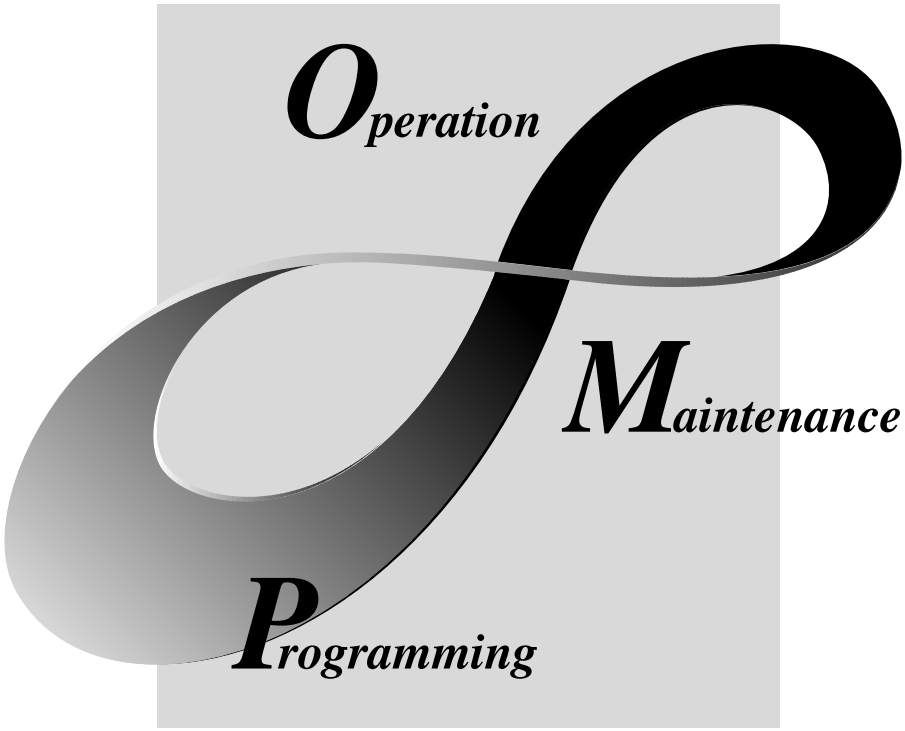
GX Developer Version 8

MITSUBISHI

Operating Manual

(Structured Text)

MELSOFT



MELSOFT
Integrated FA Software

SW8D5C-GPPW-E

• SAFETY PRECAUTIONS •

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the ⚠ CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Designing Precautions]

⚠ DANGER

- For data change, program change and status control to be performed for the running programmable logic controller from a personal computer, configure interlock circuits in the outside of the PLC system so that the whole system will always operate safely.
  Also, for online operations to be performed from the personal computer to the PLC CPU, predetermine as a system the corrective actions for communication errors that will occur due to poor cable connection, etc.

[Startup/Maintenance Precautions]

⚠ CAUTION

- Before performing online operations (program change during PLC CPU RUN, forced I/O operation, RUN-STOP or similar operating condition change, remote operation) with the personal computer connected to the running PLC CPU, read the manual carefully and ensure safety fully.
  Note that program change during PLC CPU RUN (online change) may cause such problems as program corruption depending on the operation condition. Use the equipment after fully understanding the precautions given in the GX Developer Operating Manual.

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REVISIONS

* The manual number is given on the bottom left of the back cover.

Print Date	* Manual Number	Revision
Feb., 2003	SH (NA) 080367E-A	First printing
Oct., 2003	SH (NA) 080367E-B	Correction Section 3.5.5, Section 4.6
Jun., 2004	SH (NA) 080367E-C	Correction Abbreviations and Generic Terms in This Manual Section 1.5.1

Japanese Manual Version SH-080364-E

INTRODUCTION

Thank you for choosing the Mitsubishi MELSOFT series Integrated FA software.
Read this manual and make sure you understand the functions and performance of MELSEC series sequencer thoroughly in advance to ensure correct use.
Please make this manual available to the end user.

CONTENTS

About Manuals

The following manuals are also related to this product.
In necessary, order them by quoting the details in the tables below.

Relevant Manuals

Manual Name	Manual Number (Model Code)
GX Developer Version 8 Operating Manual (Startup) Explains the system configuration, installation method and startup method of GX Developer. (Option)	SH-080372E (13JU40)
GX Developer Version 8 Operating Manual Explains the program creation method, printout method, monitoring method, debugging method, etc. using GX Developer. (Option)	SH-080373E (13JU41)
GX Developer Version 8 Operating Manual (Function Block) Explains the program creation method, printout method, etc. using GX Developer. (Option)	SH-080376E (13JU44)
Structured Text (ST) Programming Guidebook Written for those who will create structured text (ST) programs for the first time. Explains the basic operation methods and functions through sample programs. (Option)	SH-080368E (13JF69)
QCPU (Q mode) Programming Manual (Structured Text) Explains the programming methods in structured text language. (Option)	SH-080366E (13JF68)
QCPU (Q mode)/QnACPU Programming Manual (Common Instructions) Explains the methods of using the sequence instructions, basic instructions and application instructions. (Option)	SH-080039 (13JF58)
GX Simulator Version 6 Operating Manual Explains the setting and operation for using GX Simulator to monitor device memory and to simulate the machine operation. (Option)	SH-080169 (13JU17)

REMARK

Each Operating Manual and the Structured Text (ST) Programming Guidebook are contained in the CD-ROM together with the software package as a set.
The Programming Manual is available separately in printed form as an option.
Please place an order with the manual number (model code) in the above table.

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This Manual ...

This manual is a commentary that gives in-depth explanation of the operation methods to create structured text (ST) programs using GX Developer. Refer to this manual when information on operation details is necessary.
"Chapter 1 Overview" describes the outline of the structured text (ST) language, the installation method, the screen display and names for creating structured text (ST) programs, the corresponding PLC CPUs, and others.
"Chapter 2 ST Program Creation Procedure" describes a structured text (ST) program creation procedure in a flowchart.
"Chapter 3 ST Programming" describes how to create a new structured text (ST) program, how to perform operations of editing functions useful for input, and others.
"Chapter 4 Online" describes the procedure for writing the created structured text (ST) program to the PLC CPU, the device test operation method, and others.
"Chapters 5 Print" describes the printing operation procedure, etc.

The following explains the symbols and information used in this manual.

Symbol	Description	Example
Point	Gives the section-related knowledge and useful information.	
[ ]	Menu name of menu bar	[Project]
( )	Icon of toolbar	
<< >>	Tab name of dialog box	<<Select file>>
☐	Command button of dialog box	Jump Button

Programming Manual ...

Use the "QCPU (Q mode) Programming Manual (Structured Text)" to perform structured text (ST) programming with GX Developer. It is suitable for the users who have the knowledge and programming experience of PLC ladder programs and for the users who have the knowledge and programming experience of high-level languages such as the C language.

When using the structured text language for the first time ...

Refer to the "Structured Text (ST) Programming Guidebook", which describes the outline of the structured text (ST) language, the procedures for creating a structured text (ST) program using GX Developer and writing it to the PLC CPU, the information necessary for that purpose, and others.

When information on other than structured text programming is necessary ...

Refer to the "GX Developer Version 8 Operating Manual" or "GX Developer Version 8 Operating Manual (Startup)".

Abbreviations and Generic Terms in This Manual

In this manual, the following generic terms and abbreviations are used to represent the GX Developer software package and PLC CPU. The package name is given when the target model name must be pointed out explicitly.

Generic terms and abbreviations	Description and target module
ST	Abbreviation for structured text.
GX Developer	Generic product name for model names SWnD5C-GPPW, SWnD5C-GPPW-A, SWnD5C-GPPW-V and SWnD5C-GPPW-VA. n means Version 8 or later.
FB	Abbreviation for function block.
Basic model QCPU	Generic term for Q00JCPU, Q00CPU and Q01CPU of function version B or later
High Performance model QCPU	Generic term for Q02 (H) CPU, Q06CPU, Q12HCPU and Q25HCPU
Process CPU	Generic term for Q12PHCPU and Q25PHCPU
Redundant CPU	Generic term for Q12PRHCPU and Q25PRHCPU
QCPU (Q mode)	Generic term for Q00(J)CPU, Q01CPU, Q02(H)CPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU, Q12PRHCPU, Q25PHCPU and Q25PRHCPU.

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1 OVERVIEW

This manual explains the editing operation for the structured text (hereafter abbreviated to ST) of the GX Developer Version 8 software package (hereafter abbreviated to GX Developer).
For the explanation of the functions in other than ST, refer to the corresponding manuals given in "Relevant Manuals".

1.1 What Is the ST Language?

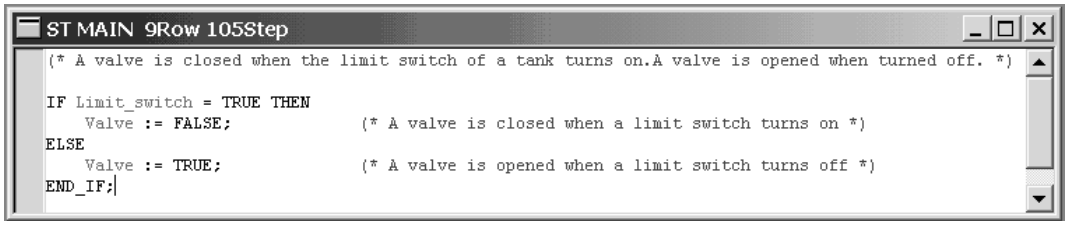
The ST language is defined in the International Standard IEC61131-3 that stipulates the logic description system in open controllers.
The ST language supports operators, control syntaxes and functions to permit the following descriptions.

- Control syntaxes such as conditional sentence-dependent selective branch and repetitive sentence-based repetition
- Expressions using operators (*, /, +, -, <, >, =, etc.)
- Call of user-defined function blocks (FB)
- Call of functions (MELSEC functions, IEC functions)
- Description of comments

The main features of the ST language are as described below.

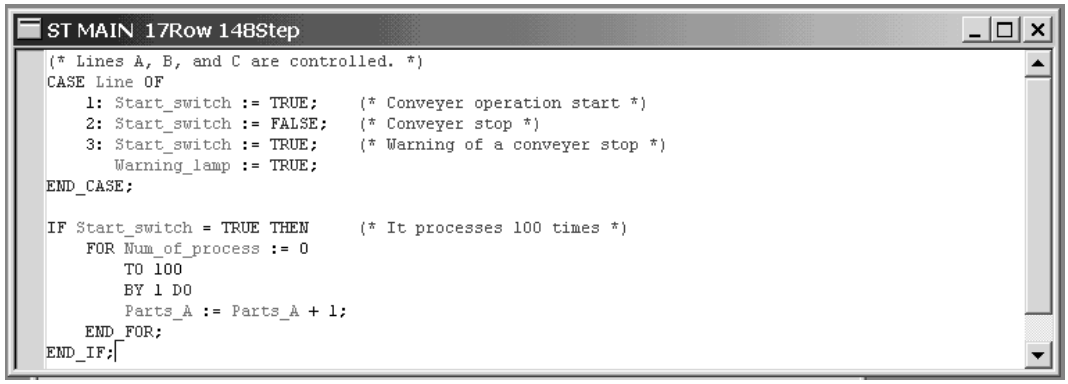
(1) Free description in text format

The ST language allows the description of alphanumeric characters, comments and labels in text format.



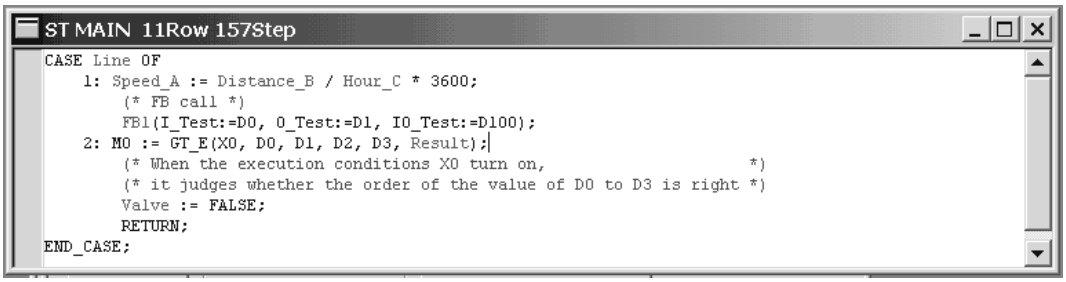
(2) Programming on the same level as those of the C and other high-level languages

Like the high-level languages such as C, the ST language can describe control with control syntaxes such as conditional sentence-dependent selective branches and repetitive sentence-based repetitions. Hence, easy-to-read programs can be written briefly.



(3) Ease of describing operation processings

Capable of briefly describing easy-to-read operation processings that are difficult to describe in lists or ladders, the ST language has a high level of program readability and is suitable for the fields where complex arithmetic operations, comparison operations, etc. are performed.



Point

ST programs assume that labels will be used.
Please understand how to use labels in advance.

1 - 2

1.2 Features

ST programs are described in ST language.
Creating ST programs using GX Developer enables efficient programming to be performed in excellent operation environment.
The following provides the main features of ST programs in the MELSEC-Q series.

(1) Design efficiency improved by defining processings as parts

With often used processings defined as parts in the form of function blocks (FB) in ST language, they can be used in necessary areas of each program. This not only enhances the efficiency of program development but also reduces program mistakes, improving program quality.

For more information, refer to the "GX Developer Operating Manual (Function Block)" given in Relevant Manuals.

(2) Program change during system operation (online change)

Part of a running program can be changed without the PLC CPU being stopped.

(3) Connection with other language programs

Since the MELSEC-Q series also supports languages other than the ST, the language adequate for processing can be used to increase the efficiency of program development.
The High Performance model QCPU and Process QCPU allow execution conditions to be set on a file basis, and multiple program files to be written to a single PLC CPU.
Multiple languages support widespread application under optimum control.

(4) A wealth of functions available

The MELSEC functions compatible with various common instructions for the MELSEC-Q series and the IEC functions defined in IEC61131-3 are available for ST programs in the MELSEC-Q series.

For more information, refer to the "QCPU (Q mode) Programming Manual (Structured Text)" given in Relevant Manuals.

1.3 Installation

This section explains the installation method and operation environment necessary for creating ST programs.

1.3.1 Installation method

Confirm the following points before starting installation.

Point

- Before starting installation, end all other applications that are running with the Microsoft® Windows® Operating System.
- When using Windows NT® Workstation 4.0, Windows® 2000 Professional or Windows® XP Professional, log on as the user who has the attributes of the administrator (for computer management).

1) Select [Start] - [Explorer] on Windows® to start.
2) Click the drive where the CD-ROM has been inserted.
   Double-click "Setup.exe".
3) Make setting and selection in the procedure of the installation wizard.
4) Check the "ST (Structured Text) language programming function" check box, and execute installation.

REMARK

For details, refer to the "GX Developer Operating Manual (Startup)" given in Relevant Manuals.

1.3.2 Operating environment

The following table indicates the operating environment for use of the ST language programming function.

Item		Description
Operating systems		Microsoft® Windows® 98 2nd Edition or later Microsoft® Windows NT® 4.0 Workstation Service Pack 3 or later Microsoft® Windows® 2000 Professional Operating System Microsoft® Windows® Millennium Edition Operating System Microsoft® Windows® XP (Home edition, Professional edition)
CPU		Pentium® II 450MHz or more
Screen		800 × 600 dots or more, small fonts only
For installation		
	Required memory capacity	64MB or more
	Required disk capacity	130MB or more
For operation		
	Required memory capacity	64MB or more
	Required disk capacity	100MB or more

Point

The ST language function is not supported on Windows 95.

REMARK

For details, refer to the "GX Developer Operating Manual" given in Relevant Manuals.

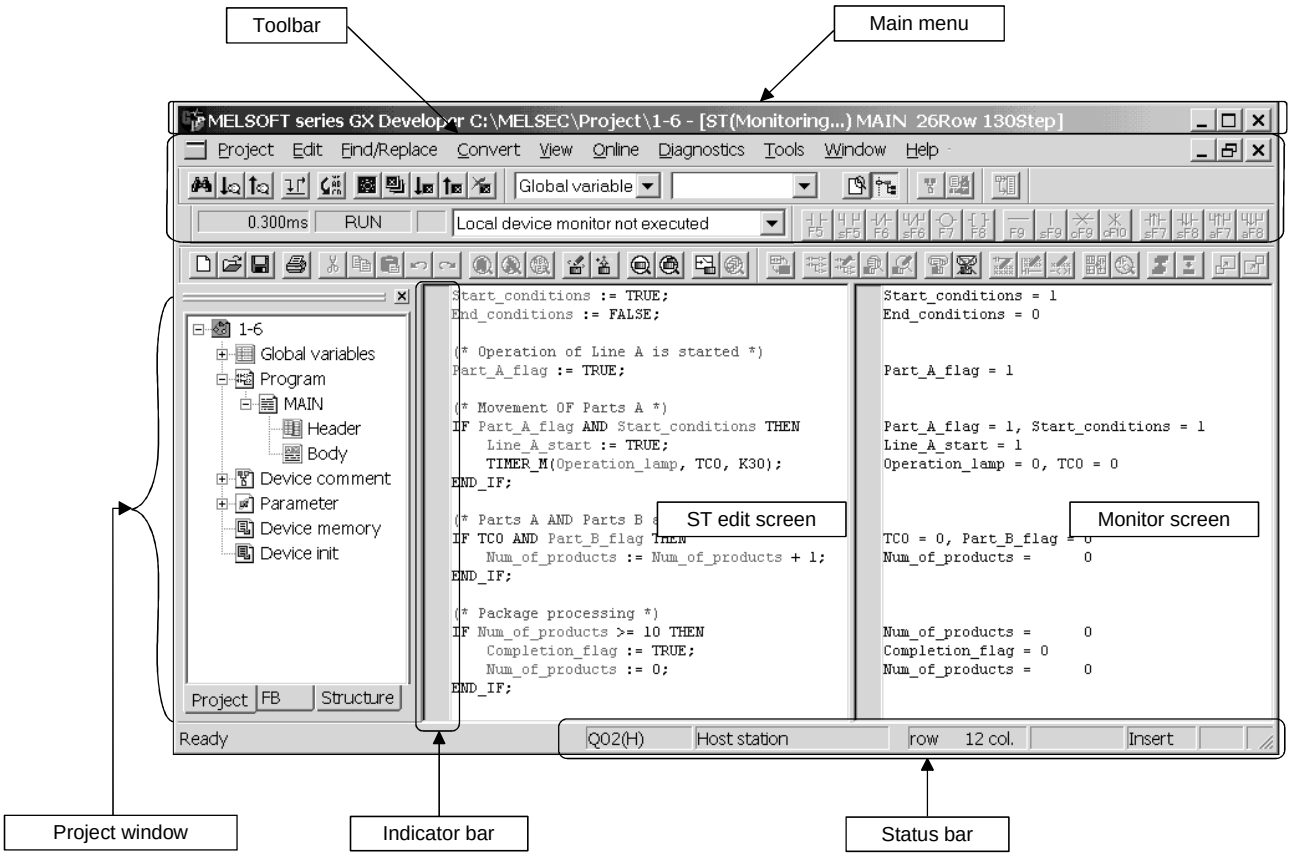
1 - 5

1.4 Screen Display and Names for Creating ST Programs

This section explains the basic information such as the screen display, function list and key operations.

1.4.1 ST edit screen

(1) Screen display and part names of main window



(2) Part names and functions

Name	Function
Main menu	Select the menu item.
Toolbar	Clicking the selected icon executes the function.
Project window	Programs and various data are managed.
ST edit screen	Screen for editing an ST program.
Monitor screen	Displays the condition of the executed program.
Indicator bar	Displays the condition during editing.
Status bar	Displays the cursor position on the edit screen.
	Displays the cursor mode on the program screen.

(3) About the shortcut keys and toolbar

1) Shortcut keys

The shortcut keys are assigned to enable menu item selection and instruction input from the keyboard.

2) Toolbar

Displays the menu items with icons.
Whether the toolbar is displayed or hidden can be specified by choosing [View] - [Toolbar].

<List of shortcut keys and toolbar icons used mainly on ST edit screen>

General	Shortcut Keys	Toolbar	Mouse Right-click
Move to first line	Ctrl + Home	—	—
Move to last line	Ctrl + End	—	—
All select	Ctrl + A	—	—
Print	Ctrl + P		—
Cut	Ctrl + X		○
Copy	Ctrl + C		○
Paste	Ctrl + V		○
Undo	Ctrl + Z		○
Redo	Ctrl + Y		○
Writing to PLC	—		—
Registered device monitor	—		—
Device batch monitor	—		—
Check parameter	—		—
Select function	Shift + F11	—	○
Select label	F11	—	○
Project data list	Alt + 0	—	—
Find	Ctrl + F		○
Find downward	F5		—
Find upward	Shift + F5		—
Replace	Ctrl + H		○
Line jump	Ctrl + J		—
Bookmark setting	Ctrl + F7		○
Bookmark list	—		—
Bookmark downward	F7		—
Bookmark upward	Shift + F7		—
Delete all bookmark	—		—
Convert/compile	F4		—

General	Shortcut Keys	Toolbar	Mouse Right-click
Convert/Compile (all programs being edited)	Ctrl + Alt + F4		—
Move to last line	Shift + F4	—	—
Start monitor (all windows)	Ctrl + F3	—	—
Stop monitor (all windows)	Ctrl + Alt + F3	—	—
Start monitor	F3		—
Stop monitor	Alt + F3		—
Device test	Alt + 1		○
Remote operation	Alt + 6	—	—

1 - 8

1.5 Specifications

This section explains the specifications for use of ST programs on GX Developer.

1.5.1 Corresponding PLC CPUs

The following models of PLC CPU are applicable to ST programs.

Basic model QCPU	High Performance model QCPU	Process CPU	Redundant CPU
Q00CPU Q00JCPU Q01CPU	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	Q12PHCPU Q25PHCPU	Q12PRHCPU Q25PRHCPU

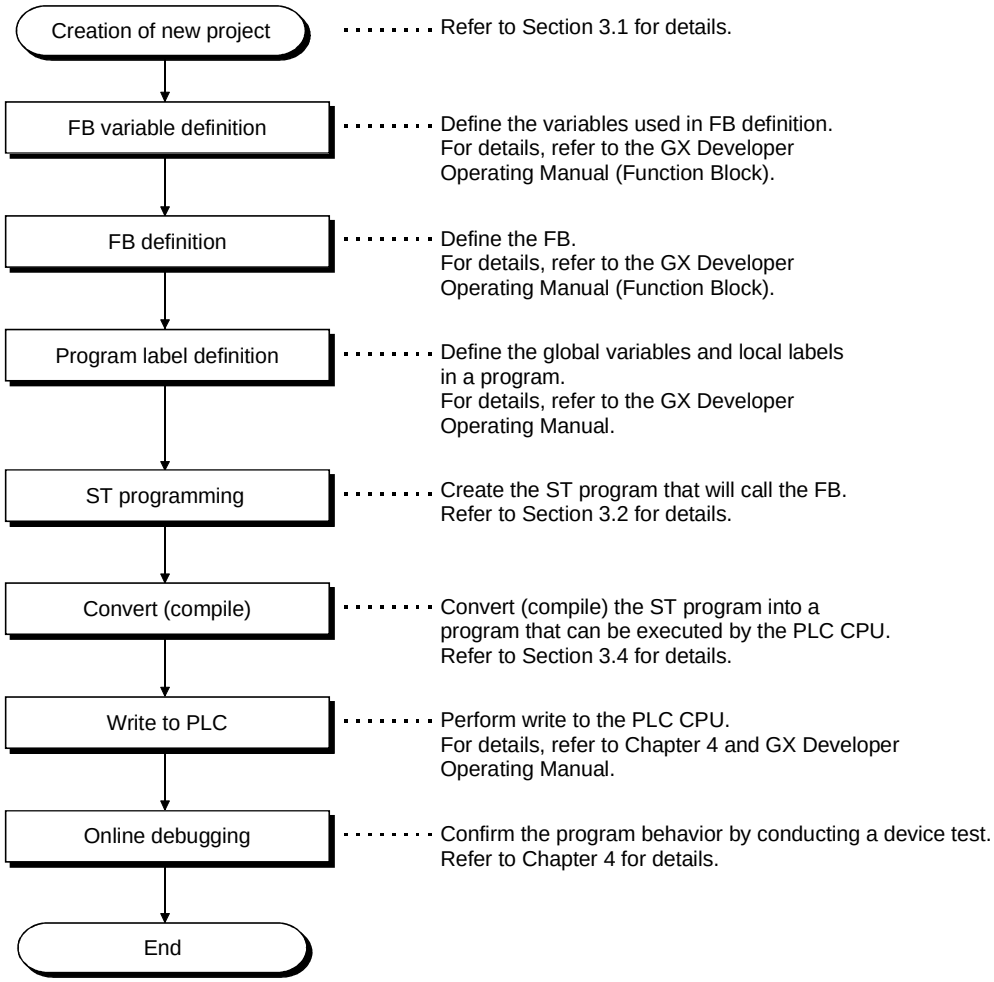
1.5.2 Specifications and precautions for ST edit screen

There are the following restrictions on the character input of the ST edit screen.

Maximum number of characters	839680 characters (Two characters are used as the line feed code.)
Maximum number of columns (display region)	999 characters
Maximum number of lines	65535 lines

2 ST PROGRAM CREATION PROCEDURE

The following flowchart indicates the general procedure of ST programming.
In the following example, parts were created with the function block function and a main program was then created in ST language.



Point

- This general procedure is for reference. Each operation can be performed in any order.
- FB definition can be described in ST language or ladder form.

MEMO

2 - 2

3 ST PROGRAMMING

This chapter explains the creation and editing methods to create a project using an ST program.

3.1 Creating a New Project

This section explains the method of creating a new project.

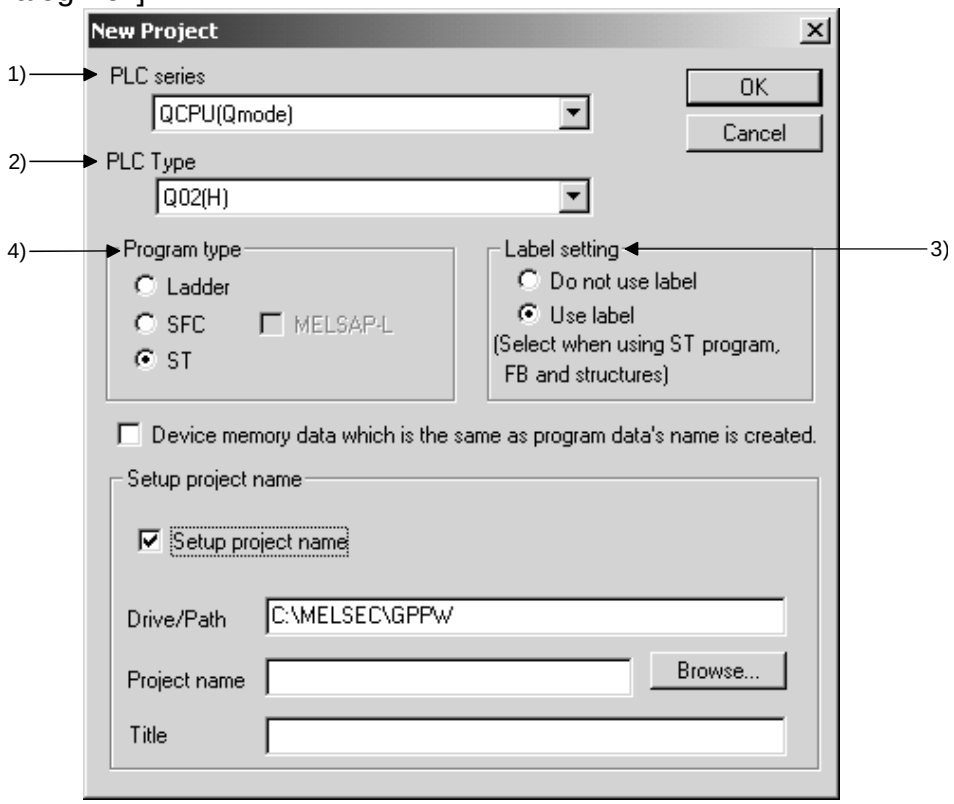
[Purpose]

Set the PLC series, PLC type, label setting, program type and project name required to create a new project.

[Operating Procedure]

Choose [Project] → [New project], click ( ), or press Ctrl + N.

[Dialog Box]



[Description]

1) PLC series

Select the PLC series.

There are the following PLC series.

- QCPU(Q mode)
- QCPU(A mode)
- QnACPU series
- ACPU series
- Motion(SCPU)
- FXCPU series

2) PLC Type
Select the PLC CPU type to be used.

3) Label setting
Make this setting when creating a label program.

4) Program type
Set the program type to be created.
To select "ST", "Use label" must be set in the label setting.

[Setting procedure]

i) As the PLC series, set the QCPU (Q mode).
ii) As the PLC type, set the PLC CPU to be used.
iii) As the label setting, set "Use label".
iv) As the program type, set "ST".
v) Set "Setup project name" and click the OK button to create a new project.
"Setup project name" can either be set before or after program creation.

REMARK

The precautions for reading and copying the project will be explained.

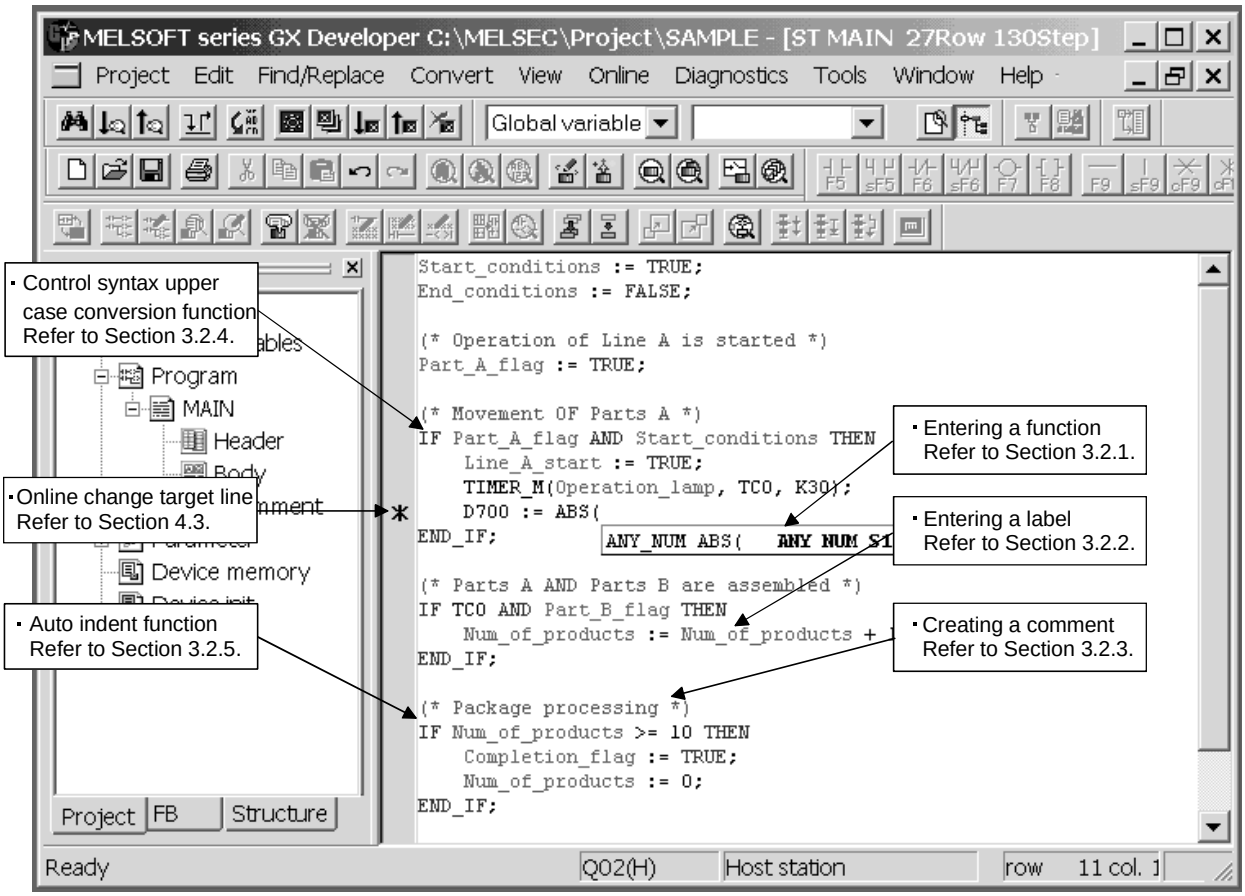
● Reading the project
If the project that includes the ST program is read using GX Developer Version 7 or earlier where the ST language function is not installed, the following message is displayed and the project cannot be read.

● Copying the project
When the project is copied, the copied ST program and FB are in a not yet converted (not yet compiled) condition.
After copying, perform convert (compile) again.

For details, refer to the "GX Developer Operating Manual" given in Relevant Manuals.

3.2 Entering an ST Program

The ST edit screen allows free editing operation to be performed like a general text editor. This section introduces the functions useful for input.



3.2.1 Entering a function

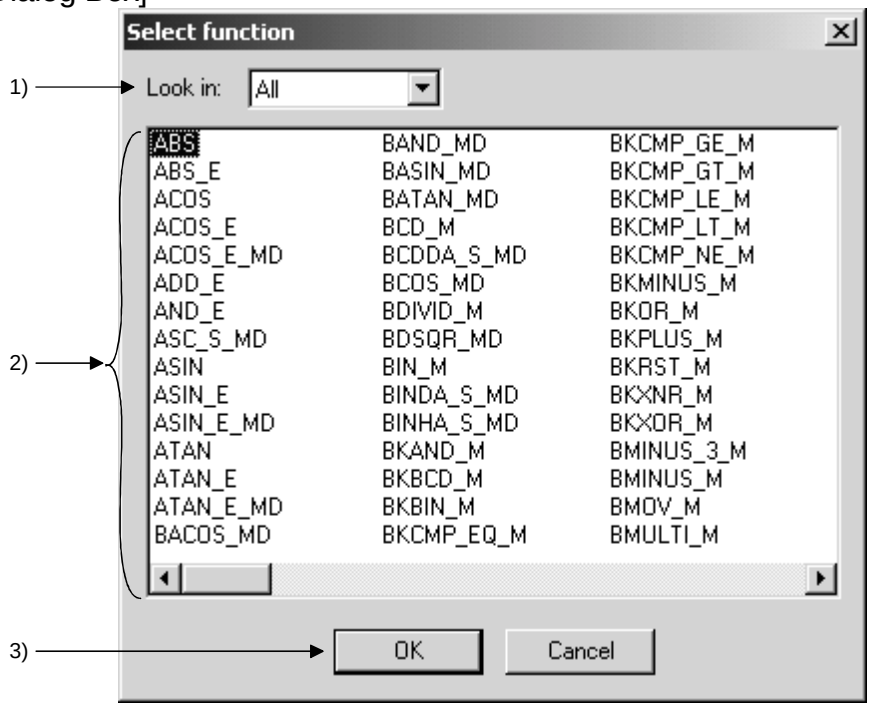
[Purpose]

A function can be entered directly. If a function name is unknown, the function selection function can be used for input.

[Operating Procedure]

Choose [Edit] → [Select function] or press Shift + F11 .

[Dialog Box]



[Description]

1) Function classification list box

The following table indicates the classification of the functions that can be selected.

Classification	Description
All	All MELSEC functions and IEC functions are displayed in the function list box in order (ascending order) of names.
MELSEC functions	All MELSEC functions are displayed in the function list box in order (ascending order) of names.
IEC functions	All IEC functions are displayed in the function list box in order (ascending order) of names.

REMARK

For the MELSEC functions and IEC functions, refer to the "QCPU (Q mode) Programming Manual (Structured Text)".

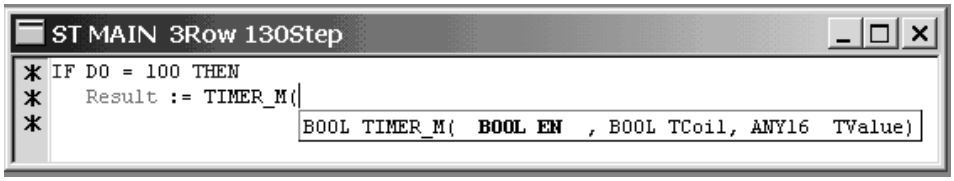
2) Function list box
The function list selected in the function classification list box is displayed.

3) OK button
The function selected in the function list box is inserted into the ST edit screen.

[Setting procedure]

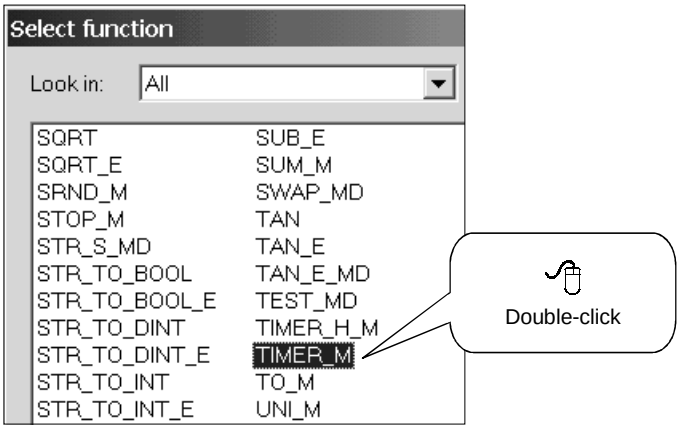
i) Select the function to be used from the function list box.

ii) Press the OK button or Enter key to insert the function into the cursor position on the ST edit screen.
After it has been inserted, enter its parameter to complete the function.



Point

- A function can also be inserted by a double-click.
(Example: TIMER_M)



- A function is also inserted when the ST edit screen is in the overwrite mode.
- When the initial of a function name is entered from the keyboard with the Select function screen open, the cursor moves to the first one of the function names that include that initial.

REMARK

The parameter can be displayed in the tool tip format.
For details, refer to "3.3.2 Displaying a function parameter".

3.2.2 Entering a label

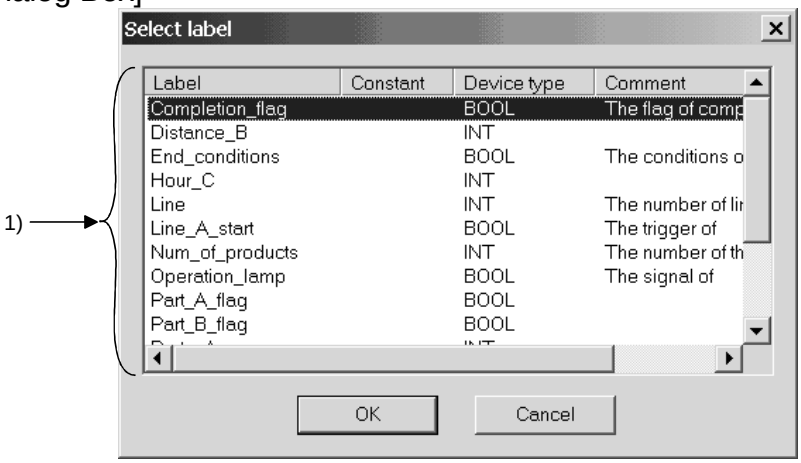
[Purpose]

If a label name is unknown during creation of the ST program, the label selection function can be used for input.

[Operating Procedure]

Choose [Edit] → [Select label] or press F11 .

[Dialog Box]



REMARK

Set labels on the global variable (label) setting screen and local variable (local label) setting screen.
For details, refer to the "GX Developer Operating Manual" given in Relevant Manuals.

[Description]

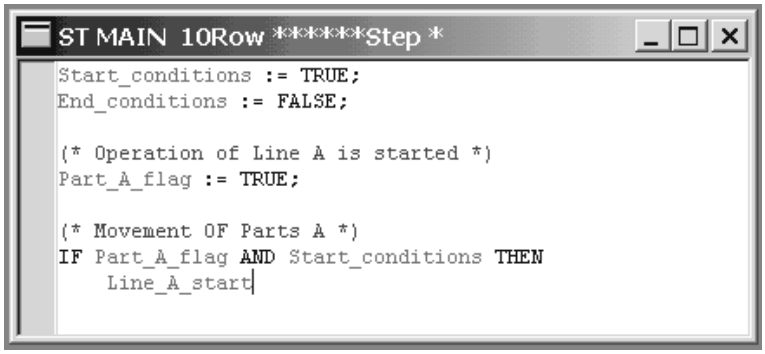
1) Label list

The labels, constants, device types and comments set to the corresponding global variables and local variables are displayed on the ST edit screen.
The displayed labels are displayed in order of names.

[Setting procedure]

i) Select the label to be entered.

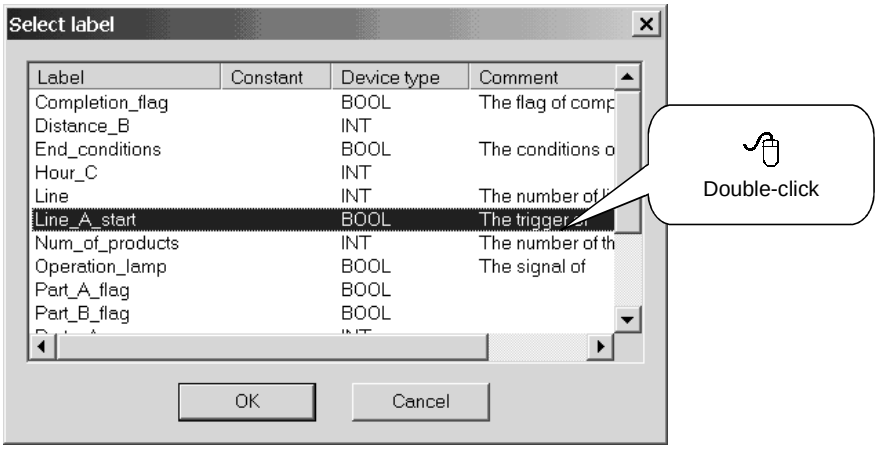
ii) Press the OK button to insert the character string of the label name into the cursor position on the ST edit screen.



Point

- A label name can also be inserted by a double-click.

  (Example : Line_A_start)



- A label name is also inserted when the ST edit screen is in the overwrite mode.
- When the initial of a label name is entered from the keyboard with the Select label screen open, the cursor moves to the first one of the label names that include that initial.
- The label display color can be changed.

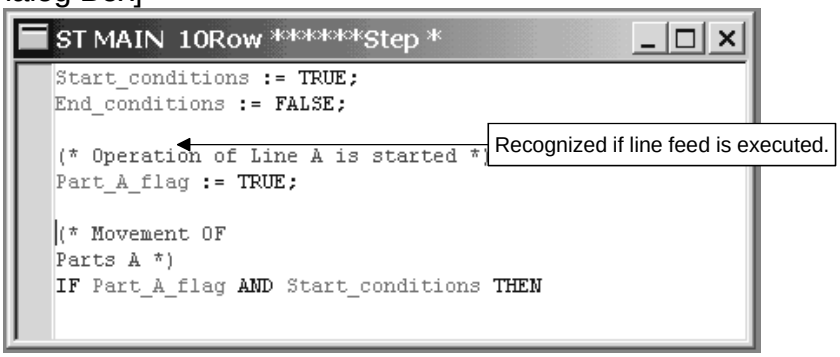
  For the changing of the display colors, refer to "3.5.2 Changing the display colors".

3.2.3 Creating a comment

[Purpose]

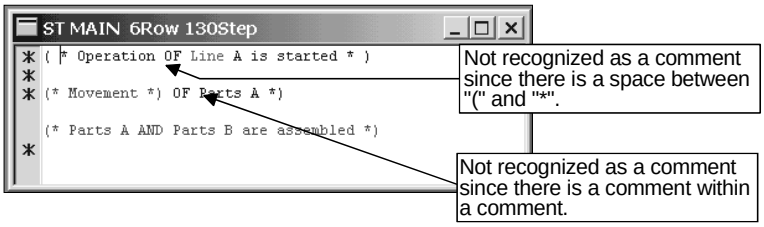
Program readability is improved by entering comments.
Enter a comment by enclosing it in "(*" and "*)".

[Dialog Box]



Point

- If characters are entered, they are not recognized as comments in the following cases.



- Comments differ from the statements, notes and device comments used in ladder programs.
- The comment display color can be changed.
  For the changing of the display colors, refer to "3.5.2 Changing the display colors".

REMARK

For details, refer to the "QCPU (Q mode) Programming Manual (structured Text)" given in Relevant.

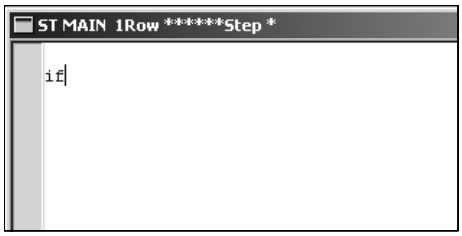
3.2.4 Control syntax upper case conversion function

[Purpose]

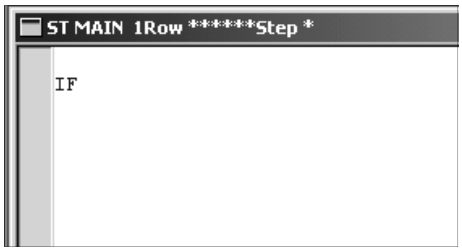
If a control syntax is entered in lower case on the ST edit screen, it is converted into upper case automatically.
This function converts the target characters of the control syntax automatically to prevent input mistakes.

[Dialog Box]

When entered



After automatic conversion



● Target characters

The control syntaxes that will be converted into upper case are as shown below.

IF, THEN, ELES, ELSIF, END_IF, CASE, END_CASE, FOR, TO, BY, DO, END_FOR, WHILE, END_WHILE, REPEAT, UNTILL, END_REPEAT, EXIT, RETURN, TRUE, FALSE, MOD, AND, XOR, OR

● Non-conversion condition

When characters are entered within a comment sentence "(＊ ＊)", they are not converted.

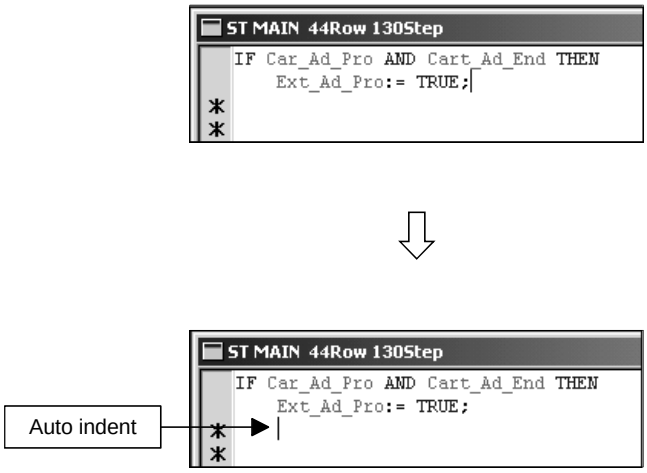
Point

- Conversion is performed after the target characters have been entered or when any of the keys that separate characters (space, Enter, Tab) is pressed.
- The control syntax display color can be changed.
  For the changing of the display colors, refer to "3.5.2 Changing the display colors".

3.2.5 Auto indent function

[Purpose]

Used to make setting to place the beginning of characters in the same position at the time of line feed on the ST edit screen.

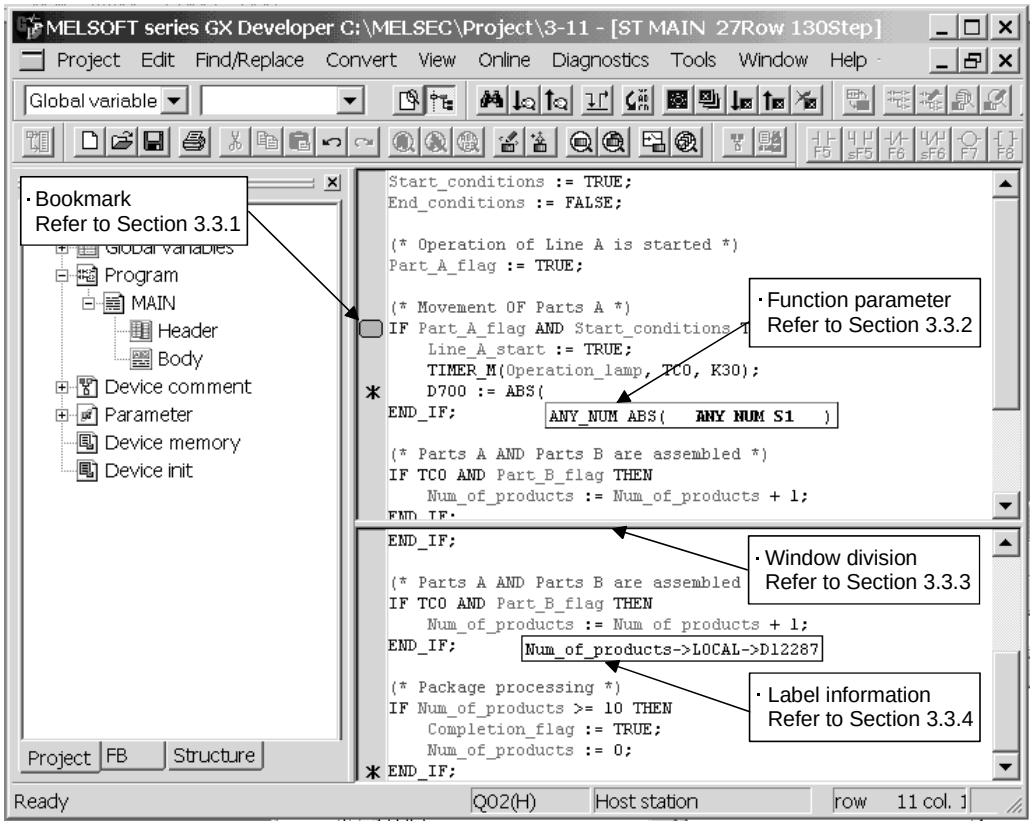


Point

- The target keys of auto indent are the Tab and space keys.
- For the setting of auto indent, refer to "3.5.1 Changing the auto indent/tab width".

3.3 Useful Edit Functions

This section explains the useful functions related to the display of the ST edit screen.



Other edit functions

• Find/Replace
Used to find/replace the specified character string on the ST edit screen.
For details, refer to "3.3.5 Find/Replace".

• Line jump
Used to move to any line on the ST edit screen.
For details, refer to "3.3.6 Line jump".

• Open Function Block
Used to display the FB definitions used on the ST edit screen as a reference screen.
For details, refer to "3.3.7 Open Function Block".

• Copy/Cut/Paste
For details, refer to "3.3.8 Copy/Cut/Paste".

• Undo/Redo
For details, refer to "3.3.9 Undo/Redo".

3.3.1 Using the bookmark

A bookmark is used to jump to a specific line.
This function is convenient when it is set as a mark to make a search in editing.

(1) Setting/deletion of bookmark

[Purpose]

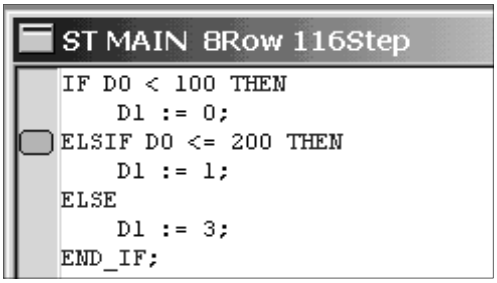
Used to mark the line of the ST program or to delete the provided mark.

[Operating Procedure]

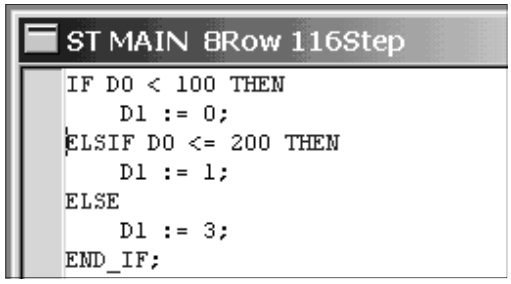
Move the cursor to the line where the bookmark is to be set/deleted.
Choose [Find/Replace] → [Bookmark setting/release], click ( ), or press Ctrl + F7.

[Display screen]

When set



When deleted



Point

By choosing [Find/Replace] → [Find] - "Set bookmark", bookmarks can be set at once on all the lines that have the found character string.
For details, refer to "3.3.5 Find/Replace".

Up to 100 bookmarks can be set.
If more than 100 bookmarks are set, the following error message is displayed.

(2) Deletion of all bookmarks

[Purpose]

Used to delete all bookmarks set in the ST program at once.

[Operating Procedure]

Choose [Find/Replace] → [Release all bookmarks] or click ( ).

When "Release all bookmarks" is selected, the following confirmation message is displayed.
Execute after confirmation.

(3) Finding the bookmark line

[Purpose]

Used to find the specified bookmark line in the ST program.

[Operating Procedure]

The operation methods are as described below.

Search Direction	Operating Procedure
Downward from cursor position	Choose [Find/Replace] → [Find bookmark downward], click ( ), or press F7.
Upward from cursor position	Choose [Find/Replace] → [Find bookmark upward], click ( ), or press Shift + F7.

A jump is made to the nearest bookmark line from the cursor position in the search direction.

(4) Bookmark list

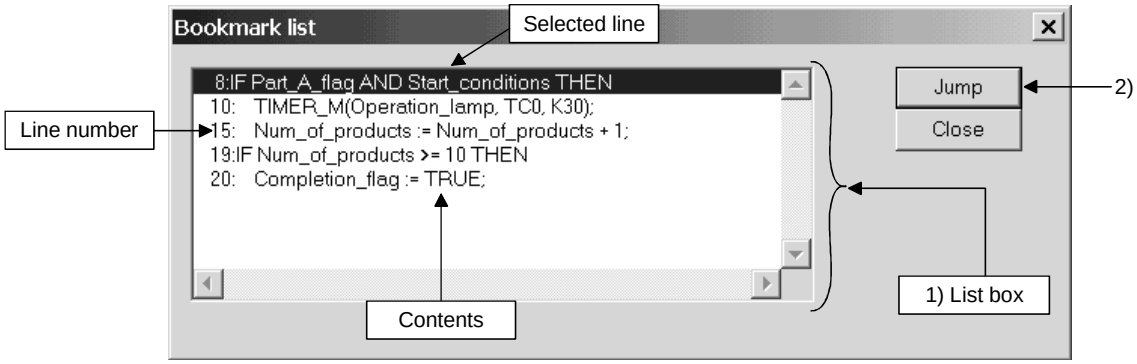
[Purpose]

Used to select the jump target line from among all the registered bookmarks.

[Operating Procedure]

Choose [Find/Replace] → [Bookmark list] or click ( ).

[Display screen]



[Description]

1) List box

Bookmark information is displayed in the form of "****** (line number):***** (registered contents)".

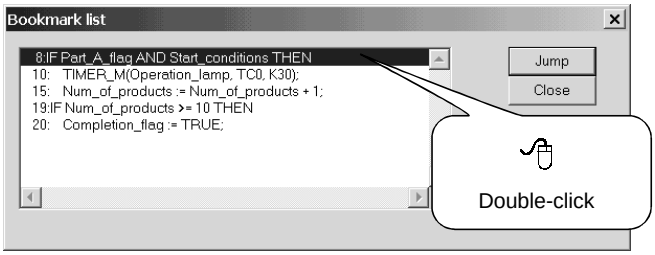
When the bookmark list screen is displayed, the fist line is being selected.

2) Jump button

Select the jump target line in the list box and click the Jump button to move the cursor to the line that has the preset bookmark.

Point

The cursor can also be moved by a double-click.



3.3.2 Displaying a function parameter

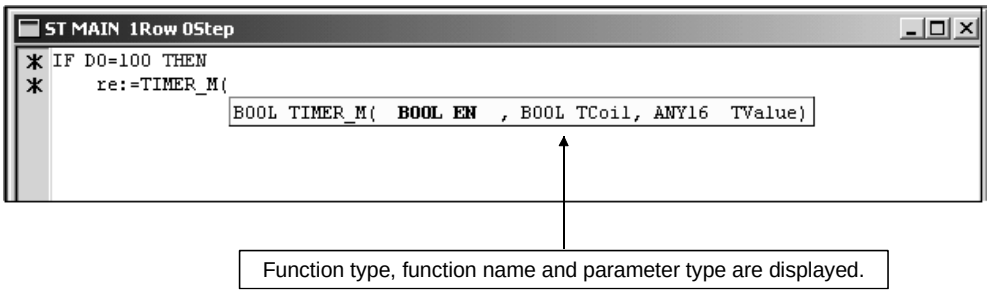
[Purpose]

When a parameter is unknown during input of a function, the function parameter can be displayed for reference.

[Operating Procedure]

Choose [View] → [Function parameter] and check Function parameter.
Make selection from the Select function screen to input the function, or enter the function from the keyboard up to "(". This displays the function parameter in the tool tip format.

[Dialog Box]



Function type, function name and parameter type are displayed.

Point

For details of the function types, refer to the "QCPU (Q mode) Programming Manual (Structured Text)" given in Relevant Manuals.

3.3.3 Window division

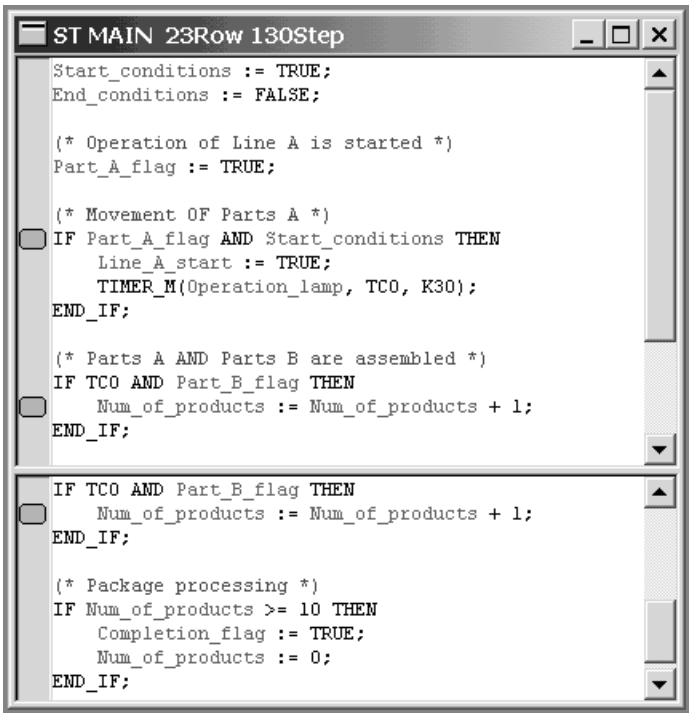
[Purpose]

When it is desired to confirm the program area that cannot be displayed on the screen during editing, divide the window into top and bottom areas.

[Operating Procedure]

- When dividing the window
  Choose [Window] → [Divide into two].
- When returning to one window
  Choose [Window] → [Divide into two].

[Display screen]



Point

The program can be edited in either window.

3.3.4 Displaying the label information

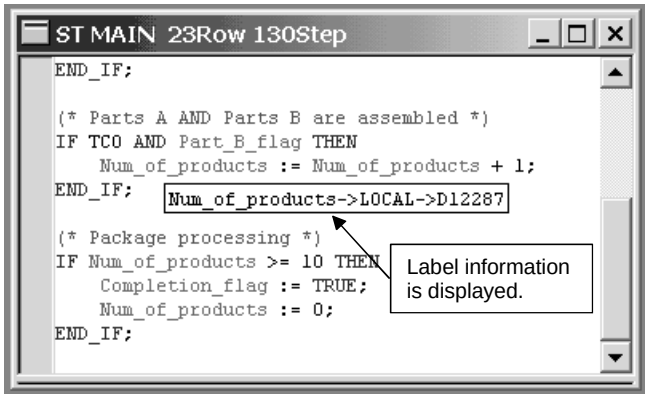
[Purpose]

Used to confirm the device assigned to the label after the ST program has been converted (compiled).

[Operating Procedure]

Choose [View] → [Label information] and check Label information.
When the mouse pointer is moved over the label on the ST edit screen, the label information is displayed in the tool tip format.

[Display screen]



The display format of the label information will be explained.

- When convert (compile) has not been performed
  Label name -> Label type -> Label comment
- When convert (compile) has been performed
  Label name -> Label type -> Label comment -> Device

The label type is displayed "GLOBAL" for a global variable, or "LOCAL" for a local label.

Point

- A label comment that does not exist is not displayed.
- Before convert (compile), the device information is not displayed since the device has not yet been assigned.
- When the FB or structure is used, the FB definition name or structure definition name is displayed.

3.3.5 Find/Replace

(1) Find

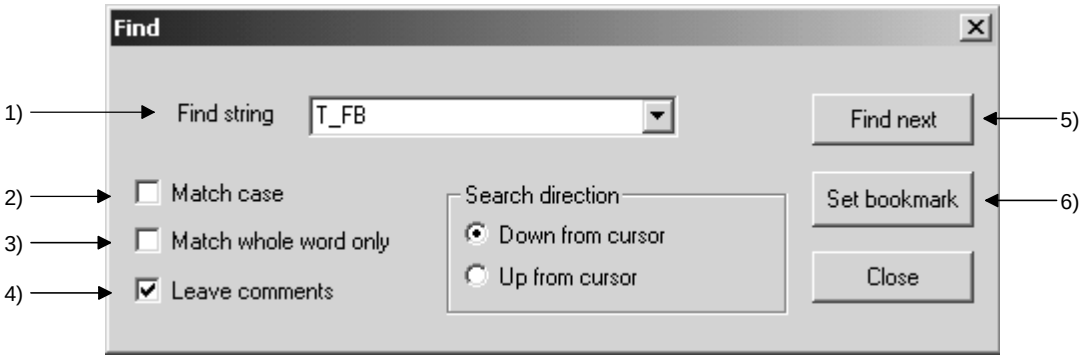
[Purpose]

Find the specified character string on the ST edit screen.

[Operating Procedure]

Choose [Find/Replace] → [Find] or press Ctrl + F.

[Dialog Box]



[Description]

1) Find string

Input the character string to be found.

Alternatively, the character string can be displayed and selected from the list box.

Point

- Specify the character string to be found within 256 characters.
- In the Find string list box, up to 10 character strings found in the past are displayed in the order from most to least recent.

2) Match case

Select whether a distinction between upper case and lower case will be made or not.

3) Match whole word only

Select whether a search will be made in a word unit or not.

The character string to be found is a collection of only alphabets or a collection of only numerals.

A tab, space, _ (under bar), etc. are recognized as separating characters.

Example: When a search is made for "abc"

Character string	Search result	Character string	Search result
abcdef	×	abc!def	○
abc tab def	○	abc01234	○
abc ␣ def	○	01234abc	○
abc_	○		

×···Not searched for, ○···Searched for

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4) Leave comments
Select whether a search will be made within comment sentences or not.

5) Find next button
Starts a search.

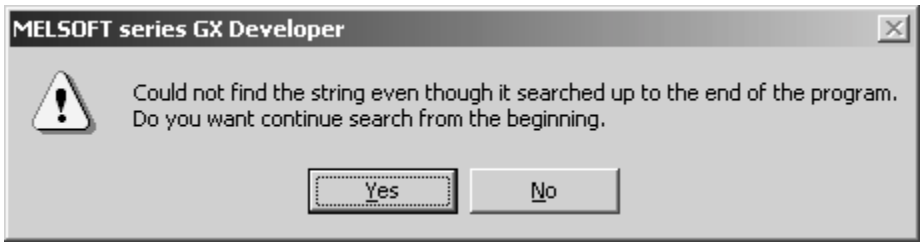
6) Set bookmark button
Searches the ST program on the ST edit screen for the character string to be found, and sets bookmarks on all the lines where the character string has matched.

[Setting procedure]

i) When making a search for the next
Input the character string to be found, and click the Find next button.

● When the character string to be found is found
The found character string is displayed in a range-selected status. The cursor moves to the found position.
To further continue a search, perform either of the following operations.
・Find downward
Choose [Find/Replace] → [Find downward] or press F5.
A search is made downward, starting from the cursor position.
・Find upward
Choose [Find/Replace] → [Find upward] or press Shift + F5.
A search is made upward, starting from the cursor position.

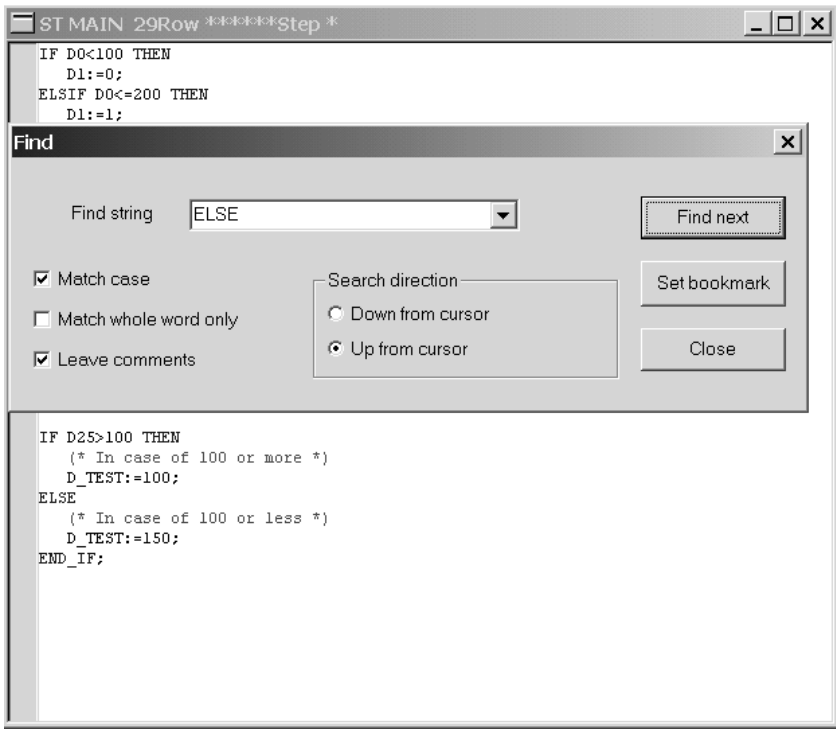
● When the character string to be found is not found
The following message is displayed.

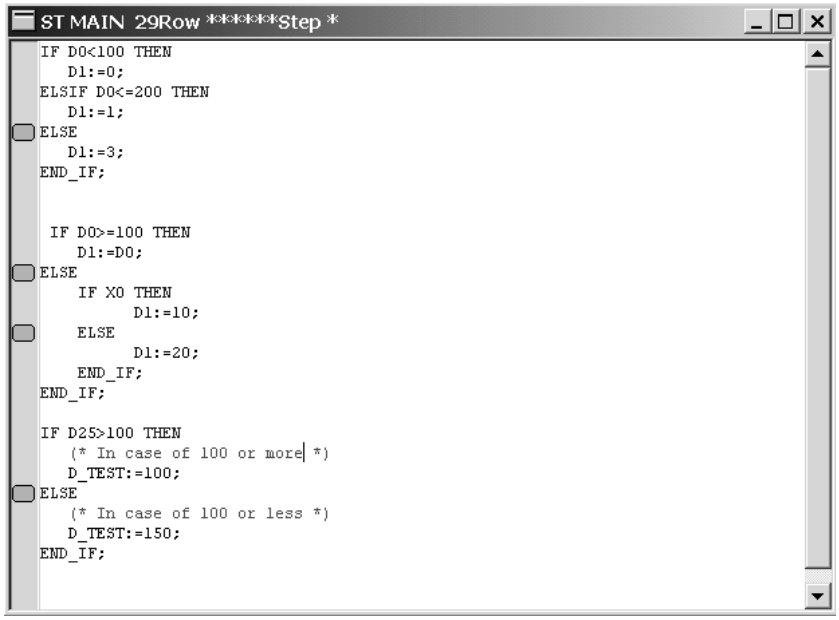


ii) When making a search using bookmark setting

Input the character string to be set in Find string, and click the Set bookmark button.

Bookmarks are set on all the lines on the ST edit screen that have the character string to be found.





(2) Replace

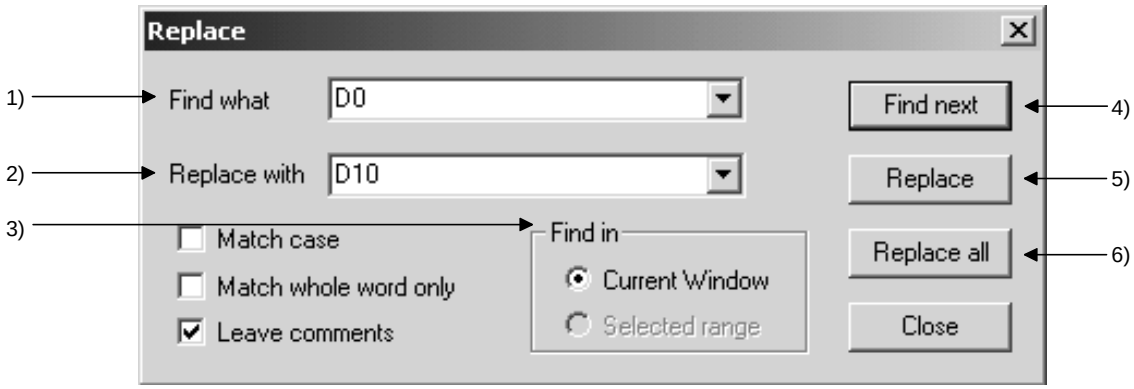
[Purpose]

Search for a character string on the ST edit screen and replace it with the specified character string.

[Operating Procedure]

Choose [Find/Replace] → [Replace] or press Ctrl + H.

[Dialog Box]



[Description]

1) Find what

Input the character string to be replaced.

Alternatively, the character string can be selected from the list box.

2) Replace with

Input the character string to replace the one to be replaced.

Alternatively, the character string can be selected from the list box.

Point

- In each of Find what and Replace with, specify the character strings within 256 characters.
- In each of the Find what and Replace with list boxes, up to 10 character strings replaced in the past are displayed in the order from most to least recent.

3) Find in

When "Current window" is selected

Replacement is made in the program currently being edited.

When "Selected range" is selected

Replacement is made in the range selected by dragging the mouse.

When the replacement range is selected on the ST edit screen, "Selected range" on the Replace screen can be selected.

4) Find next button

Starts a search.

5) Replace button

Replaces only the character string found first.

6) Replace all button

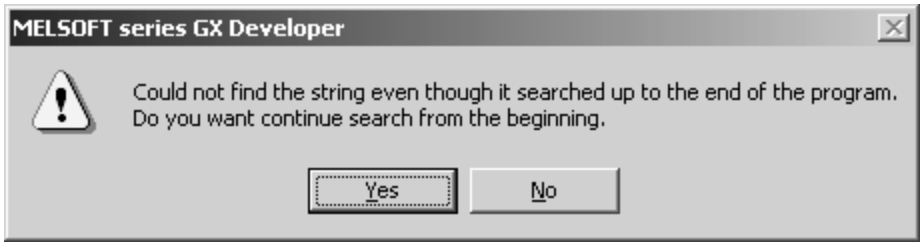
Replaces all the corresponding character strings on the target ST edit screen.

Point

- As the replacement processing target range, select either "Current window" or "Selected range". If the range has not been selected, "Current window" is the replacement target.
- If the Replace button is pressed without a character string being set in Replace with, the character string in Find what on the ST edit screen is deleted.

● When the character string to be replaced is found for Replace all
The following message is displayed.

● When the character string to be replaced is not found
The following message is displayed. The cursor does not move.



3.3.6 Line jump

[Purpose]

Used to move the cursor to the specified line on the ST edit screen.

[Operating Procedure]

Choose [Find/Replace] → [Line jump], click ( ), or press Ctrl + J.

[Dialog Box]

[Description]

1) Line setting edit box
   Input the line to which the cursor will jump.
2) Jump button
   Causes the cursor to jump to the specified line.

Point

If the specified line is beyond the program being edited, the cursor moves to the last line of the program.

If the following error message is displayed, a line jump cannot be made. Confirm the error definition and make setting again.

- When the Jump button is clicked with the specified line set to line 65536 or more or to other than an integer.

3.3.7 Open Function Block

[Purpose]

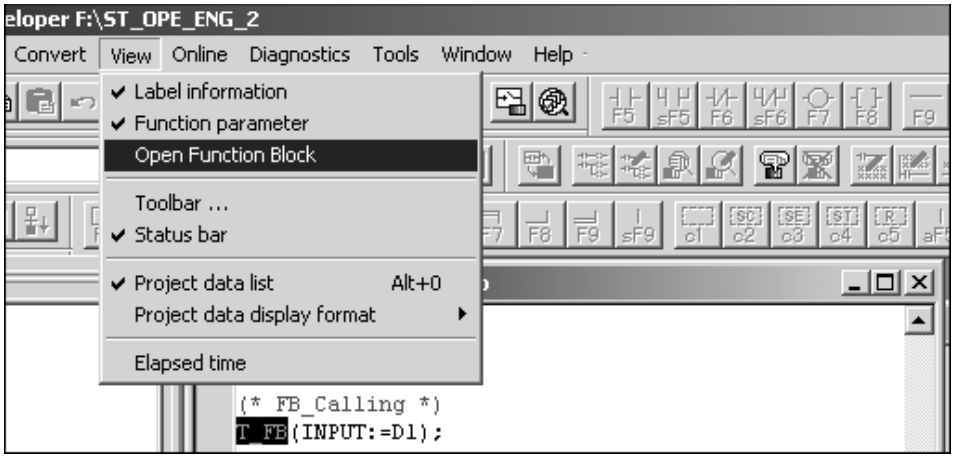
The FB window is used to confirm the contents of the FB definition program used in the ST program.

[Operating Procedure]

● Select the FB name.

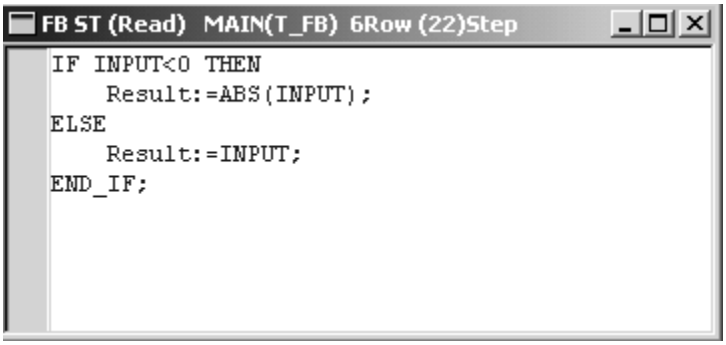
Choose [View] → [Open Function Block] or right-click and choose [Open Function Block].

(FB name: T_FB)



The FB window is displayed.

(The contents of the T_FB program are displayed.)



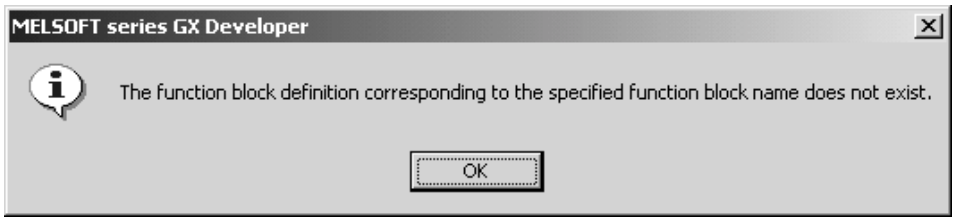
Point

This program is read-only and cannot be edited.

If either of the following error messages is displayed, the FB window cannot be opened.
Confirm the error definition and make setting again.

● When the FB definition is not yet converted (compiled)

● When the selected character string is not defined as the FB name



3.3.8 Copy/Cut/Paste

● In the case of copy

[Operating Procedure]

Choose [Edit] → [Copy], click ( ), or press Ctrl + C.

i) Specify the range of the character strings to be copied.

ii) The character strings in the specified range are copied.

● In the case of cut

[Operating Procedure]

Choose [Edit] → [Cut], click ( ), or press Ctrl + X.

i) Specify the range of the character strings to be cut.

ii) The character strings in the specified range are cut.

● In the case of paste

[Operating Procedure]

Choose [Edit] → [Paste], click ( ), or press Ctrl + V.

i) Move the cursor to the position where the character strings will be pasted.

ii) The character strings copied or cut are pasted.

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3.3.9 Undo/Redo

[Purpose]

The editing operation performed immediately before can be undone or the undoing operation can be redone.

[Operating Procedure]

● Undo

Choose [Edit] → [Undo], click ( ), or press Ctrl + Z.

● Redo

Choose [Edit] → [Redo], click ( ), or press Ctrl + Y.

Point

- Number of operation times enabled for Undo/Redo ····· 40 times
- Operation disabled for Undo/Redo ····· Copy
  Cursor movement
  Bookmark setting/deletion
  Convert (compile)
  Project storage

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3.4 Performing Convert (Compile)

[Purpose]

The created ST program is converted (compiled) into a program that can be executed by the PLC CPU.

[Operating Procedure]

- When the program currently being edited is converted (compiled)
  Choose [Conversion] → [Convert/Compile], press F4, or click ( ).
- When all the programs not yet converted (compiled) are batch-converted (compiled)
  Choose [Conversion] → [Convert/Compile (All programs being edited)], click ( ), or press Alt + Ctrl + F4.
- When all programs are batch-converted (compiled)
  Choose [Conversion] → [Convert/Compile (All programs)].

Point

When [Convert/Compile (All programs)] is selected, the programs already converted (compiled) are also converted (compiled) again.
By performing convert (compile) again, the devices assigned to the programs whose devices have not been changed may be changed.

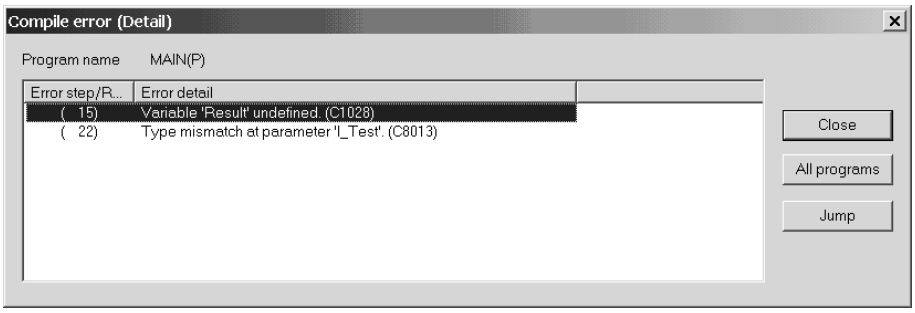
(1) When operation is completed normally

The "*" on the title bar that indicates the programs are not yet converted (compiled) disappears and the number of steps is displayed.

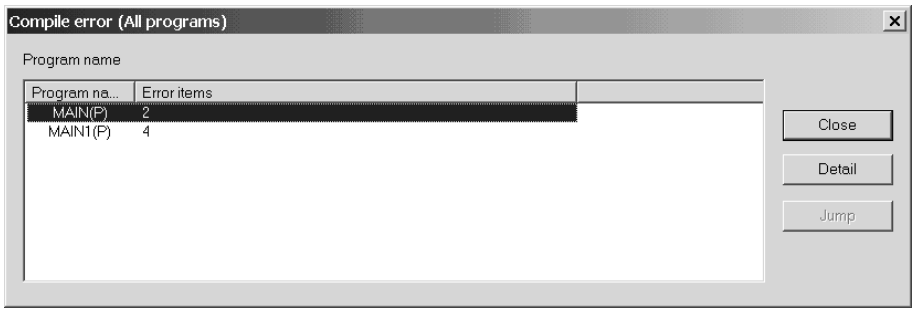
(2) When error has occurred

i) When an error has occurred in one program

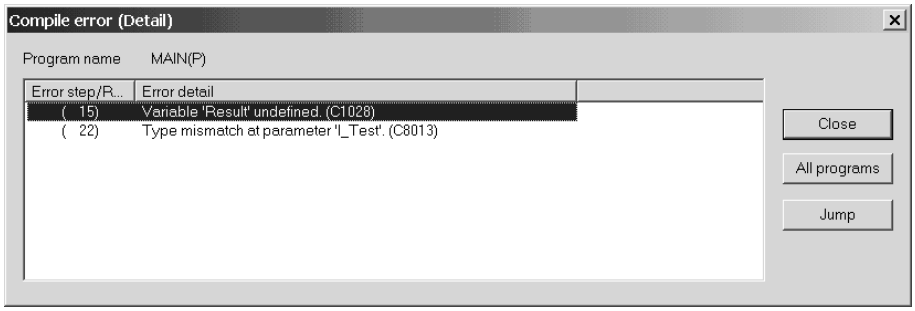
When an error has occurred, "******Step*" that indicates the program is not yet converted (compiled) is displayed in the window title.
The following screen is displayed.



ii) When an error has occurred in more than one program
The following screen is displayed.



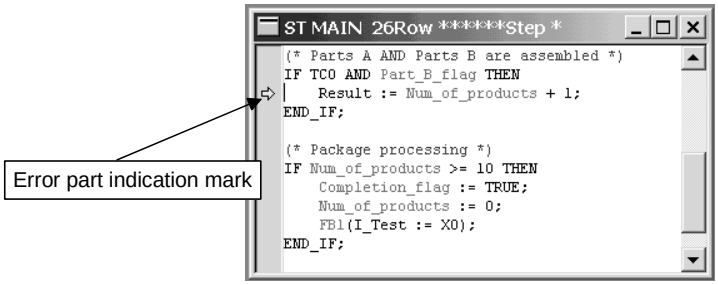
Select the program name and click the Detail button to display the error result of the corresponding program.



iii) How to jump to the error part

- Select the corresponding error in the error display list and click the Jump button.
- Select the corresponding error in the error display list and press the Enter key or double-click.

When the cursor jumps to the selected error line, the error part indication mark is displayed on the indicator bar as shown below for identification of the error part.



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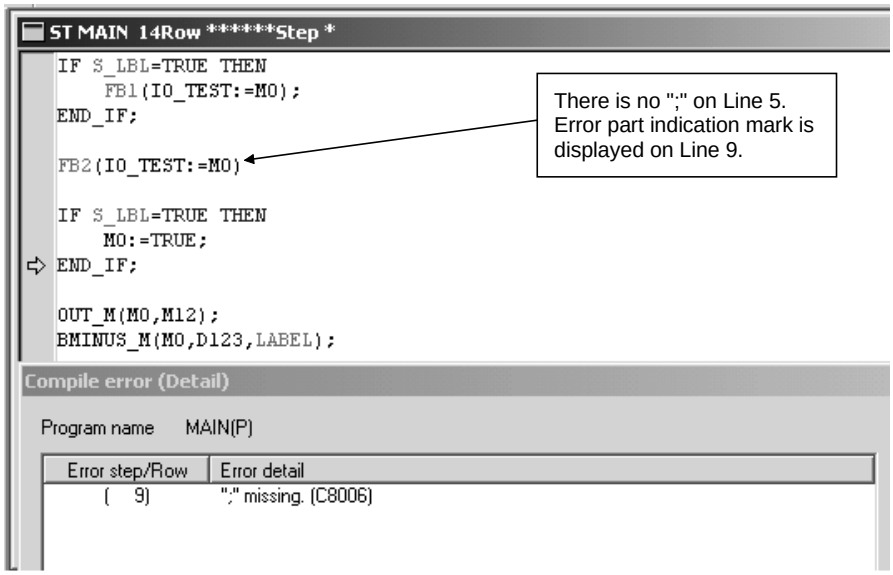
Point

The position of the error part indication mark may differ from the actual error part. Locate the faulty part from the error definition displayed on the "Compile error (Detail)" screen and the program contents of the line where the error part indication mark is displayed.

Example of error part indication

Example of error part indication



REMARK

For details related to errors, refer to the "QCPU (Q mode) Programming Manual (Structured Text)" given in Relevant Manuals.

3.5 Customizing the ST Edit Screen

Operation-related data can be set on the ST edit screen.

3.5.1 Changing the auto indent/tab width

[Purpose]

Set the auto indent/tab width.

(1) Auto indent

This function performs an auto indent when the Enter key is pressed during editing.

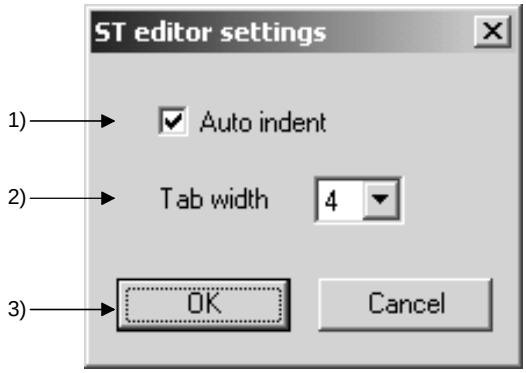
(2) Tab width

This function sets the tab width at the time when the Tab key is pressed.

[Operating Procedure]

Choose [Tools] → [ST editor settings].

[Dialog Box]



[Description]

1) Auto indent check box
   Checked: Auto indent valid
   Not checked: Auto indent invalid
2) Tab width combo box
   Any of 4, 8 and 12 can be selected.
3) OK button
   Makes the setting valid.

3.5.2 Changing the display colors

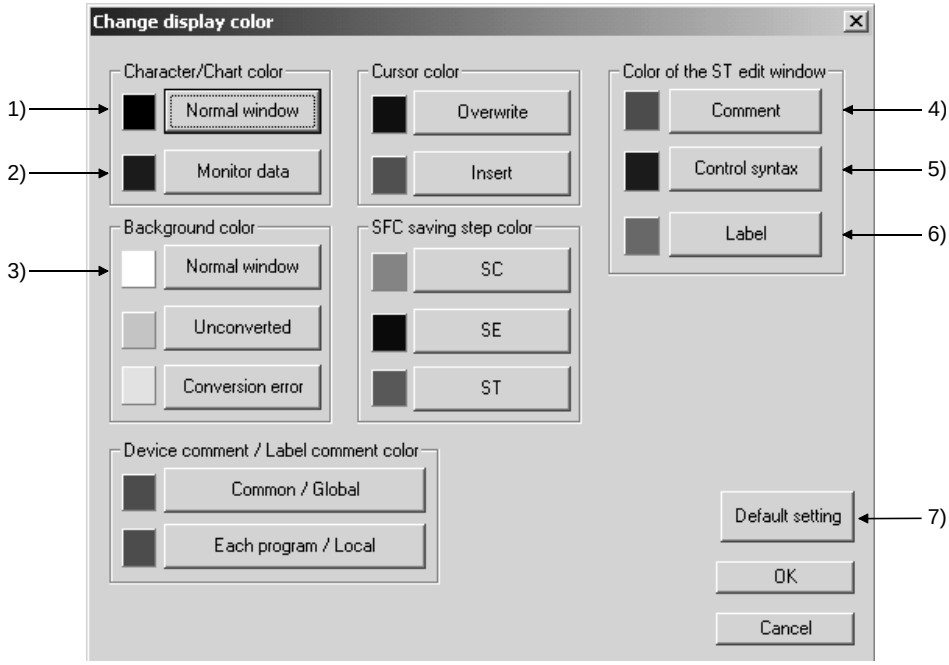
[Purpose]

The background, comments, control syntaxes, label character strings, etc. on the ST edit screen are displayed in the specified display colors.

[Operating Procedure]

Choose [Tools] → [Change display color].

[Dialog Box]



REMARK

Here, the parts related to the ST edit screen will be explained. For the other parts, refer to the "GX Developer Operating Manual" given in Relevant Manuals.

[Description]

1) Normal window (Character/Chart color)
   Specify the color of the display characters such as the device names and operators.
2) Monitor data (Character/Chart color)
   Specify the color of the display characters on the monitor screen.
3) Normal window (Background color)
   Specify the background color of the ST edit screen.
4) Comment
   Specify the color of the display characters in the comment parts.
5) Control syntax
   Specify the color of the display characters in the control syntax parts.
6) Label
   Specify the color of the display characters in the label parts.

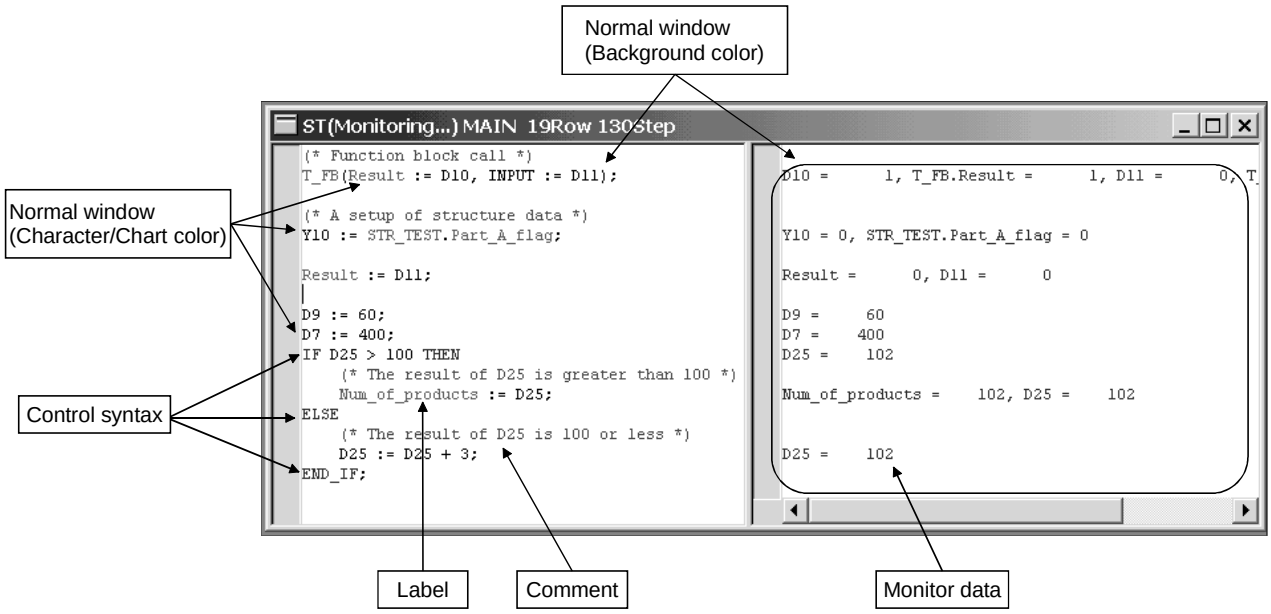
7) Default setting

Returns to the standard.

The standard colors are as follows.

Normal window (Character/Chart color)	: Black
Monitor data (Character/Chart color)	: Blue
Normal window (Background color)	: White
Comment	: Green
Control syntax	: Blue
Label	: Pink

A display example on the ST edit screen is shown below.



3.5.3 Changing the display font

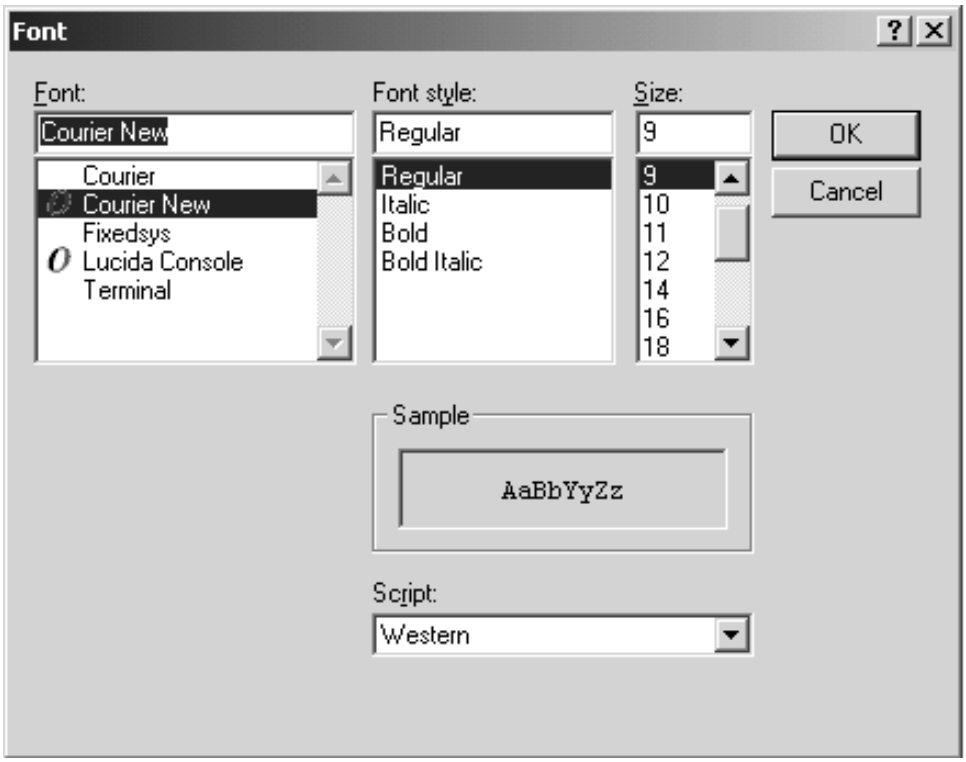
[Purpose]

The font used on the ST edit screen or for monitoring can be changed.

[Operating Procedure]

Choose [Tools] → [Font].

[Dialog Box]



[Description]

1) Font
   Set the font name of the display characters.
2) Font style
   Set the style of the display characters.
3) Size
   Set the size of the display characters.
4) OK button
   Makes the setting valid.

REMARK

The default settings are as follows.

Font	: Courier New
Font style	: Regular
Size	: 9

4 ONLINE

This chapter explains the read of the ST program from the PLC CPU, the write of the ST program to the PLC CPU, and the confirmation of monitor and program behavior.

4.1 Read from PLC

Read the ST program from the PLC CPU.

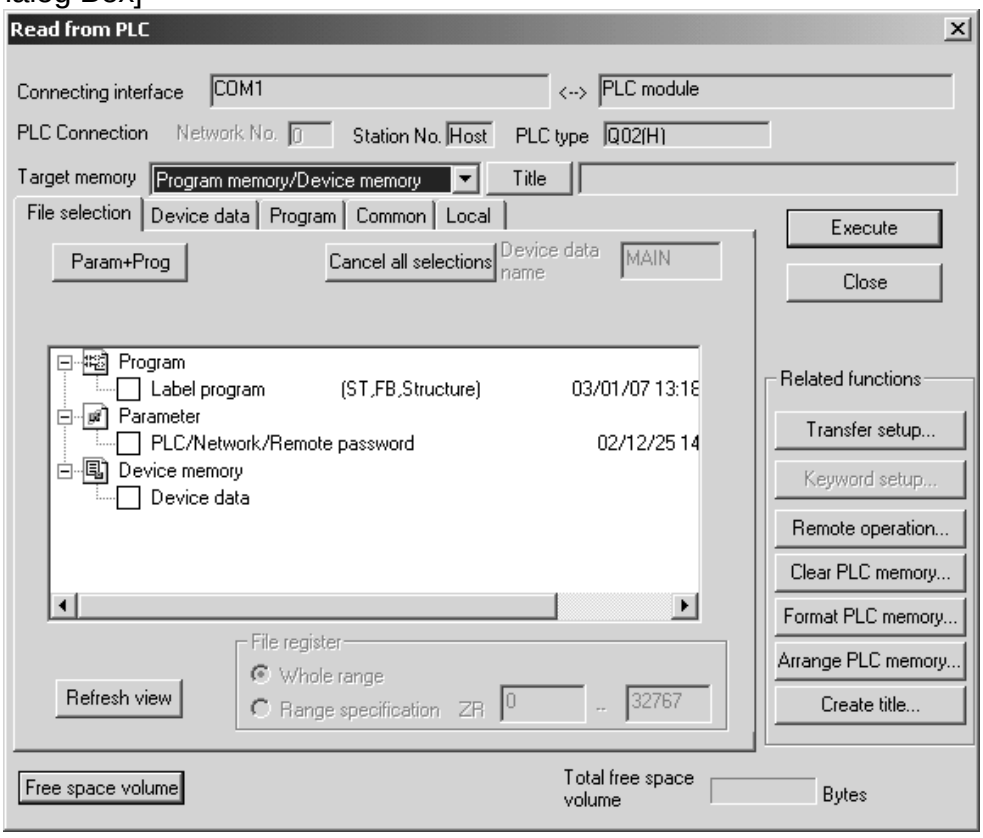
[Purpose]

Used to read the ST program from the PLC CPU.

[Operating Procedure]

Choose [Online] → [Read from PLC], or click ( ).

[Dialog Box]



[Setting procedure]

i) Choose [Online] → [Transfer setup] and set the connection target.
ii) Choose [Online] → [Read from PLC] to display the Read from PLC screen.
iii) Select the corresponding item in the <<File selection>> tab.
When "Parameter + Prog" is selected
The parameters and program are selected.
When the "Cancel all selections" button is selected
All are deselected.
iv) Click Execute.

Point

- When the ST program is to be read from the PLC, the read range cannot be specified.
- When the label program is to be read from the PLC, read from PLC is started after the project where "Use label" was selected in the label setting is created or read.
- When there is no label program in the CPU, "Label program" is not displayed in the data list of the Read from PLC dialog.

REMARK

For details, refer to the "GX Developer Operating Manual" given in Relevant Manuals.

4 - 2

4.2 Write to PLC

Write the already converted (compiled) ST program to the PLC CPU.

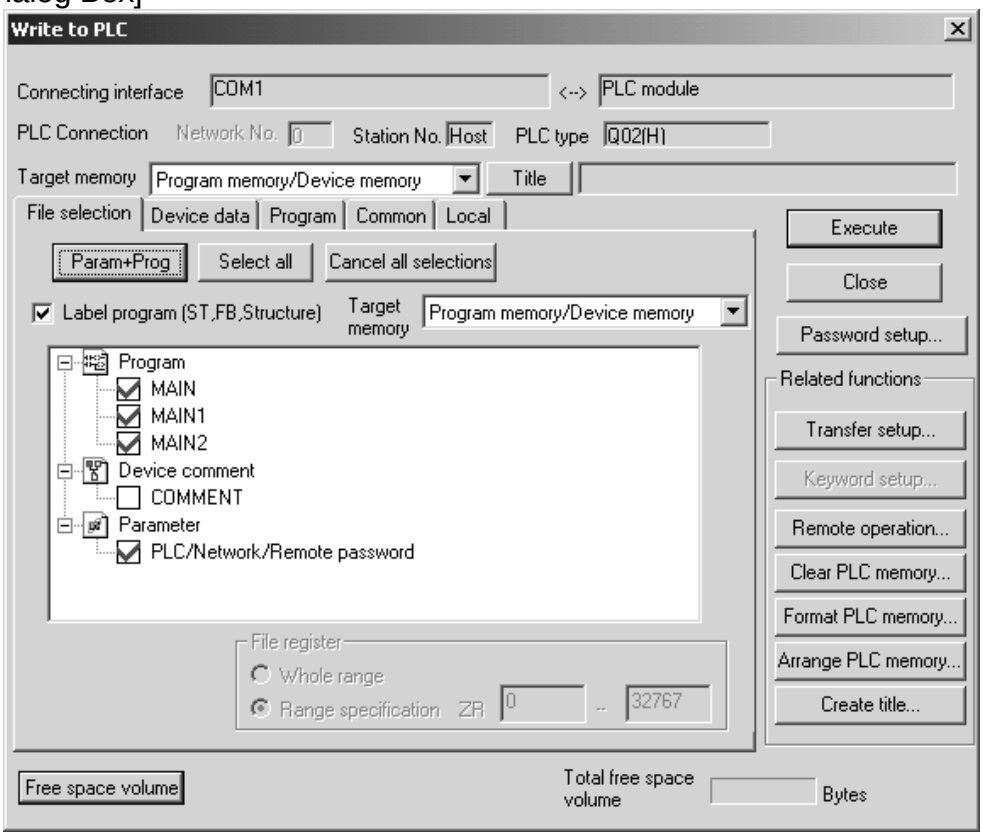
[Purpose]

Used to write the converted (compiled) program to the PLC CPU.

[Operating Procedure]

Choose [Online] → [Write to PLC], or click ( ).

[Dialog Box]



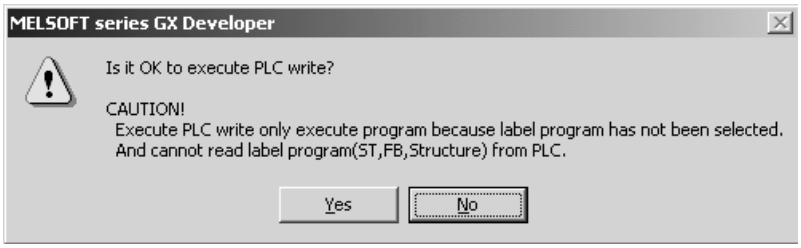
[Setting procedure]

i) Choose [Online] → [Transfer setup] and set the connection target.
ii) Choose [Online] → [Write to PLC] to display the Write to PLC screen.
iii) Select the corresponding item in the <<File selection>> tab.
When the "Label program (ST, FB, structure)" button is selected
The label program can be written.
When Param + Prog is selected
The parameters and program are selected.
When the Select all button is selected
All are selected.
When the Cancel all selections button is selected
All are deselected.
iv) Click Execute.

Point

- When the ST program is to be written to the PLC, the write range cannot be specified.
- If the program specified for write to PLC is not yet converted (compiled), the following error message is displayed and writing that program to the PLC is suspended.

- If the "Label program (ST, FB, structure)" check button was not checked for write to PLC, the following error message is displayed. When Yes is selected, only the execution program is written to the PLC and the label program cannot be read.



REMARK

For details, refer to the "GX Developer Operating Manual" given in Relevant Manuals.

4.3 Monitoring the ST Program

Monitor the ST program written to the PLC CPU to confirm the operation status of the PLC CPU.

4.3.1 Monitoring the ST program

[Purpose]

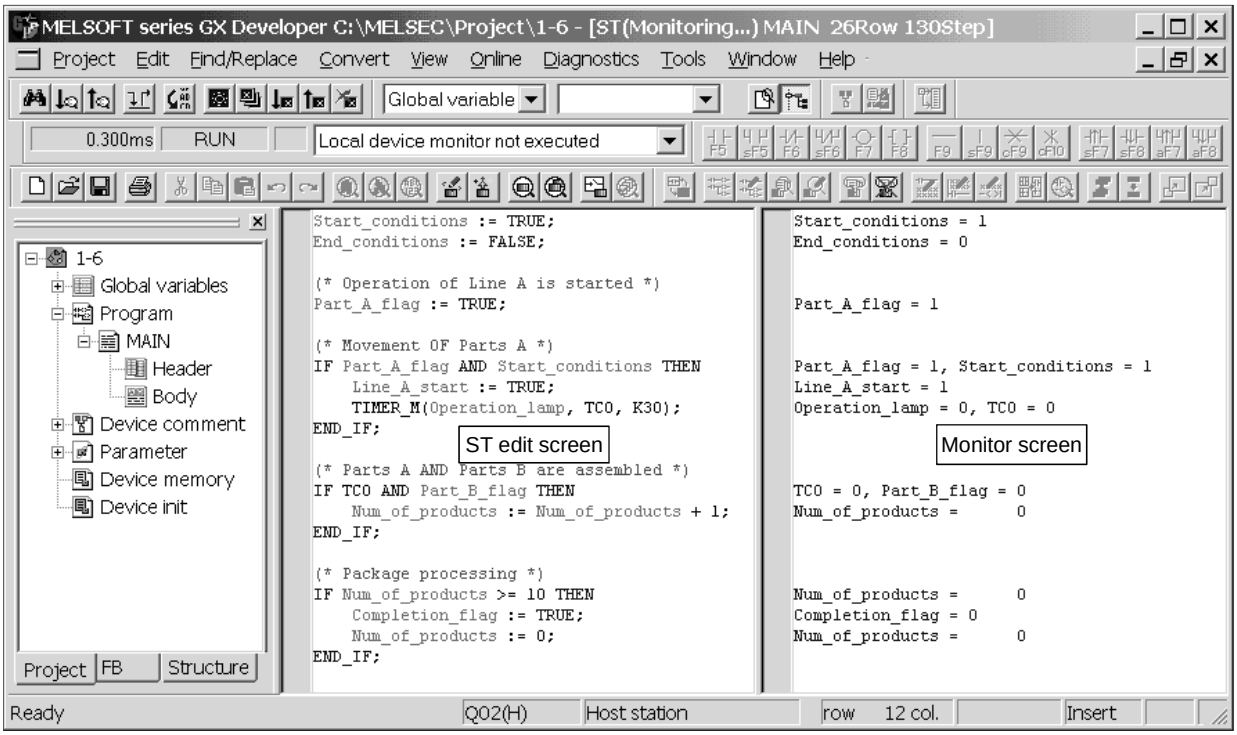
Used to monitor the ST program to confirm the operation status of the PLC CPU.

[Operating Procedure]

- When starting monitor
  Choose [Online] → [Monitor] → [Monitor], click ( ), or press F3.
- When stopping monitor
  Choose [Online] → [Monitor] → [Stop monitor], click ( ), or press Alt + F3.

[Display screen]

The following monitor screen is displayed.



The monitor screen displays the variable (label, structure, device), which is used on each line of the ST edit screen, on the same line of the monitor screen in a "label = monitor value" format.
When there are more than one identical variable on one line, the first one is displayed and the second and later are not displayed.

Variable Type	ST edit screen	Monitor screen	Remarks
Bit	Input := TRUE; Input := FALSE;	Input = 1 Input = 0	TRUE 1 FALSE 0
Word	Word1 := -32767;	Word1 = -32767	Decimal: 6 characters
		Word1 = H8001	Hexadecimal: 5 characters
Real	Result := 340282.338;	Result = 3.403e + 005	
Character string	Str1 := "ABCDEFGH" ;	Str1 = 16961	Decimal: The first one word of a character string is displayed in decimal. 6 characters
		Str1 = H4241	Hexadecimal: The first one word of a character string is displayed in hexadecimal. 5 characters
Array	Label [0] := 80; Label [1] := 100; Label [3] := 160;	Label [0] = 80 Label [0] = 80 Label [0] = 80	Only the value that begins with [0] is displayed. The display format changes depending on the type of the selected data.
Structure	STR_A. name := "ABCDEFGHIJ" ; STR_A. point := 40 ;	STR_A. name = 16961 STR_A. point = 40	The display format changes depending on the type of the selected data.

Point

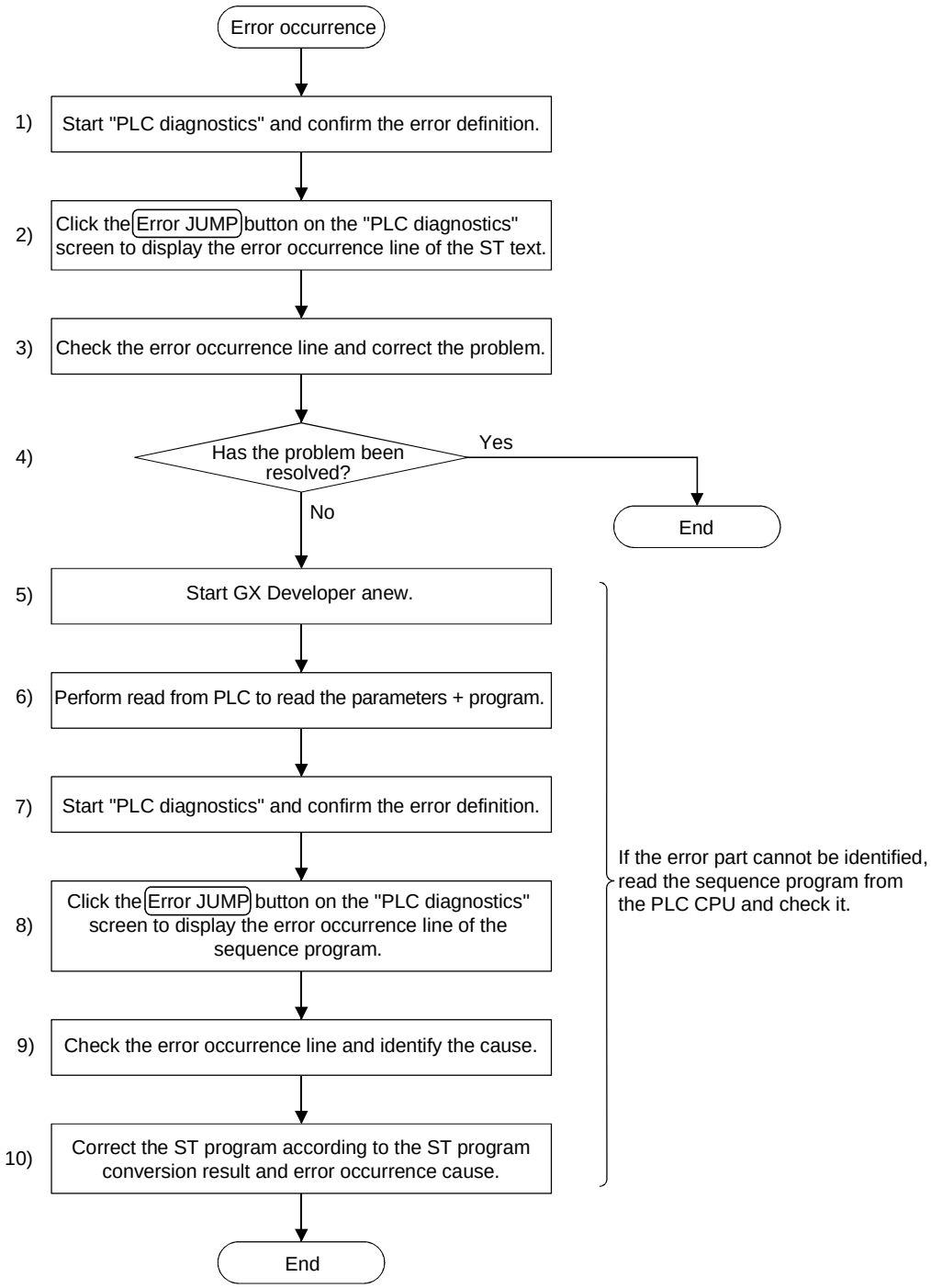
- Switching between decimal and hexadecimal can be performed by choosing [Online] → [Monitor] → [Change current value monitor (Decimal)] or [Change current value monitor (Hexadecimal)].
- The background color is the same as that of the ST edit screen.
  The display color selected by choosing [Tools] → [Change display color] → "Monitor data" is used.

4 - 6

4.3.2 Troubleshooting at error occurrence in ST program

This section explains troubleshooting to be performed when the ST program written to the PLC CPU has resulted in an error.

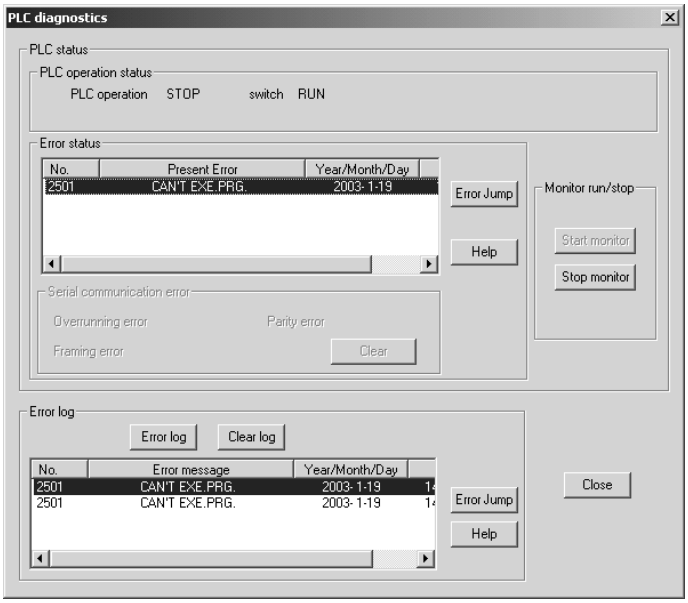
Troubleshooting to be performed when an error has occurred in the PLC CPU for the ST program



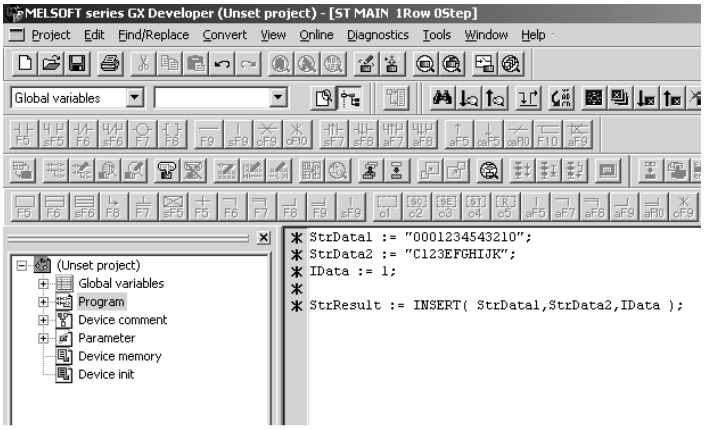
4 - 7

The operating procedure to be performed when an error occurred in the PLC CPU for the ST program will be explained using the actual screen as an example.

(1) Display the ST program where the error has occurred. (Operations 1), 2) in the flowchart)
Perform "PLC diagnostics" to display the error occurrence line.



1) Confirm the error definition.
2) Click the Error JUMP button.



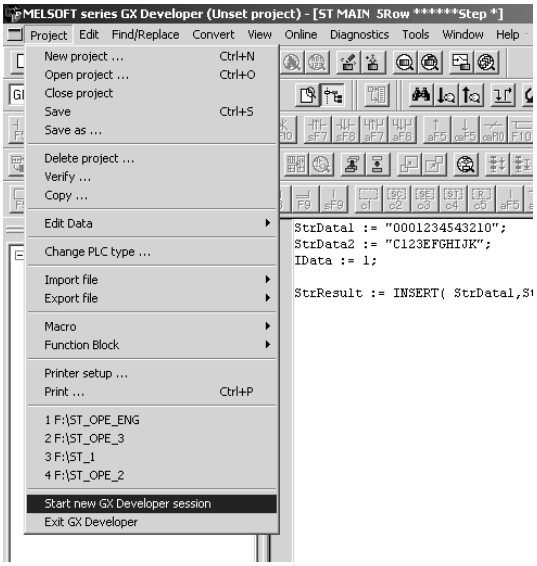
The error occurrence line is displayed.

(2) Diagnosis of the error part using the ST program (Operations 3), 4) in the flowchart)

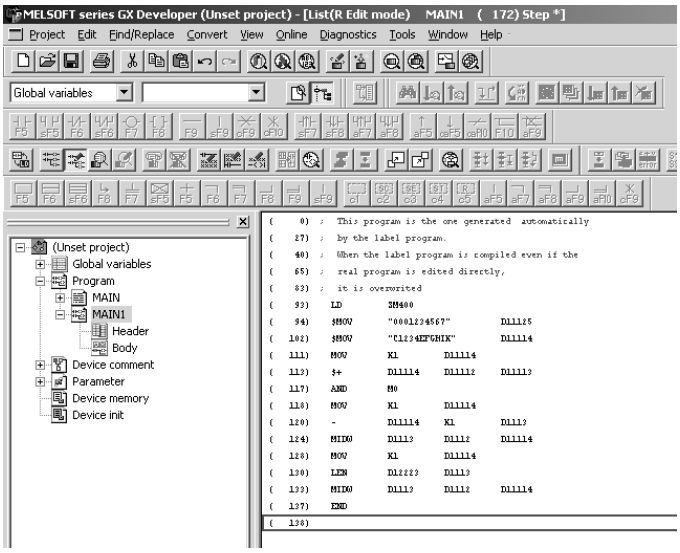
Diagnose what should be corrected from the error occurrence line and error code, and make correction. For details, refer to the "QCPU (Q mode) Programming Manual (Structured Text)" given in Relevant Manuals.
Since the cause of "error code: 4101" cannot be identified, perform the operations described in "(3) Display the sequence program where the error has occurred".

(3) Display the sequence program where the error has occurred (Operations 5) to 8) in the flowchart)

To display the sequence program where the error has occurred, read the sequence program from the PLC.



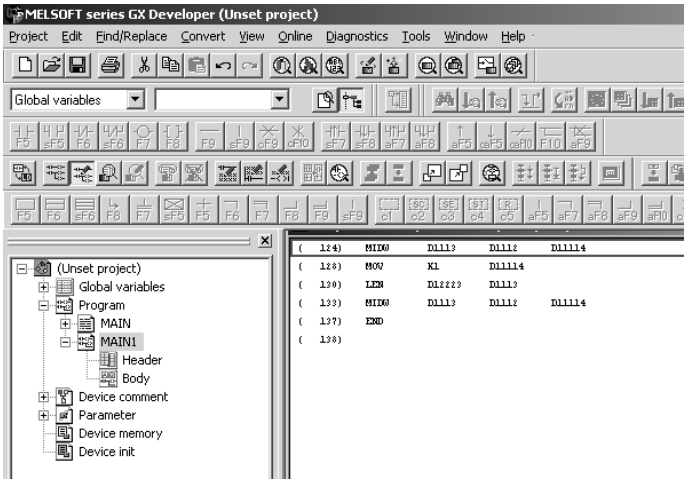
5) Start GX Developer anew.



6) Perform read from PLC.

To next page

From previous page



7), 8) Click the Error JUMP button on the "PLC diagnostics" screen to display the corresponding step in the list.

(4) Diagnosis of the error part using the sequence program (Operations 9), 10) in the flowchart)

(a) Confirm the contents of the error code in the "QCPU (Q mode)/QnACPU Programming Manual (Common Instructions)" given in Relevant Manuals to identify the error cause.

There are the following causes for the occurrence of "error code: 4101" of the MIDW instruction.

MIDW S1 D S2

i) The value of S2 is greater than the number of characters of D.

ii) The value of S2 + 1 is greater than the number of characters of S1.

(b) Diagnose the part of the error cause in the ST program from the conversion result in the "QCPU (Q mode) Programming Manual (Structured Text)" given in Relevant Manuals, and correct the ST program.

Excerpt from the "QCPU (Q mode) Programming Manual (Structured Text)"

ST Program	Conversion Result			
StrResult :=	LD	SM400		
INSERT (StrData1, StrData2, IData);	$+	D11114	D11125	D11102
	AND<>	D11113	K1	
	MOV	K1	D11100	
	-	D11113	K1	D11101
	MIDW	D11125	D11102	D11100
	MOV	D11113	D11100	
	LEN	D11114	D11101	
	MIDW	D11114	D11102	D11100

(c) Confirm the corresponding devices by performing device monitor, etc. to identify the error cause.

(5) Write the program to the PLC CPU and confirm that the error has been corrected. If the problem is not resolved, repeat the operations in 1) to 10) to correct the error.

4.4 Online Change

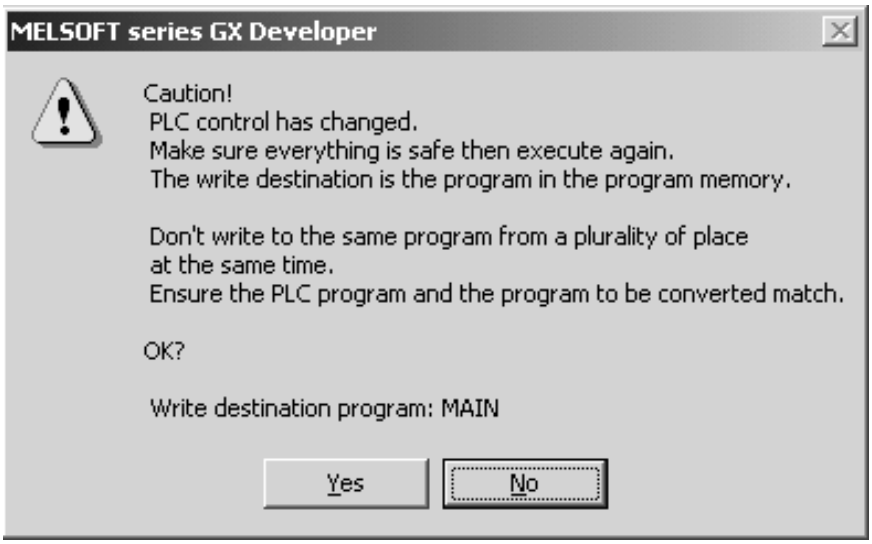
Change part of the sequence program and write it to the PLC CPU in a RUN status.

[Purpose]

Used to perform write to the PLC CPU in a RUN status.
To indicate the online change target line, " * " is displayed on the indicator bar.

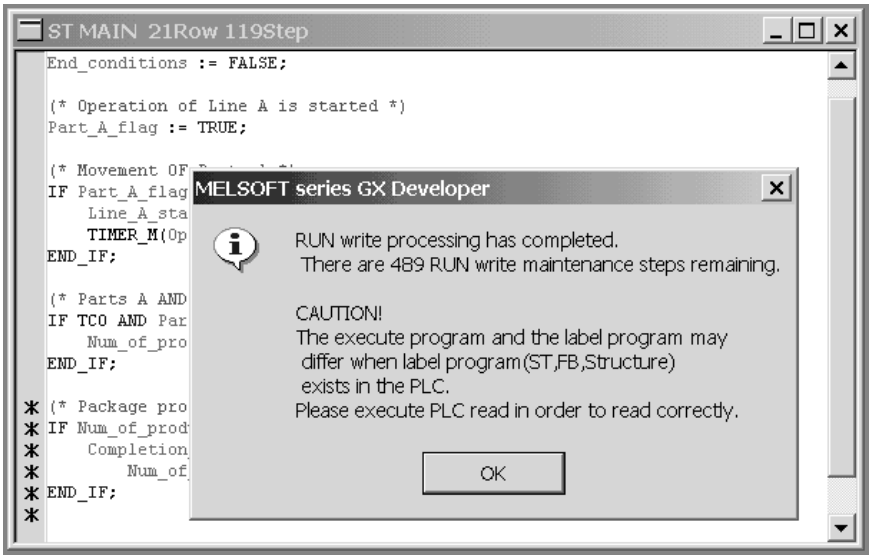
[Operating Procedure]

Choose [Convert] → [Convert/Compile (Online change)] or press Shift + F4.
When online change is executed, the following online change confirmation message is displayed.
Execute online change after confirming the message.



(1) When operation is completed normally

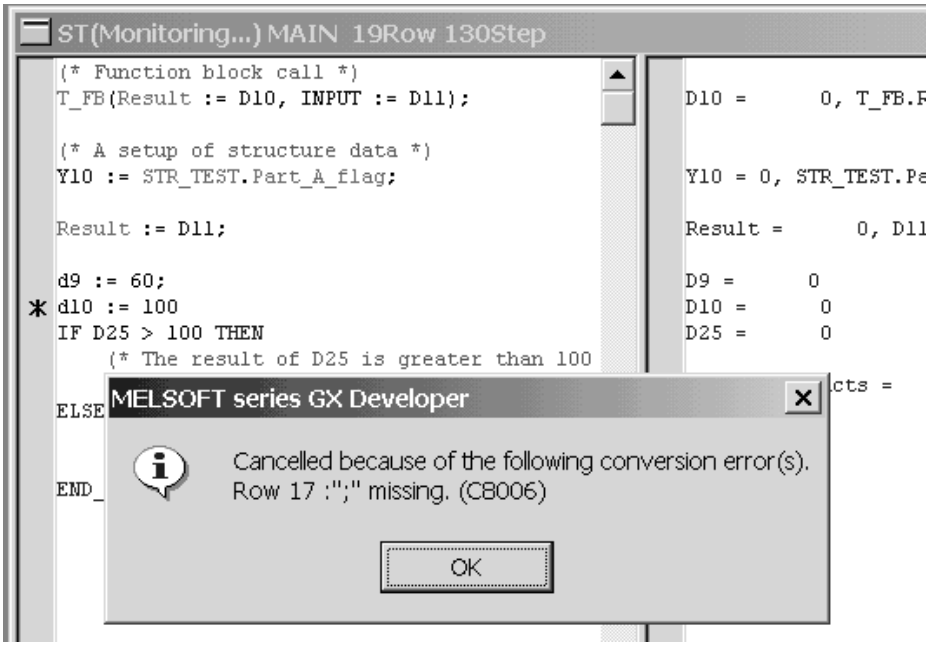
The " * " displayed on the indicator bar on the target line disappears when the OK button is clicked.



(2) When error has occurred

The error definition is displayed and the processing stops. After correcting the conversion error, execute online change again.

Example of error display (when "d10 := 100" is input)



REMARK

For details of the error display, refer to the "QCPU (Q mode) Programming Manual (Structured Text)" given in Relevant Manuals.

4.5 Device Test

Forcibly turn on/off the bit device of the PLC CPU or change the current value of the word device.

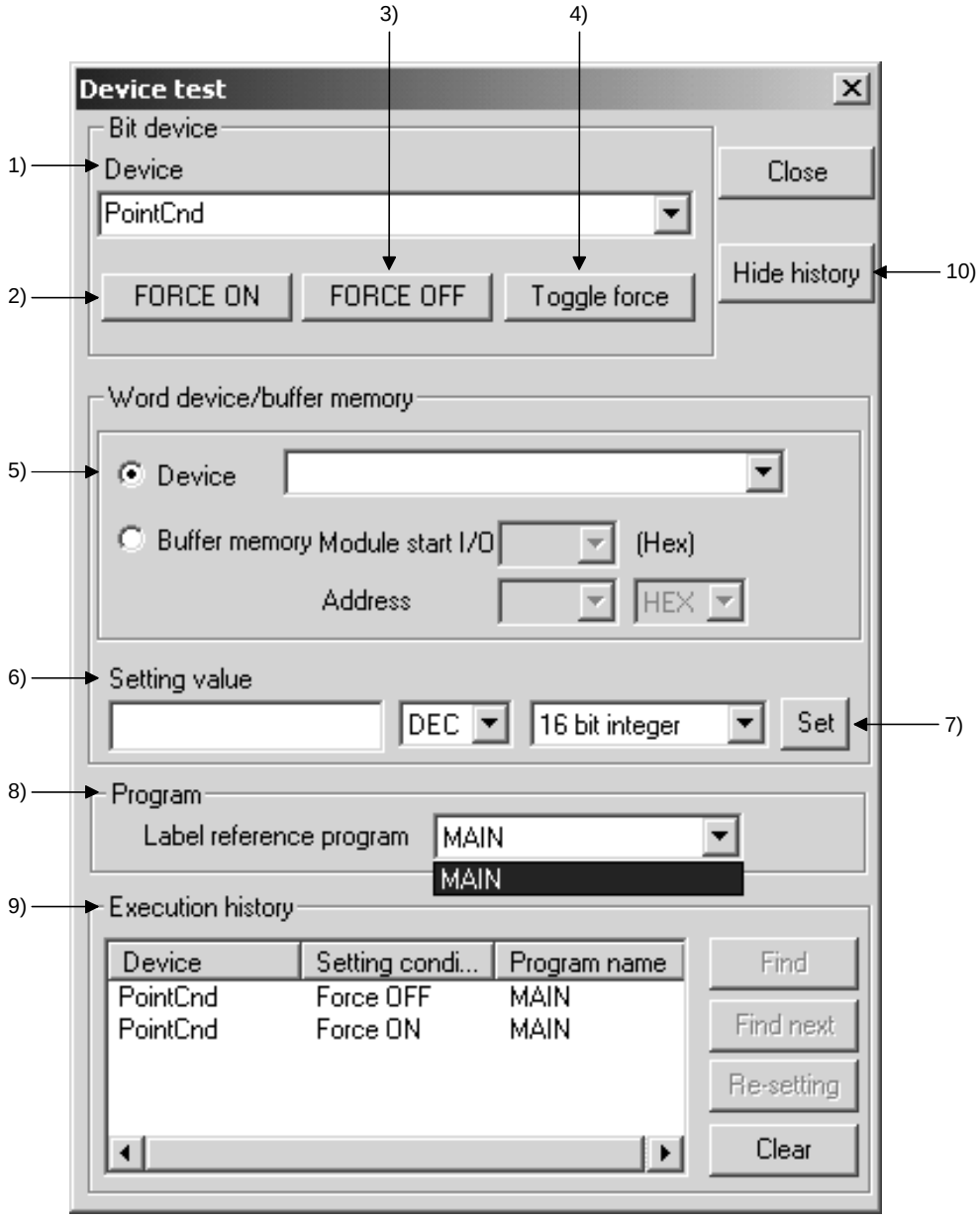
[Purpose]

Used to change the value of the specified device/variable (label, structure, device).

[Operating Procedure]

Choose [Online] → [Debug] → [Device test], click ( ), or press Alt + 1.

[Dialog Box]



[Description]

1) Device
   Specify the bit device to be forcibly turned on or off.
2) FORCE ON button
   Forcibly turns on the specified bit device.
3) FORCE OFF button
   Forcibly turns off the specified bit device.
4) Toggle force button
   Forcibly reverses the ON/OFF of the specified bit device.
5) Device
   Specify the word device whose current value will be changed.
6) Setting value
   Set a new value of the word device.
7) Set button
   Click after the setting is completed.
   The current value of the word device is changed.
8) Program
   Specify the program to be used in the device test.
9) Execution history
   The device test setting history is displayed.
10) Hide history (Execution result Display)
    The execution result of the device test is displayed/hidden.

REMARK

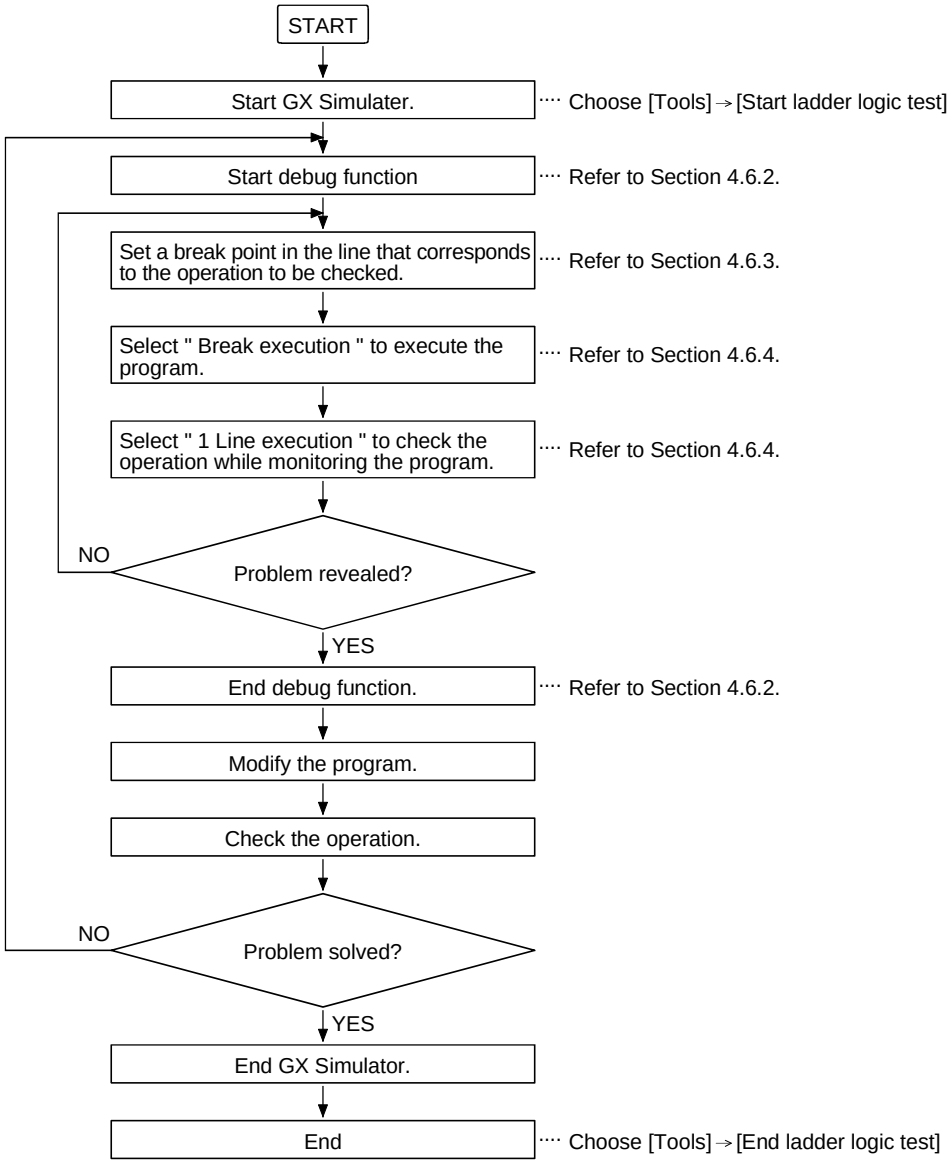
For details, refer to the "GX Developer Operating Manual" given in Relevant Manuals.

4.6 Debug Function

GX Simulator is required to execute debug function. Set break points within the program written in ST language, and execute it according to the set break points line-by-line. With this execution, the system operation can be monitored and checked.

4.6.1 Debug function flowchart

The following flowchart shows an example for using debug function on GX Developer.



Point

- GX Simulator Ver6.16S or later is required to use debug function.
- For details of GX Simulator, refer to GX Simulator Operating Manual.
- Debug is disabled when connected to PLC CPU

4.6.2 Starting/Ending debug function

[Purpose]

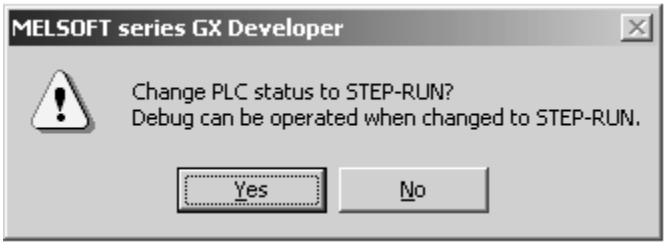
Start/End debug of the ST program.

[Operating Procedure]

Choose [Online] → [Debug] → [Debug].

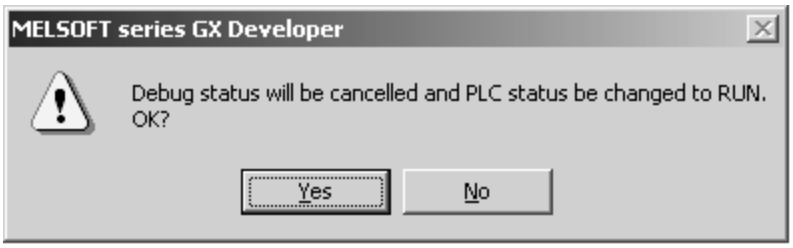
[Dialog Box]

- Start



Click [Yes] button to start debug function.

- End



Click [Yes] button. This displays a message telling that debug status is canceled.
Click [OK] button to end debug function.

4.6.3 Setting/Clearing break points

Set/Clear break points.

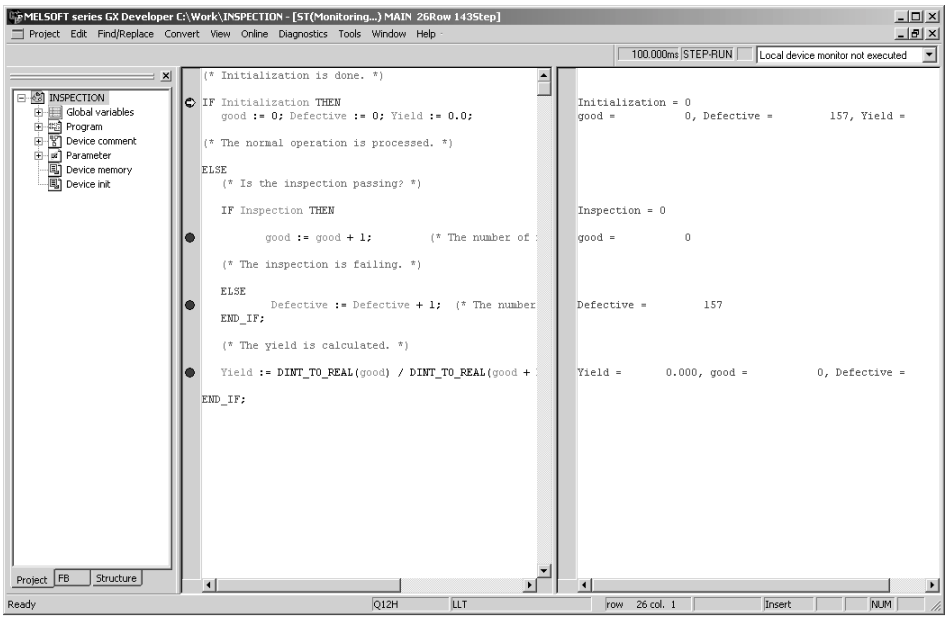
[Purpose]

Set break points in order that the execution will be halted at the specified location in a program during brake execution.

[Operating Procedure]

Choose [Online] → [Debug] → [Break point setting/cancellation], and click  or press F9 button.

[Dialog Box]



[Setting procedure]

Break point setting

1) Place the cursor in the line where a break point to be set.
2) Choose [Online] → [Debug] → [Break point setting/cancellation], and click  or press F9 button.
3) appears on the indicator bar.

Break point clear

1) Place the cursor in the line where a break point is set.
2) Choose [Online] → [Debug] → [Break point setting/cancellation], and click  or press F9 button.
3) appears on the indicator bar.

Point

- Up to 8 break points can be set within one program.

The following table shows the statements and the relevant restrictions on break point settings :

No.	Control statement	Break point setting (○: Available ×: N/A)
1	IF	○: The line that includes " THEN " *1 ×: The line that includes " END_IF "
2	CASE	○: The line that includes " OF " *2 ○: The line that includes " : " (colon) right after an optional value *1 ×: The line that includes " END_CASE "
3	FOR	○: The line that includes " DO " *1 ×: The line that includes " FOR " ×: The line that includes " END_FOR "
4	WHILE	○: The line that includes " DO " *1 ×: The line that includes " END_WHILE "
5	REPEAT	○: The line that includes " UNTIL " *1 ×: The line that includes " REPEAT " ×: The line that includes " END_REPEAT "
6	EXIT	○: The line that includes " EXIT " ×: The line that includes " END_WHILE "
7	RETURN	○: The line that includes " RETURN " ×: The line that includes " REPEAT " ×: The line that includes " END_REPEAT "
8	Operation sentence	○: The line that includes " ; " (semicolon) *3 at the end of a sentence
9	FB utilization	○: The line that includes " ; " (semicolon) at the end of the control statement.
10	FUNCTION	○: The line that includes " ; " (semicolon) at the end of the control statement.

*1: Break point setting is available even when sentences within the control statement are all blank.
*2: Break point setting is available. However, if the same variables (device, label) are used for the integer expression within " CASE <Integer expression> OF " , the break is executed in the line that includes " : " (colon) right after the first optional value instead of the line that includes " OF ".
*3: Break point setting is not available when sentences within the control statement are all blank (" ; " (semicolon) only).

4.6.4 Break execution/1 Line execution

Perform break execution/I line execution of programs.

[Purpose]

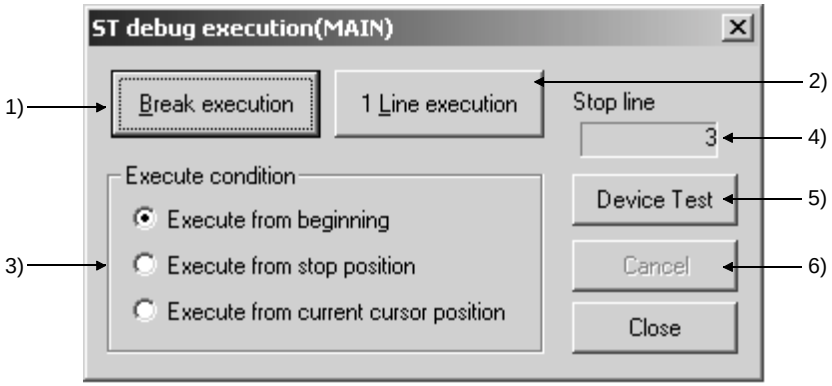
Break execution debugs programs by halting the prgram execution at the location specified by break point.

1 line execution debugs programs by halting the program execution line-by-line.

[Operating Procedure]

Choose [Online] → [Debug] → [ST debug execution], and click  or press F8 button.

[Dialog Box]



[Setting Items]

1) Break execution button

Starts program execution from the location selected as "Execution condition" to the preset break point.

2) 1 Line execution button

Starts program execution line-by-line from the location selected as "Execution condition".

3) Execution condition

Specify the line from which to start debugging.

4) Stop line

Displays the line No. at which the program execution is being halted during break execution or 1 line execution.

5) Device Test button

Displays "Device test" dialog box. Fox details, refer to Section 4.5.

6) Cancel button

Interrupts break execution or 1 line execution.

Point

- Break execution and 1 line execution can be performed by pressing ALT + B , ALT + L , respectively.
  This is available while "ST debug execution" dialog box is on the screen.

4.6.5 Break point list

A list that displays the set break points.

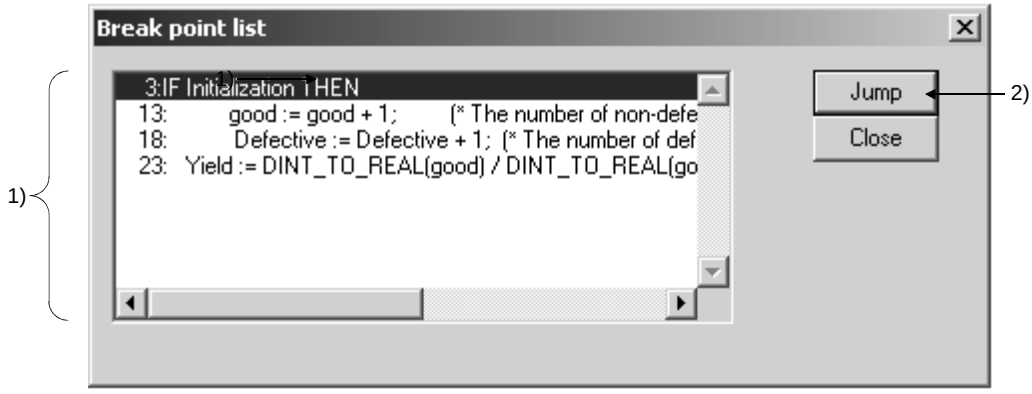
[Purpose]

Use the break point list to jump to the other line.

[Operating Procedure]

Choose [Online] → [Debug] → [Break point list].

[Dialog Box]



[Setting Items]

1) Break point list box
   This list box displays the line No. and statements at which break points are set.
   Select a line and double click it (or then press Enter) to perform the same as Jump button.
2) Jump button
   Click this button to move to the head of the line selected in the break point list box.

4.6.6 Clearing all break points

Clear all break points.

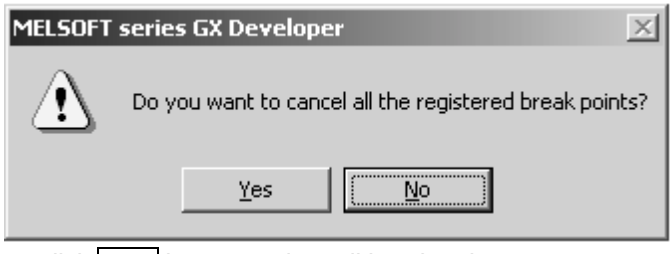
[Purpose]

Clear all break points.

[Operating Procedure]

Choose [Online] → [Debug] → [Cancel all break points].

[Dialog Box]



Click Yes button to clear all break points.

5 PRINT

This chapter explains the method of printing the ST program.
For other printing methods, refer to the " GX Developer Operating Manual" given in Relevant Manuals.

(1) PRINT

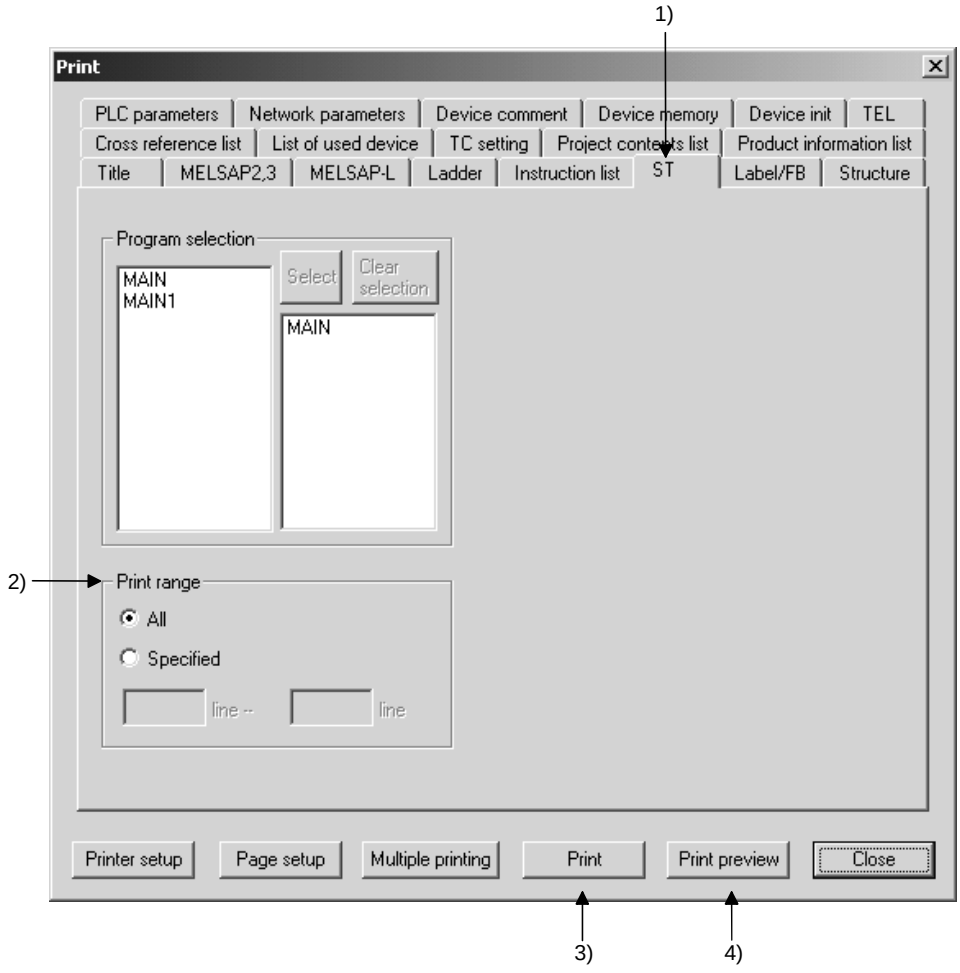
[Purpose]

Print the ST program.

[Operating Procedure]

Choose [Project] → [Print], click ( ), or press Ctrl + P.

[Dialog Box]



5

[Description]

1) <<ST>> tab
   Switches to the screen where print details will be set.
2) Print range
   Specify the print range of the ST program.
   ● Entire range
     The ST program is printed from the first line to the last line.
   ● Range specification
     The ST program is printed in the specified range.
3) Print button
   Prints the ST program.
4) Print preview button
   Displays the preview screen.

[Setting procedure]

After setting the information required for Print, click the Print button to start printing.

(Print Example)

```
 1 Start_conditions := TRUE;
 2 End_conditions := FALSE;
 3
 4 (* Operation of Line A is started *)
 5 Part_A_flag := TRUE;
 6
 7 (* Movement OF Parts A *)
 8 IF Part_A_flag AND Start_conditions THEN
 9       Line_A_start := TRUE;
10       TIMER_M(Operation_lamp, TC0, K30);
11 END_IF;
12
13 (* Parts A AND Parts B are assembled *)
14 IF TC0 AND Part_B_flag THEN
15       Num_of_products := Num_of_products + 1;
16 END_IF;
17
18 (* Package processing *)
19 IF Num_of_products >= 10 THEN
20       Completion_flag := TRUE;
21       Num_of_products := 0;
22 END_IF;
```

- The line numbers are printed in serial numbers.
- If print cannot be performed midway through characters, a line feed is executed in that position.
  The line number is not provided for the part where the line feed was executed.
- When the print range is specified, print starts from the specified line number.
- The number of characters on one line changes depending on the printer setting and font.

REMARK

For the print of an FB program, refer to the "GX Developer Operating Manual (Function Block)" given in Relevant Manuals.

(2) Print preview

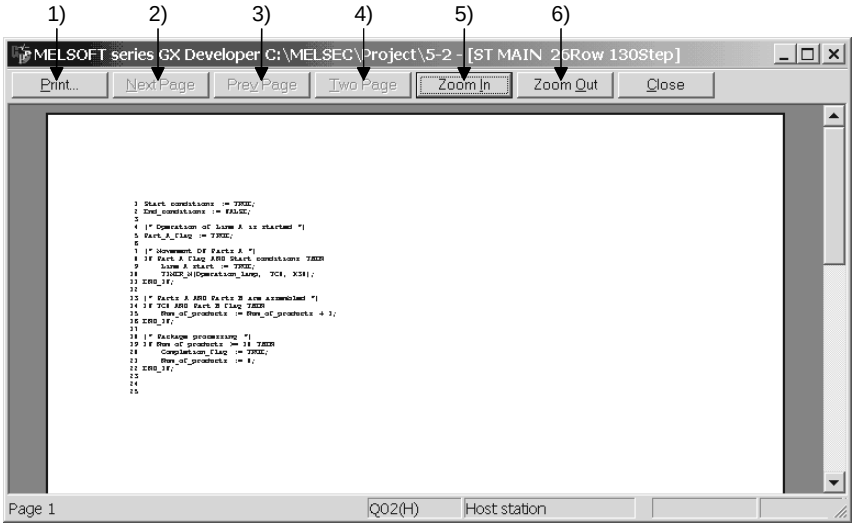
[Purpose]

Display the print image of the ST program whose print range has been set.

[Operating Procedure]

Choose [Project] → [Print] → Print preview button,
click ( ) → Print preview button, or press Ctrl + P → Print preview button.

[Dialog Box]



[Description]

1) Print button
   Prints the data displayed on the print preview screen.
2) Next Page button
   Displays the print image of the next page.
3) Prev Page button
   Displays the print image of the previous page.
4) Two Page button
   Selects whether the print image will be displayed on a one page basis or two page basis.
5) Zoom In button
   Displays an enlarged print image on the screen.
   The display can be switched in three stages.
6) Zoom Out button
   Displays a reduced print image on the screen.

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GX Developer Version 8

Operating Manual (Structured Text)

MODEL	GXDEV8-O-ST-E
MODEL CODE	13JU37
SH(NA)-080367E-C(0406)MEE	

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