's initial value is 0. There is an error of ± 10 ms.
Communication Cycle Time (LS2037)	One cycle's time is from the start to the end of the management of the System Data Area allotted inside the device/PLC, and each type of device. Data is stored in binary format, in 10 ms units. The data is updated when all processing for the System Data Area and target device has finished. The data's initial value is 0. There is an error of ±10 ms. **NOTE** • When multiple devices/PLCs are connected to a single GP, the System Data Area can only be allotted to one device/PLC.
Display Scan Counter (LS2038)	The counter increments each time the Part set on the display screen processes. The data is binary.
Communication Error Code (LS2039)	When a communication error occurs, this stores the last displayed communication error code in binary.

A.1.4.4 Device/PLC's System Data Area Allotment Procedure

When referencing a screen number displayed on the GP from a device/PLC or changing screens, to automatically reference/control the GP's data, share the GP's internal System Data Area's allotted data with the device/PLC.

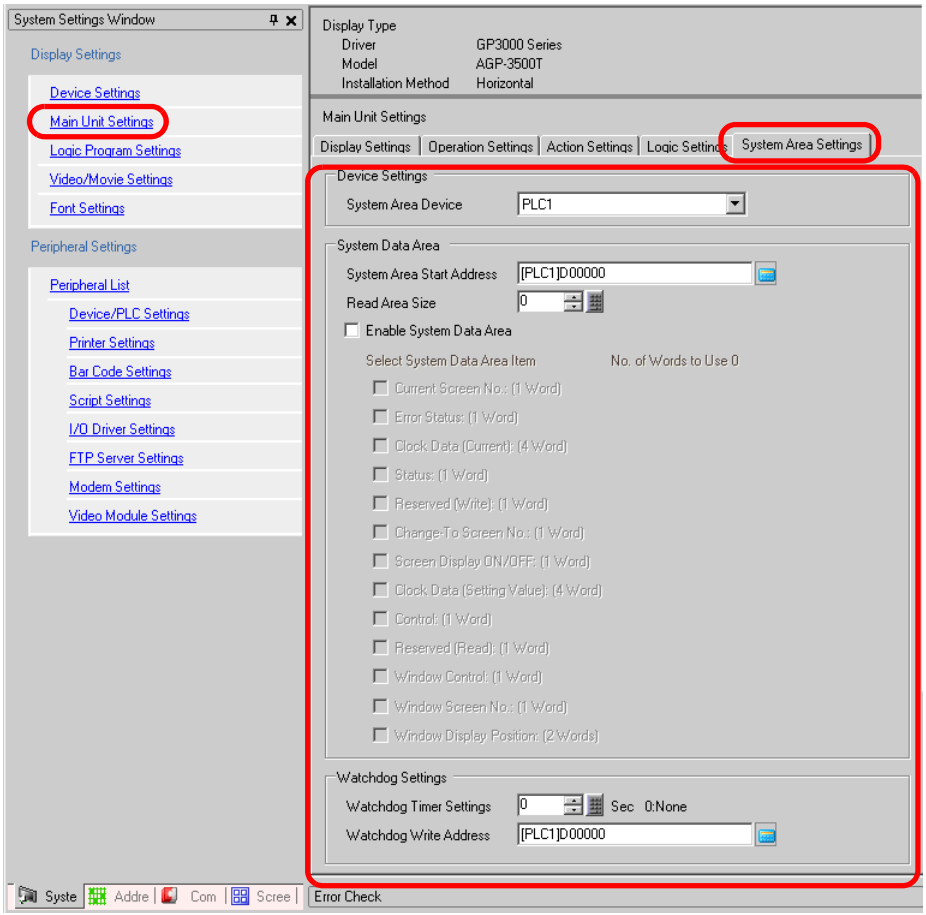


*1 Please set up the start address with the process mentioned on the next page.
*2 n = 0 to 20 This depends on the number of selected items in the GP's set System Data Area.
*3 This is the Read Area Size.
*4 ∗ = Read Area Start Address (20) + Read Area Size (m)

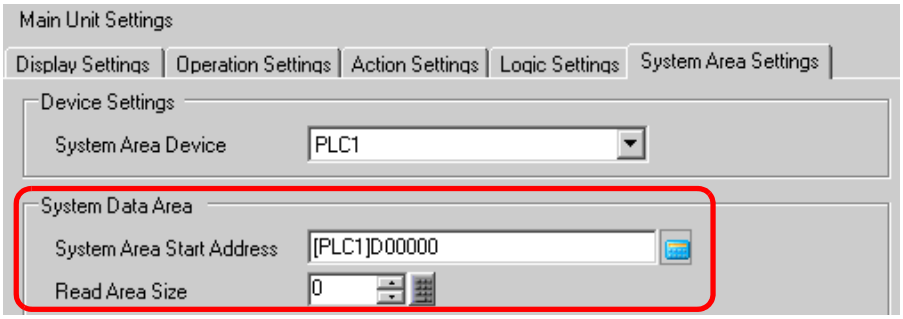
IMPORTANT
- When multiple devices/PLCs are connected to a single GP, the System Data Area can only be allotted to one device/PLC.
- Please do not set addresses for Parts which span the System Data Area and Read Area, or the Read Area and User Area.
- When setting addresses for Parts in the System Data Area, please designate the data length as 16 bit.

NOTE
- The number of address that can be set in the System Data Area differs depending on the device/PLC. For details, please refer GP-Pro EX Connection Device Manual.

1 Select the [Project (F)] menu - [System Settings (C)] command, or click , and click the System Settings Window - [Main Unit Settings] - [System Area Settings] tab. The following screen will be displayed.



2 Allot the addresses in the device/PLC you will communicate with. In [System Area Device], select the device/PLC (e.g. “PLC1”) where you will allot addresses, and designate the start address of an area which can ensure 16 words or more of continuous addresses in [System Area Start Address]. (e.g. [PLC1] D00000)

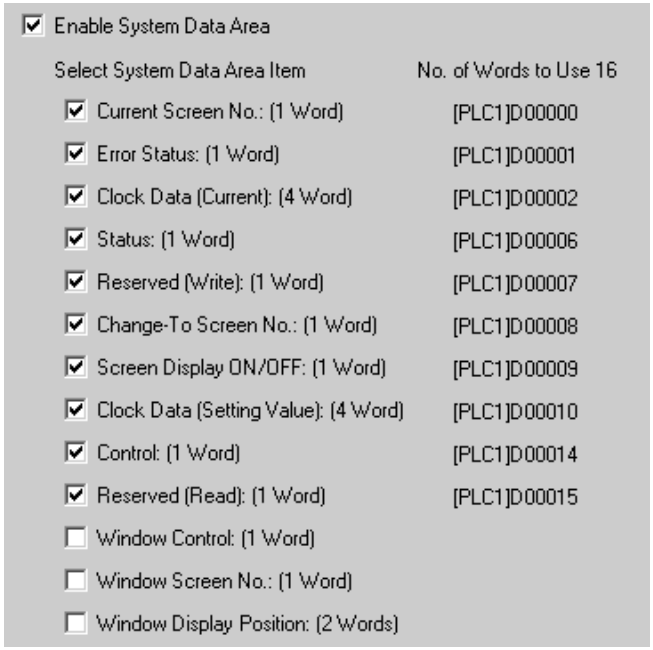


NOTE

- Data used in all common screens and Line Charts’ block display data is stored in the “Read Area.” According to your needed capacity, you can designate a [Read Area Size] of up to 256 words. Use the LS area exclusively as the read area starting from the address on the right (e.g. “[PLC1]D00000”) and continuing for the designated number of words.

3 Put a check mark next to the [Enable System Data Area] box. 16 words will be automatically allotted starting from the start address.

☞ "A.1.5.2 System Data Area" (page A-25)



NOTE

- When using a Global Window, 4 words will be used for the [Window Control], [Window Screen No.], and [Window Display Position].

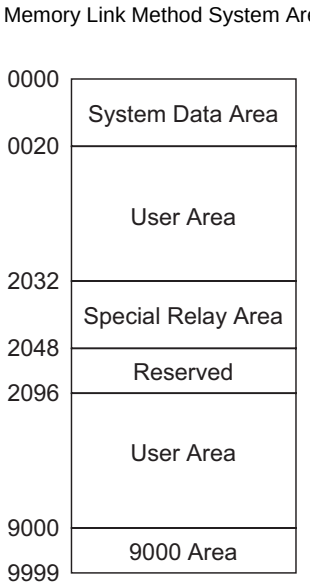
☞ "18.6 Changing the Displayed Window on All Screens" (page 18-17)

4 The settings are complete.

A.1.5 System Area (Memory Link Area)

When communicating inside the GP by Memory Link Method, the System Area is secured. This area is used for exchanging with the host.

A.1.5.1 System Area List



IMPORTANT

- When setting addresses for Parts in the System Data Area, please designate the data length as 16 bit.

Area Name	Description
System Data Area	This area stores data necessary for the system's operation, such as the GP's screen control data and error information. The write contents are decided. ☞ "A.1.5.2 System Data Area" (page A-25)
User Area	This area is used for exchanging data between the GP and host (computer, etc.). On the host, decide which GP address data to write, and create a program to write the data. In the GP, configure settings for special Parts in order to display data written in the addresses. In order for the host to read written data by means of Switches, Data Displays, and keypads, you need to create a program in the host to read the GP's data.
Special Relay	This area stores each type of status information that occurs when the GP communicates. ☞ "A.1.5.3 Special Relay" (page A-32)
Reserved	Used inside the GP. Please do not use this area. Otherwise, it will not function normally.
9000 Area	Stores the GP's internal operating information such as a Trend Graph's historical data and the communication scan time. There is also an adjustable portion.

NOTE

- When the address has a bit designation, add a bit position after the word device. (Designate from 00 to 15.)

  < e.g.> When bit 02 of the user area's 0020 address is designated

  "002002"

  Bit Position

  Word Address

A.1.5.2 System Data Area

This shows the contents of write data in each address of the System Data Area.

IMPORTANT
- Normally, when turning OFF the Screen Display, do not use 11 (Control)'s "Backlight OFF" bit, please use 12 (Screen Display ON/OFF).

NOTE
- The "Word Addresses" in this table are the values which would appear if you put a check mark next to the [Enable System Data Area] box and selected all of the items.

Word Address	Description	Bit	Details
0	Reserved	—	Reserved
1	Status	0 to 1	Reserved
		2	Printing
		3	Data Display Part Write Setting Value
		4 to 7	Reserved
		8	Data Display Part Input Error
		9	Display ON/OFF 0:ON, 1:OFF
		10	Expired backlight detected
		11 to 15	Reserved
2	Reserved	—	Reserved
3	Error Status	0 to 2	Unused
		3	Screen Memory Check Sum
		4	SIO Framing
		5	SIO Parity
		6	SIO Overrun
		7 to 9	Unused
		10	Backup Battery Low Voltage
		11 to 15	Unused
4	Clock's current "Year" value	0 to 7	Last 2 digits of year (2 BCD digits)
		8 to 15	Unused
5	Clock's current "Month" value	0 to 7	01 to 12 (2 BCD digits)
		8 to 15	Unused
6	Clock's current "Day" value	0 to 7	01 to 31 (2 BCD digits)
		8 to 15	Unused
7	Clock's current "Hour" value	0 to 7	00 to 23 (2 BCD digits)
		8 to 15	Unused
8	Clock's current "Minute" value	0 to 7	00 to 59 (2 BCD digits)
		8 to 15	Unused
9	Reserved	—	Reserved

Continued

Word Address	Description	Bit	Details
10	Interrupt Output (When touch is OFF)	—	If writing to a Word Switch (16 bit), when you take your finger off the Switch, the lower 8 bits get outputted as an interrupt code.*1
11	Control	0	Backlight OFF
		1	Buzzer ON
		2	Print Started
		3	Reserved
		4	Buzzer
		5	AUX Output
		6	Writes “FFh” when you touch a screen and return to the screen (from “Display OFF” to “Display ON”). 0: Do not output interrupt 1: Output interrupt
		7 to 10	Reserved
		11	Print Cancelled
		12 to 15	Reserved
12	Screen Display ON/OFF	—	Turn Screen Display OFF with FFFFh Display screen with 0h
13	Interrupt Output (When touch is ON)	—	When writing to a Word Switch (16 bit), the lower 8 bits get outputted as an interrupt code.*1
14	Reserved	—	Reserved
15	Change - To Screen No.		When applying “Change - To Screen No.” to Device/PLC 1 to 9999 (BIN) 1 to 7999 (BCD)
16	Window Control	0	Window Display 0:OFF, 1:ON
		1	Change Window overlap order 0: Permitted, 1: Not permitted
		12 to 15	Reserved
17	Window Screen No.	—	Global Window’s registration number selected by indirect designation 1 to 2000 (BIN/BCD)
18	Window Display Position (X Coordinate)	—	Global Window’s top-left display position, selected by indirect designation (BIN/BCD).
19	Window Display Position (Y Coordinate)	—	

*1 If you write over data from 0x00 to 0x1F there may be some damage to communications.

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Reserved</td><td>Addresses “0”, “2”, “9”, and “14” are reserved.
Because they are used within the GP, please do not write data to them. Otherwise, they will not function properly.</td></tr>
<tr><td>Status</td><td>Please monitor only the necessary bits. Reserved bits are sometimes used for maintenance of the GP’s system so please do NOT turn them ON/OFF.
<table>
<tr><th>Bit</th><th>Description</th><th>Details</th></tr>
<tr><td>0,1</td><td>Reserved</td><td>-</td></tr>
<tr><td>2</td><td>Printing</td><td>Turns ON during printing. While this bit is ON, there are cases when the offline screen will appear, or when output will be disturbed.</td></tr>
<tr><td>3</td><td>Write Setting Value</td><td>This bit is reversed each time a write occurs from a Data Display (Setting Value Input).</td></tr>
<tr><td>4 to 7</td><td>Reserved</td><td>-</td></tr>
<tr><td>8</td><td>Data Display Part Input Error</td><td>When Alarm Settings are set on the Data Display where you are currently inputting and you input a value outside of the alarm range, this bit turns ON.
When you input a value inside the alarm range or change screens, this bit turns OFF.</td></tr>
<tr><td>9</td><td>Display ON/OFF
(0: ON, 1: OFF)</td><td>This can detect whether to turn the GP’s screen display ON/OFF from the device/PLC. This bit will change in the following cases.
(1) When FFFFh is written to the System Data Area’s Display ON/OF, the display turns OFF.
(2) When the standby time passes, the display wil automatically turn OFF.
(3) If the screen changes or is touched after the display turns OFF, the display will turn back ON.
NOTE
• This bit cannot change LS0014 “Control”’s 0 bit (Backlight OFF).</td></tr>
<tr><td>10</td><td>Expired backlight detected</td><td>When an expired backlight is detected, this bit turns ON.</td></tr>
<tr><td>11 to 15</td><td>Reserved</td><td>-</td></tr>
</table></td></tr>
</table>

Continued

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Error Status</td><td>When an error occurs in the GP, the corresponding bit turns ON. After the bit turns ON and the power turns OFF, the status is maintained until it changes from offline mode back to active mode.
<table>
<tr><th>Bit</th><th>Description</th><th>Details</th></tr>
<tr><td>0 to 2</td><td>Unused</td><td></td></tr>
<tr><td>3</td><td>Screen Memory Check Sum</td><td>There is an error in the project file.
Please transfer it again.</td></tr>
<tr><td>4</td><td>SIO Framing</td><td></td></tr>
<tr><td>5</td><td>SIO Parity</td><td></td></tr>
<tr><td>6</td><td>SIO Overrun</td><td></td></tr>
<tr><td>7 to 9</td><td>Unused</td><td></td></tr>
<tr><td>10</td><td>Backup Battery Low Voltage</td><td>This turns ON when the voltage of the backup lithium battery is low. The backup battery is used by the clock and SRAM.</td></tr>
<tr><td>11 to 15</td><td>Unused</td><td></td></tr>
</table>
⃠ Because the addresses are used for system control, please do not display them by means of a Data Display.</td></tr>
<tr><td>Clock Data (Current)</td><td>Whatever the value, it will be stored in BCD, in the highest-order bit to bit 7.
[Year] is the 2 final digits of the year, [Month] is 2 digits from 01 to 12, [Day] is 2 digits from 01 to 31, [Hour] is 2 digits from 00 to 23 and [Minute] is 2 digits from 00 to 59.
■Setting Example < October 19th, 2005, 21:57>
• “Year” - Write “0005” → Word Address “4”
• “Month” - Write “0010” → Word Address “5”
• “Day” - Write “0019” → Word Address “6”
• “Hour” - Write “0021” → Word Address “7”
• “Minute” - Write “0057” → Word Address “8”</td></tr>
<tr><td>Interrupt Output (When touch is OFF)</td><td>If writing to a Word Switch (16 bit), when you take your finger off the Switch, the lower 8 bits get outputted as an interrupt code. (Control code “FFh” will not be outputted.)
⃠ Please do not write control codes in the “00 to 1F” range. It can cause a communication problem.</td></tr>
</table>

Continued

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Control</td><td>
NOTE

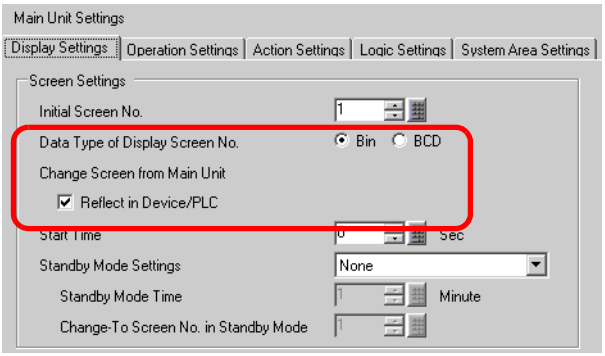
Please make sure to write this address in bit units. In some cases, writing with word data will change the value.
“Reserved” bits are sometimes used for maintenance of the GP’s system so please turn them OFF.

<table>
<tr><th>Bit</th><th>Description</th><th>Details</th></tr>
<tr><td>0</td><td>Backlight OFF</td><td>When ON, the backlight turns OFF, when OFF, the backlight turns ON. (The parts placed on the screen will still function after the LCD is lit.)
NOTE
• Normally, when turning OFF the screen display, please use Word Address “12” (Screen Display ON/OFF).</td></tr>
<tr><td>1</td><td>Buzzer ON</td><td>0: Do not sound, 1: Sound</td></tr>
<tr><td>2</td><td>Print Started</td><td>0: Do not sound, 1: Sound
When the bit turns ON, the screen’s copying starts.
NOTE
• When Status “Bit 2” (Printing) turns ON, please turn it OFF manually.</td></tr>
<tr><td>3</td><td>Reserved</td><td>0 Fixed</td></tr>
<tr><td>4</td><td>Buzzer</td><td>The following action occurs only when Control “Bit 1” (Buzzer ON) is ON.
0: Sound, 1: Do not sound
To stop the buzzer sound, turn this bit ON.</td></tr>
<tr><td>5</td><td>AUX Output</td><td>The following action occurs only when Control “Bit 1” (Buzzer ON) is ON.
0: Sound, 1: Do not sound
To stop the AUX output, turn this bit ON.</td></tr>
<tr><td>6</td><td>Interrupt output for when a screen is changed from OFF to ON by touching a touch panel</td><td>(Interrupt code: FFh) 0: Do not output interrupt, 1: Output interrupt</td></tr>
<tr><td>7 to 10</td><td>Reserved</td><td>0 Fixed</td></tr>
<tr><td>11</td><td>Print Cancelled</td><td>0: Sound, 1: Do not sound
When the bit turns ON, all current printing is cancelled.
NOTE
• After printing stops, when Status “Bit 2” (Printing) turns OFF, please turn it OFF manually.
• Even when the Print Cancelled bit turns ON, data previously taken in by the printer’s memory will be printed.</td></tr>
<tr><td>12 to 15</td><td>Reserved</td><td>0 Fixed</td></tr>
</table>
</td></tr>
</table>

Continued

Description	Details
Screen Display ON/OFF	Displays when the value is “0h”, hides the screen when the value is “FFFFh.” Values other than “0h” and “FFFFh” are reserved. When the screen display is hidden (when the value becomes “FFFFh”), the next touch on the screen will turn the display back ON. Because the addresses are used for system control, please do not display them by means of a Data Display. Because the addresses are controlled in word units, you cannot write bits. When you write “FFFFh”, the displayed screen disappears momentarily. If you want the screen display to disappear for the standby mode time designated in the GP offline mode’s initial settings, please write “0000h”.
Interrupt Output (When touch is ON)	When writing to a Word Switch (16 bit), the lower 8 bits get outputted from the GP to the host as an interrupt code. Please do not write control codes in the “00 to 1F” range. It can cause a communication problem. Because the addresses are used for system control, please do not display them by means of a Data Display. Because the addresses are controlled in word units, you cannot write bits. NOTE • When you write data with a Word Switch (16 bit), it will be outputted as interrupt data. Retrieve this byte of interrupt input in the host (with the INPUT$ in BASIC, for example), and you can simplify the program by using the retrieved interrupt output to jump to each subroutine.

Continued

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Change -
To Screen No.</td><td>
Set the Change-to Screen No. The setting range differs depending on whether or not [Data Type of Display Screen No.] and [Change Screen from Main Unit - Reflect in Device/PLC] are set on the System Settings - [Main Unit Settings] - [Display Settings] tab.


When [Data Type of Display Screen No.] is [Bin]
<table>
<tr><th>Reflect in Device/PLC</th><th>Screen Change from Device/PLC</th><th>Screen Change from Main Unit (Switch, etc.)</th></tr>
<tr><td>Checked</td><td>1 to 9999</td><td>1 to 9999</td></tr>
<tr><td>Unchecked</td><td>1 to 9999</td><td>1 to 9999</td></tr>
</table>
When [Data Type of Display Screen No.] is [BCD]
<table>
<tr><th>Reflect in Device/PLC</th><th>Screen Change from Device/PLC</th><th>Screen Change from Main Unit (Switch, etc.)</th></tr>
<tr><td>Checked</td><td>1 to 7999</td><td>1 to 7999</td></tr>
<tr><td>Unchecked</td><td>1 to 1999</td><td>1 to 7999</td></tr>
</table>
⃠ Because the addresses are used for system control, please do not display them by means of a Data Display.
⃠ Because the addresses are controlled in word units, you cannot write bits.
</td></tr>
<tr><td>Window Control</td><td>Controls the window display.
☞ “18.7.2 Word Action” (page 18-23)</td></tr>
<tr><td>Window Screen No.</td><td>Stores the Global Window’s registration number selected by indirect designation. 1 to 2000 (BIN/BCD)</td></tr>
<tr><td>Window Display Position</td><td>Stores the Global Window’s top-left display position, selected by indirect designation. “+18” shows the X coordinate, “+19” shows the Y coordinate. The data type is BIN or BCD.</td></tr>
</table>

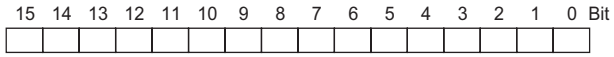
A.1.5.3 Special Relay

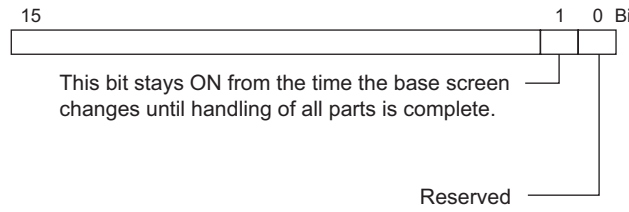
The Special Relay is not write-protected. Do not turn it ON/OFF with Parts or write words.

The Special Relay has the following structure.

Memory Link Method

Address	Description
2032	Common Relay Information
2033	Base Screen Information
2034	Reserved
2035	1-Second Binary Counter
2036	Display Scan Time
2037	Reserved
2038	Display Scan Counter
2039	Reserved
2040	Reserved
2041	
2042	
2043	
2044	
2045	
2046	
2047	

<table>
<tr><th>Description</th><th>Details</th></tr>
<tr><td>Common Relay Information (2032)</td><td>


<table>
<tr><th>Bit</th><th>Description</th></tr>
<tr><td>0</td><td>Reserved</td></tr>
<tr><td>1</td><td>After a screen (Base, Window) changes, turns ON until the Part handling is complete.</td></tr>
<tr><td>2</td><td>Reserved</td></tr>
<tr><td>3</td><td>Turns ON while the initial screen is displayed at power ON.</td></tr>
<tr><td>4</td><td>Normally ON.</td></tr>
<tr><td>5</td><td>Normally OFF.</td></tr>
<tr><td>6</td><td>Turns ON when backup SRAM data is erased.
(Only on-board backup SRAM)</td></tr>
<tr><td>7</td><td>When using D-Scripts, turns ON when a BCD error occurs.</td></tr>
<tr><td>8</td><td>When using D-Scripts, turns ON when a zero error occurs.</td></tr>
<tr><td>9</td><td>Turns ON when filing data could not be transferred to backup SRAM.</td></tr>
<tr><td>10</td><td>Turns ON when filing data transferred according to the Control Word Address could not be transferred from PLC *1 to SRAM.
Also, if transferring between the PLC by means of a Special Data Display, when there is a Transfer Completion Bit Address, turns ON when data could not be transferred from PLC*1 → Area, or PLC*1 → SRAM.</td></tr>
<tr><td>11</td><td>Turns ON while transferring filing data between SRAM and LS Area *1 by means of a Special Data Display (Filing).</td></tr>
<tr><td>12</td><td>When using D-Scripts, turns ON when a communication error occurs from a memcpy ( ) or address offset designation read. Turns OFF when data finishes reading normally.</td></tr>
<tr><td>13</td><td>In [System Settings] - [Script Settings], when no [D-Script/Global D-Script] is set in the project, turns ON when the readout of the Send function, Receive function, Control, Status variable, and Received Data Size is executed in [SIO Port Operation]'s Label Settings.</td></tr>
<tr><td>14</td><td>In [System Settings] - [Script Settings], when [D-Script/Global D-Script] is set in the project, turns ON when an extended script's [Text Operation] function is executed. Also, in [System Settings] - [Script Settings], when [Extended Script] is set in the project, turns ON even when a D-Script/Global D-Script [SIO Port Operation]'s I/O function (IO_WRITE, IO_READ) is executed.</td></tr>
<tr><td>15</td><td>Reserved</td></tr>
</table>
*1 For the Memory Link Method, represents the "User Area" inside the System Area.
</td></tr>
<tr><td>Base Screen Information (2033)</td><td>


</td></tr>
</table>

Continued

Description	Details
Reserved (2034, 2037, 2040 to 2047)	The value of the reserved address is not yet specified. Please do not use it.
1-Second Binary Counter (2035)	Increments once every second immediately after power is turned ON. The data is binary.
Display Scan Time (2036)	The display time taken starting from the first Part set on the display screen to the end of the last Part. Data is stored in binary format, in ms units. The data is updated when the targeted Parts' preprocessing is complete. The data's initial value is "0". There is an error of ±10 ms.
Display Scan Counter (2038)	The counter increments each time the Part set on the display screen processes. The data is binary.

A.1.6 Restrictions

A.1.6.1 GP Internal Device Restrictions

- Data stored in the GP's internal device (including Memory Link's System Area) will be deleted when the GP enters offline mode (by turning OFF the GP's power, by transferring, etc.). However, you can copy the User Area's data to backup SRAM.

☞ "5.13.6 [System Settings Window] Settings Guide ◆ Action Settings •Backup Internal Device" (page 5-112)

A.1.6.2 Special Relay Restrictions

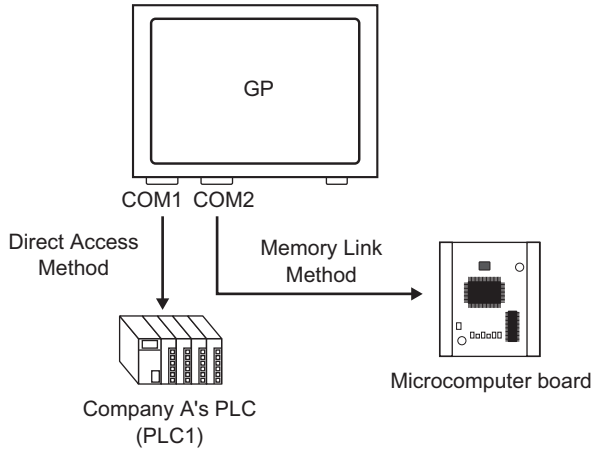
A System Error may occur if a communication error continues for a long time, due to a communication cable coming loose, etc. In this case, please reset the GP again.

When you use the value of a 1-Second Binary Counter or Display Scan Counter as the trigger bit for a Trigger Action part's Monitoring Bit or for the Script feature, a System Error may occur if a communication error continues for a long time. In this case, please reset the GP again.

The Special Relay is not write-protected. Do not turn it ON/OFF with Parts or write words.

A.1.6.3 Restrictions when Using Direct Access and Memory Link Together

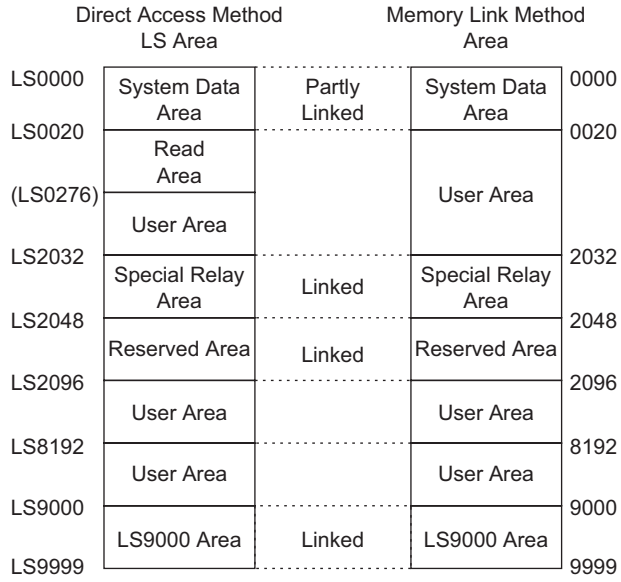
<When using both the Direct Access Method and the Memory Link Method, and communicating with a device/PLC>



- When setting addresses with Parts or the Script feature, please separate them in the GP internal device.
  For example, when setting a word switch's [Word Address], you can select 2 types of device code when you use the GP internal device, but the supported communication method differs depending on the area.

- [#INTERNAL]LS
  The User Area allocated in the Device/PLC with the Direct Access Method. You cannot use the Memory Link Method to communicate.
- [#INTERNAL]USR
  An area that can be arbitrarily set as a work area. Can be used with both the Direct Access Method and Memory Link Method.
- [#MEMLINK]
  The User Area used only for communication by Memory Link Method. You cannot use the Direct Access Method to communicate.

- The Direct Access Method LS Area and the Memory Link Area (System Area) are mutually linked, with the exception of some addresses.



- The System Data Area in the Direct Access Method (LS Area) and the System Data Area in the Memory Link Area are partially linked. Please confirm the details in the corresponding table.

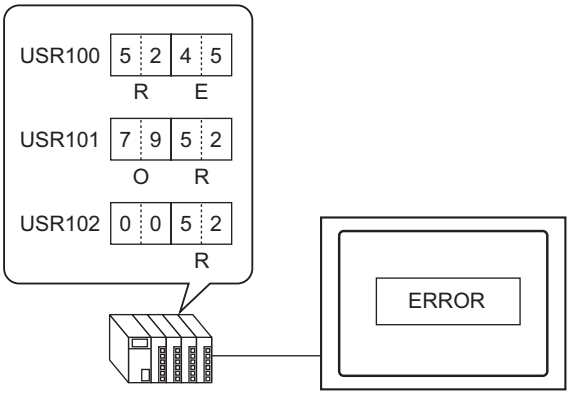
Description	Direct Access Method Address	Memory Link Method Address
Current Screen No.	LS0000	0015 (Read)
Error Status	LS0001	0003
Clock data's current value (Year)	LS0002	0004 (Read)
Clock data's current value (Month)	LS0003	0005 (Read)
Clock data's current value (Day)	LS0004	0006 (Read)
Clock data's current value (Time)	LS0005	0007, 0008 (Read)
Status	LS0006	0001
Reserved	LS0007	None
Change - To Screen No.	LS0008	0015 (Write)
Screen Display ON/OFF	LS0009	0012
Clock data's setting value (Year)	LS0010	0004 (Write)
Clock data's setting value (Month)	LS0011	0005 (Write)
Clock data's setting value (Day)	LS0012	0006 (Write)
Clock data's setting value (Time)	LS0013	0007, 0008 (Write)
Control	LS0014	0011
Reserved	LS0015	None
Window Control	LS0016	0016
Window Screen No.	LS0017	0017
Window Display Position (X Coordinate)	LS0018	0018
Window Display Position (Y Coordinate)	LS0019	0019
Interrupt Output Data (When touch is OFF)	None	0010
Interrupt Output Data (When touch is ON)	None	0013

NOTE

- Some LS areas communicate with the device/PLC. For example, if "Change -To Screen No." is changed to 3 (Memory Link Method address 0015) from a microcomputer board or other host, 3 will also be stored in Direct Access Method address LS0008, linked within GP. Make sure the LS areas' operation will not be affected by these changes.

A.1.6.4 Restrictions when Using the USR Area

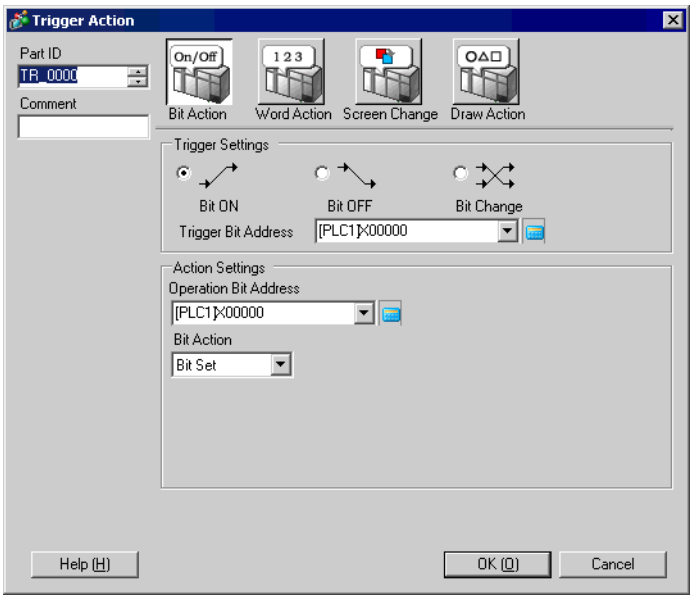
- The storage order for text data is as follows. You cannot change the order.



A.2 Executing Multiple Actions (Programs) with a Switch Operation

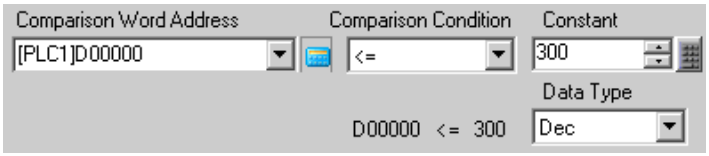
A.2.1 Trigger Action Settings Guide

■ Bit operation

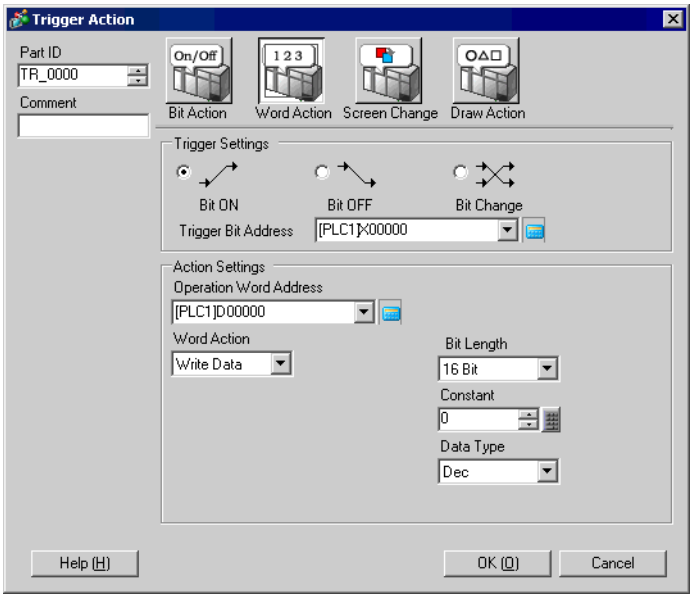


Setting		Description
Trigger Settings	Bit ON	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from OFF to ON.
	Bit OFF	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from ON to OFF.
	Bit Change	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from ON to OFF or from OFF to ON.
	Trigger Bit Address	Designate the bit address which will trigger the action designated in [Action Settings].
Action Settings	Operation Bit Address	Designate the bit address to run the action.

Continued

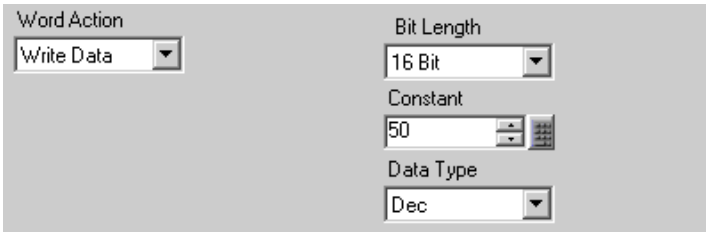
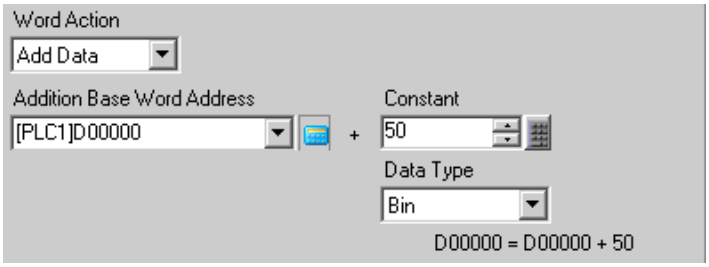
Setting		Description
Action Settings	Bit Action	Bit Set Turns ON the [Operation Bit Address] and maintains the ON state. Bit Reset Turns OFF the [Operation Bit Address] and maintains the OFF state. Flip Changes the ON/OFF state of the [Operation Bit Address]. Comparison When the comparison condition is satisfied, turns ON the [Operation Bit Address]. Compares the Word Address data and a constant.  • Comparison Word Address Designate the Word Address to be compared. • Comparison Select the comparison condition. • Constant Designate the constant to be compared. • Data Type Designate the constant's data type.

■ Word Action

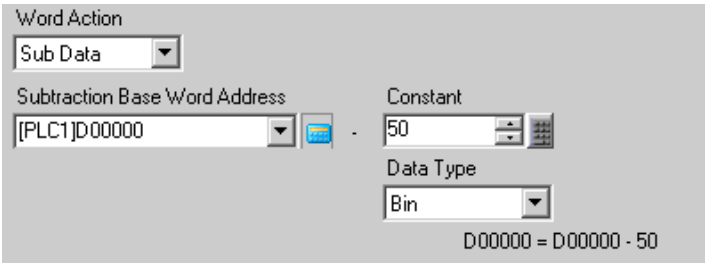


Setting		Description
Trigger Settings	Bit ON	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from OFF to ON.
	Bit OFF	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from ON to OFF.
	Bit Change	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from ON to OFF or from OFF to ON.
	Trigger Bit Address	Designate the bit address which will trigger the action designated in [Action Settings].
Action Settings	Operation Word Address	Designate the word address to run the action.

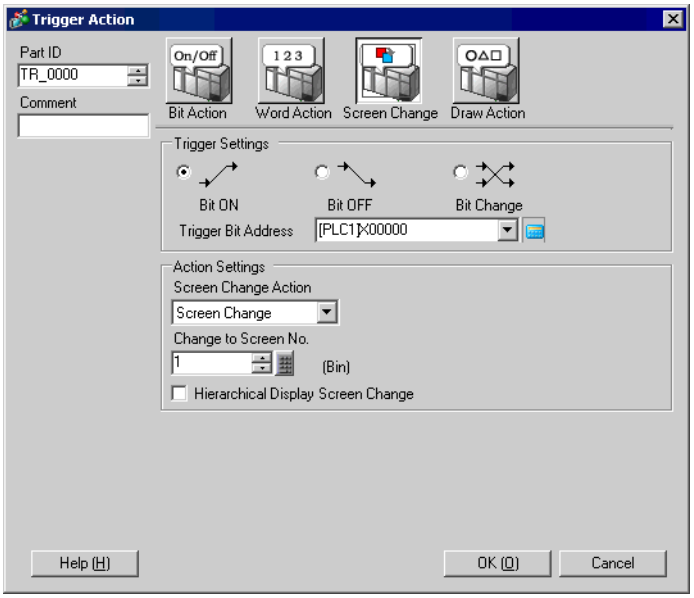
Continued

Setting		Description
Action Settings	Word Action	Write Data Writes the constant in [Operation Word Address].  • Bit Length Set the data length for the word address to 16 bit or 32 bit. • Constant Designate the constant to write. • Data Type Designate the constant's data type.
		Add Data Writes the value of the constant added to the [Addition Base Word Address] into the [Operation Word Address].  • Addition Base Word Address Designate the Word Address to be added to the constant. • Constant Designate the constant to add. • Data Type Designate the constant's data type.

Continued

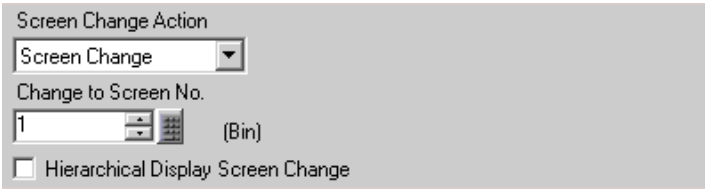
Setting		Description
Action Settings	Word Action	Sub Data Writes the value of the [Subtraction Base Word Address] minus the constant into the [Operation Word Address].  • Subtraction Base Word Address Designate the Word Address the constant will be subtracted from. • Constant Designate the constant to subtract. • Data Type Designate the constant's data type.

■ Screen Change

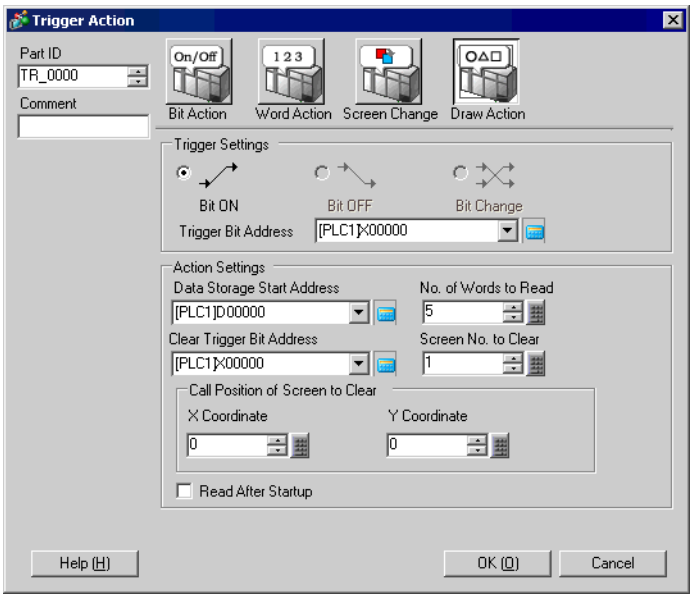


Setting		Description
Trigger Settings	Bit ON	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from OFF to ON.
	Bit OFF	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from ON to OFF.
	Bit Change	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from ON to OFF or from OFF to ON.
	Trigger Bit Address	Designate the bit address which will trigger the action designated in [Action Settings].

Continued

Setting		Description
Action Settings	Screen Change Action	Screen Change The displayed screen changes (jumps) to the specified screen.  • Change to Screen No. Specify the number of the Screen you want to display from 1 to 9,999. This can only be set when [Screen Change Action] is set to [Screen Change]. • Hierarchical Display Screen Change You can set a level hierarchy to the Screen Change. This can only be set when [Screen Change Action] is set to [Screen Change]. A maximum of 32 levels can be set. Previous Screen Returns to the previously displayed screen. For screens that are organized hierarchically, the screen one level up (the parent screen) will reappear. 

■ Draw Action



Setting		Description
Trigger Settings	Bit ON	Executes the action designated in [Action Settings] when the [Trigger Bit Address] changes from OFF to ON.
	Trigger Bit Address	Select the bit address which will trigger the drawing of the image. **NOTE** • When the image displays, this will automatically turn OFF. • Please maintain graphical data while drawing.
Action Settings	Data Storage Start Address	Stores the image and properties as graphical data in a word address. Designate this word address' start address. ☞ "■ Graphical data" (page A-49)
	No. of Words to Read	Designate the number of words of graphical data. ☞ "■ Graphical data" (page A-49)
	Clear Trigger Bit Address	Designate a trigger bit in order to clear the drawn image. When the clearing bit turns ON, a Clearing Screen will overwrite the displayed screen. **NOTE** • When the Clearing Screen appears, this will automatically turn OFF.
	Screen No. to Clear	Designate a screen number (base screen) in order to clear the drawn image. You have to have a previously prepared Clearing Screen.
	Call Position of Screen to Clear	Designate the Clearing Screen's call position (X coordinate, Y coordinate). **NOTE** • The top-left of the screen becomes coordinate (0, 0).

Continued

Setting		Description
Action Settings	Read After Startup	Read graphical data when the [Trigger Settings]'s condition is satisfied. This improves the performance of processes other than reading. **NOTE** • This action cannot be used when the [Data Storage Word Address] is an internal device.

■ Graphical data

Graphical data starting from the Data Storage Start Address will be as follows.

+0	Graphic Type	
+1	Display Attributes	
+2	Color Attributes	
+3	Coordinate Data	
+n		(Max +7)

◆ Graphic Type (+0)

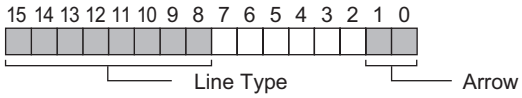
You can display a line, rectangle, circle, or dot. The following corresponding values will be stored.

Line: “1”, Rectangle: “2”, Circle: “3”, Dot: “5”

◆ Display Attributes (+1)

The display attributes, such as Line Type and Pattern, differ depending on each graphic. When drawing a dot, the display attributes (+1) data will be ignored.

- When drawing a line



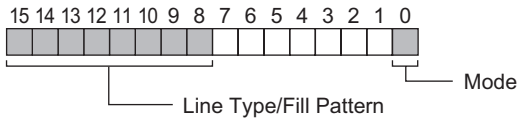
Arrow

Stored Value	Arrow
0	None
1	One Side →
2	Both Ends ↔

Line Type

Stored Value	Line Type
0	(Solid Line: 1-dot thickness)
1	(Dashed Line: 1-dot thickness)
2	(Chain Line: 1-dot thickness)
3	(Two-Dot Chain Line: 1-dot thickness)
4	(Solid Line: 2-dot thickness)
5	(Dashed Line: 2-dot thickness)
6	(Chain Line: 2-dot thickness)
7	(Two-Dot Chain Line: 2-dot thickness)
8	(Solid Line: 3-dot thickness)
9	(Solid Line: 5-dot thickness)

- When drawing a rectangle



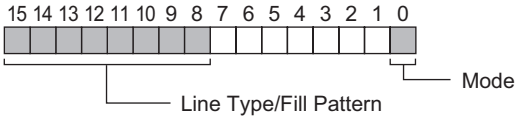
Mode

Stored Value	Mode
0	Draw Line
1	Fill

Line type/Fill pattern

Stored Value	Line Type	Fill Pattern
0	(Solid Line: 1-dot thickness)	
1	(Dashed Line: 1-dot thickness)	
2	(Chain Line: 1-dot thickness)	
3	(Two-Dot Chain Line: 1-dot thickness)	
4		
5		
6		
7		
8	(Solid Line: 3-dot thickness)	
9	(Solid Line: 5-dot thickness)	

- When drawing a circle



Mode

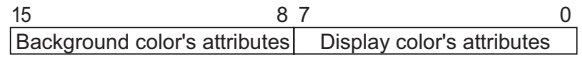
Stored Value	Mode
0	Draw Line
1	Fill

Line Type/Fill Pattern

Stored Value	Line Type	Fill Pattern
0	(Solid Line: 1-dot thickness)	
1	(Dashed Line: 1-dot thickness)	
2	(Chain Line: 1-dot thickness)	
3	(Two-Dot Chain Line: 1-dot thickness)	
4		
5		
6		
7		
8	(Solid Line: 3-dot thickness)	
9	(Solid Line: 5-dot thickness)	

◆ Color Attributes (+2)

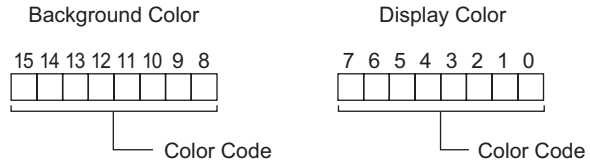
You can set the display color, background color, and individual blink settings. As shown below, display color data is stored in bit 0 to 7, and background color data is stored in bit 8 to 15.



The format used to store attribute data differs depending on the following display colors and whether or not blink is set.

- 256-Color Display (No Blink)
- 64-Color Display + 3-Speed Blink
- Monochrome 16 Levels + 3-Speed Blink

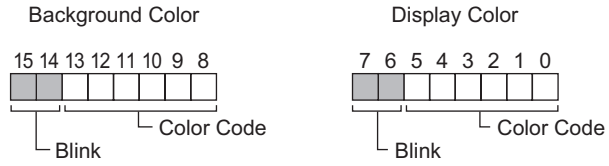
- For 256-Color Display (No Blink)
  As shown below, the display color's color code is stored in bit 0 to 7, and the background color's color code is stored in bit 8 to 15. For information about color codes, please refer to the following table.



Color Code Table

Color Code	RGB Code	Color Code	RGB Code	Color Code	RGB Code	Color Code	RGB Code
0	00h	64	6Eh	128	CCh	192	A2h
1	01h	65	7Eh	129	DCh	193	B2h
2	02h	66	7Fh	130	DDh	194	B3h
3	03h	67	6Fh	131	CDh	195	A3h
4	04h	68	2Eh	132	C4h	196	AAh
5	05h	69	3Eh	133	D4h	197	BAh
6	06h	70	3Fh	134	D5h	198	BBh
7	07h	71	2Fh	135	C5h	199	ABh
8	10h	72	82h	136	8Ch	200	E2h
9	11h	73	92h	137	9Ch	201	F2h
10	20h	74	93h	138	9Dh	202	F3h
11	30h	75	83h	139	8Dh	203	E3h
12	31h	76	8Ah	140	84h	204	EAh
13	21h	77	9Ah	141	94h	205	FAh
14	22h	78	9Bh	142	95h	206	FBh
15	32h	79	8Bh	143	85h	207	EBh
16	33h	80	C2h	144	28h	208	EEh
17	23h	81	D2h	145	38h	209	FEh
18	12h	82	D3h	146	39h	210	FFh
19	13h	83	C3h	147	29h	211	EFh
20	40h	84	CAh	148	68h	212	E6h
21	50h	85	DAh	149	78h	213	F6h
22	51h	86	DBh	150	79h	214	F7h
23	41h	87	CBh	151	69h	215	E7h
24	60h	88	CEh	152	6Ch	216	AEh
25	70h	89	DEh	153	7Ch	217	BEh
26	71h	90	DFh	154	7Dh	218	BFh
27	61h	91	CFh	155	6Dh	219	AFh
28	62h	92	C6h	156	2Ch	220	A6h
29	72h	93	D6h	157	3Ch	221	B6h
30	73h	94	D7h	158	3Dh	222	B7h
31	63h	95	C7h	159	2Dh	223	A7h
32	42h	96	8Eh	160	A0h	224	2Ah
33	52h	97	9Eh	161	B0h	225	3Ah
34	53h	98	9Fh	162	B1h	226	3Bh
35	43h	99	8Fh	163	A1h	227	2Bh
36	44h	100	86h	164	A8h	228	6Ah
37	54h	101	96h	165	B8h	229	7Ah
38	55h	102	97h	166	B9h	230	7Bh
39	45h	103	87h	167	A9h	231	6Bh
40	64h	104	0Ah	168	E0h	232	08h
41	74h	105	1Ah	169	F0h	233	18h
42	75h	106	1Bh	170	F1h	234	19h
43	65h	107	0Bh	171	E1h	235	09h
44	66h	108	4Ah	172	E8h	236	48h
45	76h	109	5Ah	173	F8h	237	58h
46	77h	110	5Bh	174	F9h	238	59h
47	67h	111	4Bh	175	E9h	239	49h
48	46h	112	4Eh	176	ECh	240	4Ch
49	56h	113	5Eh	177	FCh	241	5Ch
50	57h	114	5Fh	178	FDh	242	5Dh
51	47h	115	4Fh	179	EDh	243	4Dh
52	14h	116	0Eh	180	E4h	244	0Ch
53	15h	117	1Eh	181	F4h	245	1Ch
54	24h	118	1Fh	182	F5h	246	1Dh
55	34h	119	0Fh	183	E5h	247	0Dh
56	35h	120	C0h	184	ACh	248	90h
57	25h	121	D0h	185	BCh	249	91h
58	26h	122	D1h	186	BDh	250	81h
59	36h	123	C1h	187	ADh	251	88h
60	37h	124	C8h	188	A4h	252	98h
61	27h	125	D8h	189	B4h	253	99h
62	16h	126	D9h	190	B5h	254	89h
63	17h	127	C9h	191	A5h	255	80h

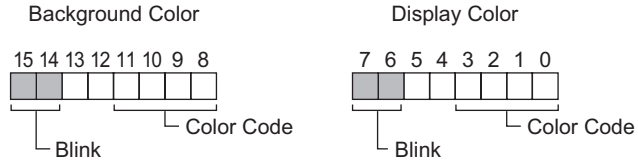
- For 64-Color Display + 3-Speed Blink
  As shown below, the display color's color code is stored in bit 0 to 5, and the background color's color code is stored in bit 8 to 13. For information about color codes, please refer to the 256-Color Display color code table.



Blink Storage Values

Bit 7 Bit 15	Bit 6 Bit 14	Blink State
0	0	None
0	1	High Speed Blink
1	0	Medium Speed Blink
1	1	Low Speed Blink

- For Monochrome 16 Levels + 3-Speed Blink
  As shown below, the display color's color code is stored in bit 0 to 3, and the background color's color code is stored in bit 8 to 11. For information about color codes, please refer to the following table.



Color Code Table

Color Code	0	1	2	3	. . .	12	13	14	15
Display Color	Black	→							White

Blink Storage Values

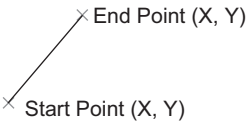
Bit 7 Bit 15	Bit 6 Bit 14	Blink State
0	0	None
0	1	High Speed Blink
1	0	Medium Speed Blink
1	1	Low Speed Blink

◆ Coordinate Data (+3)

For coordinate data, the top-left of the screen is coordinate (0, 0). For graphics in a window, the top-left of the screen registered as a window is coordinate (0, 0).

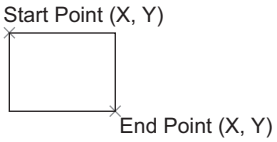
- When drawing a line

+3	Start Point X Coordinate
+4	Start Point Y Coordinate
+5	End Point X Coordinate
+6	End Point Y Coordinate



- When drawing a rectangle

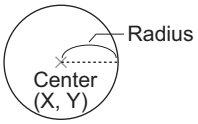
+3	Start Point X Coordinate
+4	Start Point Y Coordinate
+5	End Point X Coordinate
+6	End Point Y Coordinate



- When drawing a circle

+3	Center X Coordinate
+4	Center Y Coordinate
+5	Radius

Radius: 0 is invalid



- When drawing a dot

+3	Center X Coordinate
+4	Center Y Coordinate

A.2.2 Trigger Action Restrictions

- For the trigger bit's ON/OFF, make sure to leave an interval longer than the communication cycle time[*1] or display scan time[*2], whichever is longer.
- After you turn ON the Trigger Bit Address, a screen change occurs before the drawing or erasing is complete, the Trigger Bit Address will be turned OFF.
- The only graphic data that will be stored is Bin data. BCD data cannot be used.
- If the graphical data to be stored is outside the range, it will become the default value, "0".
- For coordinate data, the top-left of the screen is coordinate (0, 0). For graphics in a window, the top-left of the screen registered as a window is coordinate (0, 0).
- For the color attribute's background color, if you designate "Black + Medium Speed Blink" or color code 255, the background color will become transparent.
- The following shows actions which occur immediately after a screen is changed or power is turned ON.

Trigger Condition	Direct Access Method		Memory Link Method	
	Bit Value "0"	Bit Value "1"	Bit Value "0"	Bit Value "1"
0 → 1 (Bit Rising)	×	○	×	×
1 → 0 (Bit Falling)	○	×	×	×
0 ↔ 1 (Bit Changing State)	○	○	×	×

○: Operation is performed immediately after the screen is changed, or the power is turned ON.

×: Operation is not performed immediately after the screen is changed, or the power is turned ON.

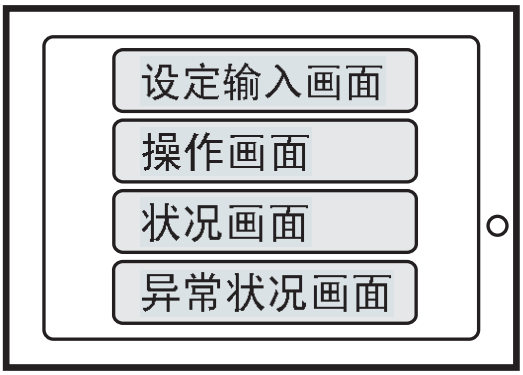
*1 The communication cycle time is the time it takes to request and take in data from the GP unit to the PLC. It is stored in the internal device LS2037 as binary data. The unit is milliseconds (ms). There is an error of ±10 ms.

*2 Display Scan Time is the time it takes to display/calculate 1 screen. It is stored in the internal device LS2036 as binary data. The unit is milliseconds (ms). There is an error of ±10 ms.

A.3 Drawing Using Foreign Languages

A.3.1 Details

This section provides an example of how to create a switch label using a Chinese (Simplified) stroke font.
In addition to Chinese (Simplified), GP-Pro EX supports writing in Western European languages, Chinese (traditional), Korean, Cyrillic, and Thai.



A.3.2 Setup Procedure

NOTE

- This procedure shows you how to use Chinese (Simplified) to enter a label for the screenchanging switch described in Section 12.2, “Changing the Display Screen by Touch”. See that section for how to specify the settings for screen-changing switches.
  ☞ “12.2 Changing the Displayed Screen By Touch” (page 12-4)
- For more information on stroke fonts, see Section, “Stroke Font, Standard Font”.
  ☞ “6.2 Stroke Font, Standard Font” (page 6-3)

Follow the steps below to draw a switch label in a foreign language (Chinese Simplified in this example).

Make the three settings below. Click the page numbers in numerical order, follow the steps, then continue the procedure.

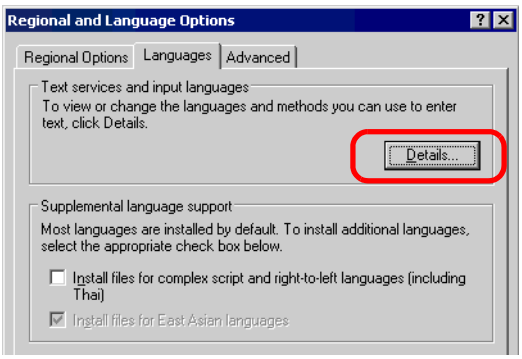
1. Adding Chinese (Simplified) to the Windows® multi-language display/input function settings
   - “ ◆ When using Windows®XP” (page A-58)
   - “ ◆ When using Windows®2000” (page A-60)
2. “ ■ Adding Chinese (simplified) stroke font to project” (page A-62)
3. “ ■ Inputting into Change Screen Switch’s label with Chinese (Simplified)” (page A-64)

■ Adding Chinese (Simplified) to the Windows® multi-language display/ input function settings

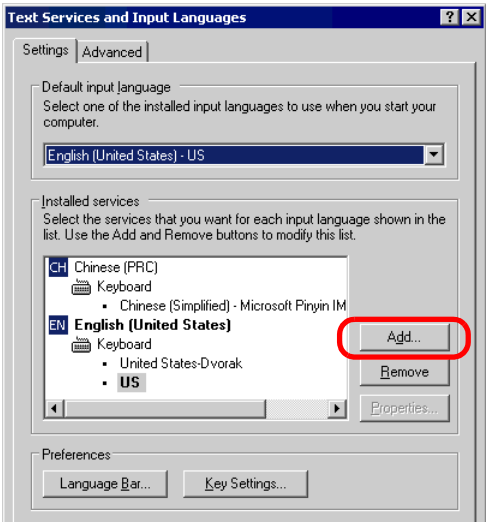
◆ When using Windows®XP

1 Open [Control Panel] from the [Start] menu, and double-click [Regional and Language Options].

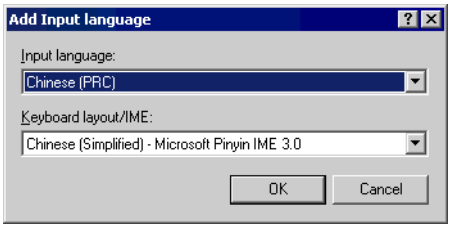
2 Click the [Details] button under [Text services and input languages] in the [Languages] tab.



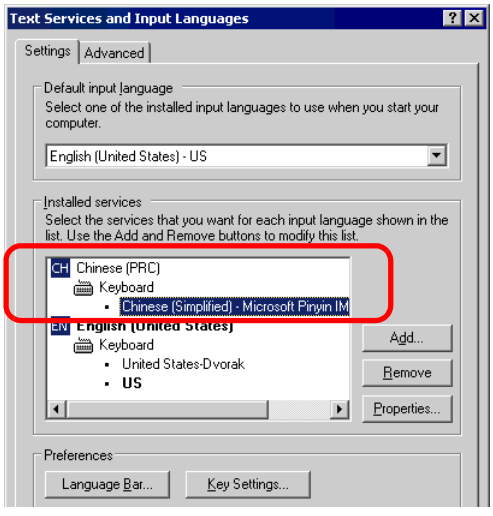
3 The [Text Services and Input Languages] dialog box appears. Click the [Add...] button under [Installed services] in the [Settings] tab.



4 In the [Add Input language] dialog box, select the desired language in [Input language] ([Chinese (PRC)] in this example)
and in [Keyboard layout/IME] ([Chinese (Simplified) - Microsoft Pinyin IME 3.0] in this example). Click [OK] to close the dialog box.



5 The [Text Services and Input Languages] dialog box returns. Check that [Chinese (Simplified) - Microsoft Pinyin IME 3.0] has been added to [Installed services], click [Apply], then [OK] to close the dialog box.

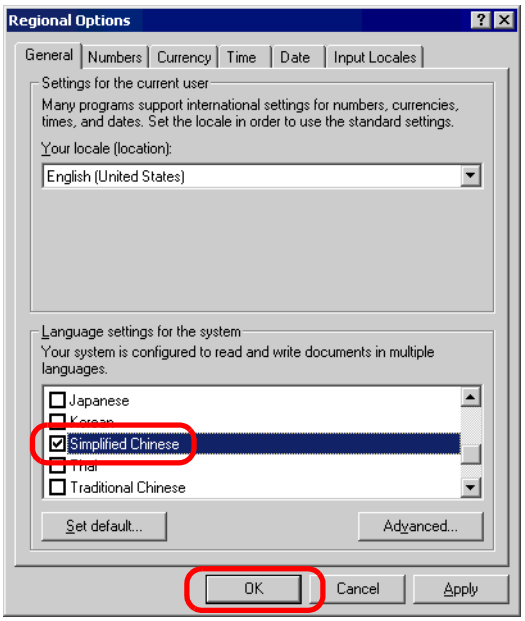


6 The [Regional and Language Options] dialog box returns. Click [OK] to close it.

◆ When using Windows®2000

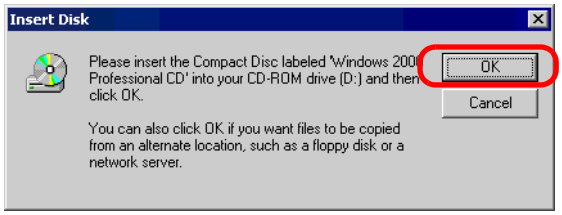
1 Open [Control Panel] from [Settings] in the [Start] menu, and double-click [Regional Options].

2 Select [Chinese (Simplified)] under [Language settings for the system] in the [General] tab, and click [OK].

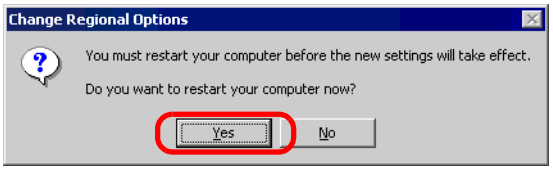


NOTE

- The dialog box below appears when adding Chinese (Simplified) for the first time. Insert the Windows®2000 CD-ROM into the PC and click [OK].

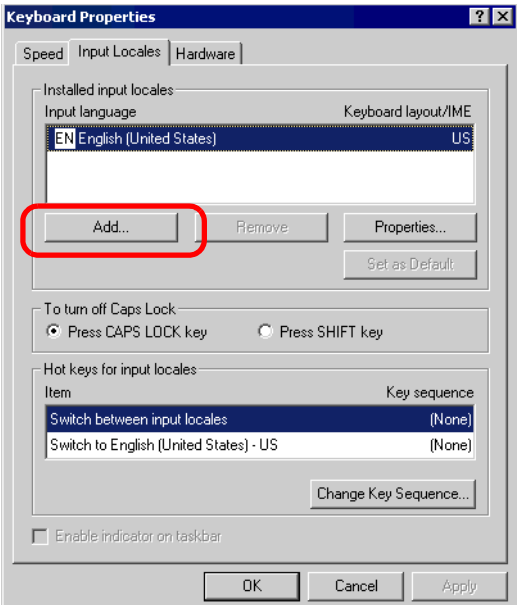


3 When the data has finished being copied from the CD-ROM, you must restart the PC. The dialog box below appears. Click [Yes].

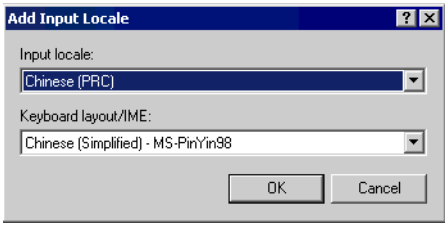


4 After restarting, open [Control Panel] from [Settings] in the [Start] menu, and double-click [Keyboard].

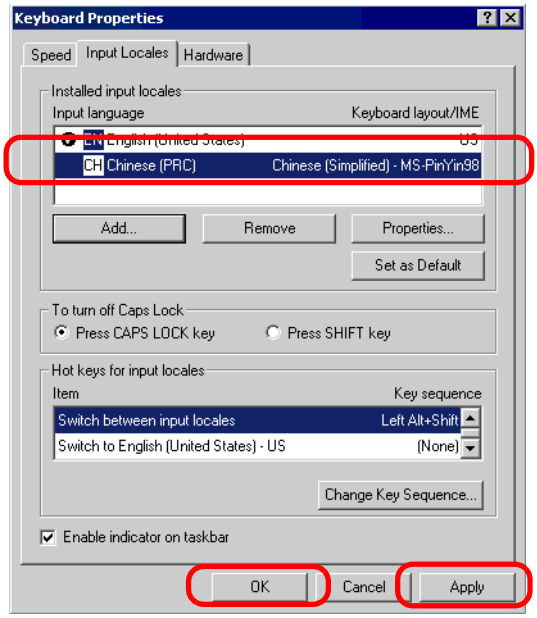
5 Open the [Input Locales] tab on the [Keyboard Properties] dialog box, and click the [Add] button under [Installed input locales].



6 The [Add Input Locale] dialog box appears. Select the language to add from the pull-down menu and click [OK].
Example: [Chinese (PRC)] is selected in [Input locale] and [Chinese (Simplified) - MS-PinYin98] is selected in [Keyboard layout/IME].



7 Verify that [Chinese (PRC)] is added to the languages in [Installed input locales]. Click the [Apply] button and click [OK] to close the window.

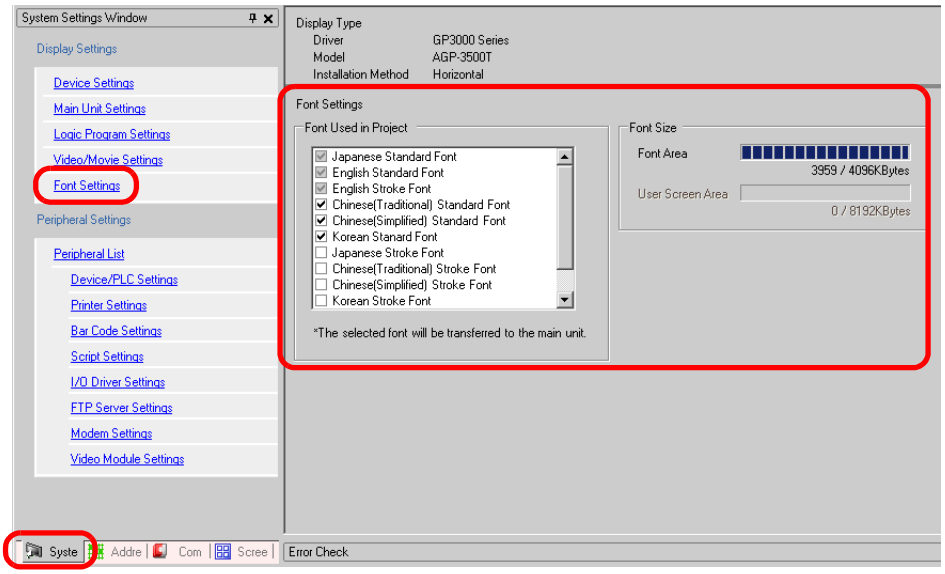


■ Adding Chinese (simplified) stroke font to project

NOTE

- Please refer to the following for details about Stroke Font.
☞ "6.2 Stroke Font, Standard Font" (page 6-3)

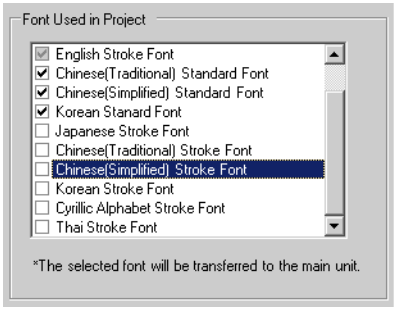
1 Select GP-Pro EX's [System Settings Window] menu - [Font Settings] command and then the [Font Settings] screen is displayed.



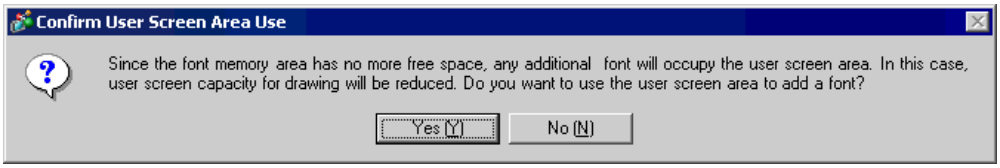
NOTE

- If the [System Settings Window] tab is not displayed in the Work Space, select the [View (V)] menu - [Work Space (W)] option - [System Settings Window (S)] command.

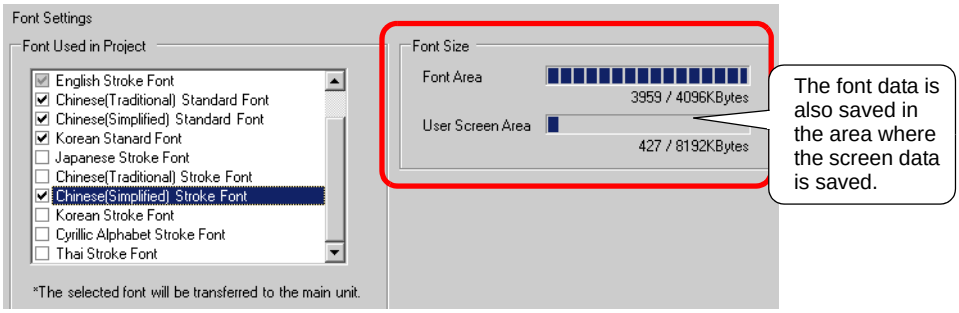
2 Put a check mark next to the [Chinese (Simplified) Stroke Font] box under the [Font Used in Project] to add the font.



3 When you place a check mark, the following message is displayed.

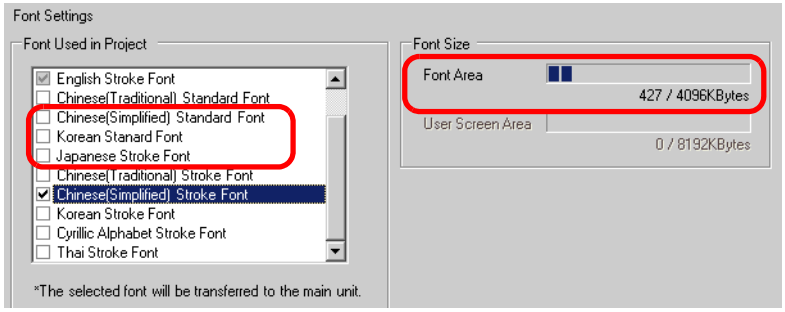


Click [Yes] to save the font data that the [Font Area] cannot store in the [User Screen Area] or to adjust the Font Area later as in the step 4. If you click [Yes], you can confirm that the User Screen Area is also used.



Click [No] to cancel adding the font.

4 Clear the check box for the fonts you are not using. This allows more free space in the Font Area.



NOTE

- "Japanese Standard Font", "English Standard Font", and "English Stroke Font" are all fixed. You cannot remove these fonts.

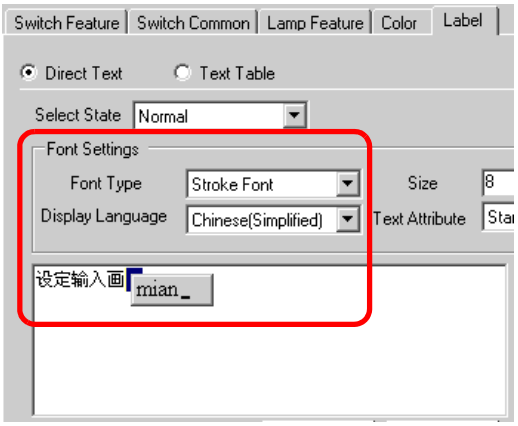
■ Inputting into Change Screen Switch's label with Chinese (Simplified)

1 Click the input system's icon ("Language" in Windows ® XP) in the taskbar, and start "Chinese (PRC)".

For Windows®XP

For Windows®2000

2 Start up GP-Pro EX, and double-click the Change Screen Switch created with the process in "12.2 Changing the Displayed Screen By Touch" (page 12-4) . Select the [Label] tab, set the [Font Type], [Display Language], and input with roman characters.

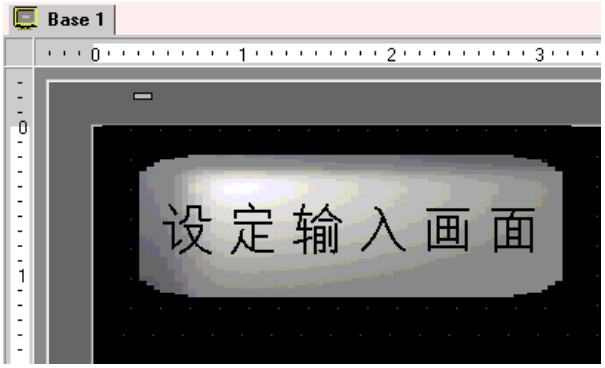


NOTE

- The moment you select the [Stroke Font] in [Font Type] or the moment you change the [Display Language], the following dialog box may be displayed. This is to confirm whether or not to add the font type, because a switch has been set before adding the font.

To add the font, click [Yes].
If you click [Cancel], adding the font is canceled. If you transfer the text in this state to the GP, the set text cannot be displayed.

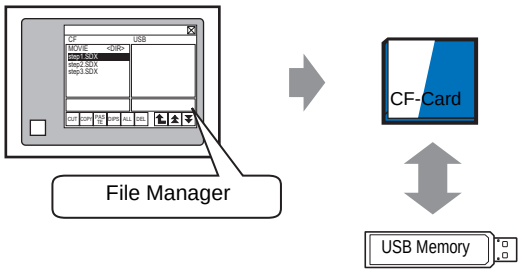
3 Click [OK] to close the [Switch/Lamp] dialog box. The Change Screen Switch's label changes to Chinese (Simplified).



A.4 Transfering Data Between a CF Card and a USB Memory Device

A.4.1 Details

You can use the Special Data Display [File Manager] on the GP screen to copy or move data from the CF card to USB memory, or from USB memory to the CF card.
This function can be used for securing available space by transfering data not immediately required in the CF card to a USB memory device when the CF card has limited available space, or for making a backup of the data.



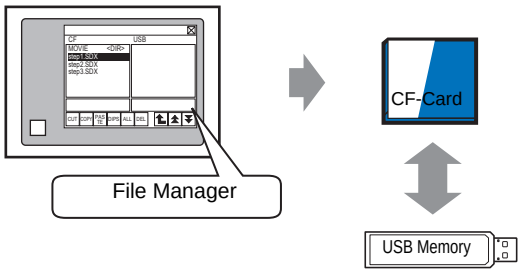
A.4.2 Setup Procedure

NOTE

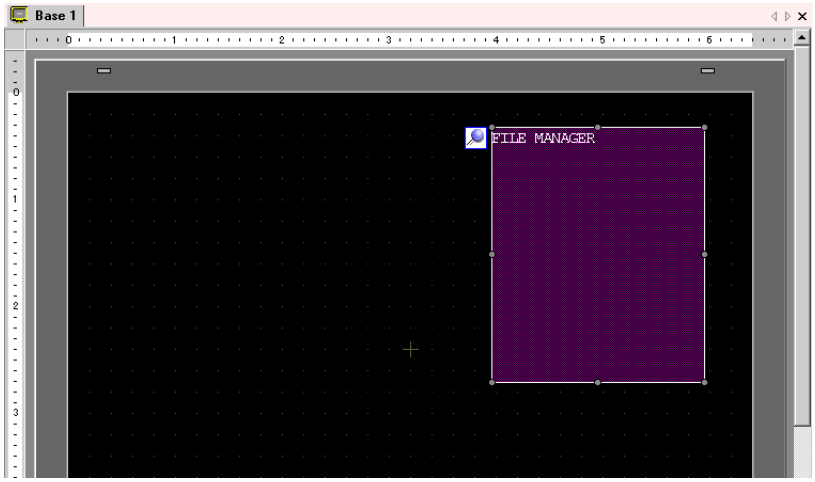
- Please refer to the settings guide for details.

☞ "25.10.2 Setup Guide for the Special Data Display ■ File Manager" (page 25-86)

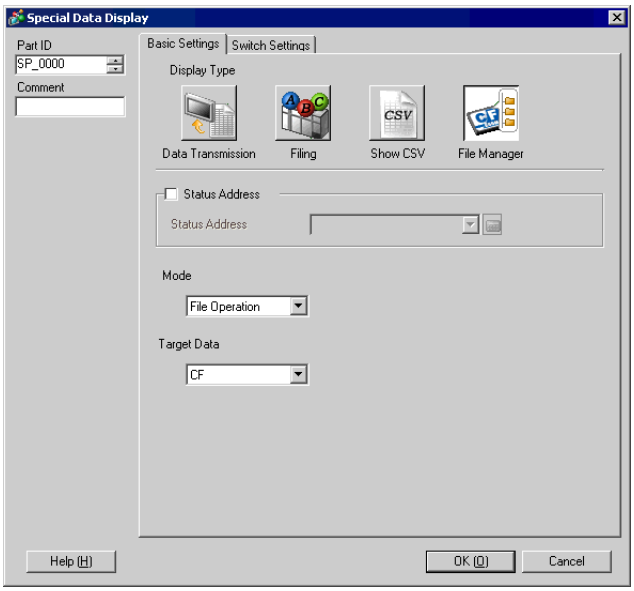
By using Special Data Display [File Manager], the data in the CF-card inserted in the GP can be moved to the USB memory device.



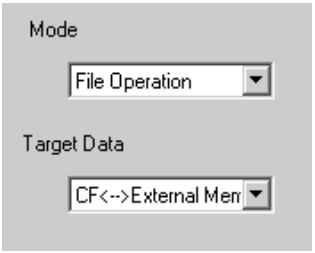
1 On the [Parts(P)] menu, select [Special Data Display(P)]-[File Manager(M)] and place File Manager on the screen.



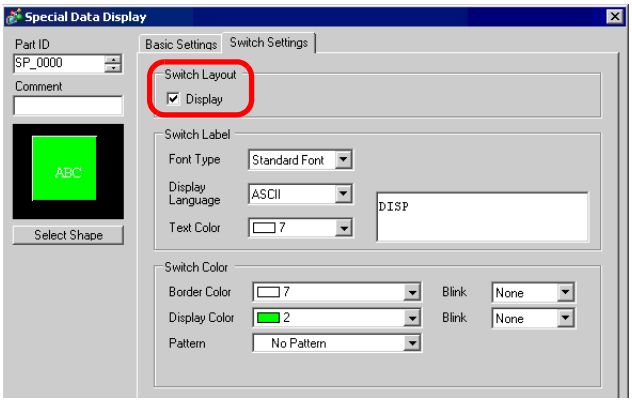
2 Double-clicking the Special Data Display [File Manager] opens the following dialog box.



3 From [Action Mode], select [File Operation], and then select [CF<-->External Memory] of [Target Data].



4 Open the [Switch Settings] tab and select the [Display] check box. In [Select Shape], select the shape of the switch, specify the label and color as required, and then click [OK].

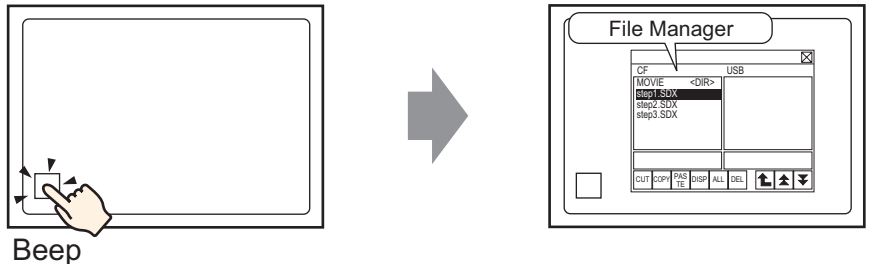


NOTE

- You can check the approximate available space of the CF-card and the USB memory device by specifying the settings for [CF-Card Available Space] and [External Memory Available Space] in [Main Unit Settings]-[Action Settings] in the System Settings Window.

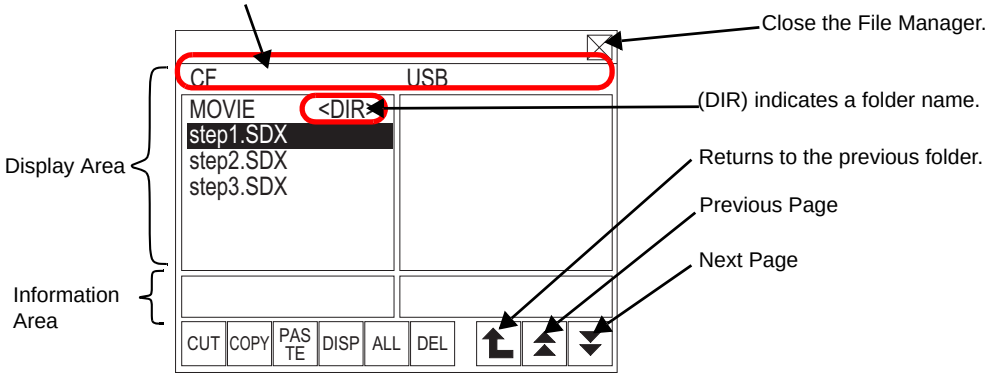
A.4.3 Operation Procedure

1 Attach the CF-Card and USB memory to the GP.
2 Touch the File Manager Display Switch and the [File Manager] is called to the GP screen.



(If you touch the display switch again, [File Manager] will close.)

The contents of the CF-card are shown on the left and the contents of the USB memory are shown on the right.



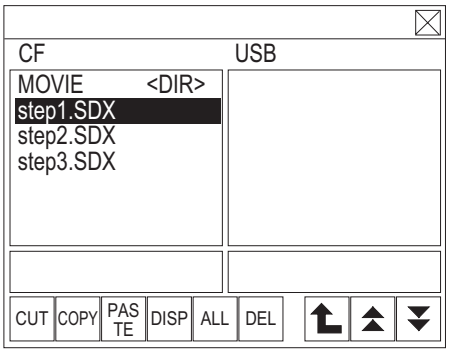
[DEL] : Deletes the selected file or folder.
[ALL] : Selects all the files in the displayed folder.
[DISP] : Displays the files in the selected folder.
If you select a CSV file, it will be displayed in [CSV Display]. If you select a JPEG file, it will be displayed in [Picture Display].
[PASTE] : Pastes the file that was cut or copied.
[COPY] : Copies the selected file or folder.
[CUT] : Cuts the selected file or folder.

- Display Area
  Displays the file name including extension up to 19 characters. If the file name contains more than 19 characters, the file name will be displayed as "..." after the first 19 characters. (e.g. "ZR12345678901234...")
  Displays the folder name up to 14 characters. If the folder name contains more than 14 characters, the folder name will be displayed as "..." after the first 14 characters. (e.g. "ABCDEFGHIJK...<DIR>").
  The full-path name can contain up to 100 characters (folder name + file name).
- Information Area
  Displays the creation date of the selected folder, or the creation date and file size of the selected file.

NOTE

- Although multiple USB memories devices are inserted in the GP, only the USB memory device recognized by the GP as the first USB memory device can be used.
- If a CF card or USB memory device is not inserted, File Manager will still be displayed, however nothing will be displayed in the Display Area. Immediately after a CF card or USB memory is inserted in the GP, first the root folder will always be displayed.

3 Select a file from [CF]. (If the file you want to transfer is contained in the folder, select the folder name and touch [DISP]. This will display the file names contained in the folder.)

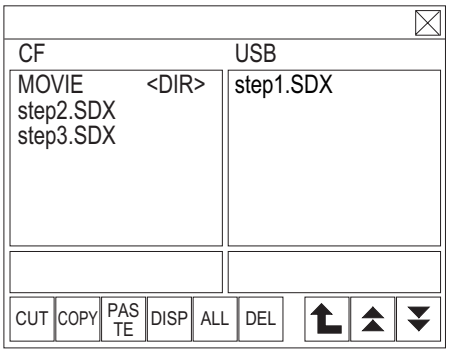


NOTE

- Touch the selected file again to clear the selection.
- Multiple files can be selected in the displayed area. If you switch the page, the selection will be cleared. Up to seven folders or files can be displayed on one page.
- The files will be displayed in the order in which they were created. It is not possible to sort the files by file name or time stamp.

4 Touch [CUT]. The [USB] to which the files will be pasted is highlighted for selection.

5 If you touch [PASTE], the message “If a file already exists, it will be overwritten.” will be displayed. Touch [OK] to paste the file to [USB].



The file was transfered from the CF card to the USB memory device.

IMPORTANT

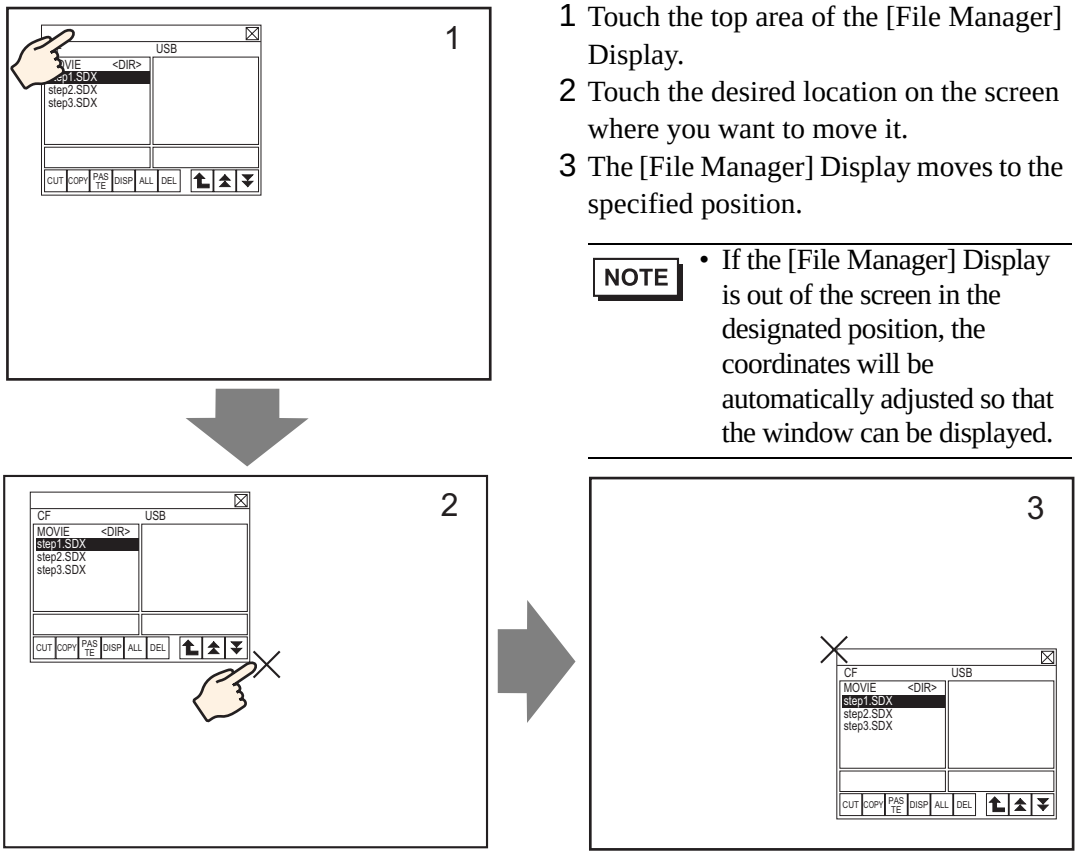
- While accessing a CF card or a USB memory device, do not reset the main unit or remove the CF card or USB memory device.

NOTE

- You cannot change the size of File Manager.
- A file cannot be copied or transfered between a CF card and another CF card, or between a USB device and another USB device.
- If you switch pages while [CUT] or [COPY] is selected, the selection will not be cleared.
- The CSV file displayed in the CSV Display cannot be cut or deleted.
- If you try to switch the screen while a file is being copied, cut, or deleted, the process will continue while the screen is switched.
- An error will occur if you try to transfer a file to a folder that is not displayed correctly in File Manager, or if you try to perform a file operation in that folder.

Moving a File Manager

The Special Data Display [File Manager]'s display position on the screen can be changed.



1 Touch the top area of the [File Manager] Display.
2 Touch the desired location on the screen where you want to move it.
3 The [File Manager] Display moves to the specified position.

NOTE

- If the [File Manager] Display is out of the screen in the designated position, the coordinates will be automatically adjusted so that the window can be displayed.

A.5 System Variables

The predefined variables in GP-Pro EX are called system variables.
System variables are either logic system variables (#L system variables) or HMI system variables (#H system variables). System variables indicate the state of the GP and affect operation. Also, similar to symbol variables, system variables have variable types (integer/bit) and operate in the same way as symbol variables.

IMPORTANT
- The user cannot arbitrarily add or delete system variables.
- The names of system variables is the same regardless of [Variable Format] and [Address Format].

A.5.1 Logic System Variables (#L System Variables)

■ Bit Logic System Variables

Symbol Variable Name		Description	Read	Write
Ladder Reference Flag				
	#L_RunMonitorA	ON in RUN	○	×
	#L_AlwaysON	Always ON	○	×
Calculation Flag				
	#L_CalcZero	Zero flag	○	×
	#L_CalcCarry	Carry flag	○	×
System Settings				
	#L_ScanModeSW	Mode setting of the logic	○	×
	#L_AutoRunSW	Mode setting at startup	○	×
	#L_InOutSW	Setting of external input and output enable	○	×
	#L_FaultStopSW	Setting for continuous error switching	○	×
Operation Information				
	#L_UnlatchClear	Zero clear for the clear area	○	○
	#L_LatchClear	Zero clear for the keep area	○	○
Time				
	#L_Clock100ms	100 ms clock pulse	○	×
	#L_Clock1sec	1 second clock pulse	○	×
	#L_Clock1min	1 minute clock pulse	○	×
Error Information				
	#L_BatteryErr	Battery malfunction	○	×
	#L_Error	Logic error	○	×
	#L_StopPending	Logic stop wait flag	○	×
	#L_Fault	Error handler stop flag	○	○
	#L_IOFault	I/O error flag	○	×

◆ #L_RunMonitorA (ON in RUN)

ON when the logic program is running, and OFF when the logic program is not running. Because this is a read-only area, writing is not possible. If you write in this area, the operation may fail.

◆ #L_AlwaysON (Always ON)

On at the beginning of a logic scan, regardless of whether or not the logic program is used. Because this is a read-only area, if OFF is written, the #L_AlwaysON bit turns OFF in the program after OFF.
ON is rewritten at the beginning of the next scan. Do not perform a write operation for #L_AlwaysON.

◆ #L_CalcZero (Zero flag)

#L_CalcZero turns ON only when the operation result is zero (0).
Every time an operation is executed, the contents of #L_CalcZero are rewritten.
After the execution of an operation, #L_CalcZero rewrites OFF or ON. Because this is a read-only area, writing is not possible.

◆ #L_CalcCarry (Carry flag)

Depending on the result after the execution of an operation, #L_CalcCarry turns ON only when a carry occurs.
Every time an operation is executed, the contents of #L_CalcCarry are rewritten.
After the execution of an operation, #L_CalcCarry rewrites OFF or ON. Because this is a read-only area, writing is not possible.

◆ #L_ScanModeSW (Mode setting of the logic)

You can check the operation mode of the logic program currently being executed.
When #L_ScanModeSW is ON, operation is in CPU Scan Percentage mode. When #L_ScanModeSW is OFF, operation is in Fixed Scan Time mode. Because this is a read-only area, writing is not possible.

◆ #L_AutoRunSW (Mode setting at startup)

When the action setting at power ON is set to RUN, #L_AutoRunSW turns ON.
When the action setting at power ON is set to STOP, #L_AutoRunSW turns OFF.
Because this is a read-only area, writing is not possible.

◆ #L_InOutSW (Setting of external input and output enable)

If the external input and output settings are enabled in the action settings at power ON, #L_InOutSW turns ON.
If the external input and output settings are disabled in the action settings at power ON, #L_InOutSW turns OFF.
Because this is a read-only area, writing is not possible.

◆ #L_FaultStopSW (Continuous error switch setting)

When [Minor Errors] is set to STOP, operation stops when a minor error occurs and #L_FaultStopSW turns ON.
When the [Minor Errors] is set to RUN, operation continues when a minor error occurs and #L_FaultStopSW turns OFF.
Because this is a read-only area, writing is not possible.

◆ #L_UnLatchClear (Zero clear of the clear area)

By turning ON #L_UnLatchClear, zero clear of the clear area is requested. (An up edge is detected and the area is cleared to zero.)
This variable operates only when the logic program is in STOP.
The setting value and time base of the timer and the setting value of the counter cannot be cleared to zero. The system variables and addresses of the connection devices cannot be cleared to zero.
Reading and writing is possible in this area.

◆ #L_LatchClear (Zero clear of a keep area)

By turning ON #L_LatchClear, zero clear of a keep area is requested. (An up edge is detected and the area is cleared to zero.)
This bit operates only when the logic program is in STOP.
The setting value and time base of the timer and the setting value of the counter cannot be cleared to zero. The system variables and addresses of the connection devices cannot be cleared to zero.
Reading and writing is possible in this area.

◆ #L_Clock100ms (100 ms clock pulse)

The variable turns ON and OFF repeatedly with a frequency of 50-ms OFF time and 50-ms ON time.
Because this is a read-only area, writing is not possible.

◆ #L_Clock1sec (1 second clock pulse)

The variable turns ON and OFF repeatedly with a frequency of 500-ms OFF time and 500-ms ON time.
Because this is a read-only area, writing is not possible.

◆ #L_Clock1min (1 minute clock pulse)

The variable turns ON and OFF repeatedly, with a frequency of 30-s OFF time and 30-s ON time.
Because this is a read-only area, writing is not possible.

◆ #L_BatteryErr (Battery malfunction)

Turns on when battery malfunction information is detected on the GP main unit.
If this bit turns ON, the #L_BatteryErr bit does not turn OFF until the GP main unit is reset or the power turns OFF.
Because this is a read-only area, writing is not possible.

◆ #L_Error (Logic error)

Turns ON if an error occurs in the logic operation.
If this bit turns ON, the #L_Error bit does not turn OFF until the GP main unit is reset or the power turns OFF.
Because this is a read-only area, writing is not possible.

◆ #L_StopPending (Logic stop wait flag)

The #L_StopPending bit remains ON Until #L_StopScans reaches 0.
Until #L_StopScans is zero, the #L_StopPending bit remains ON for the duration of the scans until the logic stops.
Because this is a read-only area, writing is not possible.

◆ #L_Fault (Error handler stop flag)

This flag is referenced at the end of the “error handler” subroutine to determine whether to stop or continue the execution of the logic program.
The execution of the logic program on the GP will stop at the end of ERRH routine if the #L_Fault bit is ON.
Reading and writing is possible in this area.
#L_Fault is not used without an “error handler” subroutine.

◆ #L_IOFault (I/O error flag)

#L_IOFault turns ON if an I/O error occurs on the I/O driver.
The flag remains until another error occurs or until the GP is reset.

A.5.2 Integer Logic System Variables

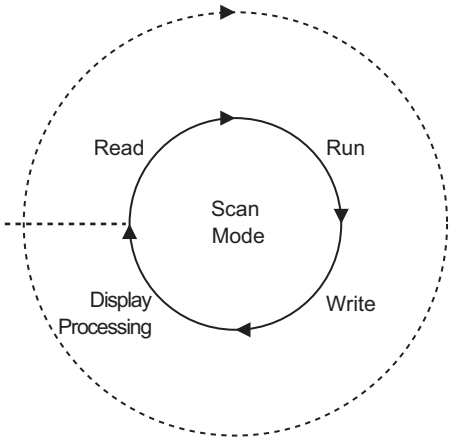
Symbol Variable Name		Description	Read	Write
Scan Time				
	#L_ScanTime	The time from the start of step 0 of the current scan to the start of step 0 of the next scan	○	×
	#L_AvgScanTime	The average of 64 #L_ScanTime cycles	○	×
	#L_MinScanTime	The minimum scan time for #L_ScanTime	○	×
	#L_MaxScanTime	The maximum scan time for #L_ScanTime	○	×
	#L_ScanCount	Number of scans	○	×
	#L_LogicTime	The time from the start of step 0 to the END instruction	○	×
	#L_AvgLogicTime	The average of 64 #L_LogicTime cycles	○	×
	#L_MinLogicTime	The minimum logic time for #L_LogicTime	○	×
	#L_MaxLogicTime	The maximum logic time for #L_LogicTime	○	×
Status				
	#L_Status	Logic status information	○	×
	#L_Platform	Code number of the GP platform	○	×
	#L_Version	Logic firmware version	○	×
	#L_EditCount	Number of online edits	○	×
	#L_IOInfo	I/O driver information	○	×
System Settings				
	#L_ConstantScan	Logic startup frequency	○	×
	#L_PercentScan	Logic operation rate	○	×
	#L_WatchdogTime	Logic WDT value	○	×
	#L_AddressRefreshTime	Connection device address refresh time	○	×
Time				
	#L_Time	Time information	○	×

Continued

Symbol Variable Name		Description	Read	Write
Operation Information				
	#L_Command	Changes the logic operation mode	○	○
	#L_LogicMonitor	The logic monitor startup switch	○	○
	#L_LogicMonStep	Indicates the steps for displaying the logic monitor	○	○
I/O Status				
	#L_IOStatus	Status of the built-in I/O driver	○	×
Error Information				
	#L_CalcErrCode	Storage area for calculation error codes	○	×
	#L_FaultStep	Storage area for the step No. of the calculation error	○	×
	#L_FaultLogicScreen	Storage area for the logic screen number of the calculation error	○	×
Logic Stop				
	#L_StopScans	Number of logic stop scans	○	○

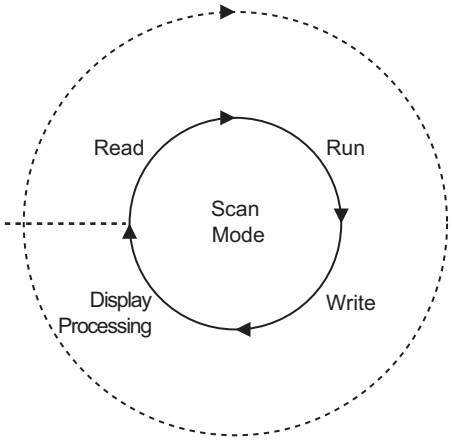
◆ #L_ScanTime (The time from the start of step 0 of the current scan to the start of step 0 of the next scan)

Stores the scan time of the previous scan just before the execution of the next scan.
Scan time is the time required for I/O reading, execution of the logic program, I/O output, and display processing.
The unit is 0.1 ms.



◆ #L_AvgScanTime (The average of 64 #L_ScanTime cycles)

Stores the average scan time.
Average scan time is the average time required for I/O reading, execution of the logic program, I/O writing, and display processing in one scan.
The variable is updated with each completion of 64 scan cycles.
The unit is 0.1 ms.



◆ #L_MinScanTime (The minimum scan time of #L_ScanTime)

Stores the minimum scan time of the logic program.
When #L_ScanTime is updated, the minimum scan check is performed and the variable is updated with every scan.
The unit is 0.1 ms.

◆ #L_MaxScanTime (The maximum scan time of #L_ScanTime)

Stores the maximum scan time of the logic program.
When #L_ScanTime is updated, the maximum scan check is performed and the variable is updated with every scan.
The unit is 0.1 ms.

◆ #L_ScanCount (Number of scans)

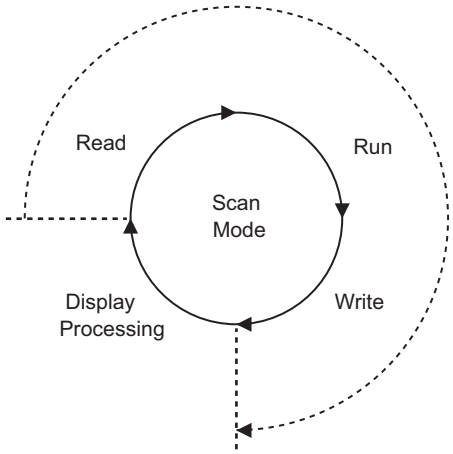
Upon completion of each logic program scan, the counter increments the variable.
The value in #L_ScanCount ranges from 0 to 16#FFFFFFFF. When the maximum value (16#FFFFFFFF) is exceeded, the variable is incremented again from 0.
You can confirm whether the logic program is being executed by checking #L_ScanCount.

◆ #L_LogicTime (The time from the start of step 0 to the END instruction)

Stores the logic time of the previous scan execution.
Logic time is the time required for I/O reading, execution of the logic program, and I/O writing in one scan. The display processing time is not included.

◆ #L_AvgLogicTime (The average of 64 #L_ScanTime cycles)

Stores the average logic time.
Average logic time is the average time required for I/O reading, execution of the logic program, and I/O writing in one scan.
The variable is updated with each completion of 64 scan cycles.



◆ #L_MinLogicTime (The minimum logic time of #L_LogicTime)

Stores the minimum logic time of the logic program.
When updating #L_LogicTime, the minimum logic time is checked and the variable is updated with every scan.
The unit is 0.1 ms.

◆ #L_MaxLogicTime (The maximum logic time of #L_LogicTime)

Stores the maximum logic time of the logic program.
When updating #L_LogicTime, the maximum logic time is checked and the variable is updated with every scan.
The unit is 0.1 ms.

◆ #L_Status (The logic status information)

Displays the state of the GP. Bytes and bits are defined as follows:
Byte 0: Displays the current error state on the GP.
Byte 1: Displays the error state history. This byte resets to 0 only when the GP is reset.
Byte 2: Displays the current operation state.
Byte 3: Reserved area.

Byte 3 Reserved	Byte 2 Current state	Byte 1 Error state history	Byte 0 Current error state

0th byte Byte: 0 (latch)

	Total error	Scan error	Reserved	Read error	Over-flow	I/O error	Minor error	Major error
Bit	7	6	5	4	3	2	1	0

1st byte Byte: 1 (latch)

	Total error	Scan error	Reserved	Read error	Over-flow	I/O error	Minor error	Major error
Bit	15	14	13	12	11	10	9	8

2nd byte Byte: 2 (latch)

	Reserved	Reserved	Standby	Stopped	Pause	Force change Enable/	I/O available	In RUN
Bit	23	22	21	20	19	18	17	16

3rd byte Byte: 3 (latch)

	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Bit	31	30	29	28	27	26	25	24

◆ #L_Platform (The GP platform code number)

Stores the GP platform code number.

Type	Code
AGP-3302B	0x020404
AGP-3301	0x020504
AGP-3300	0x020514
AGP-3400	0x020614
AGP-3500	0x020714
AGP-3600	0x020814
AGP-3450	0x020634
AGP-3550	0x020734
AGP-3650	0x020834
AGP-3750	0x020934

◆ #L_Version (The logic firmware version)

Stores the logic firmware version.

◆ #L_EditCount (The number of online edits)

Stores the number of online edits. (This variable cannot be executed while writing in RUN.)

◆ #L_IOInfo (I/O driver information)

Stores information about the I/O driver.

◆ #L_ConstantScan (The logic startup frequency)

Sets the scan time in units of 10 ms in Fixed Scan Time mode.
When logic time is constant, the display processing time can be extended by increasing the value of #L_ConstantScan. By decreasing the value, the display processing time can be reduced. This is because most of the processing time is used by logic functions.
This variable can be set by default or specified in Monitor mode during logic operation.

NOTE ☞ "29.13.3 Adjusting Logic Scan Time ◆ Fixed Scan Time" (page 29-111)

◆ #L_PercentScan (The logic operation rate)

Sets the usage rate of the logic function compared to the total logic processing time in CPU Scan Percentage mode. Specify this variable in units of 10 ms.
This variable can be set by default or specified in Monitor mode during logic operation.

NOTE ☞ "29.13.3 Adjusting Logic Scan Time ◆ CPU Scan Percentage" (page 29-112)

◆ #L_WatchdogTime (WDT value of the logic)

Sets the WDT value (watch dog timer) in ms.
When #L_ScanTime exceeds this value, a major error occurs.
This variable can be set by default or specified in Monitor mode during logic operation.

◆ #L_AddressRefreshTime (The connection device address refresh time)

Sets the address refresh time for the connection device addresses used in the logic program.

NOTE ☞ "29.13.3 Adjusting Logic Scan Time ■ Address Refresh" (page 29-114)

◆ #L_Time (Time information)

Indicates the "time" set in the logic in 4-digit BCD.
The time is stored in the following state:

e.g. 11:19 pm

	Hour (tens)	Hour (ones)	Minute (tens)	Minute (ones)
Value	2	3	1	9

◆ #L_Command (Changes the logic operation mode)

This is an integer variable used as a logic control command.
After the logic acknowledges #L_Command, the bits other than bit 7 are reset to 0. If multiple bits are ON, the least significant bit is prioritized.

3rd byte Reserved	2nd byte Reserved	1st byte Reserved	0th byte

0th byte

	I/O Enable/ disable	Reserved	Pause	Continue	1 scan	Reset	Run	Stop
Bit	7	6	5	4	3	2	1	0

◆ #L_LogicMonitor (Startup switch of the logic monitor)

Starts up and operates the logic program monitor function on the GP.
The following shows each operation.

Byte 3	Byte 2	Byte 1	Byte 0

0th byte Byte: 0

	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Logic monitor startup: 1	Device monitor startup: 1
Bit	7	6	5	4	3	2	1	0

1st byte Byte: 1

	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Bit	15	14	13	12	11	10	9	8

2nd byte Byte: 2

	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Bit	23	22	21	20	19	18	17	16

3rd byte Byte: 3

	Running: 1 Stopped: 0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Bit	31	30	29	28	27	26	25	24

◆ #L_LogicMonStep (Indicates the steps for displaying the logic monitor)

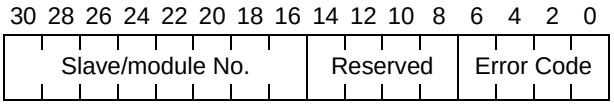
Stores the starting rung number to be displayed when the logic monitor is running.
If the logic monitor is not running, write the rung number in #L_LogicMonStep to start up the logic monitor with the specified rung number as the first rung when the logic monitor trigger bit (bit 0 of #L_LogicMonitor) turns OFF → ON.
This variable is used when the logic monitor function is enabled.

◆ #L_IOStatus (Status of the built-in I/O driver)

Stores the error codes for the built-in I/O driver.
The error codes can be confirmed by checking the error messages displayed in #L_IOStatus and on the screen.
The detailed error code classifications are defined as follows:

Error Code	Description
001 - 049	Project data error
050 - 099	Hardware error
100 - 199	Application error
200 - 254	General error

The stored error codes are as shown below.



Error Messages

Error Code Classification	Description
RGEA***	Built-in I/O driver

*** indicates the error codes for each driver (0 - 255).
The S.No of the FlexNetwork unit where the error occurred is stored in the slave/module No.

◆ #L_CalcErrCode

The calculation error state can be identified in #L_CalcErrCode. The area is cleared to 0 when reset.

Error Code List

Error Code	Description	
0000	—	No error.
0001	Minor error (continue)	An overflow occurs when converting a real number to an integer, or a 64-bit real number to a 32-bit real number.
0002	Major error (stop)	A reference exceeded the area of the array.
0003		A reference exceeded the range of an integer.
0004		The stack overflowed.
0005		An invalid instruction code is used.
0006		An error occurred during error handler processing.
0007		The scan time exceeded the WDT.
0008	—	Reserved

Continued

Error Code	Description	
0009	Major error (stop)	Software error
0010		An invalid operand is used.
0011	—	Reserved
0012	Minor error (continue)	BCD/BIN conversion error
0013		ENCO/DECO conversion error
0014	—	Reserved
0015	Minor error (continue)	The SRAM data (user program) is read from a destroyed FROM.
0016		The number of shift bits exceeded the range.
6701	Continuous error	• The CJ and CALL instructions have no jump destination. • The index has been modified so that the address is outside of the P0 to P4095 range where a label is not defined. • P63 was executed in a CALL instruction. P63 cannot be used in a CALL instruction to branch to END.
6702		The CALL instruction has a nesting level of 6 or higher.
6703		The interrupt has a nesting level of 3 or higher.
6704		The FOR and NEXT instructions have a nesting level of 6 or higher.
6705		The application instruction operand is outside the target device.
6706		The device No. and data value of the application instruction operand have exceeded the range.
6707		The final register was accessed without specifying the parameter settings.
6708		FROM/TO instruction error
6709		Other (invalid branch, etc.)
6710		Parameter incompatibility
6730		The sampling time (Ts) is out of range ($Ts \leq 0$).
6731		
6732		The input filter constant (α) is out of range ($\alpha < 0$ or $100 \leq \alpha$).
6733		The proportion gain (Kp) is out of range ($Kp < 0$).
6734		The integral calculus time (Ti) is out of range ($Ti < 0$).
6735		The differential gain (Kd) is out of range ($Kd < 0$ or $201 \leq Kd$).
6736		The differential calculus time (Td) is out of range ($Td < 0$).

Continued

Error Code	Description
6740	Sampling time (Ts) ≤ sampling frequency
6742	The change in measurement value is out of range (ΔPV < -32768 or 32767 < ΔPV).
6743	The deviation is out of range (EV < -32768 or 32767 < EV).
6744	The integral calculated value is out of range (other than -32768 to 32767).
6745	The differential value is out of range because the differential gain (Kp) is out of range.
6746	The differential calculated value is out of range (other than -32768 to 32767).
6747	The PID calculation result is out of range (-32768 to 32767).
6748	The PID output upper limit setting value < Outupt lower limit setting value
6749	PID input/output change alarm settings error.
6750	<<Step response method>> Auto-tuning result failure
6751	<<Step response method>> Incompatibility of auto-tuning direction
6752	<<Step response method>> Auto-tuning failure
6753	<<Limit cycle method>> Incompatibility of auto-tuning output settings values [ULV (upper limit) ≤ LLV (lower limit)]
6754	<<Limit cycle method>> Incompatibility of auto-tuning PV threshold (hysteresis) settings values (SHpv < 0)
6755	<<Limit cycle method>> Auto-tuning transition state error (The data in the device managing the transition state was not successfully rewritten.)
6756	<<Limit cycle method>> Result error caused by exceeding the auto-tuning measurement time. (τ on > τ, τ on < τ, τ < 0)
6757	<<Limit cycle method>> The proportion gain of the auto-tuning result is out of range. (Kp = other than 0 to 32767)
6758	<<Limit cycle method>> The integral calculus time of the auto-tuning result is out of range. (Ti = other than 0 to 32767)
6759	<<Limit cycle method>> The differential calculus time of the auto-tuning result is out of range. (Td = other than 0 to 32767)
6760	The sum of ABS data from the server is inconsistent.

Continued

Error Code	Description
6762	The port specified by the inverter communication instruction is already being used.
6765	Application instruction usage time error
6770	Writing to the FLASH memory board failed
6771	The FLASH memory board is disconnected.
6772	The write error that occurs when writing to the FLASH memory board is prohibited.

◆ #L_FaultStep

Stores the program step No. when abnormal processing occurs.

◆ #L_FaultLogicScreen

Stores the logic screen No. when abnormal processing occurs.
INIT : 1
MAIN : 2
ERRH : 3
SUB-01: 32 to SUB-32: 63

◆ #L_StopScans

Enter a numeric value to execute scanning for the specified number of times. The logic scan continues until the setting reaches 0. Meanwhile, the #L_StopPending bit is ON. When this bit turns OFF, the logic stops.

A.5.3 HMI System Variables (#H System Variables)

The following 33 variables are the default HMI system variables registered in the logic program.

Symbol Variable Name	Description	Read	Write
#H_CurrentScreenNo	Current Screen No.	○	×
#H_ChangeScreenNo	Change To Screen No.	○	○
#H_GlobalWindowControl	Window Control	○	○
#H_GlobalWindowNo	Window Screen No.	○	○
#H_GlobalWindowPosX	Window Display Position (X)	○	○
#H_GlobalWindowPosY	Window Display Position (Y)	○	○
#H_CounterbySecond	1-Second Binary Counter	○	×
#H_DispScanTime	Display Scan Time	○	×
#H_DispScanCounter	Display Scan Counter	○	×
#H_CurrentYear	Year Data (Current Value)	○	×
#H_CurrentMonth	Month Data (Current Value)	○	×
#H_CurrentDay	Day Data (Current Value)	○	×
#H_CurrentHour	Hour Data (Current Value)	○	×
#H_CurrentMinute	Minute Data (Current Value)	○	×
#H_CurrentSecond	Second Data (Current Value)	○	×
#H_SetYear	Year Data (Setting Value)	○	○
#H_SetMonth	Month Data (Setting Value)	○	○
#H_SetDay	Day Data (Setting Value)	○	○
#H_SetHour	Hour Data (Setting Value)	○	○
#H_SetMinute	Minute Data (Setting Value)	○	○
#H_SetSecond	Second Data (Setting Value)	○	○
#H_JpegCaptureFileNo	Screen Capture File No.	○	○
#H_CurrentDayofTheWeek	Day (Current Value)[*1]	○	×
#H_Status.Print	Printer Status	○	×
#H_Status.DispOnOff	Display ON/OFF	○	×
#H_Control.Buzzer	Buzzer Output	○	○
#H_Control.HardcopyPrint	Print Control for Screen Hard Copy	○	○
#H_Control.BuzzerEnable	Enable the Buzzer Output	○	○

Continued

Symbol Variable Name	Description	Read	Write
#H_Control.PrintCancel	Control of Print Cancel	○	○
#H_Control.JpegCaptureTrigger	Control of Screen Capture	○	○
#H_Status.JpegCaptureProcess	Screen Capture Status (Processing in Progress)	○	×
#H_Status.JpegCaptureCompletion	Screen Capture Status (Completed)	○	×
#H_Control.JpegCaptureEnable	Enable Screen Capture	○	○

*1 The current value of the day of the week is stored in LS9310. For the meaning of values to be stored, refer to [Clock Data (Current)] in "A.1.4.2 System Data Area" (page A-13).

A.5.4 Logic System Variables Comment List

Comments are preset in system variables.

■ Bit System Variable Comments

#L System Variable	Comment
#L_RunMonitorA	ON when the logic program is in RUN.
#L_AlwaysON	Always ON when the logic program is running.
#L_CalcZero	ON when the result of the calculation is zero.
#L_CalcCarry	ON if a calculation results in a carry.
#L_ScanModeSW	OFF in Fixed Scan Time and ON in CPU Scan Percentage.
#L_AutoRunSW	OFF when the operation at power ON is STOP, and ON when the operation at power ON is RUN.
#L_InOutSW	ON when external input and output are enabled, and OFF when external input and output are disabled.
#L_FaultStopSW	ON when [Minor Errors] is set to STOP, and OFF when [Minor Errors] is set to RUN.
#L_UnlatchClear	The clear area is cleared to zero if the logic stop bit is ON.
#L_LatchClear	The keep area is cleared to zero if the logic stop bit is ON.
#L_Clock100ms	Repeats 50-ms OFF and 50-ms ON.
#L_Clock1sec	Repeats 500-ms OFF and 500-ms ON.
#L_Clock1min	Repeats 30-s OFF and 30-s ON.
#L_BatteryErr	ON when a battery malfunction is detected.
#L_Error	ON when an error occurs in the logic operation.
#L_StopPending	After the logic stops, the #L_StopScans setting time turns ON.
#L_Fault	When this bit is ON, the logic program stops after the execution of the ErrorHandler subroutine.
#L_IOFault	ON when an I/O driver error occurs.

■ Integer System Variable Comments

#L System Variable	Comment
#L_ScanTime	Stores the current scan time in units of 0.1 ms.
#L_AvgScanTime	Stores the average scan time for 64 scans in units of 0.1 ms.
#L_MinScanTime	Stores the minimum scan time in units of 0.1 ms.
#L_MaxScanTime	Stores the maximum scan time in units of 0.1 ms.
#L_ScanCount	Counts up by 1 upon completion of each scan.
#L_LogicTime	Stores the time for 1 logic scan in units of 0.1 ms.
#L_AvgLogicTime	Stores the average time for 64 logic scans in units of 0.1 ms.
#L_MinLogicTime	Stores the minimum value for a logic scan in units of 0.1 ms.
#L_MaxLogicTime	Stores the maximum value for a logic scan in units of 0.1 ms.
#L_Status	Displays the logic operation state in units of bits.
#L_Platform	Stores the main unit platform code number.
#L_Version	Stores the firmware version of the main unit.
#L_EditCount	Number of online edits
#L_IOInfo	I/O driver information
#L_ConstantScan	Scan time when Fixed Scan Time is set.
#L_PercentScan	Percentage value when CPU Scan Percentage is set.
#L_WatchdogTime	A major error occurs when the setting time exceeds the range.
#L_AddressRefreshTime	Refresh interval for connection device addresses
#L_Time	Stores the current hour and minutes (BCD).
#L_Command	Controls the logic operation in units of bits.
#L_LogicMonitor	Starts up the logic and device monitors.
#L_LogicMonStep	The Step No. to be displayed when starting up the logic monitor.
#L_IOStatus	I/O driver error information
#L_CalcErrCode	Stores the error code when a calculation results in an error.
#L_FaultStep	The number of the step where the error occurred
#L_FaultLogicScreen	The number of the screen where the error occurred
#L_StopScans	The logic stops after completion of the specified number of scans.

Memo