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FUJI PROGRAMMABLE CONTROLLER

MICREX-SX

D300win Reference

USER'S MANUAL

Type : NP4H-SEDEV2

This User's Manual explains the functions of D300win and their application as well as programming, monitoring and testing methods with The MICREX-SX Series programmable controller. Read this manual carefully to ensure correct operation. When using modules or peripheral devices, be sure to read the corresponding user's manual listed below.

Title	Manual No.	Contents
User's Manual Commands MICREX-SX series SPH	FEH200	Explains the system configuration, the memory and the language of SPH.
User's Manual Hardware, MICREX-SX series SPH	FEH201	Explains the system configuration, the specifications and operations of modules in the MICREX-SX series.
User's Manual P/PE-link modules, MICREX-SX series SPH	FEH203	Explains the communication specifications of P/PE-link, the specifications and operations of the modules.
User's Manual T-link master module / T-link interface module, MICREX-SX series SPH	FEH204	Explains the communication specifications of the T-link, the specifications and operations of the T-link master module / the T-link interface module.
User's Manual D300win Ver1.x <GUIDE>, MICREX-SX series	FEH250	Explains the basic operations of D300win Ver1.x, the programming and monitoring for MICREX-SX series.
User's Manual D300win Ver1.x <REFERENCE>, MICREX-SX series	FEH251	Explains the menu and icon of D300win and all of the operations of D300win Ver1.x.

Notes

1. This manual may not be reproduced in whole or part in any form without prior written approval by the manufacturer.
2. The contents of this manual (including specifications) are subject to change without prior notice.
3. If you find any ambiguous or incorrect descriptions in this manual, please write them down (along with the manual No. shown on the cover) and contact FUJI.

Safety Precautions

Before mounting, wiring, operation, maintenance and inspection of the device, be sure to read the operating instructions carefully to ensure proper operation. The operation instructions should be furnished to the maintenance supervisions of final users.

Warning : Incorrect handling of the device may result in death or serious injury.

Caution : Incorrect handling of the device may result in minor injury or physical damage.

Even some items indicated by “Caution” may also result in a serious accident.

Both safety instruction categories provide important information. Be sure to strictly observe these instructions.

Caution

- ◊ Do not bring the magnetic object close to the floppy disk, otherwise, failure might be caused.
- ◊ Insert the memory cassette, floppy disk and engage the loader connector in a correct orientation, otherwise, failure or erratic operation might be caused.
- ◊ Sufficiently make sure of safety before program change, forced output, starting, stopping or anything else during a run. The wrong operation might break or cause machine problems.
- ◊ Do not turn off the loader during a run (accessing to the hard disk or the floppy disk, communicating to the PLC), otherwise, missing of *data, failure or erratic operation of products, damage or trouble of machines might be caused.
- ◊ Use this package in the operating environment of software described in the user's manual, otherwise, failure or erratic operation might be caused.
- ◊ Perform the version-up operation by the explanation of the user's manual, otherwise, failure or erratic operation might be caused.
- ◊ Engage the communication cable connector firmly and lock it, otherwise, erratic operation be might caused.
- ◊ Do not touch the disk's surface of the floppy disk, otherwise, failure or erratic operation might be caused.
- ◊ Perform the periodic inspection for the floppy disk drive and the hard disk drive. If the data are made by the fault disk, failure or erratic operation of the system might be caused.
- ◊ When disengaging the communication cable or the power cable, do not pull the cord, otherwise, failure, erratic operation or damage might be caused.

Revision

***Manual No. is shown on the cover.**

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August. 2000	FH254	First edition (Products Version 2.1.xxx)

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Points for Using This Manual

What Is D300win?

(1) D300win is program-creation system software for programmable controllers (hereinafter called PCs) which operates on Microsoft Windows and conforms to international standard IEC 61131-3.
Based on standard Microsoft Windows, D300win provides an easy operating environment for your developed program-creation system software.

(2) D300win supports 4 languages (IL, ST, LD, FBD) which follow the IEC 61131-3 standard, and one element (SFC), allowing you to select languages which best match the processing capacity of your PC system. In addition, two language editors (graphic editor and text editor) are provided for each of these languages.

(3) In D300win the PC programs, including the hardware configuration, are dealt with by the Project method. Projects are expressed in an easy-to-understand tree structure with items such as the program organization unit (POU), which is an element used to construct a PC system, libraries, user-defined data types, and system hardware configuration.

(4) D300win provides programming expressions which are clear and easy to understand, such as programming by variables and description comments which can be set freely in programs. D300win also provides excellent documentation functions, allowing the user to freely define the printing format.

How to Use This Manual

This document describes the functions of D300win, how to use them, and all operations with the MICREX-SX Series programmable controller, from programming to on-line testing. For those who want to understand IEC 61131-3, “User’s Manual D300win <Introduction>” is available which, as a guide to IEC 61131-3, explains what IEC 61131-3 languages are in comparison with languages used in conventional Fuji PCs. It also provides an outline of the functions and basic operating method of D300win.

Concerning the Descriptions in This Manual

This manual is written using the following conventions:

•	Used for list.
◊	Used for actual operation.
[ ]	Used to denote icons, menu item names or object names. For example, [File] menu or [OK] button in a dialog box.
<ALT>	<> is used to denote the name of a key on the keyboard which is used for input.
<ALT> + <F4>	“+” is used to mean that two keys are pressed simultaneously.
{ }	Used to denote dialog names.

Used for important information and key points.

Indicates another manual or a page of this manual for reference

Precautions for Upgrading

1. Handling Projects Created with Old Versions of D300win

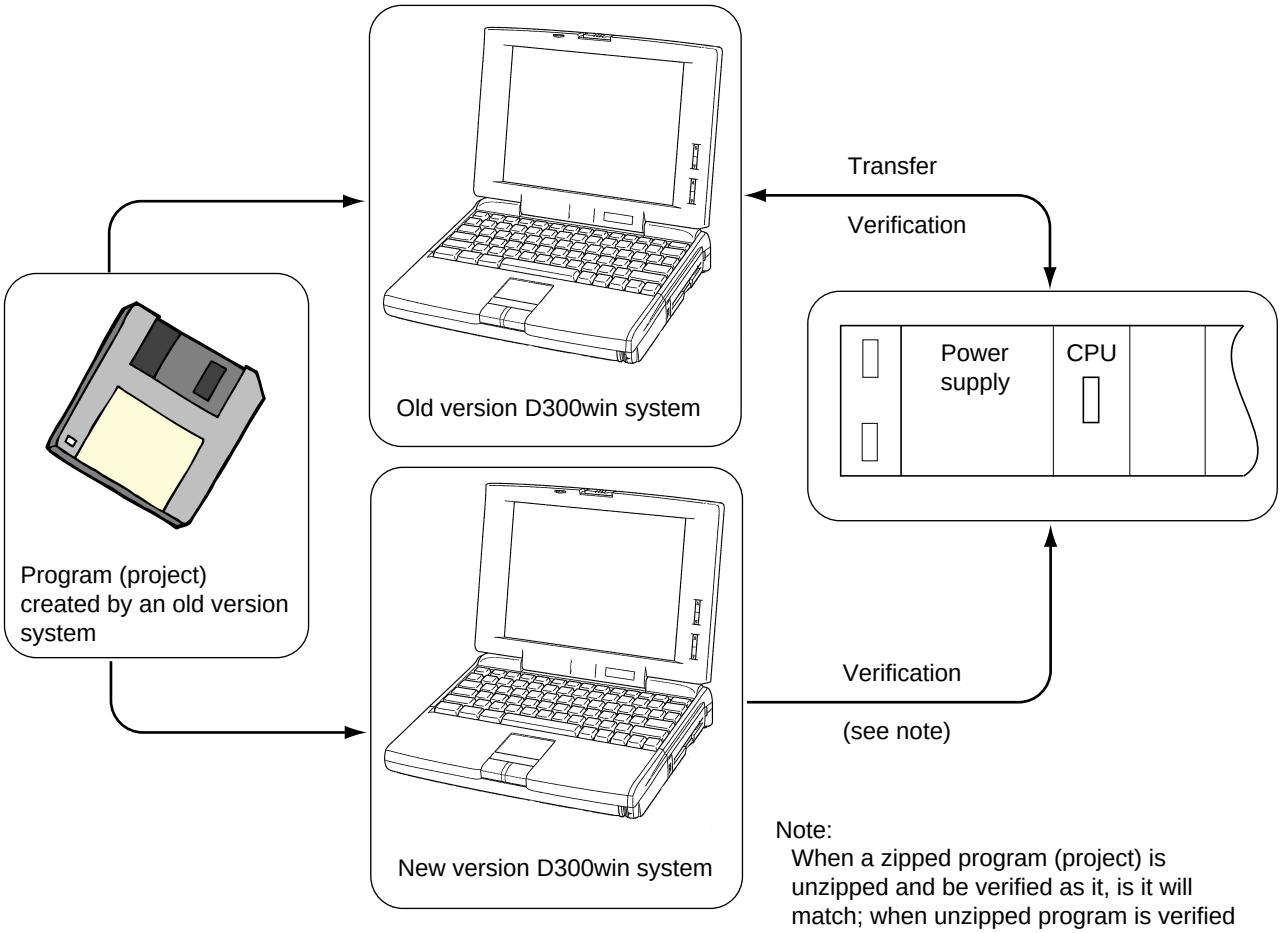
The following procedure applies to the D300win user upgrading an old version of D300win system (Version 1.x) to a new version (Version 2.x). Since the functions are greatly changed in the new version, carefully read this manual to correctly use the system.

New D300win users can skip this section and proceed to Section 1.

Before upgrading your D300win system, it is recommended to zip source programs (projects) with the old version system and store them as zipped project files. For how to zip projects, see "15-2-1 Zip of project files."

For the new version of D300win, part of the internal codes (machine codes) for programs transferred to PC are changed. Therefore, even with the same source programs (projects), there is a difference in the result of compilation (internal codes) between new and old versions.

As a result, if a program that is downloaded into a PC using an old version system is verified on-line with the corresponding program that was compiled by the new version system, a verification error will occur.



Note:
When a zipped program (project) is unzipped and be verified as it, is it will match; when unzipped program is verified after compilation, a mismatch will result.

2. To Prevent Verification Error of Projects

Use the new version system to unzipped projects which were zipped by an old version system and then verify them on-line, as they are (without compilation), with the projects downloaded into a PC which uses the old version system.

Precautions for Upgrading

3. Procedure for Upgrading from Old Version to New Version System

Use the following procedure to upgrade the D300win system:

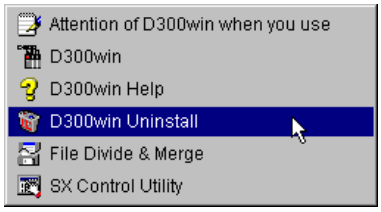
Step 1) Uninstall the D300win Version 1 system.
Step 2) Uninstall the standard expansion function block (FB) for the D300win Version 1 system.
Step 3) Install the D300win Version 2 system.
Step 4) Make backup copies of projects (files) created with the D300win Version 1 system.
Step 5) Install the standard expansion FB for the D300win Version 2 system.
Step 6) Convert the projects (files) created with the D300win Version 1 system to those for the Version 2 system.

(1) Uninstalling the D300win Version 1 system

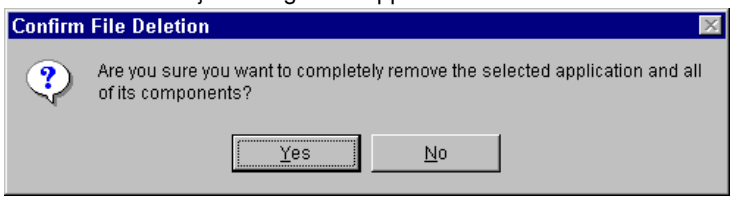
> Before installing the new version system, be sure to uninstall the old version system. The new version system may not successfully install with the old system retained.

Delete files related to the D300win Version 1 system from the hard disk using the following procedure:

1) Left-click the Windows 98/95 [Start] menu, select the [D300win] program folder from the [Programs] submenu, and then left-click the [D300win Uninstall] command.

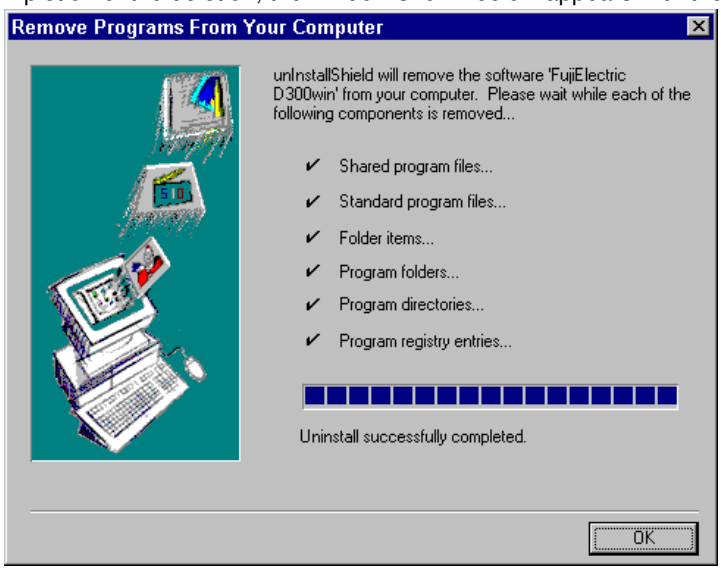


The {Confirm File Deletion} message box appears.



To execute deletion, left-click the [Yes] button.

2) Deletion is executed.
Upon completion of the deletion, the window shown below appears with the removed items checked.

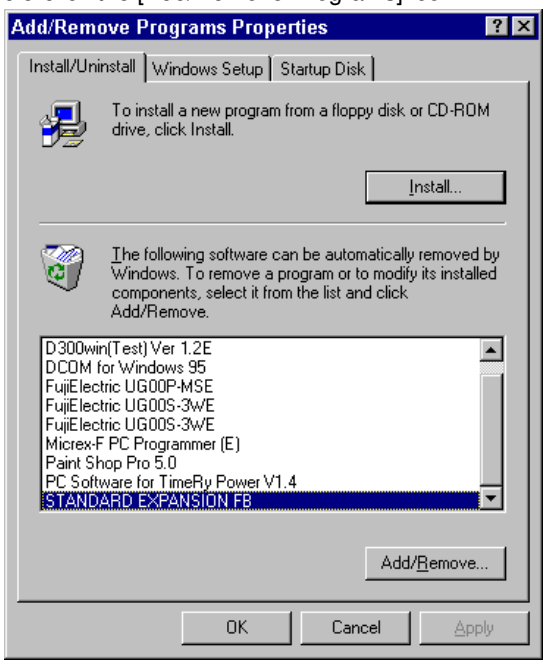


3) Left-click the [OK] button to close the {Remove Programs From Your Computer} dialog.

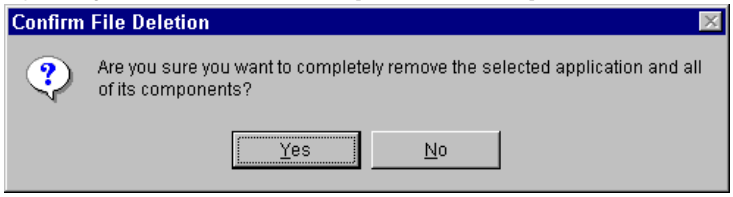
(2) Uninstalling the old version of expansion FB

Delete the old version of expansion FB files from the hard disk using the following procedure:

1) Left-click the Windows 95/98 [Start] menu, and select [Control panel] from the [Settings] submenu to display the {Control Panel} dialog.
   Left-double-click the [Add/Remove Programs] icon.

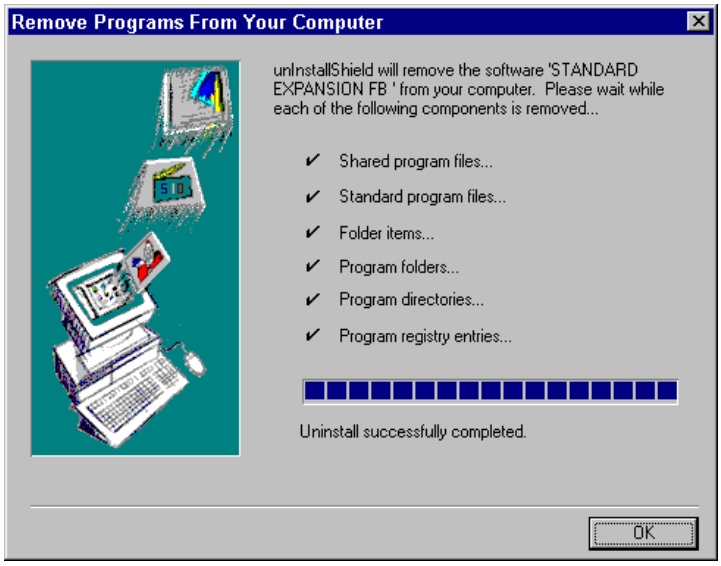


   Select [STANDARD EXPANSION FB] from the list in the {Install/Uninstall} panel of the {Add/Remove Programs Properties} dialog, and then left-click the [Add/Remove ...] button.



   To execute deletion, left-click the [Yes] button.

2) Deletion is executed.
   Upon completion of the deletion, the window shown below appears with the removed items checked.



3) Left-click the [OK] button to close the {Remove Programs From Your Computer} dialog.

Precautions for Upgrading

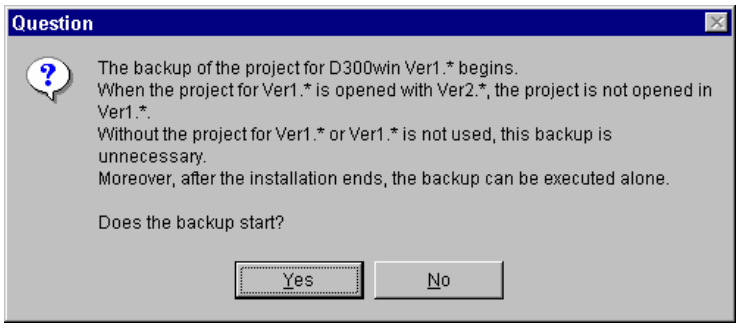
(3) Installing the D300win Version 2 system

Install the D300win Version 2 system. For how to install the new system, see “1-3 Installation Procedure.”

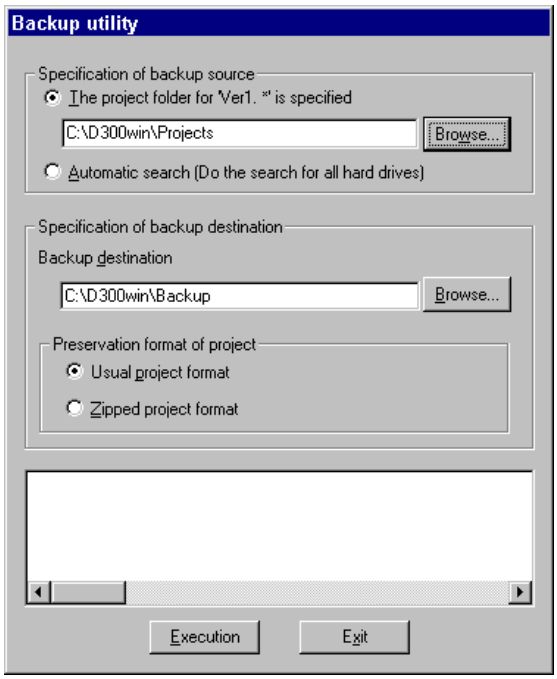
(4) Making backup copies of old projects (files)

Backup the projects (files) created with the old version system.

1) While installation of the D300win Version 2 system is in progress, the {Question} dialog shown below is displayed.

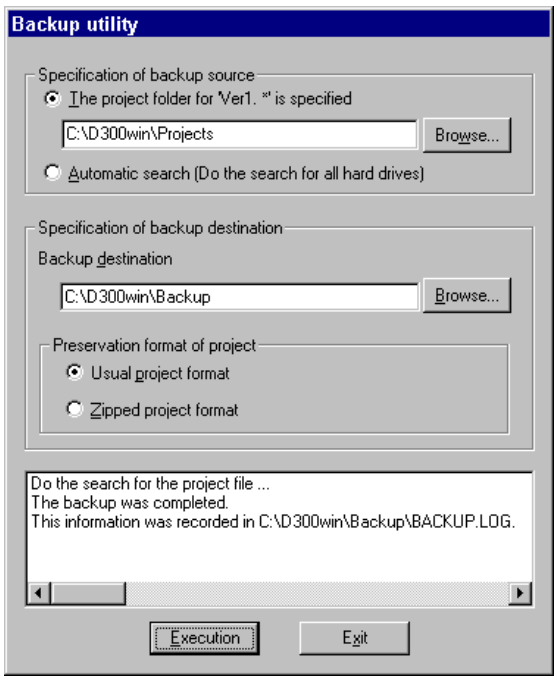


Left-click the [Yes] button, and the {Backup utility} dialog appears to set items necessary for backup of the project files created with the old version system. After the new D300win system is installed, the {Backup utility} dialog can also be displayed by selecting the Windows 95/98 [Start] menu, [Programs] submenu, [D300win] folder, and then [Backup utility], or alternatively left-clicking the [Backup utility] command in the [Extras] menu.



2) Set the backup information.
Specify the project folder for the old version system under the [Specification of backup source] item.
If you select [Automatic search], old project files in all hard disks are automatically searched.
Specify the backup destination folder under the [Specification of backup destination] item.
Specify a file format for saving the backup files under the [Preservation format of project] item. If you select [Zipped project format], the project files are zipped and saved. In this case, the backup disk space is reduced, but the unzip operation is necessary to open the files.

3) Left-click the [Execution] button, and the following dialog will appear starting backup.



Upon completion of backup, left-click the [Exit] button.
Finally, the {Setup Complete} dialog appears. For the subsequent steps, see the description of the D300win installation.

(5) Installing standard expansion FB for D300win Version 2 system

Install the standard expansion function block (FB).

Precautions for Upgrading

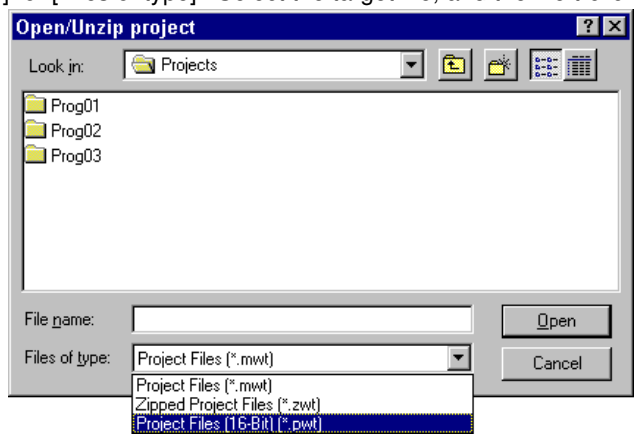
4. Converting Projects Created with Old Version System

Convert the projects (files) created with the D300win Version 1 system to those for the D300win Version 2 system.
There are two types of files created with the old version system as shown below.

- Normal project file (with an extension .pwt)
- Zipped file (with an extension .zwt)

(1) Converting normal project files (*.pwt)

Left-click the [Open/Unzip project] command in the [File] menu to open the dialog shown below. Specify [Project Files (16-bit) (*.pwt)] for [Files of type]. Select the target file, and then left-click the [Open] button.



When the dialog shown below appears, confirm that the selected project file is already backed up, and left-click the [Yes] button. The selected project file of the old version is converted to the new version file of the D300win system.

<If a user library has been registered in the project>

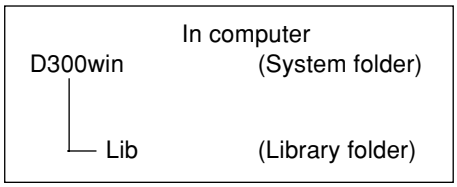
If a user-created project has been registered in the converted project's library, be sure to convert the user-created project to a new version system file.

<If an expansion FB library has been registered in the project>

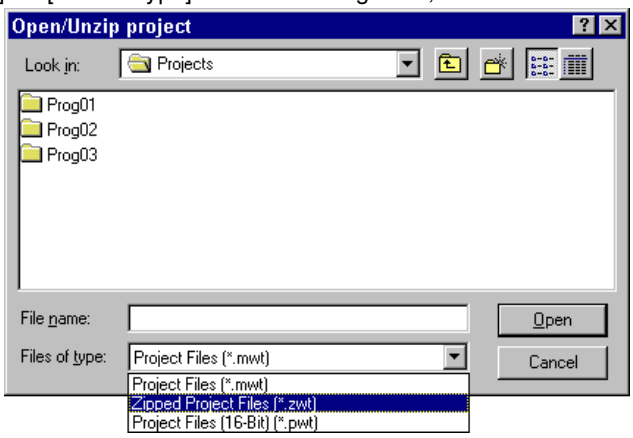
If an "expansion FB" supplied by Fuji Electric has been registered in the converted project's library, delete the expansion FB for D300win Ver. 1.x from the project tree, and then register the expansion FB for D300win Ver. 2.1x in the project tree.

(2) Converting zipped project files (*.zwt)

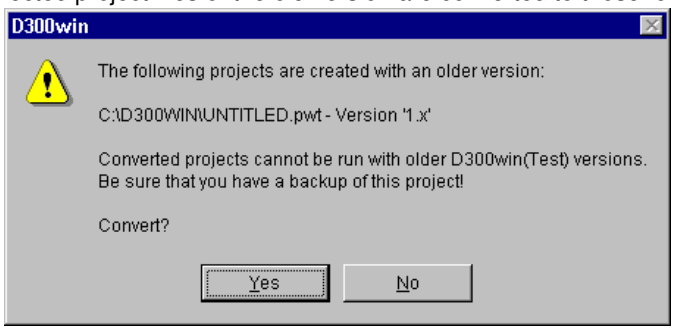
Note: When another project exists as a library in a zipped project file created with the old version system, files may not be correctly converted from the old version to the new version system if a file with the same name as the library exists in the [Lib] folder under the [D300win] folder.
In this case, be sure to backup all project files created with the old version system, delete all files from the [Lib] folder, and then carry out the unzip operation.



Left-click the [Open/Unzip project] command in the [File] menu to open the dialog shown below. Specify [Zipped Project Files (*.zwt)] for [Files of type]. Select the target file, and then left-click the [Open] button.



Upon completion of unzipping, the following dialog will appear on the screen. Confirm that the selected project files are already backed up, and then left-click the [Yes] button.
The selected project files of the old version are converted to those for the new version system.



Note 1: After project conversion, be sure to recompile.
Note 2: If a project for each zipped file is included as a library, the project is also unzipped into the [LIBRARIES] folder. To recompile, close the unzipped project, compile the libraries, reopen the unzipped project, and then recompile.

Precautions for Upgrading

5. Notes on upgrading from D300win Version 1 to Version 2

(1) The conventional ‘Project Information’ function has been deleted. If a project created with the old version D300win system contains ‘project information,’ copy the project into a POU ‘description worksheet’ before converting project files to the D300win Version 2 system. (The ‘project information’ content will be lost after file conversion.)

(2) Part of the ‘Environment text’ in ‘Page layout’ cannot be used. Thus, the user must directly set characters or numbers. The following 6 items of the ‘Environment Text’ cannot be used:

LAST CHANGE PAGE/TOTAL, PROJ AUTHOR, PROJ LAST CHANGE, PROJ TITLE, and TOTAL PAGE

The “Cross-referenced Program Print” function has also been deleted. Thus, a ‘cross-reference area’ set in the page layout created with the old version cannot be used.

(3) The respective names related to the SFC elements (action name, step name, and transition name) have a length of up to 24 alphanumeric characters. A name consisting of more than 24 characters (up to 30 characters) in a project created with the old version system can be used as is. However, only use up to 24 alphanumeric characters when changing the name.

(4) A task name is specified with up to 7 alphanumeric characters. A task name of 8 characters in a project created with the old version system can be used as is. However, only use up to 7 alphanumeric characters when changing the name

(5) A file storing the content of a watch list created with the old system cannot be read into the watch window after system upgrading. Be sure to register the file again in the new version system. Up to 4 watch windows can be registered and saved in the new system.

(6) If the separately available extended FB is used, it is necessary to relink and recompile products compatible with the D300win Version 2 system.

(7) It is necessary for the SC matrix or POD loader (UG00S-3W) user to upgrade to the system compatible with the D300win Version 2 system.

Section 1 Preparation and Starting the D300win System

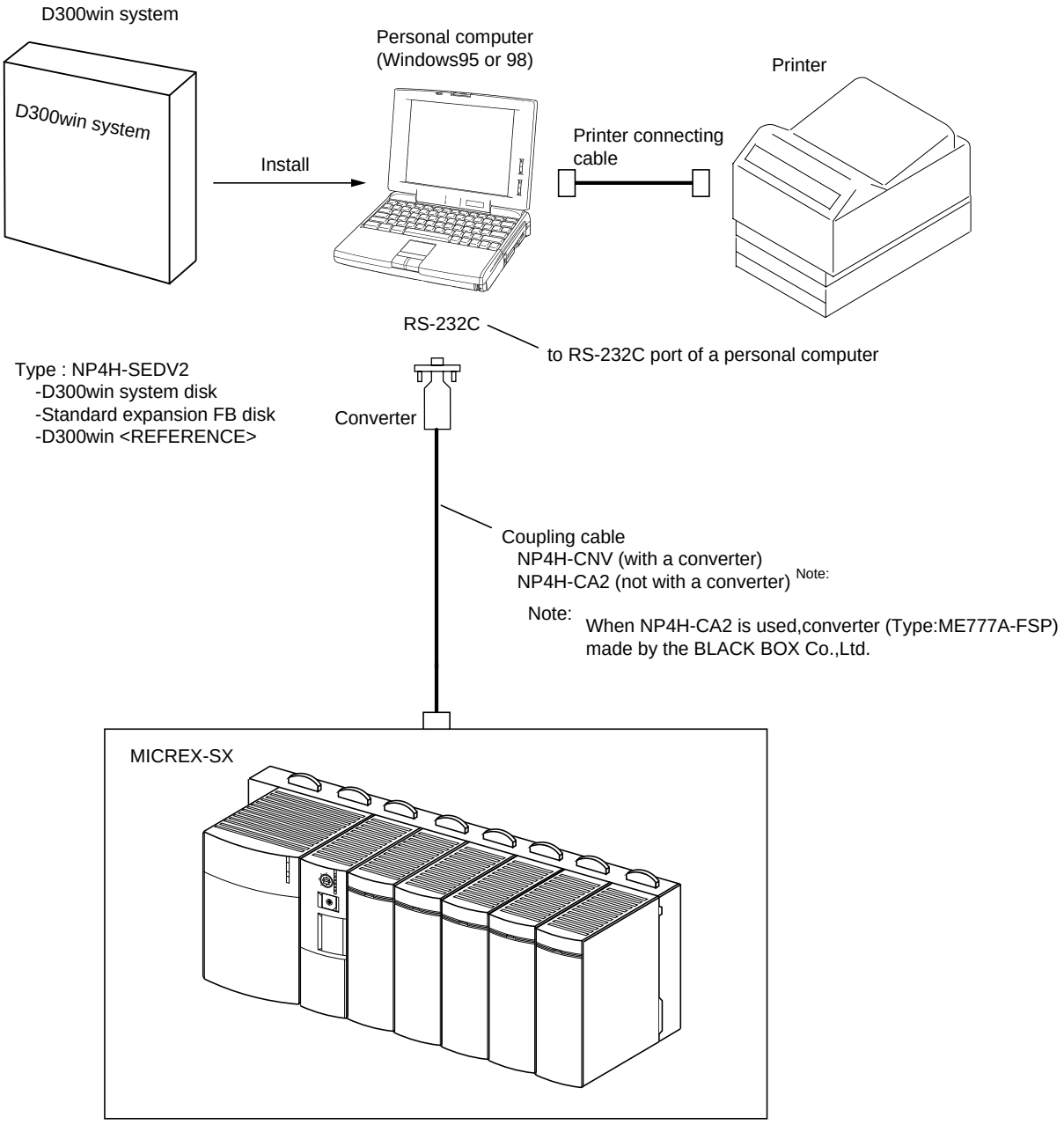
page

Section 1 Preparation and Starting the D300win System

1-1 D300win System Configuration

1-1-1 D300win system configuration

When D300win (system software) is installed in a personal computer, the computer system can be used as a programming tool for Fuji PCs.



1-2 System Requirements

1-2-1 Hardware

For D300win to operate normally, the following hardware requirements must be satisfied:

- IBM-compatible, DOS/V or PC98 series personal computer having Intel 486/33MHz or higher processor (Pentium/133MHz or higher is recommended)
- Windows SVGA resolution of 800x600 or higher (SVGA resolution of 1024x768 are recommended.)
- 32 MB or more RAM
- 220 MB or more hard disk free space. However, the capacity of hard disk changes with the program to be installed. (D300win system : 100MB or more, Standard expansion FB package : 120MB or more)
- 3.5-inch floppy disk drive (which can read 1.44 MB formatted floppy disks)
- Mouse

1-2-2 Software

For D300win to operate normally, the following software requirements must be satisfied:

- Microsoft Windows95/98
- Microsoft WindowsNT V.4.0
  (Operation on Windows 3.1 or WindowsNT V.3.5 is not guaranteed.)

1-3-1 About D300win software package

D300win software package is supplied in the form of multiple floppy disks. The installation disk includes the installation program which automatically executes operations necessary for installation as well as the registration of icons.

Note: A project (file) created or zipped with the D300win system Japanese version cannot be used in an English version of the system.

When installation is made via a PC network, depending on network or operating environment, copy or installations may not be executed normally.

1-3-2 Installation

(1) Disable any virus detection software and screen saver.

(2) Select [Control panel] from the [Settings] submenu under the Windows95/98 [Start] menu.

(3) Left-double-click the [Add/Remove Programs] icon in the {Control panel} dialog box.

(4) Left-click the [Install...] button.

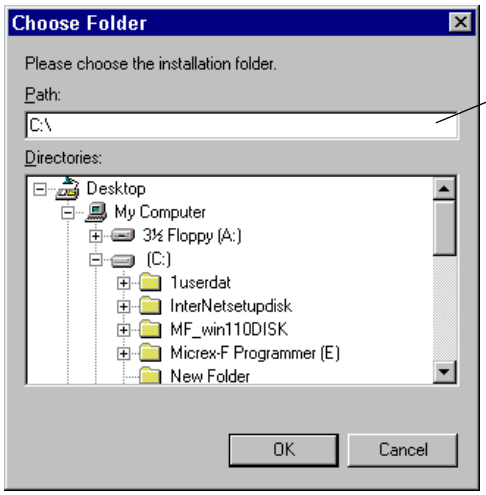
(5) Insert the No. 1 system disk, which contains the installation program, into the floppy disk drive.

(6) Left-click the [Next >] button.

(7) Make sure that “A:\SETUP.EXE” is displayed in the {Command line for installation program : } text box. If not, left-click the [Browse...] button, select the drive No. for the floppy disk drive, and select file name [Setup.exe]. Left-click the [Finish] button.

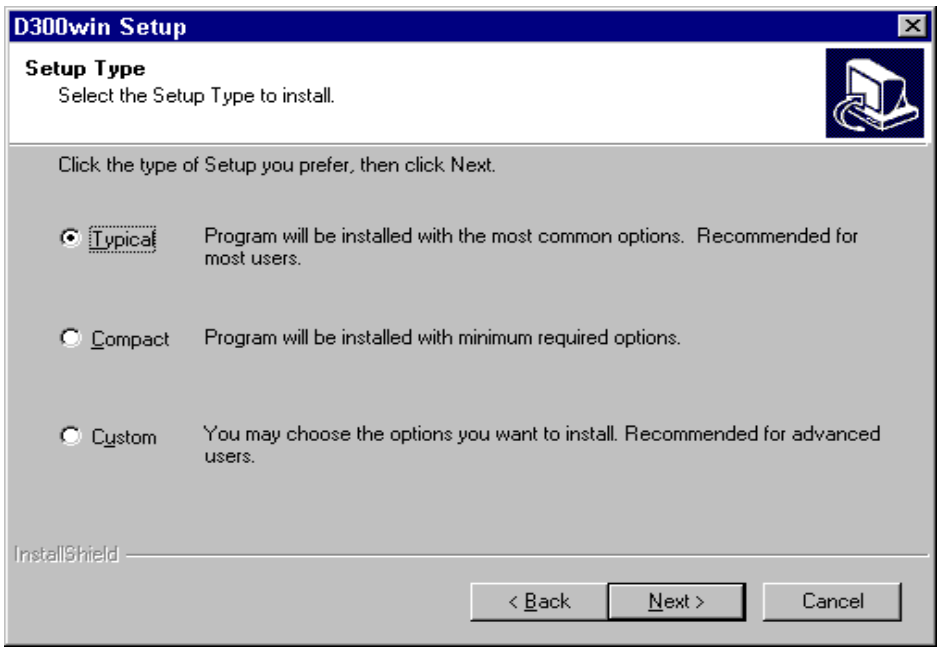
(8) {Install Shield Wizard Preparing} working box appears on the screen. A dialog box appears in which installation related information and how to operate this program are displayed.
Left-click the [Next >] button.
The {Choose Destination Location} dialog box appears.

(9) When you want to change the default directory for installation (C:\D300win), left-click the [Browse...] button, designate the desired directory for installation in the {Choose Directory} dialog box, and left-click the [Yes] button.



Note: Designate the directory name with up to 8 alphanumeric characters.

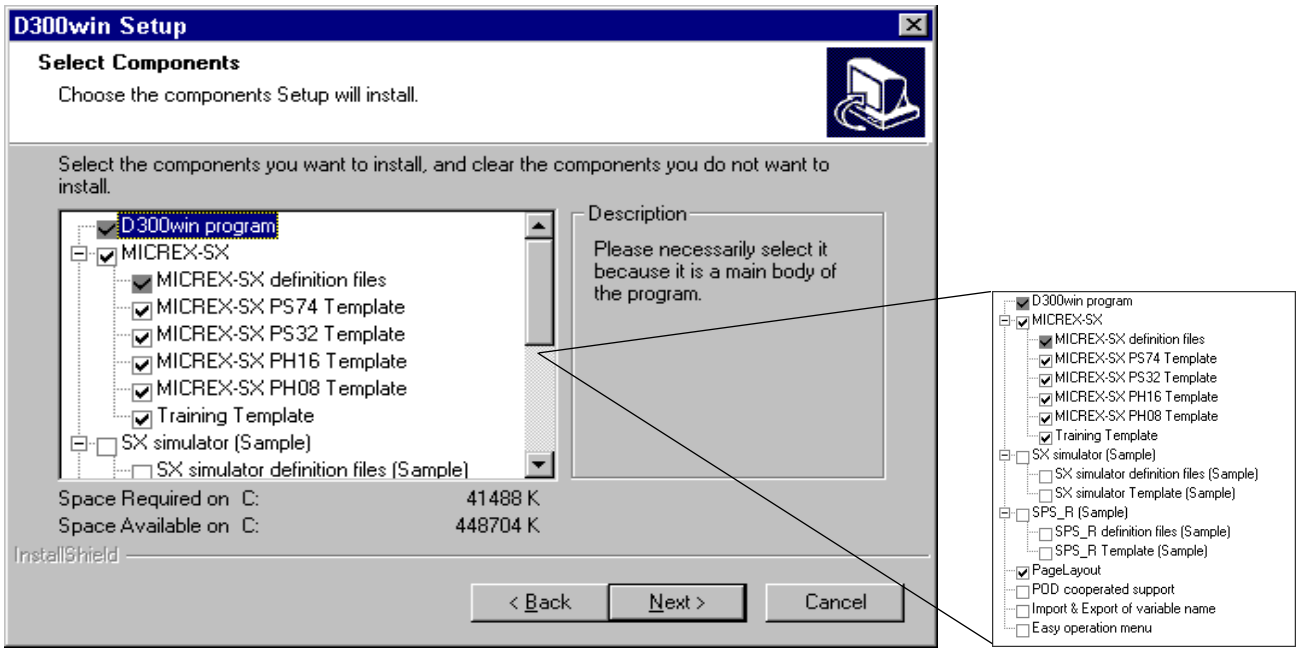
(10) Then left-click the [Next >] button, and the {Select setup type} dialog box will appear on the screen.



Select [Standard], [Compact] or [Custom] for setup method, and left-click the [Next >] button.
Left-click the [Next >] button.

<When [Custom] is selected>

When [Custom] is selected, the {Select component}] dialog box appears on the screen.
Check the box for the items you want to install.



Left-click the [Next >] button.

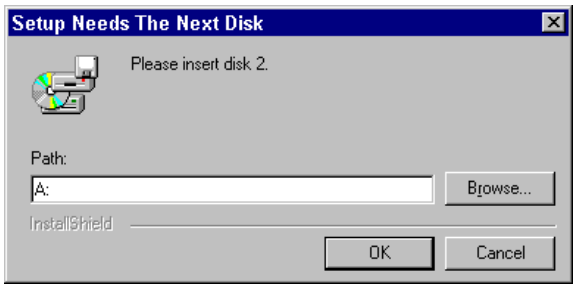
<Description of selectable items>

- D300win program
  Basic D300win program. Must be selected and installed.
- MICREX-SX
  Selected to create programs for the MICREX-SX series.
- SX simulator (sample)
  Selected to simulate programs for the MICREX-SX Series on the personal computer (D300win).
  This function is now under development and provided only as a sample.
- Page layout
  Selected to use the sample page layout (5 types) which is necessary to print out a project or worksheet. (For details of the sample page layout, refer to “14-1-5 Page layouts prepared for D300win.” File name “DEFAULT.plt” for the introduced page layout is always installed.)
- POD link support
  When a Fuji UG210/UG400 Series POD (programmable operating display) is connected to the MICREX-SX Series, this function is used to relate assigned variables between them.
- Import & Export of variable name
  This function is used to input a CSV file (text file) as a variable name or to output a variable name as a CSV file.
- Easy operation menu
  The basic D300win operation can be selected from this menu (selecting what to do) to execute the operation steps ranging from project creation to debugging.

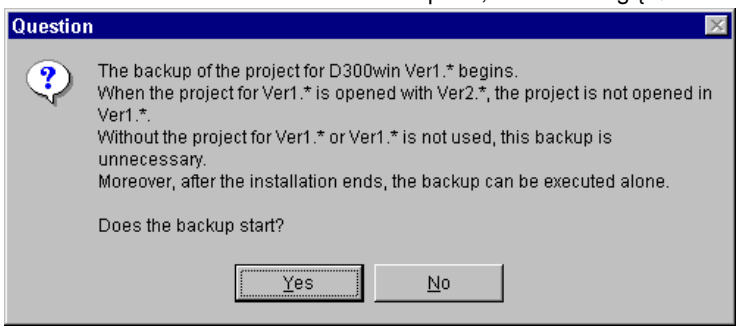
(11) The {Select program folder} dialog box appears on the screen. When you do not want to use the default folder (D300win), input your desired program folder name in the text box.
Left-click the [Next >] button.

(12) The {Start file copying} dialog box appears on the screen. After checking the contents, left-click the [Next >] button, and file copying will be started.

(13) When the installation of the first system disk ends, the {Setup Needs The Next Disk} dialog box as shown below appears on the screen.
Insert the second disk, and left-click the [OK] button. Install the third and following disks in the same manner.



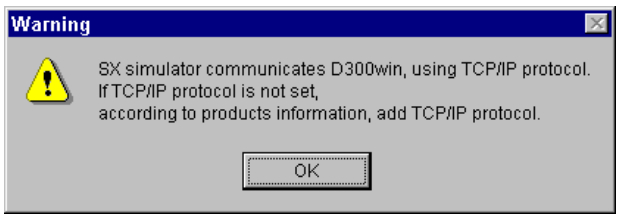
(14) When the installation of all disks is complete, the following {Question} dialog appears on the screen.



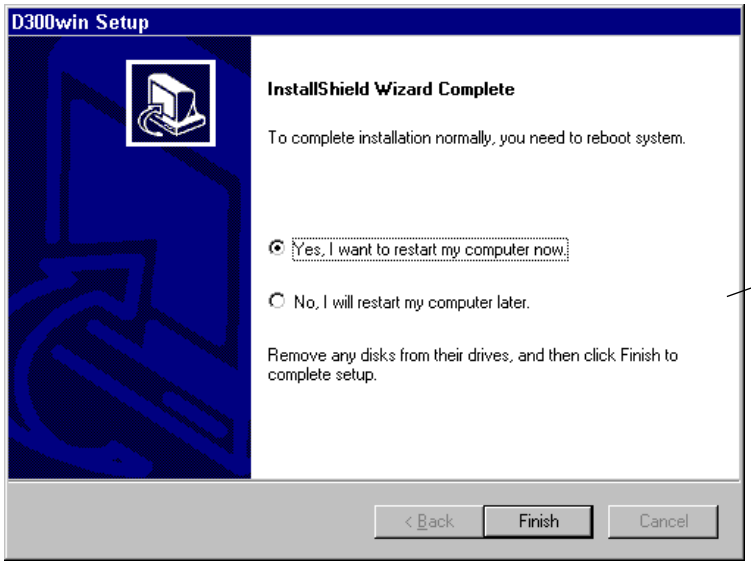
Left-click the [No] button in this dialog.
If you left-click the [Yes] button, the {Backup utility} dialog will appear on the screen enabling backup of project files created with the D300win Version 1 system.

For the method or details of the {Backup utility} dialog, see “Precautions for Upgrading.”

(15) When the menu item [SX simulator] under [Custom] installation is selected, the following message appears after the installation of all system disks is completed.



(16) When setup completes, the following screen appears.

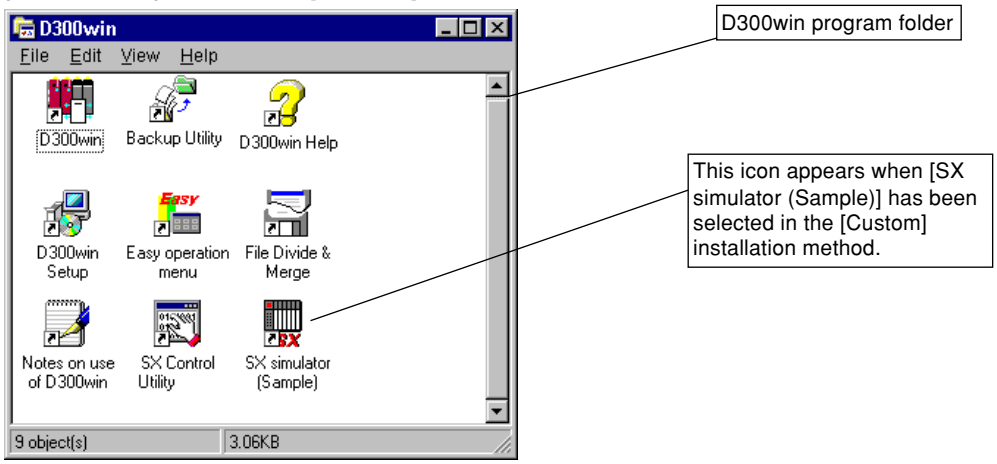


When the menu item [Sample project] under [Custom] installation is selected, the message “Immediately start D300win using sample project” is displayed here.

(17) After restarting the computer and confirming that there is no problem, check the optional [Yes, I want to restart my computer now.] button, and then left-click the [Finish] button. Your computer is automatically restarted and the D300win setup is complete.

1-3-3 D300win program group

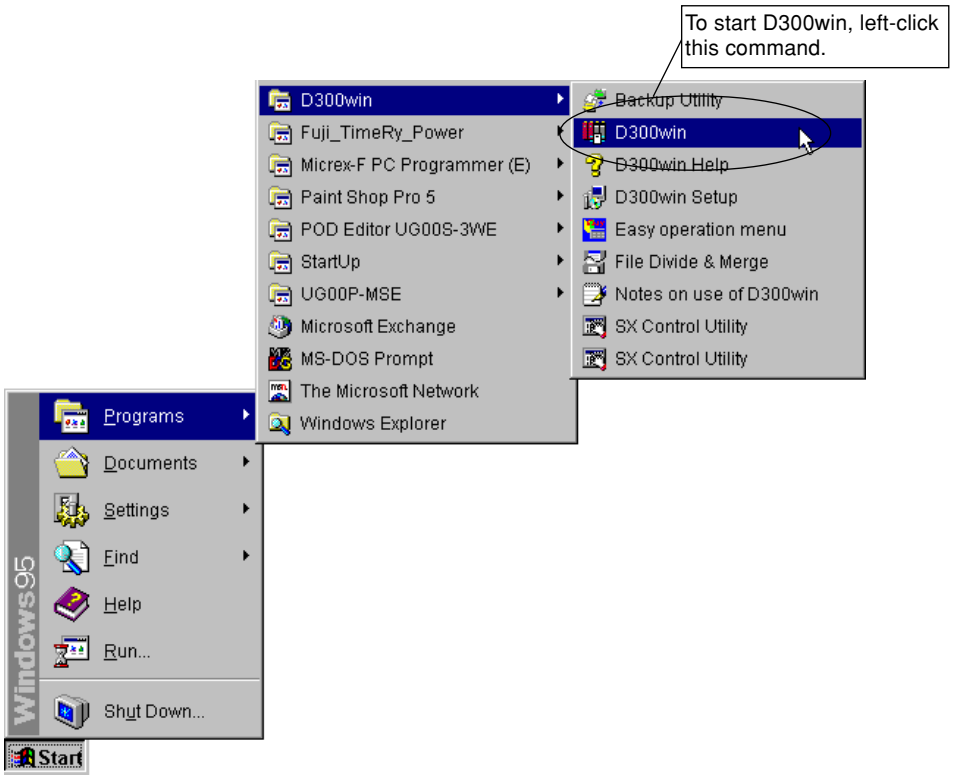
When setup is completed, the [D300win] folder is created in the [Program] folder under Windows95/98 [Start] menu. The following icons are registered in the [D300win] folder.



* The items (icons) registered in the [D300win] program folder vary according to installation method (Standard/Compact/Custom).

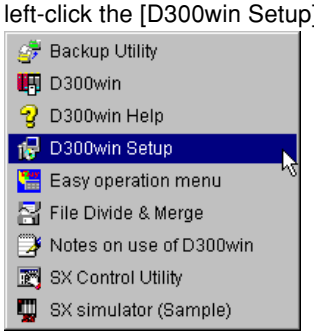
<[Start] menu after installation>

The content of program groups is registered in the [Start] menu.

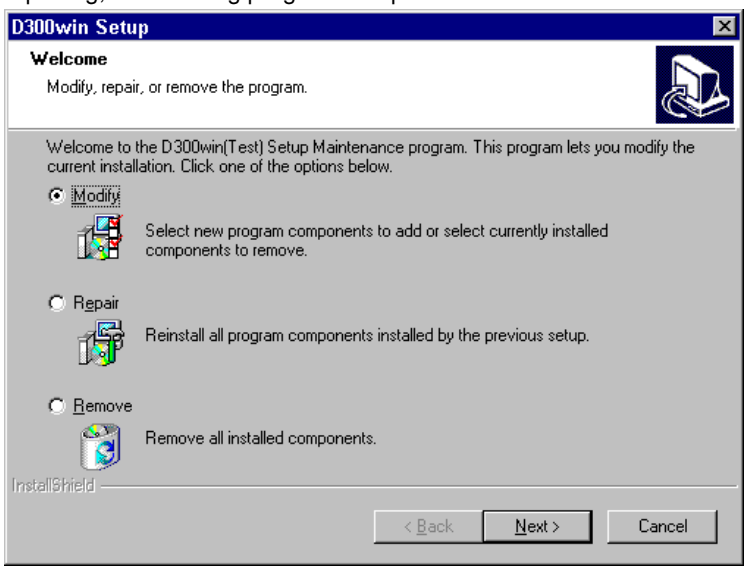


It is possible to add or delete an optional program to or from the installed D300win system or to reinstall the set programs.

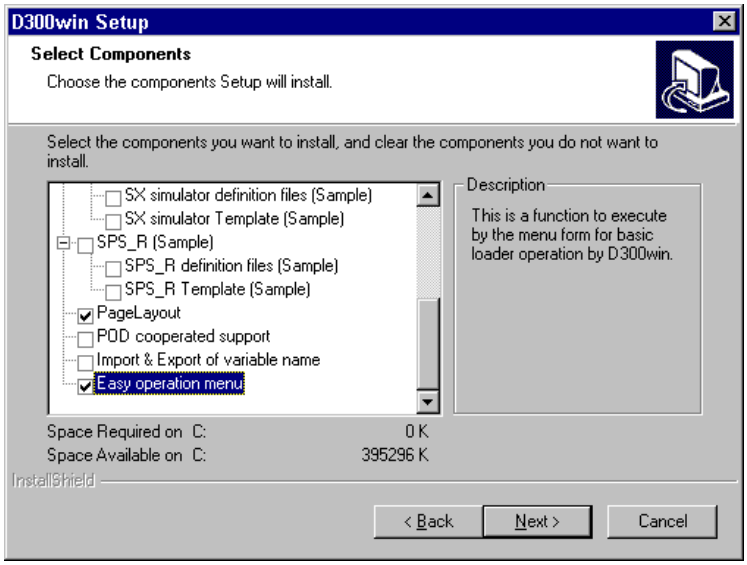
(1) Left-click the Windows [Start] menu button, select the [D300win] program group from the [Programs] menu, and then left-click the [D300win Setup] program icon.



(2) The {Preparing InstallShield Wizard} working box appears on the screen. Then, the dialog is displayed for modifying, repairing, or removing program components.



(3) Check the optional [Modify] button, and then left-click the [Next>] button. The {Select Components} dialog will appear on the screen.



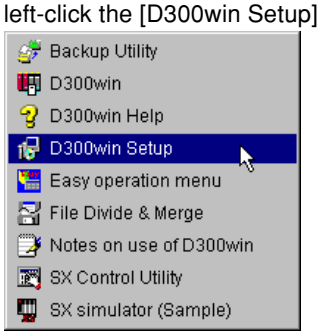
(4) Check the box for an item to be added or uncheck the box for an item to be deleted in the component list, and then left-click the [Next>] button.

(5) If a program component has been added, the {Disk Change} dialog will appear on the screen. Insert the requested disk, and left-click the [Next >] button.

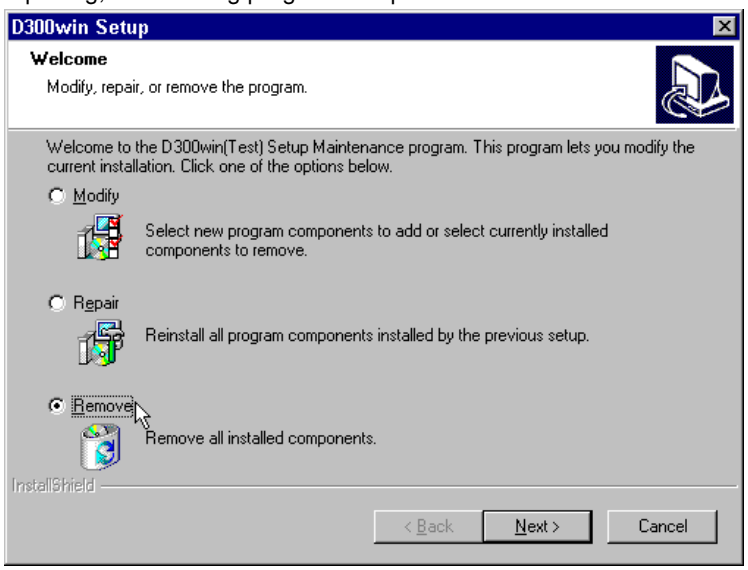
(6) Upon completion of program component installation, the {Maintenance Complete} dialog will appear on the screen as shown below. Left-click the [Finish] button to close the dialog.

This operation deletes D300win system files from the hard disk and is executed according to the following procedure:

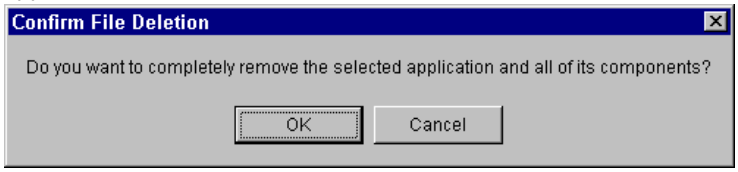
(1) Left-click the Windows [Start] menu button, select the [D300win] program group from the [Programs] menu, and then left-click the [D300win Setup] program icon.



(2) The {Preparing InstallShield Wizard} working box appears on the screen. Then, the dialog is displayed for modifying, repairing, or removing program components.

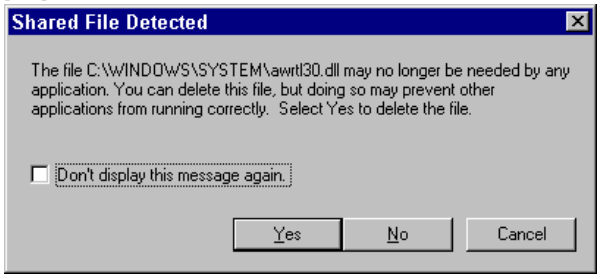


(3) Check the optional [Remove] button, and then left-click the [Next>] button. The {Confirm File Deletion} message box will appear on the screen.

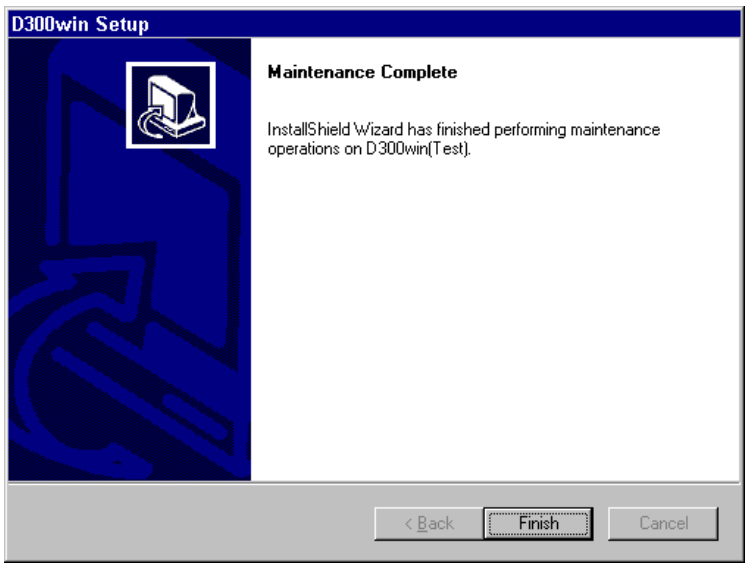


To execute deletion, left-click the [OK] button.

(4) Deletion is executed.
The {Shared File Detected} dialog shown below may appear during uninstallation. In this case, if the [Yes] button is selected, specific software may be disabled or, in worst case, Windows may be unable to run. Normally, left-click the [No] button.



Uninstalling is completed.



(5) Left-click the [OK] button, and the {Remove Program From Your Computer} dialog box will be closed.

Key-point:

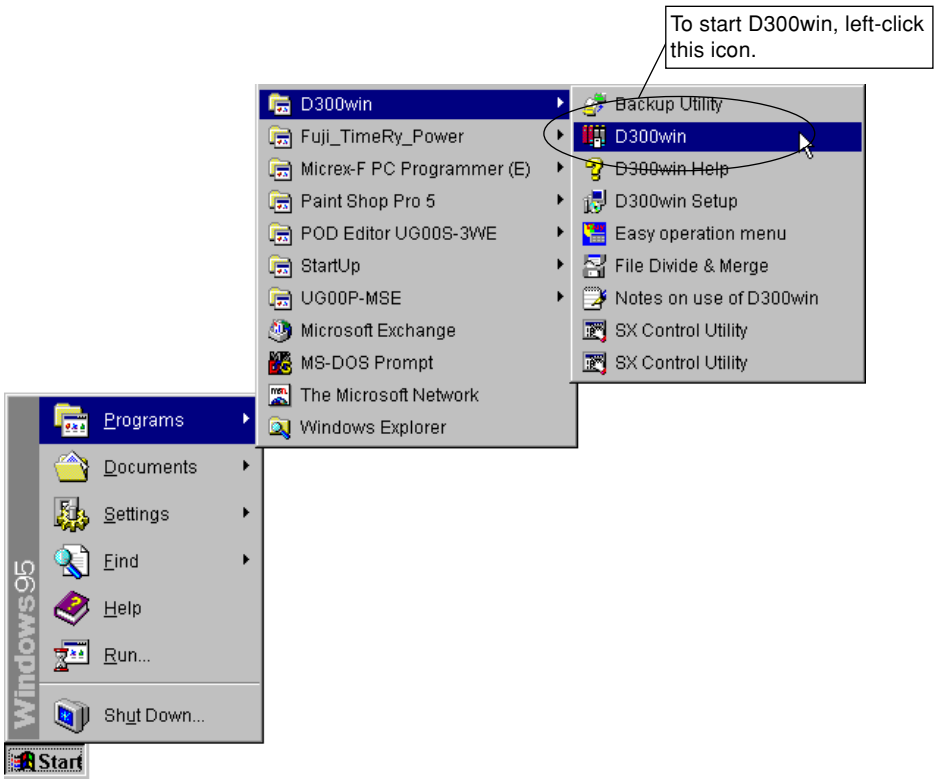
The files created/stored by user cannot be deleted by the “uninstall program” operation.

1-6-1 How to start D300win

There are two methods, as explained below, for starting D300win. Do not start D300win by other method.

(1) Starting from the [Start] menu

When the installation of D300win system programs completes, a new program group which contains the following icons is created. At the same time, the program group contents are registered in the [Start] menu.



◊ Left-click the [Start] button, select the [D300win] program group from the [Programs] menu, and left-click the [D300win] program icon.
The D300win system will be activated, displaying the image shown in 1-5-2 on the screen.

<Description of the icons for the program group>

The [D300win] icon is used to start the D300win system.

The [SX Control Utility] icon is used to activate the SX control utility of MICREX-SX series. With this utility, you can monitor the input/output data to/from the basic input/output modules on the MICREX-SX system, or check the output.

The [File Divide & Merge] icon is used to activate the file divide/merge function. This function can divide a compressed project file (larger than the capacity of a single floppy disk) into multiple files for storage, or merge divided files into to a single file.

The [Easy operation menu] icon is used to display a menu containing basic D300win operation items. An operation ranging from project development to debugging can be selected and executed from the menu.

The [SX simulator] icon is used to activate the MICREX-SX simulator. The simulator can perform off-line simulation (on the personal computer) of MICREX-SX Series programs created on D300win. (This function is installed when [Custom] installation is selected.)

The [D300win help] icon is used to display the help (off-line mode help) screen for D300win. The contents of help topics are displayed.

The text, which is opened by left-double-clicking the [D300win Help] icon, describes the precautions for using D300win system. Please read this text before using D300win.

The [D300win uninstall] icon is used to activate the D300win uninstall program. The uninstall program deletes D300win system-related files from the hard disk of the personal computer.

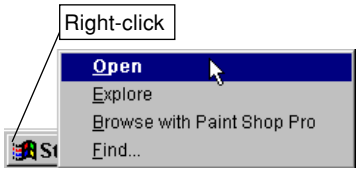
(2) Starting with the shortcut icon

It is possible to create a shortcut for [D300win] program icon and start D300win with the shortcut icon.

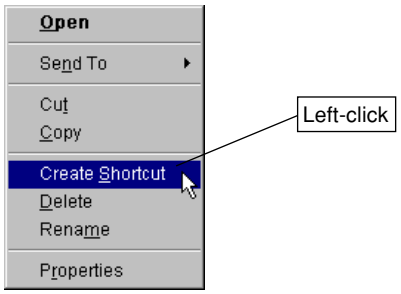
Do not create the shortcut icon by any method other than that explained below.

How to create the shortcut icon is explained below.

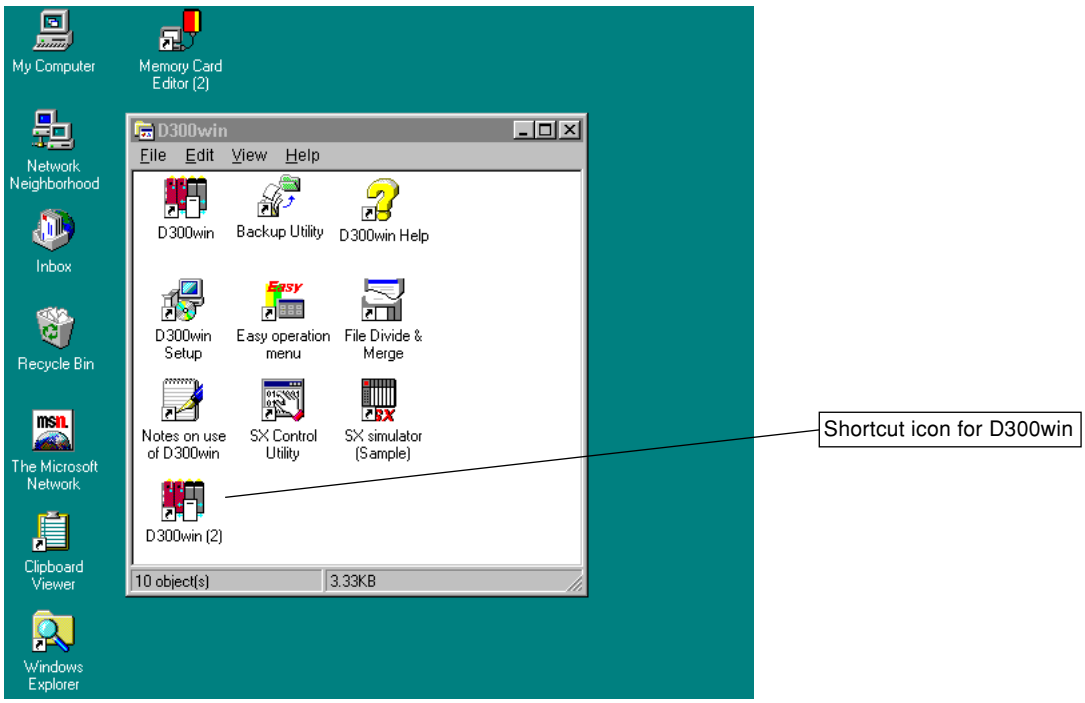
◊ Right-click Windows95 [Start] button.



◊ Left-click the [Open] command, and the [Start menu] folder will be displayed.
◊ Left-double-click the [Program] folder icon in the [Start menu] folder.
◊ Left-double-click the [D300win] folder icon in the [Program] folder.
◊ Left-click the [D300win start] icon, and left-click the [File] menu.
◊ Left-click the [Create shortcut] command in the file menu.



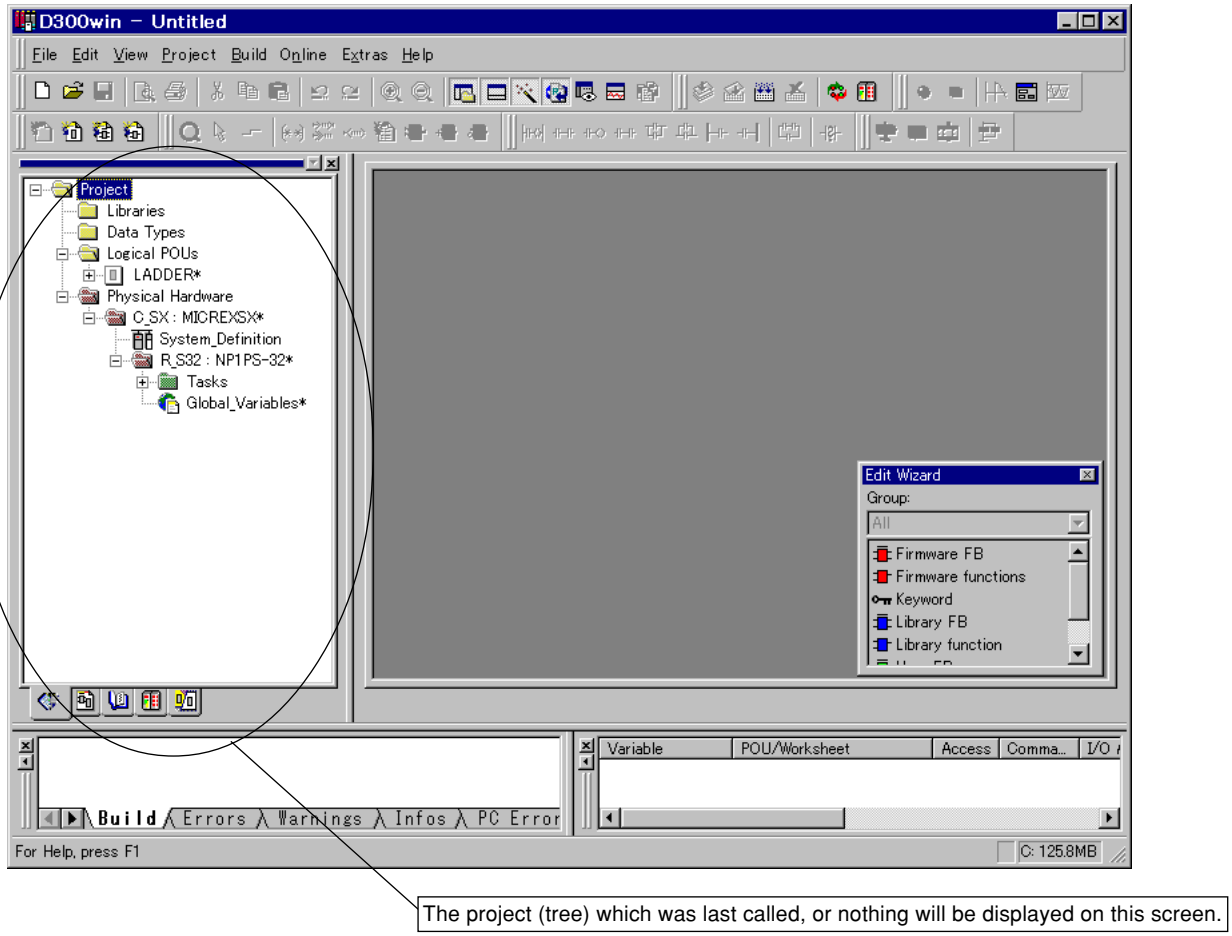
The shortcut icon [D300win (2)] is created in the [D300win] program folder.



◊ Drag the [D300win (2)] shortcut icon onto the Windows desktop.
D300win can then be activated by left-double-clicking the shortcut icon on the desktop.

1-6-2 D300win starting screen

The following screen appears when D300win is activated.



Section 2 D300win Common Items

page

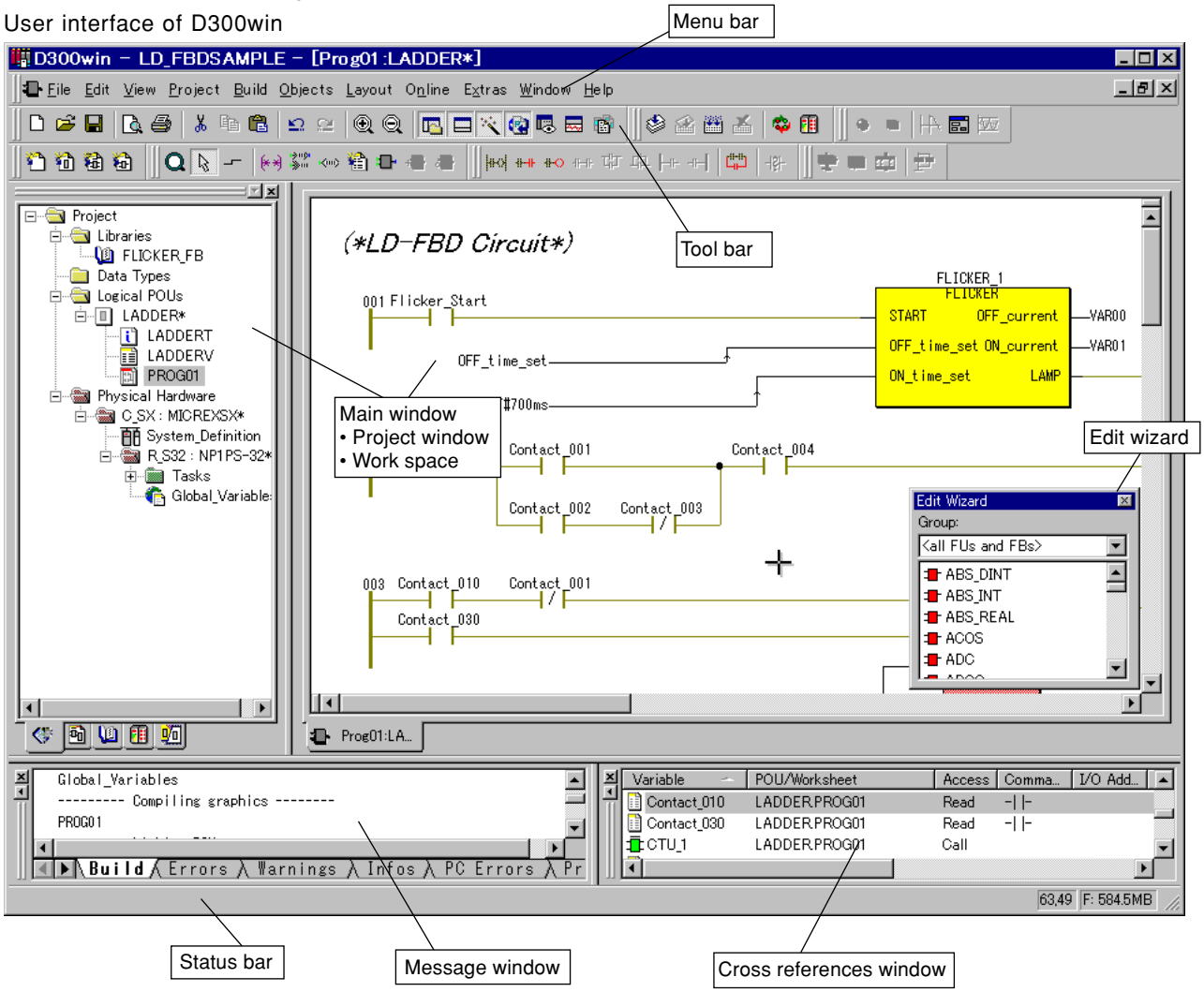
Section 2 D300win Common Items

2-1 Screen Structure and Functions of D300win

2-1-1 User interface

When D300win is activated, the following screen appears. The user interface of D300win consists of 7 parts: menu bar, tool bar, main window, status bar, message window, cross references window, and edit wizard.

User interface of D300win

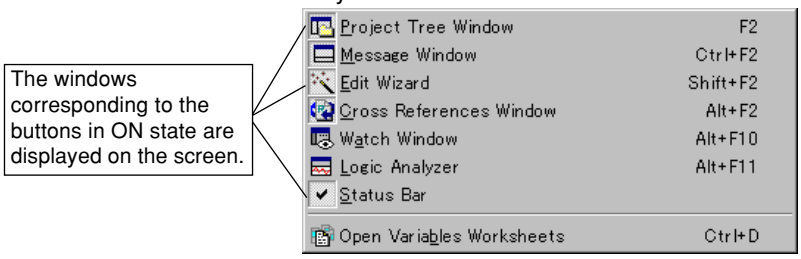


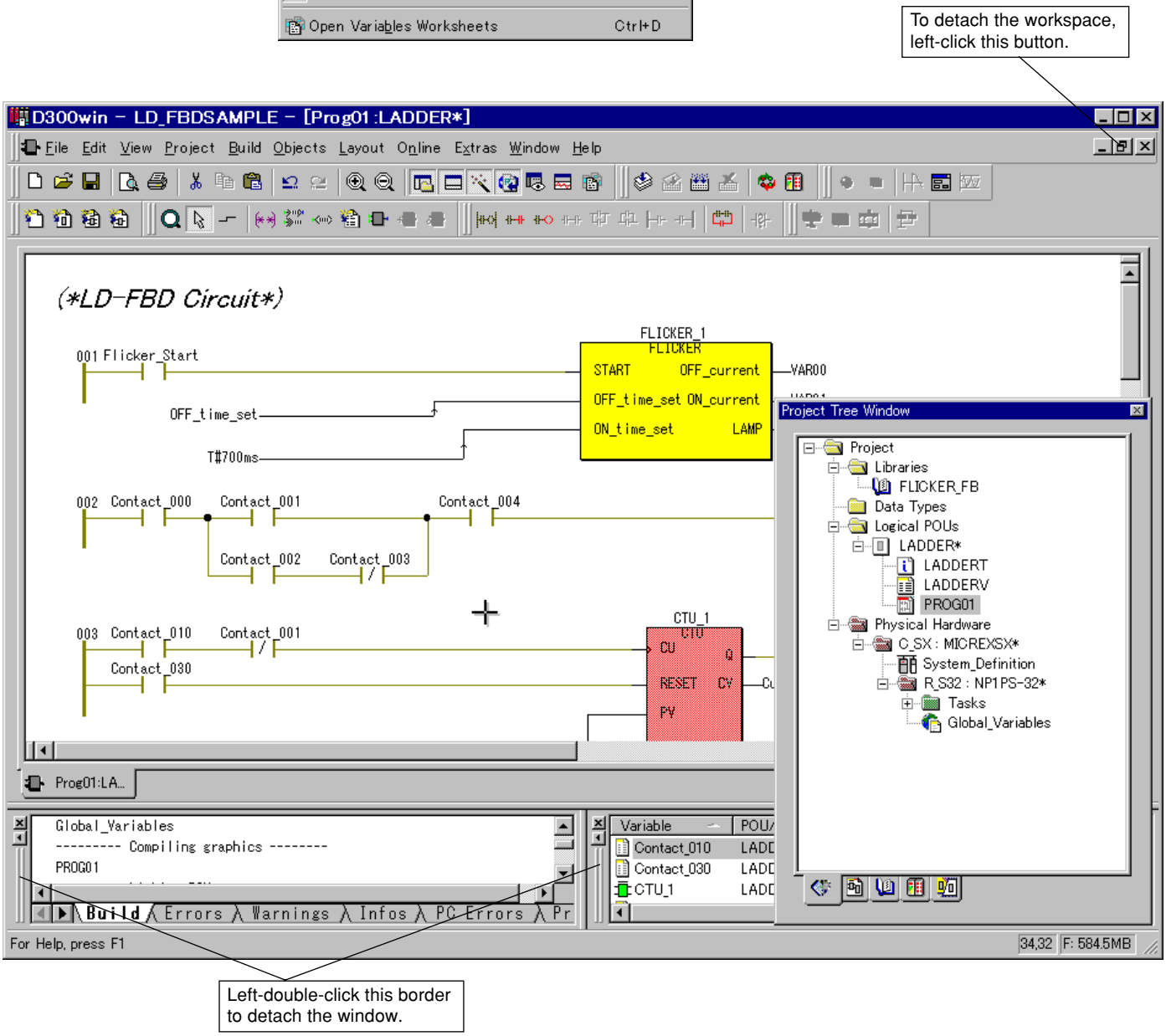
2-1-2 Window layout

The windows displayed in D300win (including the project tree window, message window, and cross references window) are the docking windows, each of which can be detached/attached. The window can be detached to optionally change its size or display position.

<Sample changed layout>

Layout menu





2-1-3 Menu bar

[D300win] menu contains various commands. With these commands, various processing necessary for creating a project or operating D300win can be executed. The commands contained in individual submenus are briefly explained below. The menu and submenu items vary with the working status.

<Menu>

<Commands contained in each menu item>

- [File] ..... Contains the commands for configuring, saving, designing or printing projects.
- [Edit] ..... Contains the commands used for editing, such as object selection, cut and paste.
- [View] ..... Contains the project tree window, message window, cross references window, watch window, logic analyzer window, Edit Wizard, and status bar.
- [Project] ..... Contains the commands for editing the project. (Library, Data type, and POU, etc. are added.)
- [Build] ..... Contains the commands for compiling a project.
- [Objects] ..... Contains the commands for editing the program. (Function/ Function block, Contact and Coil, etc.)
- [Layout] ..... Contains the commands for designing a display layout.
- [Online] ..... Contains online mode commands and various utilities.
- [Extras] ..... Contains the commands for setting basic D300win operations.
- [Window] ..... Contains the commands for changing the window display.
- [Help] ..... Contains the commands for activating the help function.

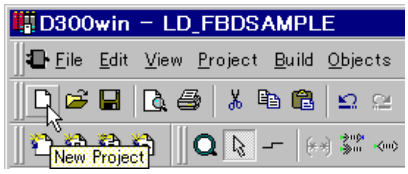
Commands contained in these menu items change according to the program section to be worked or the editor selected. The places where each command can be used are explained in the Help window.

2-1-4 Tool bar

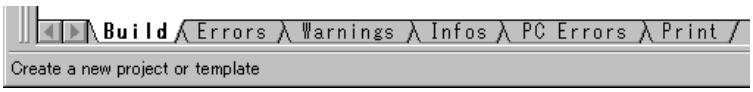
The tool bar contains multiple buttons. By using these buttons, frequently used functions can be executed easily. All these functions can be executed from menu or with shortcut icon.

The items (buttons) contained in the tool bar can be optionally customized. For how to customize the tool bar items, see “2-7-1 Setting the tool bars and commands.”

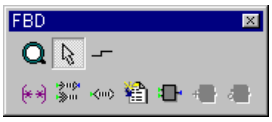
If the tool activated by the button is not recognized at a glance, place the mouse pointer on the button. The tool name (command name) will appear below the mouse pointer.



In addition, the explanation of the command is displayed on the status bar.

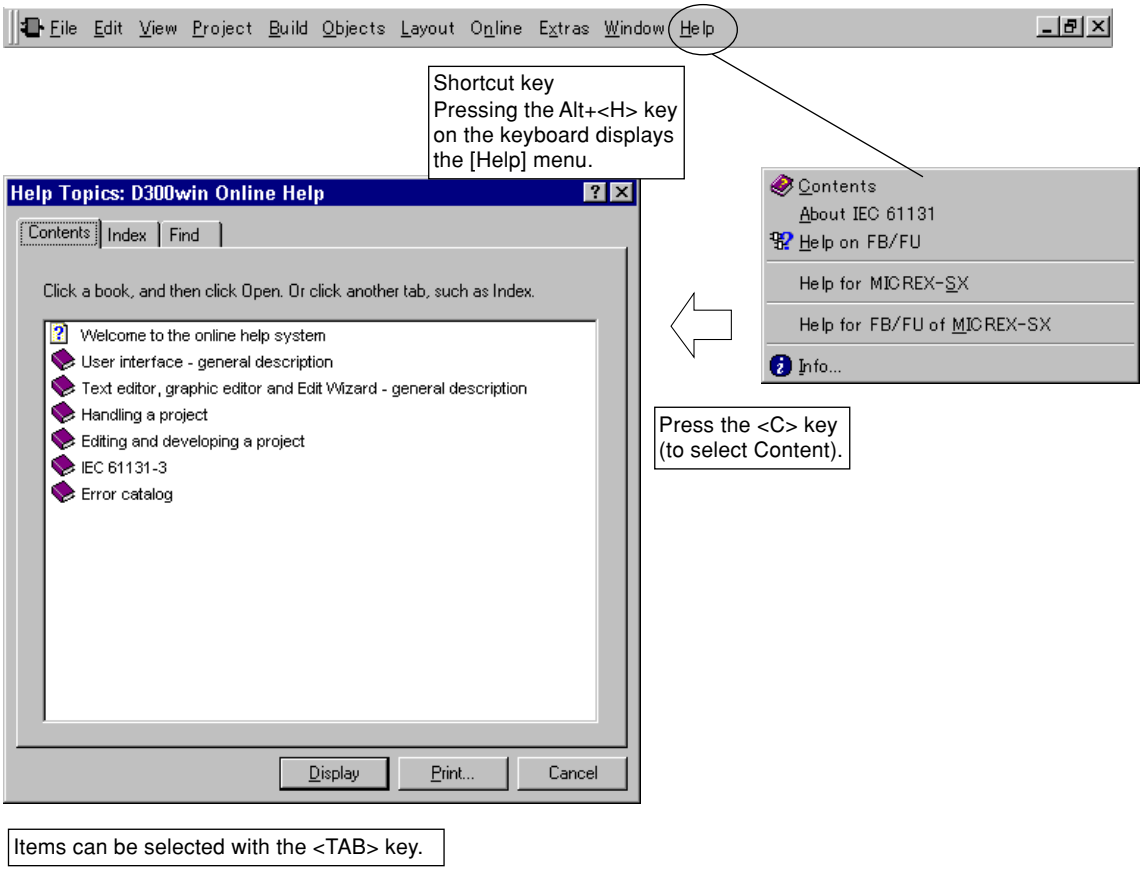


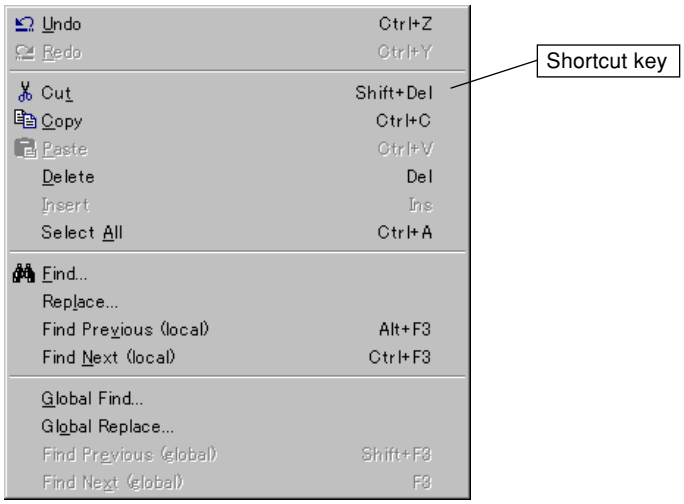
The tool bar is a free tool bar. The move handle at the edge of the tool bar can be dragged and dropped to the main window (workspace) to display the tool bar as a window.



2-1-5 Keyboard shortcut

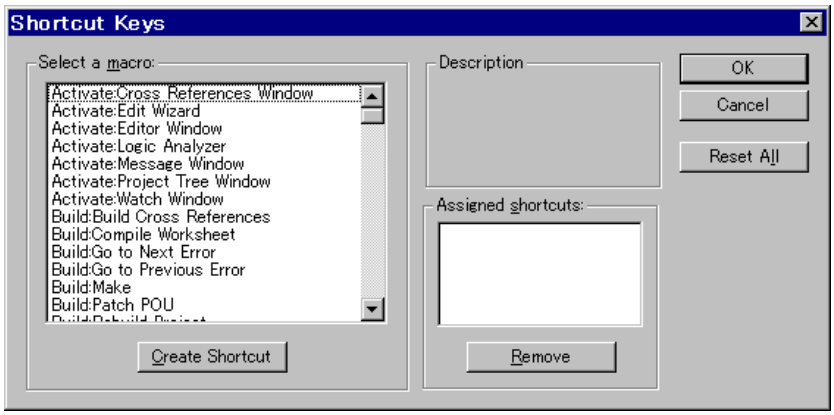
A keyboard shortcut is a function to execute, from the keyboard, the same operation as by using the tool bar. Keyboard shortcuts can be operated with a single key or a combination of multiple keys. For D300win, the user can optionally customize keyboard shortcut keys.





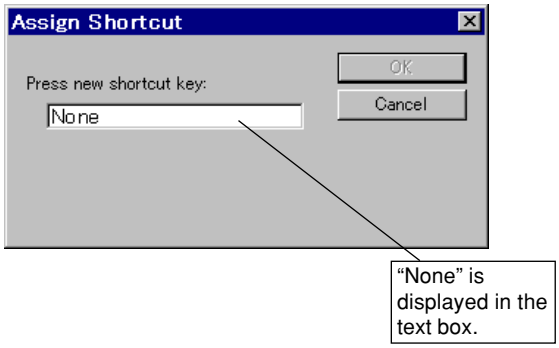
<Customizing shortcut keys>

◊ Left-click the [Shortcuts...] command in the [Extras] menu.
The {Shortcut Key} dialog will appear on the screen.

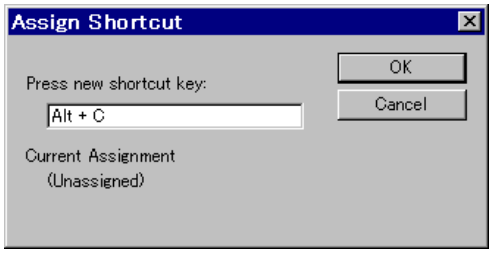


◊ Select an item (macro) assigned to a shortcut key in the [Select a macro] list box. In this sample, “Edit: Copy To...” is selected.

◊ Left-click the [Create Shortcut] button.
The {Assign Shortcut} dialog will appear on the screen.



◊ Press the keys to which the selected macro is assigned.
In this sample, the <Alt> and <C> keys are pressed.
The message shown in the figure below will be displayed.



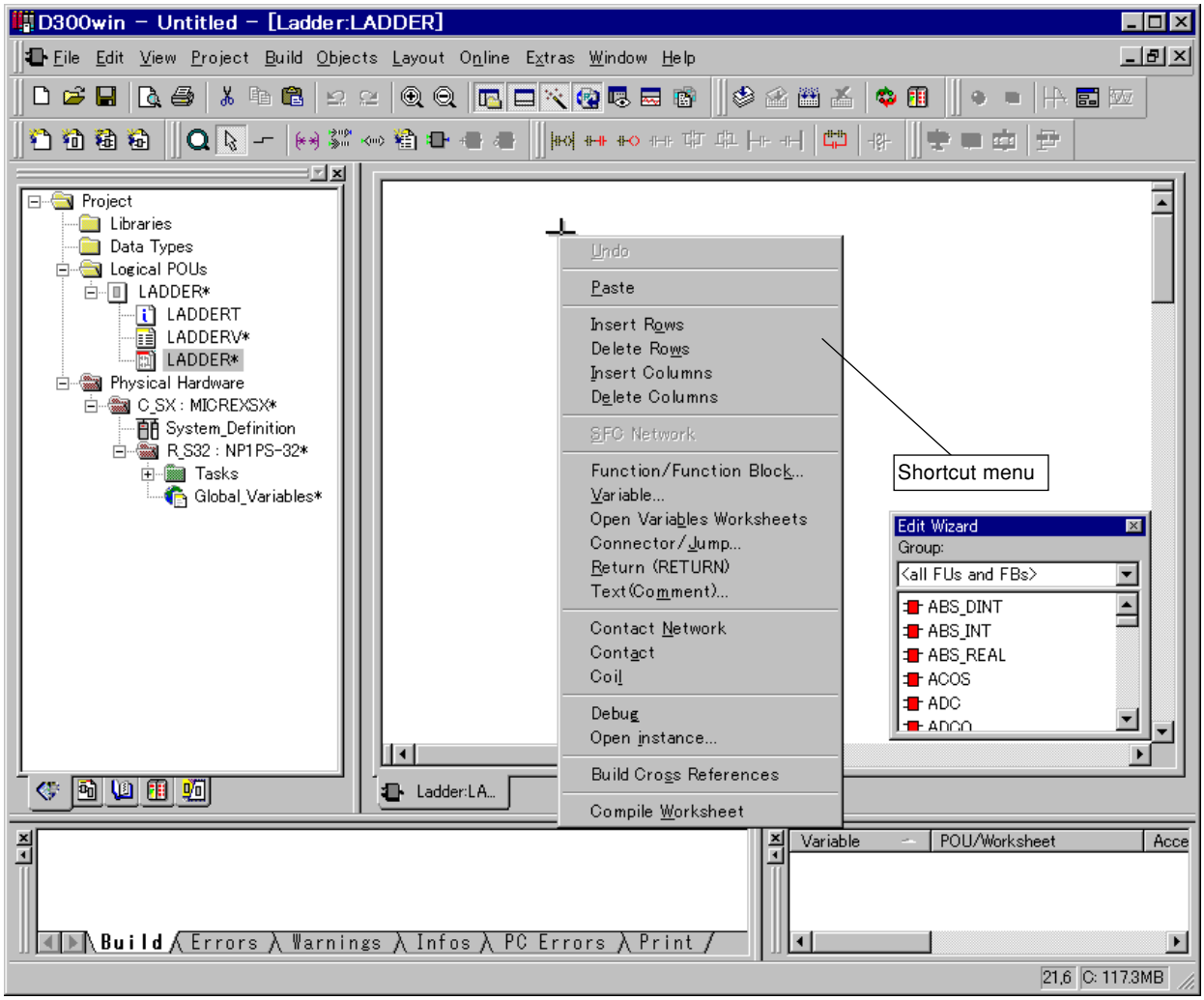
◊ Left-click the [OK] button to register the shortcut.

If the selected shortcut key is already defined, the corresponding “macro name” will be displayed. In this case, assign a different shortcut key. If the [OK] button is left-clicked without assigning a new shortcut key, the existing shortcut key is deleted.

2-1-6 Shortcut menu

The shortcut menu contains frequently used functions which are available for the selected object. The shortcut menu can be used for almost all selectable objects. The shortcut menu can be displayed by right-clicking on an object with the mouse cursor.

<Sample screen displayed by right-clicking on the LD worksheet>

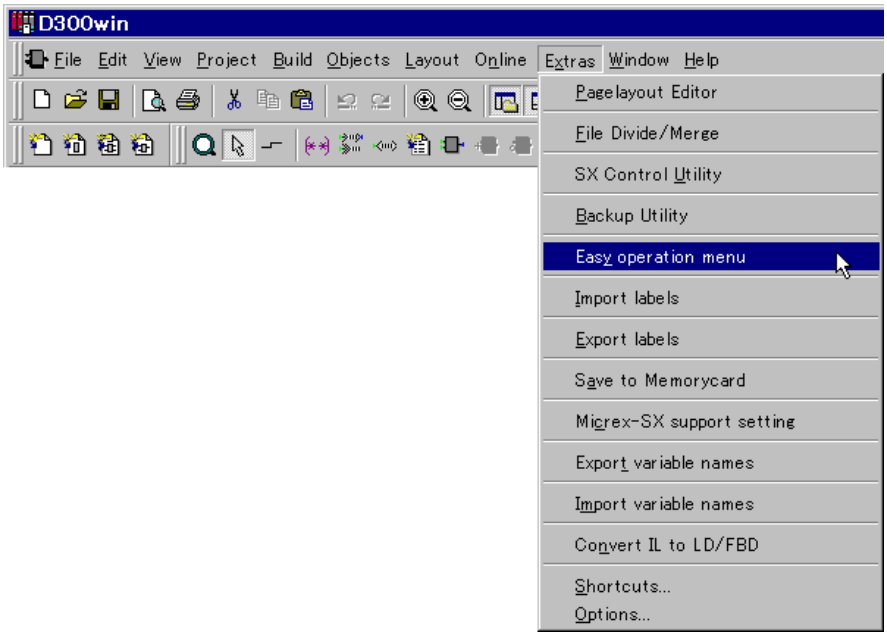


The explanation of shortcut menus or individual commands in a shortcut menu is given when an individual editor (the editing function for an individual language) is used.

2-1-7 Easy operation menu

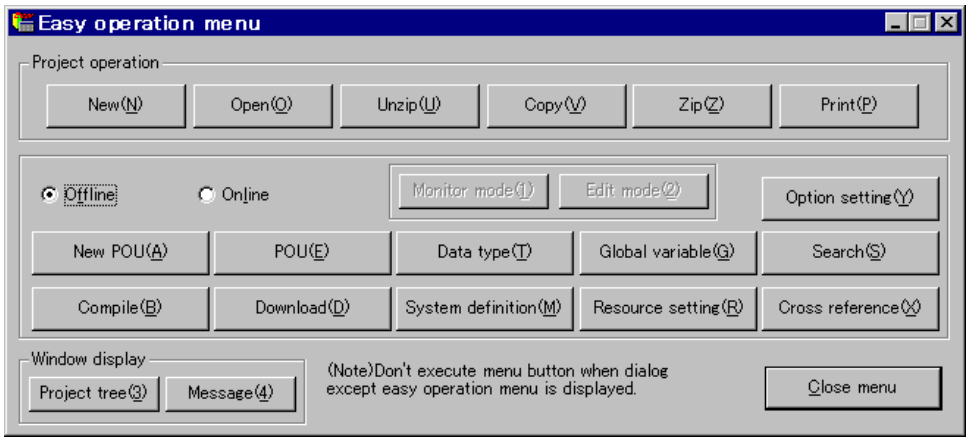
(1) Outline
The “easy operation menu” allows a basic D300win operation to be selected from the menu (selecting what to do) so that an operation ranging from project creation to debugging can be executed.

(2) Activation and functions of the easy operation menu
1) Activating the easy operation menu
Start D300win, and left-click the [Easy operation menu] command in the [Extras] menu.

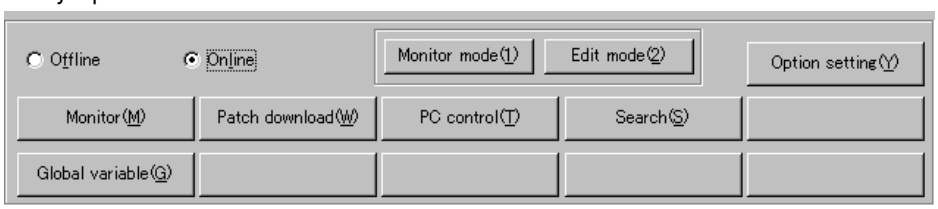


To use the easy operation menu, select the “Custom” installation method with the D300win installer, and select the “Easy operation menu.” If the “Typical” or “Compact” installation method has been selected, the easy operation menu will not be displayed.

2) Display of the easy operation menu
When the menu is activated, the following easy operation menu is displayed.



When the optional [Online] button is turned on, the menu shown below will appear on the screen.
<Easy operation menu in online connection mode>



(3) Function list of the easy operation menu

Classification	Button	Description	Related Item
Project operation	New	Creates a new project.	
	Open	Load a project.	
	Unzip	Unzips a zipped project.	
	Copy	Copies and saves a project.	
	Zip	Zips and saves a project.	
	Print	Prints a project.	
Menu change operation	Offline	Changes to the offline menu.	
	Online	Changes to the online menu.	
Offline operation	New POU	Creates a new POU.	
	POU	Displays the specified POU code worksheet.	
	Data type	Displays a data type worksheet.	
	Global variable	Displays a global variable worksheet.	
	Search	Executes local or global search.	
	Compile	Executes [All compile] or [Make].	
	Download	Displays the resource control.	
	System definition	Displays the system definition window.	
	Resource setting	Makes resource settings.	
	Cross reference	Creates a cross reference.	
	Option setting	Makes the operation settings for the easy operation menu.	
Online operation	Monitor mode	Changes to the monitor mode.	
	Edit	Changes to the edit mode.	
	Monitor	Displays the specified POU code worksheet in monitor mode.	
	Patch download	Downloads to PC after compilation.	
	PC control	Displays the resource control.	
	Search	Executes local or global search.	
	Global variable	Displays the global variable worksheet in monitor mode.	
	Option setting	Makes the operation settings for the easy operation menu.	
Windows operation	Project tree	Changes between viewing and hiding the project tree window.	
	Message	Changes between viewing and hiding the message window.	
Other	Close menu	Closes the easy operation menu.	

<Notes on using the easy operation menu>
(1) Do not execute any menu button when a dialog or message box other than the easy operation menu is displayed.
(2) The easy operation menu cannot be used when two or more D300win systems are active at the same time.
(3) The easy operation menu cannot be used for the SX simulator/SRS-R.
(4) When the easy operation menu is used on a personal computer with Microsoft Visual Test installed, the Visual Test Viewpoint window may appear on the screen. However, this will cause no problem with the use of the easy operation menu. Use this window by reducing it into an icon.

2-1-8 Status bar

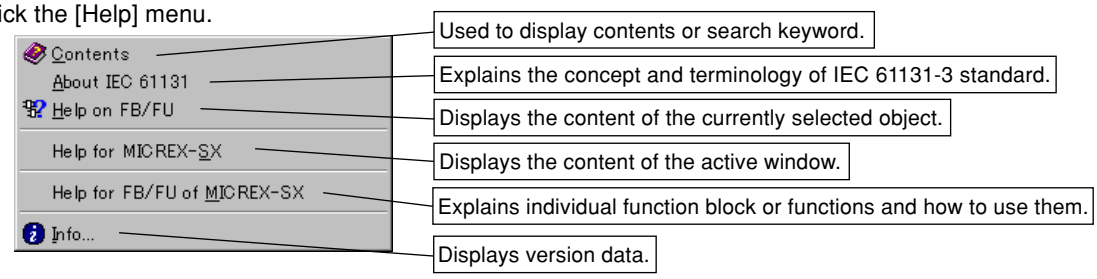
During D300win operation, various messages are displayed in the status bar.
In the lower left corner in the status bar, information on the executed operation or a D300win system message (the content of mouse instruction) is displayed.
For example, when a certain menu item is selected, the information related to this menu item is displayed in the status bar.
On the right, the available RAM memory is displayed. The rightmost field is used to show the D300win starting process.

2-1-9 D300win help function

The D300win help function provides information related to general operations, descriptions of commands necessary to create programs, and information related to IEC 61131-3.

(1) How to display the Help window

Left-click the [Help] menu.



Key-point:

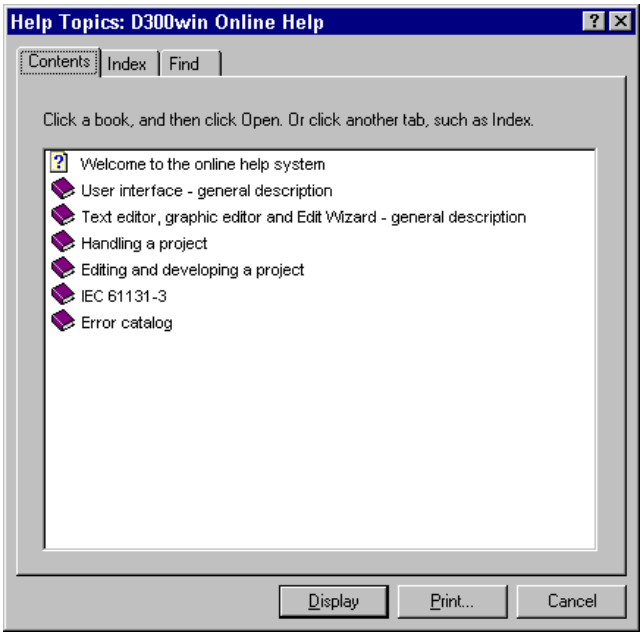
When an underlined word or phrase is displayed in green in the help window (which is displayed with the help command), it means that there is additional related information for the item. To reference the additional information, left-click the word or phrase.

(2) Using [Contents] command

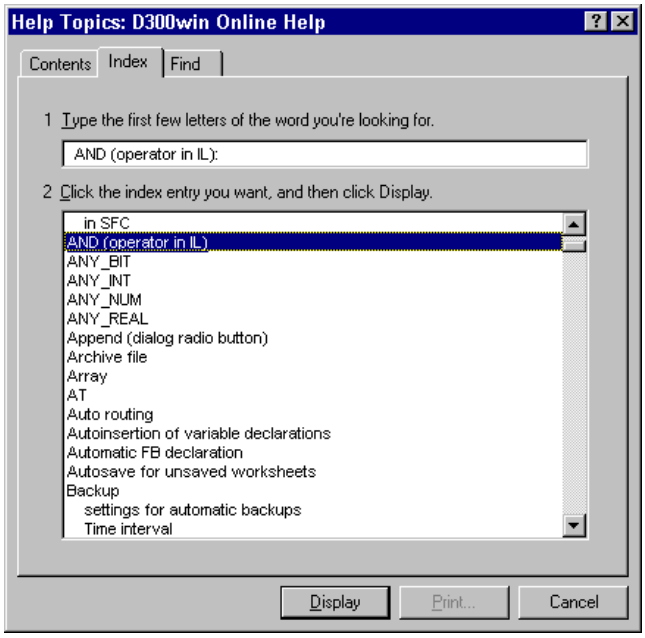
1) Contents

In the Contents window the information necessary to use D300win, the D300win operation method, the procedure for creating a project and other information are displayed.

{Help (contents)} dialog box



2) Search keyword
Select an object keyword from the keyword list, or input characters from the keyboard to directly display the help information.
Left-click the [Search] button in the {Help} dialog box.
The {Search topic} dialog box appears on the screen.



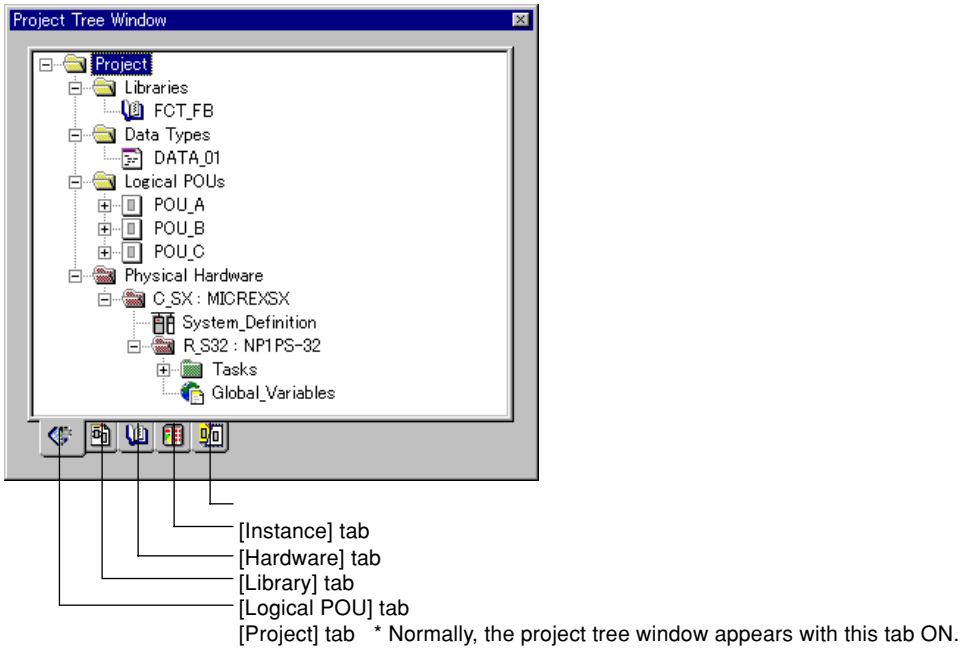
2-2-1 Outline of the project tree window

The project tree window displays all projects in tree structure. This tree consists of 4 sub-trees: [Libraries], [Data Types], [Logical POUs], and [Physical Hardware].
The project tree is the primary tool for editing the project configuration. Editing of the project configuration refers to insertion or deletion of a POU or worksheet to/from the project configuration. (For how to insert a POU or worksheet, see “Section 3 Preparation for Creating a Project.”) Any of these object icons in the project tree window may be left-double-clicked to call the associated editor and edit a code (program) or variable declaration.
The project tree is illustrated with several icons. An individual icon indicates a project file and the corresponding file type.
In the project tree window, the copy&paste and cut&paste operations can be used with the clipboard. The corresponding tool bar is registered in the common section of the tool bars.

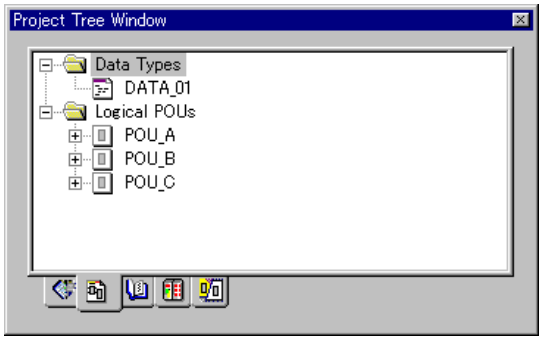
2-2-2 Display method of the project tree window

The tab icons at the bottom of the project tree window can be operated to display only the portion that the user wishes to view or to display inside an element configured in the tree.

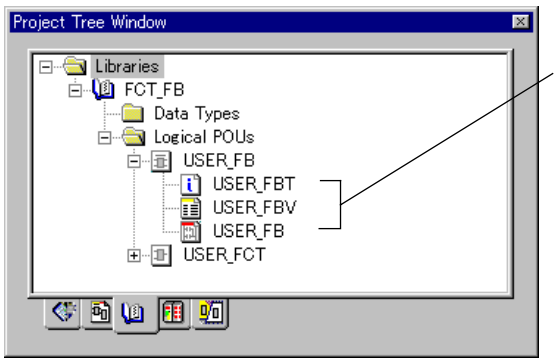
1) When the [Project] tab is turned on



2) When the [Logical POU] tab is turned on

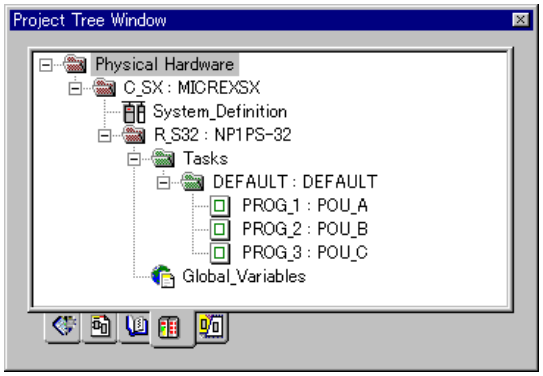


3) When the [Library] tab is turned on

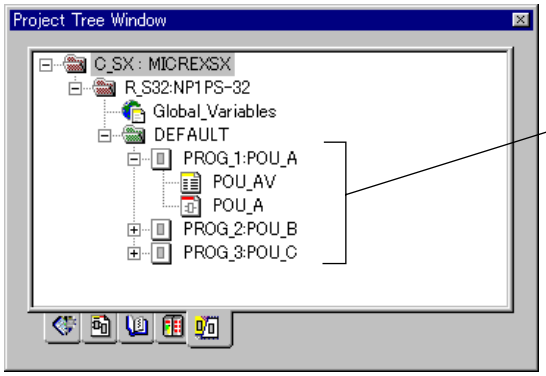


When the [Library] tab is turned on, the POUs registered in the libraries can be referenced or changed.

4) When the [Hardware] tab is turned on



5) When the [Instance] tab is turned on



An instance is used after a program (project) is downloaded to CPU. It is displayed with online information contained.

Left-double-click any of these icons to monitor the selected program or variable on line.

For how to use the project tree editor, refer to the paragraph for the corresponding project tree element as shown below:

- Libraries ..... Section 10 Using an Existing Project
- Data Types ..... Refer to “Instructions manual”
- Logical POUs ..... Section 3 Preparation for Creating Project
- Physical Hardware ..... Section 11 PC Structure/Operation Definition

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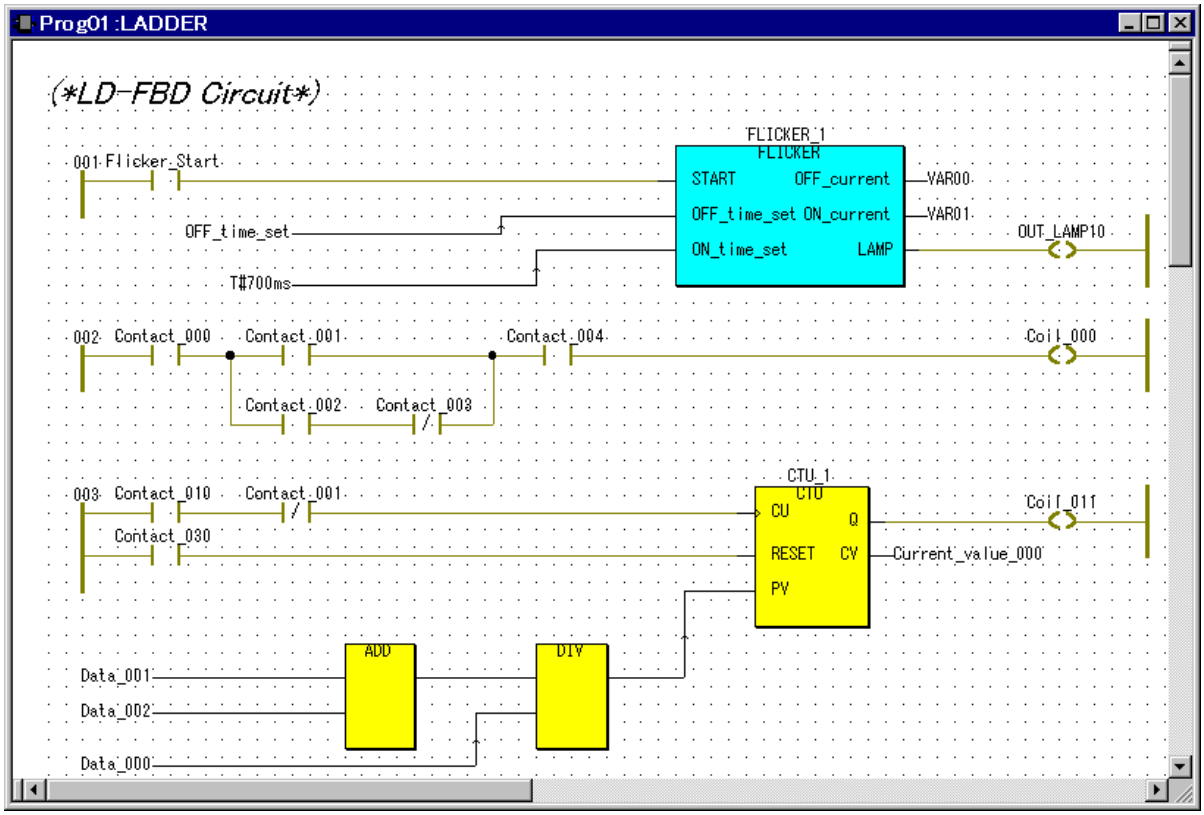
2-2-3 Graphic editor and operation

The graphic editor is a window which is used to develop a PC program in SFC, FBD or LD language. The graphic editor is displayed when the [FBD Worksheet], [SFC Worksheet] or [LD Worksheet] icon in the project tree is left-double-clicked. Search, replace, cut & paste and drag & drop functions are available in the graphic editor. In addition, a grid (which is not actually printed out) can be displayed on the worksheet. When the grid is displayed, objects can easily be aligned for layout.



Most of the general functions can be accessed by shortcut menu or tool bar, without using menus.

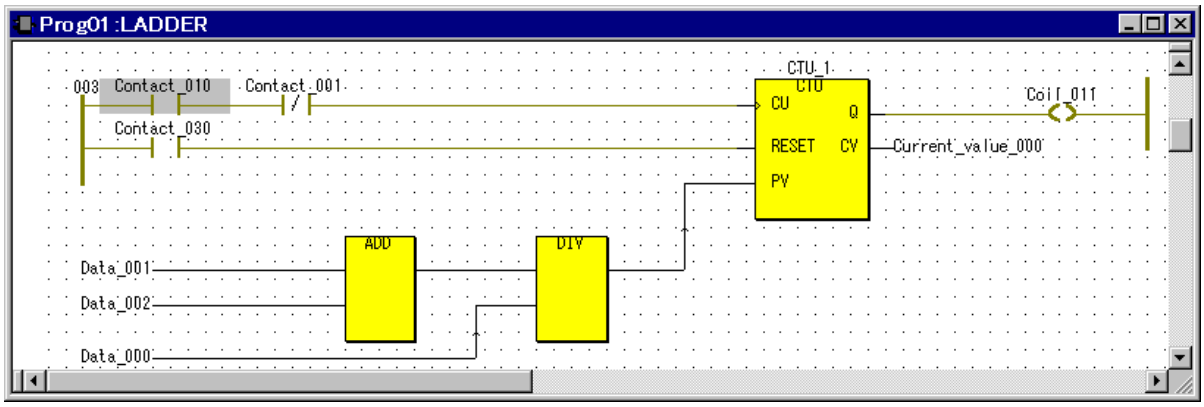
(1) Selecting objects

For moving, deleting, copying or pasting objects, it is necessary to select the objects in advance. There are 4 methods for selecting objects:

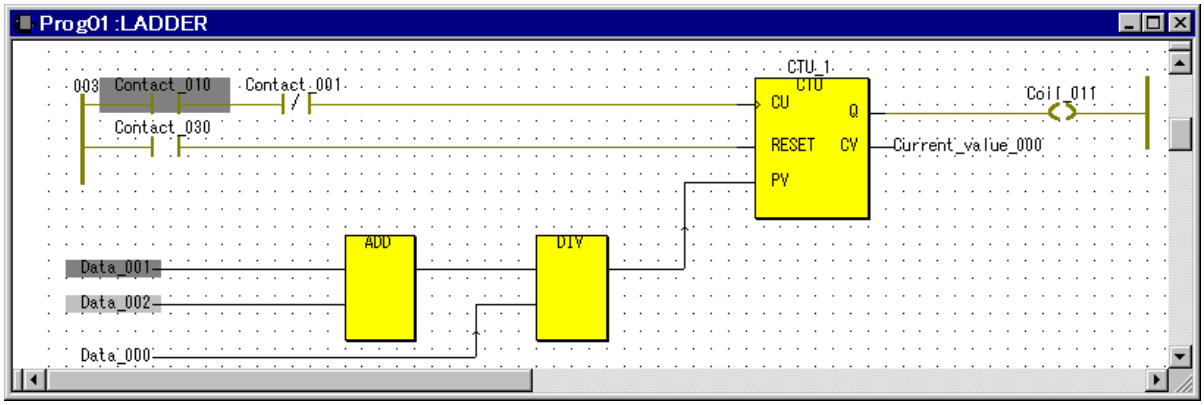
1) Selecting a single object
2) Selecting multiple objects
3) Selecting objects by area
4) Selecting all objects

These methods are explained below:

1) How to select a single object
   ◊ Left-click the object to be selected.
   The selected object is displayed with a gray frame.

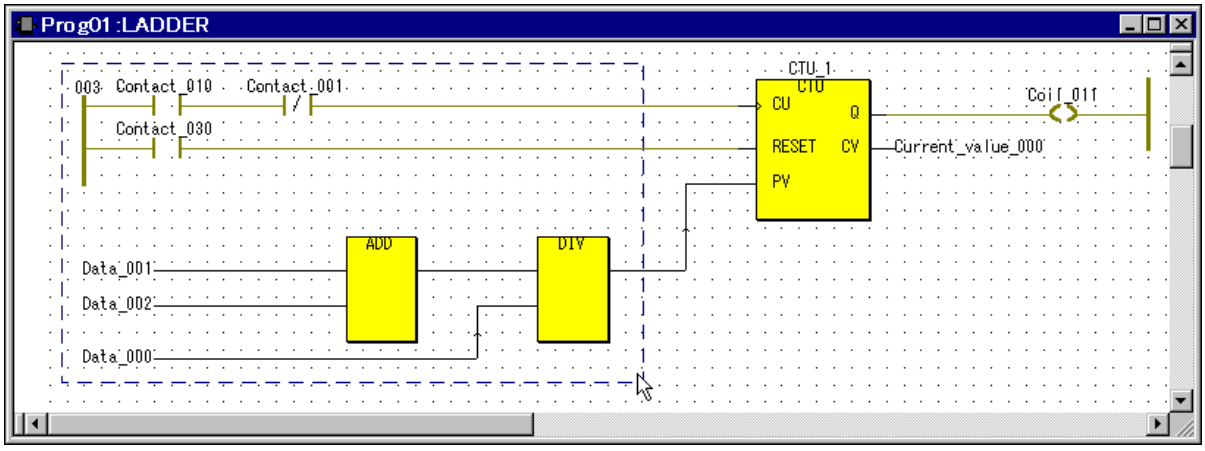


2) How to select (add) multiple objects
   ◊ First select one object by left-clicking it.
   ◊ While pressing the [Shift] key, move the mouse pointer onto another object and left-click the object.
   The selected object is displayed with a gray frame.



If the wrong object was selected, left-click the object while pressing the [Ctrl] key. The selection will then be canceled without affecting other selected objects.

3) How to select objects by area
   ◊ At the starting point of the area, left-click the mouse. Then drag the mouse to make a rectangle for selecting the range.
   ◊ Take your finger off the mouse button, and the object in this area will be selected.
   The selected object is displayed with a gray frame.



Set the range so that the objects to be selected are all included in the rectangle.

4) How to select all objects

◊ Make sure that the worksheet is active.

◊ Left-click the [Select All Objects] command in the [Edit] menu, and all objects will be selected. The selected object is displayed with a gray frame.

(2) Moving objects

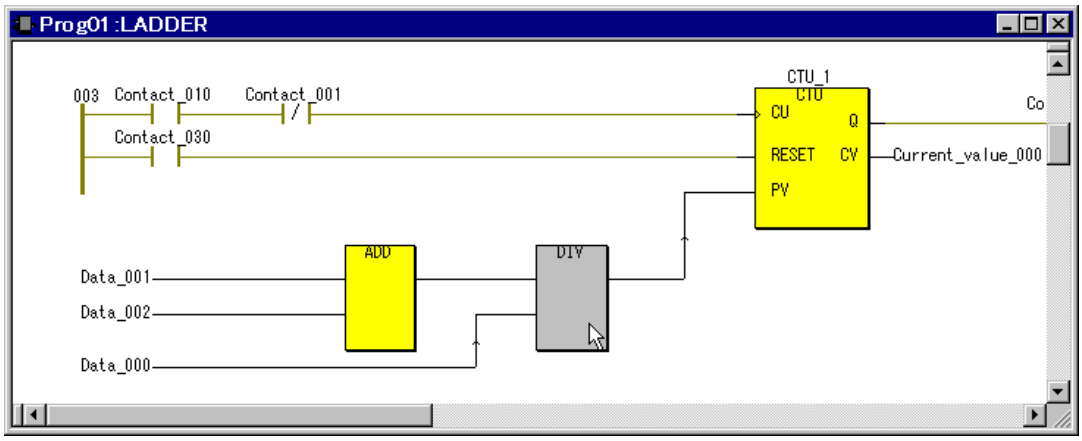
There are various methods for moving objects: moving a single object, moving multiple objects at the same time, and moving an object that is connected to another element.

When an object that is connected to another element is moved, the connection between them is maintained even after the moving. Objects can be moved arbitrarily. However, if an object comes in contact with other objects when moved, it cannot be moved, and instead the contact range is displayed in a red rectangular shape (approximately 1 second) and the object returns to the original position.

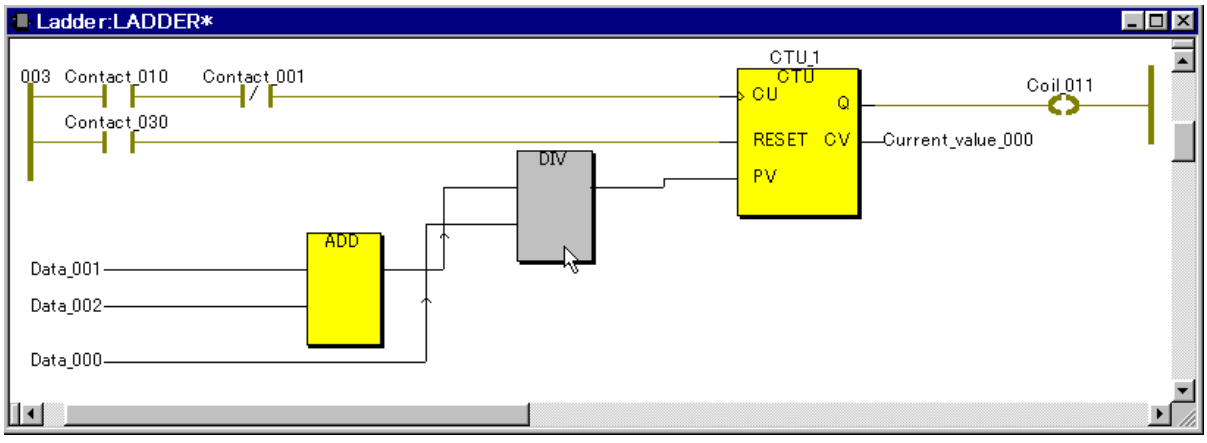
Comments, however, may come in contact with other elements.

<How to move objects>

◊ Select the objects to be moved.



◊ Move the objects to the desired position using the drag&drop operation.



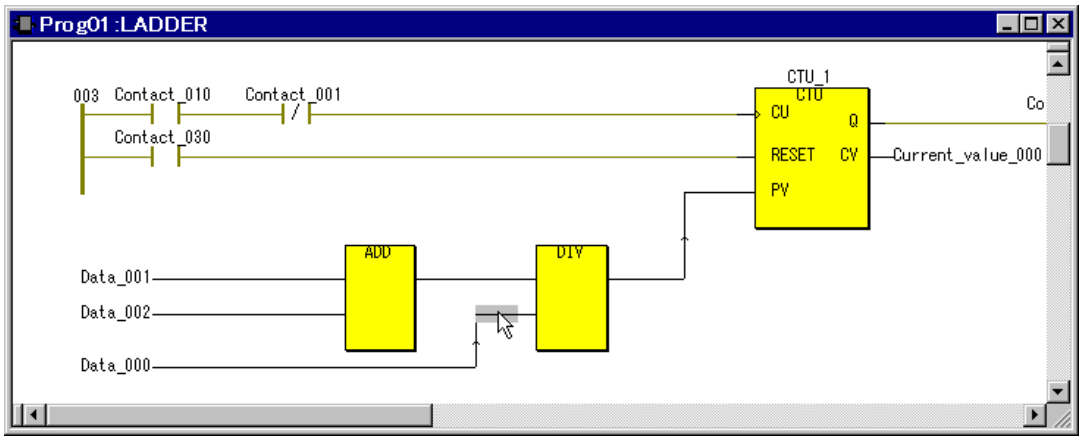
With cursor keys, the position to place the objects can be finely adjusted (by the dot). To do this, press a cursor key to move it (or them) while keeping the objects left-clicked.

(3) Deleting objects

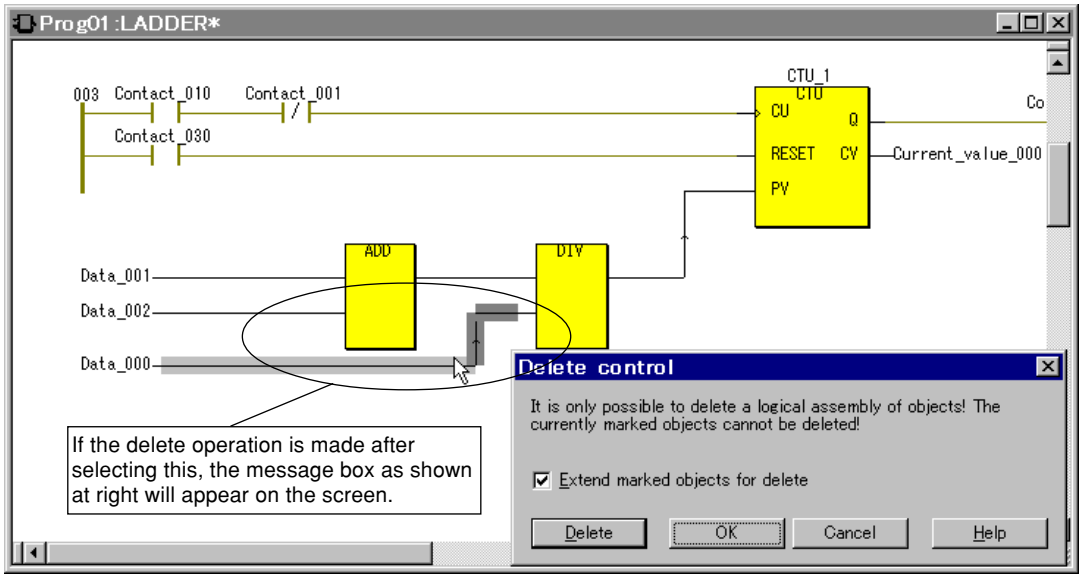
One or multiple objects can be deleted. However, if not selected properly, objects cannot be deleted. In this case, a message dialog appears on the screen.

<How to delete objects>

◊ Select the objects to be deleted.



◊ Right-click to display the shortcut menu and left-click the [Delete] command, or press the [Delete] key. The selected objects will be deleted. However, if not selected properly, a message dialog will appear on the screen as shown below.

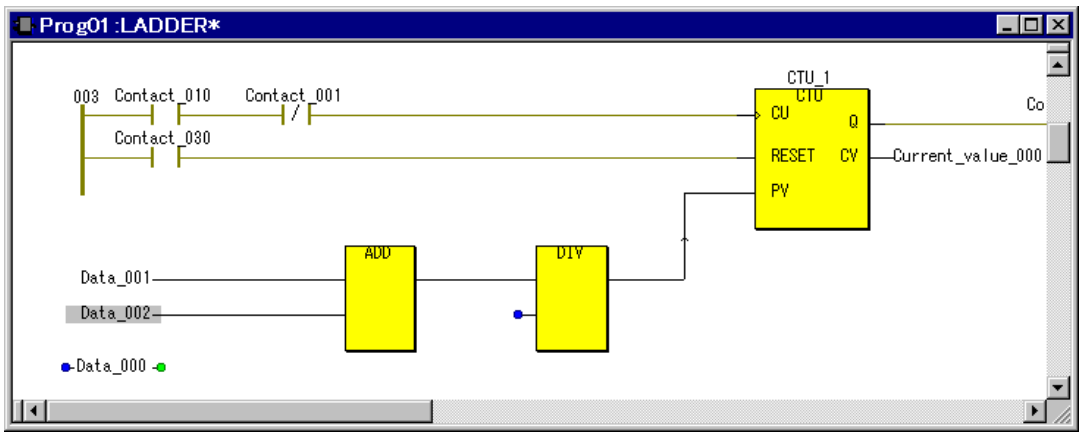


[Extend marked objects for delete] .... Selects all the objects that are necessary to create a single structure which can be deleted.

[Delete] ..... Directly deletes a single structure. However, the object is accessed only when the [Extend marked objects for delete] box is checked.

[OK] ..... Displays the structure to be deleted only when the [Extend marked objects for delete] box is checked (examples are shown on the next page.) When the [Extend marked objects for delete] box is not checked, the message box will be closed.

Sample display after deleting



<SFC language>
Steps and transitions are deleted in order to be replaced with connecting lines, which can be optimized. After selecting the connecting lines to be optimized, left-click the [Optimize SFC Connect Lines] in the [Edit] menu.
<LD language>
Left and right objects are connected automatically when a contact, coil, etc. in an LD circuit is deleted, or a symbol for connection (green point) is displayed at deleted left/right object.

(4) Clearing worksheets
The content of an individual worksheet can all be deleted at once.

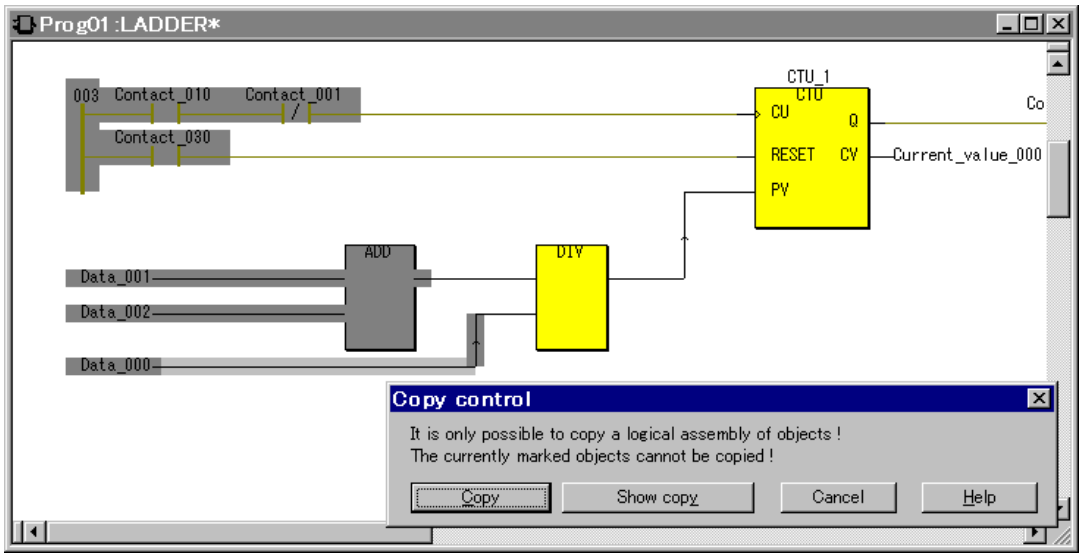
Note: Be careful, as once deleted, the worksheet can no longer be restored.

◊ Select (activate) the worksheet that you want to delete the contents from.
◊ Left-click the [Delete worksheet] command in the [Edit] menu, and the message box for delete will appear on the screen.

(5) Copying and pasting objects
The graphic editor can copy LD or FBD circuit objects to the clipboard. However, this function is disabled for SFC language.

1) Copying objects to the clipboard

<How to copy objects to the clipboard>
◊ Select objects to be copied to the clipboard.
◊ Left-click the [Copy] button, or press the [C] key together with the [Ctrl] key to copy the selected objects to the clipboard.
In the following case, the {Copy control} dialog box appears on the screen.



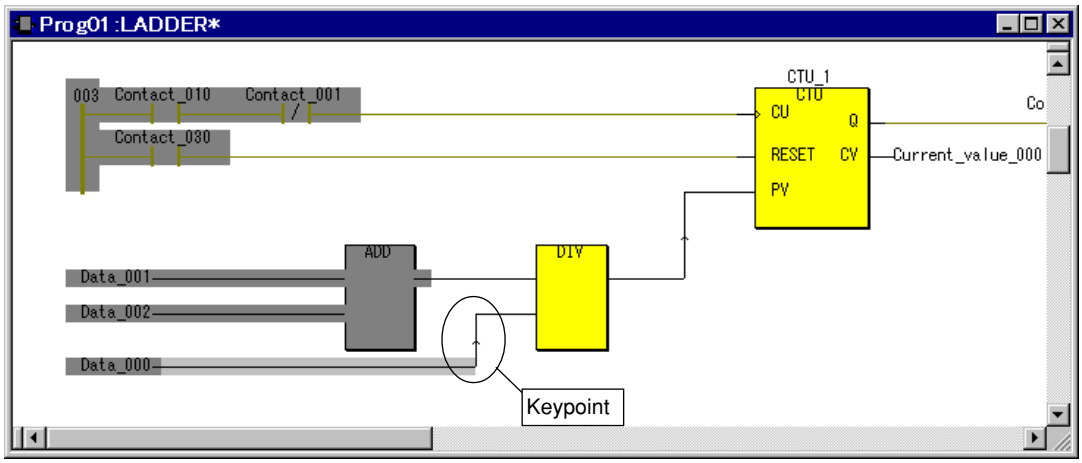
[Cut] ..... Automatically selects all the objects that make up a single structure and copies them to the clipboard.
[Show copy] ..... Displays a range of the objects that make up a single structure for confirmation purposes.

<Copy>

◊ When the {Copy control} dialog box appears on the screen and you want to copy the objects to the clipboard as a single structure, left-click the [Cut] button.

<Display of copy range>

◊ When the {Copy control} dialog box appears on the screen and you want to reference the objects copied to the clipboard, left-click the [Show copy] button.



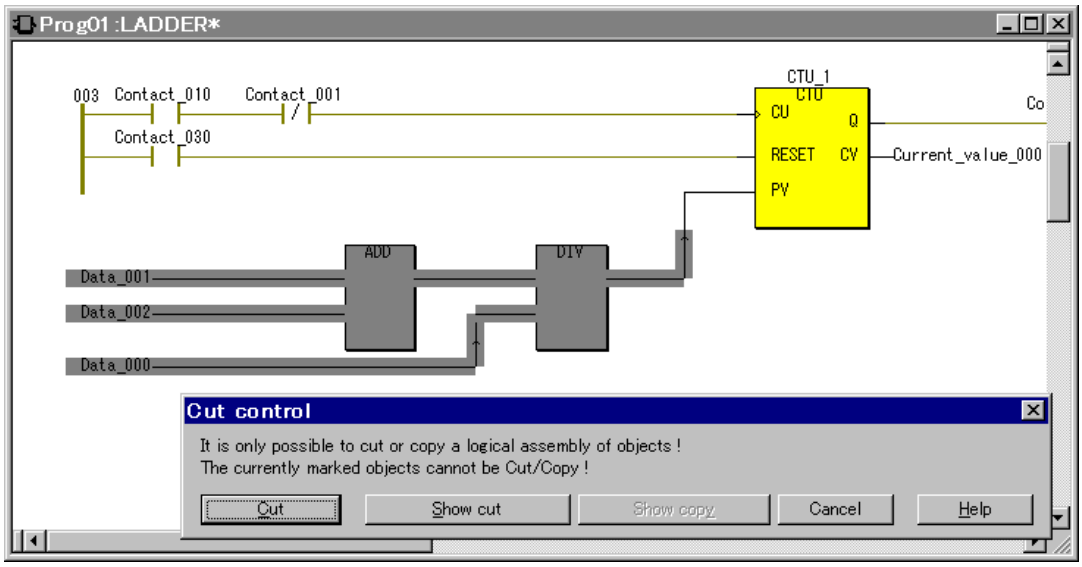
2) Cutting objects and copying them to the clipboard

When the [Cut] function is used, the objets are deleted from the worksheet and copied to the clipboard.

<How to cut objects and copy them to the clipboard>

◊ Select the objects.

◊ Left-click the [Cut] button, or press the [X] key together with the [Ctrl] key.
The selected objects are then copied to the clipboard, and at the same time are deleted from the worksheet.
However, when part of objects which should be treated as a single structure (a collection of objects) are selected, as shown in the figure below, the {Cut control} dialog box will appear on the screen.



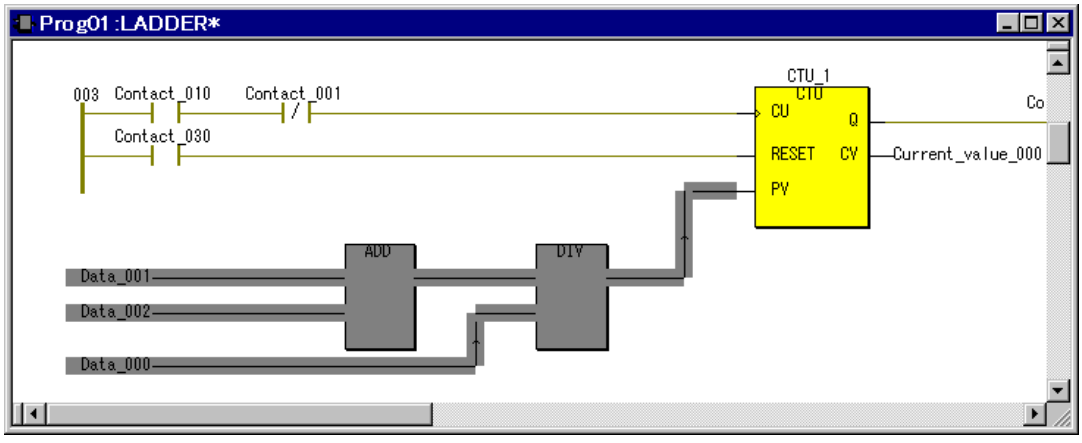
[Cut] ..... Automatically selects all the objects that make up a single structure and copies them to the clipboard while deleting them from the worksheet.
[Show cut] ..... Displays the range of objects making up a single structure that you want to cut.
[Show copy] ..... Displays the range of objects making up a single structure that you want to move to the clipboard.

<Cut>

◊ When the {Cut control} dialog box appears on the screen and you want to cut objects as a single structure and move them to the clipboard, left-click the [Cut] button.

<Display of cut range>

◊ When the {Cut control} dialog box appears on the screen and you want to reference the objects which are to be moved to the clipboard, left-click the [Show cut] button.



<Display of copying range>

◊ When the {Cut control} dialog box appears on the screen and you want to reference the objects which are copied to the clipboard, left-click the [Show copy] button.

3) Pasting objects

The objects that are cut or copied to the clipboard can be pasted on other worksheet.

<How to paste the objects moved to the clipboard onto a worksheet>

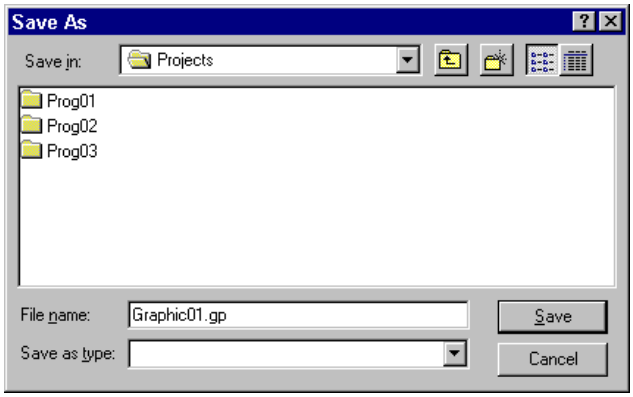
◊ Left-click the point in the worksheet where the objects are to be pasted.
◊ Left-click the [Paste] button, or press the [V] key together with the [Ctrl] key.
Then the objects on the clipboard will be pasted onto the worksheet.

(6) Copying the content of a worksheet in a graphic file
The graphic editor can copy the entire content of a worksheet in a D300win dedicated graphic file (extension: .gp). This function increases the program creation efficiency by creating and saving frequently used elements as a type of file.

1) Copying the content of a worksheet in a graphic file

◊ To select all the objects in the worksheet, left-click the [Select all] command in the [Edit] menu. (It is only possible to select and copy all the objects at one time.)

◊ Left-click the [Copy to ...] command in the [Edit] menu, and the {Save as} dialog box will appear on the screen.

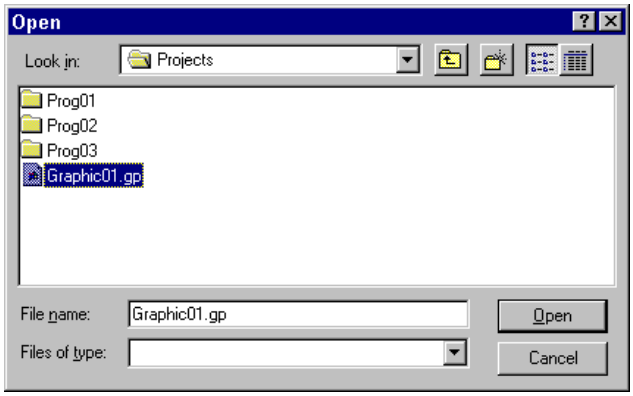


2) Inserting the contents of a graphic file in a worksheet
The following describes how to insert objects from a graphic file into a worksheet.

Note: The content of graphic file can be inserted only when the object worksheet is empty. When the existing worksheet is not empty, it is necessary to delete all the contents of the worksheet to make it empty, or to insert a new worksheet in the project tree editor.

◊ Delete all elements from the existing worksheet, or open a new worksheet.

◊ Left-click the [Insert from ...] command in the [Edit] menu, and the {Open} dialog box will appear on the screen.



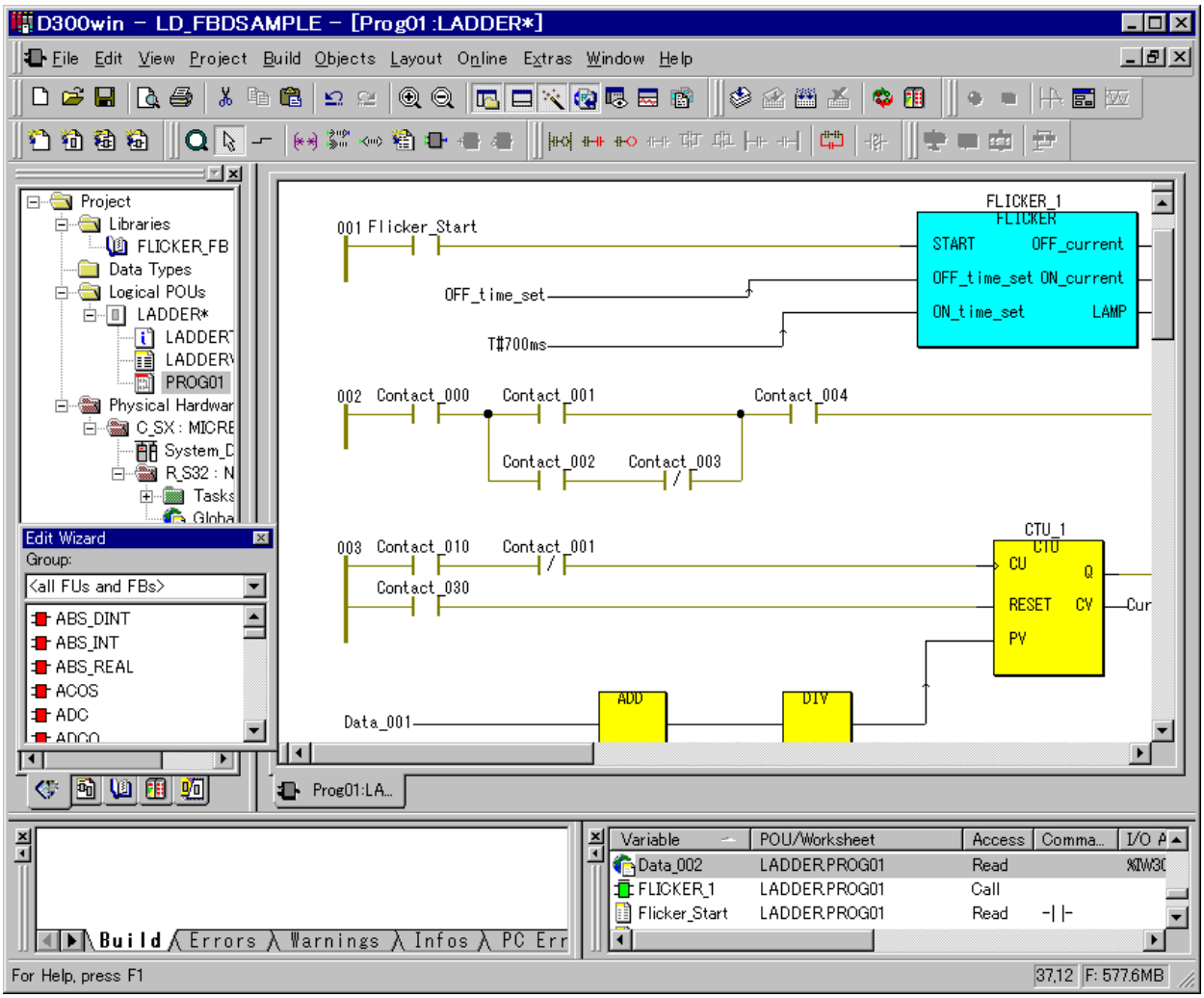
◊ Select the file which you want to insert, and left-click the [OK] button. Then the content of the selected graphic file will be displayed in the worksheet.

2-2-4 Overview window

The overview window can be used when the graphic editor is active. This window is used to recognize which portion of a worksheet is displayed in the graphic editor.

The following shows a sample overview window display.

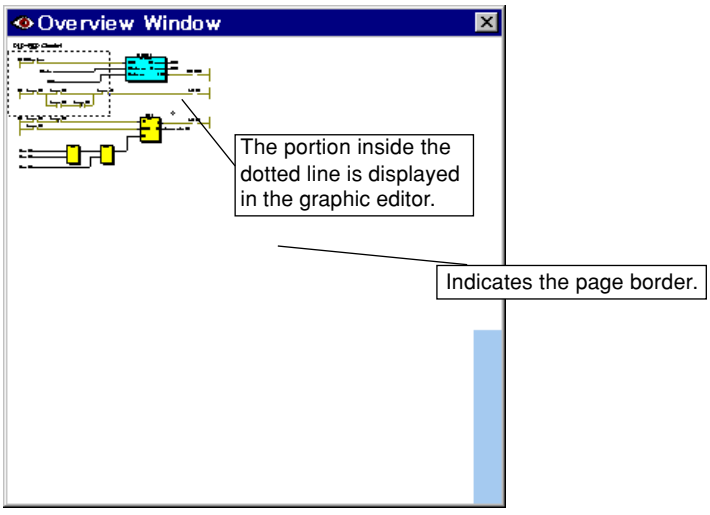
<Display of the graphic editor>



<Display of the overview window>

The following shows that the graphic editor illustrated above is displayed in the overview window.

◊ With the state shown above, left-click the [Overview window] command in the [Layout] menu.

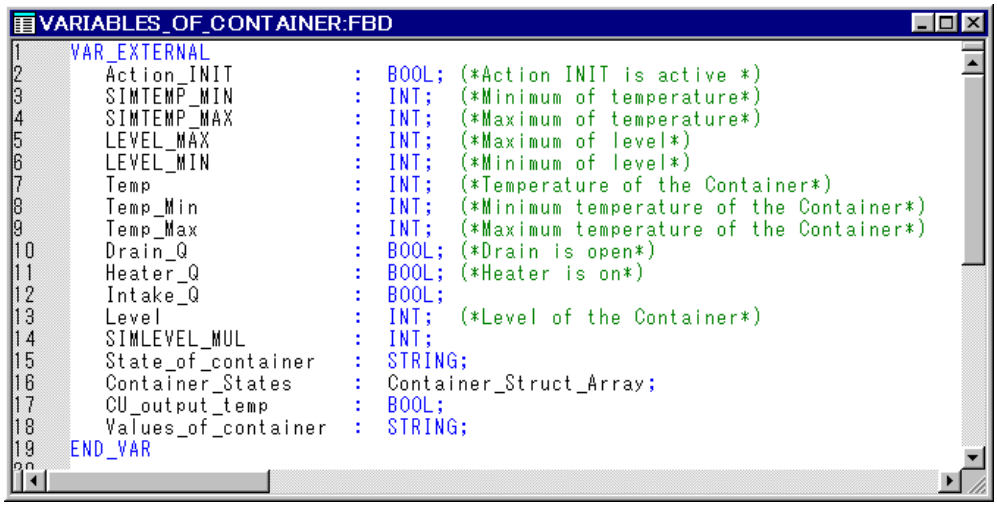


2-2-5 Text editor

The text editor is a window used to develop a PC program or declare variables in IL or ST language.
The text editor can be used for various purposes:

- Variable declaration and debugging of a variable worksheet (POU variable declaration or global declaration)
- Editing and debugging of the IL code
- Editing and debugging of the ST code
- Editing of a user-defined data type
- Editing of a product documentation in a description worksheet

The text editor has a syntax highlight function which is very effective for editing a text worksheet. This function indicates different elements in different colors on an IL worksheet. Namely, operators and qualifiers are blue, variables and operands are black, and comments are green. On the ST worksheet, keywords are blue, variables and instance names are black, and comments are green.
The colors described above are the default colors, which can be changed with the {Options} dialog.
<Sample display of a variable worksheet>



Operation of this text editor is the same as that of general text editors.

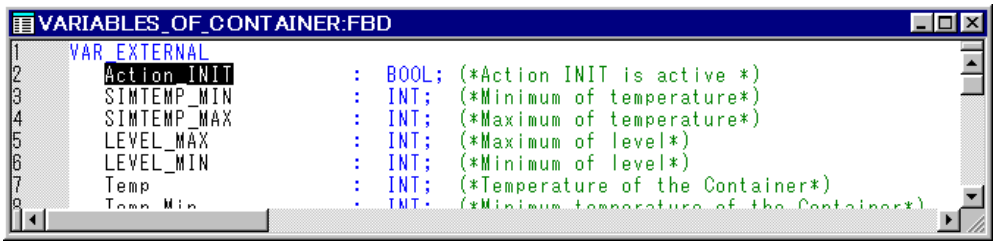
(1) Selecting objects
There are 3 methods for selecting objects:

- Selecting part of a text
- Selecting text lines in units of lines
- Selecting a text block

<How to select part of a text>

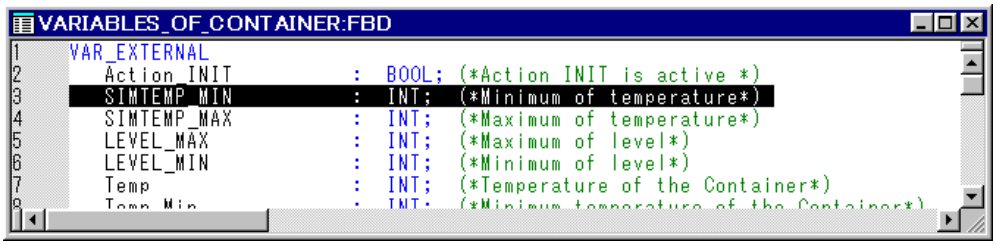
◊ With the mouse left button kept clicked at the starting point of the selecting range, move the mouse to the end point of the range.

◊ Take your finger off the left-side mouse button, and the text within the specified range will be selected. The selected text is highlighted.



<How to select text lines in units of lines>

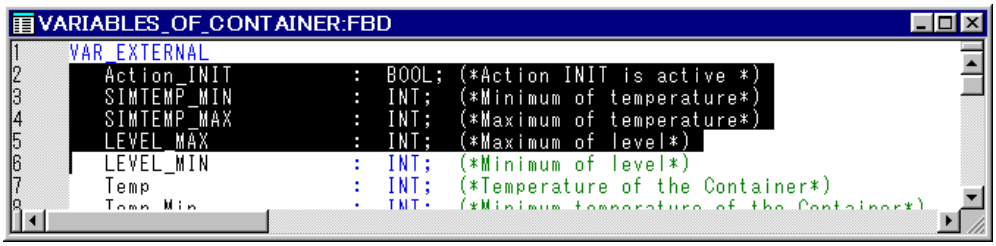
◊ Left-click the number of a line you want to select.
The entire selected line is highlighted.



<How to select a text block>

◊ Left-click the first line you want to select.

◊ While pressing the [Shift] key, left-click the last line of the block you want to select. The entire block will be selected.
The selected lines are highlighted.



(2) Copying and pasting objects
Copy text to the clipboard. The elements that are copied to the clipboard can then be inserted in the desired arbitrary position in the same worksheet or in another worksheet with the [Paste] command in the [Edit] menu.

1) Copying objects to the clipboard.

<How to copy text to the clipboard>

◊ After selecting text, left-click the [Copy] command in the [Edit] menu or the  [Copy] button on the tool bar. The selected text will then be copied to the clipboard.

2) Cutting objects and copying it to the clipboard
Cut text from a worksheet and then copy it to the clipboard. The elements that are copied to the clipboard can then be inserted at the desired position in the same worksheet or in another worksheet with the [Paste] command provided in the [Edit] menu.

<How to cut and copy text to the clipboard>

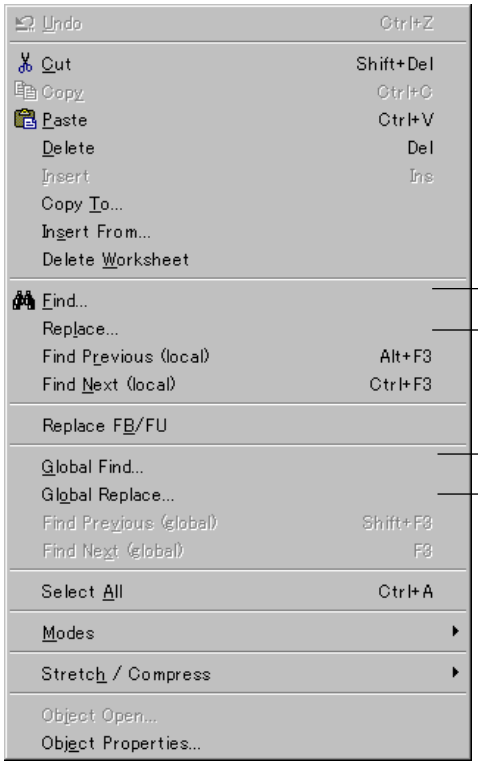
- ◊ After selecting text, left-click the [Cut] command in the [Edit] menu or the  [Cut] button on the tool bar. The text will be then deleted from the worksheet and copied to the clipboard.

3) Pasting objects
Text can be inserted into a worksheet from the clipboard.

<How to paste text into a worksheet from the clipboard >

- ◊ Left-click a point in the worksheet at which you want to insert the text.
- ◊ Left-click the [Paste] command in the [Edit] menu or the  [Paste] button on the tool bar. The text will then be inserted in the worksheet.

The Search and Replace functions of D300win can search a whole project (for example, all worksheets) or a selected (activated) editor for text elements (variables, comments, worksheet names, etc.) and can replace the found search objects with the desired text elements. There are two modes for the Search and Replace functions: Local and Remote modes.
The following [Edit] menu appears when the code worksheet is displayed and active.



Searches only selected worksheets for specified text elements (and replaces them).
* To search a project (tree) for worksheets, activate the project tree editor and then use the local search function.

Searches all worksheets in the project for specified text elements (and replaces them).

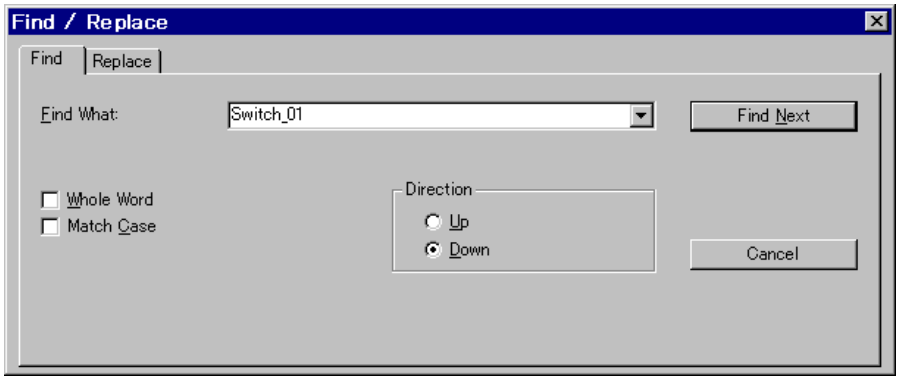
* Commands of this menu differ depending on which editor is selected.

2-3-1 Local search and replace

(1) Local search
This function is used to search the active window for specified text elements.

<How to search for text elements>

◊ Left-click the [Find ...] command in the [Edit] menu, and the {Find/ Replace} dialog box will appear on the screen.



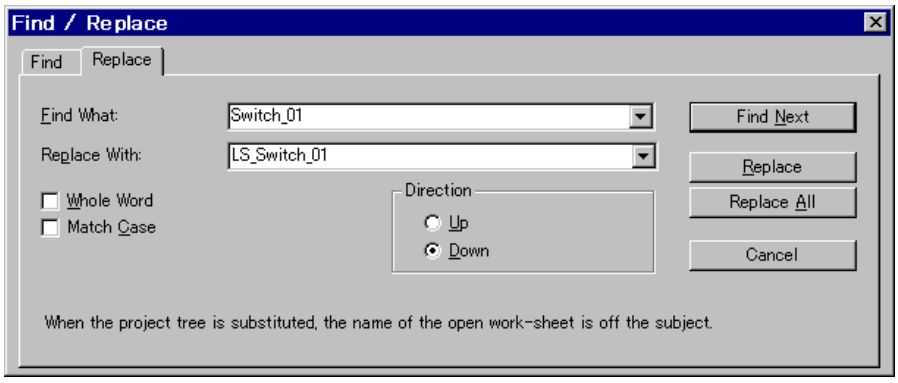
[Find What] ..... Input the text element you want to search for.
[Match Whole Word Only] ..... Searches for text which perfectly matches.
[Match Case] ..... Searches for text that matches by letter case.
[Find Next] ..... Searches for the next text element that matches.
[Direction] ..... Select the direction of the retrieval.

◊ Input the text element you want to search for, and left-click the [Find Next] button.
When text is found which matches the specified one, it will be highlighted in the worksheet. Left-clicking the [Find Next] button resumes searching for the next matching text element.
◊ Left-click the [Find Next (local)] command in the [Edit] menu to resume searching for the next matching text element.

(2) Local replace
Searches the active window (worksheet) for specified text elements and replaces the ones found with the desired text elements.

<How to replace text elements>

◊ Left-click the [Replace...] command in the [Edit] menu. The {Find/Replace} dialog box will appear on the screen (with the [Replace] tab on).



[Find What] ..... Input the text element you want to search for.
[Replace With] ..... Input the text element to replace the text found.
[Match Whole Word Only] ..... Searches for text that matches completely.
[Match Case] ..... Searches for text that matches by letter case.
[Direction] ..... Select the direction of the retrieval.
[Find Next] ..... Searches for the first text element that matches. This button is used to start searching or to search for the next object without replacing the one currently found.
[Replace] ..... Replaces the currently found text. Each time this button is pressed, the next found text is replaced.
[Replace All] ..... Replaces all the corresponding text elements. When replacement has ended, the completion message box appears on the screen.

◊ Input the text element you want to search for, and then the text element you want to replace it with.
◊ Left-click the [Find Next] button, and when an object element is found, left-click the [Replace] button. If you do not wish to replace the found element, left-click the [Find Next] button instead of the [Replace] button.
Left-clicking the [Replace All] button replaces all the corresponding elements.
When replacement has completely ended, the replacement result message box appears on the screen.

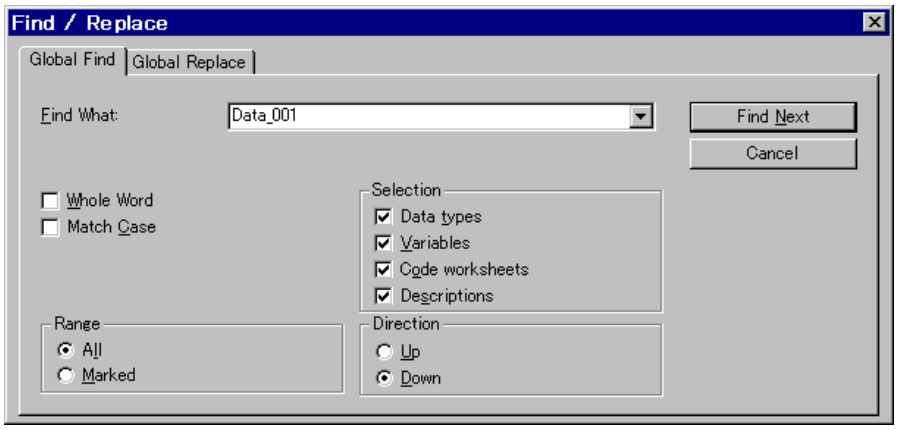
2-3-2 Global search and replace

(1) Global search

This function is used to search all opened projects for specified text elements. The search range includes the data type worksheet, code worksheet, variable worksheet, and description worksheet.

<How to search for text elements>

◊ Left-click the [Global Find ...] command in the [Edit] menu, and the {Global Find} dialog box will appear on the screen. (The dialog is displayed with the [Global Find] tab ON.)



[Find What] ..... Input the text element for which you want to search.
[Match Whole Word Only] ..... Searches for text that completely matches.
[Match Case] ..... Searches for text that matches by letter case.
[Range] ..... When [All] is selected, the entire project is searched. In the entire project, worksheets checked under [Selection] are searched.
When [Marked] is selected, only worksheets selected in the project tree are searched.
[Selection] ..... Searches checked worksheets when the optional [Marked] button is turned on.
[Direction] ..... Selects the search direction.
[Find Next] ..... Searches for the next text element that matches.

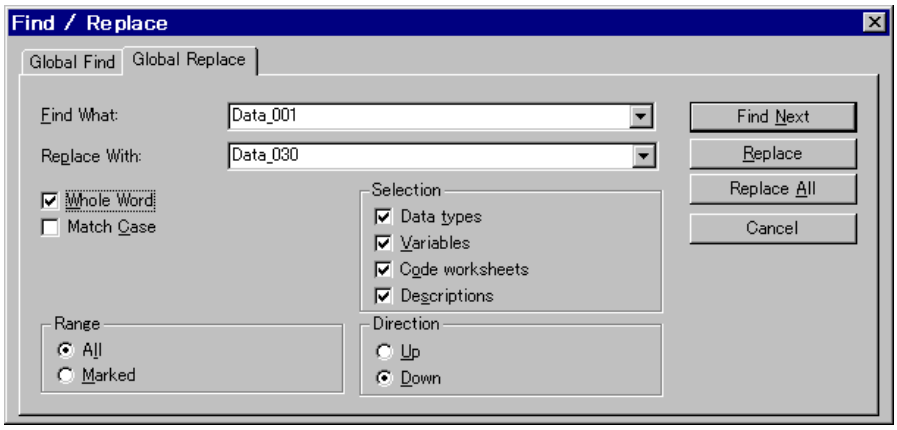
◊ Input the text element you want to search for, and left-click the [Find Next] button.
A worksheet with the matched text is opened and the found text is selected and highlighted.
◊ To search for the next text element which matches, left-click the [Find Next] button or left-click the [Find Next (global)] command in the [Edit] menu.

Text elements in a project library cannot be searched for.

(2) Global replace
Searches all opened projects for specified text elements and replace them with the desired text elements. The search range includes the data type worksheet, code worksheet, variable worksheet, and description worksheet.

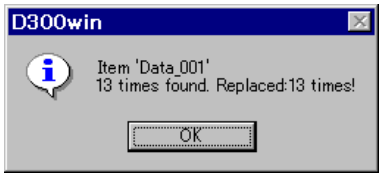
<How to replace textSïüïments>

◊ Left-click the [Global Find and Replace ...] command in the [Edit] menu, and the {Global Replace} dialog box will appear on the screen. (The dialog is displayed with the [Global Replace] tab ON.)



[Find What] ..... Input the text element you want to search for.
[Replace With] ..... Input the text element to replace the text found.
[Match Whole Word Only] ..... Searches for text that matches completely.
[Match Case] ..... Searches for text that matches by letter case.
[Range] ..... When [All] is selected, the entire project is replaced. In the entire project, worksheets checked under [Selection] are replaced.
When [Marked] is selected, only worksheets selected in the project tree are searched.
[Selection] ..... Searches checked worksheets when the optional [Marked] button is turned on.
[Direction] ..... Select the direction of the retrieval.
[Find Next] ..... Searches for the first text element that matches. This button is used to start searching or to search for the next object without replacing the one currently found.
[Replace] ..... Replaces the currently found text. Each time this button is pressed, the next found text is replaced.
[Replace All] ..... Replaces all the corresponding text elements. When replacement has ended, the completion message box appears on the screen.

◊ Input the text element you want to search for and replace, and input the text element you want to replace with.
◊ Left-click the [Find Next] button. When the corresponding element is found, left-click the [Replace] button. When not replacing the found element, left-click the [Find Next] button.
When the [Replace All] button is left-clicked, all the corresponding elements are replaced at one time.
When replacement has completely ended, the replacement result message box appears on the screen.



(1) Outline of cross-references

Cross-references show where a certain variable is used in a POU or a project. The position is indicated by POU name, worksheet name, and the coordinate values (X, Y) in the worksheet.

The following variables are displayed as cross-references:

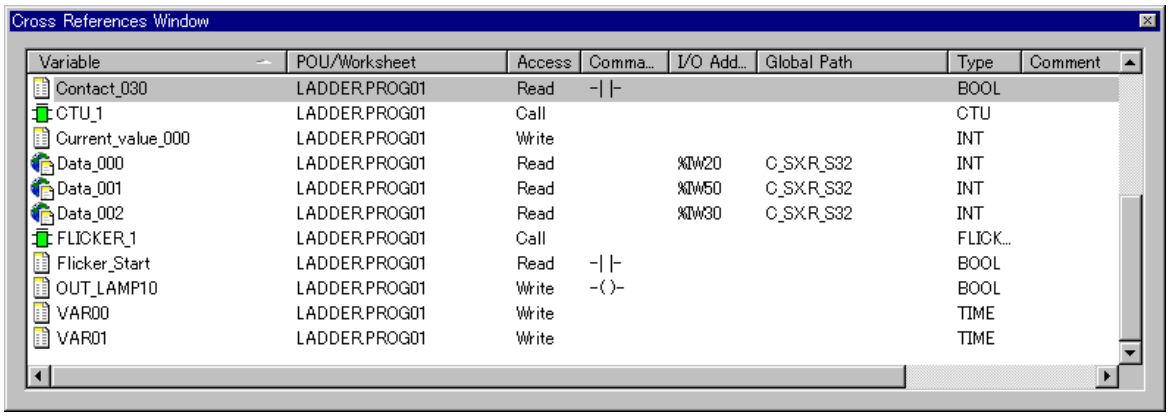
- Variable used in a project (global variable)
- Variable used only in a POU (local variable)
- Instance name of a function block
- Action variable, transition, and step used in an SFC element
- Label and connector

(2) Display of cross-references

1) How to display cross-references

◊ Left-click (turn on) the [Cross References Window] button or left-click (turn on) the [Cross references window] command in the [View] menu.

The cross references window will appear in the lower right of the D300win window.



2) How to read the display of the cross references window

[Variable] ..... Corresponding symbols and variable, FB, step, and transition names are displayed with the property symbol. When the filter is on, the symbols and names are displayed in the header section of the column.

Note: For the structure or array, each standalone element is individually displayed.

Symbol	Meaning
	Local variable
	Gloval variable
	Input variable (VAR_IN)
	Output variable (VAR_OUT)
	I/O variable (VAR_IN_OUT)
	Function block

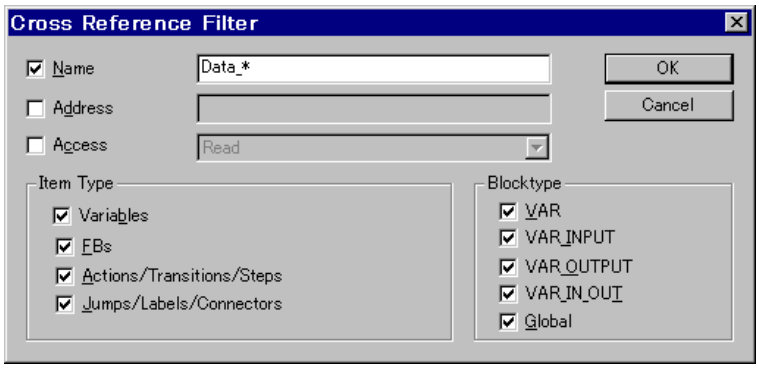
Symbol	Meaning
	Step
	Transition detail
	Action detail
	Jump
	Label
	Connector

[POU/Worksheet] ..... Displays the names of POUs with a variable/FB declared or the names of worksheets with a variable/FB used.
[Access] ..... Variable's access is divided into 'Read' and 'Write.'
[Command] ..... Displays commands in which a variable is used. Effective only for the IL, ST, and LD code worksheets.
[I/O Address] ..... Indicates a physical PC address.
[Global Path] ..... Indicates the instance path of a global variable consisting of a configuration name and a resource name, in which a global variable is declared.
[Type] ..... Shows an associated data type.
[Comment] ..... Shows a user-defined comment.
[Row/Position (X/Y)] ..... Indicates the row No. in a text worksheet or an element position in a graphic worksheet.

(3) Setting a filter

Filter settings are made in the cross references window to clarify the display items by restricting the variables to be displayed and the types (VAR, VAR_INPUT) of function blocks and variables.

◊ Move the mouse pointer onto the cross references window, and then right-click to display the shortcut menu.
◊ Left-click the [Filter] command in the menu.
The {Cross Reference Filter} dialog will appear on the screen.



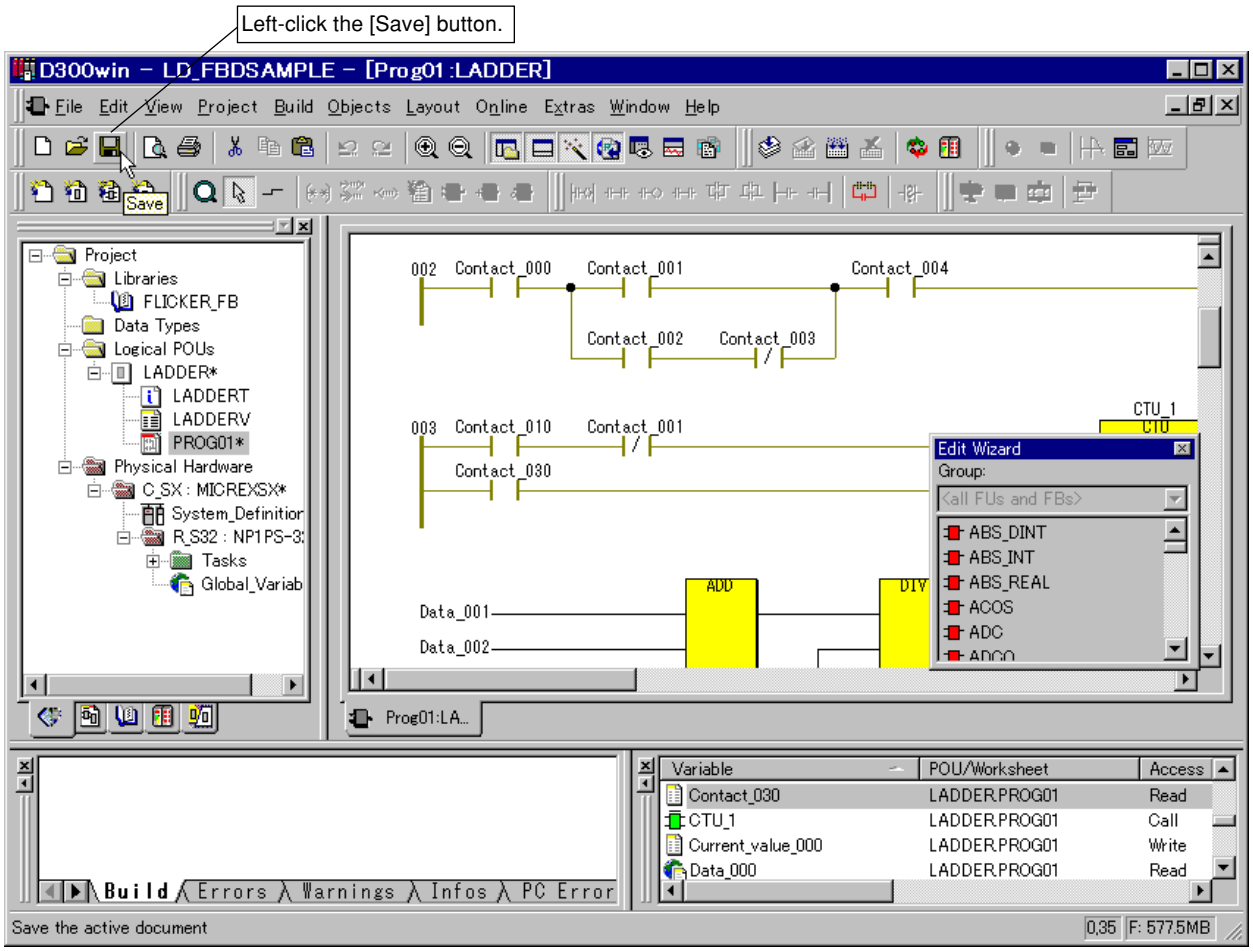
◊ Check the box for only items to be displayed in list form.
If the [Name] and/or [Address] box is checked, input the display content to the corresponding text box. If the [Access] box is checked, specify the access type in the list box.
◊ After confirming the settings in the dialog, left-click the [OK] button.
The cross reference list will be displayed according to the settings.

Periodically saving edited worksheets and projects is recommended. If not saved, data may be lost in case of power failure, etc. D300win can save edited project files in a single archive file (a file made by compressing a large file or multiple files).

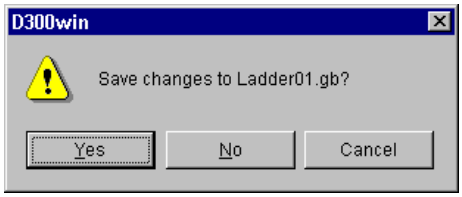
2-5-1 Saving and exiting a worksheet

(1) Saving a worksheet
The procedure for saving various edited worksheets is explained below.

◊ Left-click the [Save] button, or left-click the [Save] command in the [File] menu.
The worksheet content is saved.



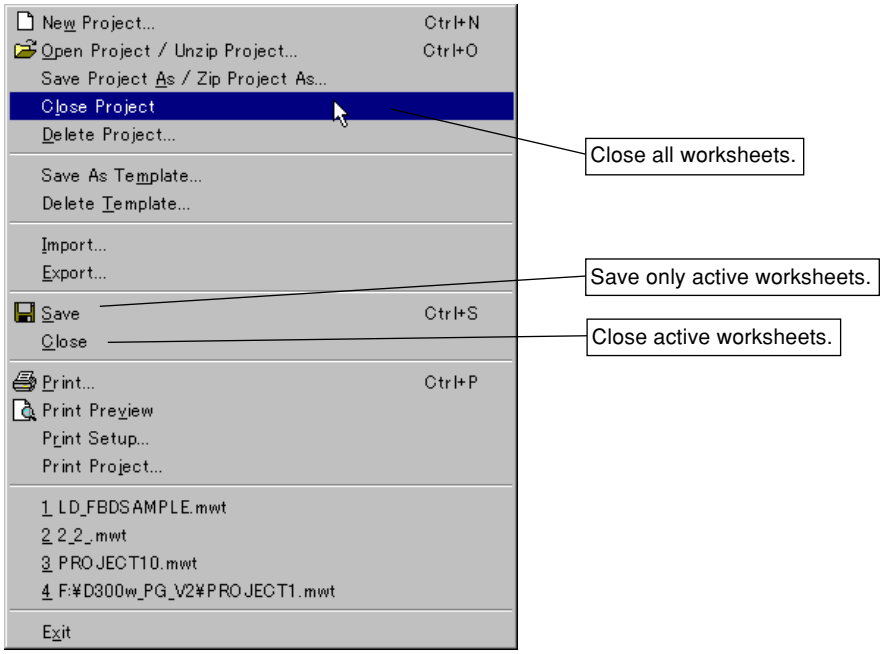
(2) Exiting the worksheet
When the editing of a worksheet has been finished, close the worksheet. If you attempt to close a worksheet which has not yet been saved, a dialog box appears on the screen. In this dialog box, select whether or not to save the worksheet.



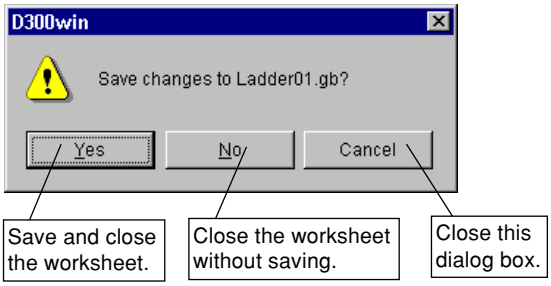
2-5 Saving and Exiting Project/Worksheet

To exit after saving all opened worksheets, select the [Close All] command from the [File] menu.

◊ Left-click the [File] menu.



◊ Left-click the object command.
The {Save worksheet?} dialog box appears on the screen.
(When the worksheet has not been changed since last saved, this dialog box does not appear.)



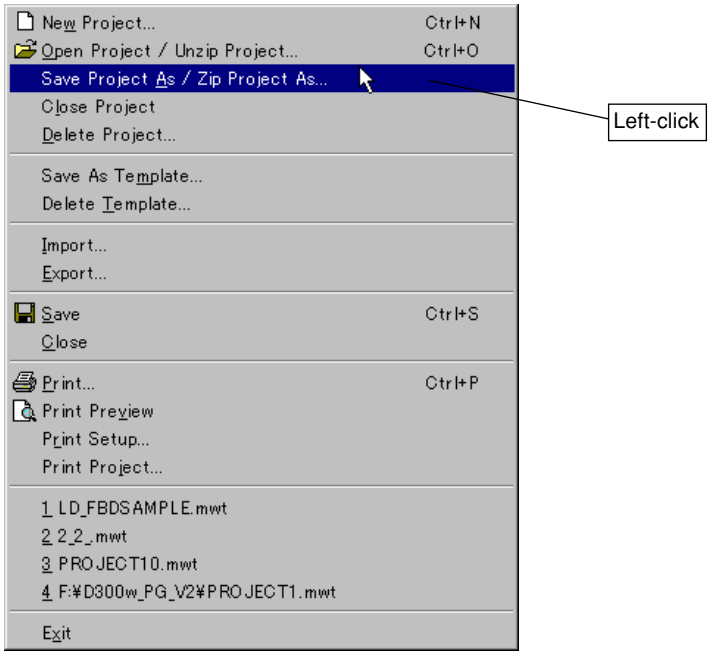
◊ To save changes and close the worksheet, left-click the [Yes] button.
◊ To close the worksheet without saving changes, left-click the [No] button.

2-5-2 Saving and exiting a project

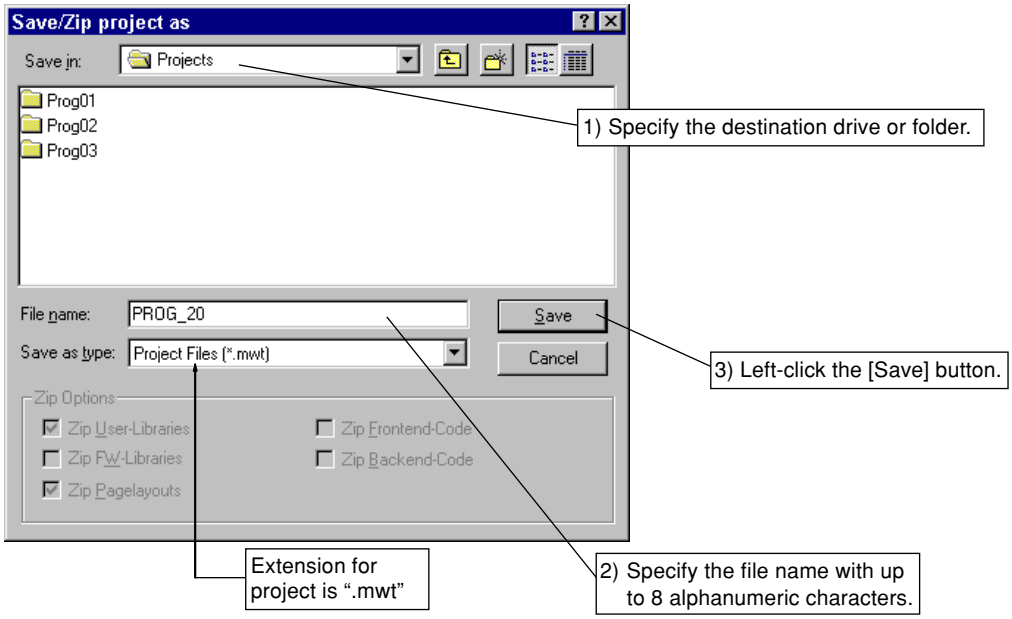
(1) Saving a project

The procedure for saving edited projects is as follows. The following explanation is made supposing that a new project is saved or that a project is saved with a different name. When a project that has previously been saved is changed, it is automatically saved.

◊ Left-click the project tree editor to activate it.
◊ Left-click the [File] menu.



◊ Left-click the [Save Project As/ Zip Project As...] command.
The {Save/ Zip Project as} dialog box appears on the screen.



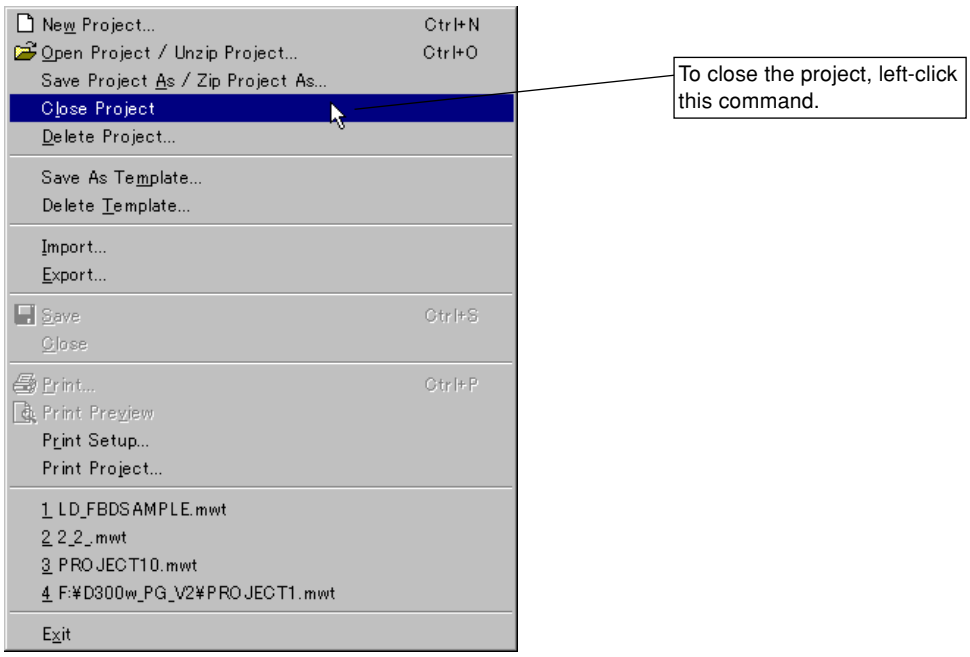
◊ Specify the drive and folder if necessary, and input the file name.
◊ Left-clicking the [OK] button saves the project.

- The maximum number of characters for a file name which can be handled by D300win is 8. (However, do not use any file name described in "3-2-3 (3) Restrictions on element names composing a project tree" or shown on the Reserve Word List in the Instructions of the User's Manual <FEH200>.
- When saving a project file, be sure to add extension ".PWT." Otherwise, the file may not be saved correctly.

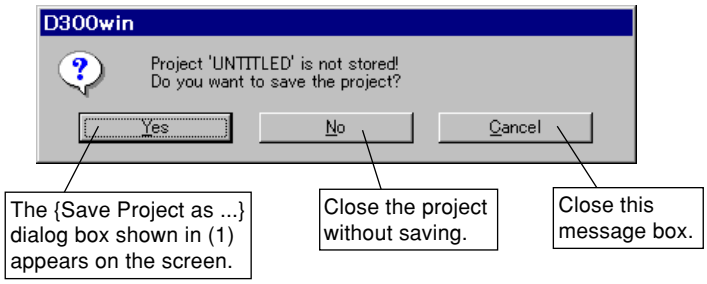
(2) Exiting a project
When the editing of a project ends or when a different project is to be edited, the currently displayed project is closed.

To end the worksheet,

◊ Left-click the project tree editor to activate it.
◊ Left-click the [File] menu.



◊ When you attempt to exit a new project, the following message box will appears on the screen. When a project that has previously been saved is ended, the project is closed without displaying the message box.



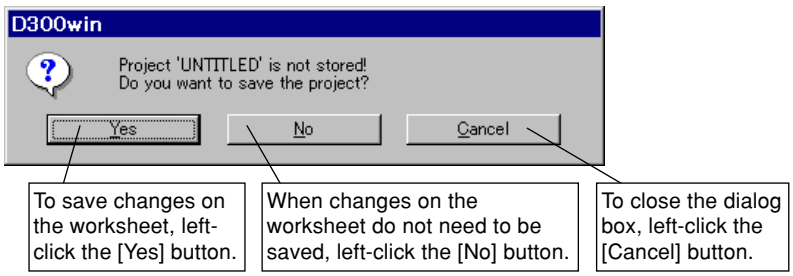
You can exit D300win at any time, even when one or more editors are opened or all windows are closed. If changes have not been saved, a dialog box appears, asking you whether or not to save changes of the worksheet.

Exiting D300win

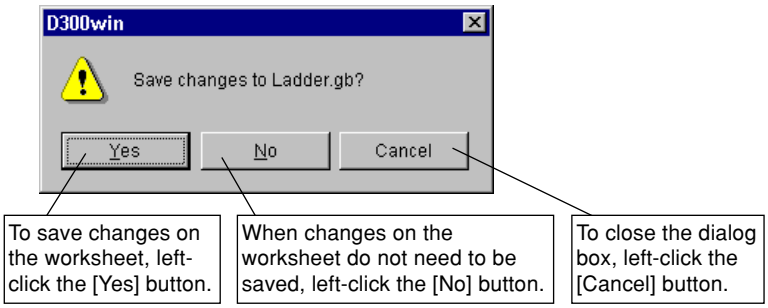
◊ Left-click the [Exit] command in the [File] menu. When the worksheet has been changed, a confirmation dialog box appears on the screen, asking you whether or not to save changes.

You can also exit D300win by left-double-clicking the system menu icon at upper left corner in the D300win user interface window.

<When the concerned project has never been saved>



<When the worksheet has been modified with the saved project>



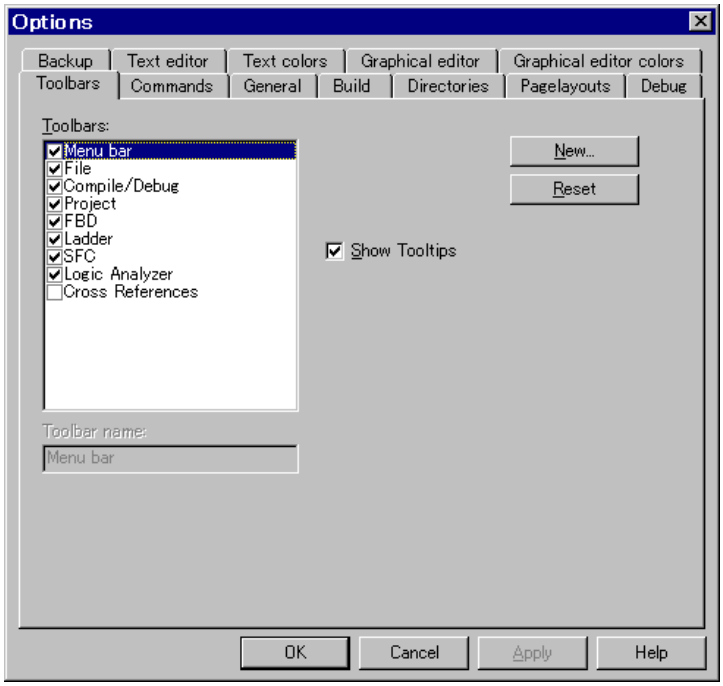
◊ To save changes and exit the worksheet, left-click the [Yes] button.
◊ To exit the worksheet without saving changes, left-click the [No] button.

Option setting allows making advance settings of the editors (graphic editor and text editor) and variable declaration method required for creating/editing a program (environment settings). The contents of these settings will be used as the initial settings of a project to be created subsequently.

<How to set options>

Call the {Options} dialog.

◊ Left-click the [Options...] command in the [Extras] menu. The {Options} dialog will appear on the screen.



For details on each panel settings, see 2-7-1 to 2-7-11.

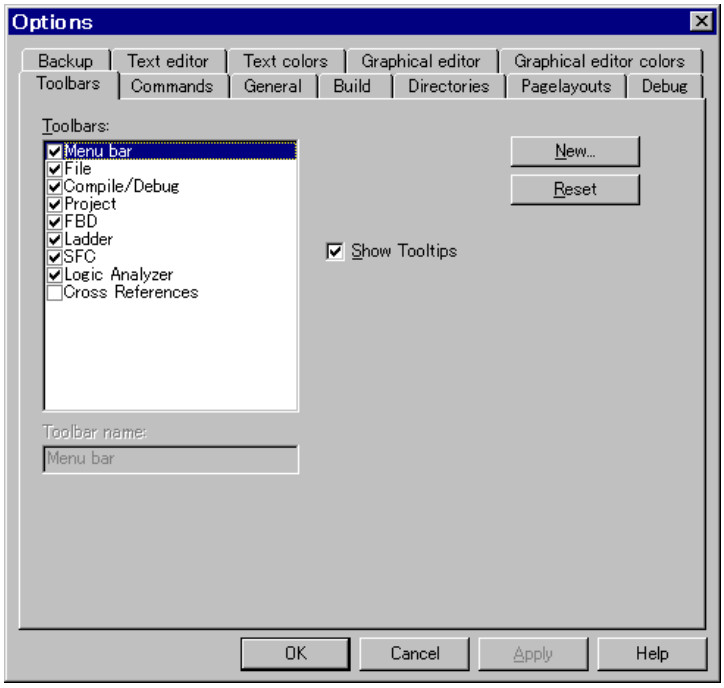
2-7-1 Setting the tool bars and commands

The items to be displayed on the tool bars can be customized in the procedure shown below.

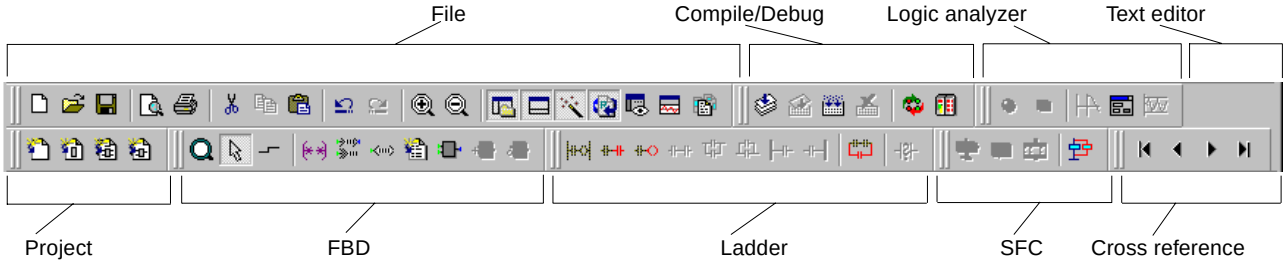
(1) Tool bar

◊ Open the [Toolbars] panel in the {Options} dialog.

◊ Check the box for the tools you want to display. To hide a tool bar, uncheck the corresponding check box.



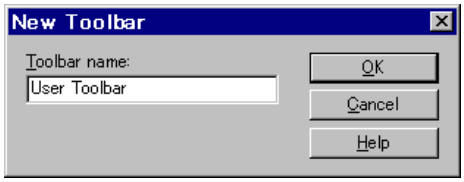
<Names of tool bars>



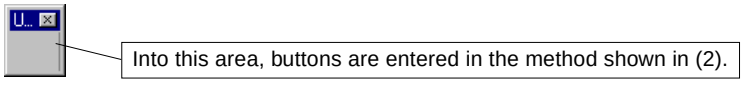
<Creating a new tool bar>

The following explains the procedure for creating an original tool bar.

◊ Left-click the [New...] button in the [Toolbars] panel.
The {New Toolbar} dialog will appear on the screen.



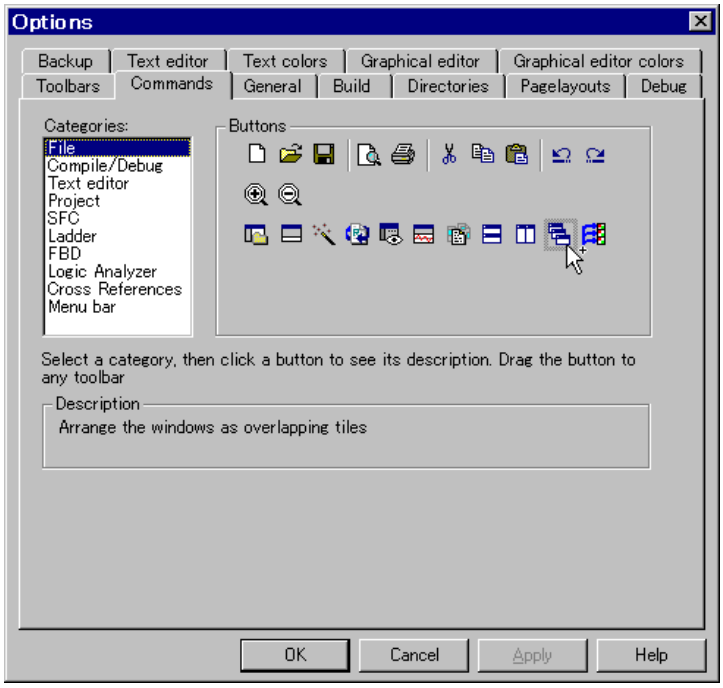
◊ Input a name of a new tool bar to be created in the [Toolbar name] text box, and then left-click the [OK] button.
The tool bar (empty) shown below will appear in the window.



(2) Adding commands to the tool bar

The D300win commands can be added to or deleted from a tool bar (new or existing) in the following procedure.

◊ Open the [Commands] panel in the {Options} dialog.

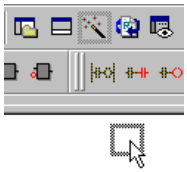


◊ Select items from the [Categories:] list box.
The icon indication of the buttons (commands) changes in the [Buttons] list box. Drag a button from the [Buttons] list box, and drop it onto the tool bar.

◊ The button will be added to the tool bar.

<Deleting a button from the tool bar>

◊ Drag a button from the tool bar, and drop it outside of the tool bar.



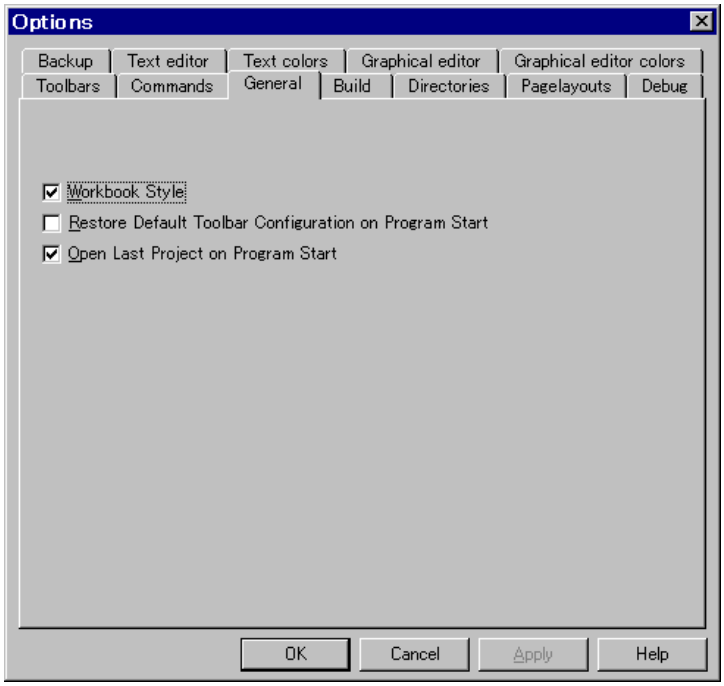
The button will be deleted from the tool bar.

◊ When not setting any items in other panels, left-click the [OK] button to close the {Options} dialog.

2-7-2 Settings for D300win startup

General settings are made including those for the initial status when D300win is started.

◊ Open the [General] panel in the {Options} dialog.



<Description of setting items>

Workbook style ..... Check this box to display the worksheet tab for activating a specific worksheet when multiple worksheets are opened in the workspace.

Restore Default Tool Bar Configuration on Program Start ..... Check this box to save the display position and size of the tool bars and windows when the program is terminated.

Open Last Project on Program Start ..... Check this box to automatically open the last project that was edited immediately before D300win shutdown when D300win is started.

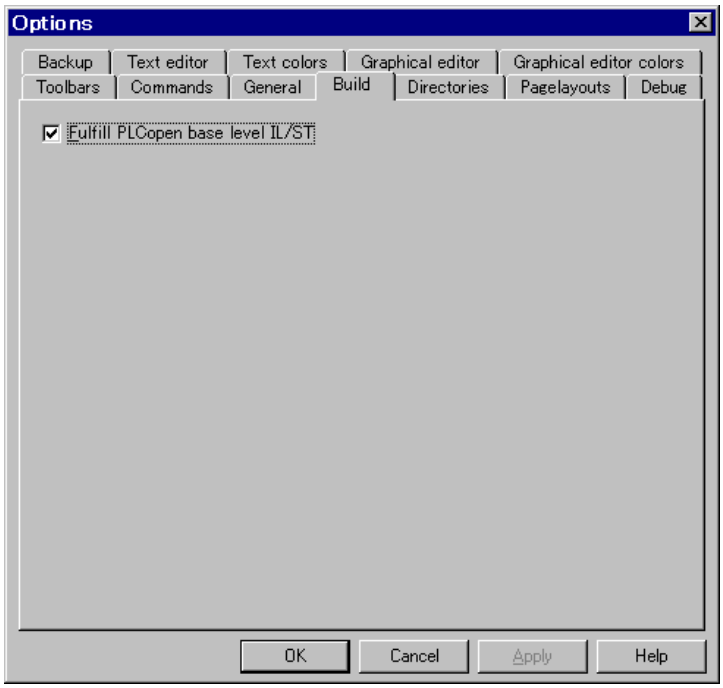
◊ After configuring all check boxes, left-click the [Apply] button.

◊ To set no items in other panels, left-click the [OK] button to close the {Options} dialog.

2-7-3 Build

This optional setting concerns compilation. Set whether or not to make the codes generated by the compiler conform to “PC open base level (IEC6311-3)” regarding IL/ST.

◊ Open the [Build] panel in the {Options} dialog.



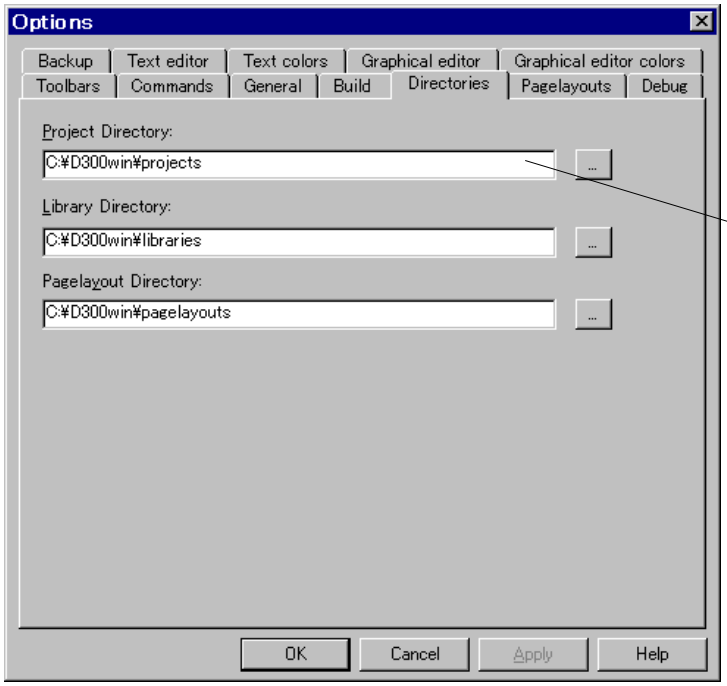
◊ Check or uncheck the box for [Fulfill PLCopen base level IL/ST], and then left-click the [Apply] button.

◊ To set no items in other panels, left-click the [OK] button to close the {Options} dialog.

2-7-4 Setting the file save destination

The location (directory) for saving a file (project, library, or page layout file) created with D300win can be set in advance.

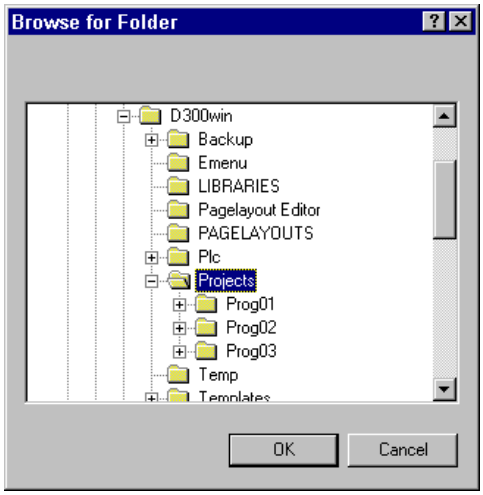
◊ Open the [Directory] panel in the {Options} dialog.



Specify each path name composing the "project directory" using a maximum of 8 alphanumeric characters.

The respective default save destination directories are set to the drive and under the directory where the D300win system has been installed (D300win in drive C, in this example).

◊ When necessary to change the directory, input a new directory name in the text box for each directory. When the directory name is unknown, left-click the [...] button to open the {Browse for Folder} dialog.



◊ Select a new directory in the {Browse for Folder} dialog, and then left-click the [OK] button to close the dialog.

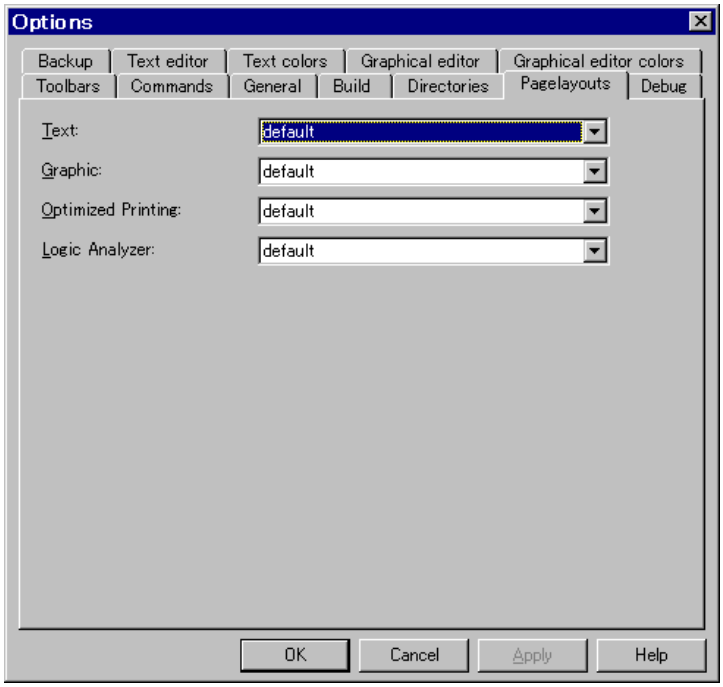
◊ Left-click the [Apply] button.

◊ To set no items in other panels, left-click the [OK] button to close the {Options} dialog.

2-7-5 Setting page layout

Page layout (created with the page layout editor) for printing programs or variables can be assigned. The page layout can be displayed as page borders in the editor for coding programs or making variable declarations. When programs or variables are written within the page borders, they can be printed without exceeding the limits of the print paper.

◊ Open the [Pagelayouts] panel in the {Options} dialog.



◊ Select the page layout to be used from each item list box, and then left-click the [Apply] button.

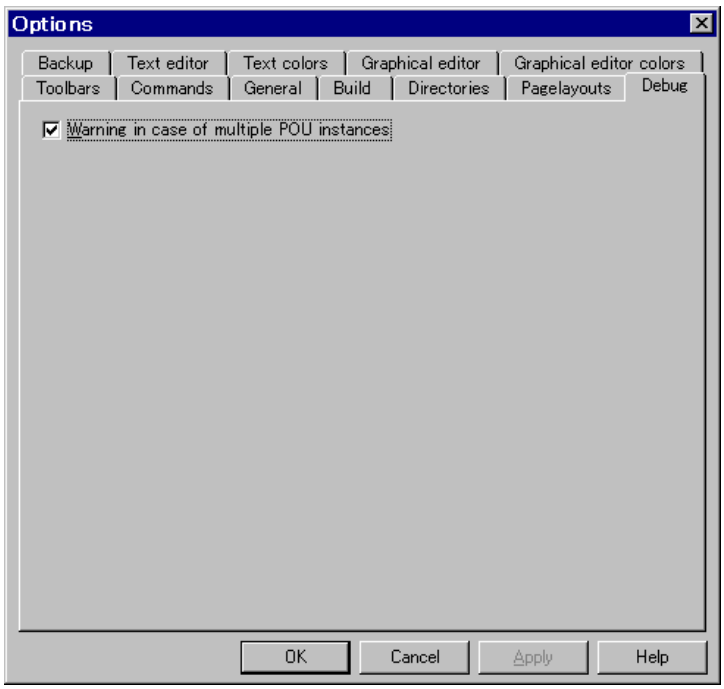
◊ To set no items in other panels, left-click the [OK] button to close the {Options} dialog.

For details on the page layout, see “14-1 Page Layout.”

2-7-6 Debug

The Debug option allows setting whether to display or hide a warning message for online monitoring. The warning message is displayed when the same program POU has been assigned (instanced) to multiple resources or when the same user function block POU has been assigned (instanced) to a resource used in multiple program POUs.

◊ Open the [Debug] panel in the {Options} dialog.

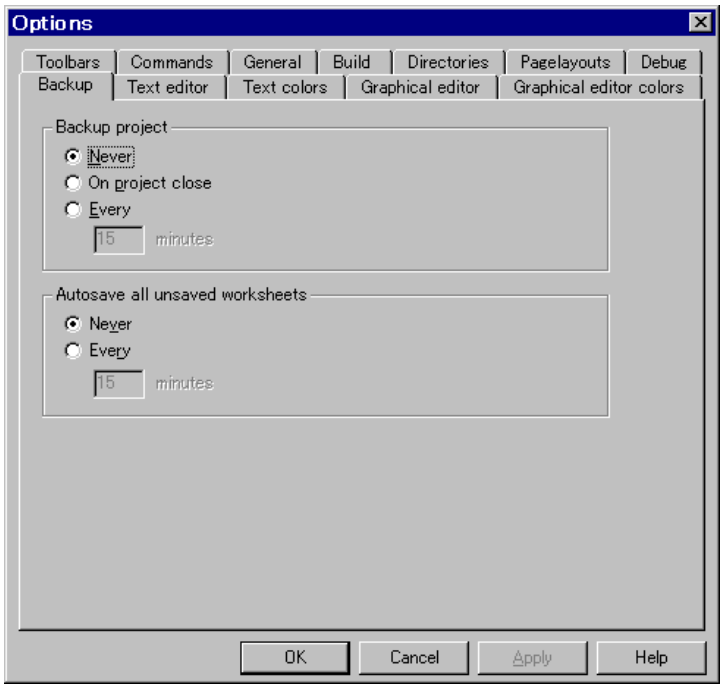


◊ Check the box to display a warning message, and then left-click the [Apply] button.

2-7-7 Backup

The current project or worksheet can be edited by automatically being saved. In this case, the editor response will be degraded during the save.

◊ Open the [Backup] panel in the {Options} dialog.



<Backup project>

[Never] ..... Check to disable automatic save of a project.
[On project close] ..... Automatically saves and closes a project when an operation has been carried out for closing (ending) the project.
[Every] ..... Automatically saves a project every number of minutes specified in the text box (in units of minutes)

<Autosave all unsaved worksheets>

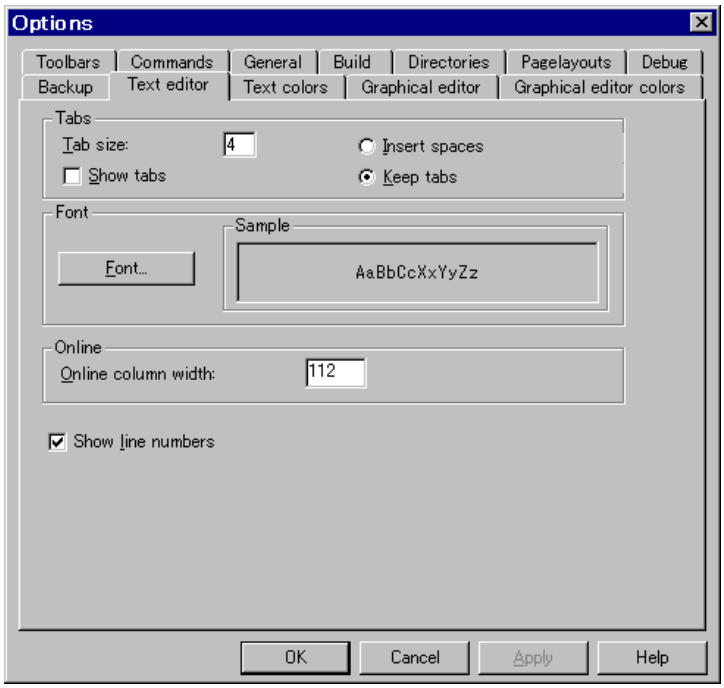
[Never] ..... Check to disable automatic save of a project.
[Every] ..... Automatically saves a project every number of minutes specified in the text box (in units of minutes)

When the automatic backup function is turned on, the project file manually created by the user is not overwritten, but a backup file (compressed file) is created with a name “project_name_back.zwt” in the D300win system.

2-7-8 Setting the text editor

The Text editor option allows making the settings for the text editor (editor for variables, IL language, and ST language) concerning the font, font size, and tab settings.

◊ Open the [Text editor] panel in the {Options} dialog.



<Tabs>

Use to align text to a specific position.

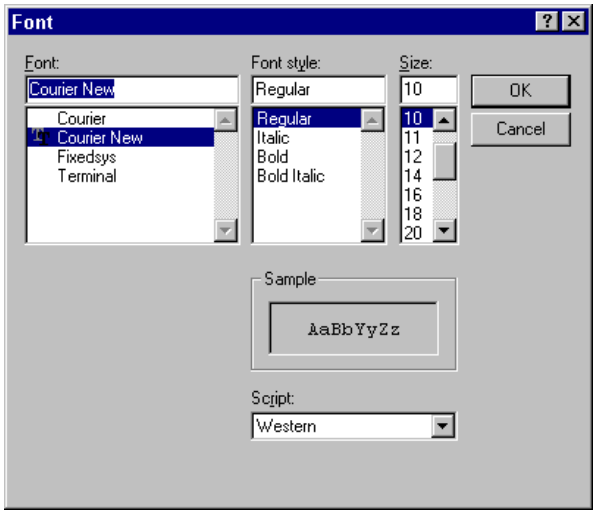
[Tab size:] ..... Specify the tab size. The tab size varies with the font size designated in the [Size:] list box in the {Font} dialog described below.

[Insert spaces] ..... Inserts spaces according to the number designated with [Tab size:]. (When the tab size is set to “5,” 5 space symbols are inserted.)

[Keep tabs] ..... Inserts a single symbol for the width corresponding to the value specified for [Tab size:].

<Font>

Left-click the [Font...] button, and the {Font} dialog will appear for specifying the font, font style, and font size.



◊ Select the font, font style, and font size to be used from each corresponding list box, and then left-click the [OK] button.

<Online>

[Online column width:] ..... Set the number of digits for online value indication in the text box. The online value is displayed on the left when the text worksheet variable, IL language or ST language code worksheet is opened in online mode.

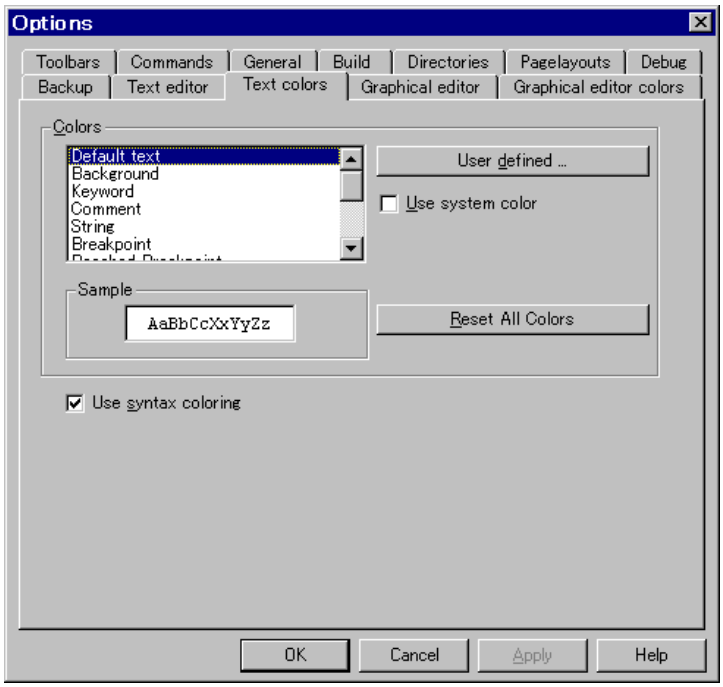
<Show line numbers>

[Show line numbers] ..... Check this box to show the line numbers on the left of the text editor.

2-7-9 Setting text colors

The character color can be changed for the instruction symbols of the program language (IL and ST languages) consisting of text, the instruction statements, variable names, and comments so that the description will be visually easy to understand.

◊ Open the [Text colors] panel in the {Options} dialog.



[Colors] ..... Includes all elements for display colors that can be set by the user. To set the display color, first select the element from this list box.

[Use system color] ..... Check this box to set the default system color for the element selected from the [Colors] list.

[User defined ...] ..... This button is effective when the [Use system color] check box is not checked. Left-click this button to display the Windows-standard color pallet and select the display color from the pallet.

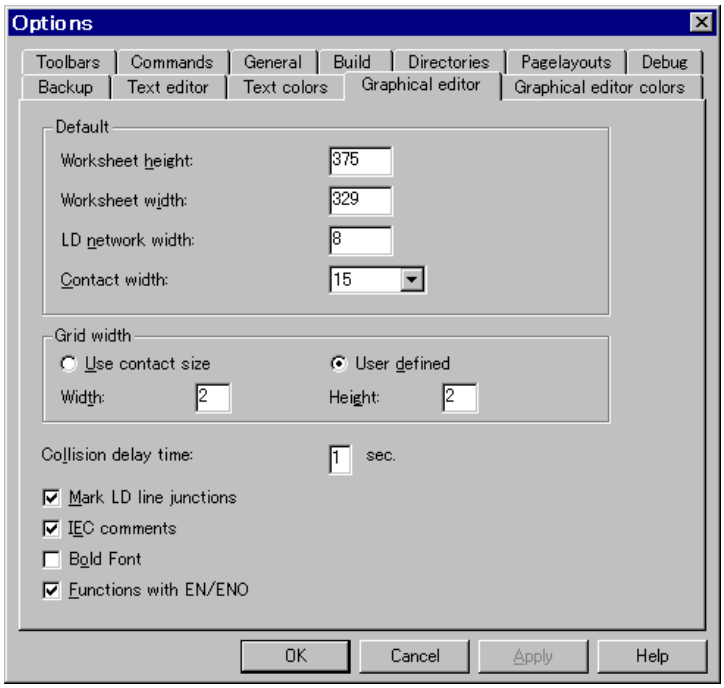
[Reset All Colors] ..... Left-click this button to reset the display color set by the user to the default setting of the D300win system.

[Use syntax coloring] ..... Check this box to apply the current color settings to the code worksheet of the text worksheet. When unchecked, the code is displayed in black.

2-7-10 Setting the graphic editor

The Graphical editor option allows making the settings for the graphic editor used to program the LD language, FBD language, or SFC elements.

◊ Open the [Graphical editor] panel in the {Options} dialog.



<Default>

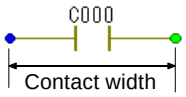
[Worksheet height:] and
[Worksheet width:]..... Allow changing the “worksheet” size. The worksheet size is specified in units of dots in the following range:

Max. height: 999 Min. height : 999
width : 999 Min. width : 999

The default settings are height: 375 and width: 329 so that programs described in the full area of a worksheet cannot be printed on a single sheet of A4-size paper.
Changes to these settings will not affect the existing worksheet sizes.

[LD network width:]..... The LD network is referred to as a circuit consisting of one contact, one coil, and left and right power rails. This item setting is used to preset the number of contacts that can be inserted in series to the circuit. This enables creating an LD network with a proper width.

[Contact width:] ..... The number of characters displayed for variables or comments to be added to a contact (coil) varies with the contact (coil) width. When the contact (coil) width is short, the variable or comment is displayed only within the available range.



The asterisk mark (*) attached to a variable name indicates that the variable name has a continuation. (The variable name can be set with a maximum of 30 alphanumeric characters, but it cannot be displayed completely.)
The sample variable name display in the case of contact width change is shown in “4-1-2 (4) Contact width.”

<Grid width>

[Use contact size] ..... Check to use the value specified in the [Contact width:] list box under [Default] as the grid width.
[User defined] ..... Check to use the value specified in the [Width:] and [Height:] text boxes as the grid width and height, respectively.

[Collision delay time]

Set from 0 to 9 seconds.
If an object inserted or moved in a graphic worksheet overlaps another, the system will automatically avoid a collision. To do so, the system waits until the specified delay time elapses, and then returns the object, that has caused a collision, to the original position (when moving an existing object) or moves it to an empty position (when inserting a new object).

[Mark LD line junctions]

Specifies whether or not to display (in black dots) junctions in an LD circuit. Check this box to display junctions.

[IEC comments]

Specifies whether or not to attach the (* and *) marks to a comment. Check this box to display the comments with these marks.
When checked: (*Sequence control program*)
When unchecked: Sequence control program

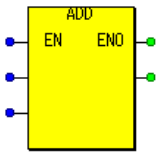
[Bold font]

Check this box to display variable names in bold font.

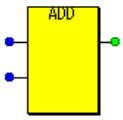
[Functions with EN/ENO]

Specifies whether or not to add the “EN” (Enable) input terminal and “ENO” (Enable Out) output terminal to a function. Check this box to add those terminals.

With EN/ENO



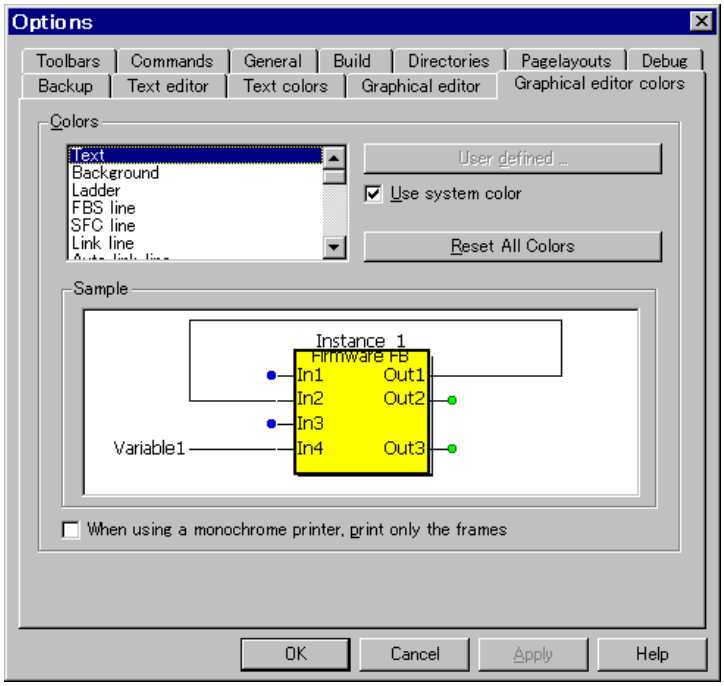
Without EN/ENO



2-7-11 Graphic editor colors

Colors can be set for the elements (LD language, FBD language, and SFC elements) handled with the graphic editor.

◊ Open the [Graphical editor colors] panel in the {Options} dialog.



[Colors] ..... Includes all elements for display colors that can be set by the user. To set the display color, first select the element from this list box.

[Use system color] ..... Check this box to set the default system color for the element selected from the [Colors] list.

[User defined ...] ..... This button is effective when the [Use system color] check box is not checked. Left-click this button to display the Windows-standard color pallet and select the display color from the pallet.

[Reset All Colors] ..... Left-click this button to reset the display color set by the user to the default setting of the D300win system.

[When using a monochrome printer, print only the frames] ..... When this box is checked, only the frames are printed. When it is unchecked, the code is shown in black and the area surrounded by the frames is printed in gray (depending on the set color).

Section 3 Preparation for Creating a Project

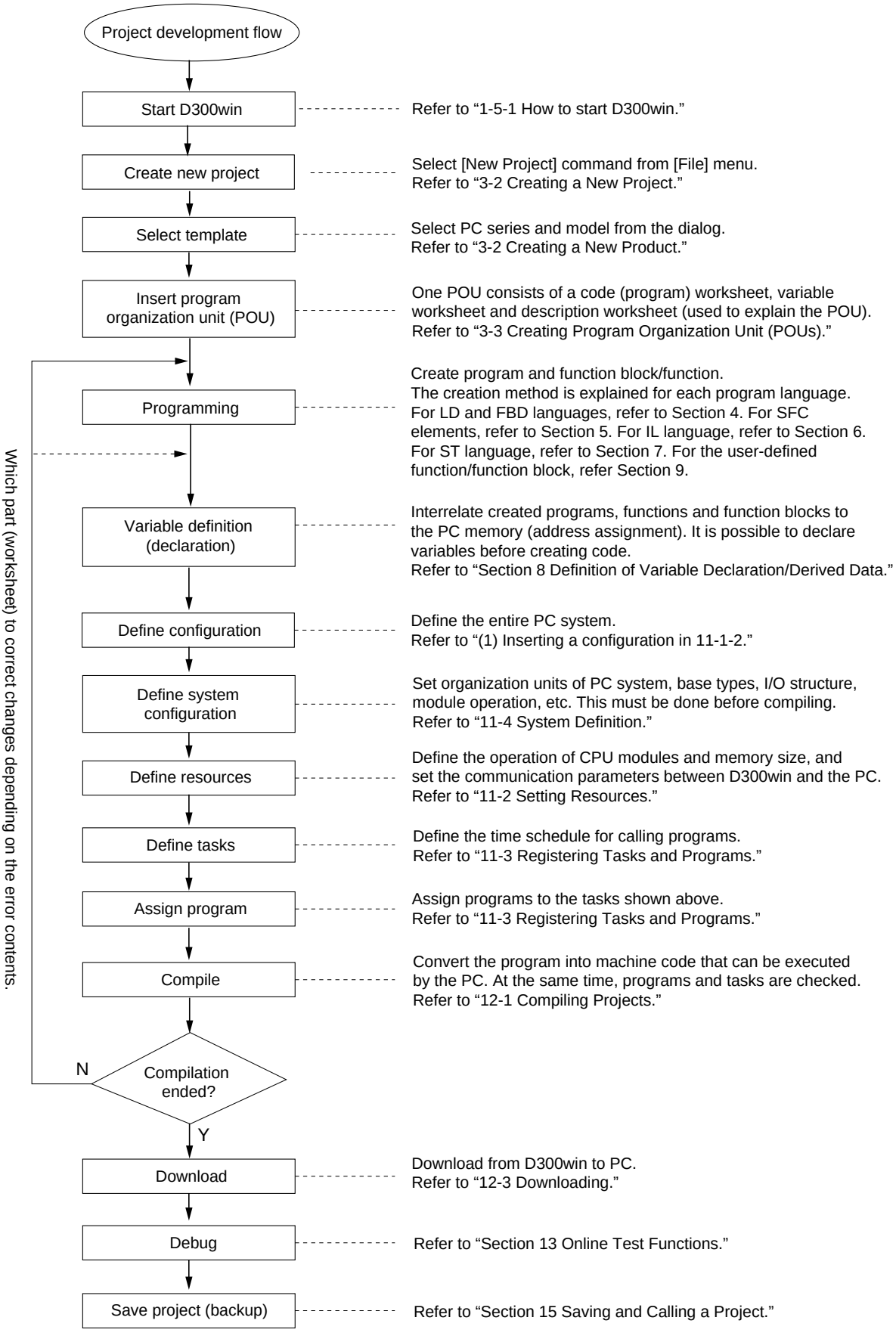
page

Section 3 Preparation for Creating a Project

3-1 Developing a Project with D300win

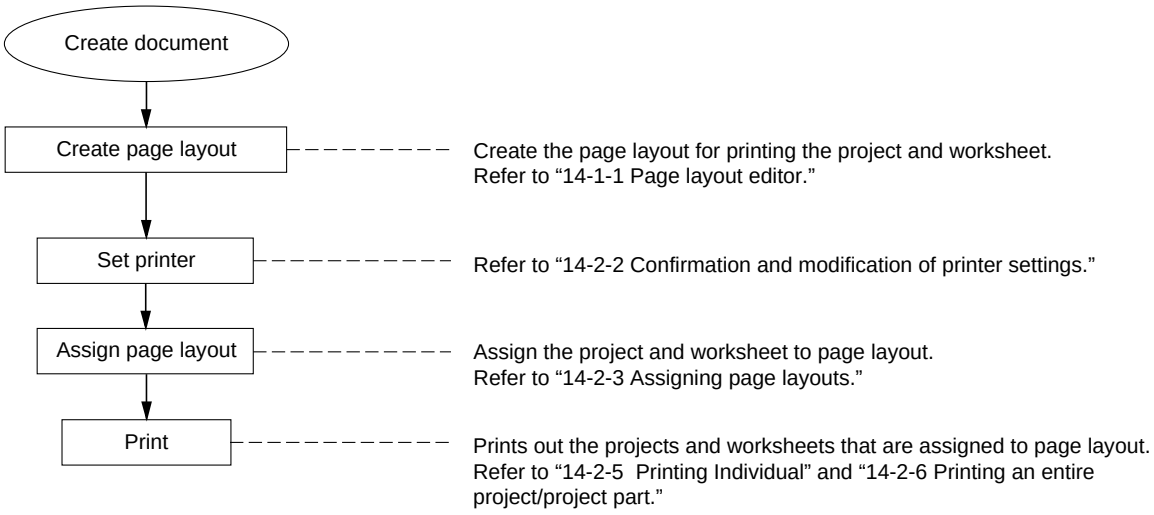
3-1-1 Project development flow

The operation flow for creating a project with D300win is shown below:



3-1-2 Documentation flow

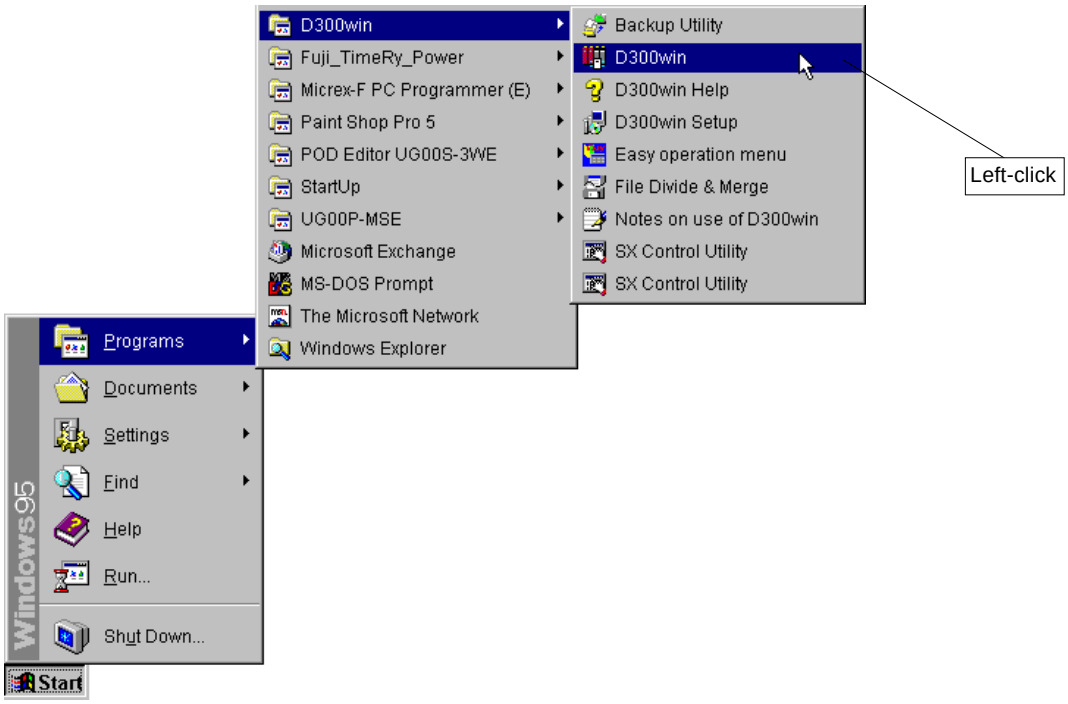
The operation flow for documentation, including the printout of the entire project, programs and variables, is shown below:



3-2-1 Starting D300win

(1) Starting D300win

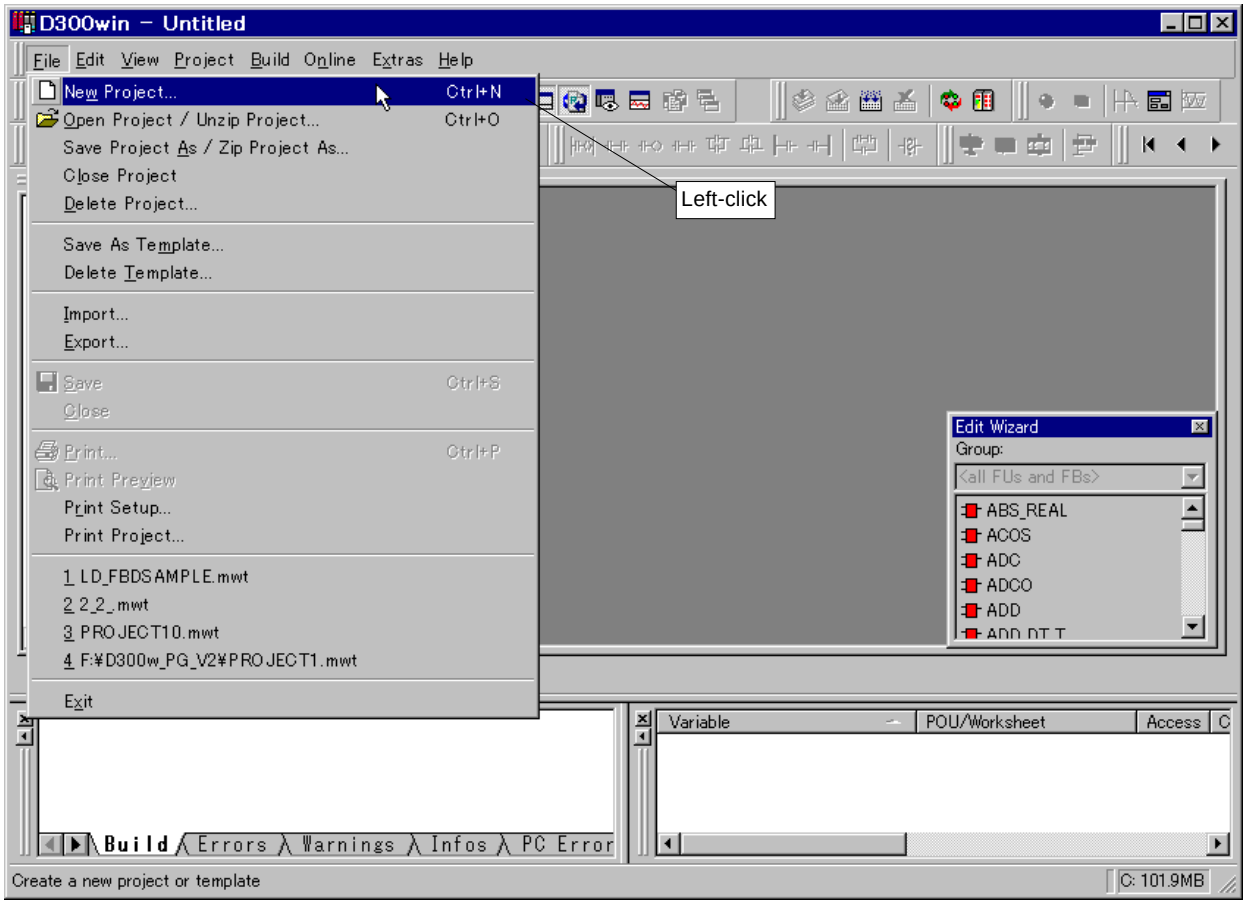
◊ To start D300win, select [D300win] program folder from the [Programs] menu under Windows95 [Start] menu, and left-click the [D300win] command.



(2) Creating a new project

◊ Left-click the [New Project] command in the [File] menu.

File menu just after D300win is started

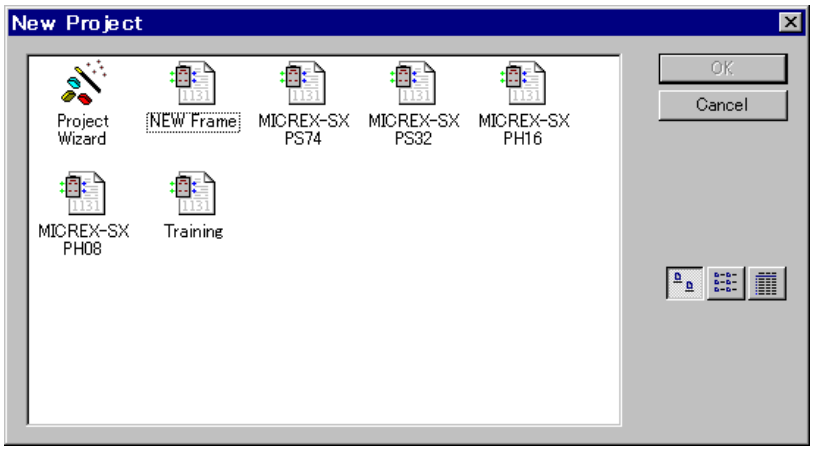


Left-clicking [New Project] displays the {Project template} dialog box on the screen.

1) Using a MICREX-SX template

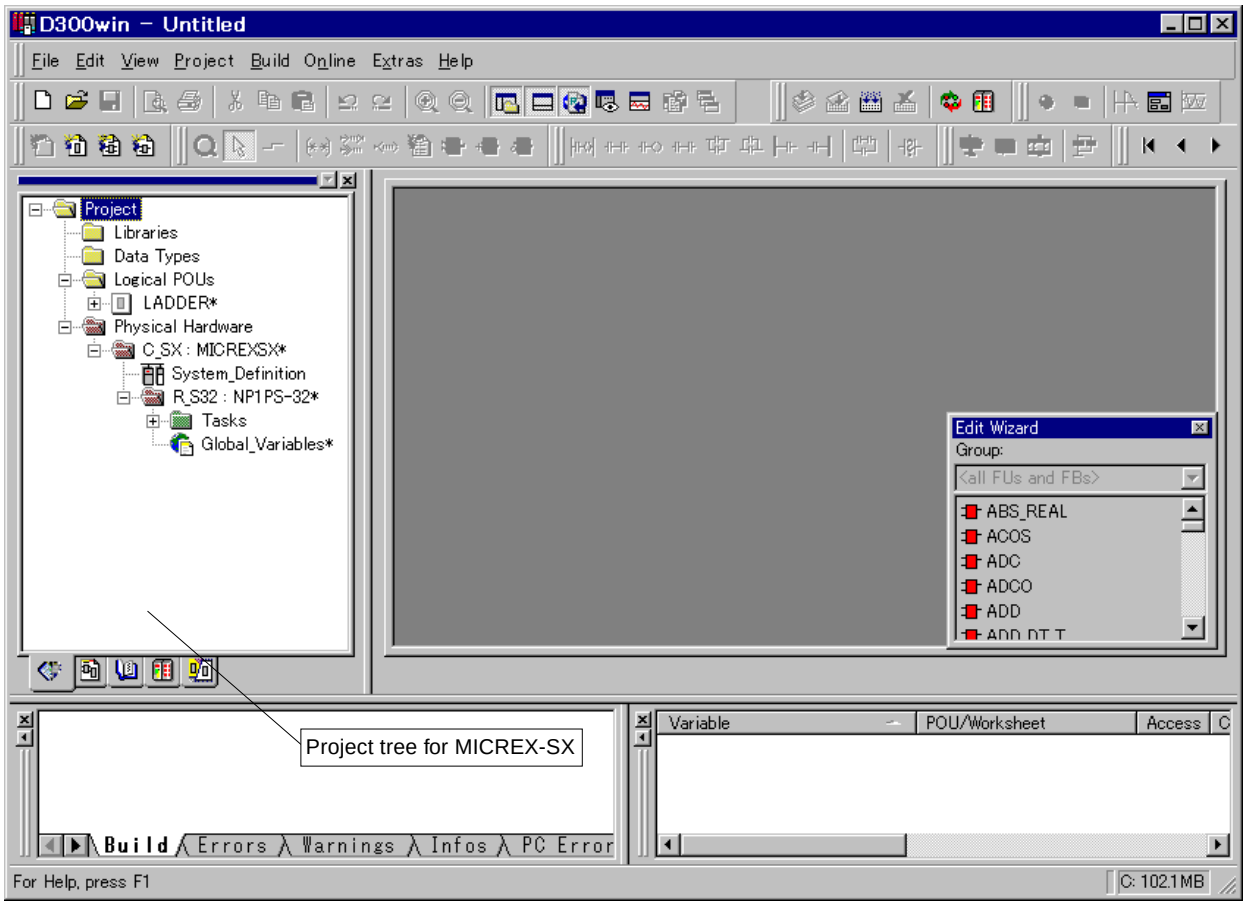
From the list box, select the template for the object system (in this example, the MICREX-SX template is selected), and left-click the [OK] button. The template assigns the minimum elements (programming commands available for the system, system definition, etc.) which correspond to the object system to the project.

{Project template} dialog box



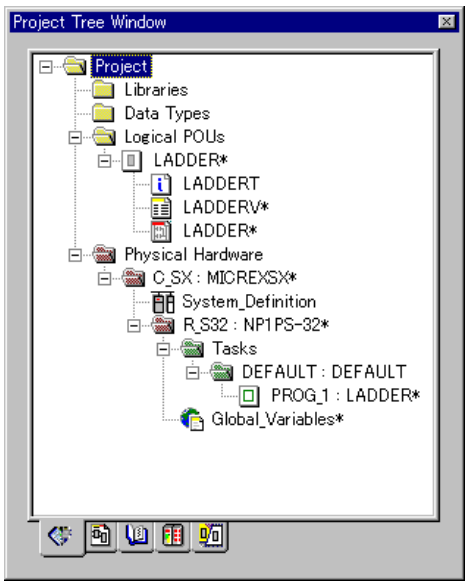
The {Project template} dialog box shown in the figure at left appears when [Typical] is selected in the {Setup} dialog box. If [Compact] or [Custom] is selected, a different template dialog will be displayed.

The project (tree) created by the MICREX-SX PS32 template is as follows:

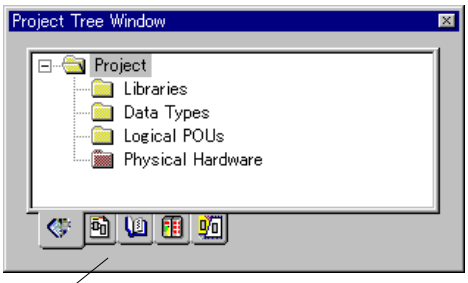


The structure of the project tree which is called first changes depending on which project template is selected. This change appears mainly in physical hardware.

Template for “MICREX-SX series”



Template for “New Project”



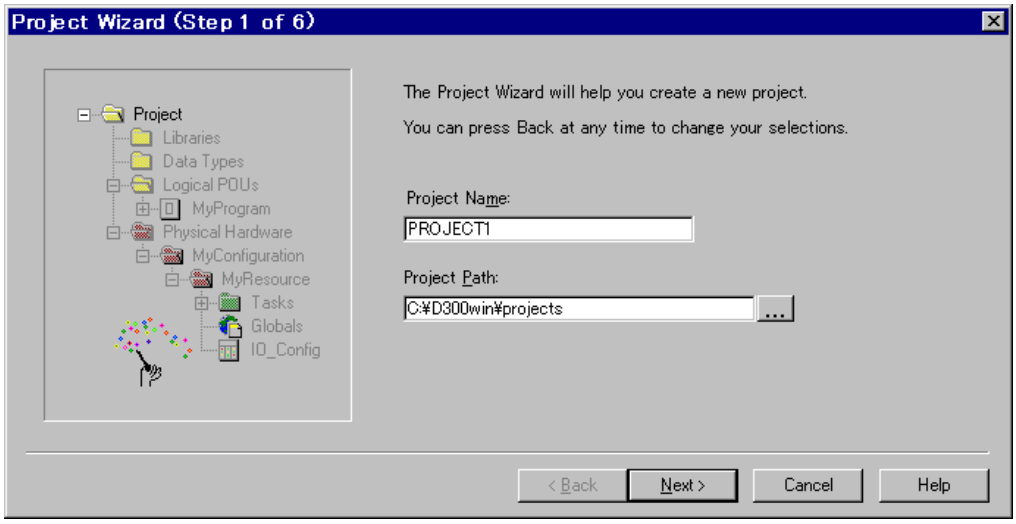
The project tree created with the “New Project” template has no definition in the “Physical Hardware” subtree. This feature can be used to create a “user defined function/function block” which has no “Physical Hardware” data. (The definition of “Physical Hardware” can be added later.)

For the relationship between PC system and project tree, see “3-2-2 Relationship between PC system and D300win”. For the name of each element of project tree, see “3-2-3 Project tree”.

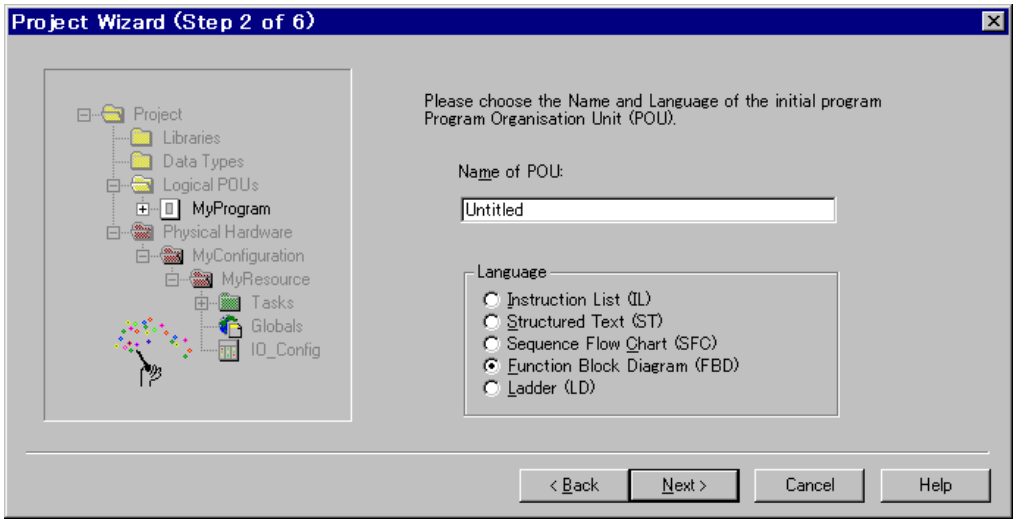
2) Using the Project Wizard

The following describes how to create a project (project tree) using the Project Wizard.

◊ Left-click the [Project Wizard] icon in the {New Project} dialog, and then left-click the [OK] button.
The {Project Wizard (Step 1 of 6)} dialog will appear on the screen.

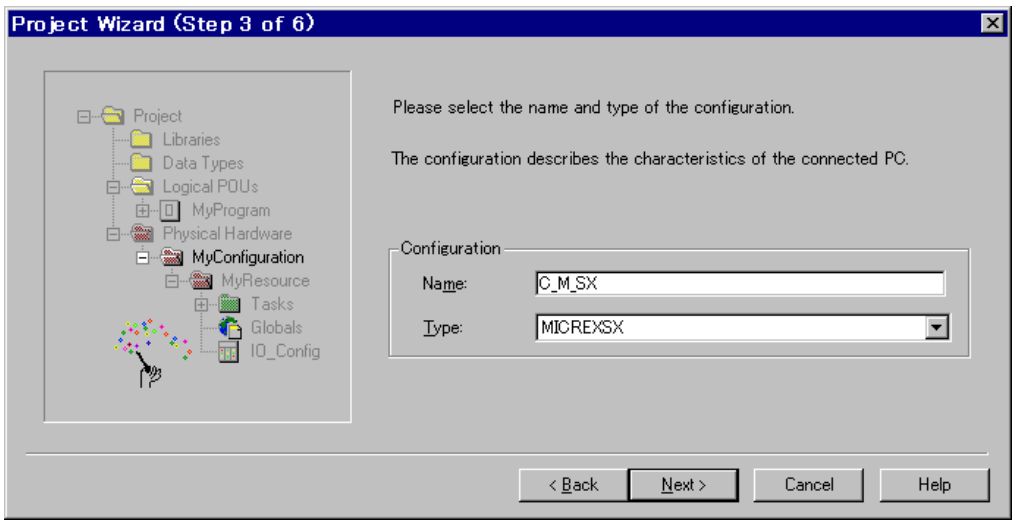


◊ Input a project name in the [Project name:] text box.
◊ To change the path shown in the [Project path:] text box, directly input a new path in the text box or left-click the [...] button to display the {Select Directory} dialog and specify a new path.
◊ Left-click the [Next] button.
The {Project Wizard (Step 2 of 6)} dialog will appear on the screen.

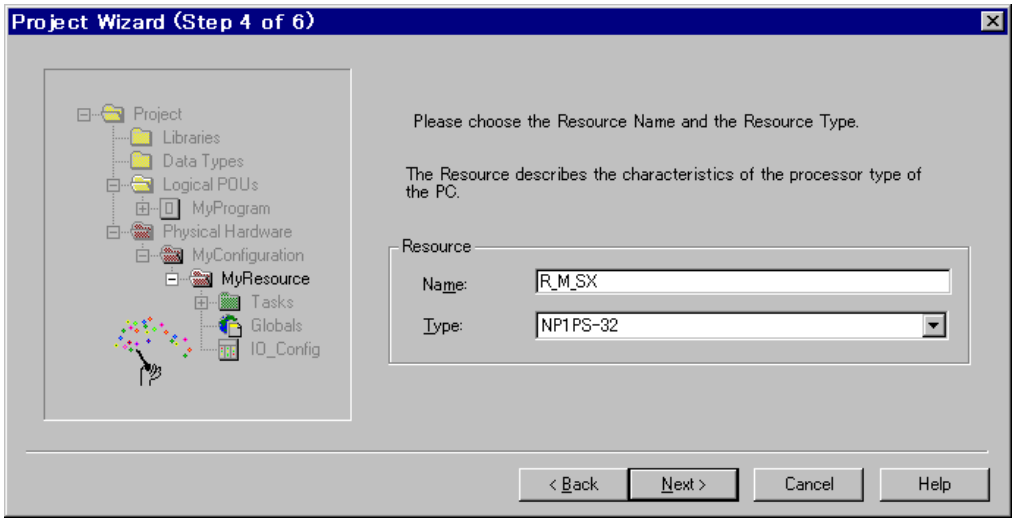


◊ Input a POU name in the [Name of POU:] text box.
◊ Turn on the option button for the program language to be used.
◊ Left-click the [Next] button.

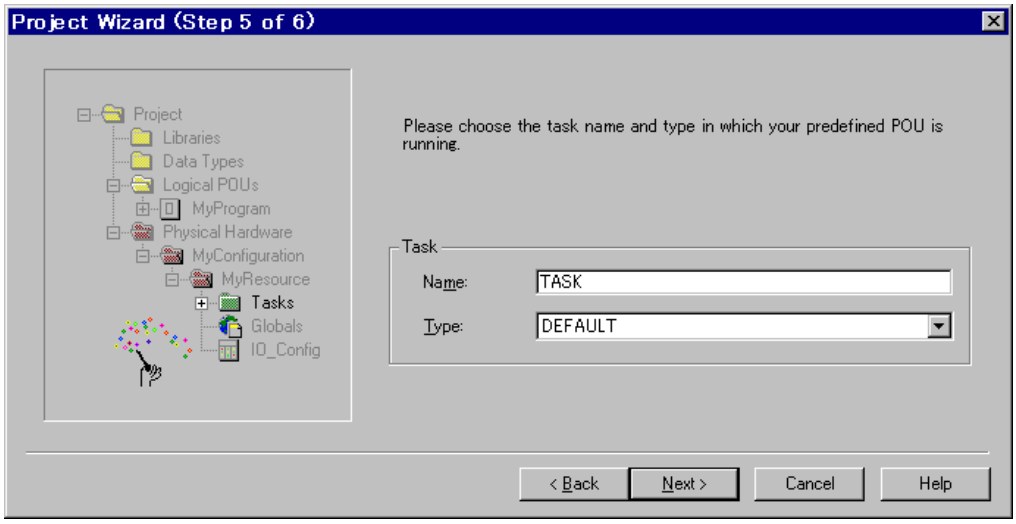
The {Project Wizard (Step 3 of 6)} dialog will appear on the screen.



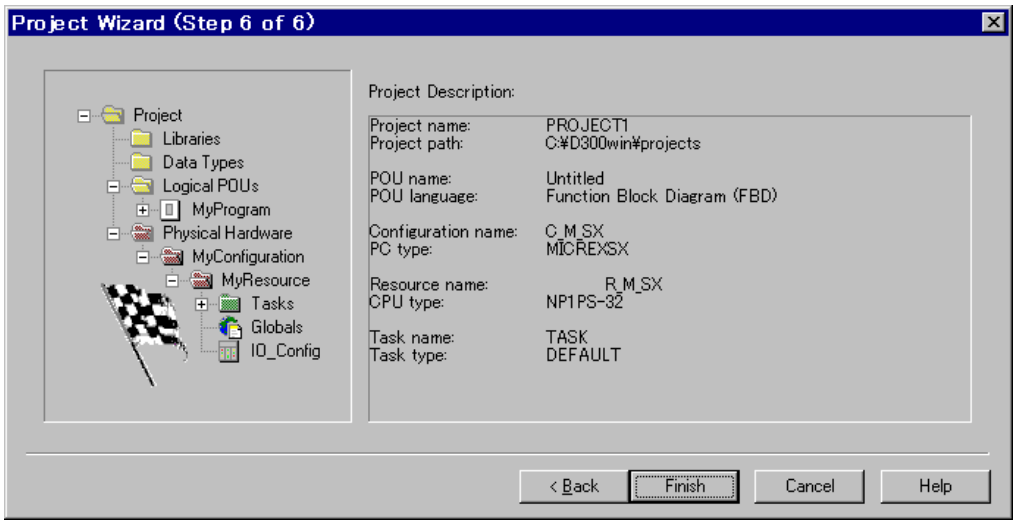
◊ Input a configuration name in the [Name:] text box.
◊ Specify the PC series name to be used in the [Type:] list box.
◊ Left-click the [Next] button.
The {Project Wizard (Step 4 of 6) dialog will appear on the screen.



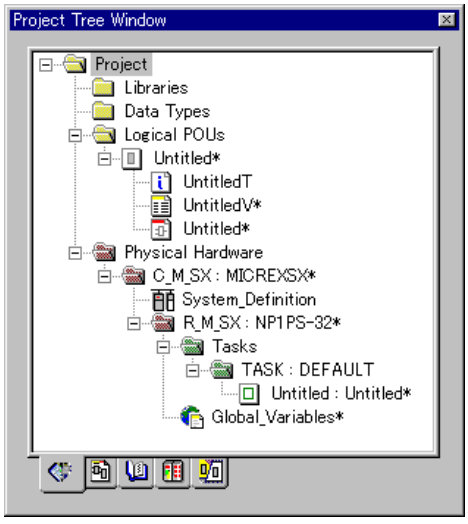
◊ Input a resource name in the [Name:] text box.
◊ Specify the CPU type to be used in the [Type:] list box.
◊ Left-click the [Next] button.
The {Project Wizard (Step 5 of 6)} dialog will appear on the screen.



◊ Input a task name in the [Name:] text box.
◊ Specify the task type (DEFAULT, FIXED_CYCLE, or EVENT) to be used in the [Type:] list box.
◊ Left-click the [Next] button.
The {Project Wizard (Step 6 of 6) dialog will appear on the screen.

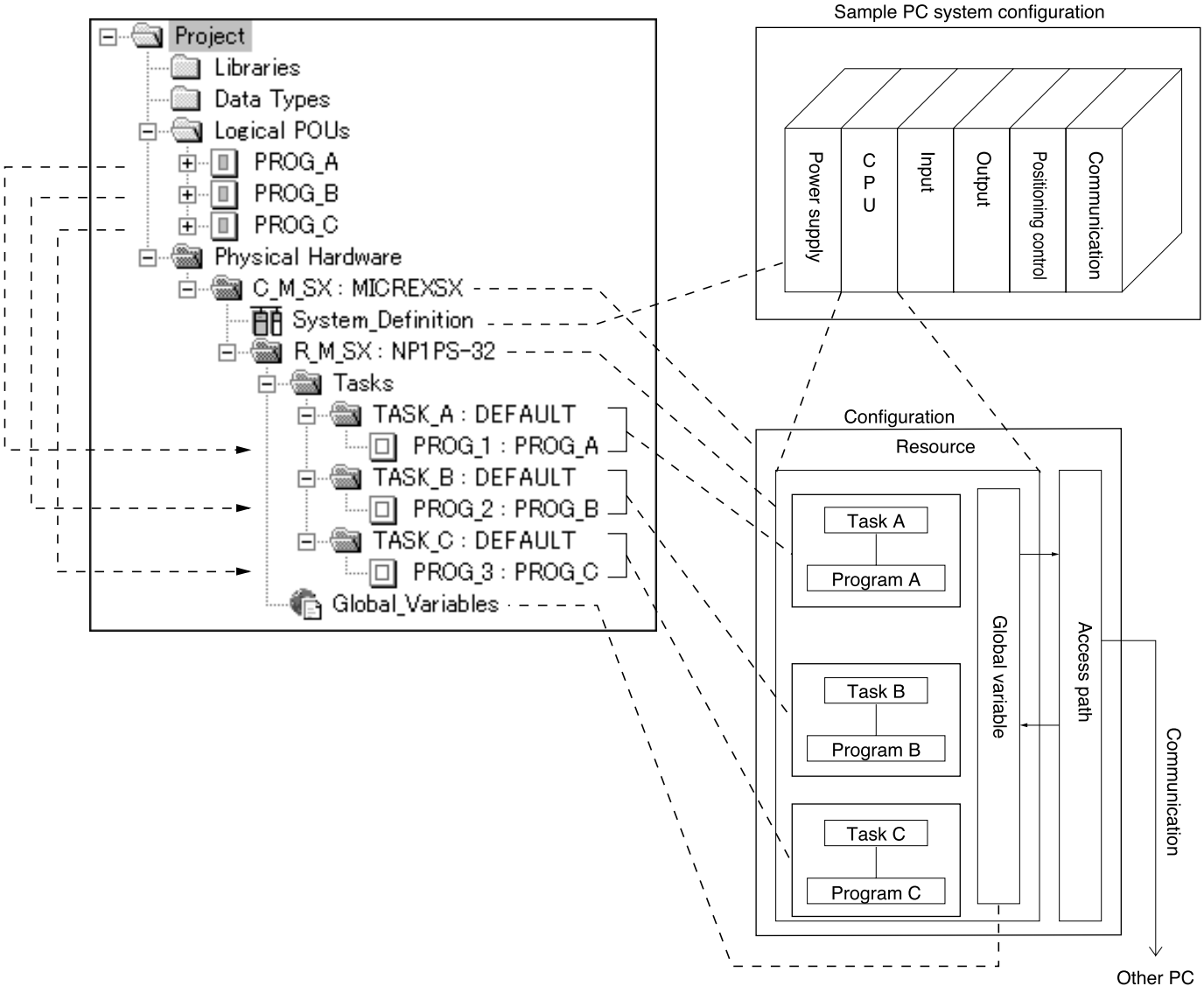


The contents input and specified in the {Project Wizard (Steps 1/6 to 6/6)} dialogs are displayed. To change the contents, left-click the [Back] button to return to the target dialog, and then make changes.
◊ After confirming the contents of the project description, left-click the [Finish] button. The project tree will be displayed in the project tree window according to the settings.



3-2-2 Relationship between PC system and D300win

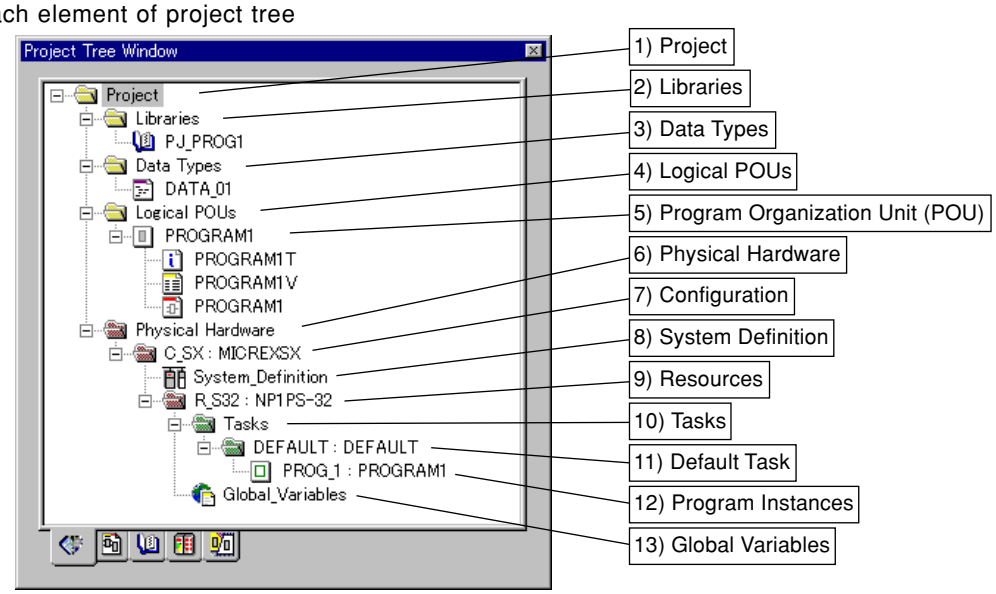
The relationship between the PC system configuration and the elements of a D300win project is as follows. (The project tree shown below is introduced only for the purpose of explanation.)



3-2-3 Project tree

The project tree created by the MICREX-SX template is as follows:

(1) Each element of project tree



1) Project ..... Situated at the highest level of the hierarchy when a PC system is constructed (planned) with D300win. Project manages what is allocated in the subordinate layers, including programs, PC system configurations, and operational definitions.

2) Libraries ..... A folder to register other projects. Programs, FBs and FCTs in the projects that are registered in this folder can freely be used by this project.

3) Data Types ..... A folder in which the worksheets for declaring derived (user defined) data types (array, structure, etc.) can be inserted.

4) Logical POUs ..... A folder in which POUs of programs, user defined functions, and user defined function blocks can be inserted.

5) Program Organization Unit (POU) (LADDER) ..... One POU consists of the description worksheet, variable worksheet, and code worksheet (these worksheets can be added)

6) Physical Hardware ..... A folder in which the elements for setting or operating hardware or software elements of a whole PC system can be registered.

7) Configuration (C_SX) ..... Can be thought of in terms of a rack-type PC systems. Configuration sets the type (series name) of PC.

8) System Definition ..... Sets PC system configuration and parameters for each module.

9) Resources (R_S32) ..... Corresponds to CPU module. The definition of CPU operation, the definition (change) of memory size, etc., are made here.

10) Tasks ..... Manages the tasks that are registered here.

11) Default Task (DEFAULT) ..... This is a cyclical task. Besides a cyclic task, a fixed-cycle task or event task can be default task.

12) Program Instances (PROG_1) ..... In order to secure (allocate) a program memory in the CPU, tasks are named and registered here.

13) Global Variables ..... The variables that are to be used in the whole project (within multiple POUs and CPU module) are registered here.

(2) Meaning of the icons displayed in the project tree window
The following describes the meaning of all the icons used in the project tree.

 An empty folder with no object. This icon is used to indicate the entire project, each sub-tree (excluding [Physical Hardware]), the action and transition in the SFC POU.

 A closed folder containing objects (for example, worksheets, sub-folders, and others).

 An open folder. The contained objects are displayed in the hierarchy below.

 Registered library contained in the [Libraries] sub-tree (folder).

 Data type worksheet contained in the [Data Types] sub-tree (folder).

 Program organization unit (POU) contained in the [Logical POUs] sub-tree (folder). The program always consists of one or more code worksheets, variable worksheet, and/or description worksheets.

 Function block POU contained in the [Logical POUs] sub-tree (folder). The function block always consists of one or more code worksheets, variable worksheets, and/or description worksheets.

 Function POU contained in the [Logical POUs] sub-tree (folder). The function always consists of one or more code worksheets, variable worksheets, and/or description worksheets.

 Description worksheet contained in a POU or configuration element. The worksheet describes an option explanation for documentation.

 Variable worksheet contained in a POU. The variable worksheet name ends with “V” as the default.

 ST code worksheet contained in a POU.

 IL code worksheet contained in a POU.

 LD code worksheet contained in a POU.

 FBD code worksheet contained in a POU.

 SFC code worksheet contained in a POU.

 Code worksheet of an action or transition contained in a POU of an SFC element.

 A closed folder of the [Physical Hardware] sub-tree. It includes the configuration and resources.

 An open folder of the [Physical Hardware] sub-tree. The configuration and resources are displayed.

 Program instance. It indicates a program instance name assigned to a task.

 System definition icon contained in a configuration in the [Physical Hardware] sub-tree.

 Global variable worksheet contained in a resource in the [Physical Hardware] sub-tree.

(3) Restrictions on element names composing a project tree
The following describes restrictions on the name of each element when the project structure (tree) is edited (for example, adding or deleting an element).

1) Element available with Japanese language
- Project name
- POU name
- Worksheet name (excluding a global variable worksheet)
- Program instance name

2) Unavailable characters
Note that the following characters cannot be used for all elements in the project tree: \, /, :, ., ,, *, ?, “, <, >, |, and system-reserved words (for example, R, C, POE, COM, and PROGRAM)

* For details on the system-reserved word, see the Instructions of the User’s Manual <FEH200>.

3) Restrictions on characters (count)

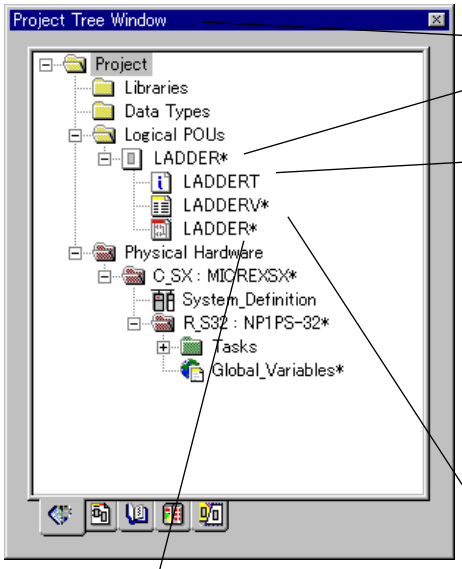
<Element specified with up to 8 characters>
The following shows elements to be specified with a maximum of 8 alphanumeric characters:
- Project name
- Program instance name
- Configuration name
- Resource name

<Element specified with up to 24 characters>
The following shows elements to be specified with a maximum of 24 alphanumeric characters:
- Data type worksheet name
- Description worksheet name
- Variable worksheet name
- Code worksheet name
- Global variable worksheet name

<Elements specified with up to 7 characters>
The following shows an element to be specified with a maximum of 7 alphanumeric characters:
- Task name

A program is described by inserting a POU into [Logical POUs], a sub-tree of the project tree. A POU consists of a “code worksheet” for describing the program, “variable worksheet” for describing variables, and a “description worksheet” for describing the explanation of the program.
When a new project is created, it is given the project name “UNTITLED” and its structure is predefined.
As shown in the figure below, the [Logical POUs] sub-tree of the project tree contains the POU called [LADDER] and has 3 worksheets:

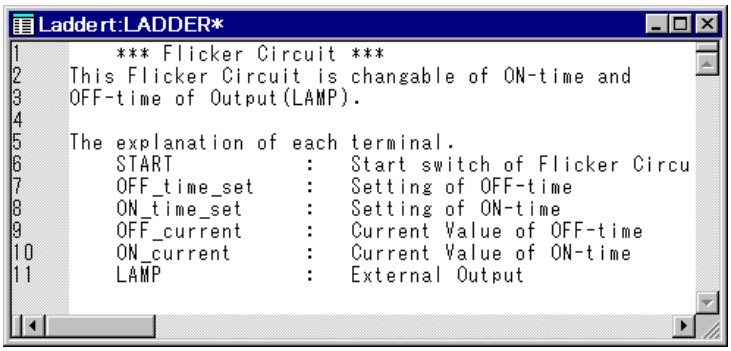
- Description worksheet [LADDERT] for the documentation of POU (Nothing may be described.)
- Variable worksheet [LADDERV] for declaring variables and function block instances
- Code worksheet [LADDER] for describing codes (program) (the worksheet for describing in LD language)
  The properties of this POU can be changed. It is also possible to insert new POUs or worksheets without changing the properties.



Project [UNTITLED]

POU [LADDER]

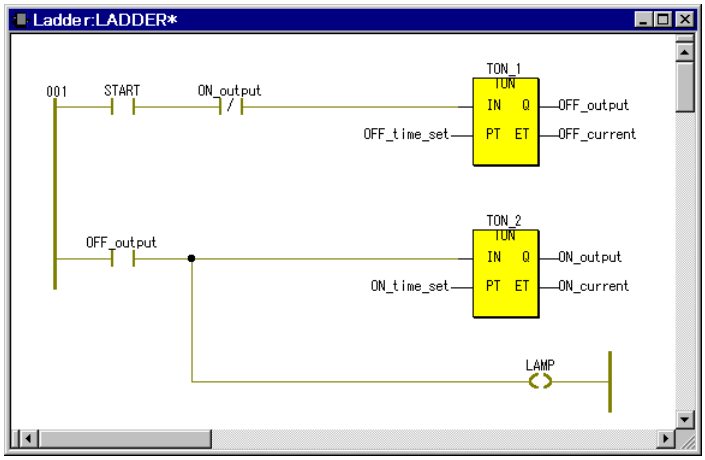
Description worksheet [LADDERT]



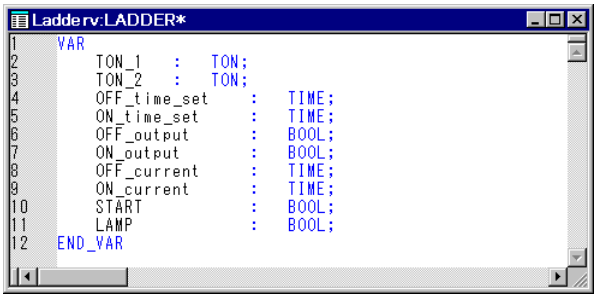
(Sheet for giving an explanation of POU, etc.)

Code worksheet [LADDER]

Variable worksheet [LADDERV]



(This sheet is used to describe a program.)



(This sheet is used to declare variables.)

3-3-1 How to insert a POU and worksheet

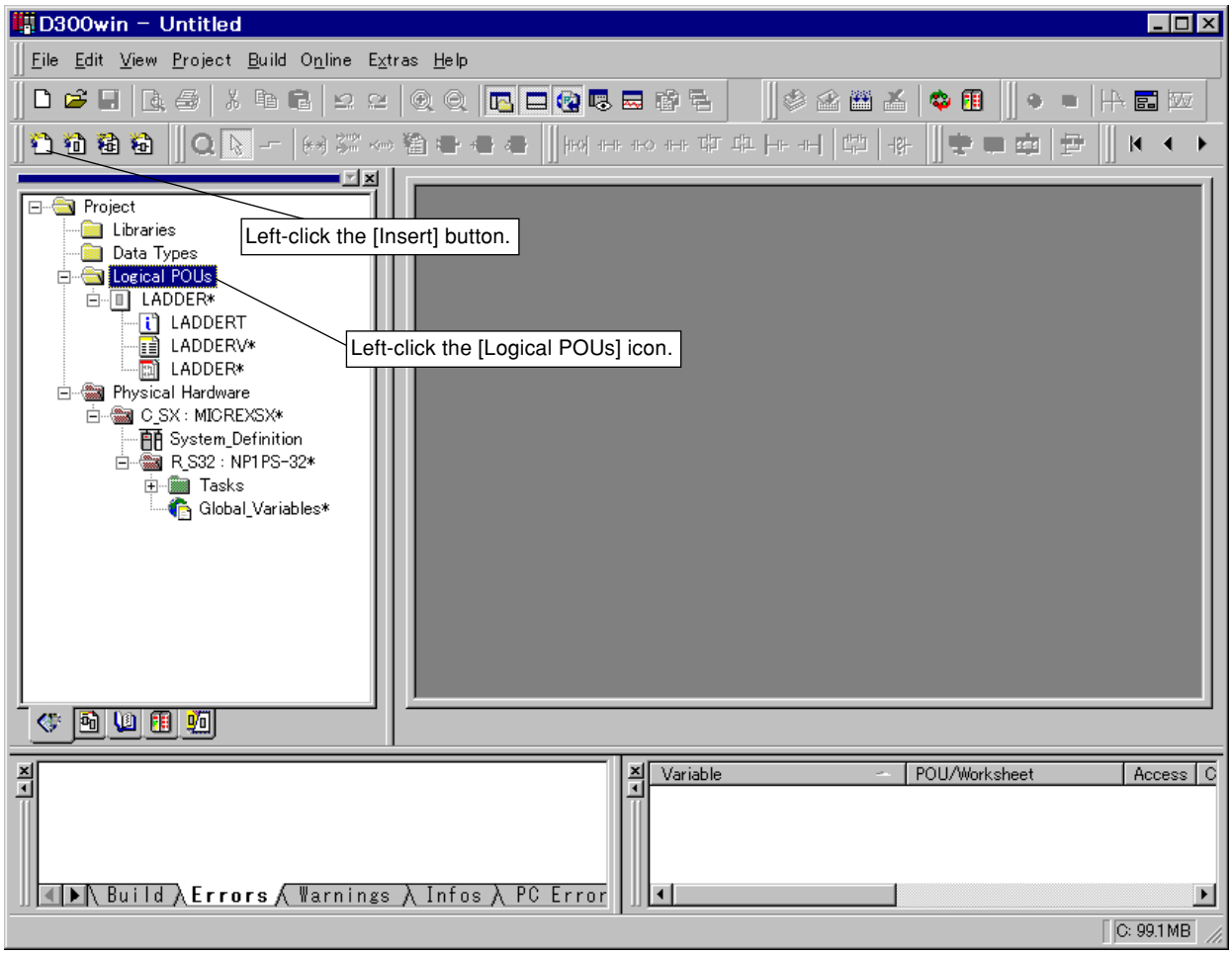
How to create new POUs and how to add POUs to a worksheet are described below:

(1) Inserting a POU

Inserting POUs (description worksheet, variable worksheet and code worksheet),

◊ To select [Logical POUs] sub-tree of the project tree, left-click the [Logical POUs] icon.
(It is possible to select existing POUs or to insert new POUs.)

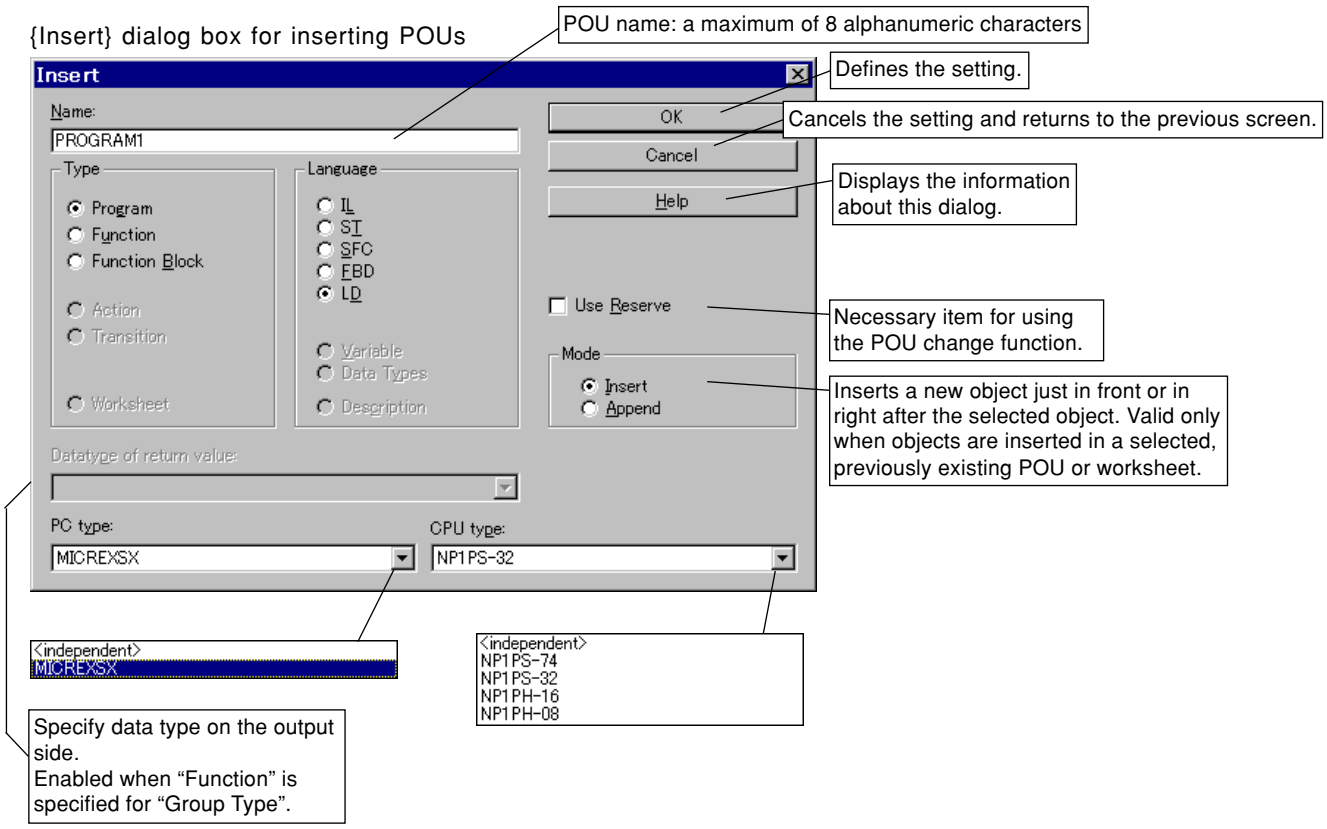
◊ Left-click the [Add Object] button, or alternatively right-click to display the shortcut menu and then left-click the [Insert] command.



The {Insert} dialog will appear on the screen.

3-3 Creating Program Organization Units (POUs)

{Insert} dialog box for inserting POUs

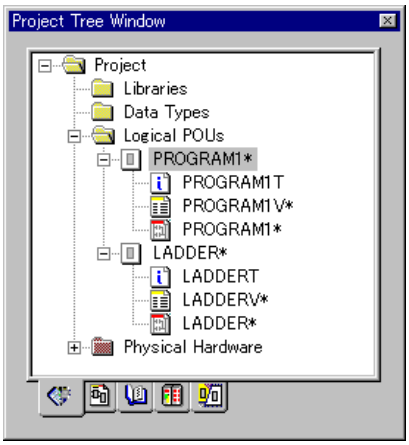


[Name]..... Input POU name.
[Group type]..... Specify the POU group type.
[Language].....Specify a language for describing codes in the POU.
[Data type of return value]..Specify the data type for returned values. (This item can be specified only when “Function” is specified for “Group type”.
[Use Reserve]..... This item takes effect only when the optional [Selected POU] button is turned on in the [Use Reserve]box in the {Define CPU memory size} dialog box. “Patch POU” can be executed even when variables are newly added to the memory area assigned to reserve area.
[Mode].....Specify whether to insert a new object preceding (for insertion) or following (for addition) the selected object.
[PC type].....Specify the type (series name) of PC.
[CPU type].....Specify the type of CPU module.

How to use the {Insert} dialog box for inserting a POU

- ◊ Input the name of the POU to be created in the text box, with a maximum of 8 alphanumeric characters. (The name may not begin with “R” or “.”. In addition, any of the names shown on the Reserve Word List in the Instructions of the User’s Manual <FEH200> cannot be used for the POU name.) In this sample, “PROGRAM1” is input from the keyboard.
- ◊ Select a group type for the POU.
  Turn on the optional [Program] button.
- ◊ Select language.
  Turn on the option button for the corresponding language.
- ◊ Select the PC type from the list box.
- ◊ Select the CPU type from the list box.
- ◊ After confirming the setting in the dialog, left-click the [OK] button.
  A new POU will then be inserted in the project tree, together with the worksheet.

POU [PROGRAM] added by the above setting.



For new worksheets, an asterisk (*) is added to the corresponding icon in the project tree. The asterisk means that a worksheet was added or changed but has not yet been compiled.

The name of an inserted POU or worksheet can be changed later. For details, see “3-3-2 Changing the properties of POU and worksheets”.

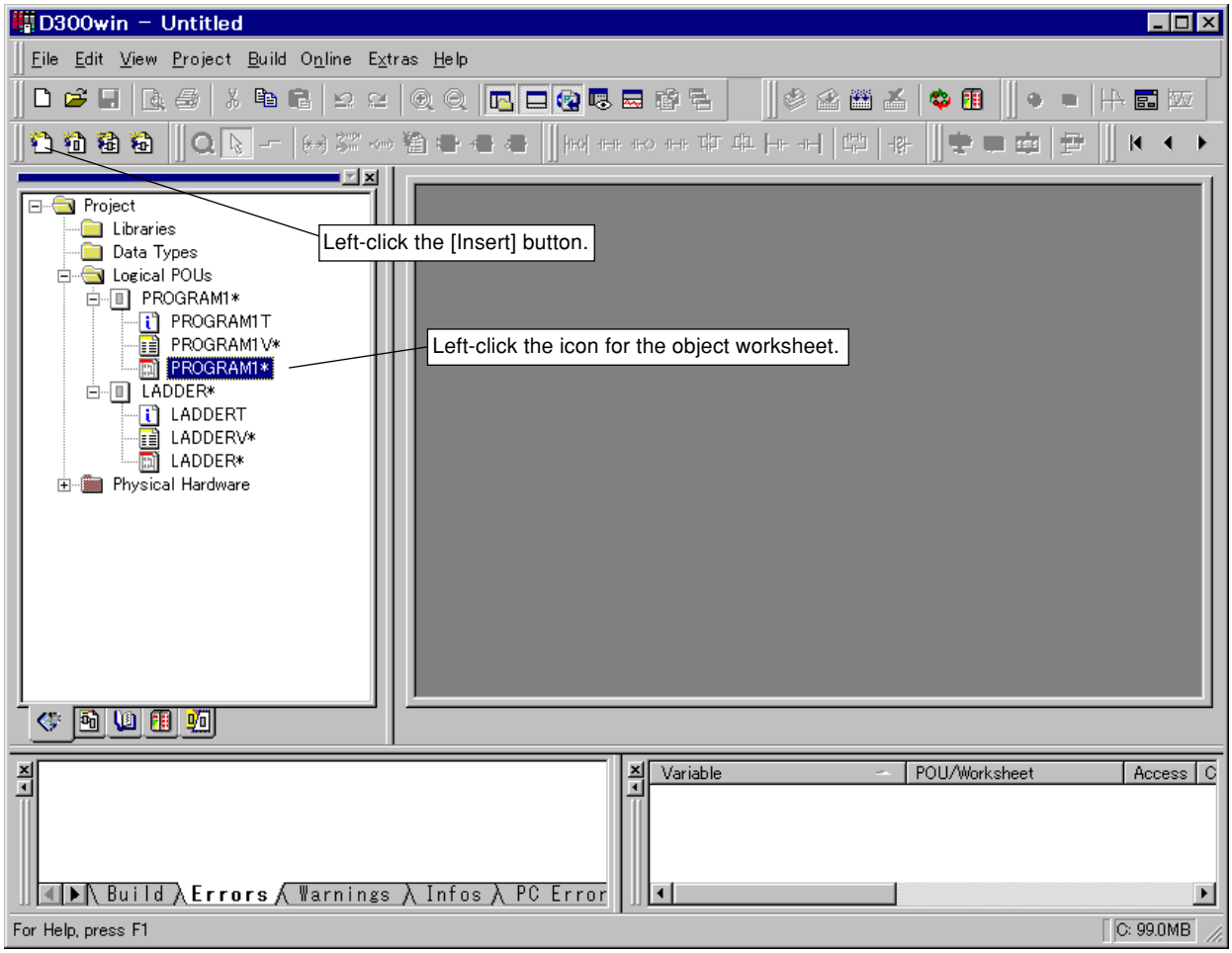
(2) Inserting a worksheet

An additional worksheet can be inserted in an already existing POU (normally consisting of description worksheet, variable worksheet and code worksheet.) However, for a code worksheet, only those which use the same programming language as specified when inserting the first code worksheet (POU) can be inserted. (For example, for a POU which had the IL language selected, only IL worksheets can be inserted.)

1) Adding a code worksheet

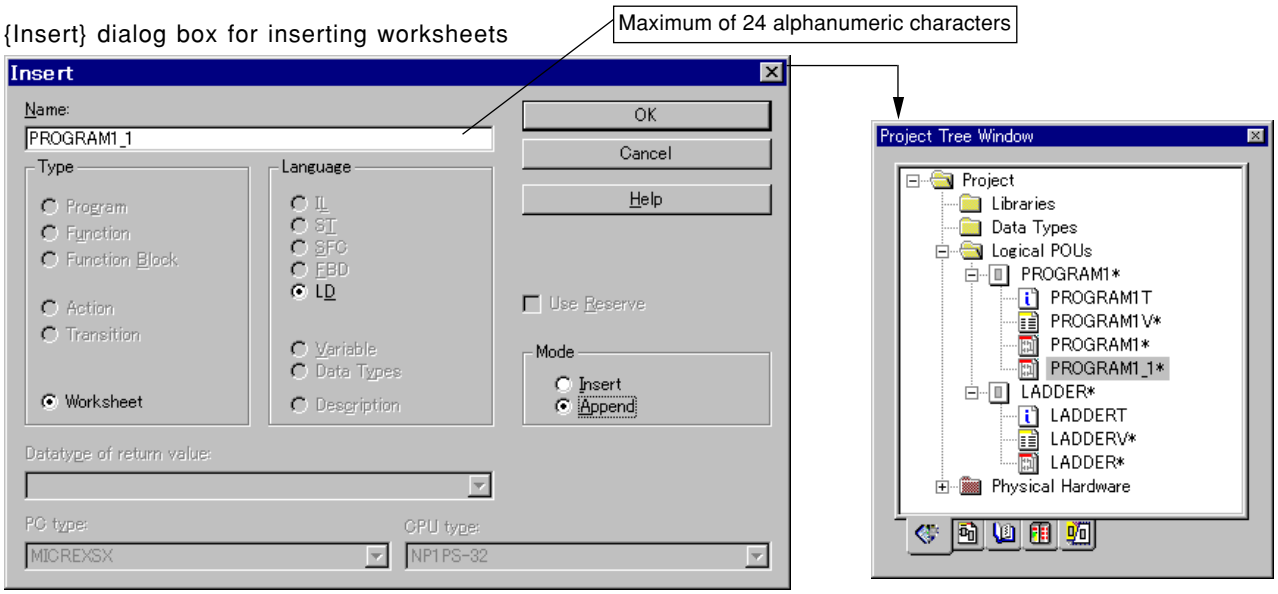
A sample case in which a code worksheet is added to the code worksheet of the POU (PROGRAM 1) inserted on the preceding page is explained below:

◊ To insert a new worksheet, left-click the icon for LD worksheet.



◊ Left-click the [Add Object] button.
The {Insert} dialog box appears on the screen.

{Insert} dialog box for inserting worksheets



The setting of {Insert} dialog box for inserting worksheets

Almost identical to the {Insert} dialog box for POU, except that language not specified by POU cannot be selected.

◊ In the text box, input the name of the worksheet which is to be created.
Input a name of up to 24 alphanumeric characters.
In this example, “PROGRAM1_1” is input from the keyboard.

◊ After checking the content of the dialog box, left-click the [OK] button.
A new worksheet is inserted in the POU.

2) Adding other worksheets

The above explanation is for adding a code worksheet. Other worksheets (description worksheet and variable worksheet) can be inserted in the same manner:

◊ Left-click the icon for the worksheet which is to be added.

◊ Left-click the [Add Object] button.
The {Insert} dialog box appears on the screen.

◊ In the text box, input the name of the worksheet which is to be created.

◊ After checking the content of the dialog box, left-click the [OK] button.
A new worksheet is inserted in the POU.

3-3-2 Changing the properties of POU and worksheets

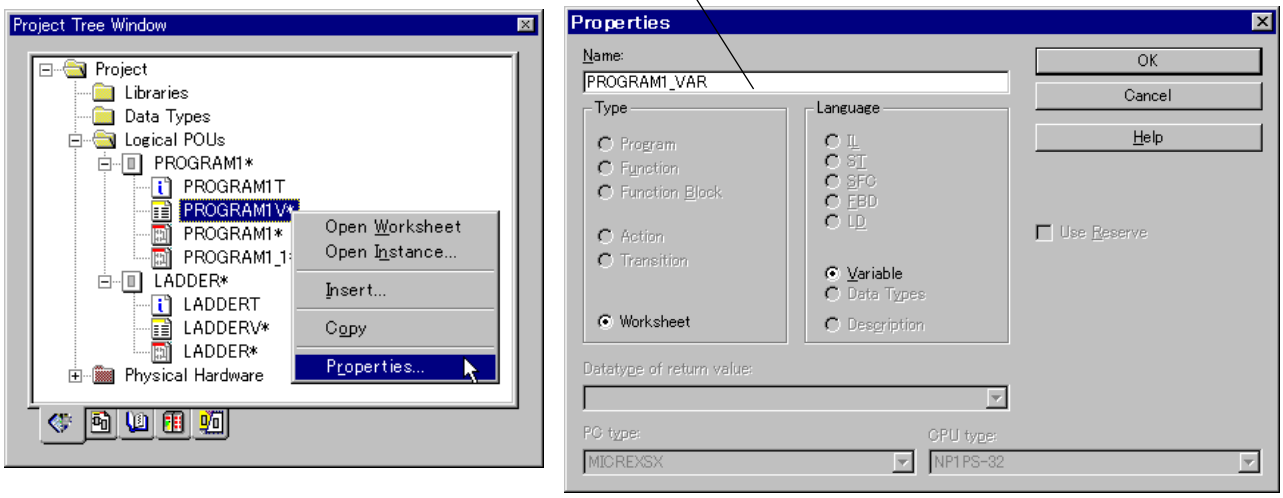
The properties of previously a created POU or worksheet can be changed.

◊ Right-click the icon for a POU or worksheet.
In this example, variable worksheet “PROGRAM1V” of POU “PROGRAM1” is selected.

◊ Left-click the [Object Properties ...] command in the shortcut menu.
The {Insert} dialog box appears on the screen.

Note: Input a POU name of up to 8 alphanumeric characters. <R> or <•> may not be used. In addition, any of the names shown on the Reserve Word List in the Instructions of the User’s Manual <FEH200> cannot be used for the POU name.

POU name – maximum of 8 alphanumeric characters
Worksheet name – maximum of 24 alphanumeric characters



* The items that are not masked gray can be changed.

◊ In this example, “PROGRAM1_VAR” is input in the [Name:] text box of the worksheet.

◊ After the desired items have been changed, left-click the [OK] button.

While a worksheet is opened, the worksheet name or the POU name cannot be changed.

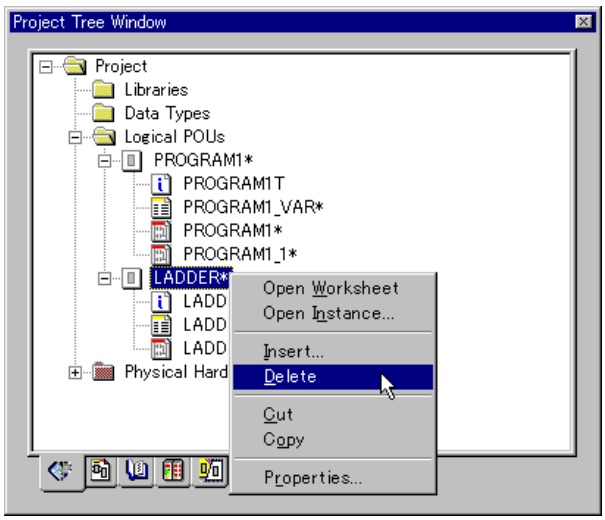
3-3-3 Deleting POU and worksheet

Deleting a previously created POU or worksheet is explained below:

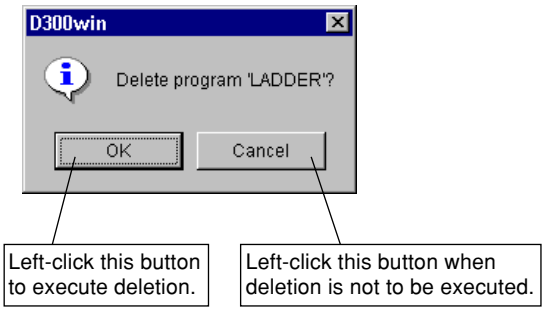
Once deleted, the data can no longer be restored. Be careful when using this function.

(1) Deleting a POU

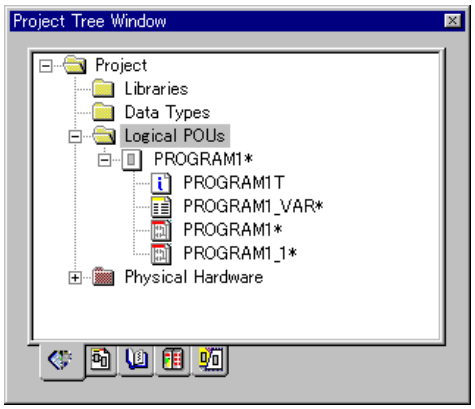
◊ Right-click the POU [LADDER] icon in the [Logical POUs] sub-tree of the project tree to display the shortcut menu, and then left-click the [Delete] command in the menu.



The safety dialog appears on the screen.

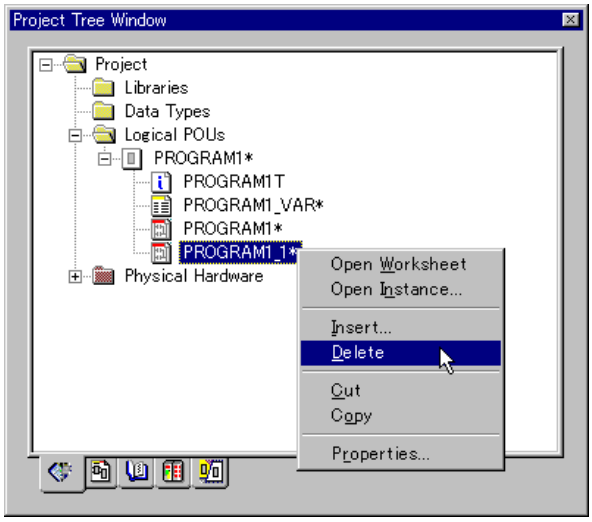


◊ Left-clicking the [Yes] button deletes the POU.
The figure below shows the project tree after the POU (LADDER) is deleted.

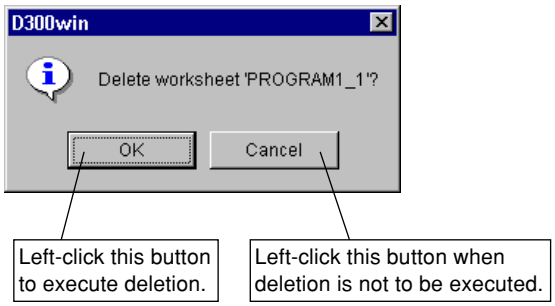


(2) Deleting a worksheet
It is possible to delete only a single worksheet.
Try the following operation.

◊ Right-click the icon for the worksheet which is to be deleted.
◊ Left-click the [Delete] command in the shortcut menu.



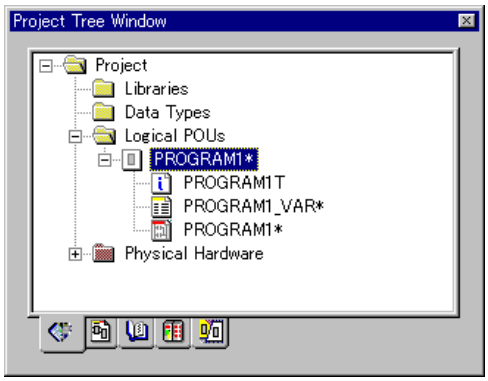
The safety dialog appears on the screen.



Left-click this button to execute deletion.

Left-click this button when deletion is not to be executed.

◊ Left-clicking the [Yes] button deletes the worksheet.
The figure below shows the project tree after the worksheet (PROGRAM1_1) is deleted.



Section 4 Editing in LD/FBD Language

page

Section 4 Editing in LD/FBD Language

4-1 Preparation for Creating LD/FBD Code

4-1-1 Introduction to LD/FBD language

(1) Introduction to LD language

The code written in ladder diagram language consists of contacts and coils. IEC 61131-3 provides various types of contacts and coils.

These contacts and coils are connected by wire as, and are connected to the power rails on the left and right. The status of left power rail is regarded as always ON. In addition to connecting contacts and coils in series, it is also possible to create branches. A branch is also referred to as a “wired OR.”

The combination of a connected contact and coil is referred to as “LD circuit.”

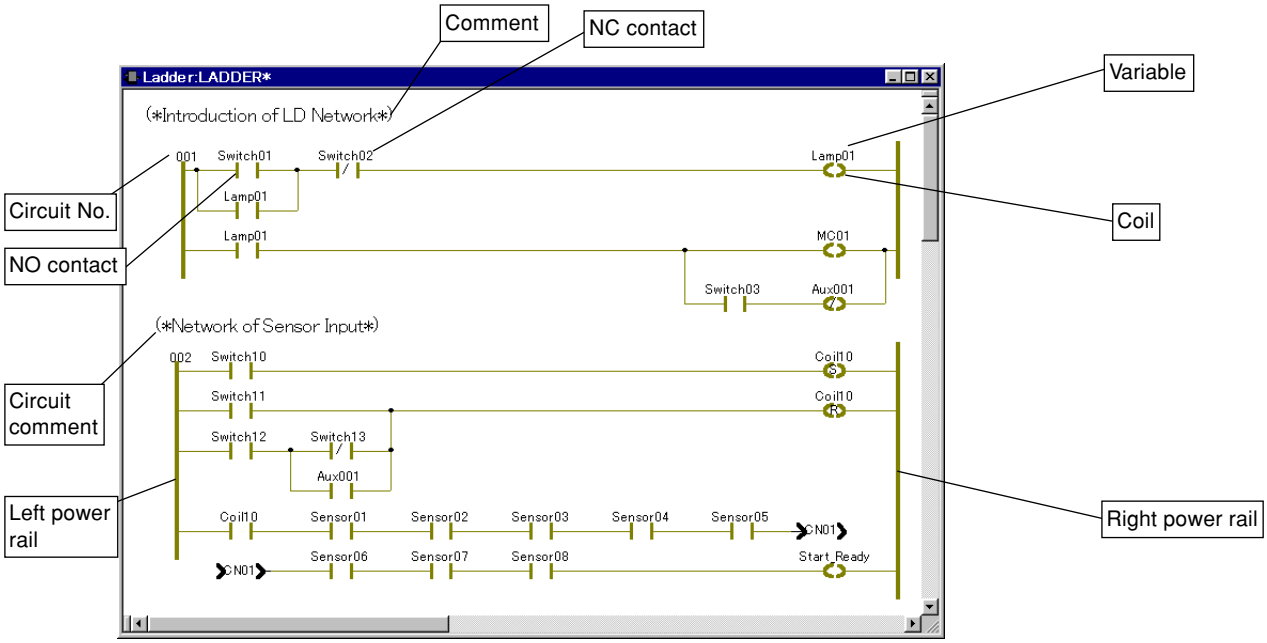
One LD circuit must contain at least one coil.

LD language expresses signal flow in an LD circuit graphically.

Variables for LD code are always Boolean variables. Variable names are input for contacts and coils.

Variable names are shown above contacts or coils in the worksheet. Comments can be inserted using an asterisk (*) and parentheses. In addition, circuit comments that have a fixed display position can be inserted for each LD circuit.

An example of a simple LD circuit is shown below:



For how to describe codes in LD language, see “4-2 Creating an LD circuit”.

(2) Introduction to FBD language

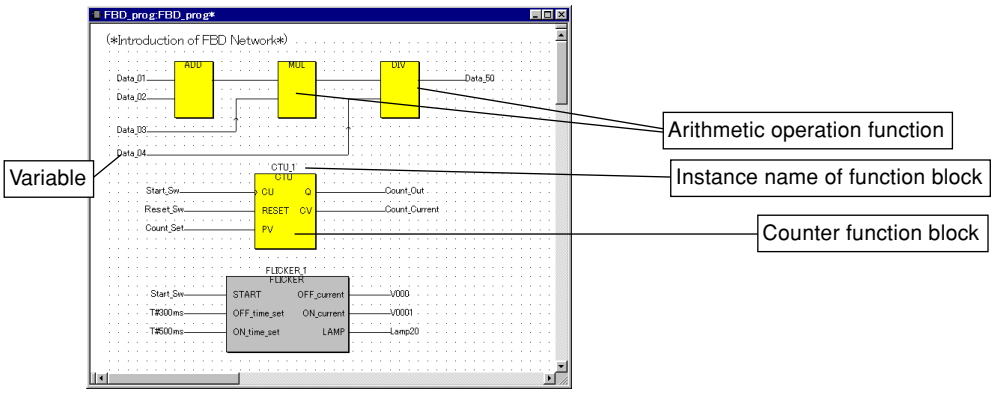
The code written in the functional block diagram (FBD) language consists of variables, functions and function blocks that are connected by wire. With the connecting wire, several data flows can be connected to each other by merging or branching. However, it is impossible to make a series connection between outputs.

The combination of connected variables, functions and function blocks is referred to as an “FBD circuit.”

FBD is a widely used programming language, and allows complicated circuits to be easily created by simply calling functions or function blocks.

Comments can be inserted using asterisk (*) and parentheses.

An example of a simple FBD circuit is shown below:

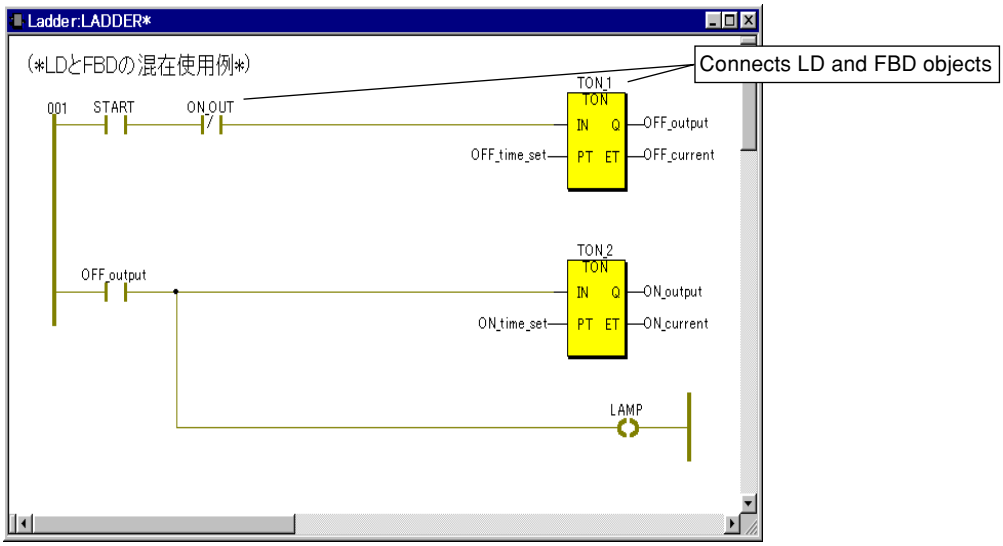


For how to describe codes in FBD language, see “4-3 Creating FBD circuit”.

(3) Mixed use of LD and FBD languages

For an LD worksheet and FBD worksheet, LD language suited to sequence control and FBD language, which enables the simple description of data flow, can be used together on the same worksheet.

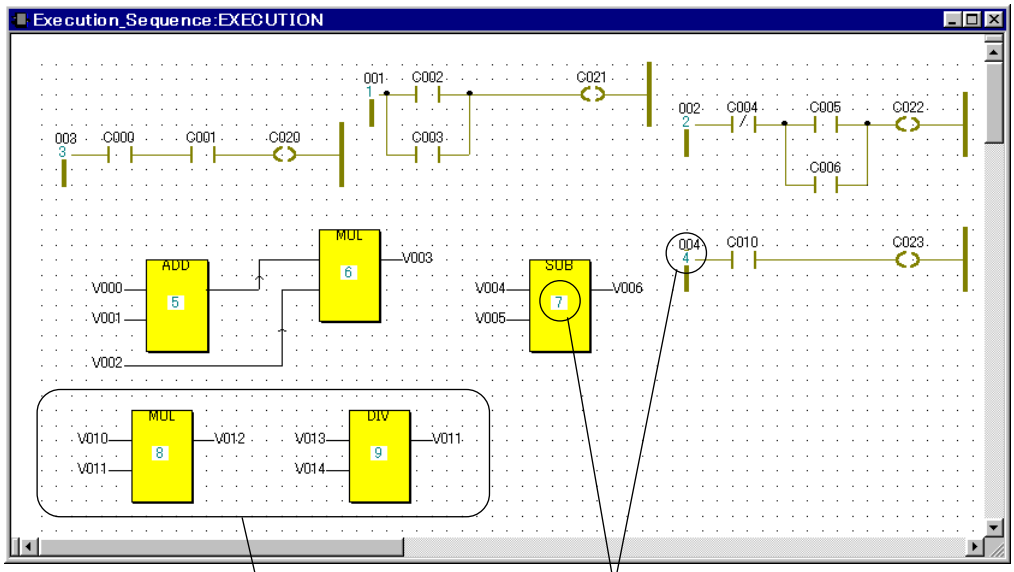
An example in which simple LD and FBD circuits are written mixed together on one worksheet is shown below:



For how to connect LD and FBD objects, see “4-3-2 Connecting objects to the FCT/FB terminal”.

4-1-2 Precautions for programming in LD/FBD language

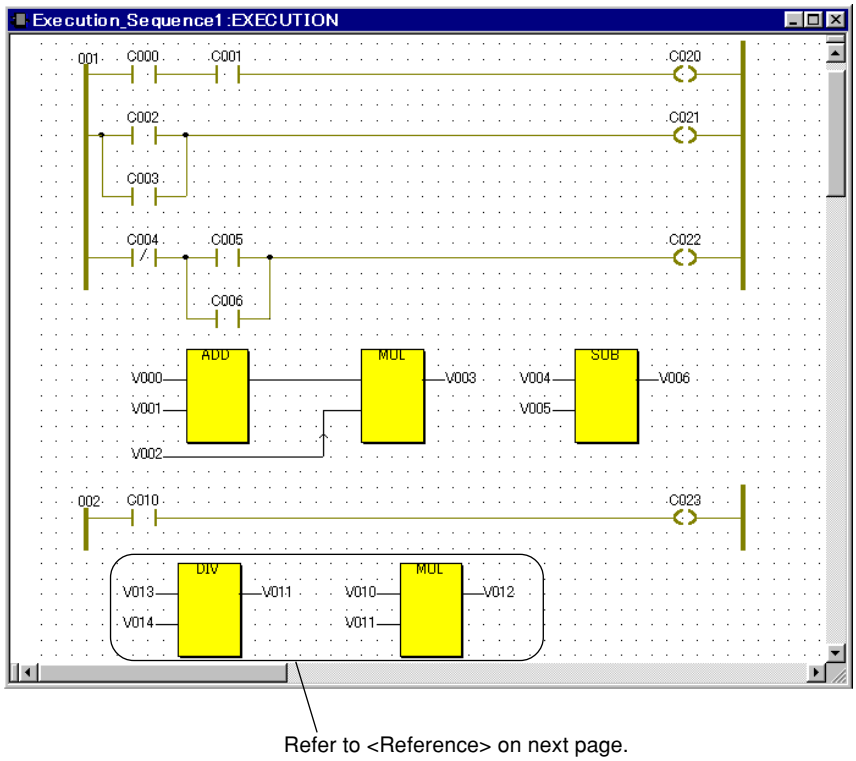
For programming using LD and FBD languages, attention must be paid to the arrangement of objects. (Operation flows from the upper left to the lower right on the worksheet according to the “Execution Order” shown in the program, as in the figure below.) When the Execution Order needs to be considered, write (arrange) referring to the <Countermeasure> on the next page.



- “Execution Order” is displayed when the [Execution Order] command in the [Layout] menu is left-clicked after the end of compilation.
- The program is executed in order from the upper left to the lower right on the worksheet.

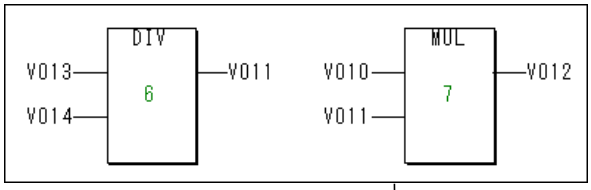
<Countermeasure>

Writing (arranging) objects vertically in rows is recommended as shown in the figure below.

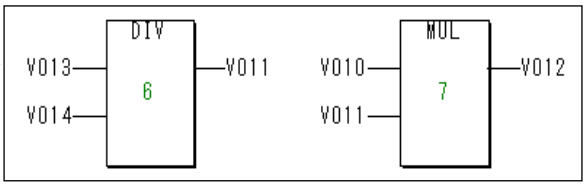


<Reference>
The sample program shown below executes arithmetic operation by using the result (V011) of the DIV (division) command as the multiplier of MUL (multiplication) command.

<Program before rearrangement>



<Program after rearrangement>



The Execution Order before rearranging the commands is that multiplication is executed first, and then division is executed. Namely, the result of division is used as the multiplier of the multiplication that is executed the next time. (To execute this program, two scans are necessary.)
To execute this program by one scan, as shown in the figure for <after rearrangement>, the commands need to be rearranged such that multiplication is executed after division is executed.

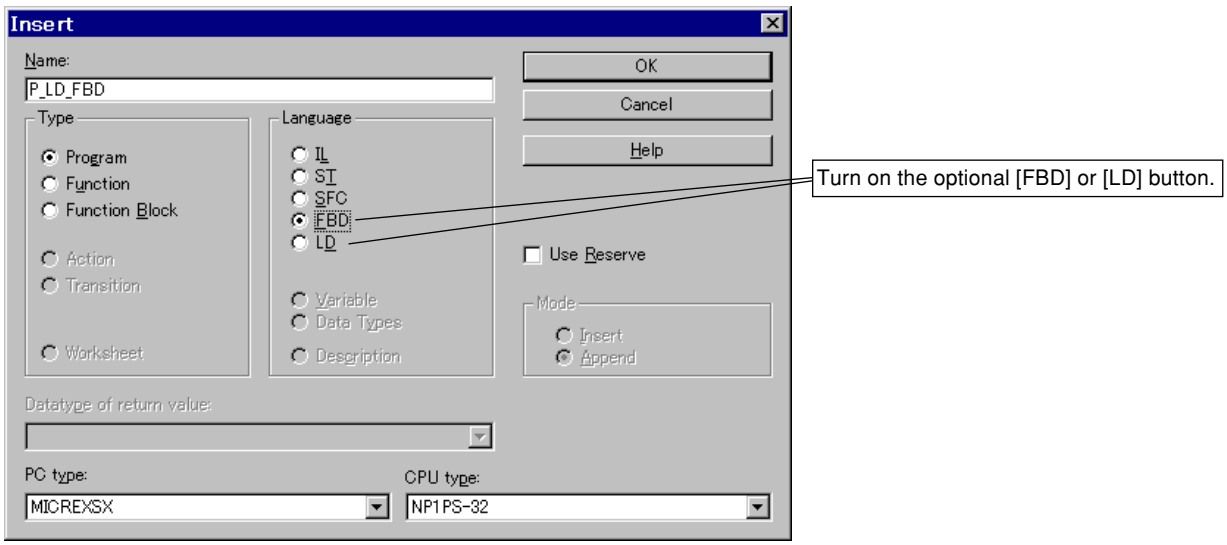
4-1-3 Inserting POUs

This paragraph describes how to insert POUs with the project tree editor.

(1) How to insert POUs

◊ Select [Logical POUs] or [POU] by left-clicking the corresponding icon in the project tree.

◊ Left-click the [Add Object] button, and the {Insert} dialog box will appear on the screen. This dialog box can also be displayed by left-clicking the [Insert] command in the shortcut menu.

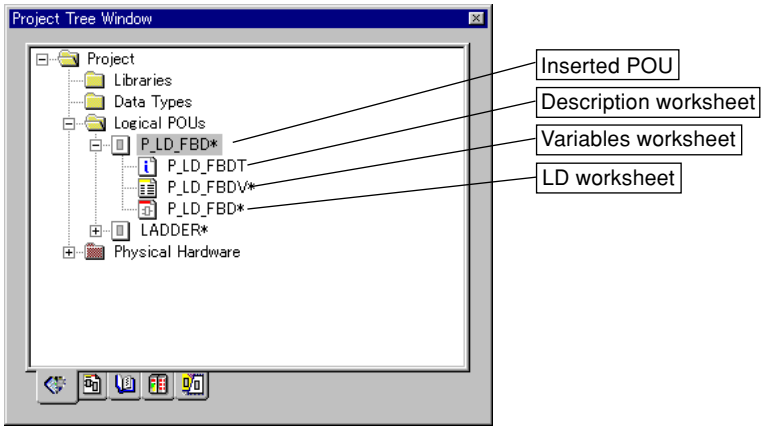


[Name] ..... Input POU name.
[Group type] ..... Specify the POU group type.
[Language] ..... Specify a language for describing codes in the POU.
[Data type of return value] ..... Specify the data type for returned values. (This item can be specified only when “Function” is specified for “Group type”.

[Use Reserve] ..... This item takes effect only when the optional [Selected POU] button is turned on in the [Use Reserve] box in the {Define CPU memory size} dialog box. “Partial compilation & download” can be executed even when variables are newly added to the memory area assigned to reserve area.
[Print Options ...] ..... Specify page layout.
[Mode] ..... Specify whether the new object is inserted in front of or after the selected object.
[PC type] ..... Specify the type (series name) of PC.
[CPU type] ..... Specify the type of CPU module.

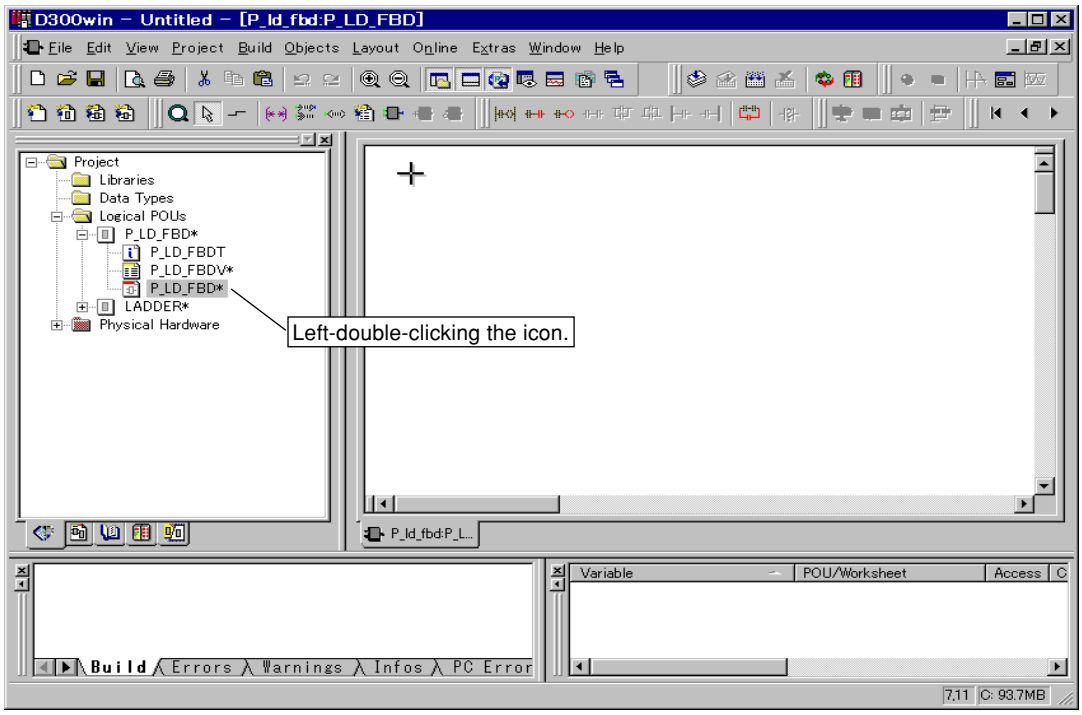
For both FBD and LD worksheets, FBD language and LD language can be used mixed together on the same worksheet.

◊ After setting the active items in the dialog box, left-click the [OK] button. A new POU will then be added to the project tree.



(2) Opening an LD/FBD worksheet

◊ Left-double-click the [P_LD_FBD] (LD worksheet) icon in the project tree, or right-click the icon to display the shortcut menu and then left-click the [Open Node] command in the shortcut menu. The worksheet (editor) will be opened.

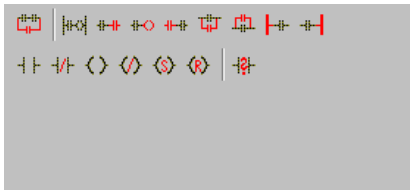


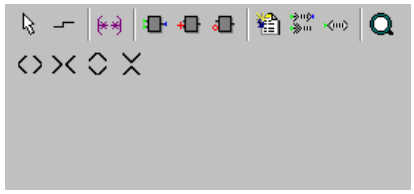
(3) Tool bar and menus for describing codes in LD/FBD language

The tool bar and menus which are used to edit codes in LD or FBD language are explained below:

1) Tool bar

The tool bar for the LD/FBD graphic editor (worksheet) includes multiple buttons for describing in LD/FD language, in addition to common buttons. These buttons can be customized by adding to or deleting from a tool bar other than that previously shown in the figure.



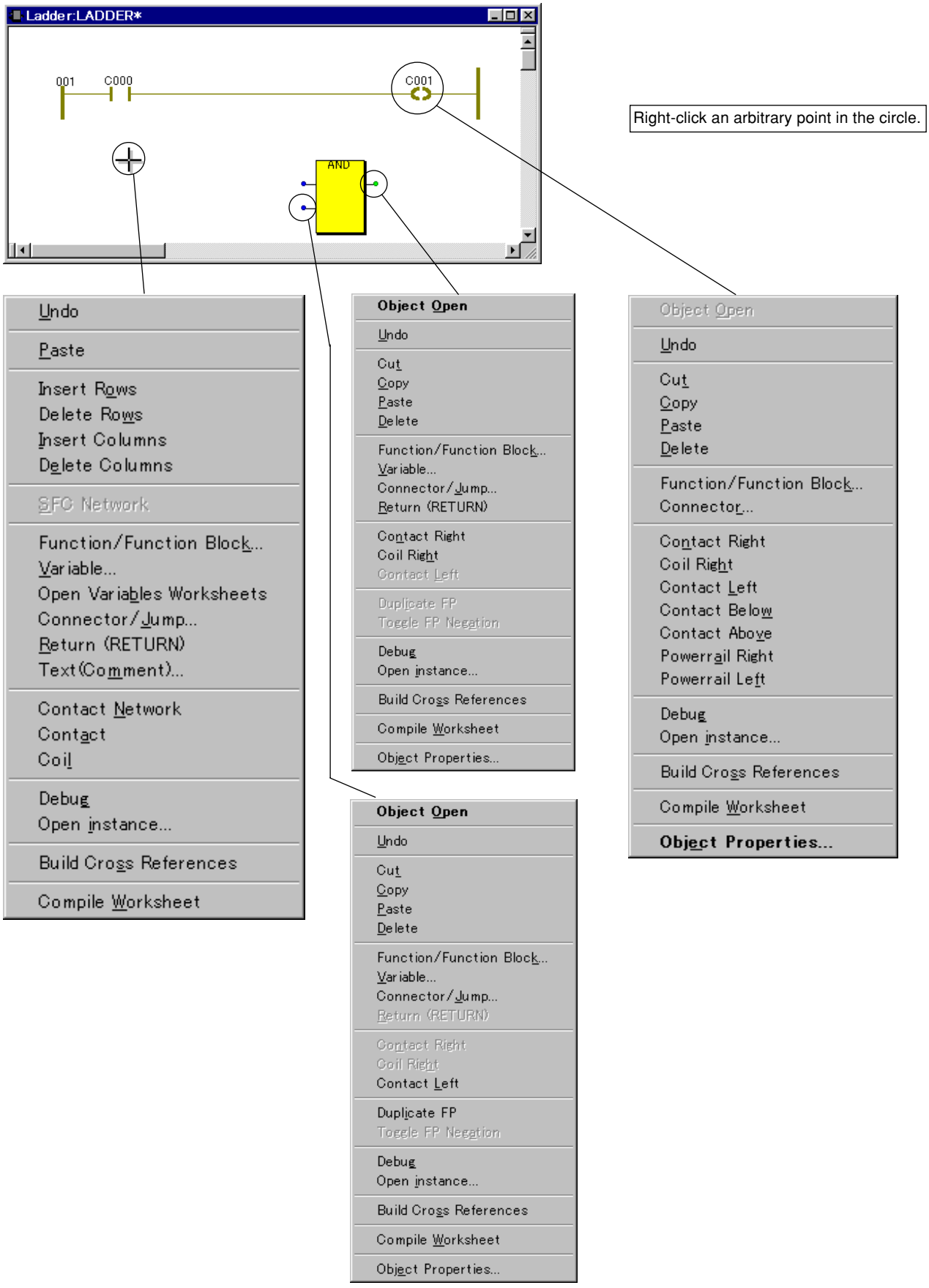


For how to customize a tool bar, see “2-7-1 Setting the tool bars and commands.”

2) Menus

<Shortcut menu>

The shortcut menu has the same commands as those included in the tool bar (buttons) and the main menu. The menu changes depending on which object is selected.



3) Description of menu/tool bar functions

Command name (button name)	Symbol	Type of menu	Description (use)
[Mark mode]		Edit	Used to change to the Mark mode. In this mode, the desired object can be selected by left-clicking the mouse.
[Connection mode]			Change to the Connect mode. In this mode, multiple objects can be connected.
[LD branch edit mode]			Change to the LD branch editing mode.
[Comment]		Object	Insert comments.
[Function/Function block]			Insert function or function block.
[Variable]			Insert variables.
[Connector/Jump...]			Insert jump/Connector label.
[Return]			Insert return.
[Insert LD network]			Insert LD circuit.
[Contact right]			Insert a contact on the right of the selected contact.
[Coil right]			Insert a coil on the right of the selected contact.
[Contact left]			Insert a contact on the left of the selected contact or coil.
[Contact above]			Insert a contact above the selected contact.
[Contact below]			Insert a contact below the selected contact.
[Insert left power rail]			Insert a left power rail with a junction.
[Insert right power rail]			Insert a right power rail with a junction.
[Normally open contact]		Used in the {Properties} dialog box. Select the [Object Properties ...] command from the [Edit] menu.	Make the selected object an NO contact.
[Normally closed contact]			Make the selected object a NC contact.
[Change in coil]			Make the selected object a coil.
[Change in negated coil]			Make the selected object a negated coil
[Change in SET coil]			Make the selected object a set coil.
[Change in RESET coil]			Make the selected object a reset coil.
[Insert columns] *		Edit	Widen the distance between the objects on the right of the insert mark so that they are shifted rightwards.
[Delete columns] *			Shorten the distance between the objects on the left of the insert mark so that they are shifted leftward.
[Insert rows] *			Widen the distance between the objects below the insert mark so that they are shifted downward.
[Delete rows] *			Shorten the distance between the objects below the insert mark so that they are shifted upward.

* The tool bar can be customized. For more information, see “2-7-1 Setting the tool bars and commands.”

4-2-1 Inserting an LD circuit

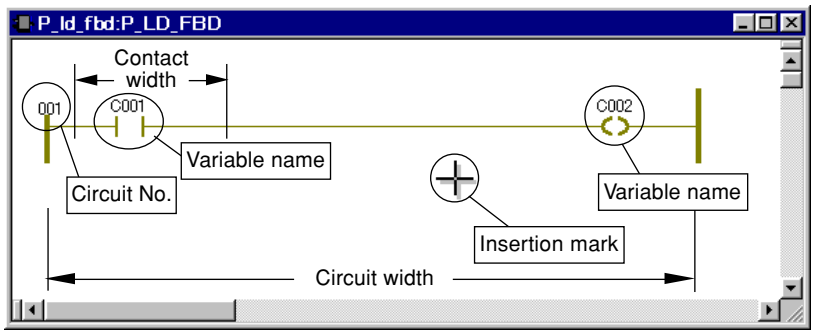
Before editing an LD circuit, a basic circuit (consisting of one contact and one coil) needs to be inserted into the worksheet.

(1) Inserting the initial LD circuit

◊ In order to set the insert mark, left-click the mouse in the edit space.

◊ Left-click the [Insert LD network] button.
The initial LD circuit consisting of one contact and one coil is inserted into the worksheet.

Initial LD circuit

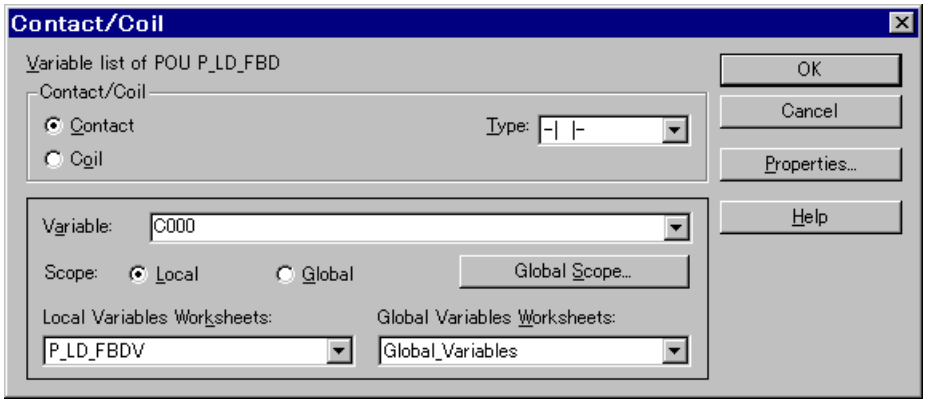


The position in the vertical direction to insert the circuit is determined by the position of the insert mark.

When a circuit is inserted for the first time, a contact is described as a normally open contact and a coil is expressed as a normal coil. To use a normally closed contact, negated coil, or set/reset coil, it is necessary to change the properties of the contact or coil.

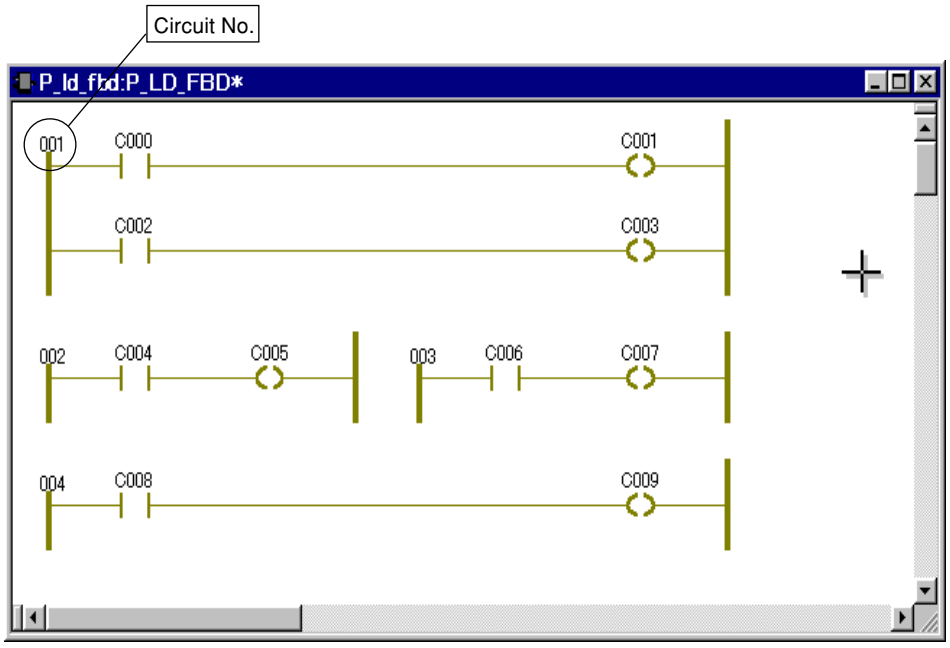
(2) Variable names for LD circuit

Variable name “CXXX” is displayed for all objects when they are inserted, as shown in the above figure. However, this is a temporary variable name for which variable declaration is not made. Therefore, it is necessary to declare variables with the {Contact/Coil} dialog box and the variable editor, as shown below, which are activated by left-double-clicking the object.



For how to change variable name, see “8-1 Variable Declaration”.

(3) LD circuit number
Circuit numbers are only for LD circuits, and are displayed above the left power rail. The numbers, or execution order, are determined from the upper left to lower right in order on the worksheet, as shown in the figure below. (Execution order may change when FBD or other program language is present.)



(4) Contact width
A function to change the width of the contact/coil is provided so that longer variable name or comments can be displayed for a specific contact/coil. There are two methods for changing the width of contact/coil.

Sample display when contact width is changed is shown in 4).

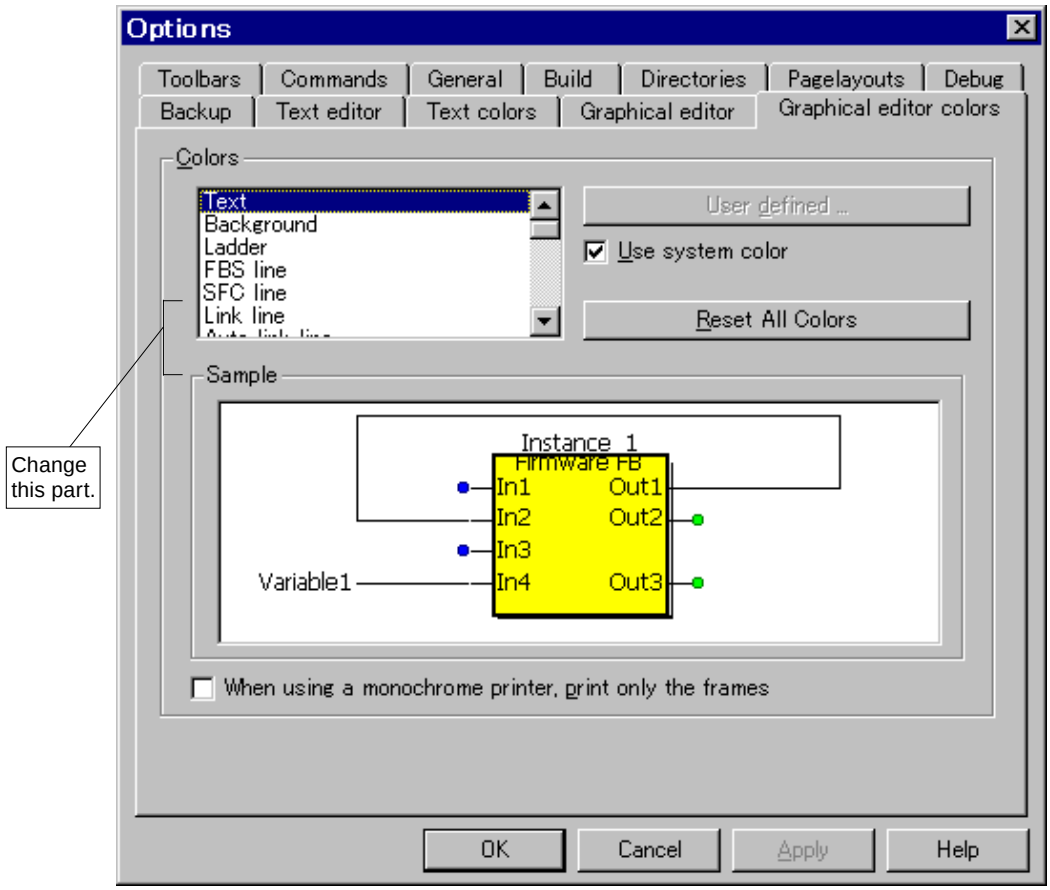
1) The method to use the [Contact width] command
Before describing contacts and/or coils, operate as follows:

◊ Left-click the [Contact width] command in the [Layout] menu to display the {Contact width} dialog box.
◊ Select the desired width in the list box, and left-click the [OK] button. Contact width can be set in a range from 7 through 43 mm, in 2 mm steps (initial value is 15 mm). Sample displays when set to 7, 13, 19, 25, 31, 37 or 43 mm are shown on the next page. (The same image is printed out.)

* The width of contacts/coils that are arranged on the worksheet cannot be changed. Be sure to change the width before arranging the contact/coil.

2) Using the {Options} dialog box

Left-click the [Options] command in the [Extras] menu to display the [Graphical editor] panel.

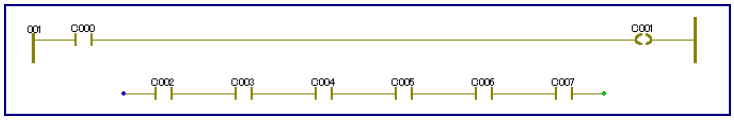


Select the desired width from the list box, and left-click the [OK] button. Contact width can be set in a range from 7 through 43 mm, in 2 mm steps (initial value is 15 mm). Sample displays when set to 7, 13, 19, 25, 31, 37 or 43 mm are shown on the next page. (The same image is printed out.)

3) LD circuit width

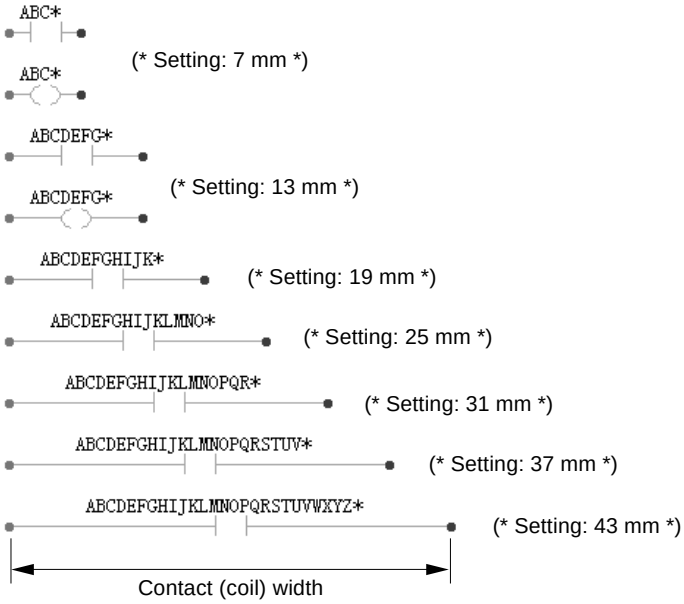
LD circuit width is set to determine in advance how many contacts can be inserted in series in the circuit. By this, it becomes possible to create an LD circuit of the proper width.

The overall width of an LD circuit changes according to the “contact width” explained before.



The width of an LD circuit that is arranged on the worksheet can be increased or decreased with the [Delete columns] or [Insert columns] button.

4) Sample display when the contact width is changed



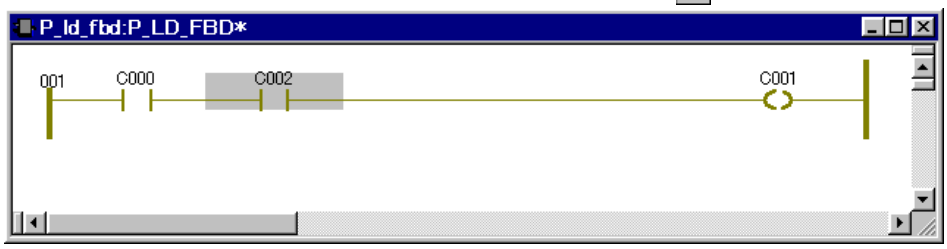
4-2-2 Inserting contacts/coils

A circuit created in LD language consists basically of series circuits and parallel circuits.
How to insert contacts or coils in the basic circuit, which is explained in “4-2-1 Inserting an LD circuit”, or in an previously existing circuit is described below.

(1) Inserting a contact in series

To insert a contact on the right of the contact “C000” shown in the figure below,

Left-click the “C000” contact to select it.
Left-click the [Contact right] button.
(To inset a contact on the left of selected contact, left-click the [Contact left] button.



To insert an additional coil in series, select the coil and left-click the [Contact right] or [Contact left] button.

(2) Inserting contacts in parallel

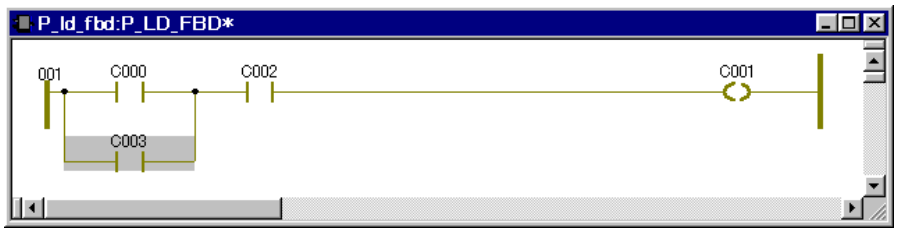
1) Inserting contacts in parallel

<Inserting a contact in parallel to an existing contact>

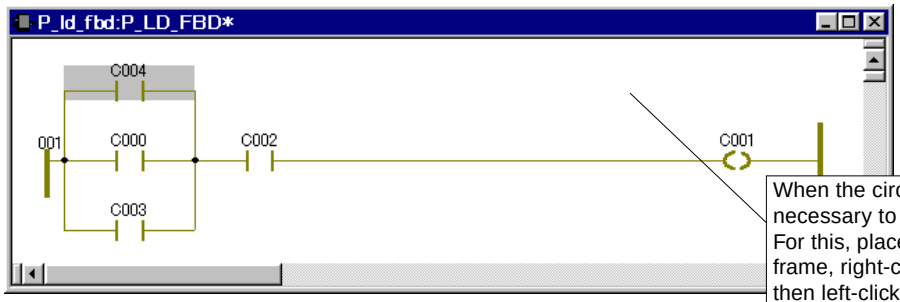
Insert a contact below and in parallel to contact “C000” as shown in the figure below.

Left-click the “C000” contact to select it.
Left-click the [Contact below] button.
A new contact is inserted below the selected contact.

The following image is displayed on the screen.

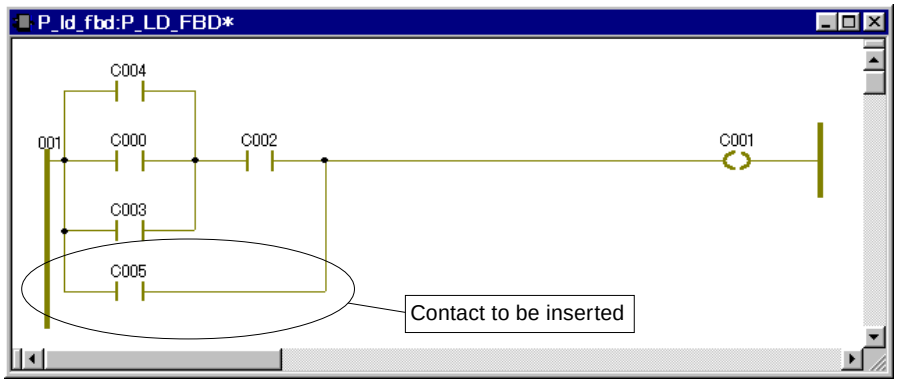


* When the [Contact above] button is used, the circuit is described as shown in the figure below.

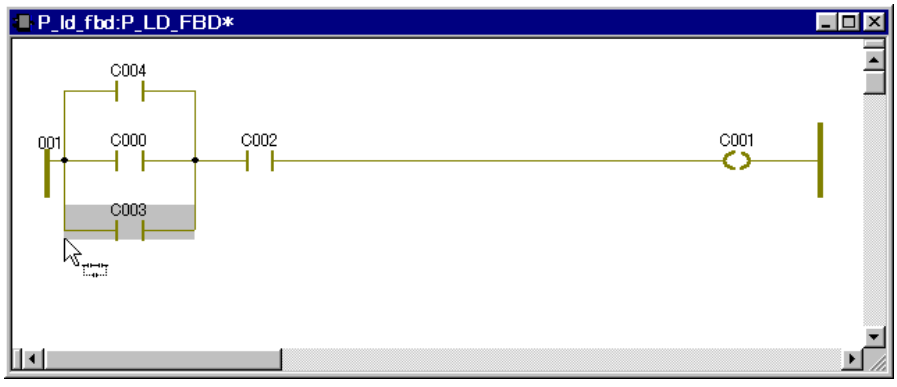


<Inserting a contact in parallel over multiple contacts>

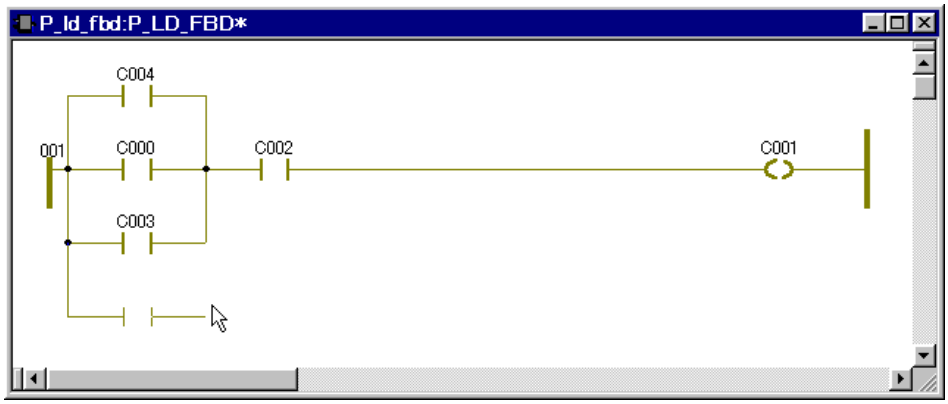
Insert a contact in parallel over multiple contacts (C000 and C002) as shown in the figure below.



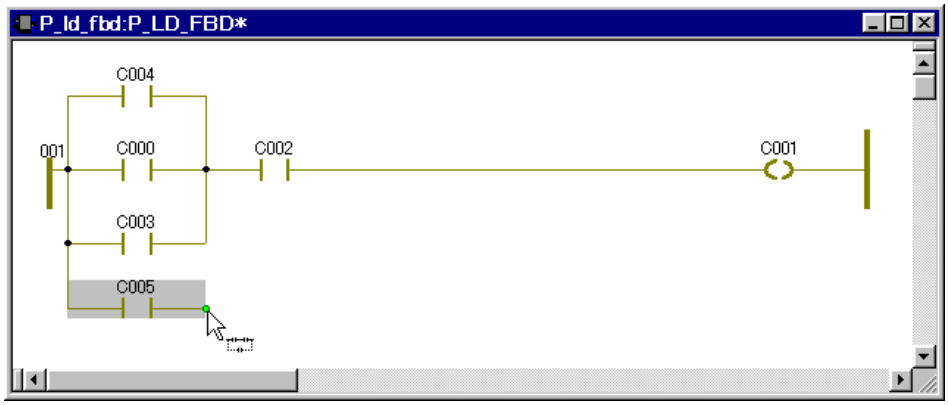
Left-click the [Insert LD branch] button.
The pointer for [Insert LD branch] button is added to the cursor.



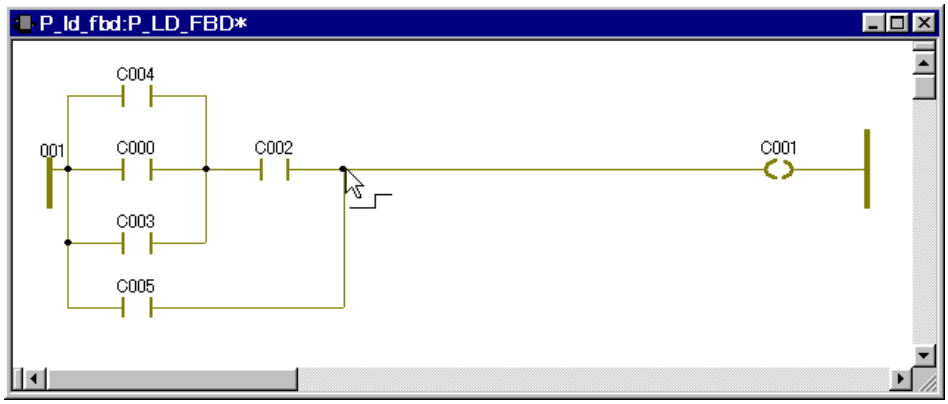
Left-click the starting point of the parallel circuit, and move the pointer to a point in the upper or lower blank space.



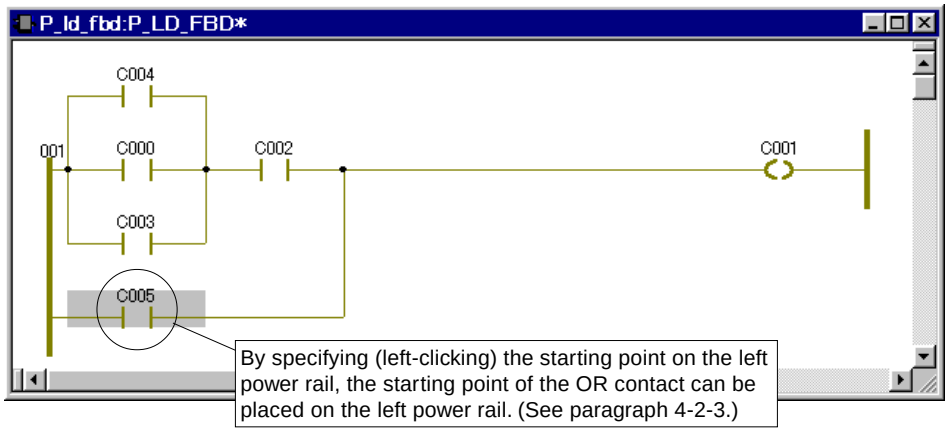
Left-click the point at which you want to position the new object.



Move the pointer to the desired junction point, and left-click this point.



* It is possible to connect an LD branch to a left power rail by positioning the starting point of the LD branch on the left power rail, as shown in the figure below.



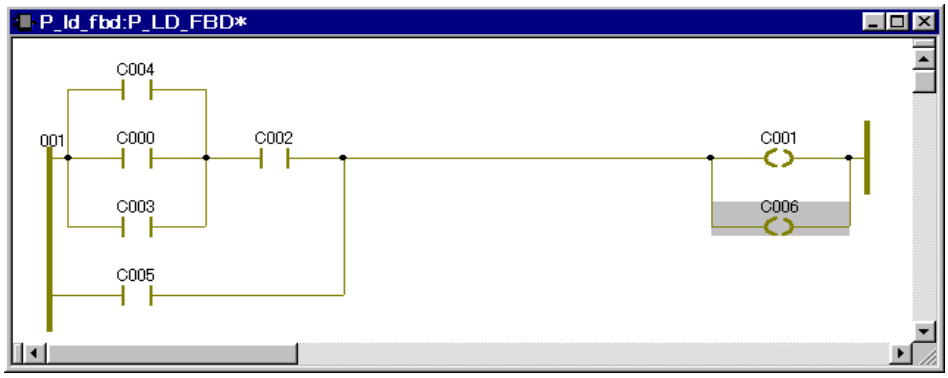
1) Inserting a coil in parallel

Insert a coil below and in parallel to coil “C001” as shown in the figure below

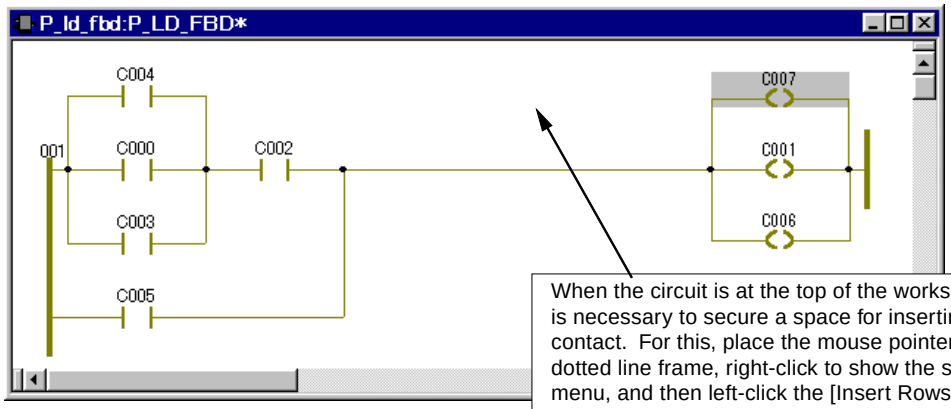
Select coil “C000” by left-clicking it.

Left-click the [Contact below] button, and a new coil will be inserted below the selected coil.

The circuit displayed on the screen becomes as follows:



* When the [Contact above] button is used, the circuit is described as in the figure below.



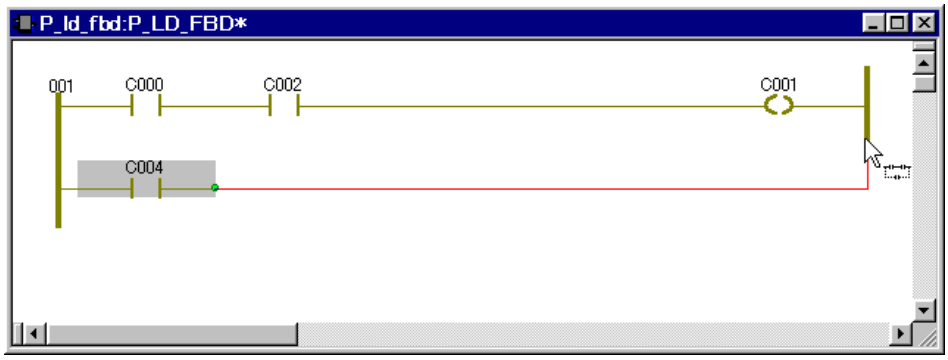
When the circuit is at the top of the worksheet, it is necessary to secure a space for inserting the contact. For this, place the mouse pointer in the dotted line frame, right-click to show the shortcut menu, and then left-click the [Insert Rows] command in the menu.

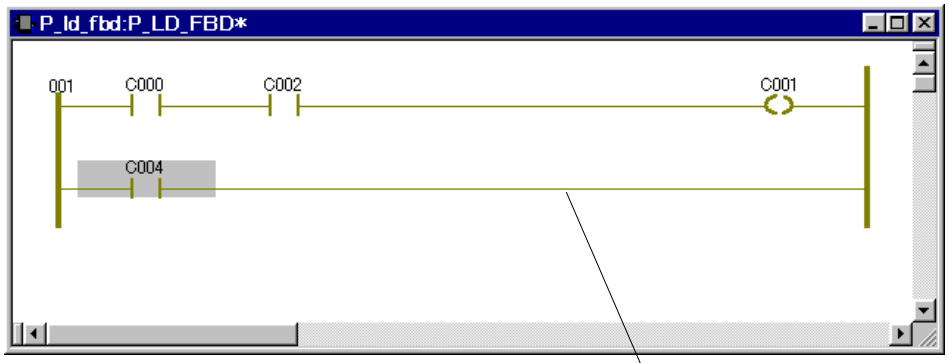
4-2-3 Adding a new circuit

(1) Adding an LD circuit

With the [LD branch edit mode] button, a new LD circuit can be added below (above) a previously-created LD circuit which has a left power rail.

Left-click the [LD branch edit mode] button to confirm that the mouse button changes to the pointer for [Insert LD branch].
Left-click the left power rail.
Determine a position above or below the original LD circuit, and left-click this point.
Determine a position rightward, and left-click this point.
A contact is created in the newly-created LD circuit.



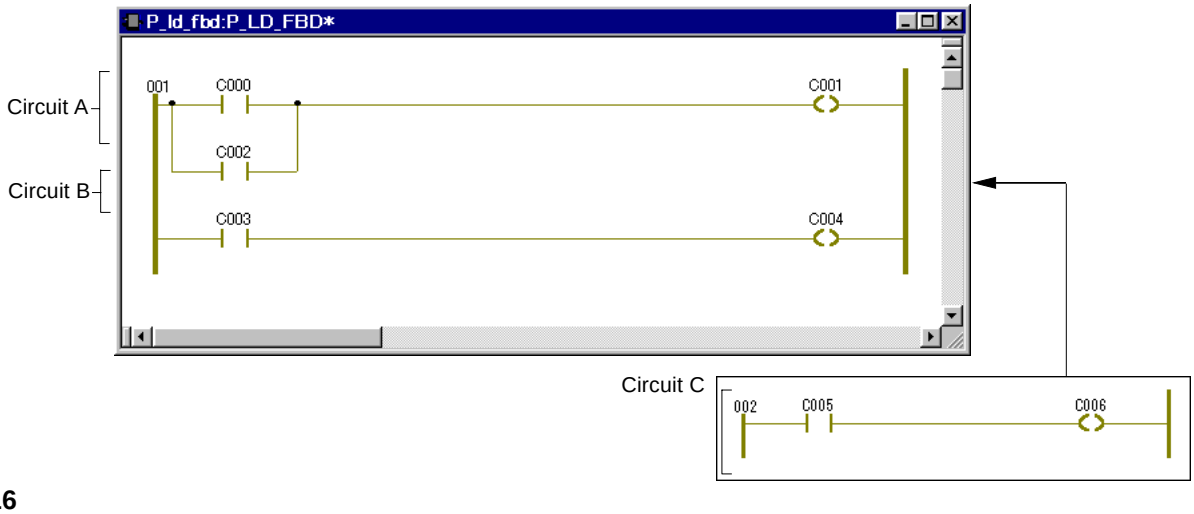


Connect the line by left-clicking, then use the contact/coil insertion button.

(2) Adding a circuit between LD circuits

In order to insert a new circuit between two LD circuits, a space for the circuit to be inserted is necessary. Secure the space in the following manner.

Example: To insert circuit C between circuit A and circuit B

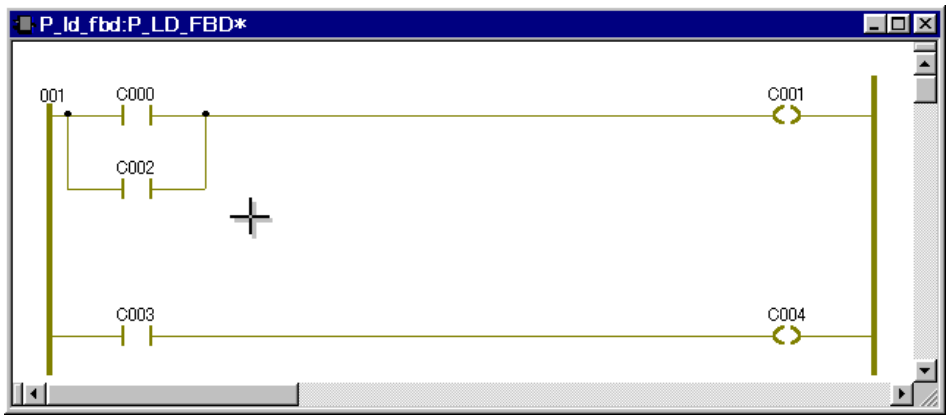


1) Secure a space for insertion

Secure a space for insertion at the point where the circuit is to be inserted.

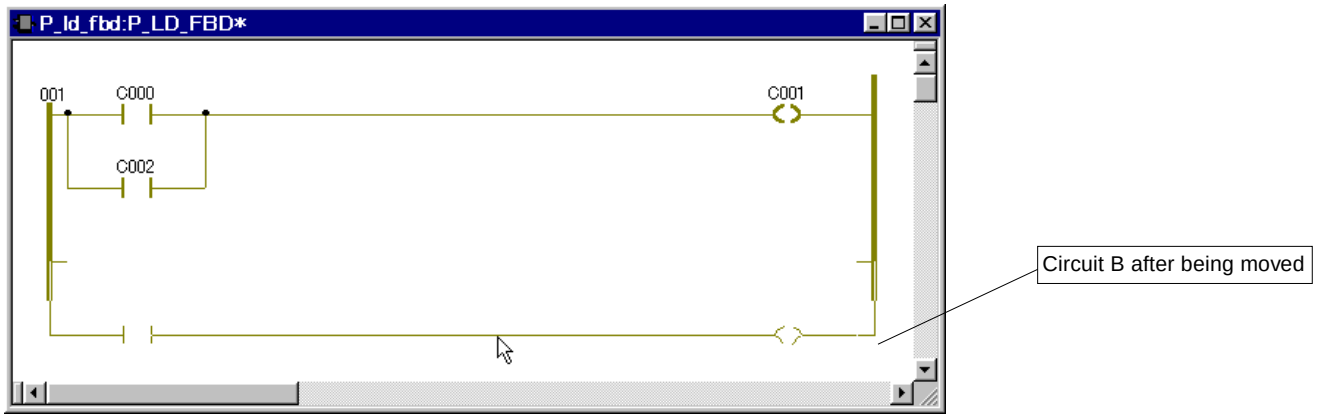
<Inserting a space with the button on the tool bar>

Move the mouse pointer to a point between circuit A and circuit B, and left-click this point.
Left-click the [Insert rows] button.
A space for one circuit is secured between the two circuits.

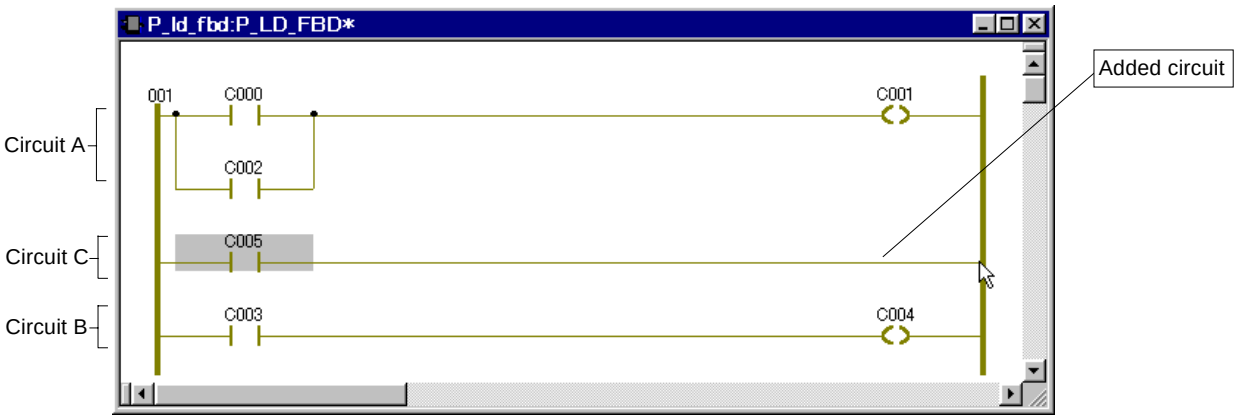


<Moving with the mouse>

Select the entire circuit B with the mouse.
The circuit is highlighted in reverse.
With the mouse pointer on the reversed part of the selected circuit B, drag the mouse downward to a point to which you want to move the circuit, and release the mouse button.

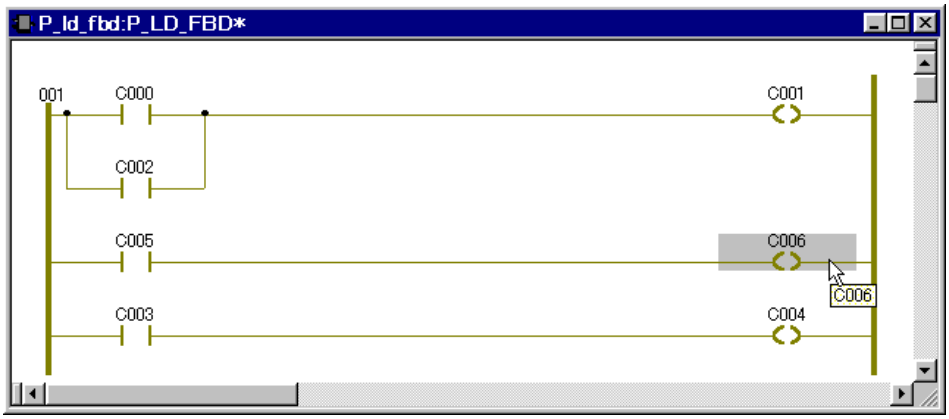


2) Inserting a circuit
Insert the “C005” contact.



Left-click the [Insert LD branch] button.
Left-click a point on the left power rail.
Left-click the contact of circuit C.
Move the mouse pointer to the right power rail, and left-click a point on the right power rail.

3) Inserting a coil
To insert the “C006” coil,



Select the horizontal line of circuit C with the mouse, and left-click the [Coil right] button.
The “C006” coil is inserted.

4-2-5 Changing the properties of contacts and coils

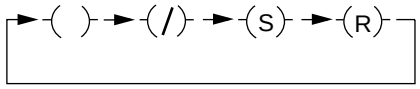
When an LD circuit is described in D300win, the normally open contacts and normal coils are initially used.
It is possible to change the properties of individual elements of an LD circuit. For example, an NO (normally open) contact can be changed to an NC (normally closed) contact; a coil can be changed to a set coil. There are two methods for this: the method to use the tool bar buttons and the method to use the {Properties ...} dialog.
In this paragraph, how to change from an NO to an NC contact as well as from a normal to a negated coil is explained.

(1) Changing the properties of contact with the tool bar

<Tool bar buttons used for changing properties>

- [Change in normally open contact] button
- [Change in normally close contact] button
- [Change in coil] button
- [Change in negated coil] button
- [Change in SET coil] button
- [Change in RESET coil] button
- [Change in contact/coil properties] button
  When “Contact” is selected, the properties of the contact change as follows:

  When “Coil” is selected, the properties of the coil change as follows:



* For the default tool bar settings of the system, only the [Change in contact/coil properties] button is displayed. To display other buttons for changing properties, it is necessary to make additional settings for the buttons using the [Toolbars] panel in the {Options} dialog.

1) To change from an NO to an NC contact,

Select the object NC contact by left-clicking it.
Left-click the [Normally closed Contact] or [Change in contact/coil properties] button.
Then, the NO contact will be changed to an NC contact.

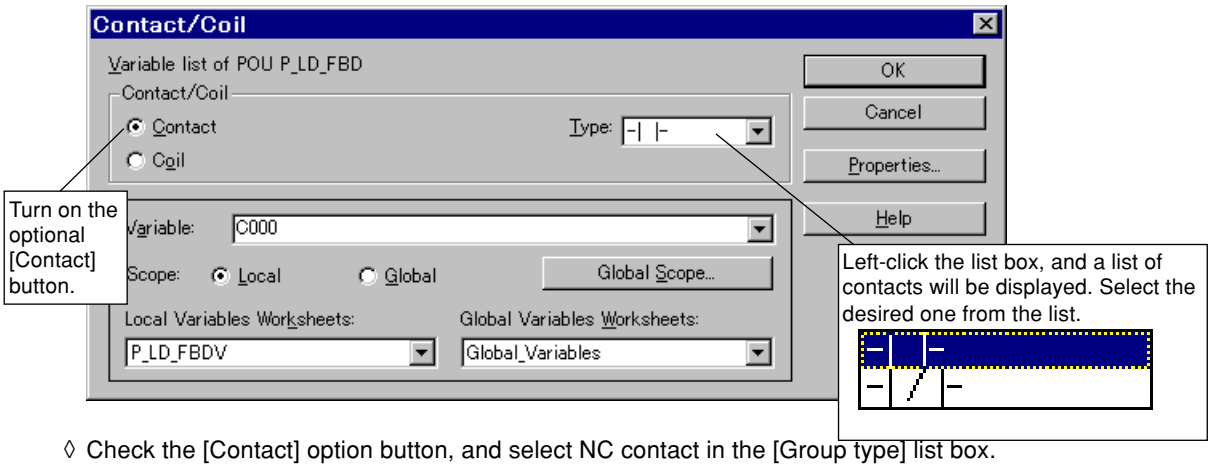
2) To change from a normal to a negated coil,

Select the object normal coil by left-clicking it.
Left-click the [Negated Coil] or [Change in contact/coil properties] button.
Then, the normal coil will be changed to a negated coil.

(2) Changing the properties of a contact with the dialog box

1) To change an NO contact into an NC contact

◊ Left-double-click the object NO contact to display the {Contact/Coil} dialog box.



◊ Check the [Contact] option button, and select NC contact in the [Group type] list box.

◊ If necessary, select a variable or input a variable name in the [Variable:] list box.

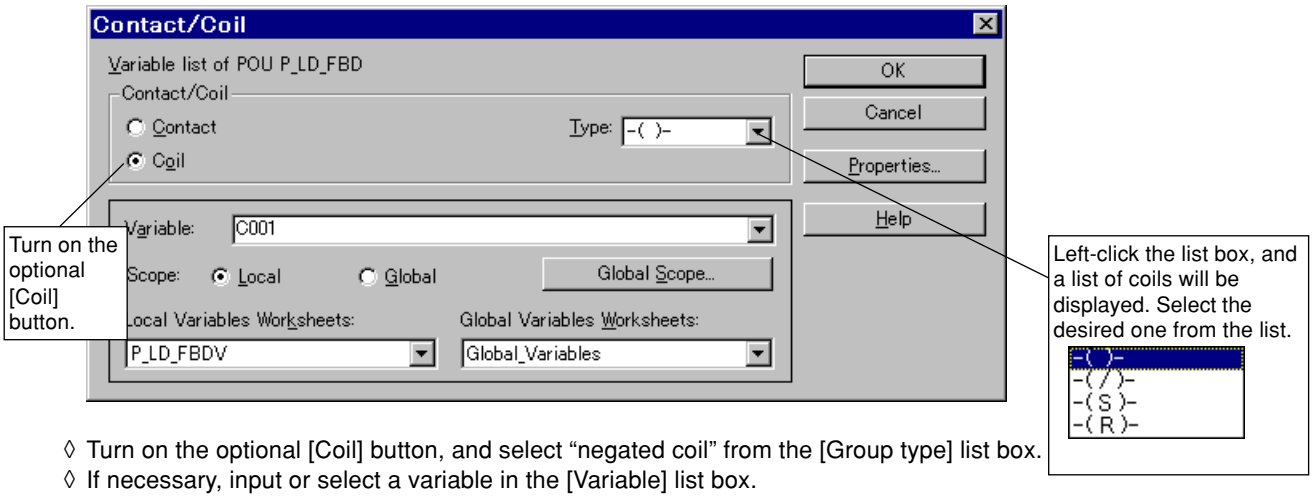
◊ After checking the content of the dialog box, left-click the [OK] button.
The {Automatic Variables Declaration} dialog box appears on the screen. Left-click the [OK] button on this dialog, without changing the setting.

📖 For a detailed explanation of variable declaration, see “8-1 Variable Declaration”.

---

2) To change a normal coil into a negated coil

◊ Left-double-click the object coil to display the dialog box, and the {Contact/Coil} dialog box will appear on the screen.



◊ Turn on the optional [Coil] button, and select “negated coil” from the [Group type] list box.

◊ If necessary, input or select a variable in the [Variable] list box.

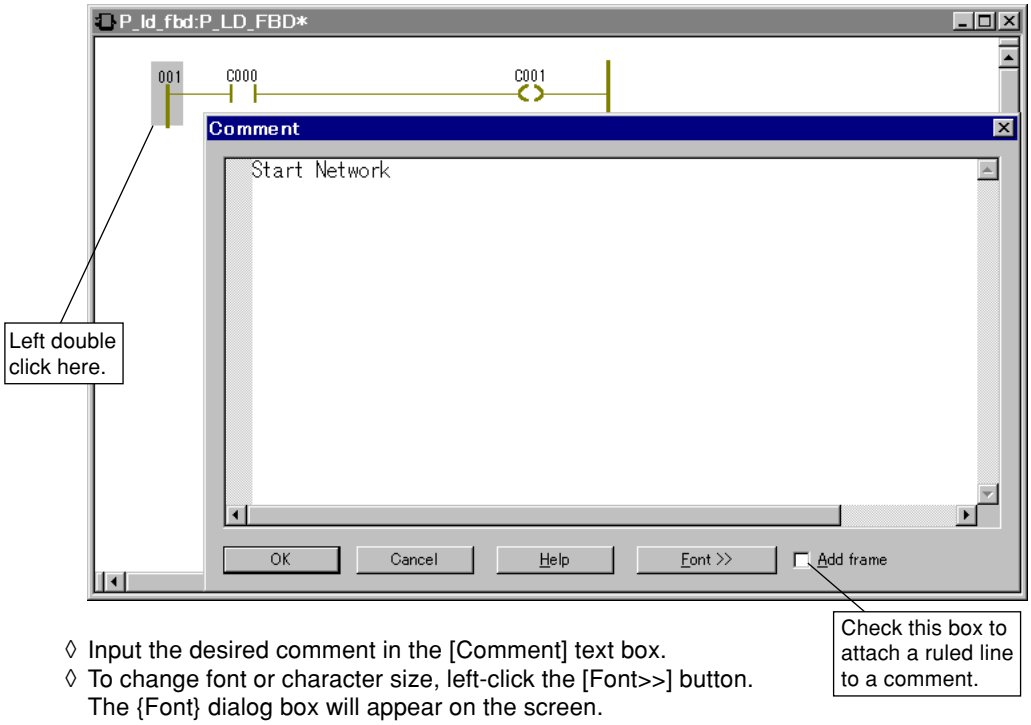
◊ After confirming the setting in the dialog box, left-click the [OK] button.
The {Automatic Variables Declaration} dialog box will then appear on the screen. Left-click the [OK] button in this dialog box without changing the setting. The specified normal coil will then be changed to a negated coil.

📖 For a detailed explanation of variable declaration, see “8-1 Variable Declaration”.

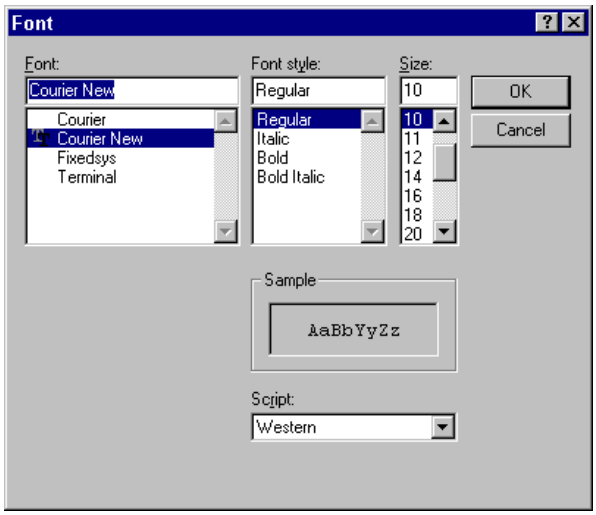
4-2-6 Circuit comments

As for the unit of LD circuit, all the objects that are connected to the left power rail are regarded as a single circuit. The circuit comment is the comment displayed for this type of circuit. The circuit comment is treated as one object of the circuit. Therefore, when the left power rail is moved, the circuit comments are moved as well.

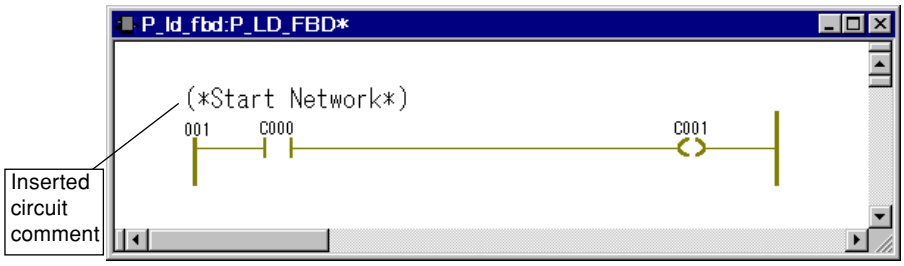
◊ Left-double-click an arbitrary point on the left power rail of the LD circuit.
The {Circuit Comment} dialog box will then appear on the screen as shown in the figure below.



◊ Input the desired comment in the [Comment] text box.
◊ To change font or character size, left-click the [Font>>] button.
The {Font} dialog box will appear on the screen.



◊ After confirming the setting in this dialog box, left-click the [OK] button.
◊ Left-click the [OK] button in the {Circuit Comment} dialog box, and the circuit comment will be displayed above the left power rail of the circuit, as shown in the following figure.



4-3-1 Inserting functions or function blocks

In this paragraph, how to insert a function or a function block in a worksheet (FBD worksheet or LD worksheet) is explained. In this example, ADD (addition) and CTU (up counter) function blocks are inserted.

The following explains how to describe “functions or function blocks.” However, the function used for explanation is described “without EN/ENO terminals.”
To use the function “with EN/ENO terminals,” see “2-7-10 Setting the graphic editor.” (For the default, the function is set to “with EN/ENO terminals.”)

---

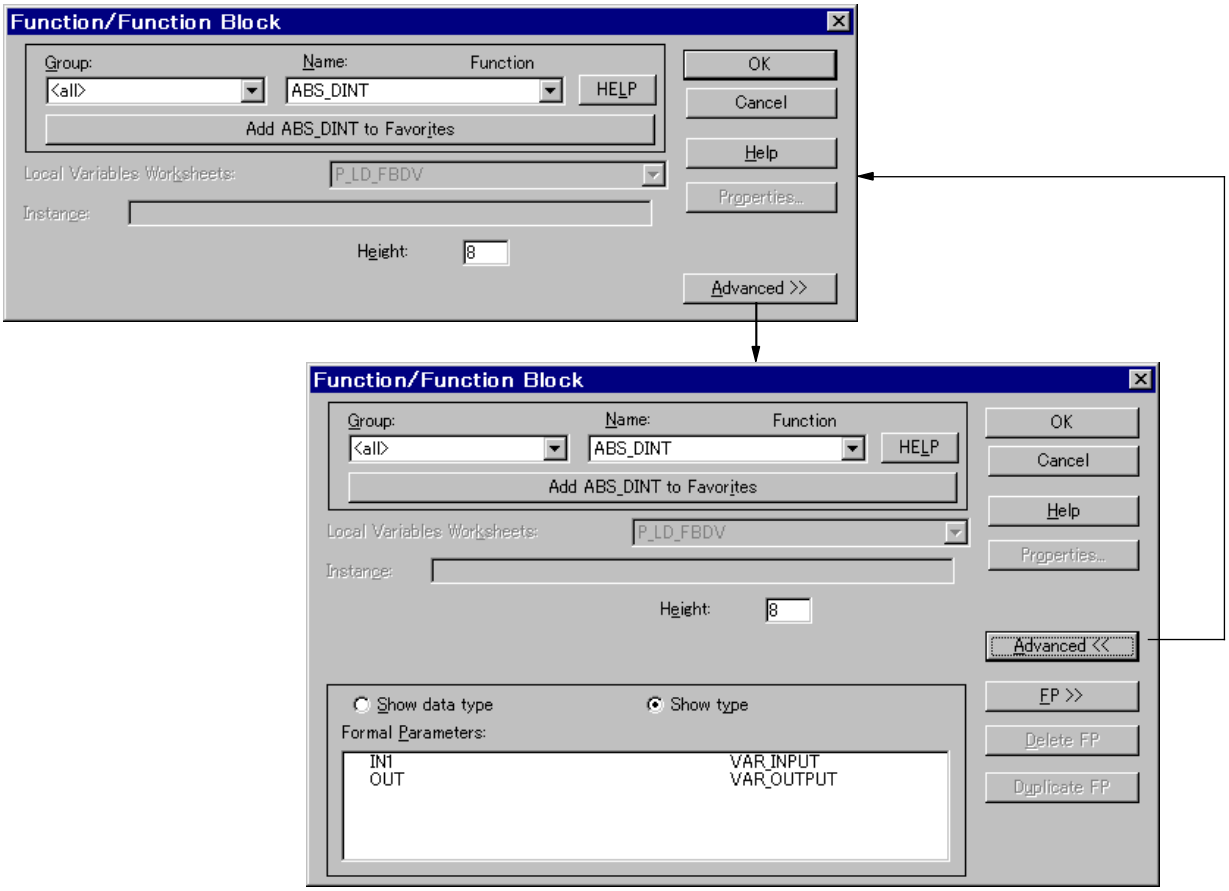
(1) Inserting a function/function block

Open the code worksheet.

◊ Left-click a point in the editing area to set the insert mark.

◊ Left-click the [Function/Function block] button.

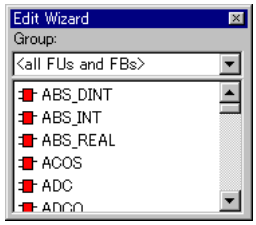
The {Function/Function block} dialog box appears on the screen. (Either dialog of the following two types is displayed.)



<Description of the dialog box>

[Group] ..... Specify the group of the function or function block to be inserted.
[Name] ..... Specify the name of the function or function block to be inserted.
[Help on FB/FU] ..... Calls the description help topics for the specified function or function block. If a user-defined function or function block is specified, this button will display the content of the corresponding description worksheet.

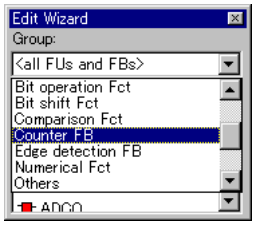
[Local Variables worksheets] ..... Displays the name of the local variables worksheet used for this POU.
[Instance] ..... Specify instance name for variable declaration. This text box is available only for function blocks. The Instance name can be specified with a maximum of 30 single-byte characters.
[Height] ..... Specify here the height of the function or function block to be inserted.
[Show data] ..... Shows the data type of the format parameters displayed in the list box.
[Show type] ..... Shows the type of the format parameters displayed in the list box.
[Formal Parameters] ..... Displays the name, data type and type of the existing formal parameters of this function or function block.
[Replace FB/FU] ..... Can be used to replace a previously arranged function or function block. To select a new function or function block, the selection should be made after checking this box. (Displayed only when properties are changed.)
[FP>>] ..... Activates the {Formal parameters} dialog box.
[Delete FP] ..... Deletes formal parameters. Can be used only for extension functions.
[Duplicate FP] ..... Duplicates formal parameters. Can be used only for extension functions.
[Properties ...] ..... Activates the {Automatic FB Declaration} dialog box for inserting or changing the comment for a function block.
[Advanced>>] ..... Sets displaying the formal parameter information (variable type or data type) of the specified function or function block.
[Advanced<<] ..... Sets hiding the formal parameter information (variable type or data type) of the specified function or function block.
[Add ... to Favorites] ..... Adds the specified function or function block to the <Favorites> group in the {Edit Wizard}. The illustration below is an example with function “ADD” and function block “CTU” added.



[Remove ... from Favorites] ..... Deletes the specified function or function block from the <Favorites> group in the {Edit Wizard}.

<Selecting a function/function block>

◊ In the [Group:] list box, left-click [Counter FBs] to select it.



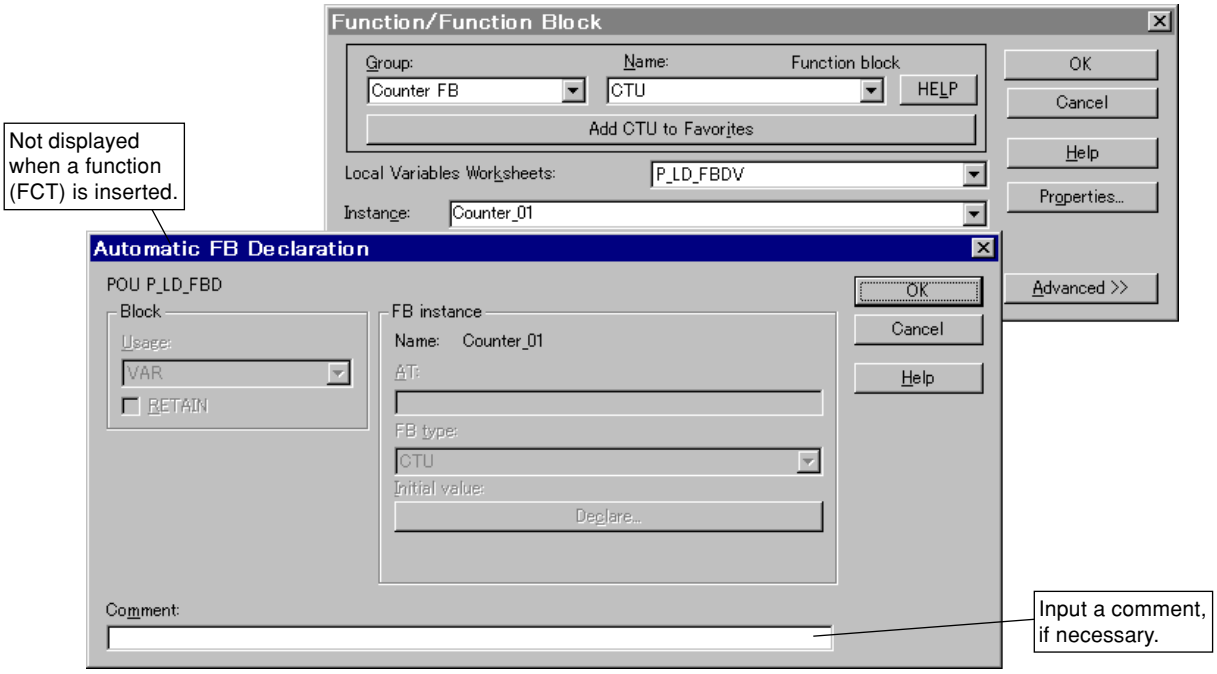
Functions and function blocks are grouped according to the content of their operation. For example, when [Arithmetic FUs] is selected from the [Group:] list box, only arithmetic operation function names are displayed in the [Name:] list box, facilitating function search. When <all> is selected, all function and function block names are listed in the [Name:] list box.

◊ Select [CTU] (Up counter) from the [Name:] list box by left-clicking it.

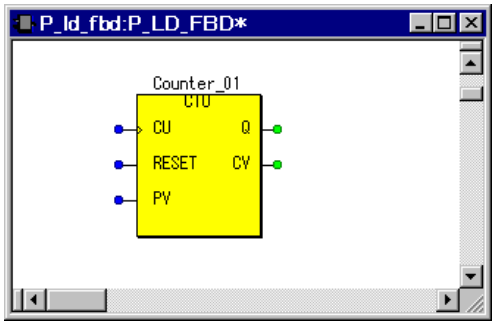
◊ Instance name “CTU_□” is displayed in the [Instance:] text box. Instance names can be used as they are, but in this example the name <Counter_01> is input.
(To insert a function, the instance name does not need to be input.)
The Instance name is specified with a maximum of 30 single-byte characters.
◊ To change [Height:], input the desired numeric value from the keyboard.
This is the height of the rectangle for displaying a function or function block. This value is changed, for example, when a newly connected object overlaps on the existing object.

📖 For how to change the height or the properties of function or function block, refer to the “Reference Volume.”

◊ After checking the content of the dialog box, left-click the [OK] button.
The {Automatic FB Declaration} dialog box appears on the screen. (When a function is selected, this dialog box does not appear on the screen.)



◊ If necessary, input a comment in the [Comment:] text box. (This comment does not have any influence on the program operation.)
◊ Left-click the [OK] button.
The function block is inserted into the code worksheet.



Description of the terminal names
• CU : Counter pulse input (BOOL data type)
• RESET: Reset input (BOOL data type)
• PV : Set value input (INT data type)
• Q : Count-up output (BOOL data type)
• CV : Current value output (INT data type)
* For details or other functions and function blocks, refer to the “Instructions.”

4-3-2 Connecting objects to the FCT/FB terminals

How to connect an LD language object, an FBD language object, or a variable to individual terminal (formal parameter) of a function or function block is explained below.

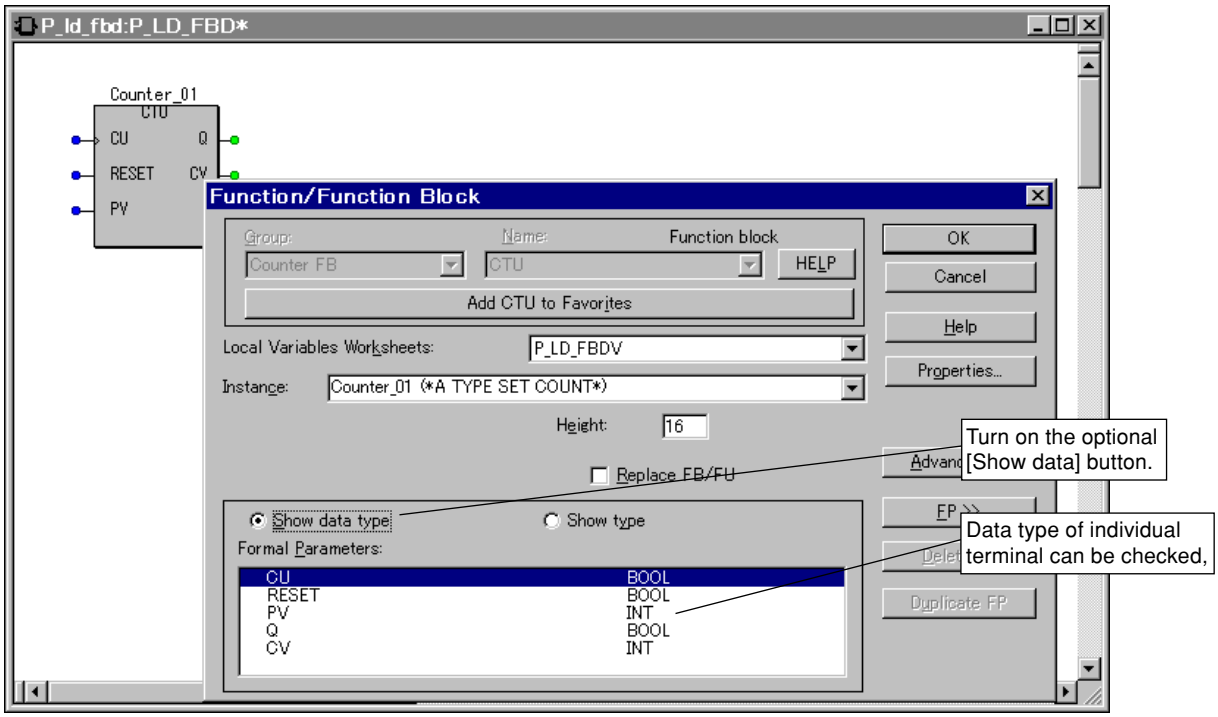
(1) Checking which objects can be connected to the terminals

The objects which can be connected to an individual terminal (formal parameter) of a function or function block must be same in data type as the terminal. The data type of terminal can be checked by the following method:

To connect objects of different data types, use the “type conversion” function.

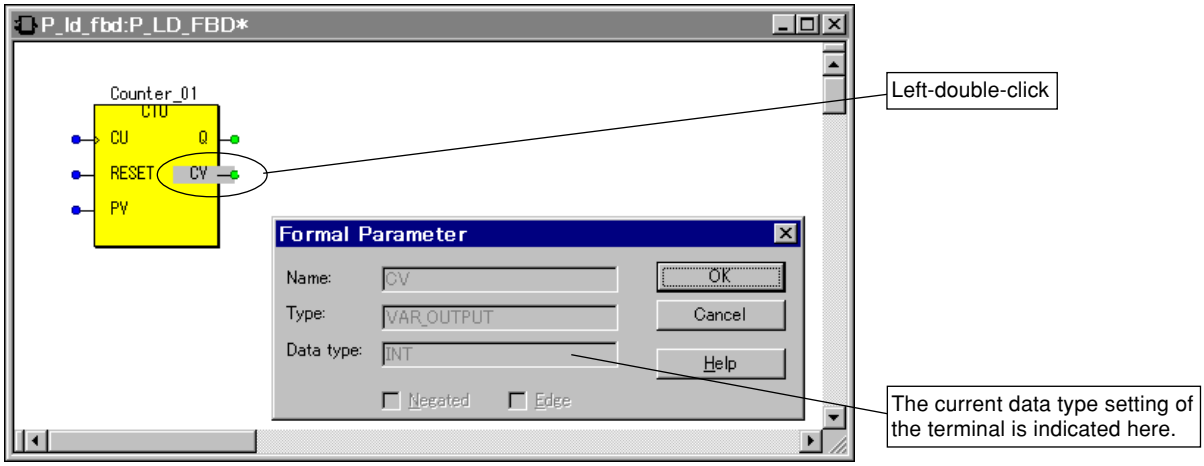
1) Check data type with the {Function/Function Block} dialog box

◊ Move the mouse pointer onto the target function or function block, and then left-double-click. And the {Function/Function Block} dialog box will appear on the screen. In this dialog box, turning on the optional [Show data] button in the [Formal Parameters] box displays formal parameter names and their data type in the list box.



2) Check data type with the {Formal Parameter} dialog box

◊ Move the mouse pointer onto the target terminal, and double-click.
Left-double-click the terminal, and the {Formal Parameter} dialog box will appear on the screen. The data type set for the terminal is indicated in the [Data type] text box in this dialog box.



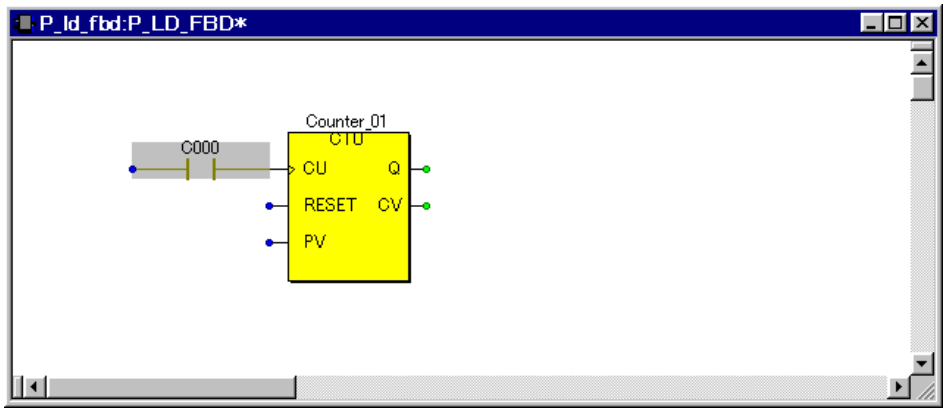
(2) Connecting an LD object to a terminal

How to connect an NO contact to the CU and RESET terminals of Counter_01 and a coil to the Q terminal is explained below. (An FBD object is connected to the PV terminal; a variable is connected to the CV terminals.)

1) Connecting a contact to input terminal “CU”

◊ Select the “CU” terminal of function block “CTU” by left-clicking it.

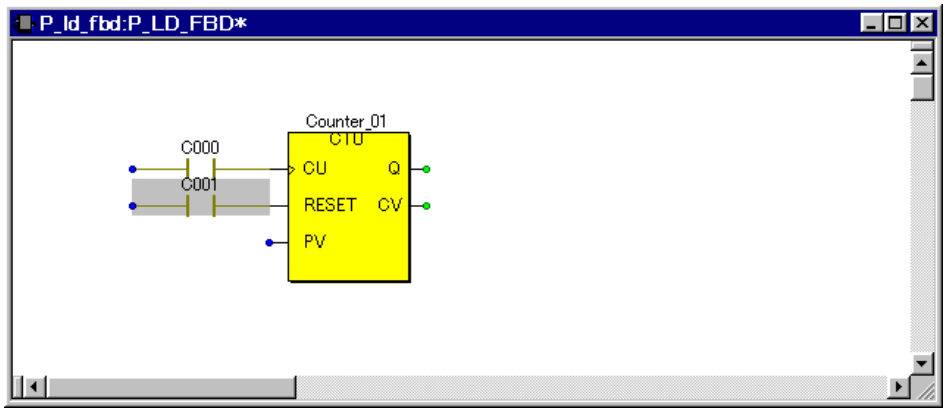
◊ Left-click the [Contact left] button.
A contact is added to terminal “CU.”



2) Connecting a contact to input terminal “RESET”

◊ Select terminal “RESET” by left-clicking it.

◊ Left-click the [Contact left] button.
A contact is added (inserted) to the RESET terminal.



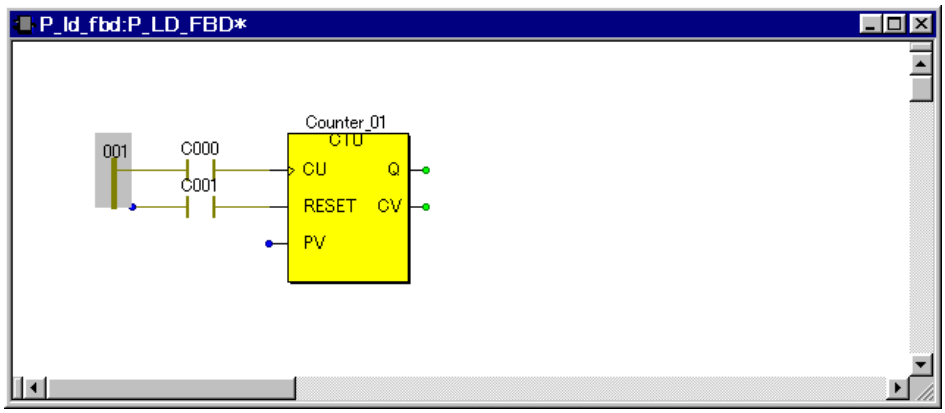
3) Adding a left power rail

◊ Select contact “C000” by left-clicking it.

◊ Left-click the [Insert left power rail] button.
A left power rail is connected to the contact.

The following image is displayed on the screen.

Function block CTU which has one contact and a left power rail



4) Connecting between objects

For example, attempting to add a left power rail to a contact which is connected to terminal (formal parameter) “RESET” of the function block shown in the figure above, the error message “Collision” appears on the screen, with the overlapped part displayed.

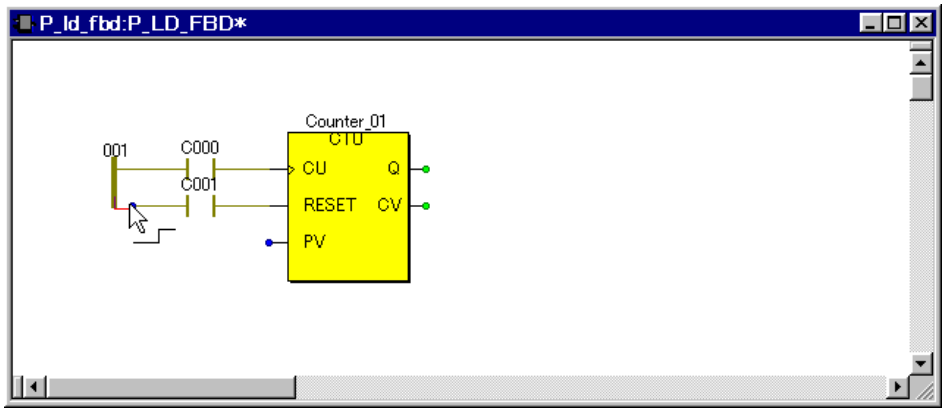
To connect objects to each other, use the [Connect Objects] button.

If the left power rail and the contact (C001) are not connected to each other as shown in the figure above, connect them using the procedure below.

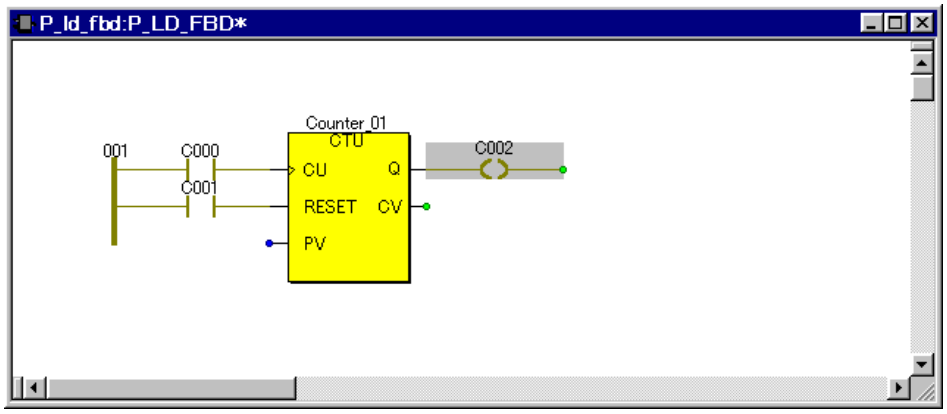
◊ Left-click the [Connection mode] button.

◊ Move the mouse pointer onto the left power rail, and then left-click.

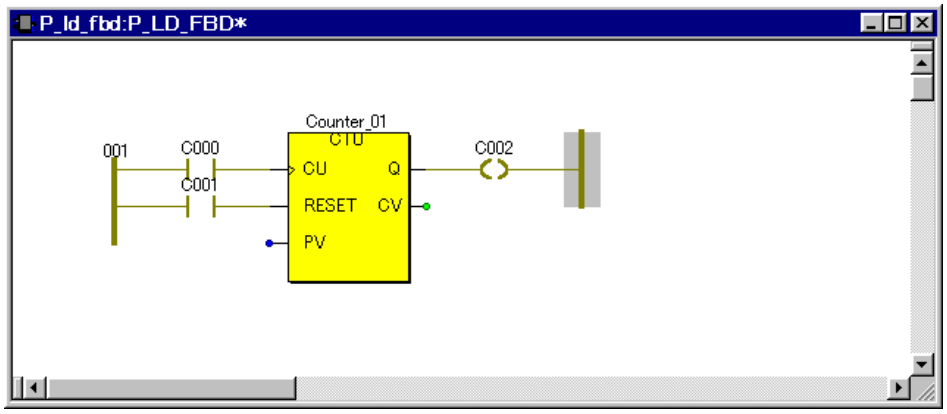
◊ Move the mouse pointer onto the left junction of the contact which is connected to terminal “RESET,” and the left-click.



5) Adding a coil to a output terminal
◊ Select terminal “Q” of function block “CTU” by left-clicking it.
◊ Left-click the [Coil right] button.
A coil is connected to terminal “Q.”
The following image is displayed on the screen.



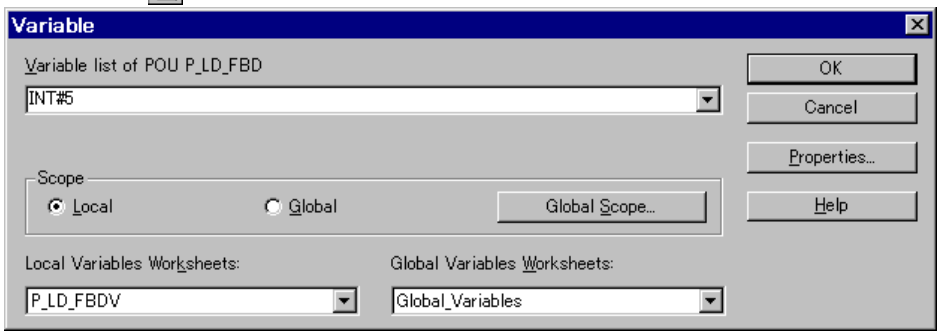
6) Adding a right power rail
◊ Select the object coil by clicking it.
◊ Left-click the [Power rail Right] button.
A right power rail is connected to the coil.



(3) Connecting variables to the terminals
How to connect a variable to individual terminal (PV and CV) of a function block is explained below.

For a detailed explanation of variable declaration, see “8-1 Variable Declaration”.

1) Declaration of a variable that is to be connected to input terminal “PV”.
◊ Select terminal “PV” by left-clicking it.
◊ Left-click the [Variable] button, and the {Variable} dialog box will appear on the screen.

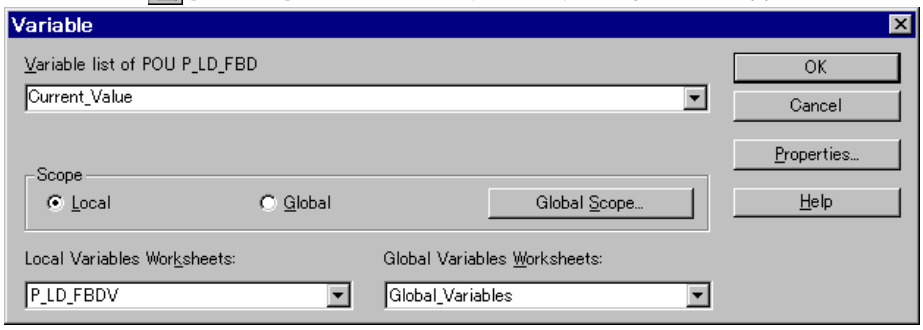


How to use the {Variables} dialog box

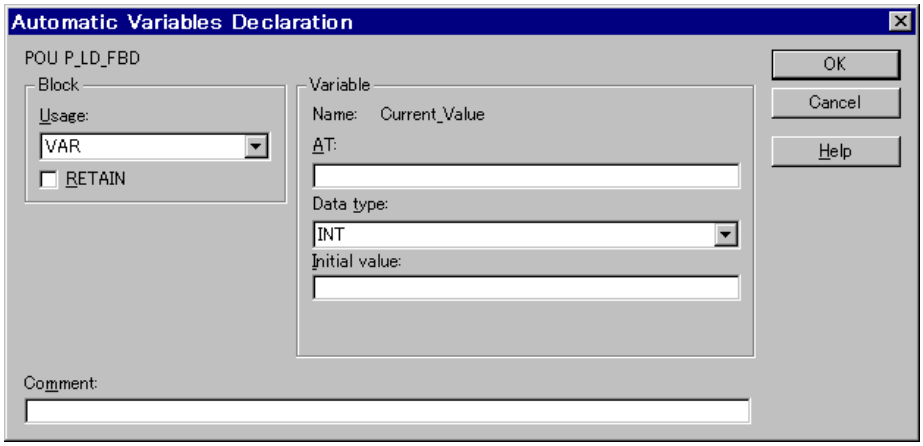
◊ Input or select the desired variable name in the [Variable list of POU *****] list box.
◊ In this example, “INT # 5” is input (integer “5” is set).
(This is the method to directly specify a set value.)
◊ After confirming the setting in this dialog box, left-click the [OK] button.

2) Declaration of a variable which is to be connected to input terminal “CV”.

◊ Select terminal “CV” by left-clicking it.
◊ Left-click the [Variable] button, and the {Variable} dialog box will appear on the screen.



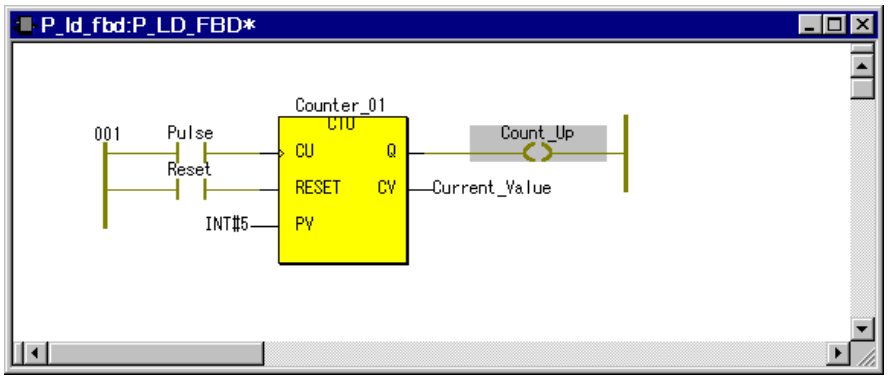
◊ Input or select the desired variable name in the [Variable list of POU *****] list box.
In this example, “Current_Value” is input.
◊ After confirming the setting in this dialog box, left-click the [OK] button.
◊ The {Automatic Variables Declaration} dialog box will then appear on the screen.



How to use the {Automatic Variables Declaration} dialog box

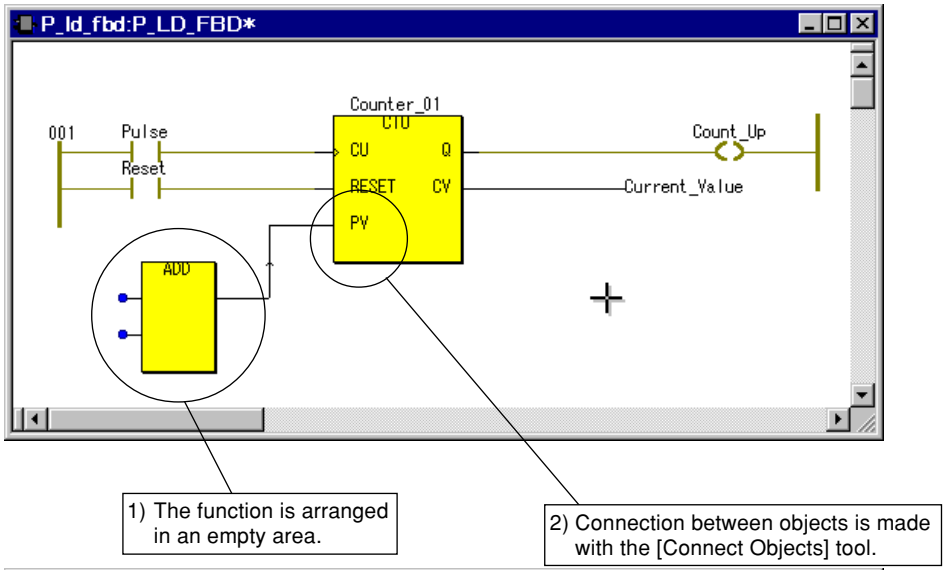
◊ In the [Data type] list box, select the desired data type. In this example, “INT” is selected by left-clicking the [Data type] list box.
◊ If necessary, input the desired initial value in the [Initial value] text box.
◊ To declare the position of variable, input the desired position value in the [AT] text box.
◊ Select a variable keyword from the [Usage] list box.
◊ If necessary, input a comment in the [Comment] text box.

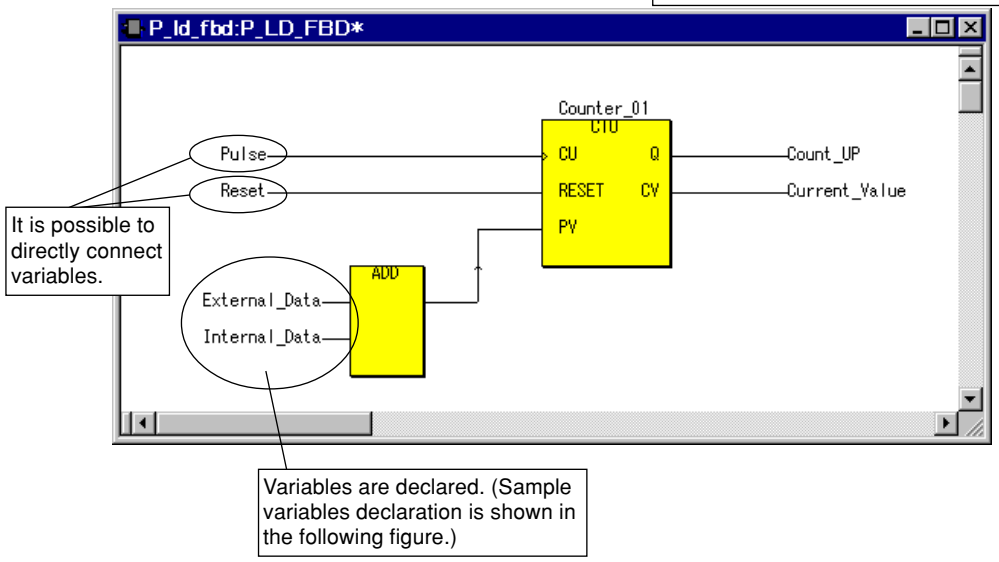
◊ After confirming the setting in this dialog box, left-click the [OK] button.
The new variable will then be inserted in the code worksheet, and the variable declaration is automatically inserted in the variable declaration of the POU.

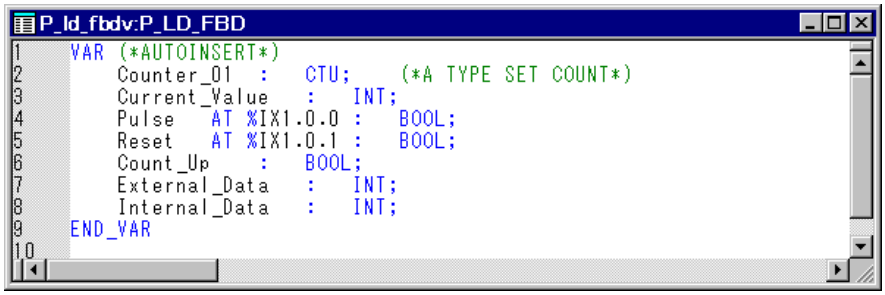


When inserting a previously declared variable, the variable name is displayed in the [Variable list of POU *****] list box of the {Variables} dialog box. Select a variable from the displayed list, left-click the [OK] button, and the variable will be inserted in the code worksheet.

(4) Example of connecting an FCT object to a terminal
How to connect an FBD language object to the PV terminal of counter 01 is explained below.
In this example, the ADD (addition) function is connected.







4-3-3 Replacing a function or function block

It is possible to replace an inserted function or function block with another function or function block. There are two methods for this.

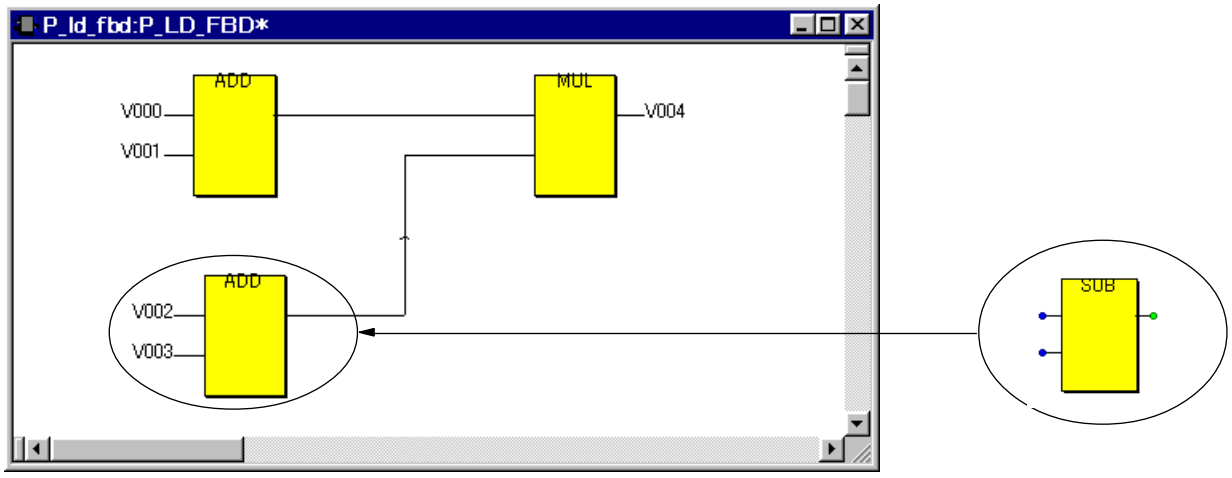
When the formal parameter (data type) is the same, it is possible to replace functions or function blocks while keeping their connecting lines. When the formal parameter is different, the connecting lines are deleted.

1) Method using the {Function/Function Block} dialog box

2) Method using the [Replace FB/FU] command in the [Edit] menu.

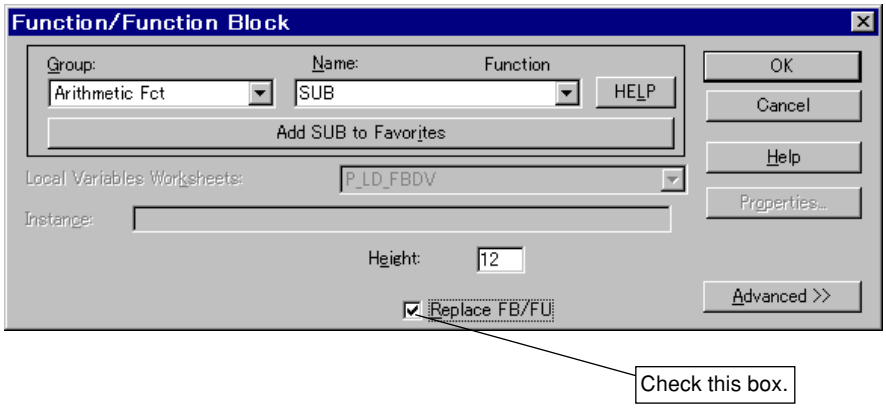
(1) Replacing one FCT/FB

How to change the ADD (addition) function in the figure below to a SUB (subtract) function is explained below

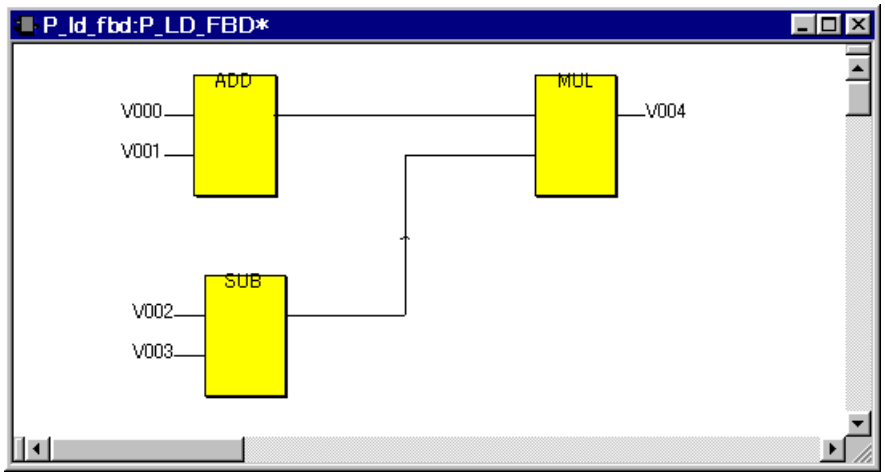


<How to replace>

◊ Left-double-click the ADD function, and the {Function/Function Block} dialog box will appear on the screen.
◊ Check the [Replace FB/FU] box, and the [Group] and [Name] list boxes will be enabled.
◊ Select “Arithmetic Fct” in the [Group] list box and “SUB” in the [Name] list box.



◊ After confirming the setting in this dialog box, left-click the [OK] button.
Then function ADD will be replaced with SUB.



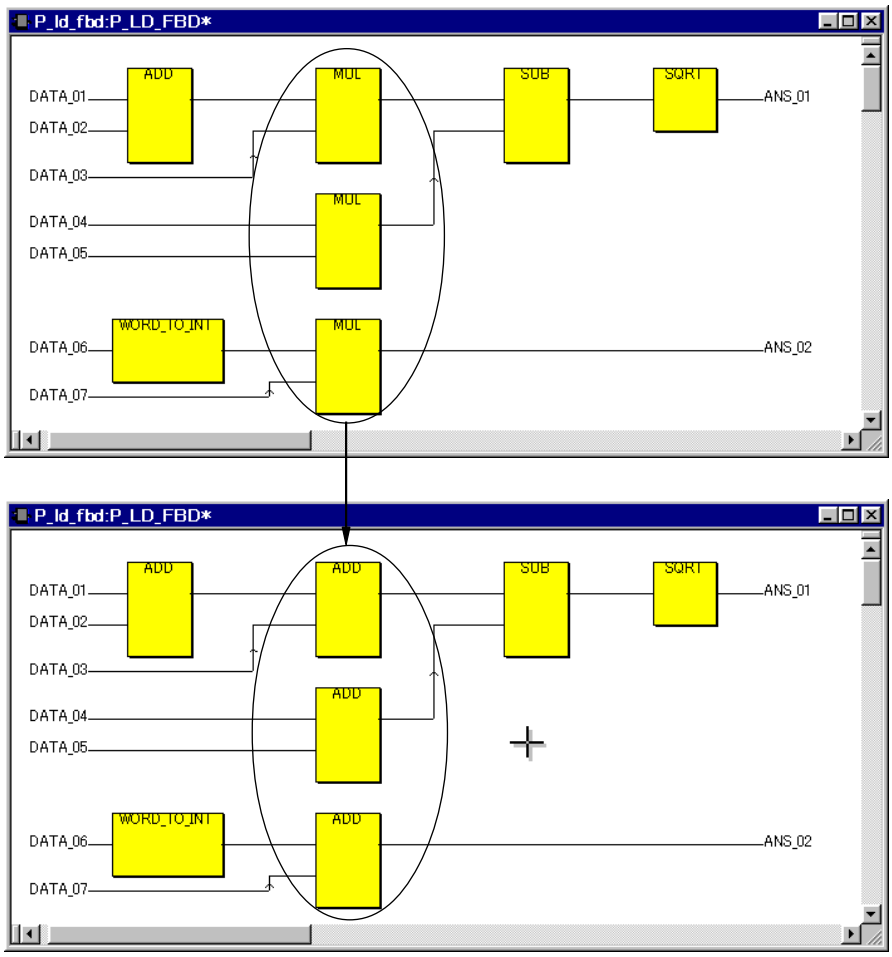
Key-point:

1) Replacement when the number of terminals is different

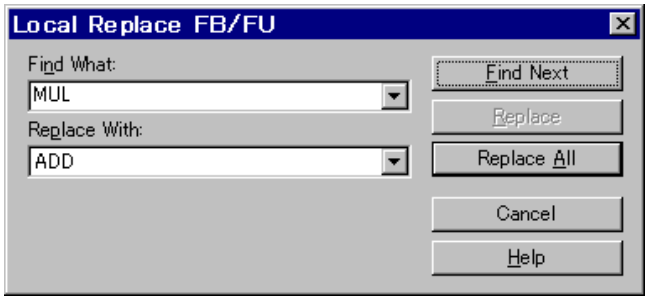
When the number of terminals is different between the replaced and replacement function or function block, all the variables are displayed independently, as shown in the above figure.

(2) Replacing multiple FCTs/FBs

How to replace all functions and/or function blocks in one worksheet is explained below. In this example, MUL (multiplication) functions in the figure below are replaced with ADD (addition) functions.



◊ Left-click the [Replace FB/FU] command in the [Edit] menu, and the {Local Replace FB/FU} dialog box will appear on the screen.

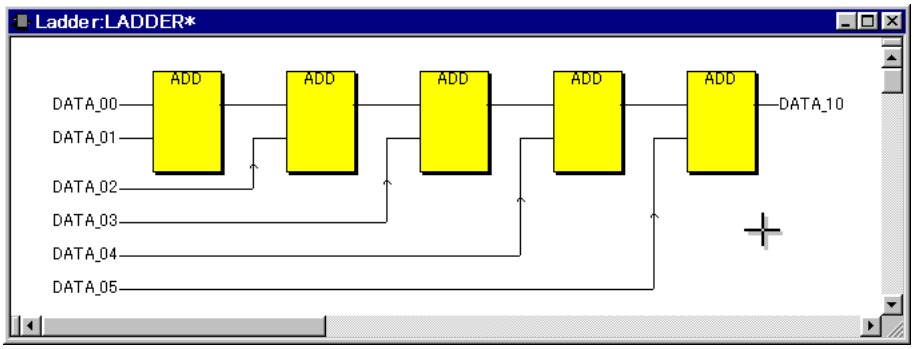


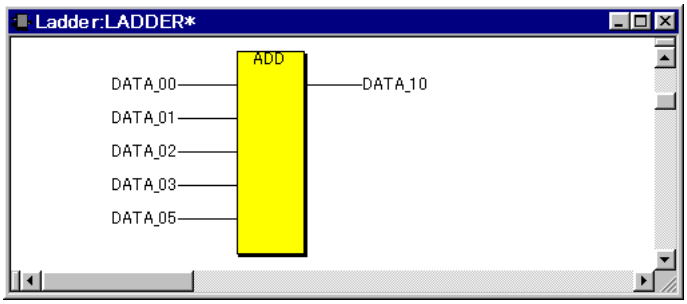
[Find What] ..... Specify the function or function block to be searched.
[Replace With] ..... Specify a new function or function block to replace the search object.
[Find Next] ..... Proceeds to the first entry (search object) of a function or function block.
[Replace] ..... Replaces the function or function block marked with the [Find Next] button.
[Replace All] ..... Replaces all search objects.

◊ Select type of function or function block to be searched.
◊ Select the function or function block to replaces the search object.
◊ In order to search the first function or function block to be replaced, left-click the [Find Next] button.
◊ When you want to replace all search object functions or function blocks, left-click the [Replace All] button.
◊ To replace search objects one by one, left-click the [Replace] button.

4-3-4 Increasing or reducing the number of input terminals

It is possible to increase the number of input terminals (formal parameters) of a function or function block so that the program can easily be described.
As shown in the figure below, it is possible to describe as a combination of multiple functions, or as a single function.

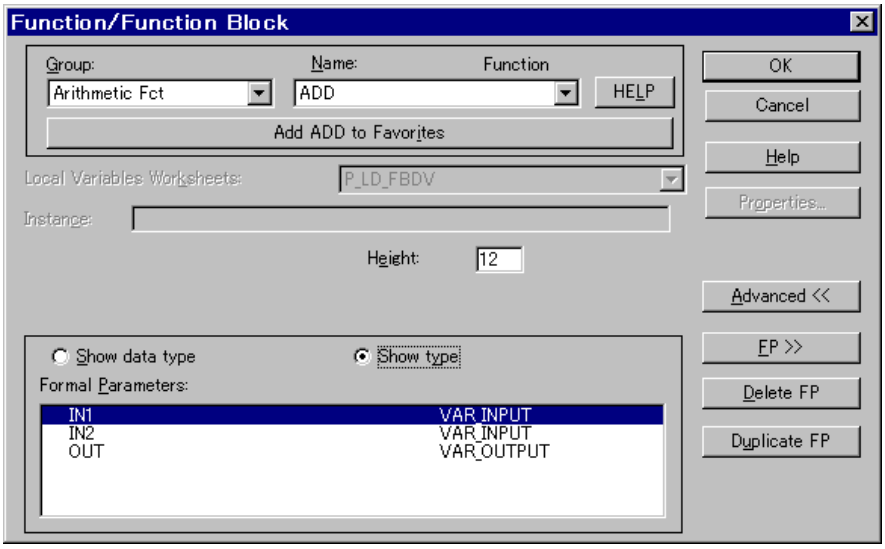




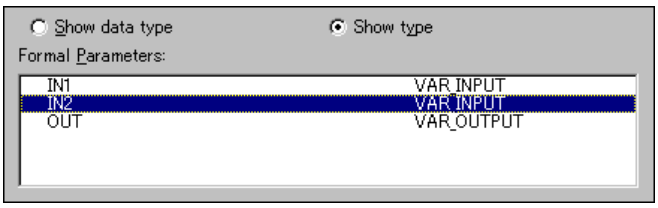
(1) Increasing the number of terminals

How to create the previously mentioned ADD (addition) function, which has 5 input terminals, is explained below.

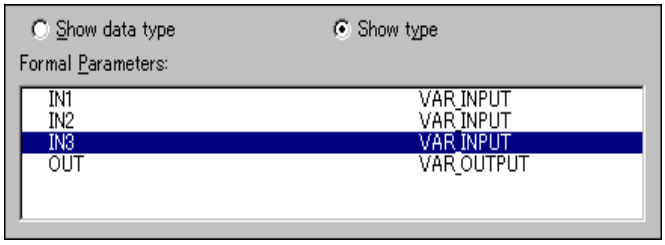
◊ According to the procedure for describing a normal function or function block, left-click the [Function/Function block] button with the insertion pointer placed on the worksheet.
The {Function/Function Block} dialog box will appear on the screen.



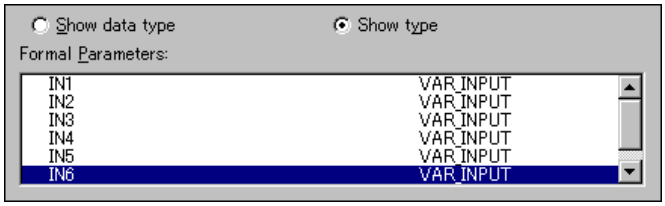
◊ In this dialog box, left-click “IN2” in the [Formal Parameters] list box.



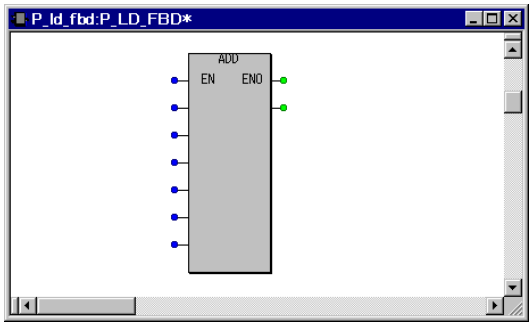
◊ Left-click the [Duplicate FP] button, and parameter “IN3” will be added.



◊ Next, left-click the [Duplicate FP] button three times.
Formal parameters “IN1 to “IN6” are displayed as shown in the figure below.

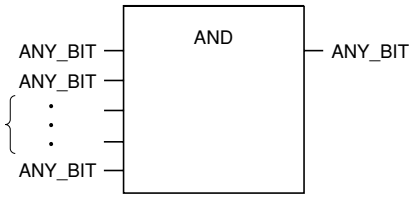


◊ Left-click the [OK] button, and an ADD (addition) function which has 6 input terminals will be described on the worksheet.



The extension of input terminals (formal parameters) is not possible for all functions or function blocks. For the functions and function blocks whose input terminals can be extended, see “Function/Function Block List” in the “User’s Manual, Commands Volume”.

• The description in the Commands Volume is as follows:

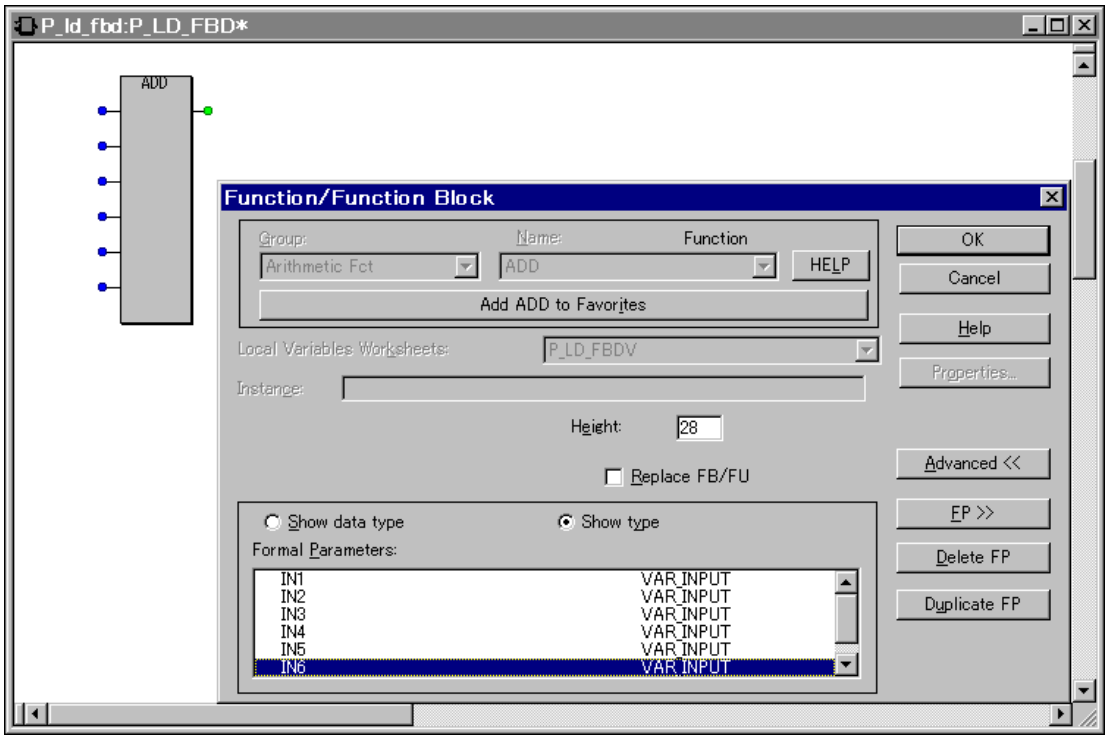
Indicates that input terminals can be extended.		Logical product AND

(2) Deleting input terminals

Extended input terminals of a function or function block can be deleted (Input terminals other than extended ones cannot be deleted.)

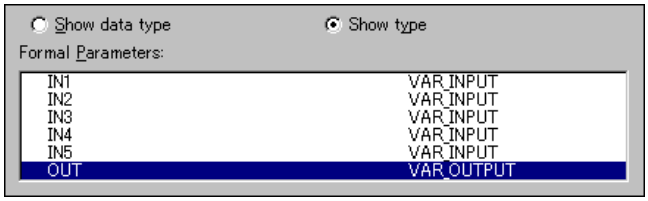
<How to delete input terminals>

◊ Move the mouse pointer onto the function with an input terminal added, and left-double-click.
The {Function/Function Block} dialog box will then appear on the screen.



◊ Select the input terminals which are to be deleted from the [Formal Parameters] list box.

◊ Left-click the [Delete FP] button.

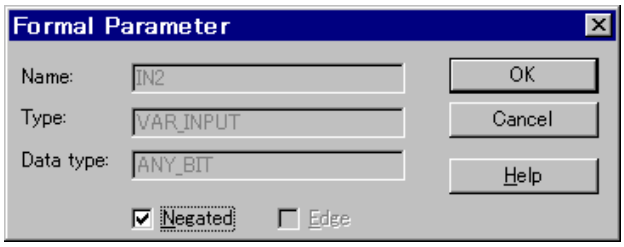


4-3-5 Changing input/output terminals to negated terminals

It is possible to change BOOL data-type input or output terminals of a function or function block to negated terminals. By this, the input or output signal value of a terminal is changed from “1” to “0” or from “0” to “1”.

<How to negate input or output terminal>

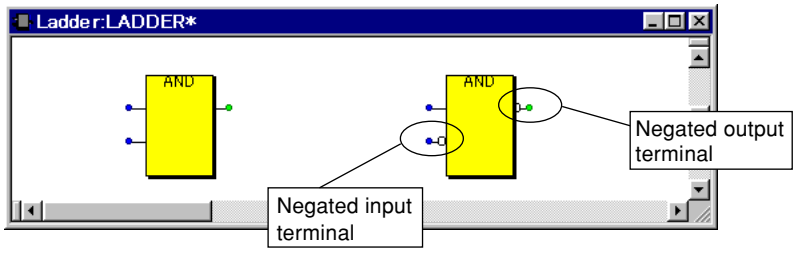
◊ Left-double-click the input or output terminal which is to be negated, and the {Formal Parameters} dialog box will appear on the screen.



[Name] ..... Specify the formal parameter name.
[Type] ..... Specify the type of formal parameter.
[Data type] ..... Specify the data type of the formal parameter.
[Negated] ..... Specifies whether or not to negate the parameter. This can be specified only for BOOL-type input or output terminals conforming to IEC 61131-3.
[Edge] ..... Detects leading or falling edge to activate FCT/FB.

◊ Check the [Negated] box.
Left-click the [OK] button, and then the corresponding terminal will be negated and indicated with “O (circle mark).”

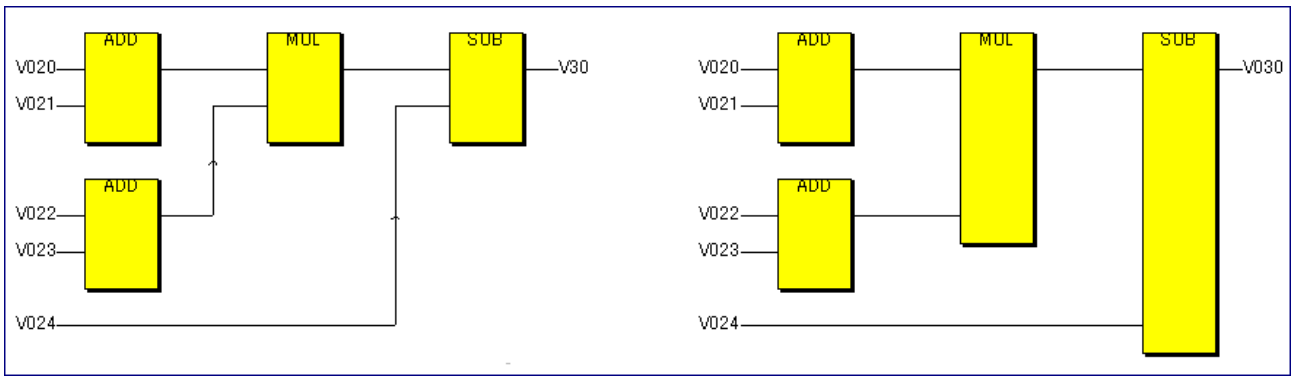
<Sample negation of output “Q”>



4-3-6 Changing the frame height of a block

The frame height of a function or function block can be changed. This feature is useful to express a circuit so that its relationship with the functions connected to individual terminal can be easily understood. The figure below shows a sample program in which the frame height of a function or function block is changed.

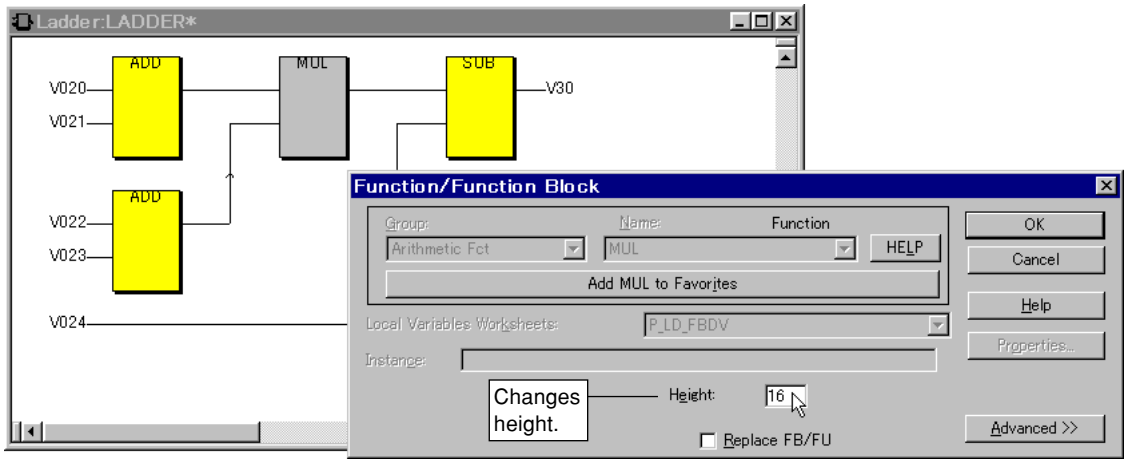
• Normal circuit • Sample change of frame height



<How to change frame height>

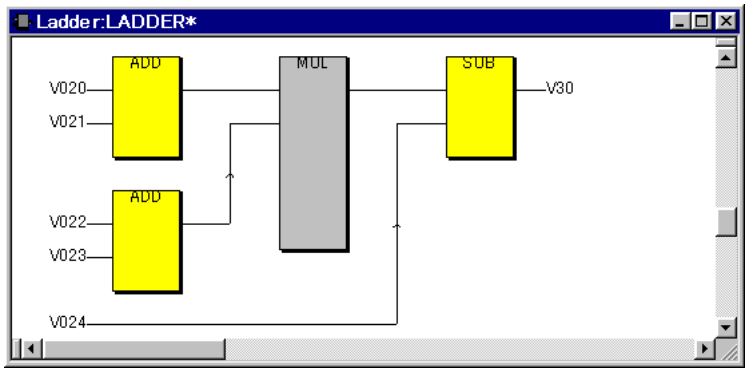
Frame height can be changed before or after the function or function block is arranged on the worksheet. The changing procedure is almost the same for both cases.

◊ Move the mouse pointer onto the function or function block arranged on the worksheet, and left-double-click. The {Function/Function Block} dialog box will appear on the screen.



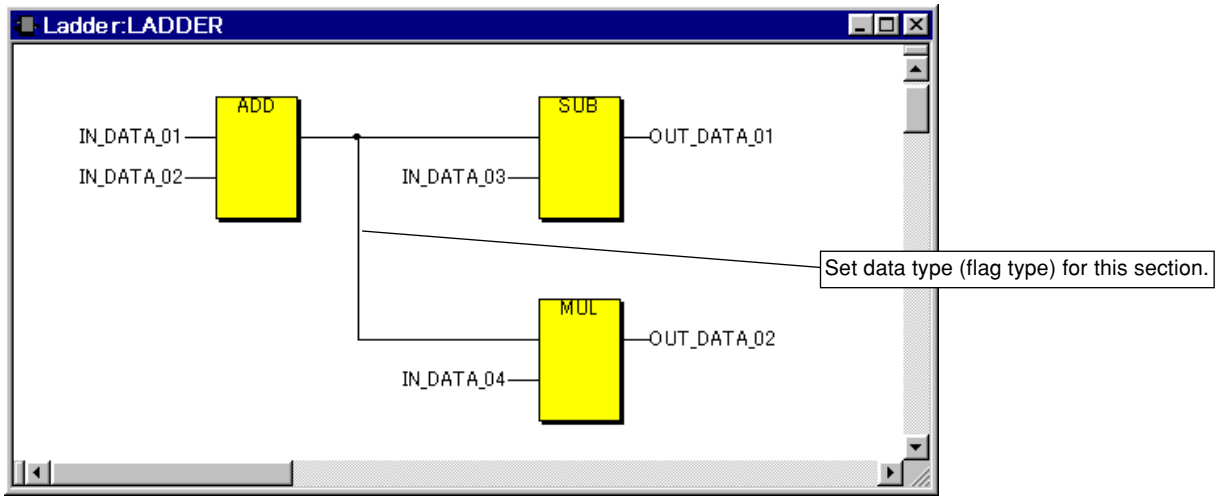
◊ In this dialog box, input the desired value in the [Height] text box.

◊ After confirming the setting in this dialog box, left-click the [OK] button. The height of the frame will then be changed to the specified value.

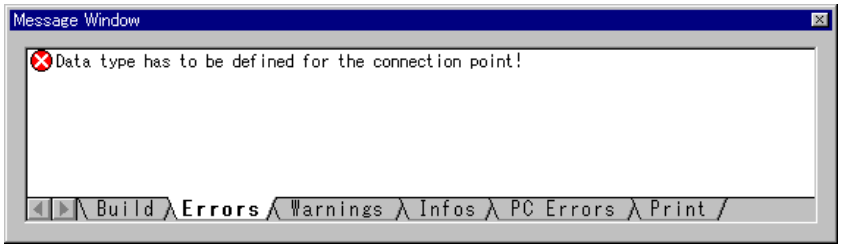


4-3-7 Setting flag type

In the FBD network, the internal flag and data type cannot occasionally be determined with the compiler depending upon the circuit structure of the function and function block. In this case, the internal flag and data type must be manually set. Normally, compilation is carried out, its result is confirmed with the compilation error list, and then the flag type setting is made.
A sample circuit that requires the flag type setting is shown below.

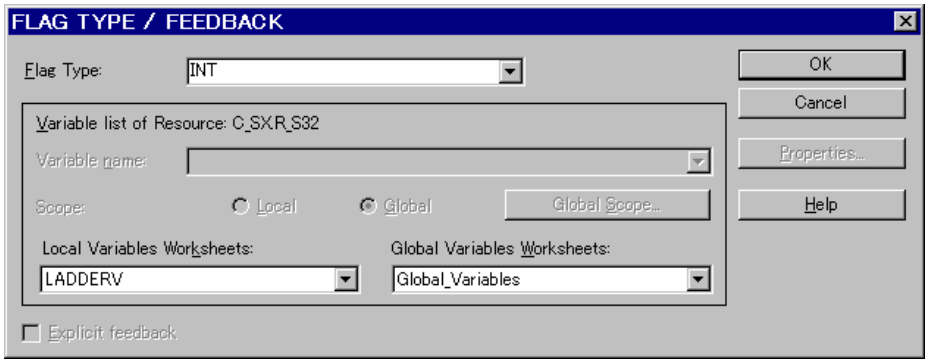


When compilation is complete, the following message is displayed on the error list in the message window.



(1) Setting data type for flag

◊ Move the mouse pointer onto the connecting line, and left-double-click.
The {FLAG TYPE/FEEDBACK} dialog will appear on the screen.

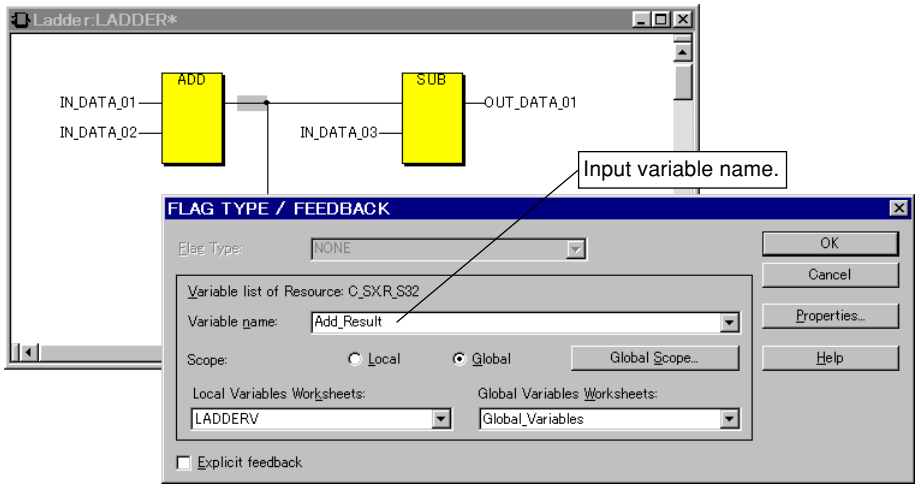


◊ Set the data type of the flag beginning with the [Flag Type] list box.

[Flag Type] ..... Specify the data type of flag.
[Variable name] ..... Specify the variable name for flag type. This text box can be used only when the data type selected in the dialog box is “NONE”.
[Explicit feedback] ..... Specifies that all flag types are automatically assigned to the variables indicated in the [Variable name] field.
[Scope] ..... Selects local or global variables.
[Global Scope ...] ..... Activates the {Select resources for global variables} dialog box for specifying the resources for which global variables are declared.
[Local Variables Worksheet] ..... Specify the local variable worksheet to be registered.
[Global Variables] ..... Specify the global variable worksheet to be registered.
[Properties ...] ..... Displays the {Automatic Variables Declaration} dialog box for setting the attributes of variables.

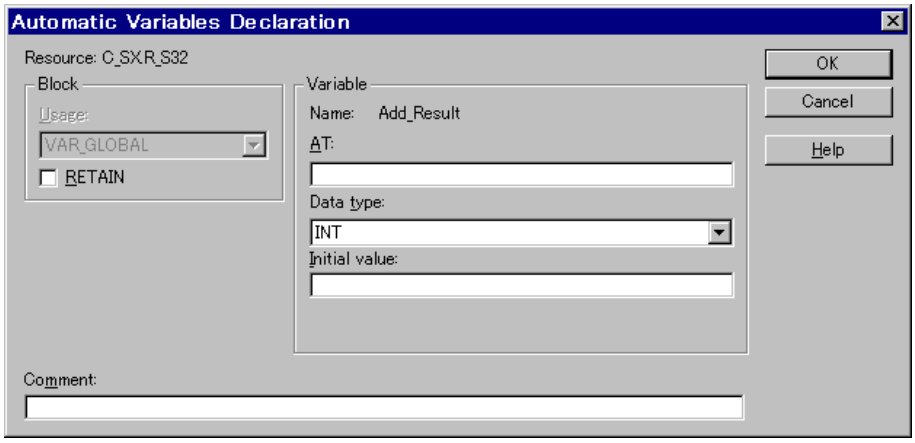
(2) When is it necessary to display on-line data? (under development)
When a function or function block is connected, input and output data (the result of the operation) can be checked by displaying variables. If necessary, the intermediate progress of an operation (data on a connecting line) can be displayed by setting the flag type. A sample setting for this is shown below.

◊ Left-double-click the connecting line for which a flag is to be set, or right-click it to display the shortcut menu and then left-click the [Object properties ...] command in this shortcut menu.
The {FLAG TYPE/FEEDBACK} dialog box will then appear on the screen.



◊ Input the desired variable name in the [Variable name] text box.
(The variable name can be specified only when “NONE” is specified in the [Flag Type] text box.)

◊ Left-click the [Properties ...] button, and the {Automatic Variables Declaration} dialog box will appear on the screen.



◊ After confirming the setting in this dialog box, left-click the [OK] button.

◊ Left-click the [OK] button in the {FLAG TYPE/FEEDBACK} dialog box, and the variable name will be displayed on the connecting line.

4-3-8 Displaying the execution order of the FBD circuit

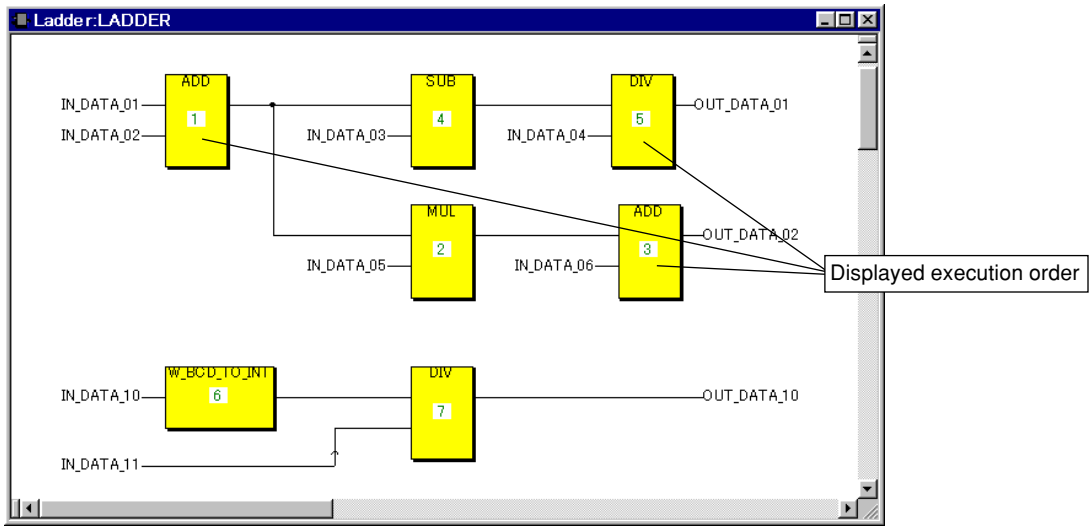
D300win can display the execution order of various functions and function blocks described on a worksheet. The execution order corresponds to the intermediate PC codes compiled and therefore may not coincide with the actual execution order of the PC. However, the execution order does not differ between circuit blocks.

Note: Displaying and checking the execution order should be done after compilation.

<How to display execution order>

◊ In order to compile the worksheet, select the [Build] command from the [Make] menu.

◊ Select the [Execution Order] command from the [Layout] menu, and the numbers for execution order will be displayed in green in the center of functions, function blocks, and the left power rail of the LD circuit.



Note: When the worksheet has been changed after compilation, the message box shown below appears. Left-click the [OK] button to close the message box, and the numbers for the execution order are displayed in red. In this case, execute the [Compile Worksheet] command in the [Build] menu to update the execution order.

4-3-9 Feedback display of FBD circuit

Feedback may occur as a result of FBD programming. An FBD object of high execution order may be connected to an object of low execution order to call feedback. Feedback can be displayed for checking. Because the displayed execution order corresponds to the intermediate language of PC codes, the displayed execution order and feedback may differ slightly from those actually performed in the PC.

Note: To display feedback, the worksheet has to be compiled.

<How to display feedback>

- ◊ Select the [Compile worksheet] command in the [Build] menu to compile the worksheet.
- ◊ Select the [Highlight Feedback] command from the [Layout] menu.
- ◊ Then feedback will be displayed underlined in green.

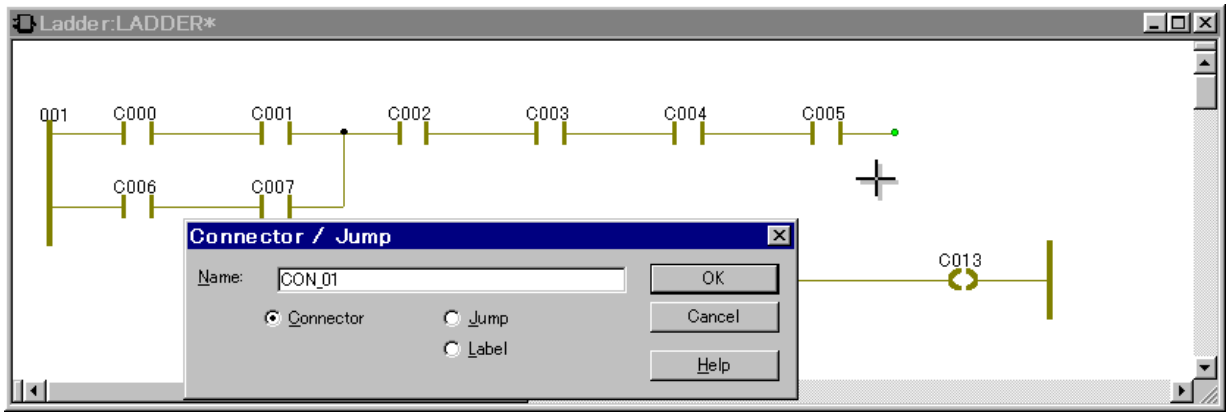
Note: If the worksheet has been changed after the last compilation, the numbers for execution order are displayed in red. In this case, select the [Compile worksheet] command from the [Build] menu.

4-3-10 Inserting connectors, jumps or labels

(1) How to insert a connector, jump or label

Connectors, jumps, and labels can be inserted with essentially the same operation method. This paragraph describes how to insert a connector.

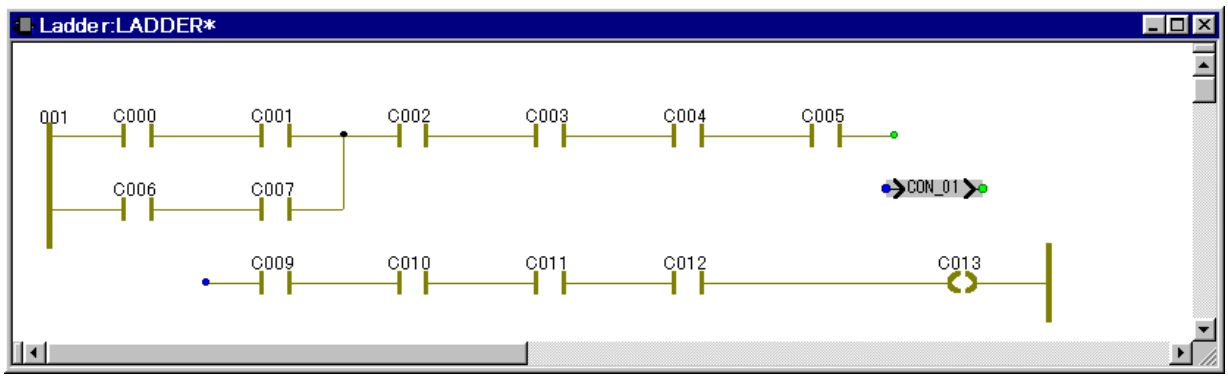
- ◊ Set a point to insert a connector/jump/label on the worksheet by left-clicking it.
- ◊ Left-click the [Connector/Jump] button, or right-click the button to display the shortcut menu and then left-click the [Connector/Jump] command in this menu.



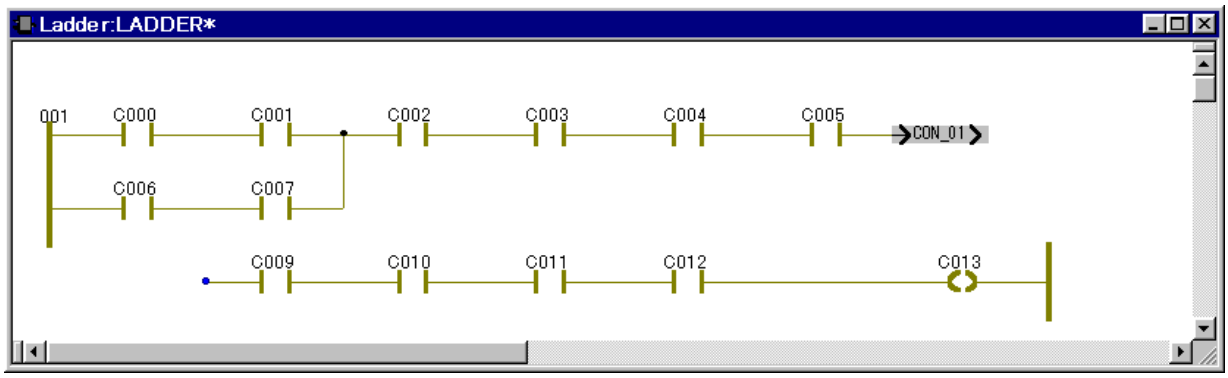
[Name] ..... Specify the name of the connector, jump or label.
[Connector] ..... To insert a connector, turn on this option button.
[Jump] ..... To insert a jump, turn on this option button.
[Label] ..... To insert a label, turn on this option button.

- ◊ Input a connector name in the [Name:] text box.

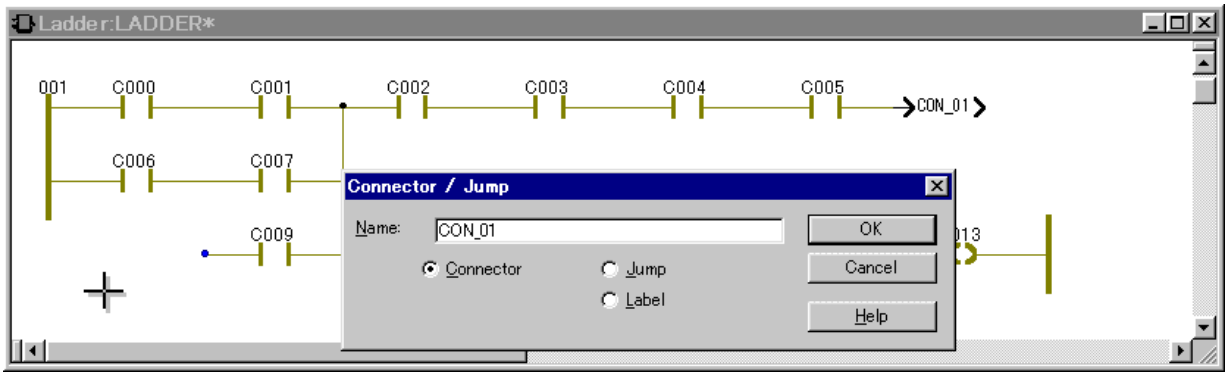
Turn on the optional [Connector] button, and left-click the [OK] button.



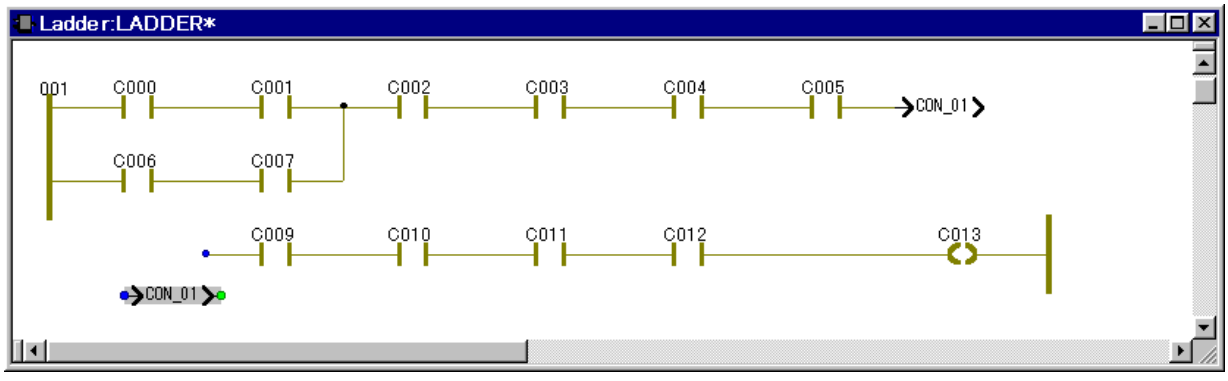
Connect the junction of connector “CON_01” and the junction of contact “C005” using the drag&drop operation.



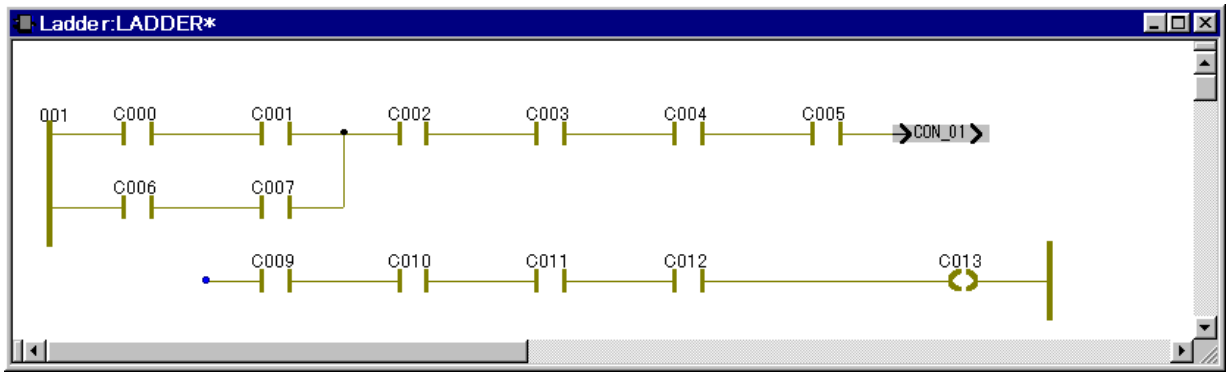
Left-click the position for arranging the connector to set the insertion point.
Left-click the [Connector/Jump] button, or alternatively right-click to display the shortcut menu and left-click the [Connector/Jump] command.



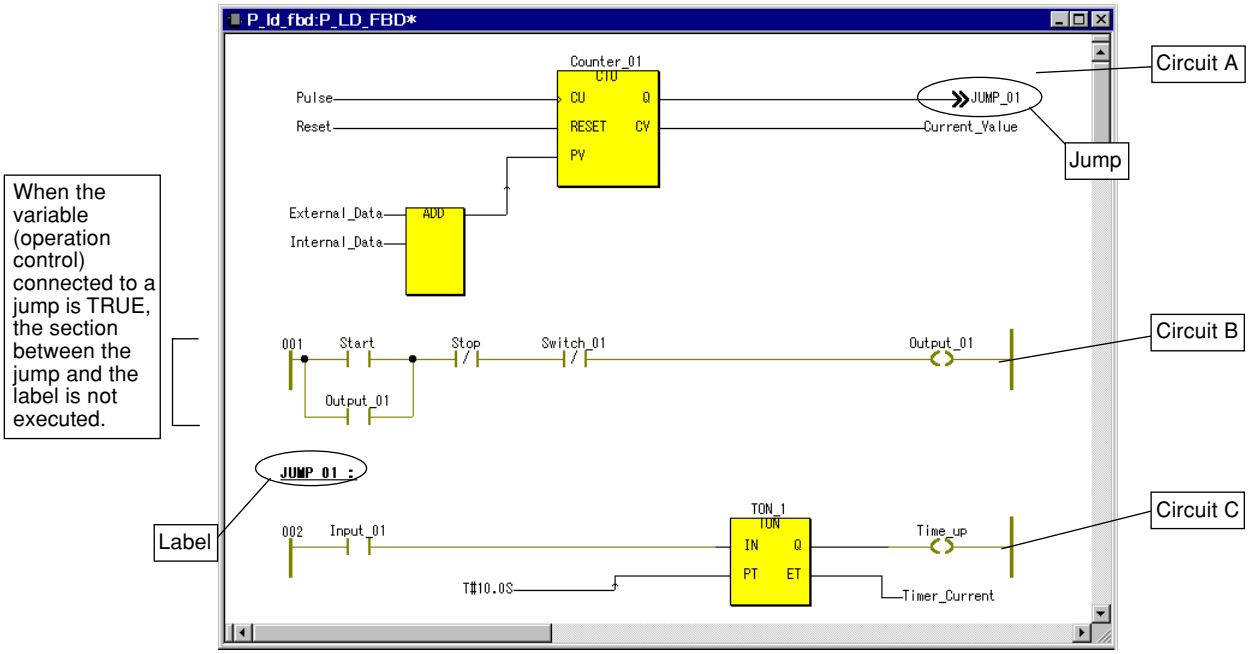
Input a connector name in the [Name:] text box.
Turn on the optional [Connector] button, and then left-click the [OK] button.



◊ Connect the junction of connector “CON_01” and the junction of contact “C005” using the drag&drop operation.



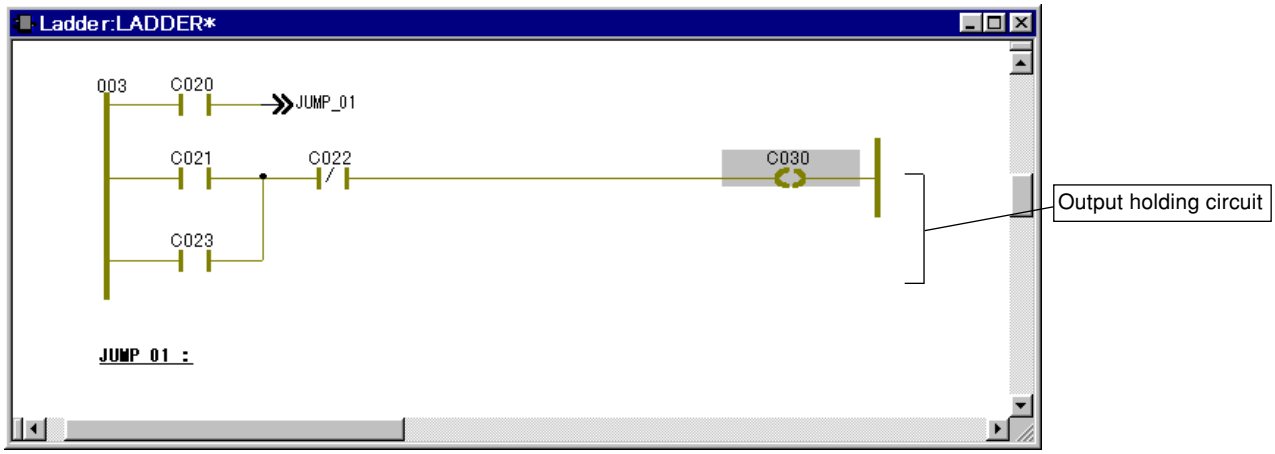
(2) Sample circuit using jump and label



For the circuit shown in the above figure, when counter_01 counts up, circuit B won’t be executed, and instead circuit C, which is described after the label, will be executed.

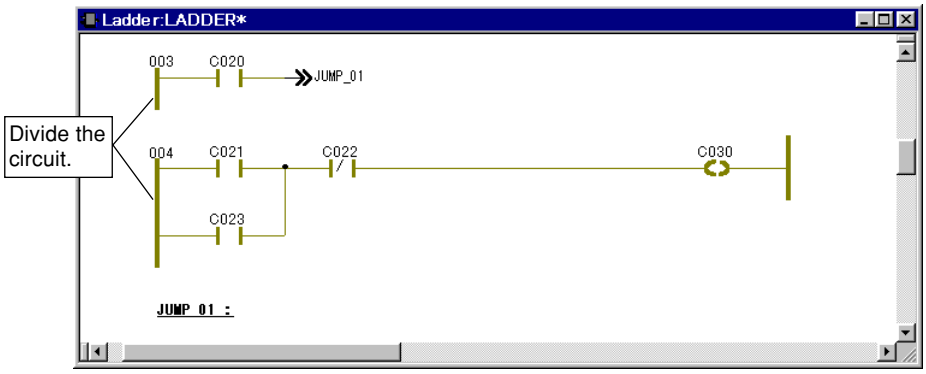
<Precautions for using jumps and labels>

A jump that exists in the same circuit is evaluated after all object of the circuit are executed.



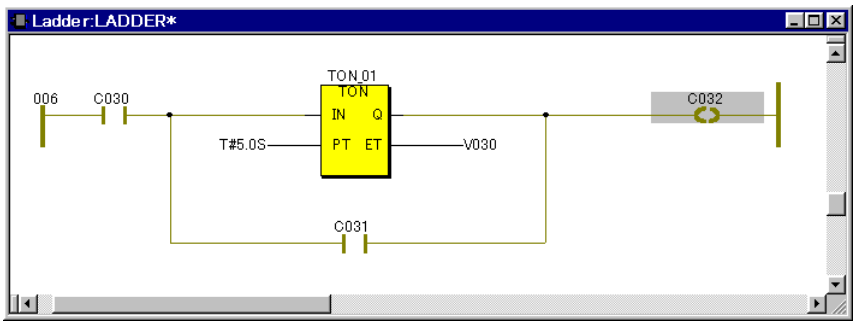
The output holding circuit always operates, whether the status of jump condition “C020” is ON or OFF. To prevent this operation, the circuit needs to be divided as shown in the figure below.

<Solution>
In order to jump the output holding circuit when the status of jump condition “C020” is ON, describe the circuit as follows.



4-3-11 Precautions for describing FBD and LD circuits together

D300win allows FBD and LD programs to exist together in the same worksheet.
In general, LD language and FBD language are used together to create a POU (program, etc.). By connecting their contacts on the worksheet, a circuit that combines objects of the two languages can be created.
However, the circuit shown below cannot be created.

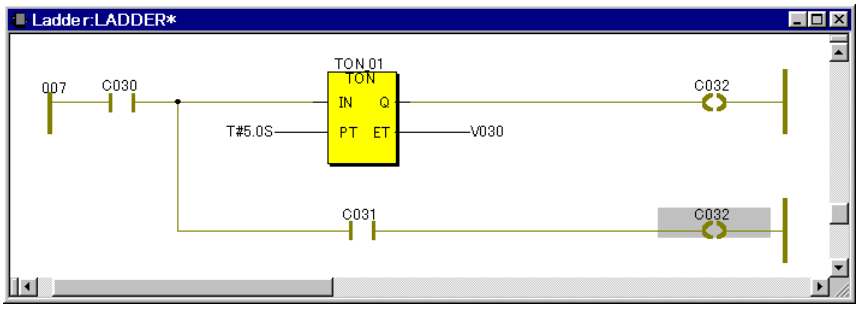


<How to connect an FBD object to an LD object>

- ◊ Insert an LD or FBD object.
- ◊ Make connections between contacts of the objects by using drag & drop operation or in Connect mode.

Note: For a circuit which has a contact and a function or function block, an OR circuit cannot be inserted in a manner to enclose the function or function block. In this case, divide the output of the circuit. In this case, divide the output of the circuit as shown in the figure below.

<Solution>



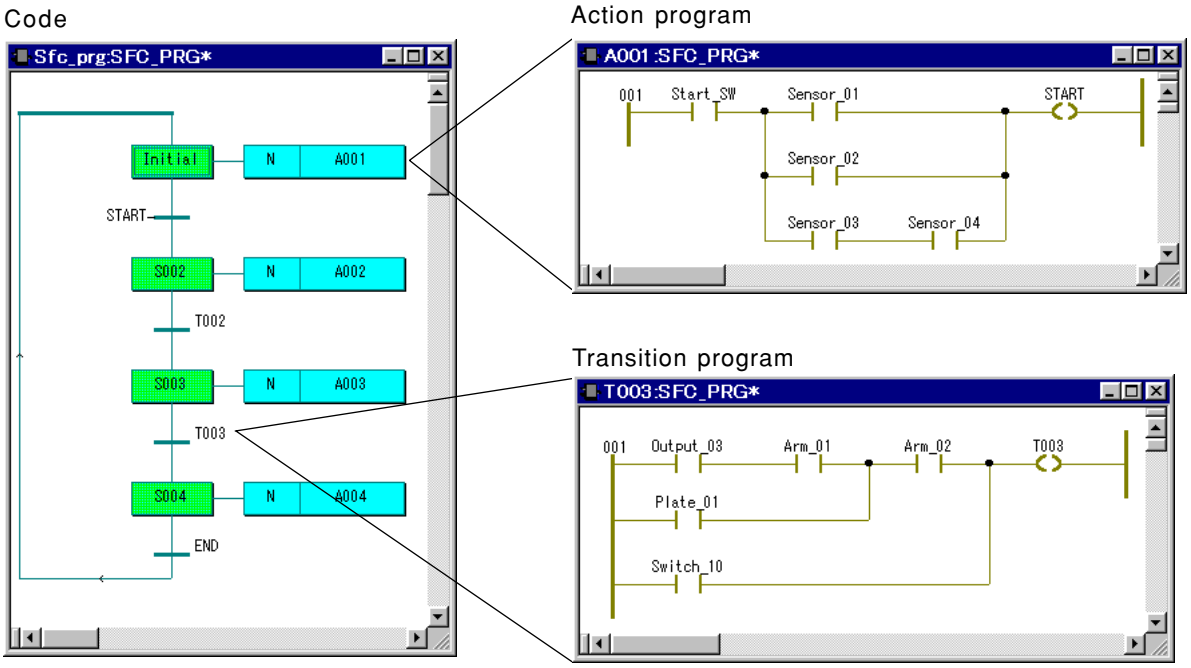
Section 5 Editing in SFC Language

page

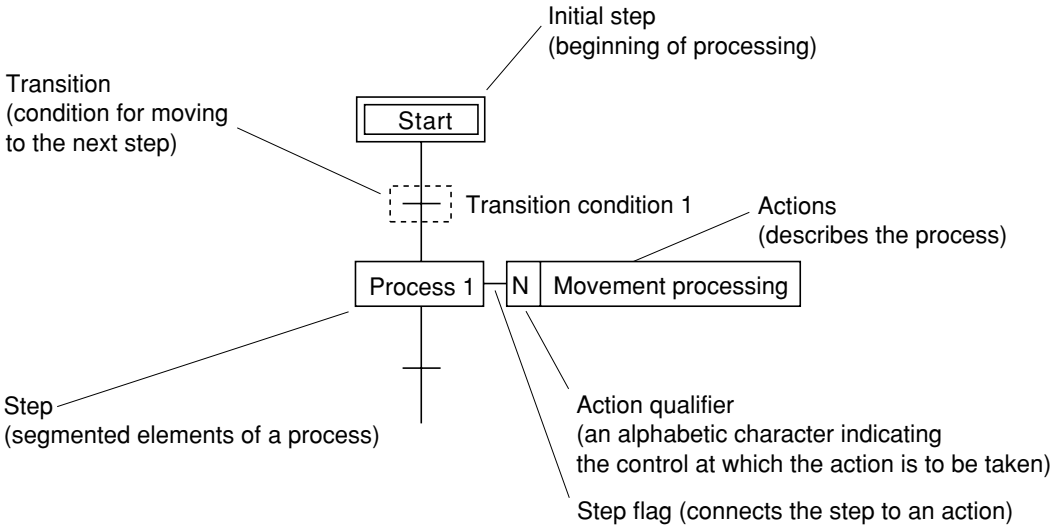
Section 5 Editing in SFC Language
5-1 Preparing for Creating an SFC Program

5-1-1 Introduction to SFC

A code written in SFC graphic language consists of steps and transitions that are connected by connecting lines. Each step is related to an action; each transition is related to a transition condition.
A step indicates a status that conforms to the rules defined in the POU action block. Each step can be set active or inactive. The conditions for transferring from an active step to the next step are described in a transition.
Action block and transition can be made into a Boolean variable. Transition can be connected directly to a contact point. It is also possible to program action or transition conditions in other POU worksheets in other programming language.
A combination of connected steps and transitions is referred to as an “SFC program.” An individual SFC program must be a closed loop and have one initial step. Divergence of sequence selection or Simultaneous-divergence can be inserted into an SFC program. It is also possible to insert comments using an asterisk (*) and parentheses.
A sample simple SFC program is shown below:



The elements of an SFC have the following meanings:



Each action or transition must be assigned to a BOOL variable or programmed using the IL, ST, LD, or FB language.

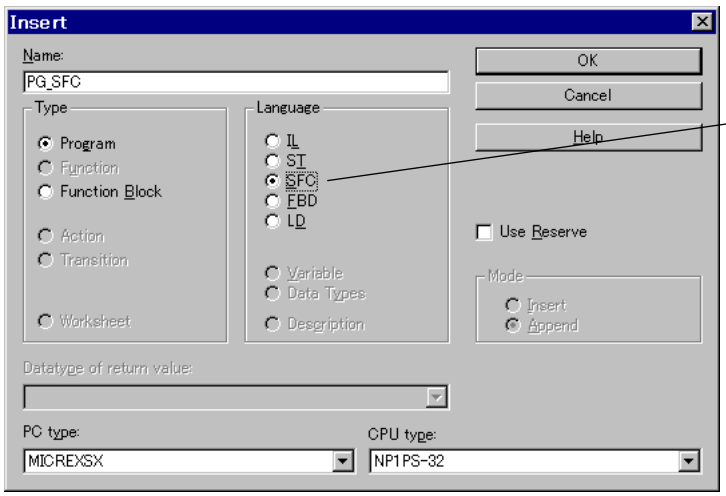
5-1-2 Inserting POUs

This paragraph explains how to insert a POU for an SFC element using the project tree editor.

(1) Inserting a POU

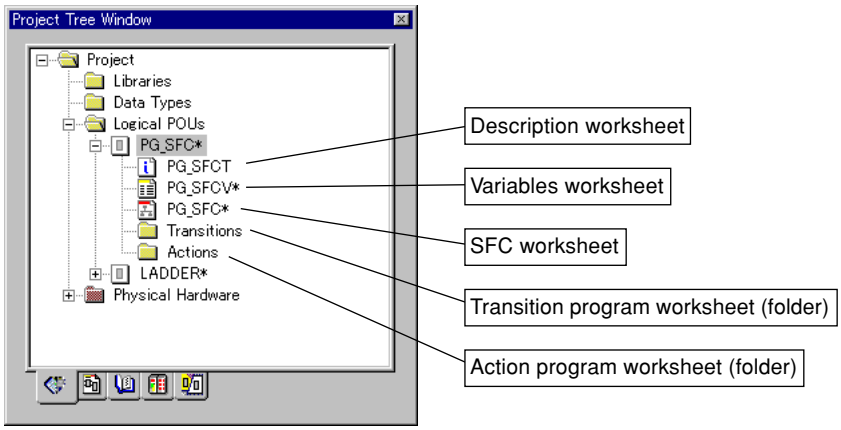
◊ Select the [Logical POUs] or [POU] icon in the project tree.

◊ Left-clicking the [Add Object] button displays the {Insert} dialog box. This dialog box also appears when the [Insert] command in the shortcut menu is left-clicked.



[Name]..... Input POU name.
[Group type]..... Specify the POU group type.
[Language]..... Specify a language for describing codes in the POU.
[Data type of return value].. Specify the data type for returned values. (This item can be specified only when “Function” is specified for “Group type”.
[Use Reserve]..... This item takes effect only when the optional [Selected POU] button is turned on in the [Use Reserve]box in the {Define CPU memory size} dialog box. “Patch POU” can be executed even when variables are newly added to the memory area assigned to reserve area.
[Mode]..... Specify whether to insert a new object preceding (for insertion) or following (for addition) the selected object.
[PC type]..... Specify the type (series name) of PC.
[CPU type]..... Specify the type of CPU module.

(2) Configuration of POUs as SFC elements
When a POU is inserted for an SFC program, the five icons shown in the figure below are generated under the POU.

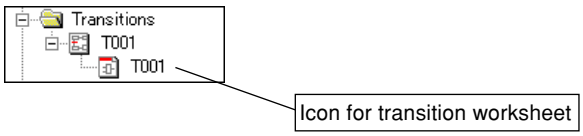


1) Description worksheet
Text for explaining the content of POU is described in this worksheet. There are no restrictions on the content described in this worksheet.

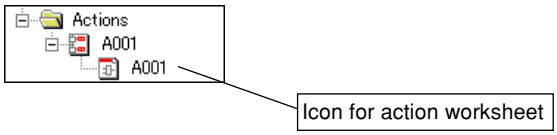
2) Variables worksheet
This is the worksheet for variable declaration. Variable declaration for action programs and transition programs is made on this worksheet. When a new POU is inserted, “V” is added in front of the name of the variable worksheet.

3) SFC worksheet
This is the worksheet for declaring the code body of SFC.

4) TRANSITIONS
A folder for transition program worksheets. All the transition program worksheets which are used in an SFC worksheet are stored in this folder.

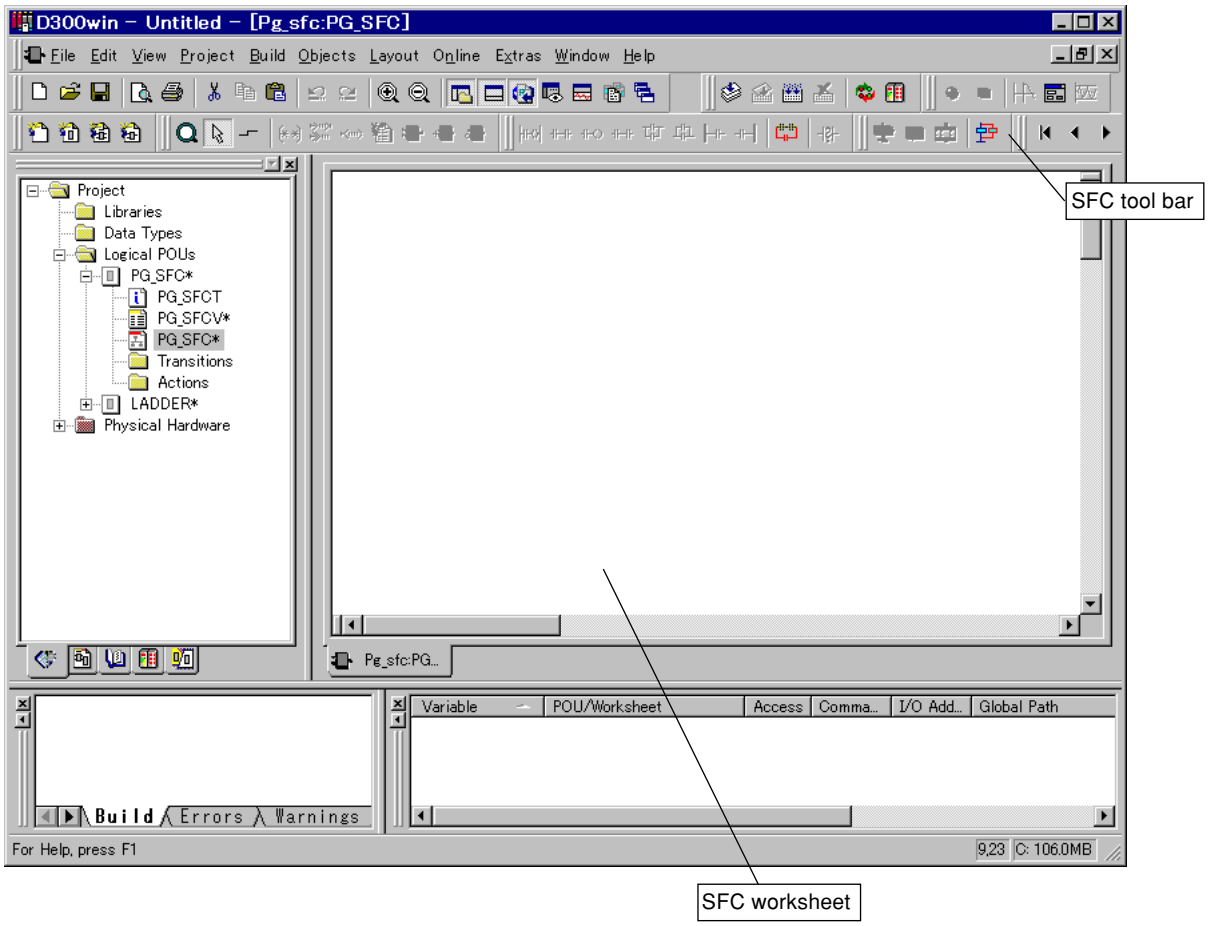


5) ACTIONS
A folder for action program worksheets. All the action program worksheets which are used in an SFC worksheet are stored in this folder.



(3) Opening an SFC worksheet

◊ Left-double-click the icon for SFC worksheet (P_SFC) in the project tree, or right-click the icon to display the shortcut menu and then left-click the [Open worksheet] command in this menu. The worksheet (editor) will then be opened.



(4) Tool bar and menus for describing on the SFC worksheet

How to use the tool bar and menus for editing codes by SFC elements is explained below.

1) Tool bar

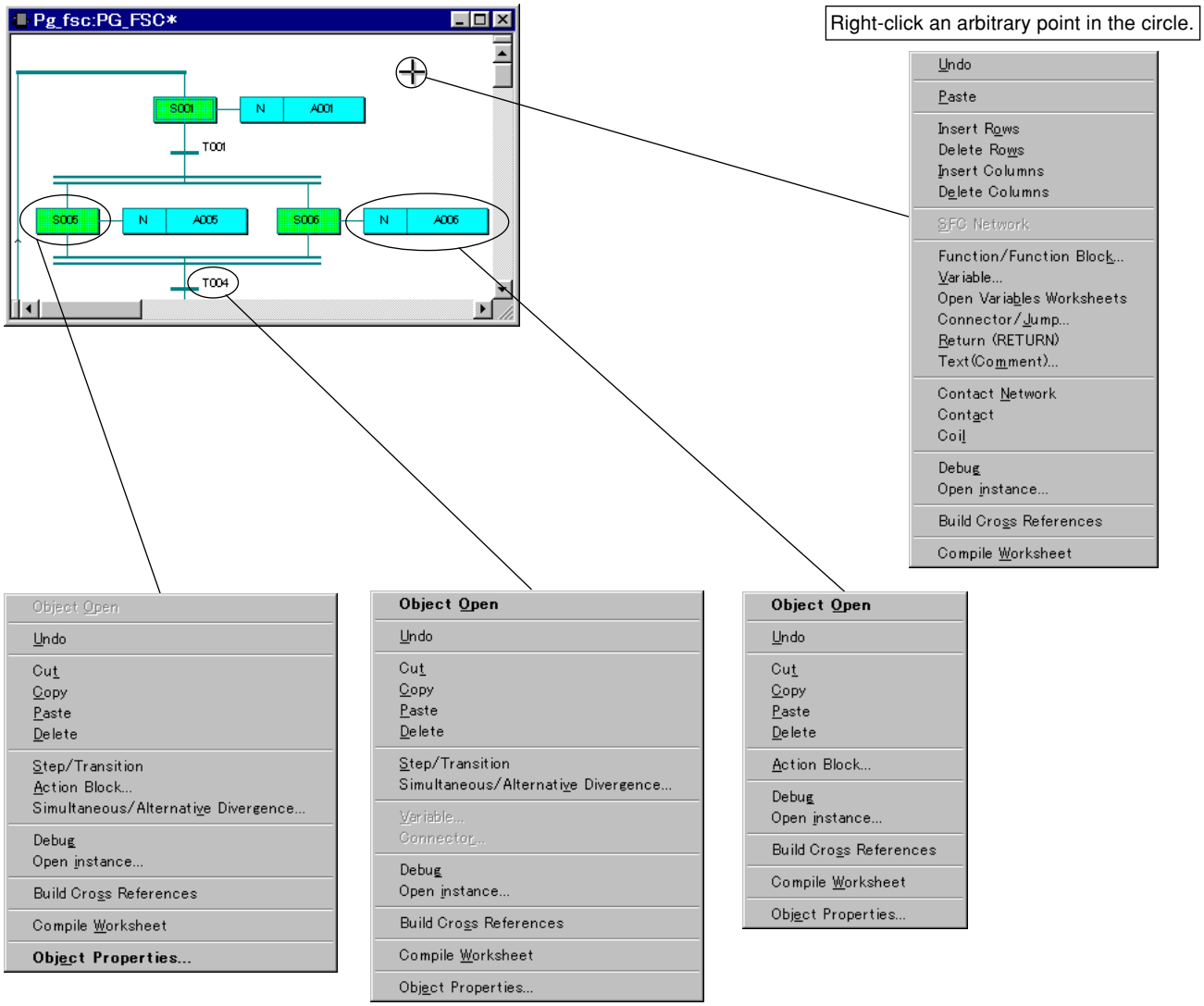
The tool bar for SFC graphic editor (worksheet) has multiple buttons for describing SFC, in addition to common buttons. These buttons can be customized by adding to or deleting from a tool bar other than that previously shown in the figure.

For how to customize a tool bar, see “2-7-1 Setting the tool bars and commands.”

2) Menus

<Shortcut menus>

These menus include the same commands as those included in the tool bar (buttons) or the main menus.



3) Description of menu/tool bar functions

Command name (button name)	Symbol	Type of menu	Description (use)
[Make mode]		Edit	Used to change to the Mark mode. In this mode, the desired object can be selected by left-clicking the mouse.
[Connection mode]			Change to the Connect mode. In this mode, multiple objects can be connected.
[Step/Transition]			Changes over to SFC Branch Edit mode.
[Insert SFC branch]			Change to the LD branch editing mode.
[Action Block...]		Object	Inserts an action block.
[Insert step/transition]			Used to insert a new SFC circuit in an existing SFC circuit or to insert a step and transition pair.
[Insert branch]			Inserts a divergence of sequence selection or a simultaneous sequences-divergence in an SFC circuit.
[Comment]			Inserts comments.
[Insert Function/Function block]			Insert function or function block.
[Variable...]			Insert variables.
[Connector/Jump]			Insert jump/Connector label.
[Return]			Insert return.
[Insert LD network]			Insert LD circuit.
[Contact right]			Insert a contact on the right of the selected contact.
[Coil right]			Insert a coil on the right of the selected contact.
[Contact left]			Insert a contact on the left of the selected contact or coil.
[Contact above]			Insert a contact above the selected contact.
[Contact below]			Insert a contact below the selected contact.
[Insert left power rail]			Insert a right power rail with a junction.
[Insert right power rail]			Insert a right power rail with a junction.
[Normal open contact]		Used in the {Properties} dialog box. Select the [Object Properties ...] command from the [Edit] menu.	Make the selected object an NO contact.
[Normal closed contact]			Make the selected object a NC contact.
[Change in coil]			Make the selected object a coil.
[Change in negated coil]			Make the selected object a negated coil
[Change in SET coil]			Make the selected object a set coil.
[Change in RESET coil]			Make the selected object a reset coil.
[Insert columns] *		Edit	Widen the distance between the objects on the right of the insert mark so that they are shifted rightwards.
[Delete columns] *			Shorten the distance between the objects on the left of the insert mark so that they are shifted leftward.
[Insert rows] *			Widen the distance between the objects below the insert mark so that they are shifted downward.
[Delete rows] *			Shorten the distance between the objects below the insert mark so that they are shifted upward.

* The tool bar can be customized. For more information, see “2-7-1 Setting the tool bars and commands.”

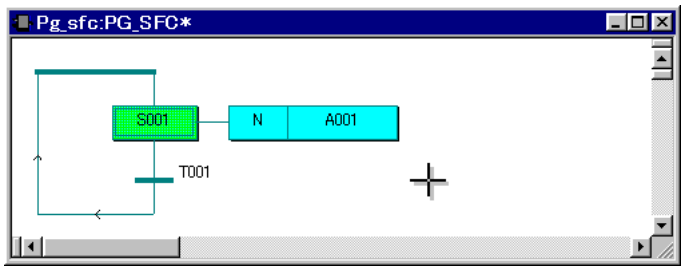
5-2-1 Inserting SFC program

To edit an SFC program, first a basic program (consisting of one step and one transition) needs to be inserted into the worksheet.

(1) Inserting the new SFC program

◊ Set the insert mark by left-clicking a point in the edit space.
◊ Left-click the [Insert step/transition] button.
An SFC program consisting of one step (initial step) and one transition is inserted.

The following image is displayed on the screen.



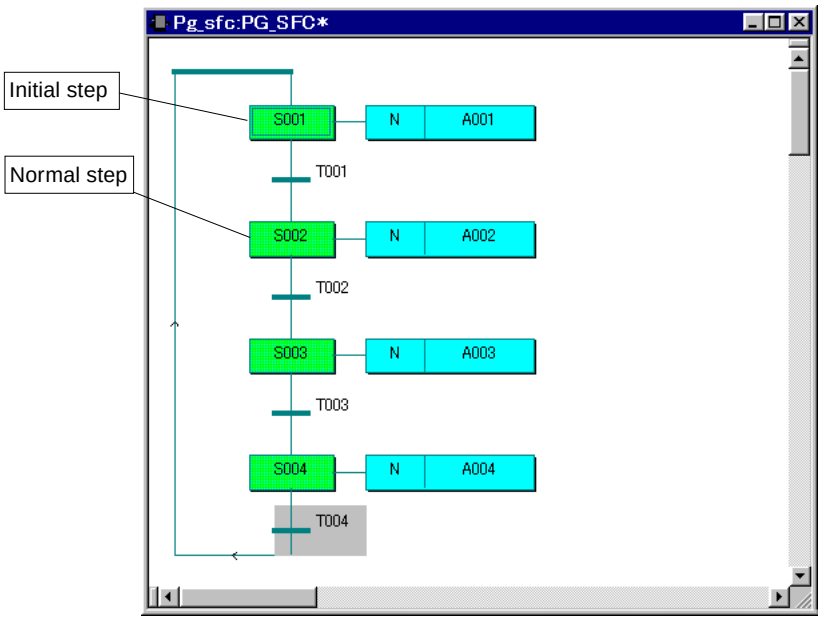
One initial step (S001) and the corresponding action block (A001) and one transition (T001) are displayed.

Step name, action name and transition name can be changed. For details, see “5-3 Setting/Changing Step Elements”.

(2) Adding steps/transitions

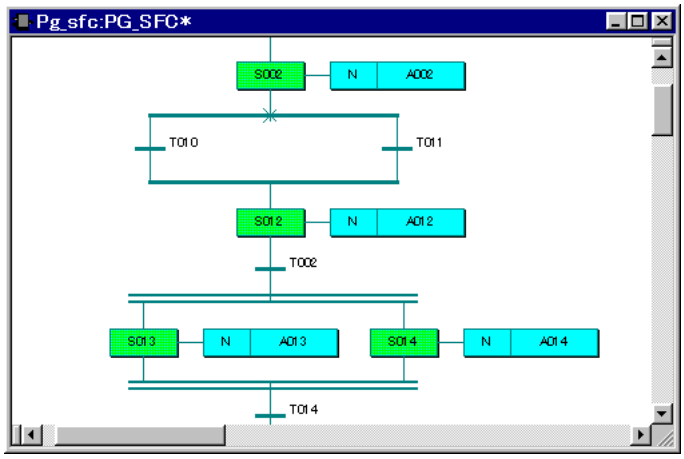
Inserting additional pairs of steps and transitions in the SFC progarm is explained below:
Adding steps and transitions.

◊ Select transition “T001” by left-clicking it.
◊ Left-click the [Insert step/transition] button.
Another step (normal step) or transition pair is inserted.
◊ Repeat the above steps to insert two additional step or transition pairs.
The following image is displayed on the screen.



5-2-2 Inserting a branch

There are two types of branching from an SFC element; divergence of sequence selection and simultaneous sequence-divergence.
Divergence of sequence selection selects and executes one step from the steps which exist beneath it. A divergence of sequence selection is expressed by a bold horizontal line.
Simultaneous sequence-divergence executes program operations at the same time and thus executes all the steps that exist beneath it in parallel. Simultaneous sequence-divergence is expressed by a bold horizontal double-line.

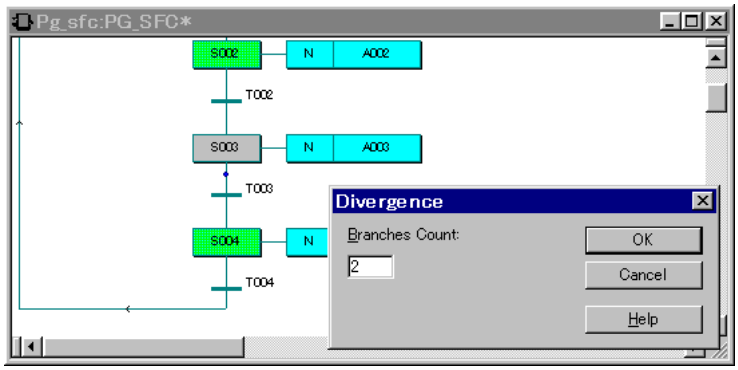


(1) Inserting a divergence of sequence selection

As explained below, selecting a step and inserting a branch make up a “Divergence of sequence selection.” On the other hand, selecting a transition and inserting a branch make up a “simultaneous sequences-divergence.”

Inserting a circuit that branches at step “S003.”

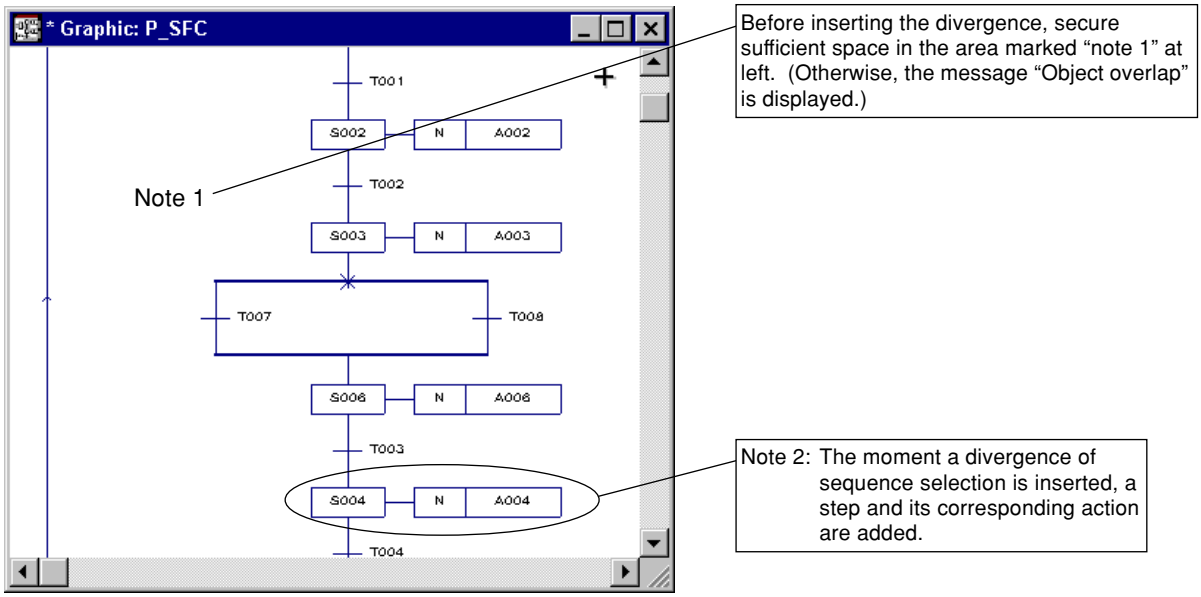
- ◊ Select step “S003” by left-clicking it.
- ◊ Left-click the [Simultaneous/Alternative Divergence] button.
  The {Divergence} dialog box appears on the screen.



Note: Maximum value for Branches Count: 32

◊ After checking that the divergence value “2” is set in the dialog box, left-click the [OK] button.
The following image is displayed on the screen.

SFC program with divergence of sequence selection

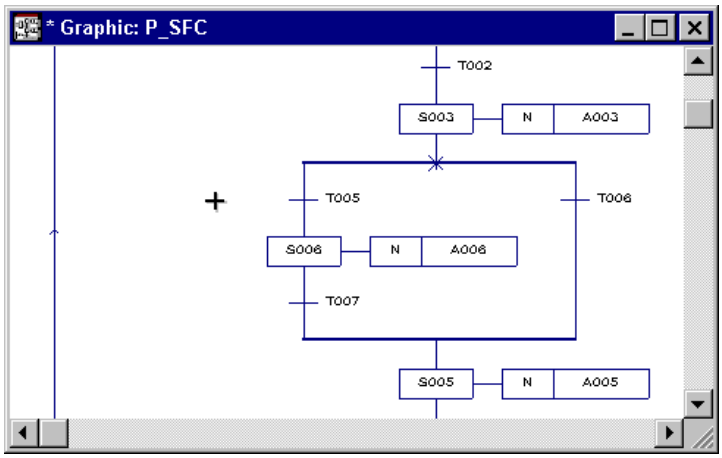


To increase the number of branches for an already existing divergence of sequence selection, SFC branch edit mode is used. For SFC branch edit mode, refer to “5-2-3 How to increase the number of branches.”

(2) Adding a step and a transition to divergence of sequence selection
Inserting a step and a transition under transition “T005”

◊ Select transition “T005” by left-clicking it.

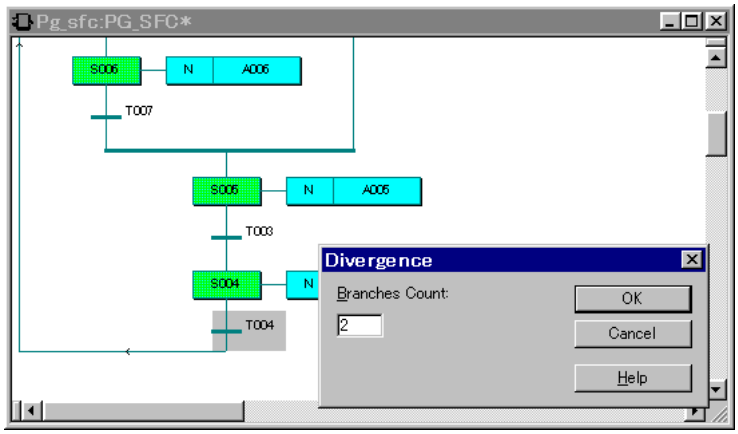
◊ Left-click the [Step/Transition] button.
The following image is displayed on the screen.



(3) Simultaneous sequences-divergence
Simultaneous sequences-divergence executes program operations at the same time and thus executes all the steps that exist beneath it in parallel. Simultaneous sequences-divergence is expressed by a bold horizontal double-line. A sample case of inserting a simultaneous sequences-divergence in transition “T004” is explained below:

As explained below, selecting a transition and inserting a branch make up a “simultaneous sequences-divergence.” On the other hand, selecting a step and inserting a branch make up a “Divergence of sequence selection.”

◊ Select transition “T004” by left-clicking it.
◊ Left-click the [Simultaneous/Alternative Divergence] button.
The {Divergence} dialog box appears on the screen.

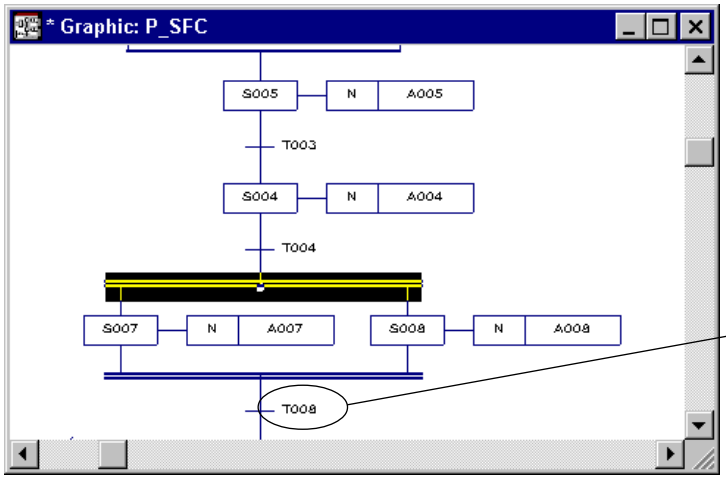


Note: The maximum value for [Branches Count:] is 32.

Using the {Divergence} dialog box

◊ After checking that the divergence value “2” is set in the dialog box, left-click the [OK] button.
The following image is displayed on the screen.

SFC program with simultaneous sequences-divergence

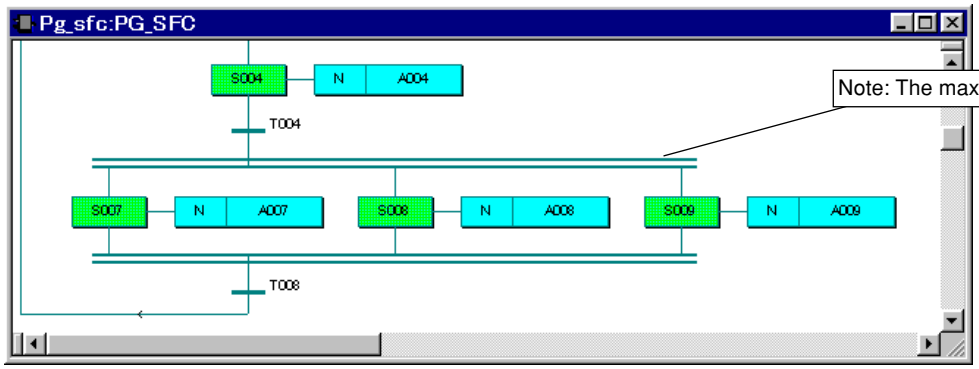


Note: The moment a simultaneous sequences-divergence is inserted, one transition is added.

To increase the number of branches for an already existing simultaneous sequences-divergence, SFC branch edit mode is used. For SFC branch edit mode, refer to “5-2-3 How to increase the number of branches.”

5-2-3 How to increase the number of branches

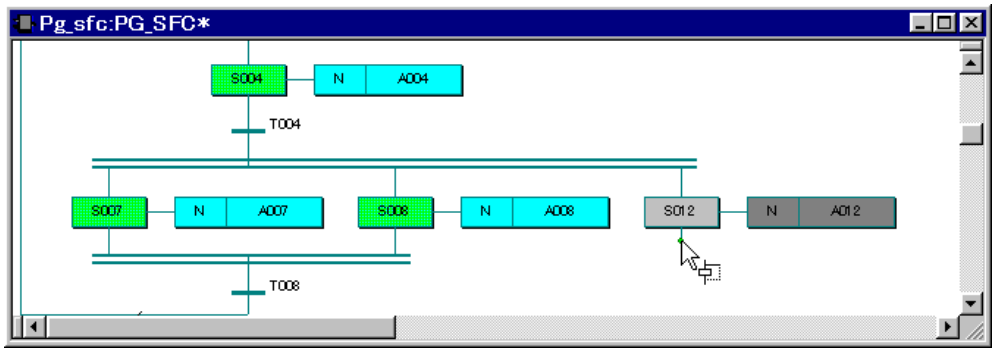
The procedure for creating a divergence of sequence selection or simultaneous sequences-divergence has been previously explained. In this paragraph, increasing the number of branches for an existing selective divergence is explained. Create the branch circuit as shown below.



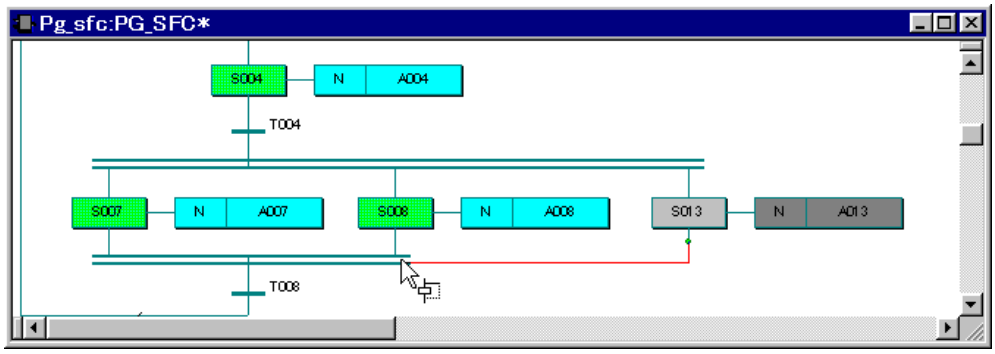
◊ Left-click the [Insert SFC branch] button.

◊ Left-click the branch line.
The branch line is extended rightward.

◊ Move the mouse cursor at a point where overlapping with existing action does not occur, and left-click this point.



◊ Move the mouse pointer on the converging point of branches, and left-click this point.



5-3-1 Changing step elements

Step elements consist of the following:

- Initial step
  A step which is activated when a program starts to operate. Only one initial step is needed in one SFC network.
- Normal step
  Indicates a process in an SFC program. The normal step has two types of status; active status and non-active status. In the active status, it executes an action according to the operation instruction of the action qualifier.
- Jump
  A step for proceeding to a process at the jump destination step in another worksheet in the same POU or in the same worksheet. It cannot jump to another POU. It is not possible to assign any action to the jump.
- End step
  A step which has no subsequent transition and is used at the end of an SFC circuit. It is possible to assign an action to the end step, which can be used for the application termination processing.

(1) Changing step name

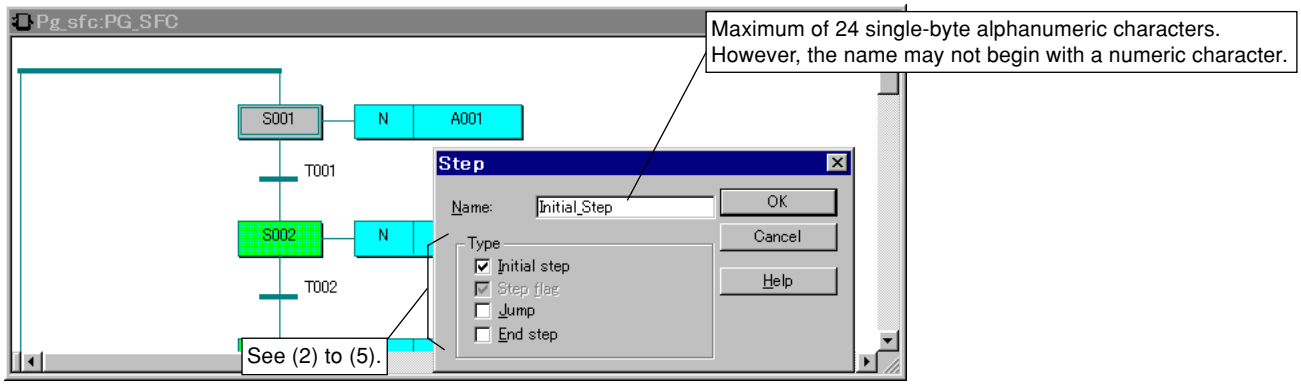
When an SFC program is created, the circuit is described in the SFC worksheet, where step name “SXXX” is set.

<About step name>

A step name can be specified with a maximum of 24 alphanumeric characters. However, the name may not begin with a numeric character. In addition, any of the names shown on the Reserve Word List in the Instructions of the User’s Manual <FEH200> cannot be used for the step name. This paragraph describes how to change this step name.

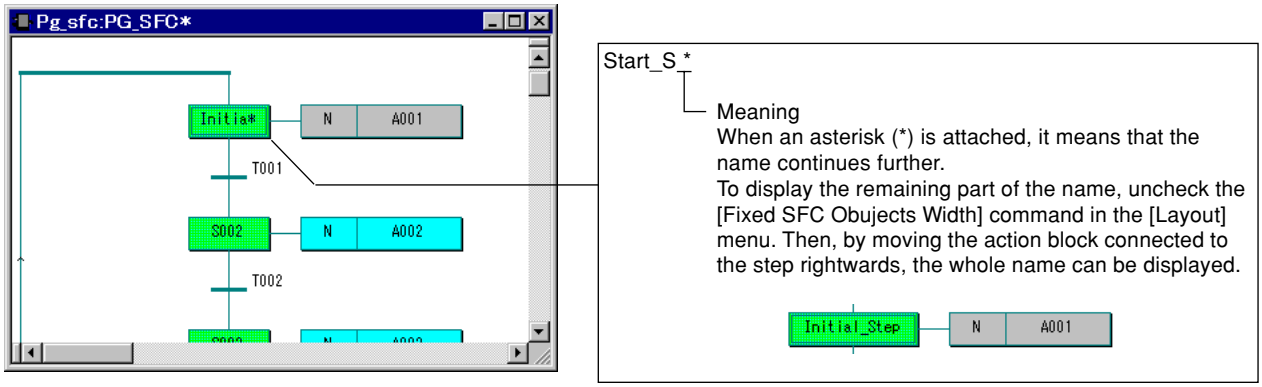
In this example, the initial step “S001” of the SFC circuit is changed to “Initial_Step”.

◊ Left-double-click “S001”, and the {Step} dialog box will appear on the screen.



◊ Input the desired name in the [Name] text box in the {Step} dialog box.

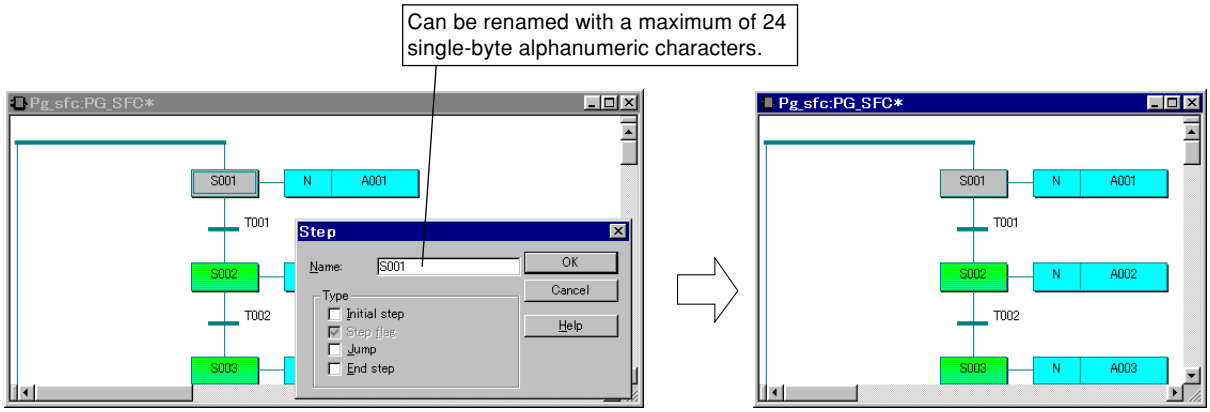
◊ Left-click the [OK] button, and “S001” will be changed to “Start_Step”.



(2) Changing from initial to normal step, and vice versa.
How to change an initial step “S001” to a normal step, or a normal step “S002” to an initial step is explained below.

1) Initial step → normal step

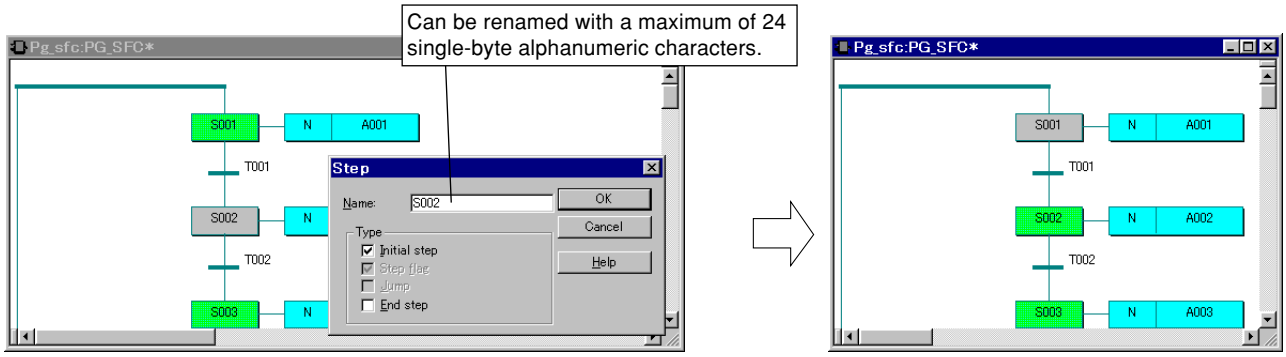
◊ Left-double-click initial step “S001”, or right-click it to display the shortcut menu and then left-click the [Object Properties ...] command in this menu.
Then the {Step} dialog box will appear on the screen.



◊ Uncheck the [Initial step] box.
◊ If necessary, input the step name.
◊ After confirming the setting in this dialog box, left-click the [OK] button.
Initial step “S001” will then be changed to a normal step.

2) Normal step → initial step

◊ Left-double-click normal step “S002”, or right-click it to display the shortcut menu and then left-click the [Object Properties ...] command in this menu.
The {Step} dialog box will then appear on the screen.

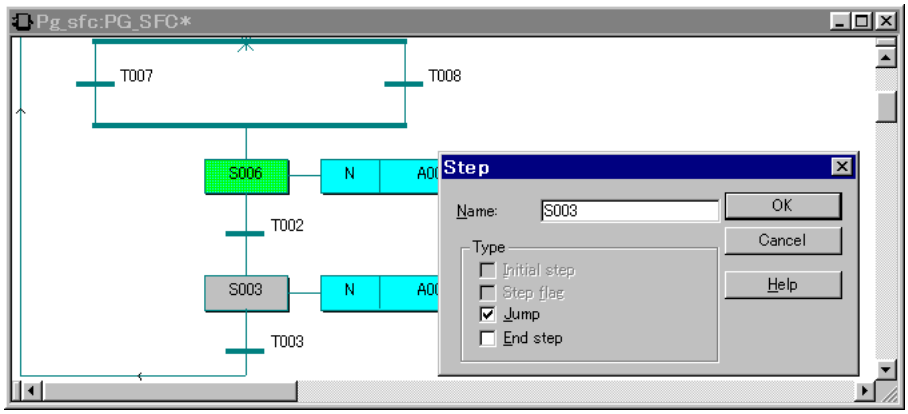


◊ Check the [Initial step] box.
◊ If necessary, input step name.
◊ After confirming the setting in this dialog box, left-click the [OK] button.
Then normal step “S002” will be changed to an initial step.

(3) Changing to a jump step

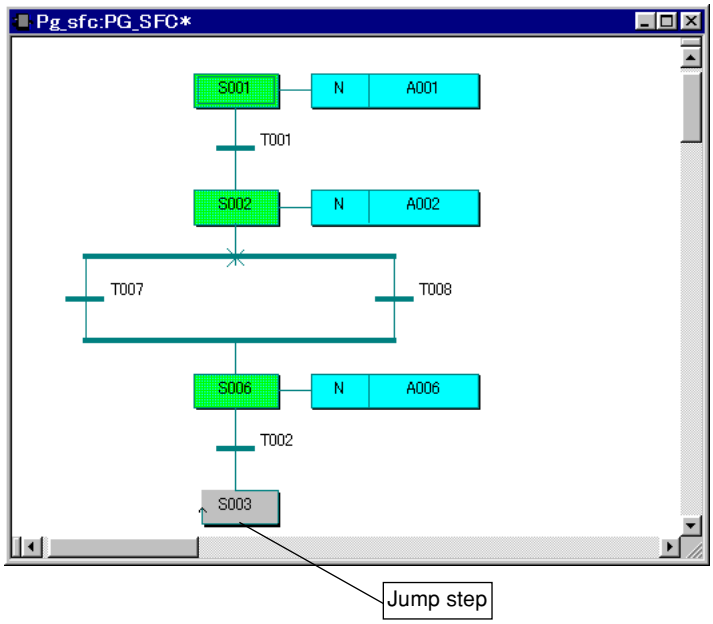
Jump means that a destination step in the SFC worksheet of another POU, or within the same SFC worksheet becomes the next step of operation. Jump cannot be assigned any action.

◊ Left-double-click normal step “S004”, or right-click it to display the shortcut menu and then left-click the [Object Properties ...] command in this menu.
The {Step} dialog box will then appear on the screen.

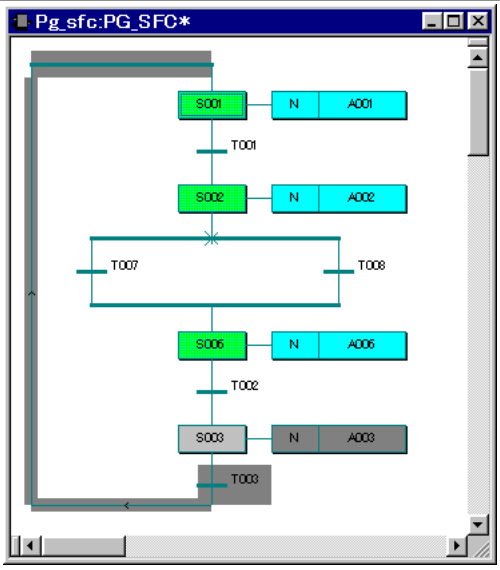


◊ Check the [Jump] box.
◊ If necessary, input the step name.
◊ After confirming the setting in this dialog box, left-click the [OK] button.
The {Jump/End step insert control} dialog box will then appear on the screen.

◊ Left-click the [Change] button, and normal step “S003” will change to a jump step.

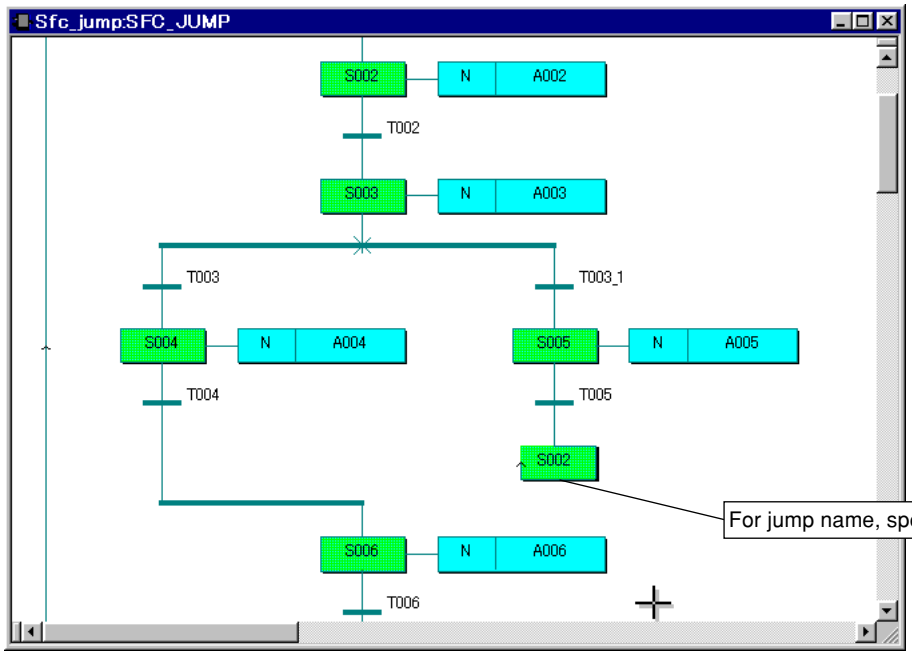


Left-clicking the [OK] button after checking the [show marked objects for delete] box highlights the part to be deleted as shown in the figure below.



For how to restore a jump step back to the original condition, see (5).

<Using a jump in a same SFC worksheet>

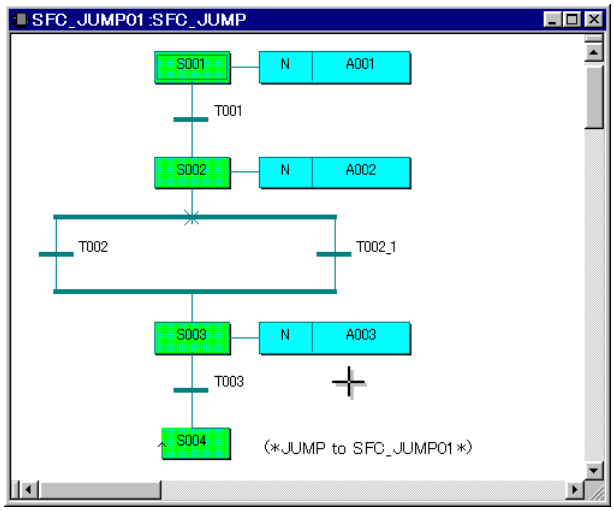


<Jumping to another SFC worksheet>
With a jump step, it is possible to create a sequence for jumping to another SFC worksheet in the same POU.
The procedure for this is as follows:

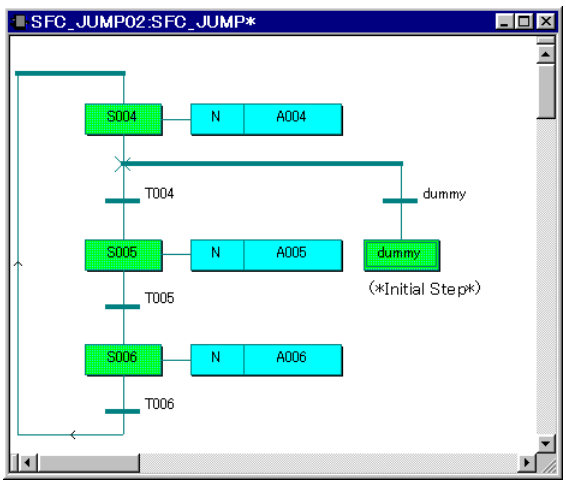
◊ Create a jump step in the source SFC worksheet.

◊ In the destination SFC worksheet, create a step which has the same name as the jump step created above. Each SFC worksheet must have one initial step. Be sure to create a dummy initial step even when no initial step is necessary for the destination worksheet.

Source worksheet SFC_01



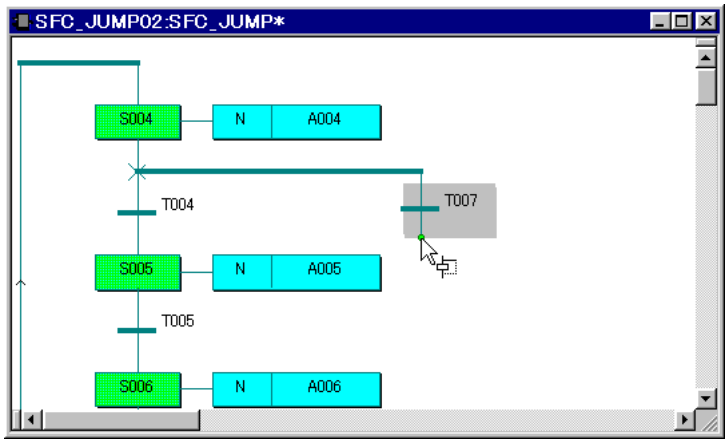
Destination worksheet SFC_02



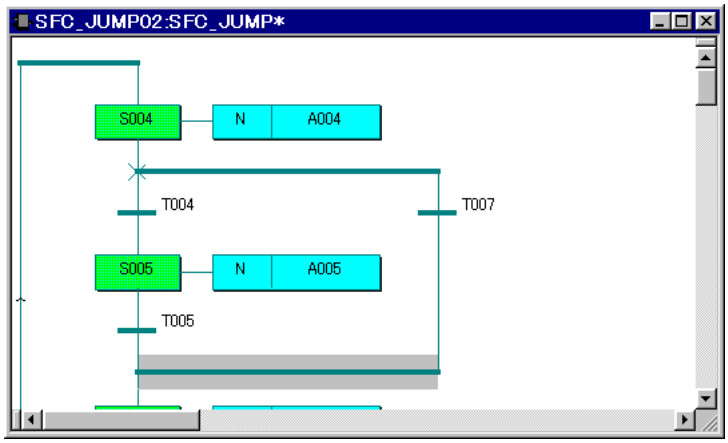
The following describes how to create a “dummy” step in the previously explained jump destination worksheet.

◊ Left-click the [Insert SFC branch] button, and left-click the connection destination of a “dummy” step.

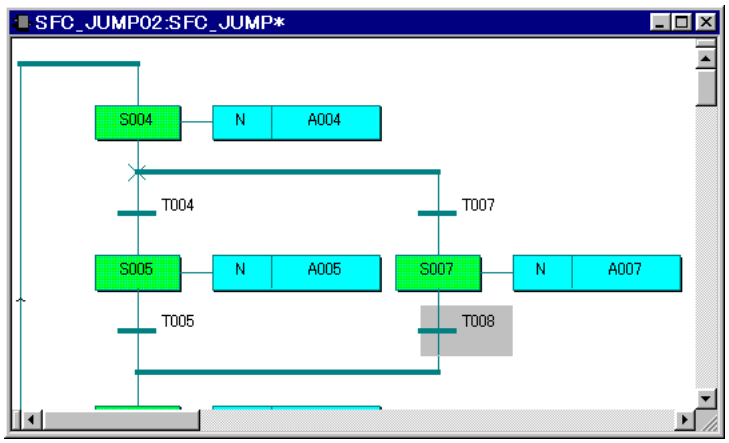
◊ Move the mouse pointer to a position where objects do not overlap, and left-click.
Transition “T007” with the junction will be displayed.



◊ Move the mouse pointer to the transition connection destination, and left-click.

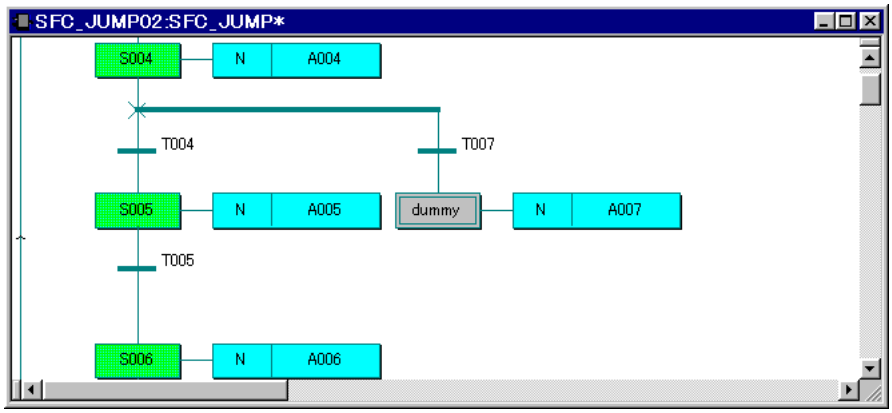


◊ Left-click the transition “T007” to select it, and left-click the [Step/Transition] button. The step, action, and transition will be added.

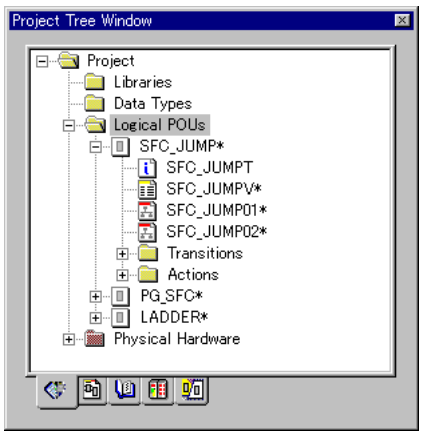


◊ Left-double-click the step “S007” to be made a “dummy” step, or alternatively right-click to display the shortcut menu and left-click the [Object Properties ...] command.
The {Step} dialog will appear on the screen.

◊ Check the [Initial step] and [End step] boxes.
◊ Input a step name in the [Name:] text box when necessary.
◊ After confirming the settings in the {Step} dialog, left-click the [OK] button.
The {Jump/End step insert control} dialog will appear on the screen.
◊ Left-click the [Change] button.



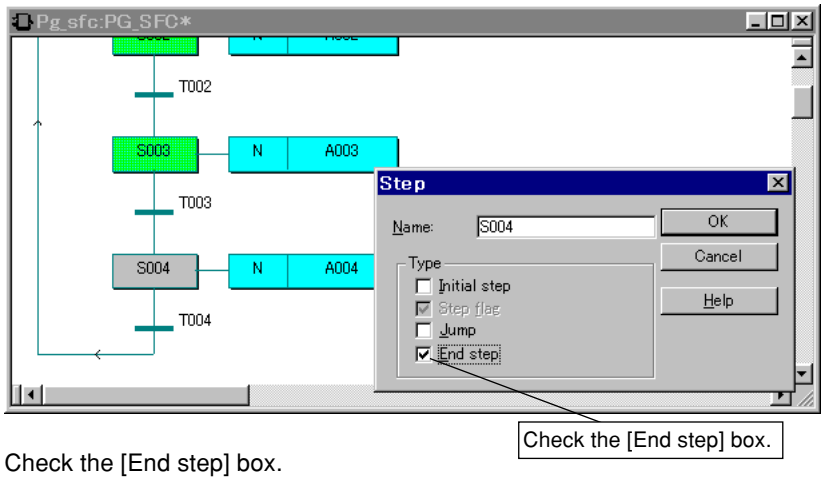
Project tree



(4) Changing to an end step

This change can be made by the same procedure as “(3) Changing to a jump step”.

◊ Left-double-click step “S004”, or right-click it to display the shortcut menu and then left-click the [Object Properties ...] command in this menu.
The {Step} dialog box will then appear on the screen.

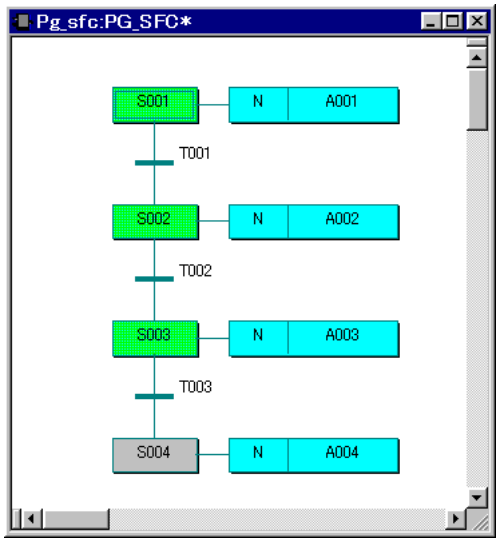


◊ Check the [End step] box.

◊ If necessary, input the step name with a maximum of 24 single-byte characters.

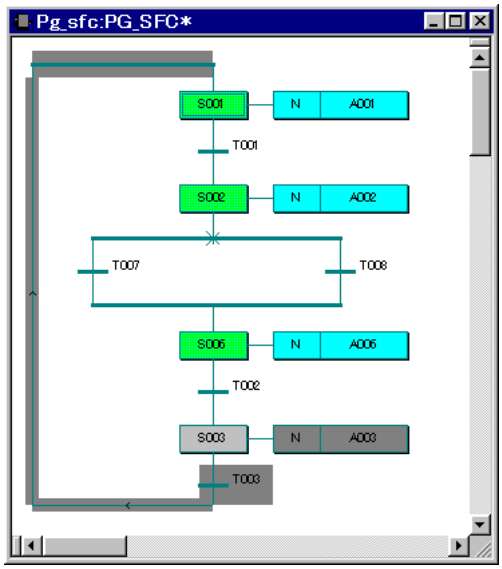
◊ Left-click the [OK] button.
The {Jump/End step insert control} dialog will appear on the screen.

◊ Left-click the [Change] button.
Normal step “S004” will be changed to an end step.



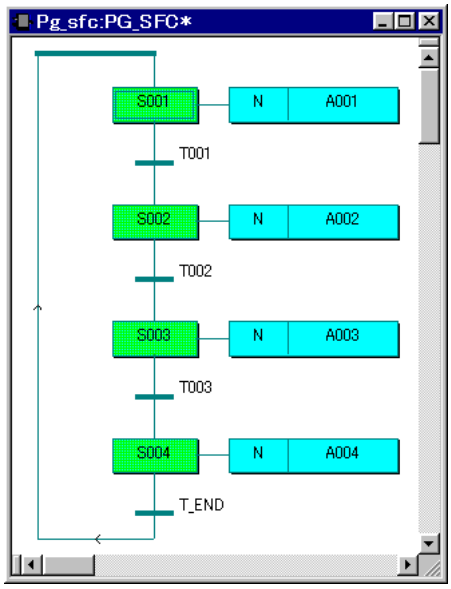
Note: Creating a circuit that has an end step as shown in the figure above requires great care.

Check the box for [Show marked objects for delete] in the dialog, and left-click the [OK] button. Then, the portion to be deleted is highlighted as shown in the figure below.



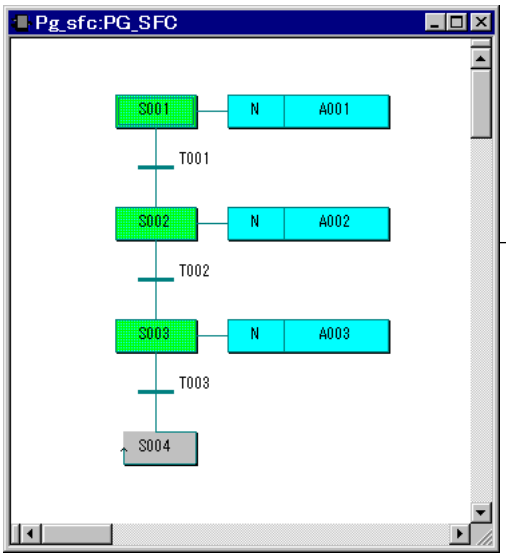
[Precautions for creating an SFC program that has an end step]
If a circuit as shown in the above figure is created, program operation will stop when the end step is reached.
To restart the circuit, the PC system needs to be restarted.
As a solution to resume program operation without restarting the PC, change the circuit as shown in the figure below to control the operation by the transition after the end step (the transition “T_END” after step “S004” in this example below).

Sample circuit taken the measure



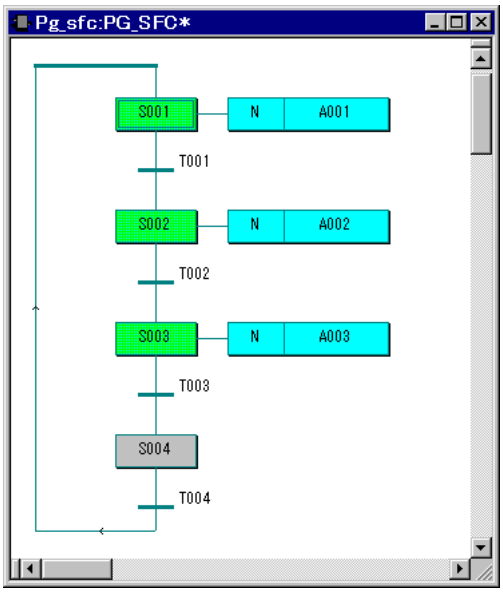
(5) Jump/end step → normal step
How to change a jump or end step to a normal step is explained below.

Sample jump step

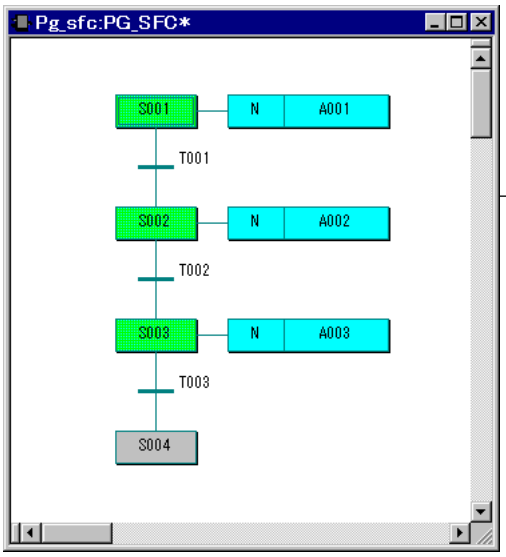


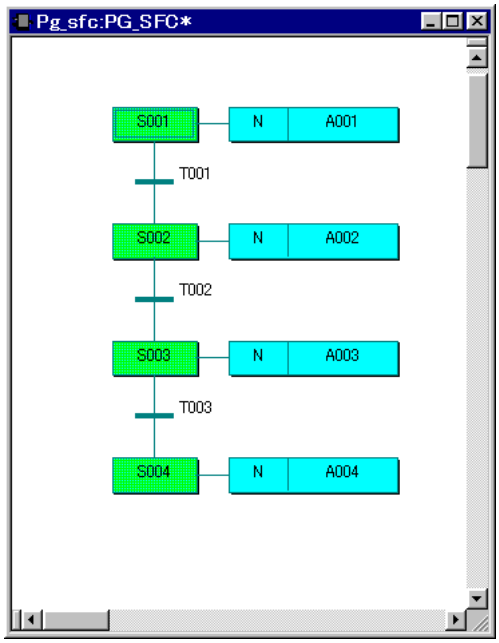
Change the jump step to an end step in advance.

After changed to a normal step



Sample end step





◊ Left-click the [Insert SFC branch] button.
◊ Left-click point 1) on step “S004”, and a transition will be added.
◊ Move the cursor to positions 2) through 6) to draw a line while left-clicking each corner point.

* When a jump step is changed to an end step, the action block which corresponds to step “S004” in the above figure is not created.

For how to create an action block, see “5-4-2 Adding and inserting an action blocks”.

5-4-1 Changing the name of action block

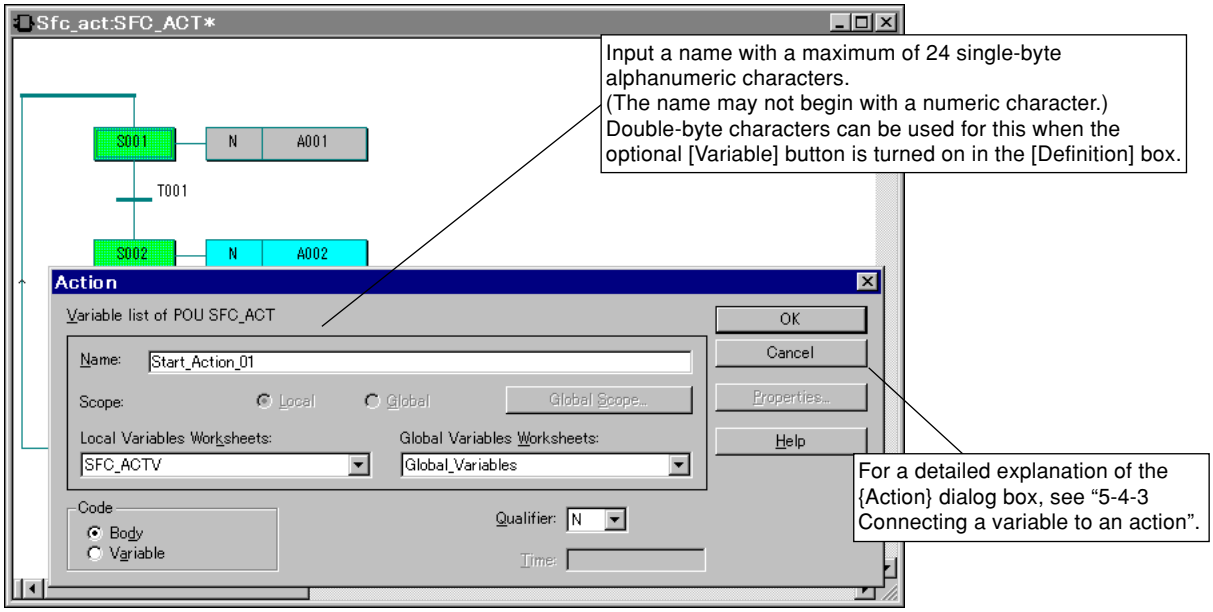
When an SFC program is created, the circuit is described in the SFC worksheet, where action name “AXXX” is set.

<About action block name>

An action block name can be specified with a maximum of 24 alphanumeric characters. However, the name may not begin with a numeric character. In addition, any of the names shown on the Reserve Word List in the Instructions of the User’s Manual <FEH200> cannot be used for the action block name. This paragraph describes how to change this action name.

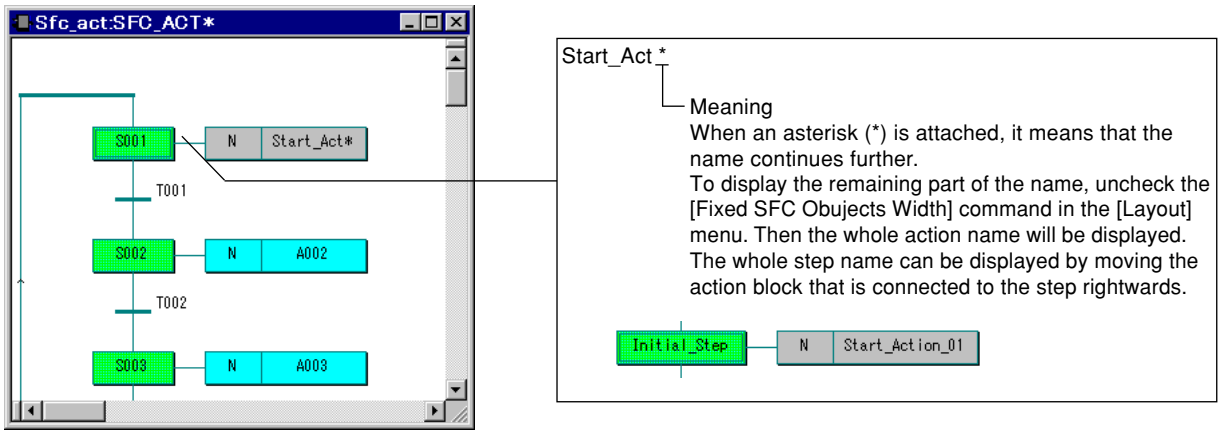
In this example, action “A001” in the SFC circuit shown in the figure below is changed to “Start_Action_01.”

◊ Right-click action “A001” to display the shortcut menu, and left-click the [Object Properties...] command in the menu. The {Action} dialog box will then appear on the screen.



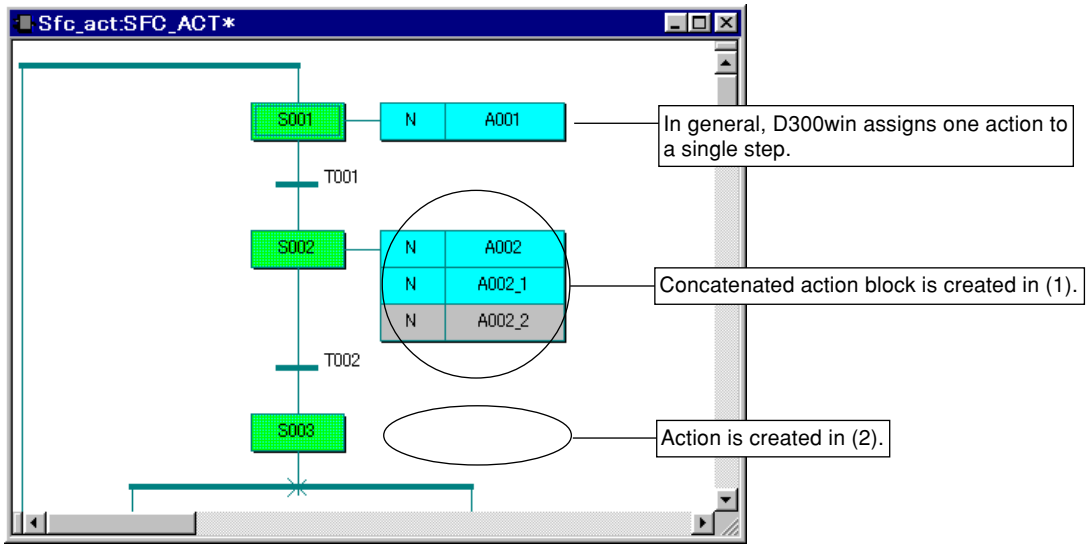
◊ Input the desired name in the [Name] text box in the {Action} dialog box.

◊ Left-click the [OK] button, and the action name will be changed from “A001” to “Start_Action_01”.



5-4-2 Adding and inserting action blocks

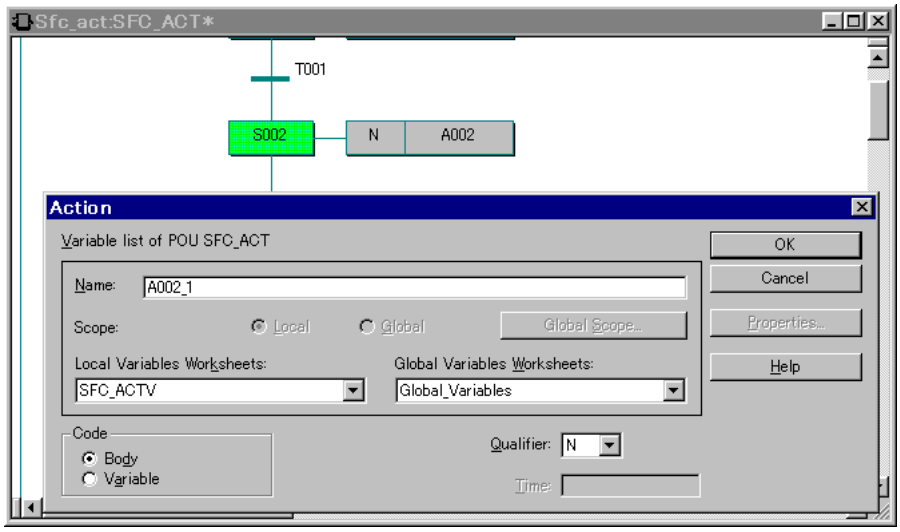
A new action block can be added to an existing action block to create a concatenated action block in an SFC worksheet.
(A concatenated action block is multiple action blocks which are assigned to a single step.)
In addition, when an action is deleted, a new action block can be inserted,



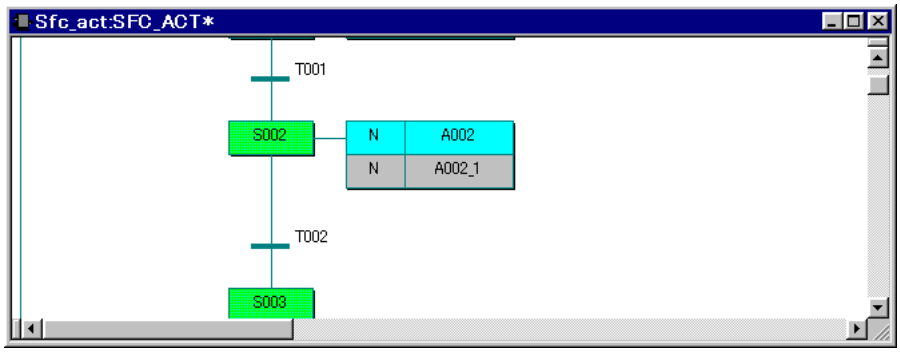
(1) Inserting a concatenated action block

◊ Move the mouse pointer onto action “A002,” and left-click.

◊ Left-click the [Action Block...] button, or alternatively right-click to display the shortcut menu and left-click the [Action Block...] command.
The {Action} dialog box will then appear on the screen.



◊ After setting the necessary items in the {Action} dialog, left-click the [OK] button. In this example, “A002_1” is input in the [Name:] text box, and then the [OK] button is left-clicked. As shown in the figure below, action block “A002_1” is added under action block “A002.”



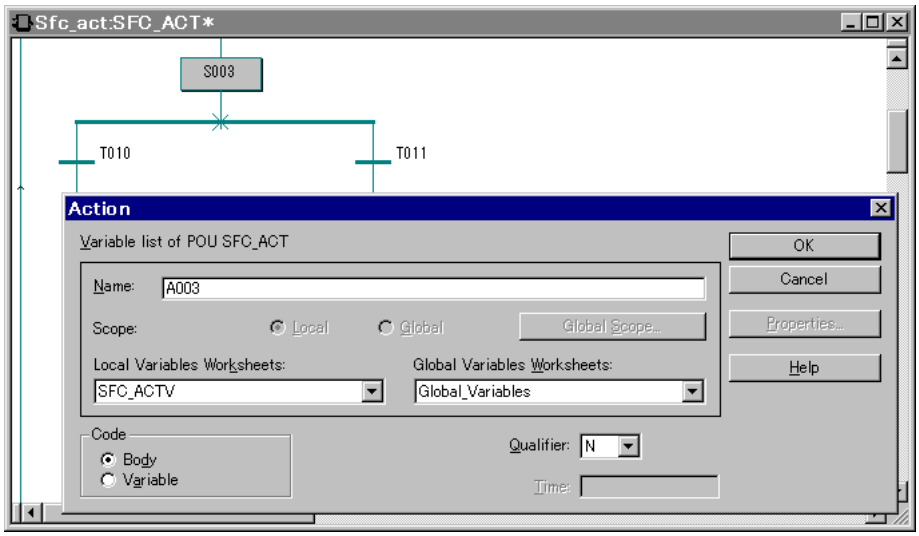
To add another action block, move the mouse pointer to action block “A002_1,” left-click, and repeat the action block addition operation.

- There is no limit on the number of actions which can be inserted in one step.
- For a detailed explanation of the {Action} dialog box, see “5-4-3 Connecting a variable to an action”.

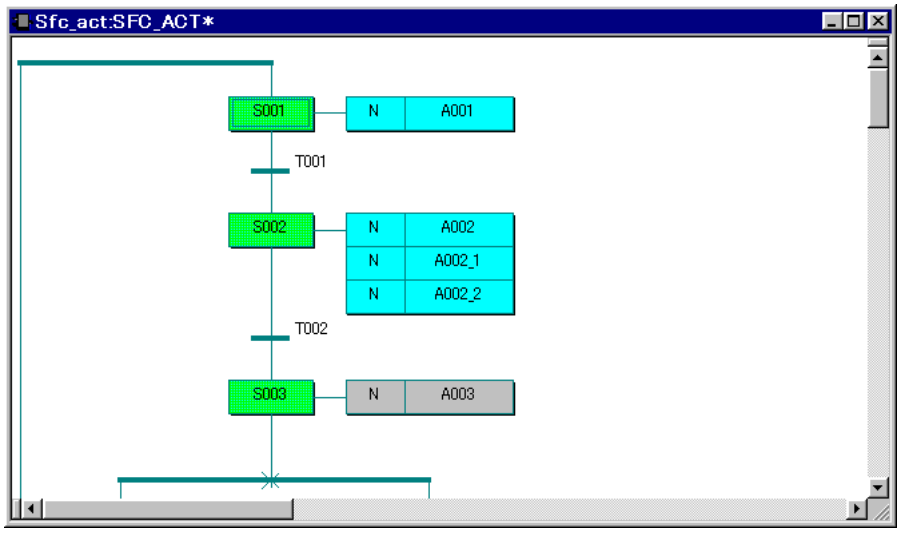
(2) Inserting a deleted action into a step

◊ Move the mouse pointer onto step “S003,” and left-click.

◊ Left-click the [Action Block...] button, or alternatively right-click to display the shortcut menu and left-click the [Action Block...] command.
The {Action} dialog will appear on the screen.



◊ After setting the necessary items in the {Action} dialog, left-click the [OK] button. In this example, “A003” is input in the [Name:] text box, and then the [OK] button is left-clicked. Action block “A003” is connected to step “S003.”



- There is no limit on the number of actions which can be inserted in one step.
- For a detailed explanation of the {Action} dialog box, see “5-4-3 Connecting a variable to an action”.

5-4-3 Connecting variables to an action

A Boolean variable or body can be connected to SFC action.

For available action qualifiers, refer to “Instructions No.FEH200.”

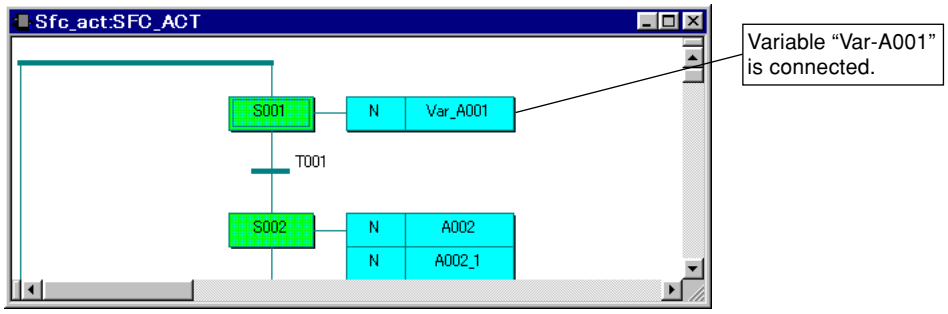
(1) Connecting Boolean variables

To make an action a variable, a variable name is set for the action name. The variable must be defined as Boolean in the variable declaration (variable worksheet declaration) for the POU of the SFC.

There are two methods for declaring variables:

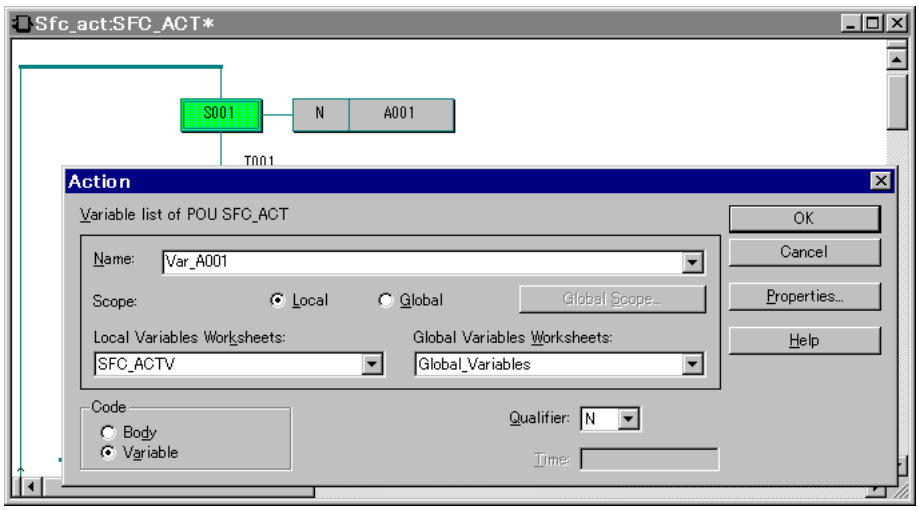
- Declare variables with the variables editor or the {Variables} dialog box before editing the SFC circuit.
- To declare variables while editing the SFC circuit, input the name of new variable in the {Action} dialog box. The {Automatic Variable Declaration} dialog box automatically appears on the screen. The variables declared with this dialog box are automatically inserted into the variables worksheet for the POU.

Connecting variable “Var-A001” to action “A001” is explained below:



◊ Right-click action block “A001,” and left-click the [Objects Properties...] command in the shortcut menu.

The {Action} dialog box appears on the screen.



Then the {Action} dialog box is explained.

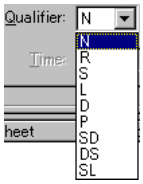
<Description of the items in the {Action} dialog box>

[Name] ..... Specify the name of the action with a maximum of 24 single-byte characters. When the optional [Body] button is turned on in the [Definition] box, the input value becomes the worksheet name for action code body; it becomes the variable name when the optional [Variable] button is turned on.

[Scope] ..... Specify Local or Global variables. When the optional [Local] button is turned on, only local variables are displayed in the list box. When the optional [Global] button is turned on, all the global variables of the resource are displayed. This item is enabled when the optional [Variable] button is turned on in the [Definition] box.

[Global Scope ...] ..... Activates the {Select Resources for Global Variables} dialog box.

[Qualifier] ..... Sets the execution conditions of the action. All the action qualifiers that conform to IEC 61131-3 can be used.



[Timer] ..... Specify the interval for executing actions. This item can be set only when action qualifier L, D, P, SD, DS or SL is selected.

[Definition] ..... Specify whether actions are defined by code body or variable (BOOL-type variable).

[Properties ...] ..... Activates the {Automatic Variables Declaration} dialog box, which can be used to declare new variables or change the properties of existing variables. This item is enabled when the optional [Variable] button is turned on in the [Definition] box.

[Local Variables Worksheet] ..... Specify the local variables worksheets to be registered.

[Global Variables Worksheet] ..... Specify the global variables worksheets to be registered.

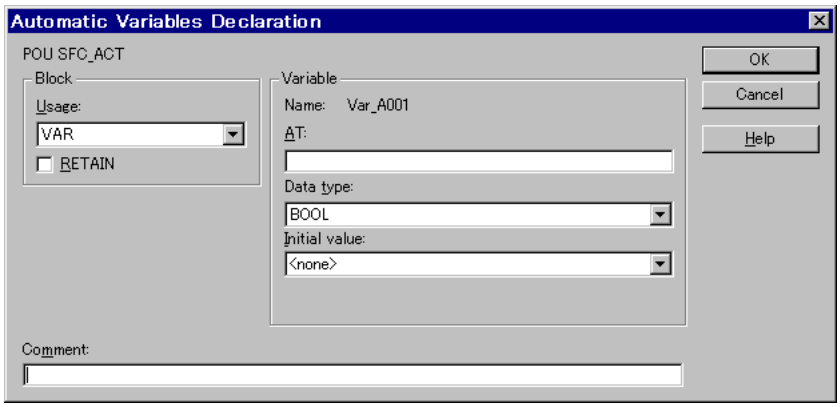
Setting the {Action} dialog box

◊ Input the variable name in the [Name:] text box.
In this example, <Var_A001> is input.

◊ Select an action qualifier from the [Qualifier:] list box.

◊ Check the [Variable] option button.

◊ After checking the content of the dialog box. left-click the [OK] button.
The {Automatic Variables Declaration} dialog box appears on the screen.



Setting the {Automatic Variables Declaration} dialog box

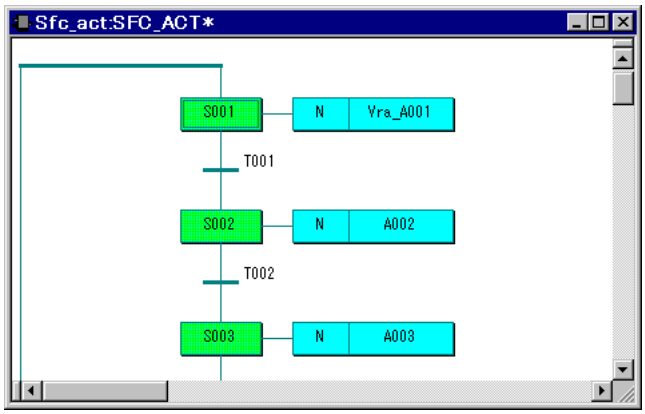
◊ If necessary, specify the initial value from the [Initial value:] list box.
◊ To declare the position of variable, input the desired position in the [AT:] text box.
◊ Specify the variable keyword from the [Usage] list box.
◊ If necessary, input a comment in the [Comment:] text box.
◊ After confirming the settings in the dialog, left-click the [OK] button.
The action name in the SFC worksheet is changed and the content of the variable declaration is automatically inserted to the variable worksheet.

When a variable which has already been declared is inserted, the variable name is displayed in the list box of the {Variables} dialog box.

For a detailed explanation of variable declaration, see “8-1 Variable Declaration”.

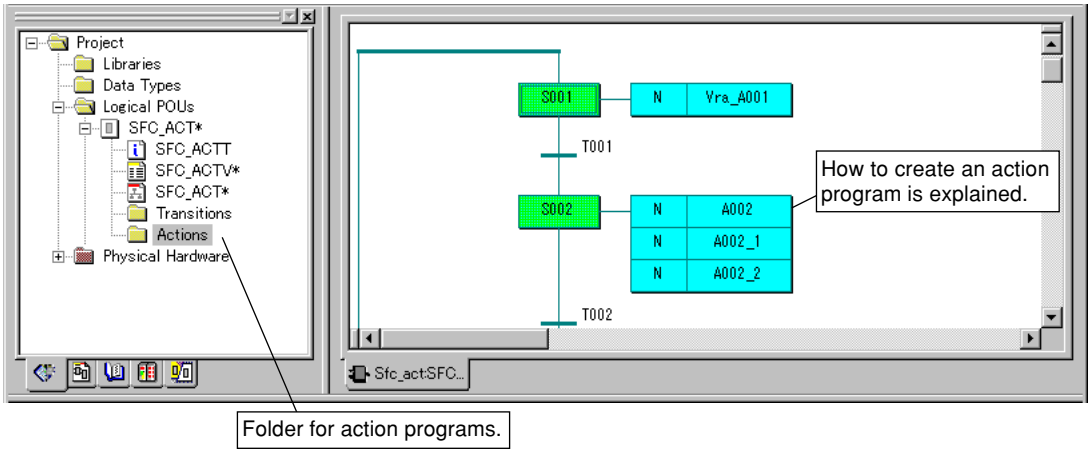
When all necessary items are set according to the procedure explained above, “Var-A001” will be connected as shown in the figure below.

Action block to which a variable is connected



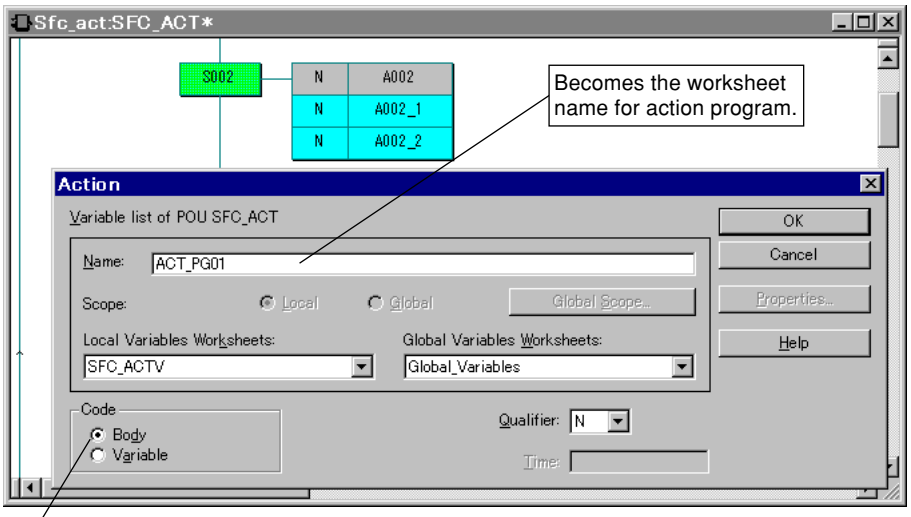
5-4-4 Creating action programs

Action programs can be created in IL, ST, LD or FBD programming language. To create an action program, the worksheet (file) for writing the program is necessary.
For SFC POU, a folder for action program is created in advance. The work file can be inserted or deleted.

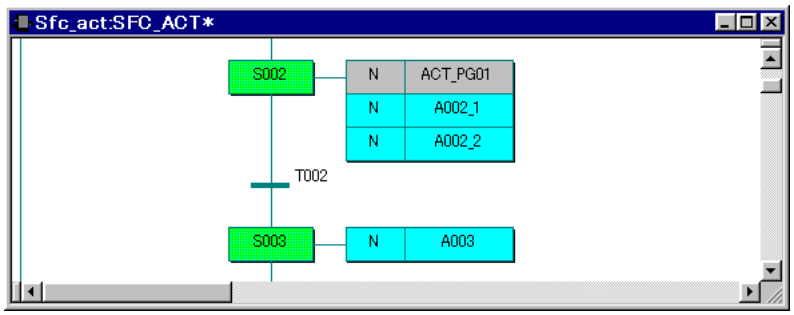


(1) Defining an action as “body”

◊ Right-click action “A002,” and left-click the [Object Properties...] command in the shortcut menu. The {Action} dialog box appears on the screen.



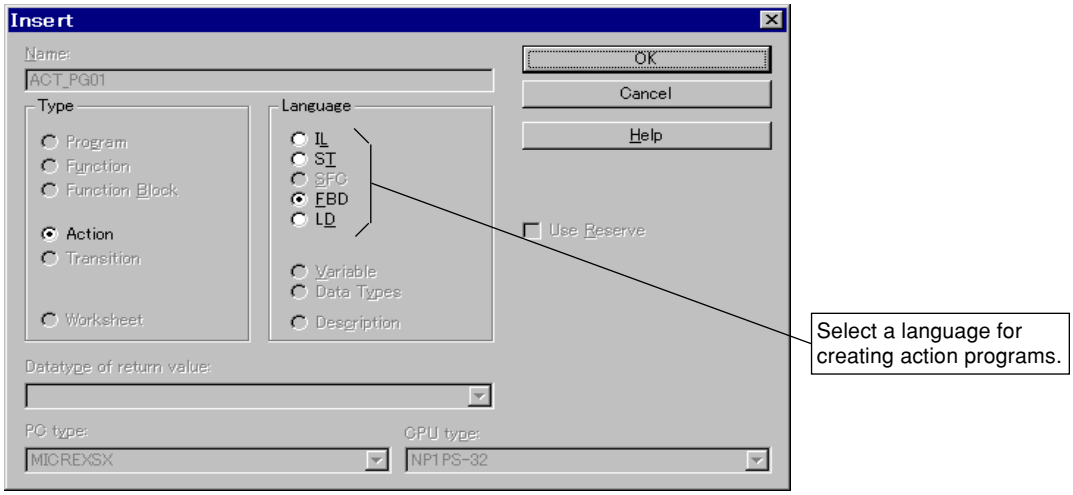
◊ Input the name of the action in the text box.
In this example, <ACT_PG01> is input.
◊ Define the attribute of the action.
Left-click the [Body] option button.
◊ Select a qualifier from the list box.
In this example, [N] is selected.
◊ After checking the content of the dialog box, left-click the [OK] button.
An action of the new name is displayed.



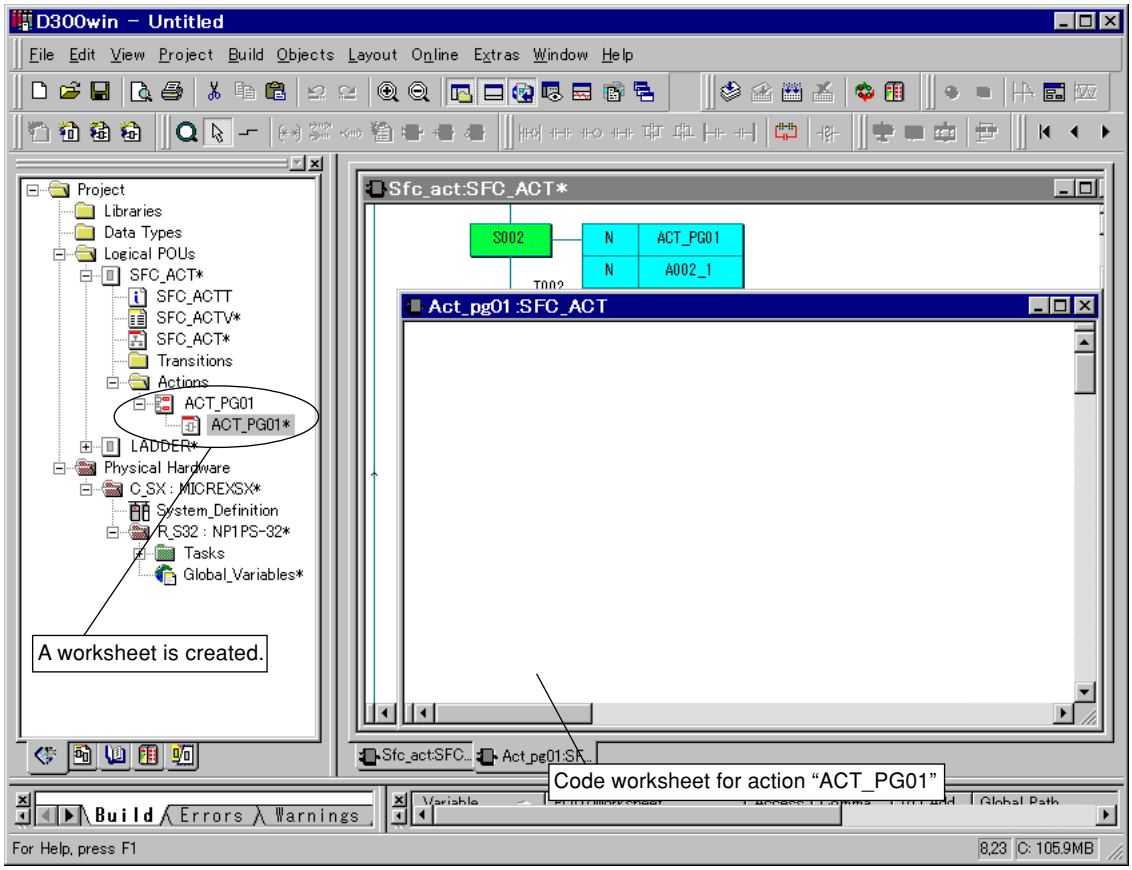
For details on the action qualifier, see the Instructions of the User's Manual <FEH200>.

(2) Creating the action code worksheet

◊ Left-double-click action "ACT_PG01" or alternatively right-click to display the shortcut menu and left-click the [Open Object] command.
The {Insert} dialog box for inserting the worksheet appears on the screen.
(The {Insert} dialog box is given the same name as the action, which cannot be changed.)



◊ With the {Insert} dialog box, select a programming "language."
◊ After checking the content of the dialog box, left-click the [OK] button.
A file called "ACT_PG01" is created as the action file for the corresponding POU in the subtree [Logical POUs] of the project tree, and the code worksheet is displayed on the screen.

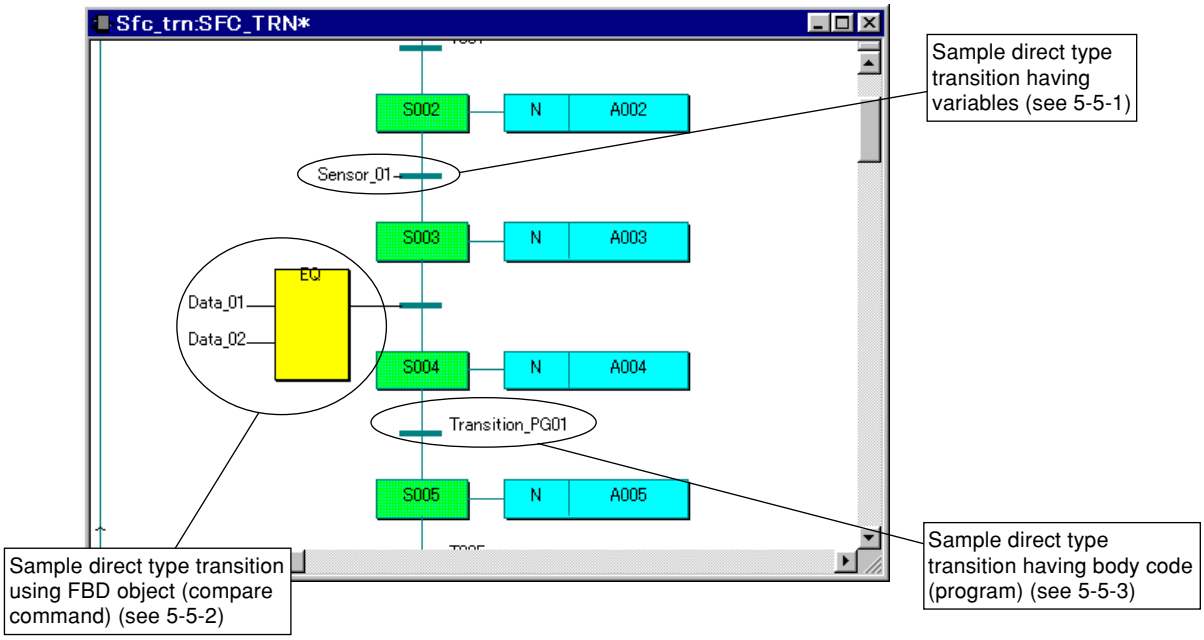


For how to edit the code worksheet, refer to the paragraph for editing in the relevant programming language.

Transition is always assigned to a transfer condition. Transfer condition is created using a Boolean variable or IL, LD or FBD code. For SFC, two types (“body” and “direct”) of transition can be used.

1) Direct
“Direct type” transition does not have a peculiar code (program) for transfer condition, but has BOOL-type variables or FBD/LD objects (those with BOOL data-type output).

2) Body
“Body” type is a transition which has a peculiar code (program) for transfer condition.

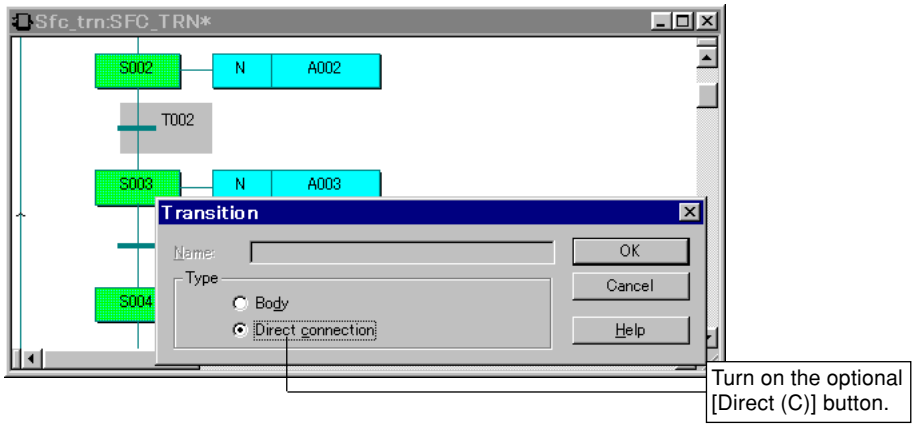


5-5-1 Connecting a variable to a transition

A sample case to connect the BOOL-type variable “Sensor_01” to transition “T002” is explained below.

(1) Changing a transition to “direct” type

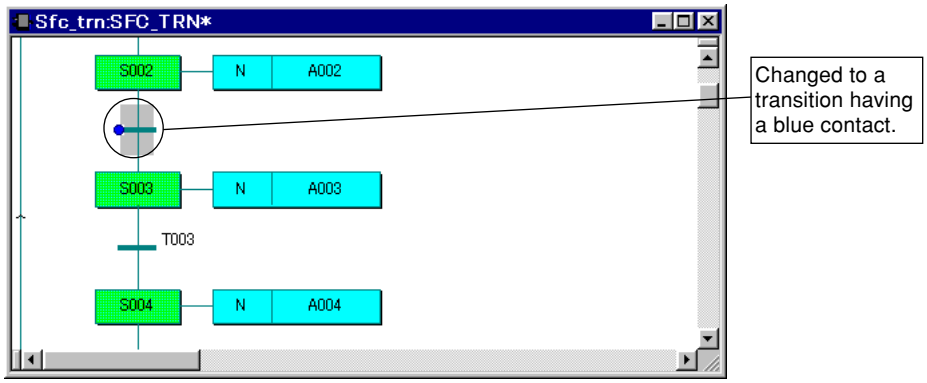
◊ Double-click the left button on transition “T002”, or right-click transition “T002,” and left-click the [Object Properties...] command in the shortcut menu.
The {Transition} dialog box appears on the screen.



Setting the {Transition} dialog box

◊ Check the [Direct connection] option button.
(Checking this box deletes transition names.)

◊ After checking the content of the dialog box, left-click the [OK] button.
A transition that has a blue junction is displayed on the screen.

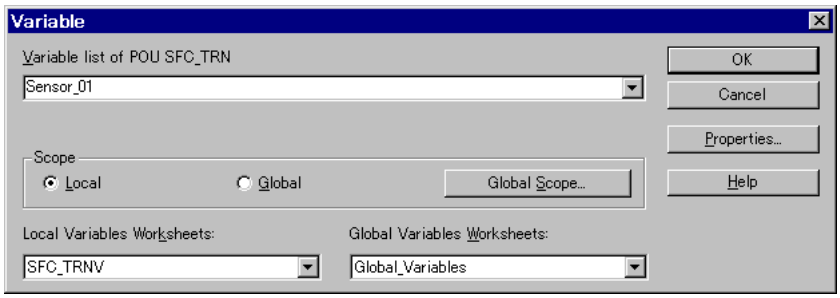


(2) Connecting a variable to a transition

In this example, directly connecting variable “Sensor_01” to the point where transition “T002” existed is explained.

◊ Move the mouse pointer onto the transition which has been changed to Direct type, and left-click.

◊ Left-click the [Variable] button, or right-click it to display the shortcut menu and then left-click the [Variable] command in this menu.
The {Variables} dialog box appears on the screen.

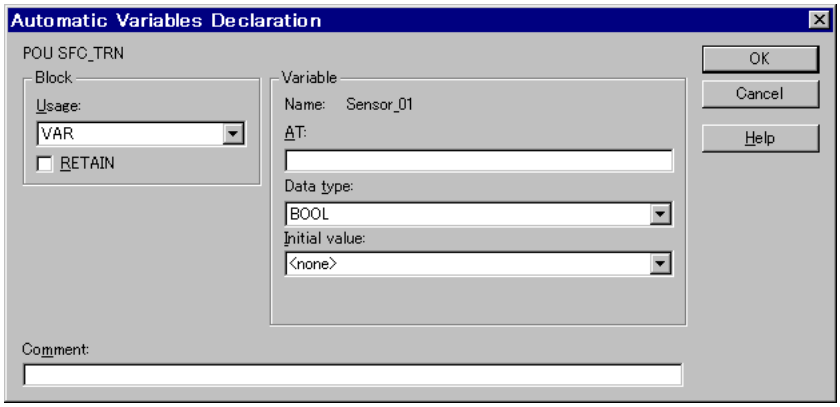


Setting the {Variables} dialog box

◊ Input the variable name in the [Variable list] list box.
In this example, <Sensor_01> is input.

◊ Left-click the [Properties...] button.
The {Automatic Variables Declaration} dialog box appears on the screen.

When a variable which has already been declared is inserted, the variable name is displayed in the list box of the {Variables} dialog box.



Setting the {Automatic Variables Declaration} dialog box

◊ If necessary, specify the initial value in the [Initial value:] list box.
◊ To declare the position of the variable, input the desired position in the [AT:] text box.
◊ Specify the variable keyword in the [Usage:] list box.
◊ If necessary, input a comment in the [Comment:] text box.
◊ After checking the content of the dialog box, left-click the [OK] button.
A new variable is inserted into the code worksheet, and variable declaration is made for the POU.

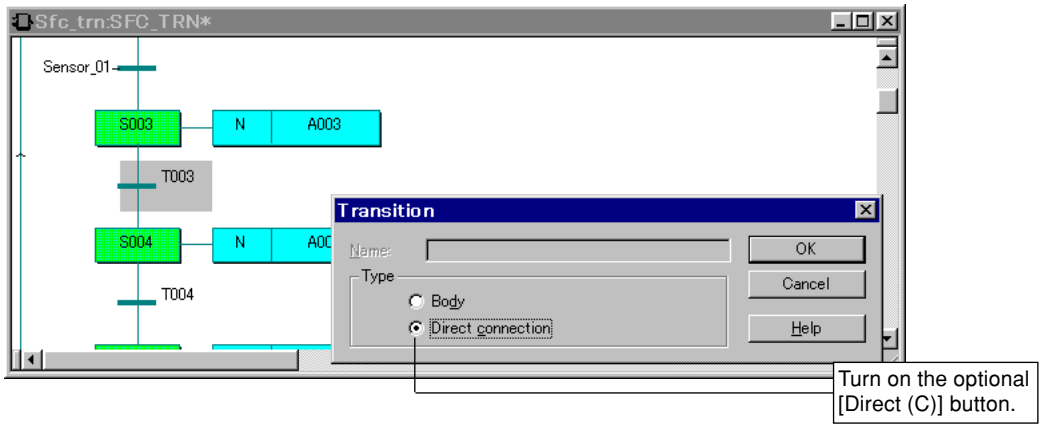
For a detailed explanation of variable declaration, see “8-1 Variable Declaration”.

5-5-2 Connecting an FBD (LD) object to a transition

A sample case to connect an FBD language object, or function “EQ” (compare) to transition “T003” is explained below.

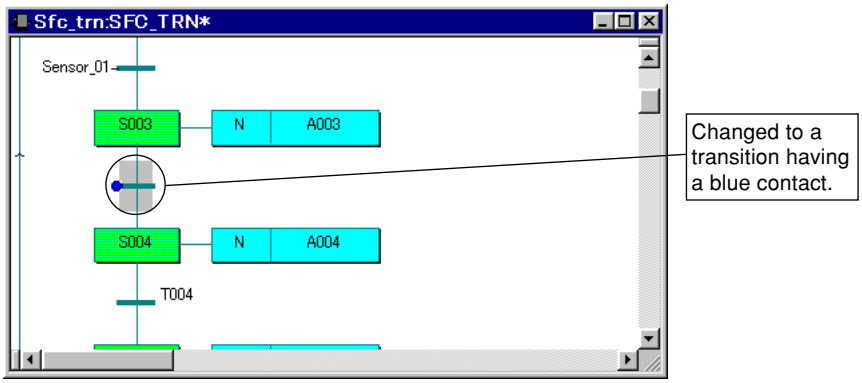
(1) Changing a transition to “direct” type

◊ Right-click transition “T003” to display the shortcut menu, and left-click the [Object Properties...] command in the menu.
The {Transition} dialog box appears on the screen.



Setting the {Transition} dialog box

◊ Check the [Direct connection] option button.
(Checking this box deletes transition names.)
◊ After checking the content of the dialog box, left-click the [OK] button.
A transition that has a blue junction is displayed on the screen.

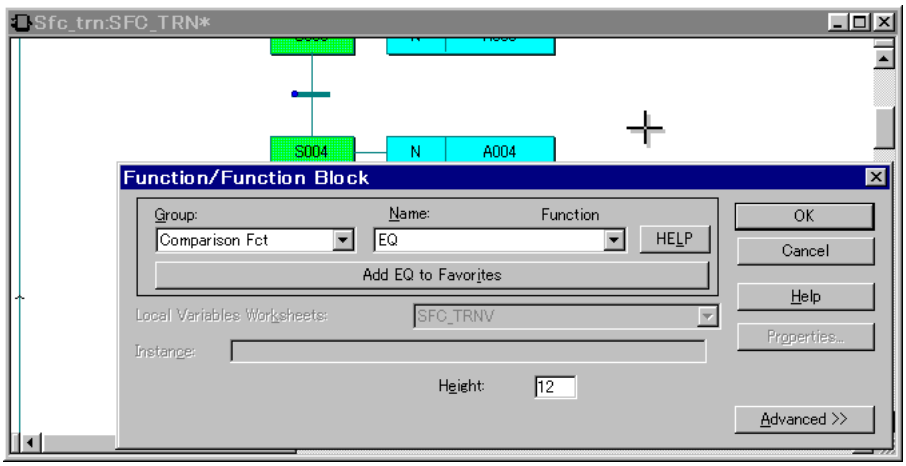


(2) Connecting an FBD object to a transition
Connecting an FBD object (function “EQ”) to a transition is explained below.
LD objects can be connected in the same manner.

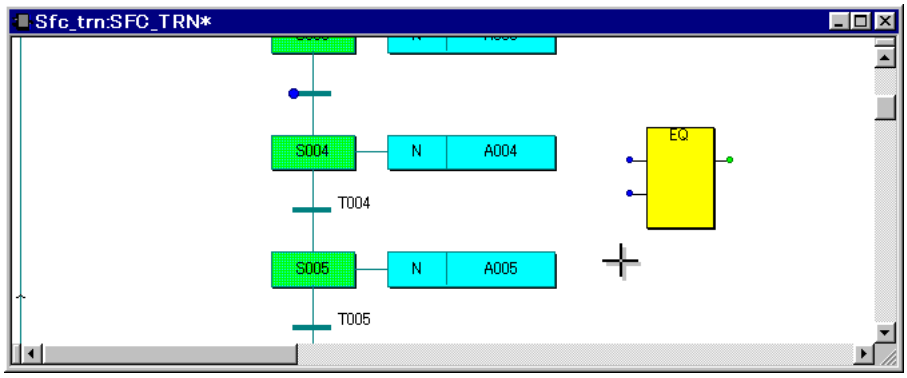
1) Inserting an object

◊ Set the insert mark by left-clicking the desired point in the edit space. (Set the insertion mark at a position where there is enough space for arranging objects.)

◊ Left-click the [Function/Function block] or [Contact right] button for the object to be inserted.
In this example, the [Function/Function block] button is left-clicked.
The {Function/Function Block} dialog box appears on the screen.



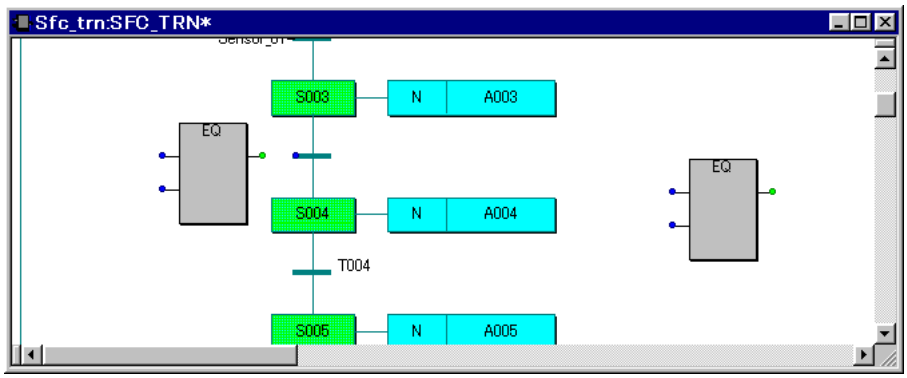
◊ Select function “EQ,” and left-click the [OK] button.
Function “EQ” is inserted into the worksheet.



2) Connecting an object to a transition

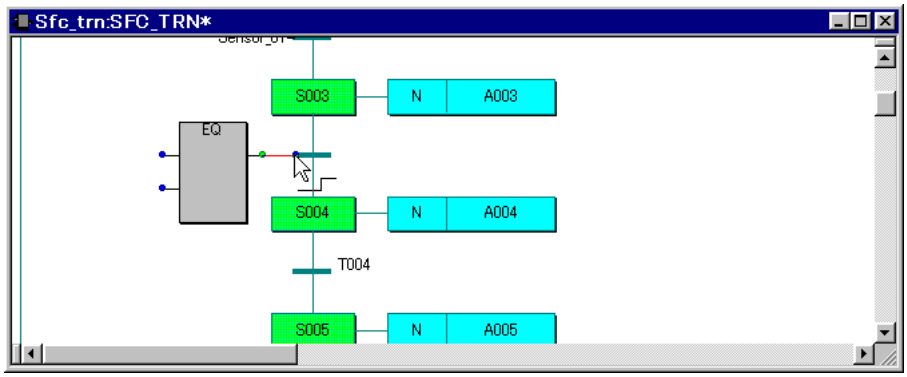
Connecting the output terminal of the inserted function to a transition

◊ Drag the function “EQ” to the left of the transition to which it is to be connected, and release the mouse button at a point where the objects do not overlap.

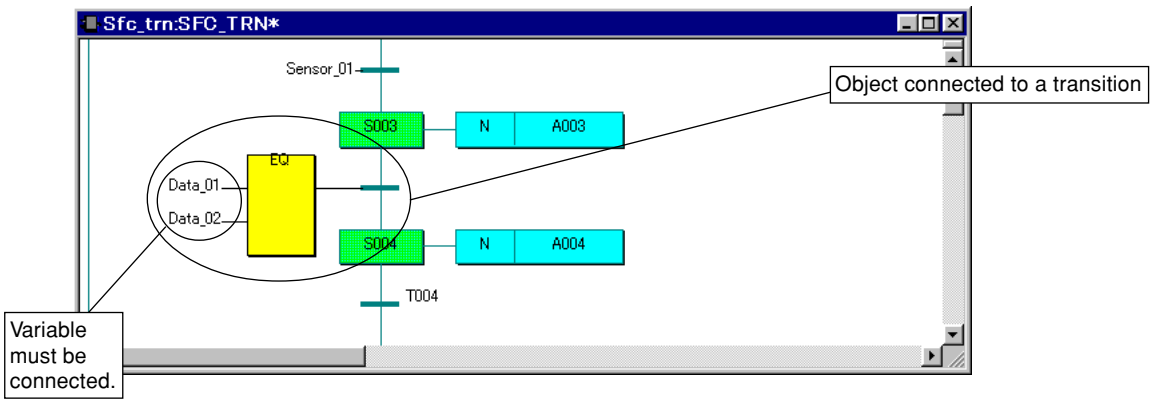


◊ Left-click the [Conect Objects] button.
The cursor changes to Connect mode.

◊ Left-click the junction of the function’s output terminal, move the cursor to the junction of the transition, and left-click this point.



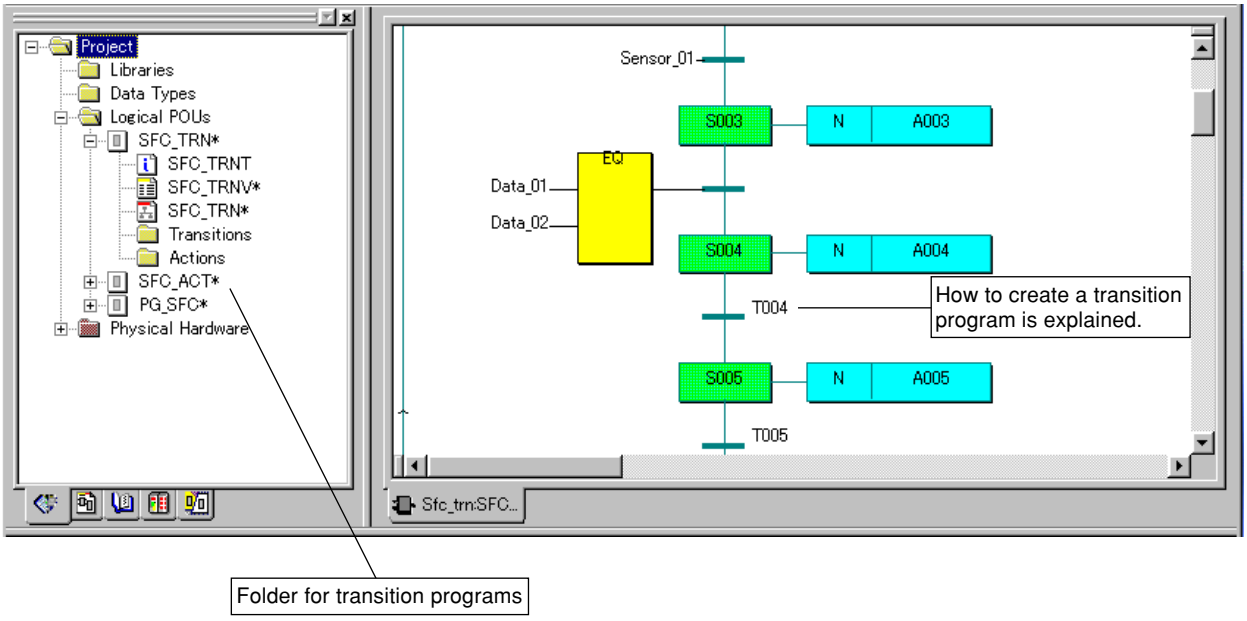
The following image is displayed on the screen.



For how to declare variables for the input terminal of function “EQ” shown in the figure above, refer to “Section 4 Editing in LD/FBD Language.”

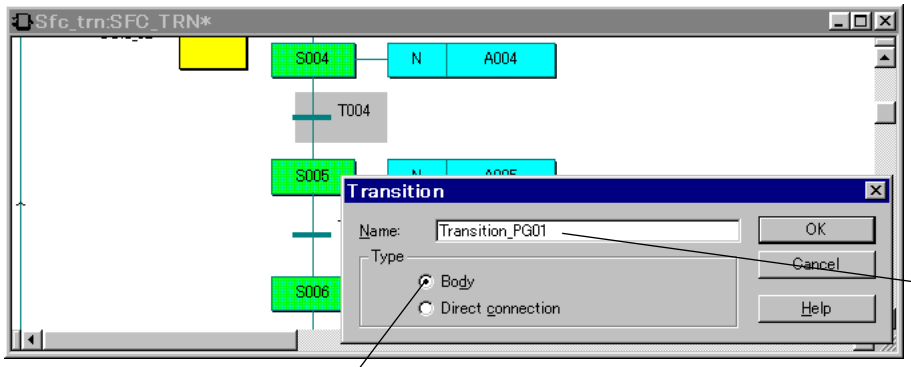
5-5-3 Creating a transition program

Transition program can be created in IL, ST, LD or FBD language. To create a transition program, the code worksheet for writing the program is necessary.
For SFC POUs, the folder for transition program is created in advance. Code worksheets can be inserted or deleted.



(1) Defining a transition as “body”

◊ Right-click transition “T004” to display the shortcut menu, and left-click the [Object Properties...] command in the menu. The {Transition} dialog box appears on the screen.



Becomes the worksheet name for transition program. The worksheet name can be specified with a maximum of 24 alphanumeric characters. (However, it may not begin with a numeric character.)

Turn on the optional [Body] button.

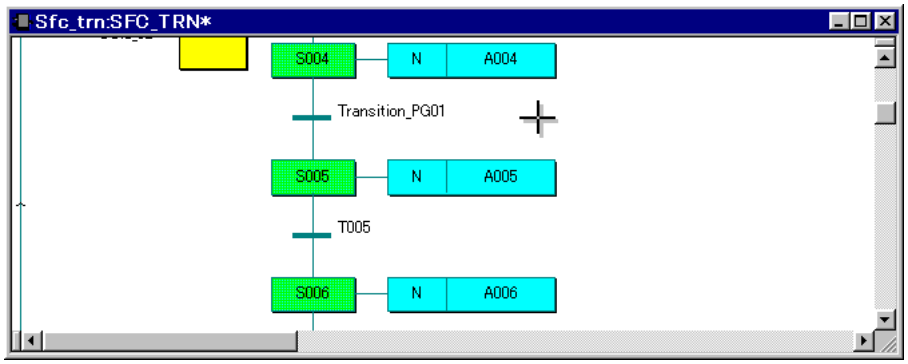
◊ Define the attribute.
Check the [Body] option box.

◊ Input the name in the text box.
In this example, <Transition_PG01> is input.

<About transition name>

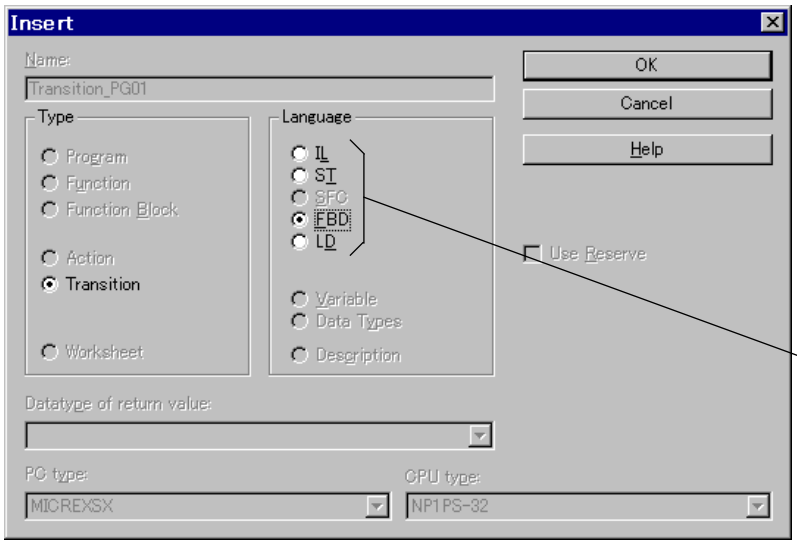
When a transition is defined as “body” (program), a transition name can be specified with a maximum of 24 alphanumeric characters. However, the name may not begin with a numeric character. In addition, any of the names on the Reserve Word List in the Instructions of the User’s Manual <FEH200> cannot be used for the transition name.

◊ After confirming the settings in the dialog, left-click the [OK] button.
The transition is displayed with a new name.



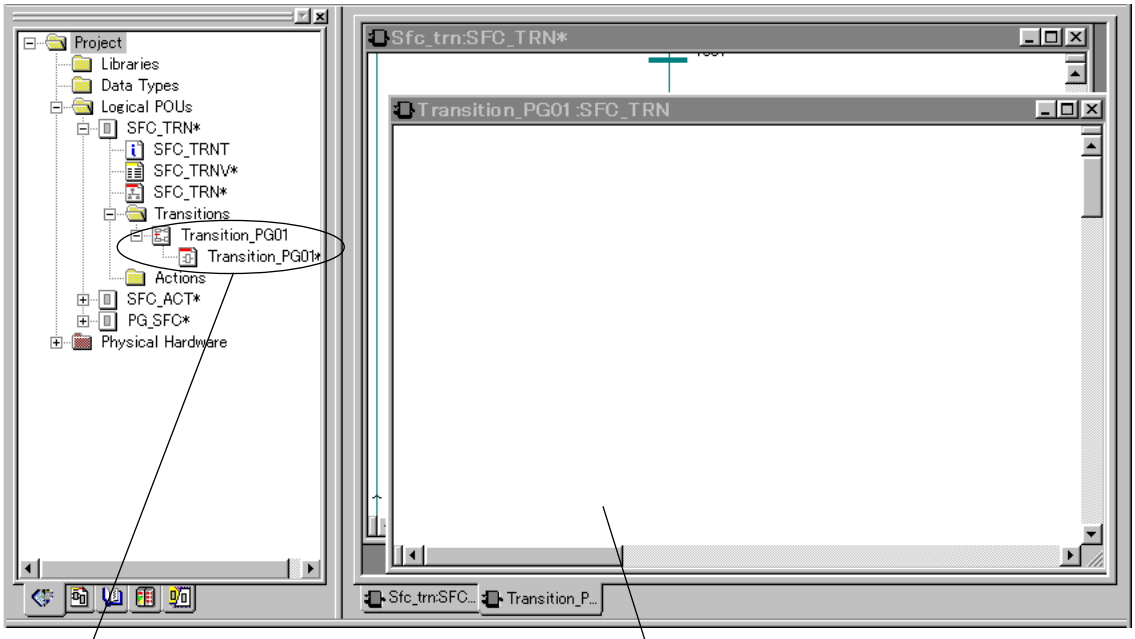
(2) Creating a code worksheet

◊ Right-click “Transition” and left-click the [Object open] command.
The {Insert} dialog box appears on the screen.



◊ Select a programming “language” from the {Insert} dialog box.

◊ After checking the content of the dialog box, left-click the [OK] button.
A file called “Transition_PG04” is created for the corresponding POU in subtree [Logical POUs] of the project tree, and the code worksheet is displayed on the screen.



📖 For how to edit the code worksheet, refer to the paragraph for editing in the relevant programming language.

Section 6 Editing in IL Language

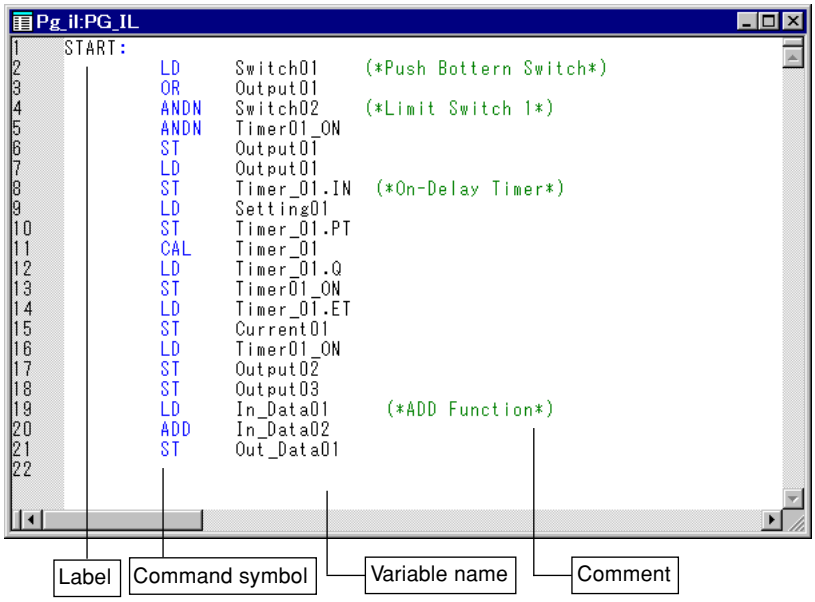
page

Section 6 Editing in IL Language
6-1 Preparing for Creating IL Code

6-1-1 Introduction to IL language

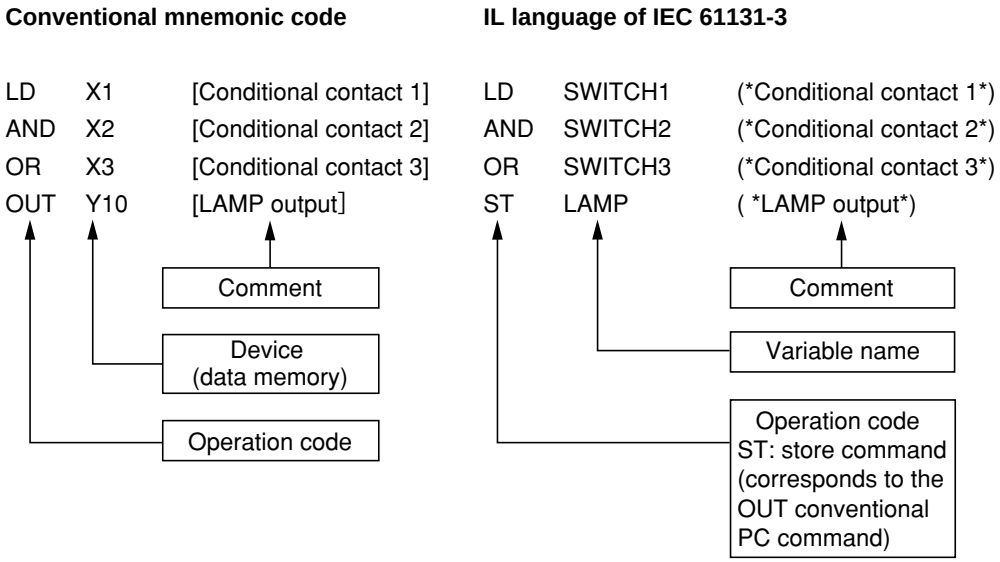
A code written in IL language consists of command symbols, variable names and comments. Labels can be placed in front of command symbols. Labels are used as destinations for jumps.

A sample IL program is shown below:



6-1-2 IL language

This language corresponds to conventionally used mnemonic code for PCs and can perform sequential, arithmetical and logical operations via the PC's internal arithmetic registers (for operation result).
The figure below shows a comparison between IEC 61131-3 IL language and the conventional mnemonic code of Fuji:



The greatest difference between them is that IL language expresses the real address of the PC memory area by using variables.

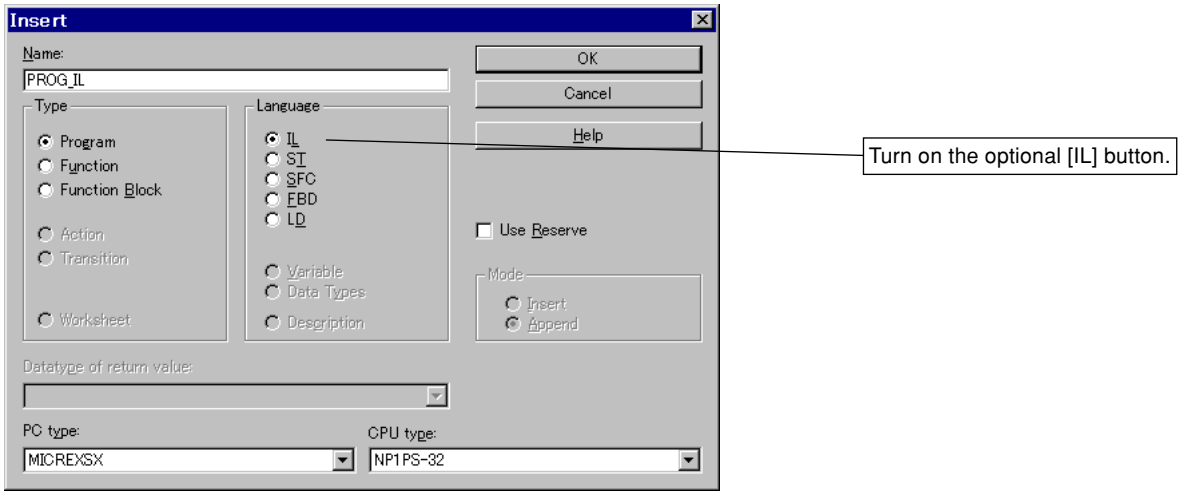
6-1-3 Inserting a POU

How to inset a POU with the project tree editor is explained below:

(1) How to insert a POU

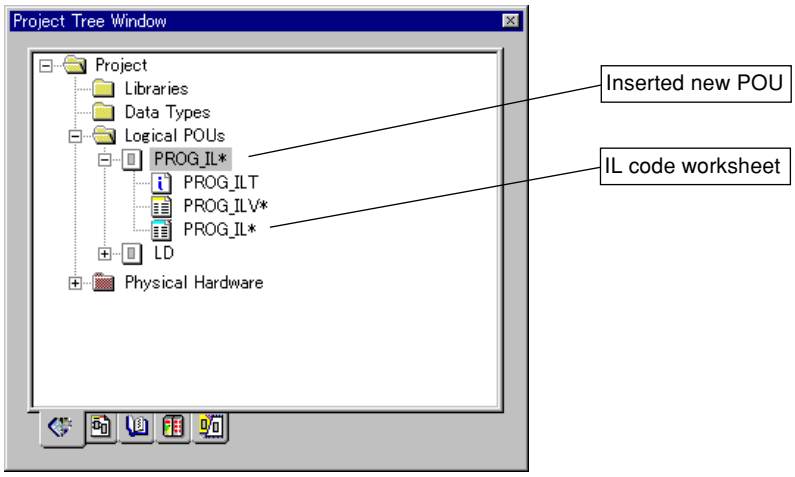
◊ Select [Logical POUs] or [POU] in the project tree.

◊ Left-click the [Insert...] button, and the {Insert} dialog box will appear on the screen. This screen can also be displayed by left-clicking the [Insert] command in the shortcut menu.



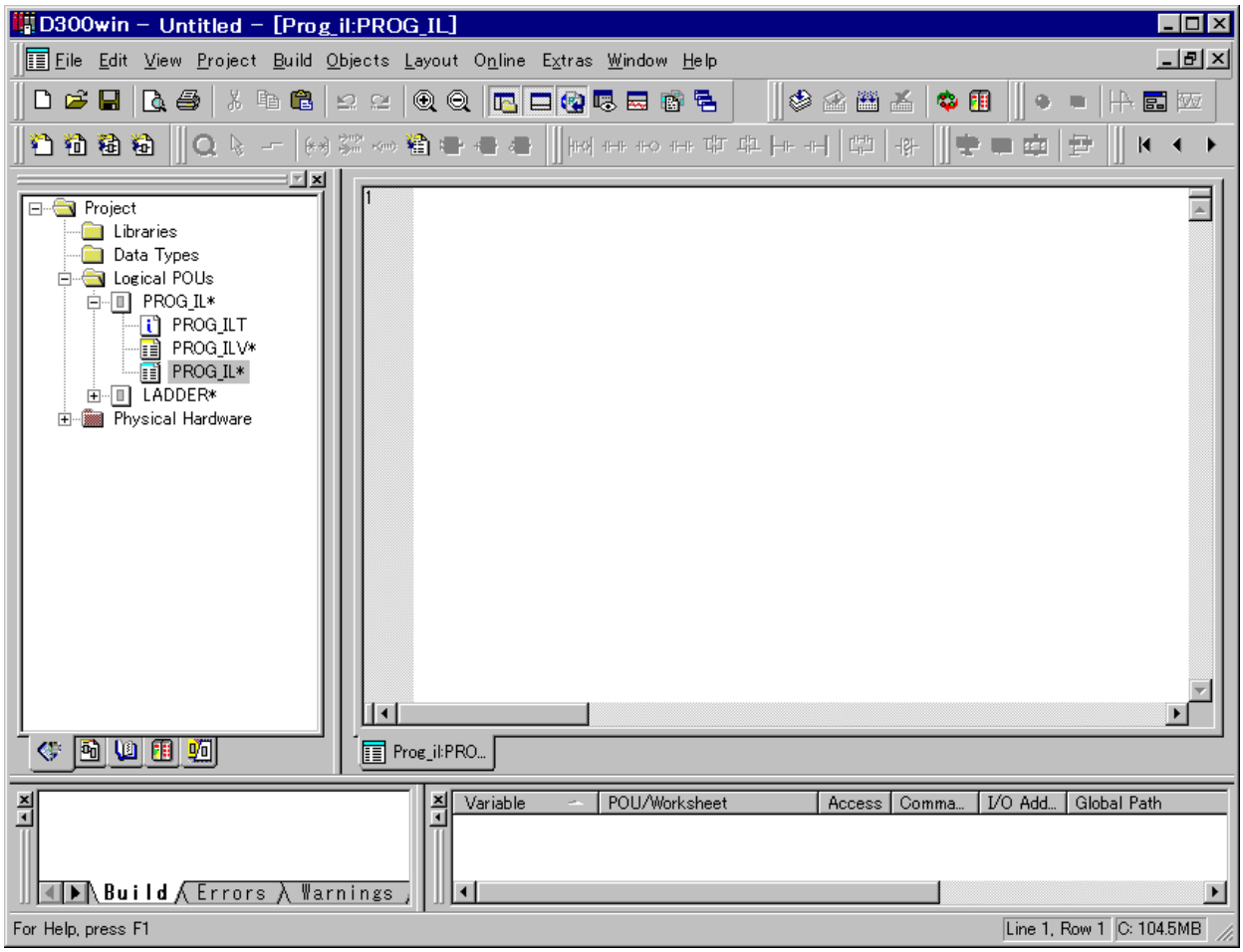
[Name] ..... Input POU name.
[Group type] ..... Specify the POU group type.
[Language] ..... Specify a language for describing codes in the POU.
[Data type of return value] ..... Specify the data type for returned values. (This item can be specified only when "Function" is specified for "Group type".
[Use Reserve] ..... This item takes effect only when the optional [Selected POU] button is turned on in the [Use Reserve] box in the {Define CPU memory size} dialog box. "Patch POU" can be executed even when variables are newly added to the memory area assigned to reserve area.
[Mode] ..... Specify whether the new object is inserted in front of or after the selected object.
[PC type] ..... Specify the type (series name) of PC.
[CPU type] ..... Specify the type of CPU module.

◊ After setting all items on the dialog box, left-click the [OK] button. A new POU will then be added in the project tree.



(2) Opening IL worksheet

◊ Left-double-click the [PG_IL] icon for the IL worksheet in the project tree, or right-click the icon to display the shortcut menu and then left-click the [Open Worksheet] command. The worksheet (text editor) will then be opened.



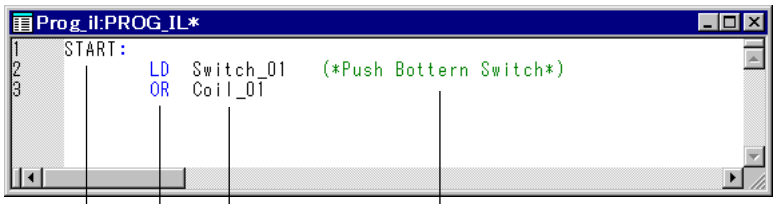
6-1-4 How to program IL code

There are two methods for editing or writing code in IL language

- The method to directly input into the IL worksheet
  The input method is the same as inputting ordinary text (with editor)
- The method using the Edit Wizard

(1) IL format and direct input

A code written in IL language consists of a series of operators (commands). Each command is written within one line and includes an operand. For programming, a specific format must be used, as shown below.



Comment
Maximum number of characters for a comment: 128 single-byte characters.
A single-byte asterisk (*) must be attached at the beginning and end of a comment.

Variable name (operand)
One or more space characters need to be inserted between the command symbol and variable name. Maximum number of characters for variable name: 30 single-byte characters.

Command symbol
- Command symbol must be input with capital letters.
- One or more space characters need to be inserted between the command symbol and variable name.

Label
The Label name shall be followed by a single-byte colon (:). Maximum number of characters for label name: 30 single-byte characters.

Note: Do not describe other command in the same line in which a label is set.

(2) Using the Edit Wizard

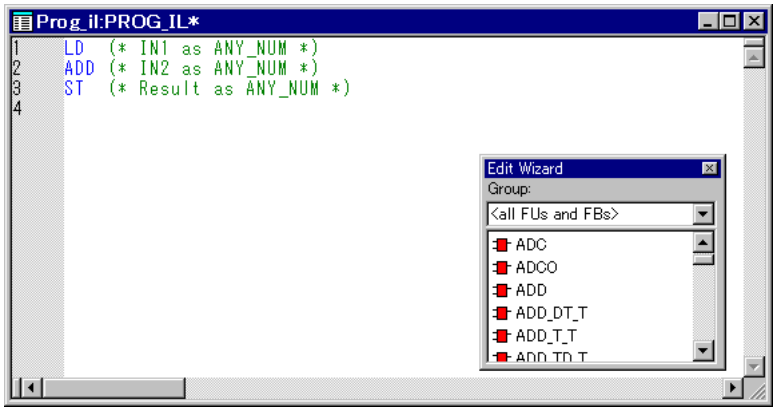
When programming in IL language, the IL format described in (1) must be used. However, the D300win system provides the Edit Wizard dedicated to the IL language to facilitate code editing and prevent program errors during code input.

1) Displaying the {Edit Wizard} window

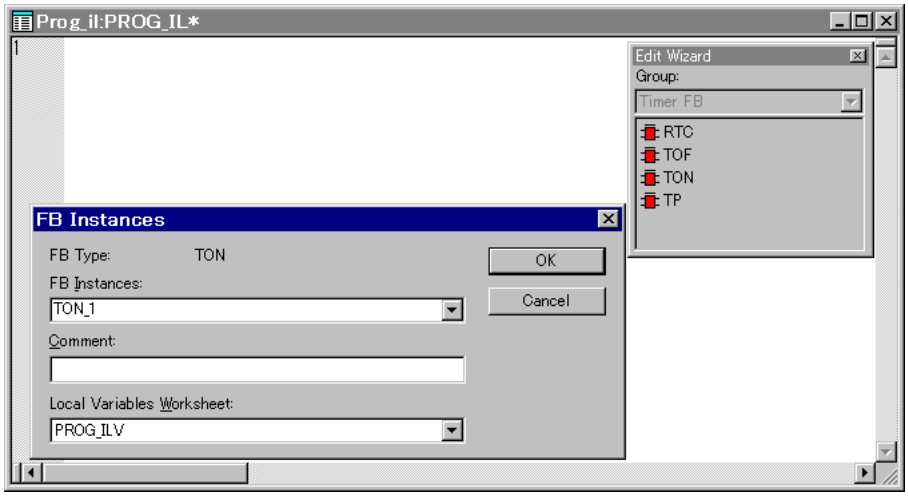
When the {Edit Wizard} window is not displayed on the screen, use the following operation to display it.

◊ Left-click the [Edit Wizard] command in the [View] menu, and then the {Edit Wizard} window will appear on the screen as shown below.

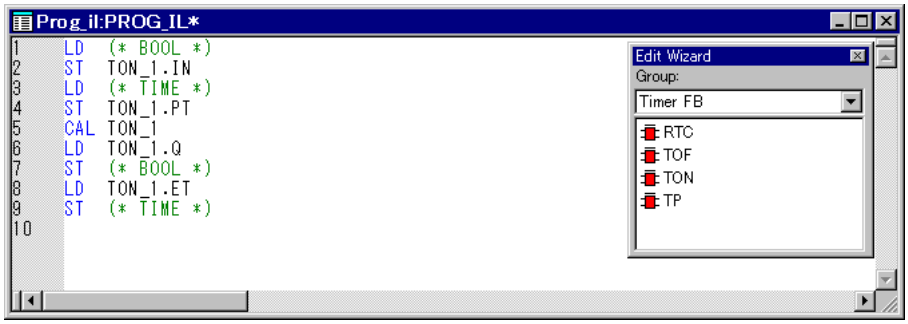
2) Sample input of function “ADD”
Left-double-click function “ADD” displayed in the {Edit Wizard} window, and the format consisting of command symbols (LD, ADD, and ST) and comments (explaining the variable data type) is displayed in the text editor. The comments can be changed or deleted as necessary.



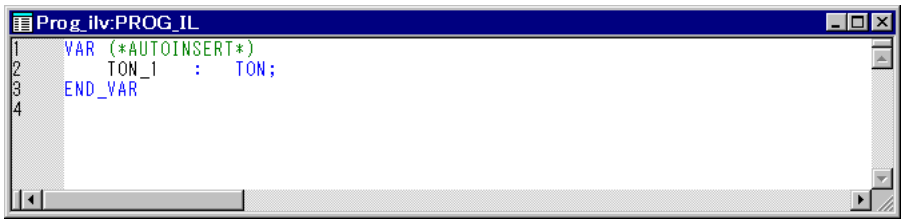
3) Sample input of function block “TON”
Left-double-click function block “TON” displayed in the {Edit Wizard} window, and then the {FB Instance} dialog will appear on the screen. An instance name input in the {FB Instance} dialog will be automatically inserted as “instance declaration of the function block” to a variable worksheet.



Left-click the [OK] button in the {FB Instance} dialog, and the text editor will display instruction symbols, TON command call instruction (CAL), and comments (explaining the variable data type) in a total of 9 lines. The comments can be changed or deleted as necessary.



<Reference>
The content input in the {FB Instance} dialog is automatically written in a variable worksheet as shown in the figure below.



Function and function blocks can be used with IL language by the following method:

6-2-1 How to use functions

(1) How to express functions

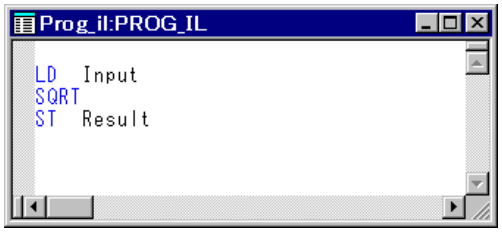
Instruction symbol	Name
Input data type Output data type REAL — SQRT — REAL Function name	Square root SQRT
STRING — LEFT — STRING UINT —	Get left sub-string LEFT
BOOL — G SEL_INT — INT INT — IN0 INT — IN1 Some functions use terminal names.	Select SEL_INT
Data type of the 1st input ANY_NUM Data type of the 2nd input ANY_NUM Indicates that input can be extended. Data type of the nth input ANY_NUM ADD — ANY_NUM	Arithmetic addition ADD

(2) How to program functions

To activate an IL function as shown in the following figures, the first input is made into the result of operation until now. Then the function call command (function name), where the part following the second input is made into the operand, is described as the operator.

1) For single-input functions

Program



Variable declaration

2) For two-input functions

Program

Prog_il:PROG_IL

```
LD      First_Input
LEFT    Second_Input
ST      Result
```

Variable declaration

Prog_ilv:PROG_IL

```
VAR
    First_Input  :   STRING;
    Second_Input :   UINT;
    Result       :   STRING;
END_VAR
```

3) For three-input functions

Program

Prog_il:PROG_IL

```
LD      First_Input
SEL_INT Second_Input,Third_Input
ST      Result
```

Variable declaration

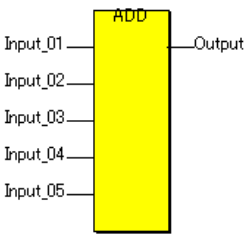
Prog_ilv:PROG_IL

```
VAR
    First_Input  :   BOOL;
    Second_Input :   INT;
    Third_Input  :   INT;
    Result       :   INT;
END_VAR
```

Note: Functions which are the same as IL language instructions, such as “ADD,” (refer to “INSTRUCTIONS No. FH200”) cannot be programmed. (They are processed as IL language instructions.) Therefore, when ADD or any other basic instruction is programmed in IL language, the function becomes a “two-input” function.

<Description in FBL and LD languages>

Fbd:FBD*



<Description in IL language>

• Correct description

Prog_il:PROG_IL*

```
(*Incorrect Usage*)

LD      Input_01
ADD     Input_02
ADD     Input_03
ADD     Input_04
ADD     Input_05
ST      Output
```

• Wrong description

Prog_il:PROG_IL*

```
(*Incorrect Usage*)

LD      Input_01
ADD     Input_02,Input_03,Input_04,Input_05
ST      Output
```

Comparing with the examples in 3), the above description appears to be correct. However, because ADD is processed as an IL instruction, a “syntax” error occurs during compilation.

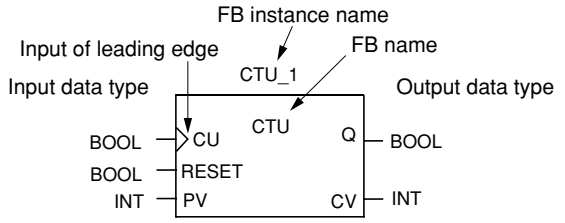
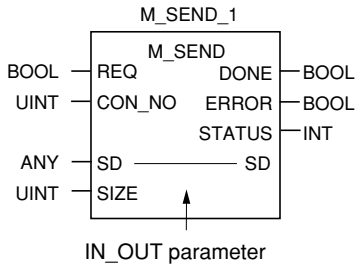
6-2-2 How to use function blocks

Function blocks are expressed in almost the same way as functions, but there are differences as shown below.

- Multiple-output commands exist.
- Edge input exists.
- The number of input terminals is fixed (cannot be expanded.)
- All input and output terminals are given a terminal name (parameter name).
- Commands including IN_OUT parameter exist.

To use function blocks, function block instances (described in the variables worksheet) need to be declared.

(1) How to express function blocks

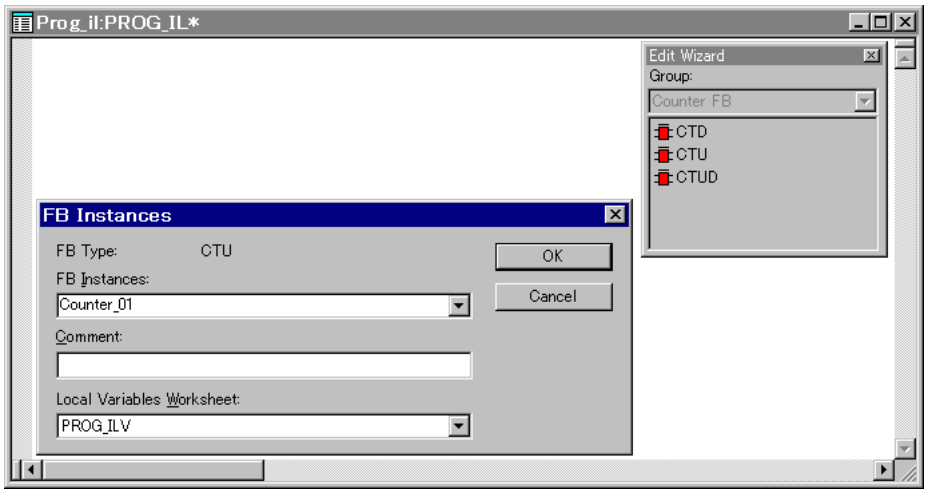
Instruction symbol	Name
	Up counter CTU (Standard function block)
	Message transmission (Original function block. For its function, see the INSTRUCTION volume.)

(2) How to describe a function block

This paragraph explains how to describe the up-counter “CTU” using the Edit Wizard.

◊ Select [<all>] or [Counter FBs] from the [Group:] list box in the {Edit Wizard} window.

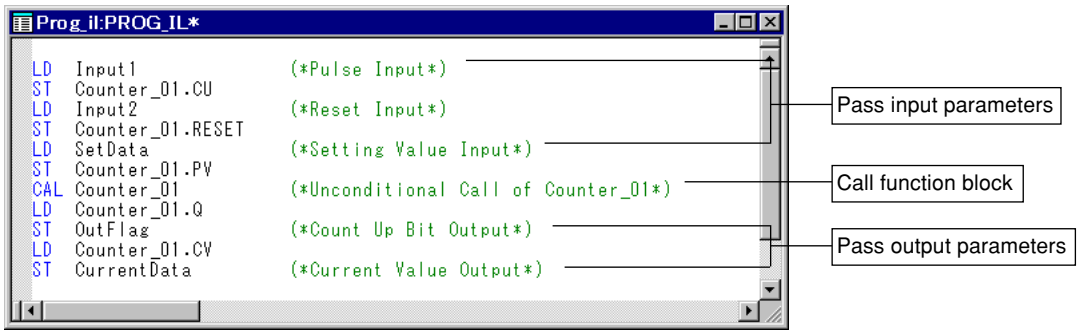
◊ Left-double-click [CTU] in the instruction list box.
The {FB Instance} dialog will appear on the screen.



◊ The [FB Instances] text box displays instance name “CTU_□.” The instance name can be used as is. However, “Counter_01” is input in this example.
(To insert a function, it is not necessary to input an “instance” name.)
The instance name can be specified with up to 30 alphanumeric characters.
◊ Input a comment in the [Comment] text box as necessary.
The comment input in this text box is automatically inserted to a variable worksheet.
◊ Confirm the settings in the dialog, and then left-click the [OK] button.
The counter function block will be written as shown in the figure below.

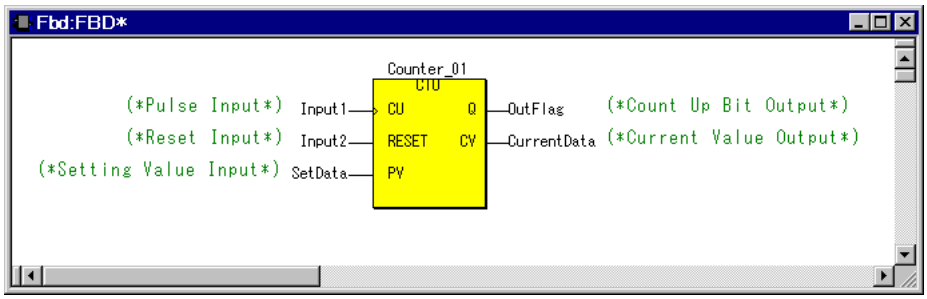
Each variable is written in the portion between “(*” and “*).” The following shows a sample description of variables.

1) Sample program to call up-counter FB (Counter_01)

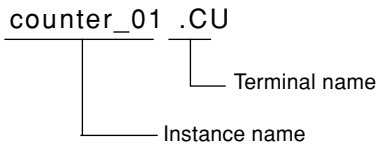


To call an IL function block, it is necessary to pass and call I/O parameters (“CAL,” “CALC,” “CALCN”).

<Reference>
The IL code explained above becomes as follows when coded in FBD language.

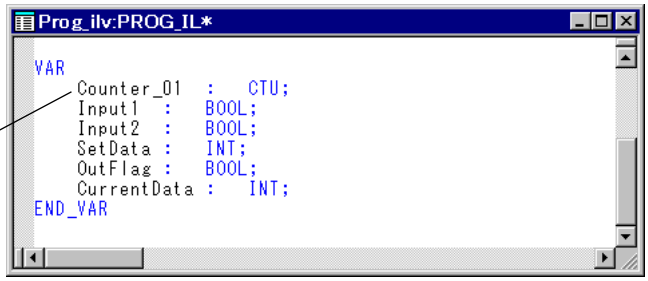


<Supplementary explanation>
“counter_01” of the input and output terminal (parameters) in the above program is the instance name while “.XX” (“.CU” in the above sample program) corresponds to the terminal name.



2) Instance declaration for up-counter FB (counter_01)
In the above sample program, “counter_01” is used for the name of up-counter FB. To use “counter_01,” instance needs to be declared in the variables worksheet, as shown below:

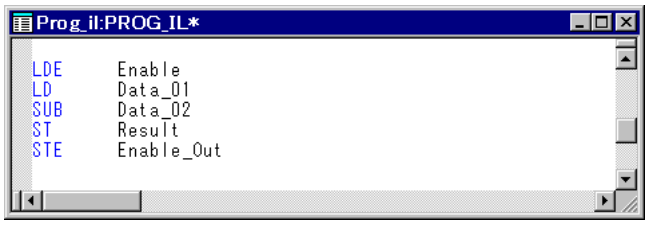
* The maximum number of characters for an instance name is 30.
  Single-byte characters: maximum 30



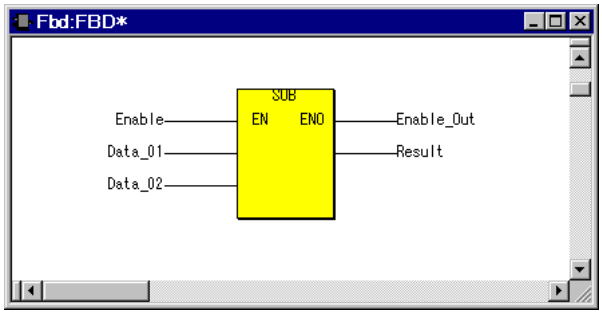
* Instance declaration is described between “VAR” and “END_VAR” in the local variables worksheet. For a detailed explanation of how to create instances, see “(1) Scope of variables” in 8-2-3.

(3) How to describe EN/ENO terminals
The following explains how to describe the “EN” and “ENO” terminals of a function in IL language.

<Description in IL language>



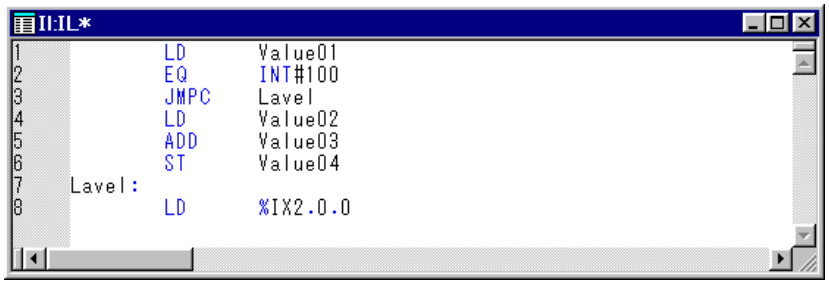
<Description in FBD language>



In FBD language, the function can be used if either EN or ENO terminal is unconnected. However, in IL language, the function must always be described between LDE and STE instructions.

“Jump” is used to jump to a specific line in the command list. For this, it is necessary to add “JMP” command as well as a label at the top of the destination.

Jump example



In this example, the jump to label “Label” occurs if Value01 is 100. When the value is not 100, jump does not occur, and “value2” is loaded.

When label is used, data type matching is not checked before or after the command. When operation is made at the jump source and the jump destination, data type matching needs to be checked.

Section 7 POU Editing in ST Language

page

Section 7 POU Editing in ST Language
7-1 Preparation for Creating ST Code

7-1-1 Introduction to ST language

A code written in ST language consists of expressions and statements. Comments can be inserted using asterisks (*) and parentheses.

1) What are expressions?

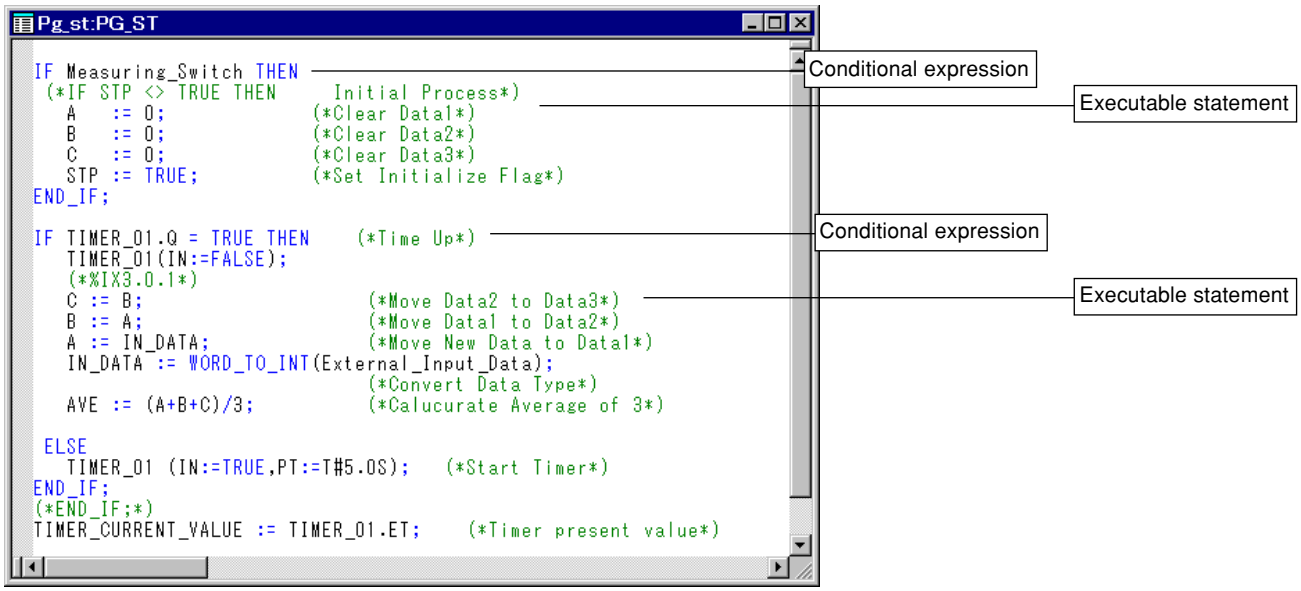
An expression is an element of a statement, namely a syntax that returns one value.

2) What is statement?

A statement consists of an operator and operand. Constant, variable, function and the calling of other expression are available for operands.

Operators and their priorities are defined in IEC 61131-3. It is necessary to consider the priority of operands when using them.

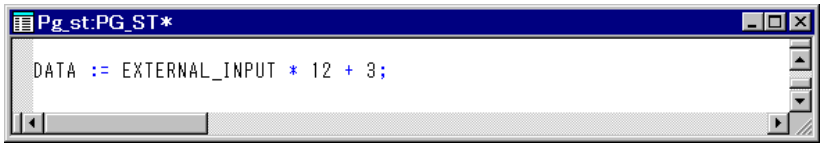
A sample ST program is shown below:



7-1-2 ST language commands and assignment statements

Assignment statement ":=" in the figure below stores the expression result on the right to the variable on the left.

Sample structure of assignment statement in ST language



For assignment statements, it is important that the data type is the same between the variable on the left and the expression on the right. Otherwise, it is necessary to make them the same data type by data type conversion.

The expression on the right consists of an operator and operand. For the operand, character, variable, function call and other expression are available. The commands that can be used with operands are listed in IEC 61131-3.

For evaluation of the expression, priority is determined according to individual operators, and they are executed according to this priority. For the priority of operators, see "INSTRUCTIONS No. FEH200".

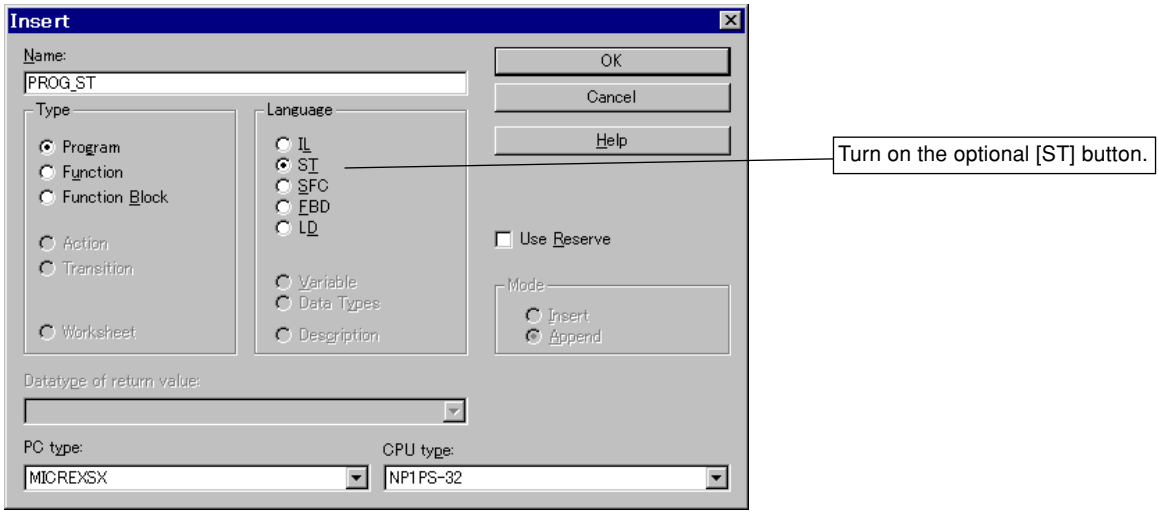
7-1-3 Inserting POUs

This paragraph describes how to insert POUs with the project tree editor.

(1) How to insert POUs

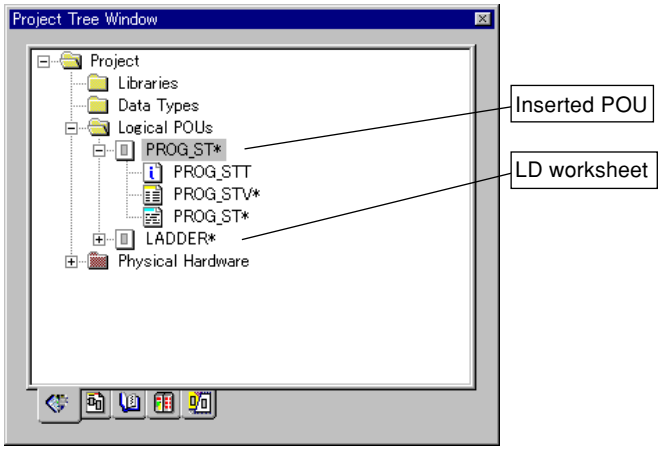
◊ Select [Logical POUs] or [POU] by left-clicking the corresponding icon in the project tree.

◊ Left-click the [Insert...] button, and the {Insert} dialog box will appear on the screen. This dialog box can also be displayed by left-clicking the [Insert] command in the shortcut menu.



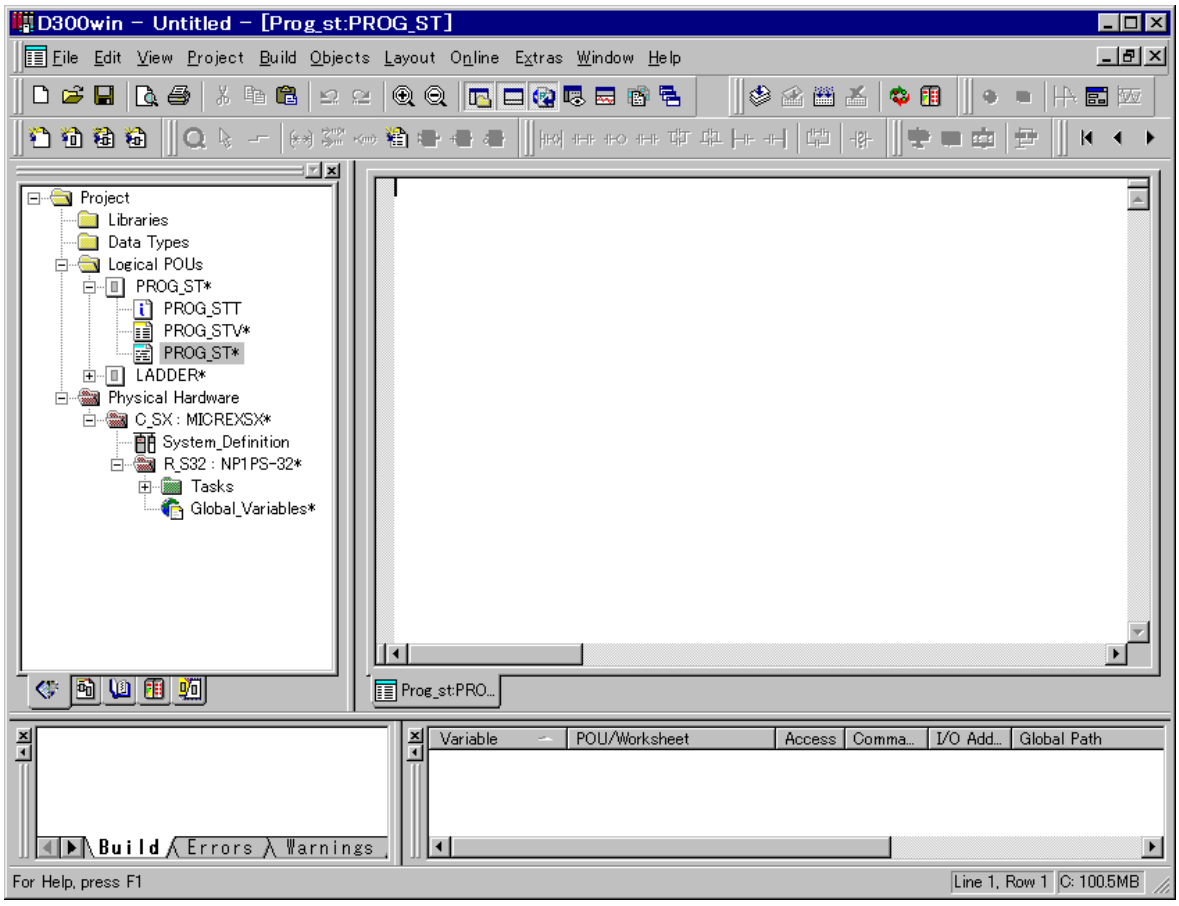
[Name] ..... Input POU name.
[Group type] ..... Specify the POU group type.
[Language] ..... Specify a language for describing codes in the POU.
[Data type of return value] ..... Specify the data type for returned values. (This item can be specified only when “Function” is specified for “Group type”.
[Use Reserve] ..... This item takes effect only when the optional [Selected POU] button is turned on in the [Use Reserve] box in the {Define CPU memory size} dialog box. “Patch POU” can be executed even when variables are newly added to the memory area assigned to reserve area.
[Mode] ..... Specify whether the new object is inserted in front of or after the selected object.
[PC type] ..... Specify the type (series name) of PC.
[CPU type] ..... Specify the type of CPU module.

◊ After setting the active items in the dialog box, left-click the [OK] button. A new POU will then be added to the project tree.



(2) Opening an LD/FBD worksheet

◊ Left-double-click the [P_LD_FBD] (LD worksheet) icon in the project tree, or right-click the icon to display the shortcut menu and then left-click the [Open Worksheet] command in the shortcut menu. The worksheet (editor) will be opened.



7-1-4 Writing ST code

The format used to create ST code is explained below.
For writing programs, there is a “format” (in which order to write symbols and expressions) which is determined grammatically, and a “style” (the arrangement of words and symbols) which the user can freely determine.

(1) Format

A sample program with an “IF THEN” statement is shown below:

<IF, THEN statement format>

The executable statement is executed when the conditional expression is “true”; it is not executed when “false.”

```
IF conditional expression THEN executable statement;
END_IF;
```

Statement
A space for one or more characters needs to be secured between the statement and the conditional expression.

Statement
A space for one or more characters needs to be secured between the statement and the executable statement.

Semicolon
Multiple statements can be written in one line. In this case, however, “;” needs to be attached at the end of each statement.

```
IF Input_A = Input_B THEN DATA := (EXT_IN + 50)/15; (*Data conversion*)
END_IF;
```

End statement
Declare the end of the “IF” statement (changes with statements).

Conditional expression
A space for one or more characters needs to be secured between the conditional expression and the statement.

Executable statement
Consists of items such as variables, operators and assignment statements.

Comment
To write a comment, “(*” and “*)” are attached at the beginning and end of the comment.

(2) Description style

The two sample programs shown below differ in their description style but are processed the same.
Thus, depending on the operation content, the line arrangement can be used to make the program more understandable.

Sample program 1

Prog_st:PROG_ST*

```
IF Input_A = Input_B THEN EXT_IN:=WORD_TO_INT(EXT_DATA); PROCESS_DATA:=(EXT_IN + 50)/15;
END_IF;
```

Sample program 2

Prog_st:PROG_ST*

```
IF Input_A = Input_B THEN
    EXT_IN:=WORD_TO_INT(EXT_DATA);
    PROCESS_DATA:=(EXT_IN + 50)/15;
END_IF;
```

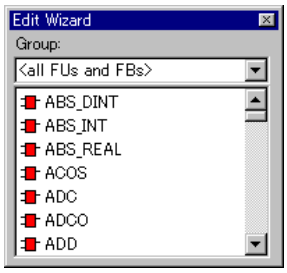
(3) Using the Edit Wizard

When programming in ST language, the coding format described in (1) must be used. However, the D300win system provides the Edit Wizard dedicated to the ST language to facilitate code editing and prevent program errors during code input.

1) Displaying the {Edit Wizard} window

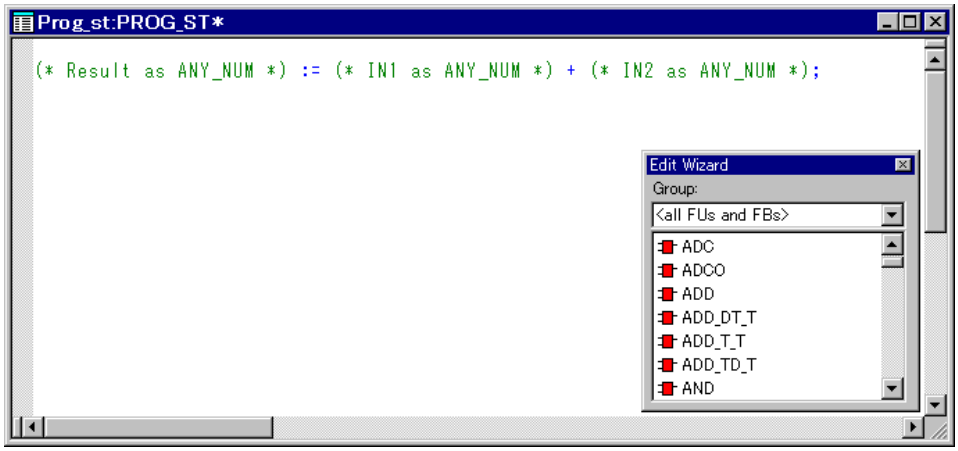
When the {Edit Wizard} window is not displayed on the screen, use the following operation to display it.

◊ Left-click the [Edit Wizard] command in the [View] menu.
The {Edit Wizard} window will appear on the screen as shown below.



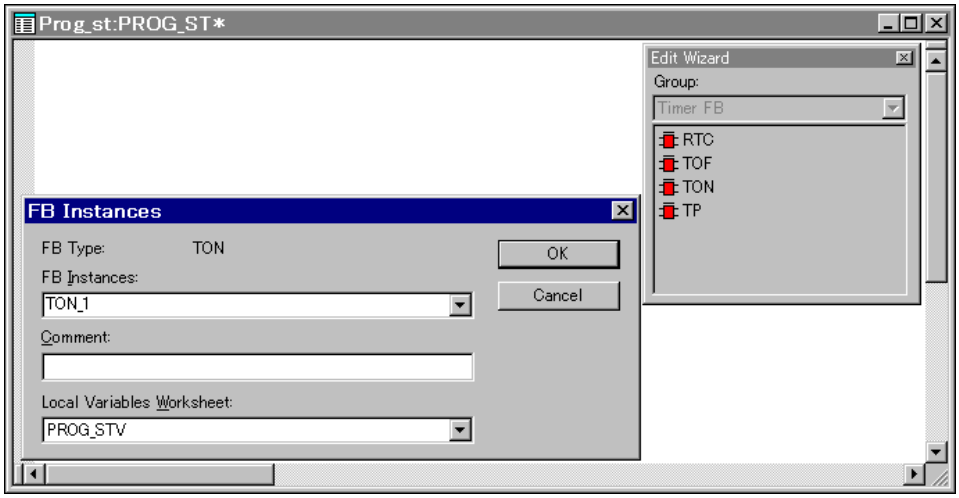
2) Sample input of function “ADD”

Left-double-click function “ADD” displayed in the {Edit Wizard} window, and the format consisting of operators, assignment statements, and comments (explaining the variable data type) is displayed in the text editor. The comments can be changed or deleted as necessary.

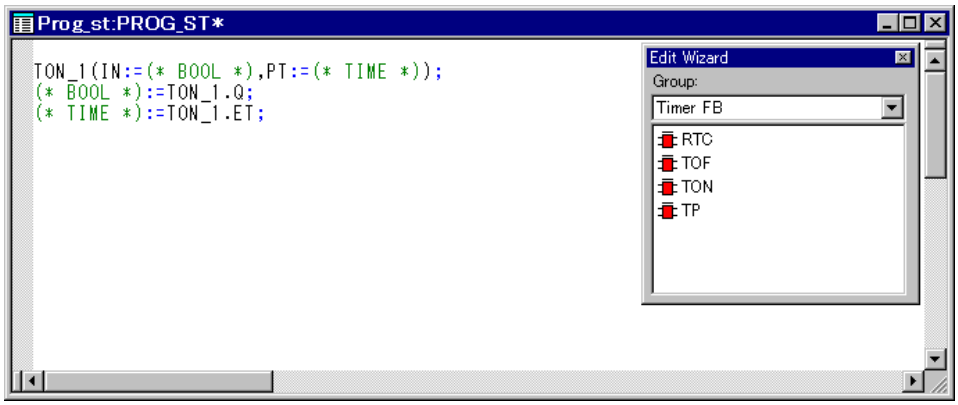


3) Sample input of function block “TON”

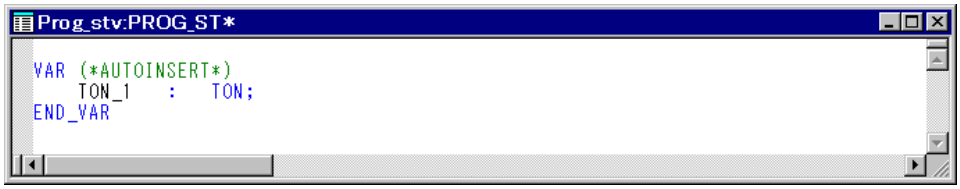
Left-double-click function block “TON” displayed in the {Edit Wizard} window, and then the {FB Instance} dialog will appear on the screen. An instance name input in the {FB Instance} dialog will be automatically inserted as “instance declaration of the function block” to a variable worksheet.



◊ Left-click the [OK] button in the {FB Instance} dialog, and the text editor will display instruction symbols, TON command call instruction, and comments (explaining the variable data type) in a total of 3 lines. The comments can be changed or deleted as necessary.



<Reference>
The content input in the {FB Instance} dialog is automatically written in a variable worksheet as shown in the figure below.

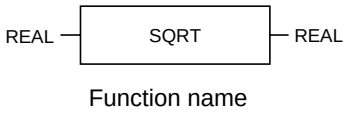
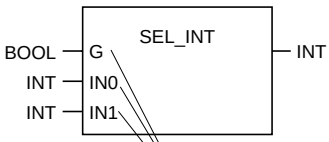


7-2 How to Use Functions/Function Blocks

Functions and function blocks (FBs) can be used with ST language. (However, functions that are the same as commands described in “7-1-3 ST operators” cannot be used. Refer to “Key-point” on the next page.)

7-2-1 How to use functions

(1) How to express functions

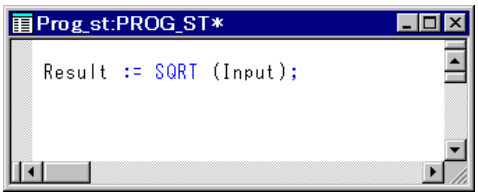
Instruction symbol	Name
Input data type Output data type  Function name	Square root SQRT
	Get left sub-string LEFT
 Some functions use terminal names.	Select SEL_INT

(2) How to program functions

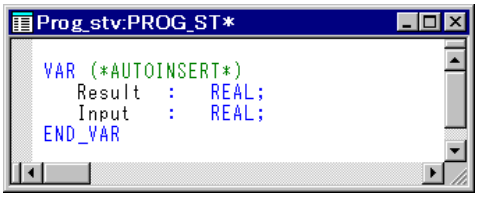
To activate an ST function as shown in the following figures, the first input is made into the result of operation until now. Then the function call command (function name), where the part following the second input is made into the operand, is described as the operator.

1) For single-input functions

Program

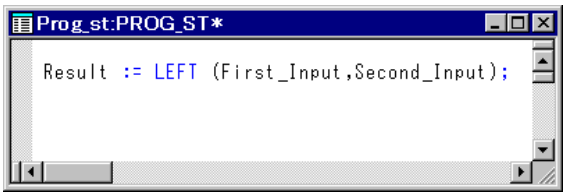


Variable declaration

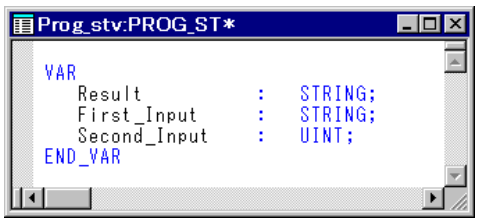


2) For 2-input functions

Program

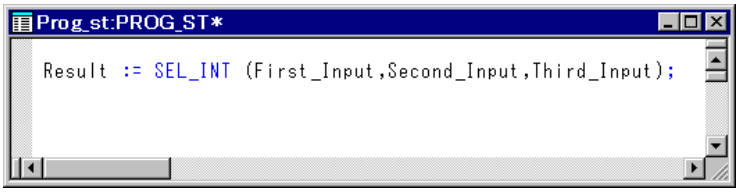


Variable declaration

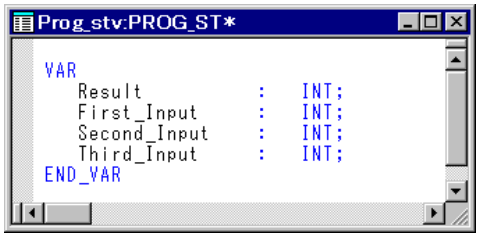


3) For 3-input functions

Program



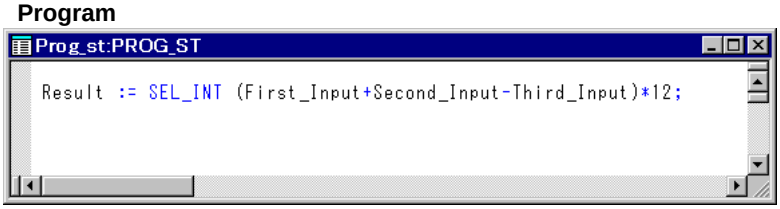
Variable declaration



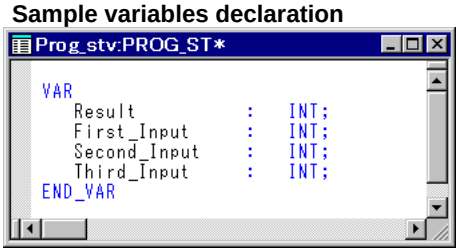
Key-point:

- Some functions work the same as commands (operators) prepared for ST language. For programming in ST language, be sure to use the operators that are prepared for ST language.
  For example, “ADD” is used for an add statement when expressed as a function, but the “+”symbol is used when expressed in ST language. Sample program and variable declaration is shown below:

Program



Sample variables declaration



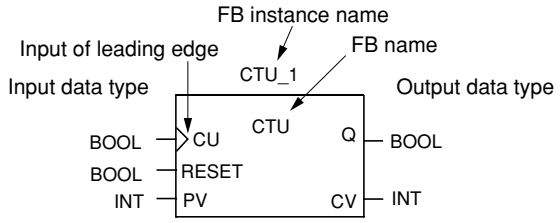
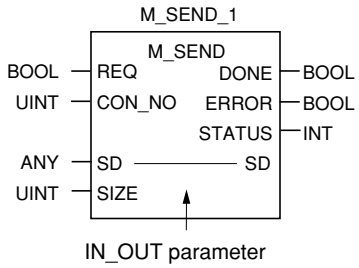
7-2-2 How to use function blocks (FB)

Function blocks are expressed in almost the same way as functions, but there are differences as shown below.

- Multiple-output commands exist.
- Edge input exists.
- The number of input terminals is fixed (cannot be expanded.)
- All input and output terminals are given a terminal name (parameter name).
- Commands including IN_OUT parameter exist.

To use function blocks, function block instances (described in the variables worksheet) need to be declared.

(1) How to express function blocks

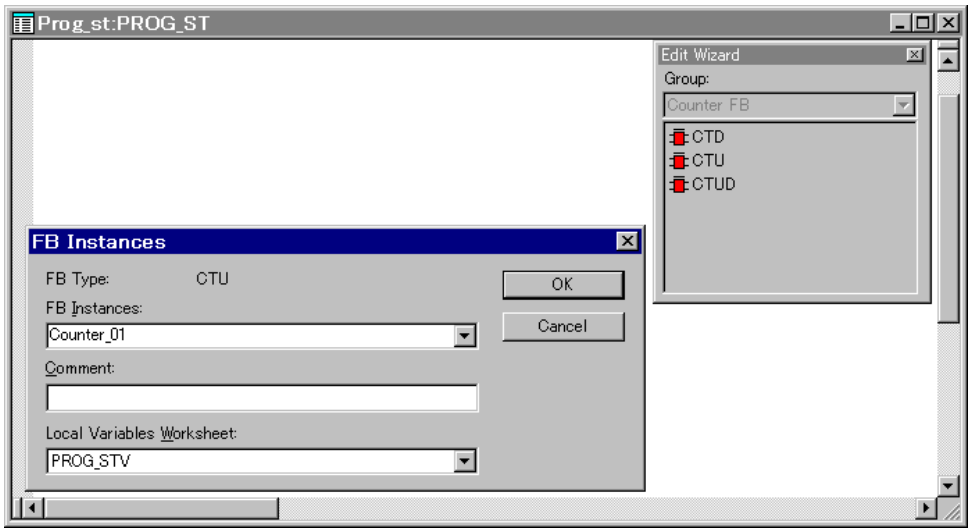
Instruction symbol	Name
	Up counter CTU
	Message transmission

(2) How to describe a function block

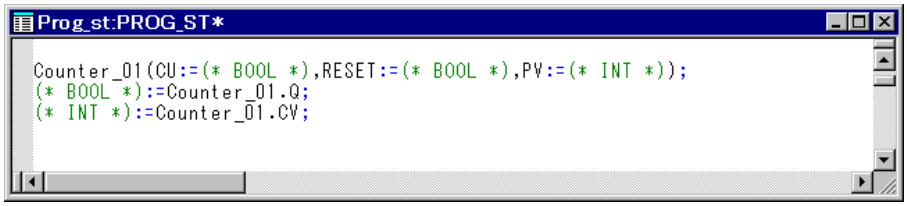
This paragraph explains how to describe the up-counter “CTU” using the Edit Wizard.

◊ Select [<all>] or [Counter FBs] from the [Group:] list box in the {Edit Wizard} window.

◊ Left-double-click [CTU] in the instruction list box.
The {FB Instance} dialog will appear on the screen.

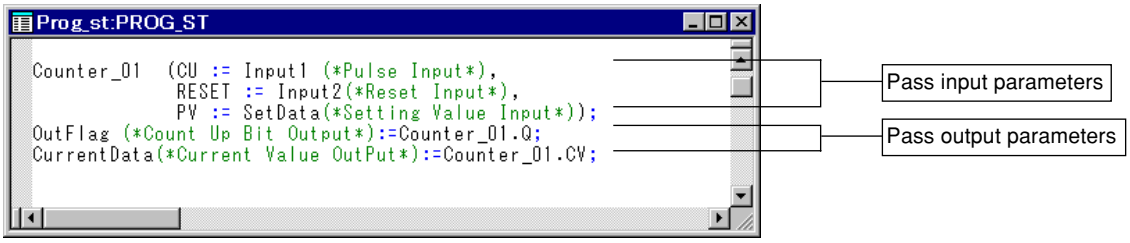


◊ The [FB Instances] text box displays instance name “CTU_□.” The instance name can be used as is. However, “Counter_01” is input in this example.
(To insert a function, it is not necessary to input an “instance” name.)
The instance name can be specified with up to 30 alphanumeric characters.
◊ Input a comment in the [Comment] text box as necessary.
The comment input in this text box is automatically inserted to a variable worksheet.
◊ Confirm the settings in the dialog, and then left-click the [OK] button.
The counter function block will be written as shown in the figure below.

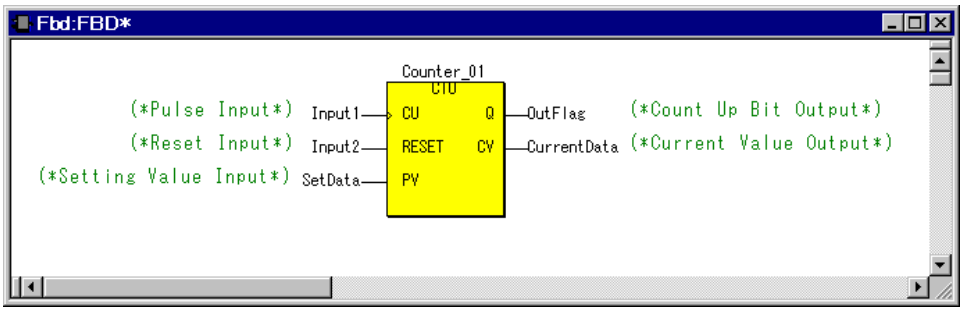


The variable is written after the operator or instruction statement with “(*” and “*).” The following shows a sample description of variables.

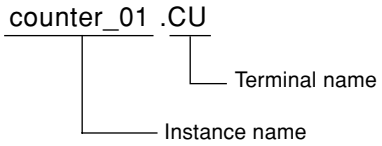
1) Sample program to call up-counter FB (counter_01)



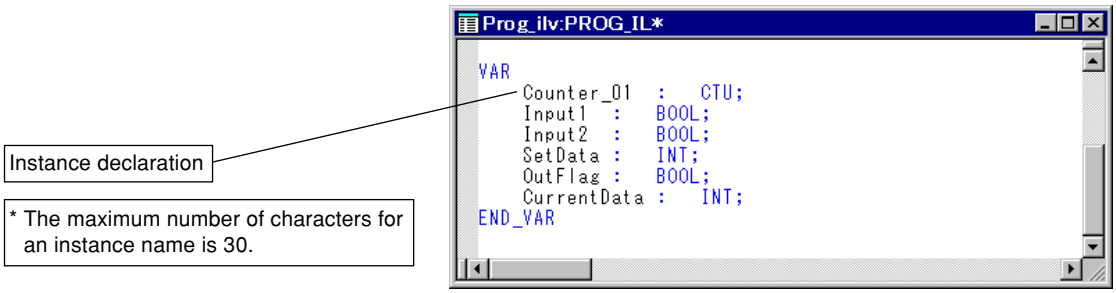
<Reference>
The IL code explained above becomes as follows when coded in FBD language.



<Supplementary explanation>
“counter_01” of the input and output terminal (parameters) in the above program is the instance name while “.XX” (“.CU” in the above sample program) corresponds to the terminal name.



2) Instance declaration for up-counter FB (counter_01)
In the above sample program, “counter_01” is used for the name of up-counter FB. To use “counter_01,” instance needs to be declared in the variables worksheet, as shown below:



* Instance declaration is described between “VAR” and “END_VAR” in the local variables worksheet. For a detailed explanation of how to create instances, see “(1) Scope of variables” in 8-2-3.

Section 8 Definition of Variables Declaration/ Derived Data

page

Section 8 Definition of Variables Declaration/Derived Data

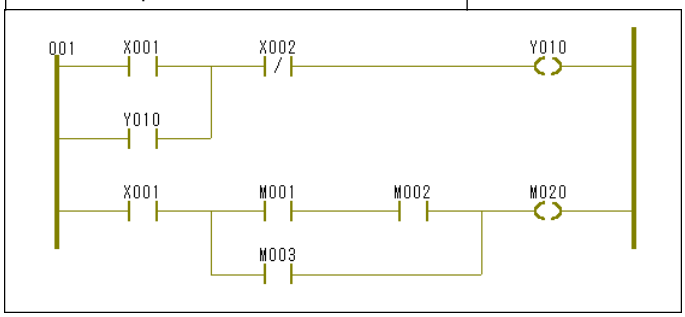
8-1 Variables Declaration

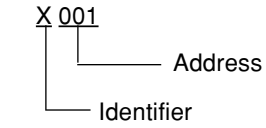
Describing code is not enough to operate a program (code) by itself. It is necessary to declare variables as well.

8-1-1 Outline of variables

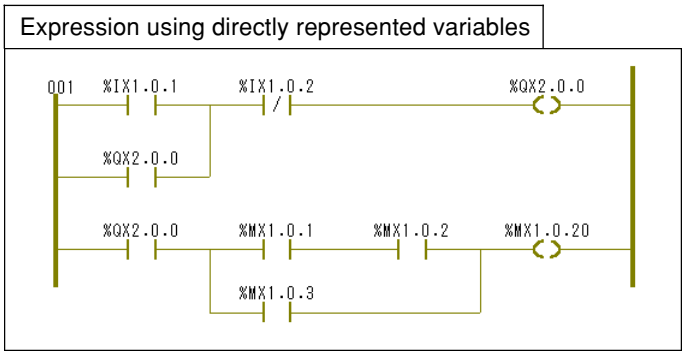
With conventional Fuji PCs, when you want to specify a memory area, the memory area is expressed by the combination of the first letter (alphabet), which indicates the area, and a number for the particular address, like “X001.”
With IEC 61131-3, while it is possible to express the real address of specific memory area by the combination of alphabet and number (directly represented variable), it is also possible to convert the real address into a more understandable character string (variable) and express the real address by using such variables. The addresses of the PC’s conventionally expressed in the ladder diagram, as in Section 1, can be expressed as follows when IEC 61131-3 language is used:

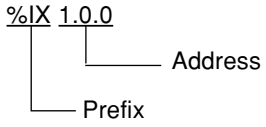
Address expression in conventional PCs





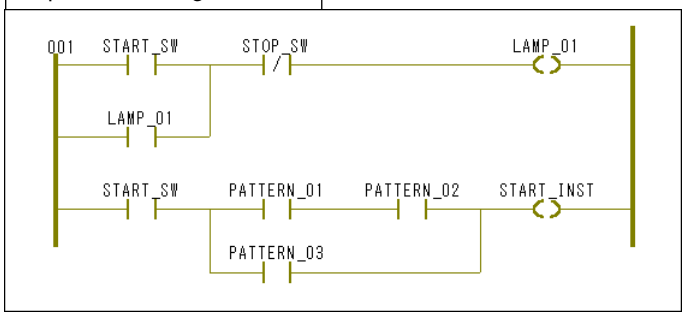
Expression using directly represented variables





For a detailed explanation of addressing, see “(2) AT specification” in 8-2-1.

Expression using variables



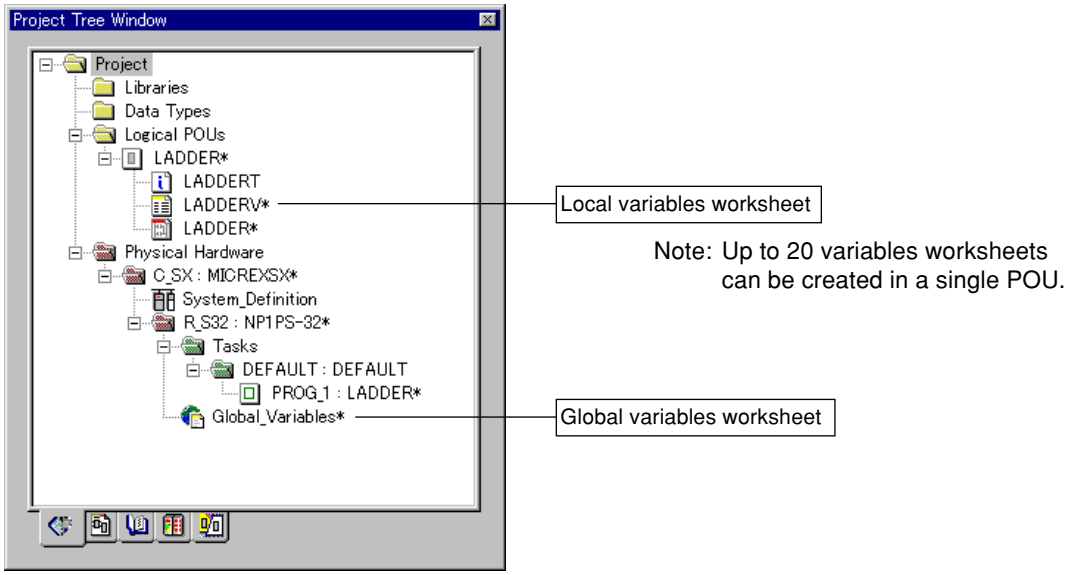
Variables declaration

```
VAR
    START_SW    AT %IX1.0.1 :   BOOL;
    STOP_SW     AT %IX1.0.2 :   BOOL;
    LAMP_01     AT %QX2.0.10 :   BOOL;
    PATTERN_01  :   BOOL;
    PATTERN_02  :   BOOL;
    PATTERN_03  :   BOOL;
    START_INST  :   BOOL;
END_VAR
```

To specify special memory areas (especially I/O areas), the following declaration is necessary.

8-1-2 How to declare variables with D300win

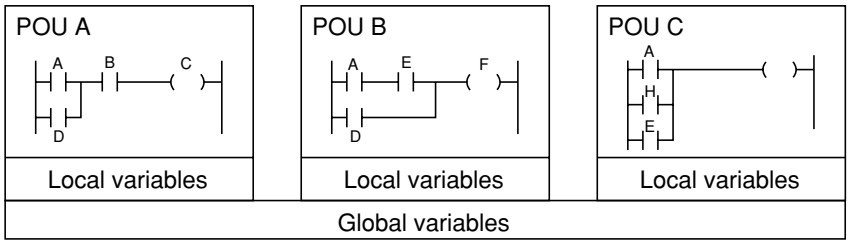
When a new project tree is created for MICREX-SX, the following project tree is displayed. In the project tree, a POU called [LADDER] is already created, and a local variables worksheet called [LADDERV] is created in this POU. This local variables worksheet is created whenever a POU is inserted. In addition, a global variables worksheet called [Global_Variables] exists under [R_32] (resource) in the [Physical Hardware] subtree.
How to declare variables with these two variables worksheets is explained below.



Note: Up to 20 variables worksheets can be created in a single POU.

<Local variables>
When variables are used only in a POU, they are declared as “VAR” in the local variable worksheet.

<Global variables>
When variables are used in the entire project, they are declared as “global variables.”
For this, they need to be declared as “VAR_GLOBAL” in the global variable worksheet, and declared as “VAR_EXTERNAL” in the POUs which use them.



<Variable declaration methods>
The following 3 methods for variables declaration are prepared for D300win:
(1) Variables declaration while editing codes —— See 8-1-3.
(2) Variables declaration by the variables editor (text editor) —— See 8-1-4.
(3) Variables declaration by the {Declaration of Variables or FB Instances} dialog box —— See 8-1-5.
A detailed explanation of individual declaration methods and how to display variables that are input from the dialog box in the text editor are given below.

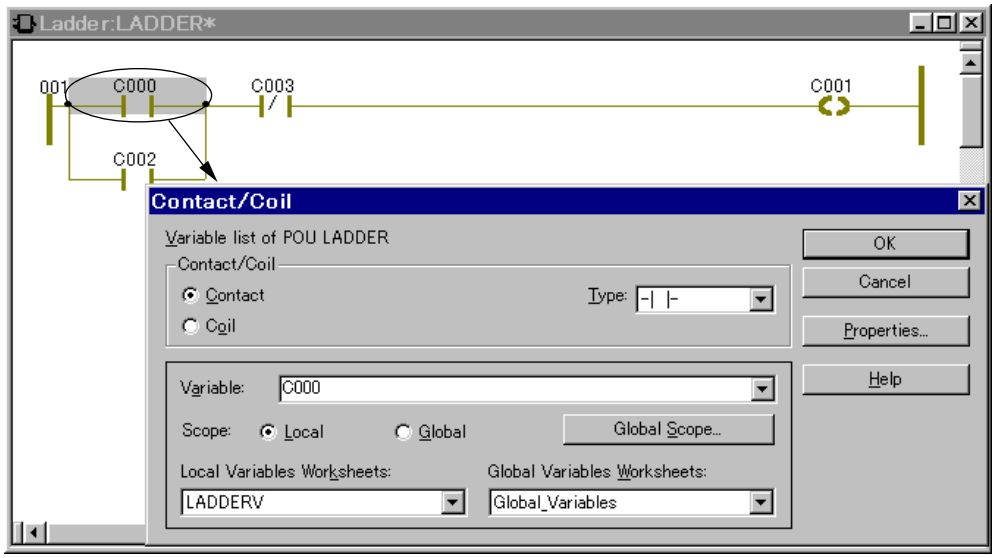
8-1-3 Variables declaration while editing codes

In order to declare or modify variables, this method activates the {Variables} dialog box or the {Automatic Variables Declaration} dialog box for declaring variables from the code worksheet and then automatically inserts the declaration content into the variables worksheet.
In this paragraph, how to activate the {Variables} dialog box and the {Automatic Variables Declaration} dialog box from the code worksheet is explained. For individual setting items in these dialog boxes, see “8-2 Content of Variables Declaration”.

How to activate the {Automatic Variables Declaration} dialog box changes depending on which programming language is used and which object is selected.

(1) When LD language is used
The method when an LD object is selected is as follows:

◊ With the cursor on the LD object (contact, coil, etc.), left-click the mouse. Alternately, left-click the [Object Properties ...] command in the shortcut menu.
The {Contact/Coil} dialog box will then appear on the screen.



<Explanation of the dialog box>

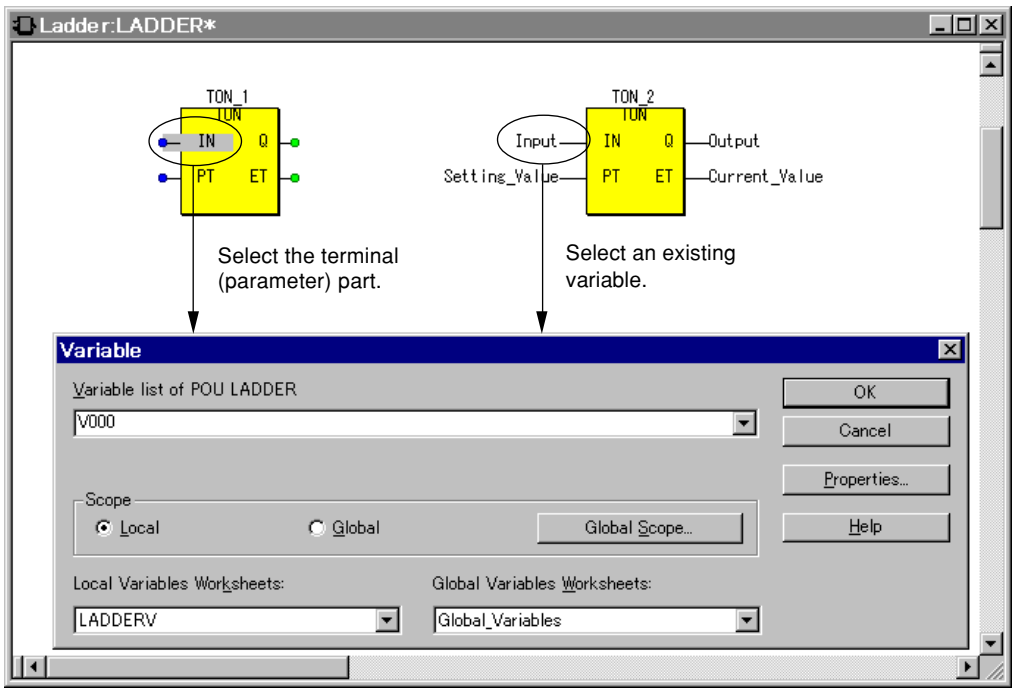
[Contact] ..... Specifies that the object is a contact.
[Coil] ..... Specifies that the object is a coil.
[Group type] ..... Specify the type of contact or coil.
[Variable:] ..... A variable name can be input or selected. The [Variable:] list box can be used only while the variable worksheet is closed.
[Scope] ..... Specify “Local” or “Global” when a local or global variable is to be inserted or declared.
When the optional [Local] button is turned on, only local variables are displayed in the list box.
When the optional [Global] button is turned on, all the global variables of the resource are displayed in the list box.
[Global Scope ...] ..... Activate the {Select Scope of Global Variables} dialog box and specify a resource for which global variables are declared.
[Local Variables Worksheets:] ..... Specify the local variables worksheet to be registered.
[Global Variables Worksheets:] ..... Specify the global variables worksheet to be registered.
[Properties ...] ..... Activate the {Automatic Variables Declaration} dialog box to declare new variable or change the properties of an existing variable.

◊Left-clicking the [Properties ...] button activates the {Automatic Variables Declaration]} dialog box.
(When a variable name is newly input or modified, left-clicking the [OK] button activates the {Automatic Variables Declaration} dialog box.)

(2) When FBD language is used

The following explains the method for connecting a variable to the input/output terminal of a function or function block.

◊ Move the mouse pointer onto the input or output terminal of a function or function block, and left-click the [Variables] button. Alternatively, right-click the input or output terminal to display the shortcut menu, and left-click the [Variables...] command in the menu.
To change an existing variable, move the mouse pointer onto the variable, and left-double-click it.
The {Variable} dialog will appear on the screen.



<Explanation of the dialog box>

[Variable list of POU LADDER] ..... Displays the variables selected from the worksheet. The variable names can be changed.
[Variable:] ..... A variable name can be input or selected.
[Scope] ..... Specify “Local” or “Global” when a local or global variable is to be inserted or declared.
When the optional [Local] button is turned on, only local variables are displayed in the list box.
When the optional [Global] button is turned on, all global variables of resources are displayed in the list box.
[Global Scope ...] ..... Activates the {Scope of Global Variables} dialog for specifying a resource for which global variables are declared.
[Local Variables Worksheets:] ..... Specify the local variables worksheet to be registered.
[Global Variables Worksheets:] ..... Specify the global variables worksheet to be registered.
[Properties ...] ..... Activates the {Automatic Variables Declaration} dialog box for setting the properties of the variable.

◊ Left-clicking the [Properties ...] button activates the {Automatic Variables Declaration]} dialog box.
(When a variable name is newly input or modified, left-clicking the [OK] button activates the {Automatic Variables Declaration} dialog box.)

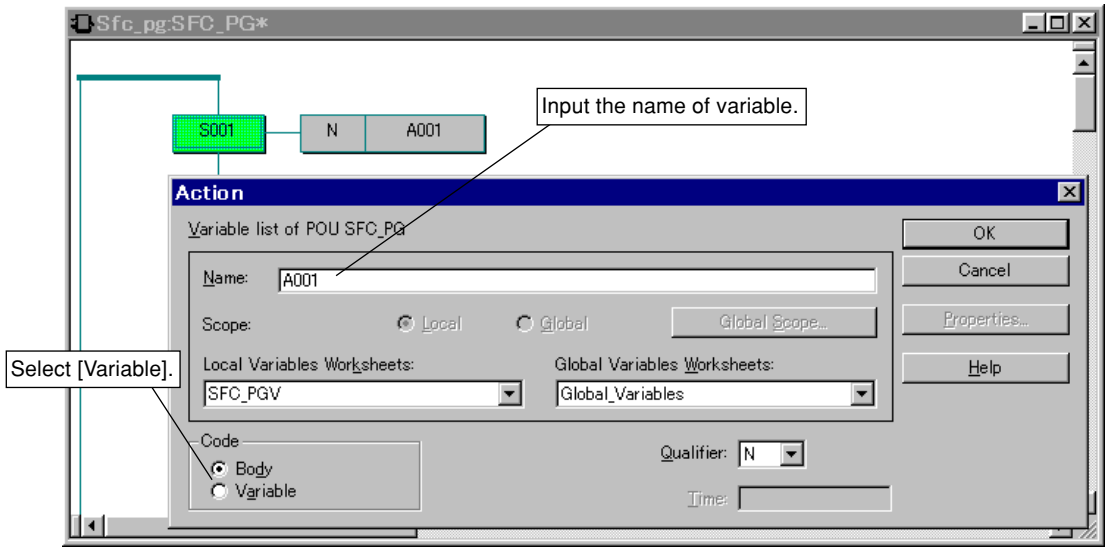
For details on operation and setting items of the {Automatic Variables Declaration} dialog, see “8-2 Content of Variable Declaration.”

---

(3) When SFC elements are used
Variable declaration for SFC elements is necessary when “variable” and “direct” are specified for action and transition, respectively. (When “body” is specified for action and transition, variable declaration is made for the program in the action code worksheet or the transition code worksheet.)

1) <Action>

◊ Move the mouse pointer onto the action, right-click to display the shortcut menu, and left-click the [Object Properties...] command.
The {Action} dialog will appear on the screen.



<Explanation of the {Action} dialog box>

[Name:] ..... Specify the name of the action with a maximum of 24 single-byte characters. When the optional [Body] button is turned on in the [Definition] box, the entry becomes the worksheet name for action code body; when the optional [Variable] button is turned on, the entry becomes the variable name.

[Scope] ..... Specify “Local” or “Global” variable. When the optional [Local] button is turned on, only local variables are displayed in the list box. When the optional [Global] button is turned on, all the global variables in the resource are displayed. These optional buttons are enabled when the optional [Variable] button is turned on in the [Definition] box.

[Global Scope ...] ..... Activates the {Resource Selection of Global Variables} dialog box to specify a resource for declaring global variables.

[Definition] ..... Specifies whether actions are to be defined by the code body or as a variable (Boolean variable).

[Properties ...] ..... Activates the {Automatic Variables Declaration} dialog box to declare new variables or to change the properties of existing variables. This button is enabled when the optional [Variable] button is turned on in the [Definition] box.

[Local Variables Worksheets:] ..... Specify the local variables worksheet to be registered.

[Global Variables Worksheets:] ..... Specify the global variables worksheet to be registered.

[Qualifier:] ..... Set the execution conditions of an action. All the action qualifiers which conform to IEC 61131-3 are available.

[Timer:] ..... Specify the execution time (intervals) of an action. This box is enabled when action qualifier “L”, “D”, “SD”, “DS” or “SL” is selected.

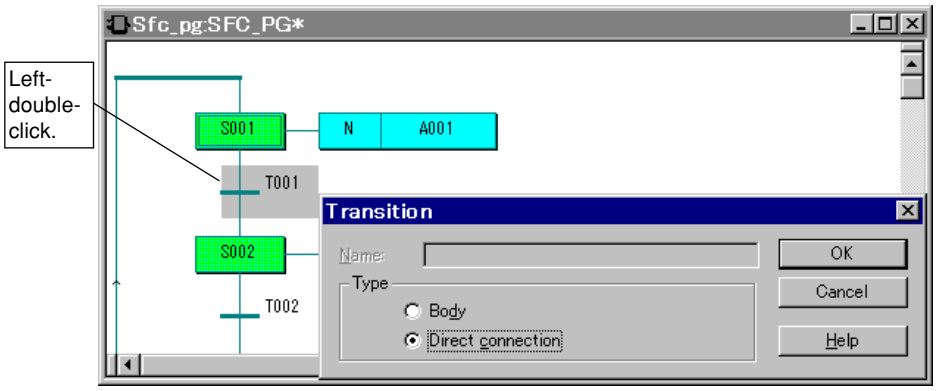
◊ If necessary, input the action name.
◊ Set other necessary items.
◊ Turn the optional [Variable] button in the [Definition] box.
◊ Left-clicking the [Properties ...] button activates the {Automatic Variables Declaration]} dialog box.
(When a variable name is newly input or modified, left-clicking the [OK] button activates the {Automatic Variables Declaration} dialog box.)

📖 For details on operation and setting items of the {Automatic Variables Declaration} dialog, see “8-2 Content of Variable Declaration.”

---

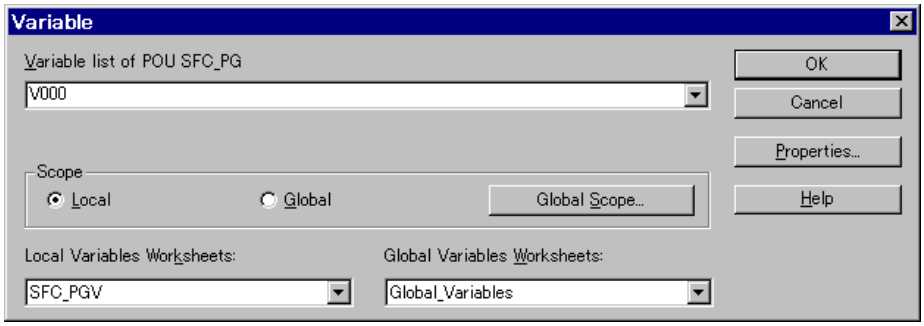
2) <Transition>

◊ Left-double-click or right-click the transition, and left-click the [Object Properties...] command in the shortcut menu.
The {Transition} dialog box appears on the screen.



◊ Check the [Direct connection] option button in the [Group type] box, and left-click the [OK] button.

◊ With the cursor positioned on the transition for which “Direct connection” is specified, left-click the mouse, and then left-click the [Variable] button. Alternately, right-click the transition, and then left-click the [Variable...] command in the shortcut menu.
The {Variables} dialog box appears on the screen.



<Explanation of the dialog box>

[Variable list of POU LADDER] ..... Displays the variables selected from the worksheet. The variable names can be changed.

[Scope] ..... Specify “Local” or “Global” variable. When the optional [Local] button is turned on, only local variables are displayed in the list box. When the optional [Global] button is turned on, all the global variables in the resource are displayed.

[Global Scope ...] ..... Activates the {Scope of global variables} dialog box for specifying a resource for which global variables declaration is to be made.

[Local Variables Worksheets:] ..... Specify the local variables worksheet to be registered.

[Global Variables Worksheets:] ..... Specify the global variables worksheet to be registered.

[Properties ...] ..... Activates the {Automatic Variables Declaration} dialog box for setting the properties of the variable.

◊ Left-clicking the [Properties ...] button activates the {Automatic Variables Declaration]} dialog box.
(When a variable name is newly input or modified, left-clicking the [OK] button activates the {Automatic Variables Declaration} dialog box.)

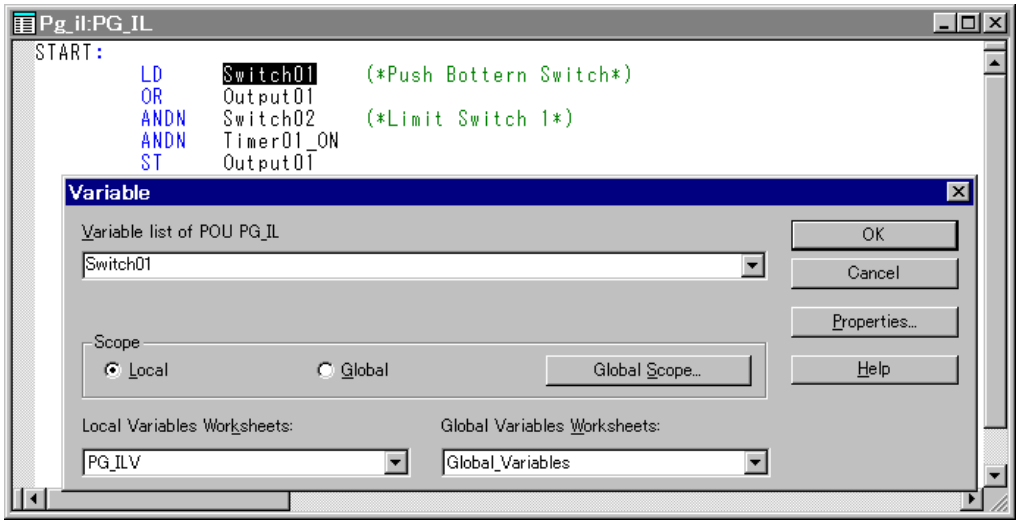
For details on operation and setting items of the {Automatic Variables Declaration} dialog, see “8-2 Content of Variable Declaration.”

---

(4) When IL language is used

◊ Left-double-click the variable to select the variable name.

◊ With the variable name selected, left-click the [Variables] button, or alternatively right-click to display the shortcut menu and left-click the [Variables...] command in the menu.
The {Variable} dialog will appear on the screen.



<Explanation of the dialog box>

[Variable list of POU LADDER] ..... Displays the variables selected from the worksheet. The variable names can be changed.

[Scope] ..... Specify “Local” or “Global” variable. When the optional [Local] button is turned on, only local variables are displayed in the list box. When the optional [Global] button is turned on, all the global variables in the resource are displayed.

[Global Scope ...]..... Activates the {Scope of global variables} dialog box for specifying a resource for which global variables declaration is to be made.

[Local Variables Worksheets:] ..... Specify the local variables worksheet to be registered.

[Global Variables Worksheets:] ..... Specify the global variables worksheet to be registered.

[Properties ...]..... Activates the {Automatic Variables Declaration} dialog box for setting the properties of the variable.

◊ Left-clicking the [Properties ...] button activates the {Automatic Variables Declaration]} dialog box.
(When a variable name is newly input or modified, left-clicking the [OK] button activates the {Automatic Variables Declaration} dialog box.)

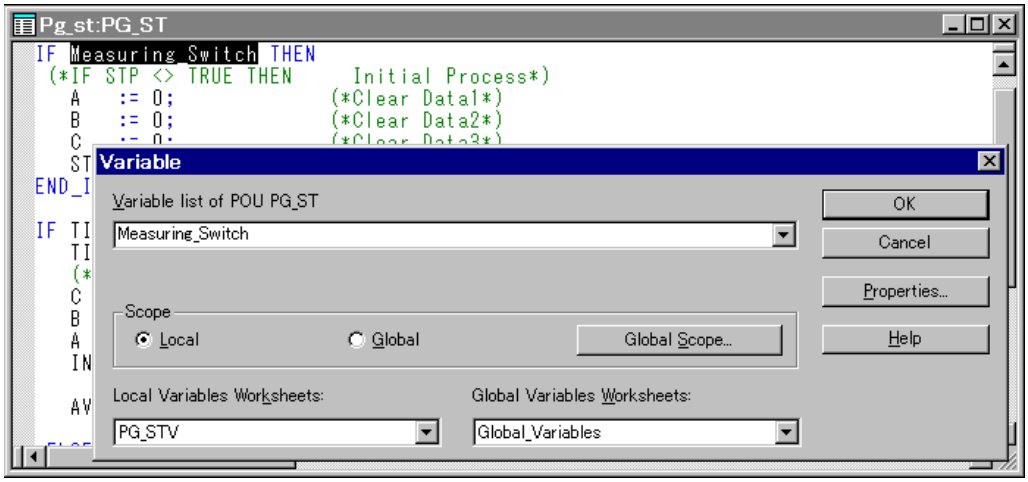
For details on operation and setting items of the {Automatic Variables Declaration} dialog, see “8-2 Content of Variable Declaration.”

---

(5) When ST language is used

◊ Left-double-click a variable in a program line, and then the variable name is selected.

◊ With the variable name selected, left-click the [Variables] button, or alternatively right-click to display the shortcut menu and left-click the [Variables...] command in the menu.
The {Variable} dialog will appear on the screen.



<Explanation of the dialog box>

[Variable list of POU LADDER] ..... Displays the variables selected from the worksheet. The variable names can be changed.

[Scope] ..... Specify “Local” or “Global” variable. When the optional [Local] button is turned on, only local variables are displayed in the list box. When the optional [Global] button is turned on, all the global variables in the resource are displayed.

[Global Scope ...] ..... Activates the {Scope of global variables} dialog box for specifying a resource for which global variables declaration is to be made.

[Local Variables Worksheets:] ..... Specify the local variables worksheet to be registered.

[Global Variables Worksheets:] ..... Specify the global variables worksheet to be registered.

[Properties ...] ..... Activates the {Automatic Variables Declaration} dialog box for setting the properties of the variable.

◊ Left-clicking the [Properties ...] button activates the {Automatic Variables Declaration]} dialog box.
(When a variable name is newly input or modified, left-clicking the [OK] button activates the {Automatic Variables Declaration} dialog box.)

For details on operation and setting items of the {Automatic Variables Declaration} dialog, see “8-2 Content of Variable Declaration.”

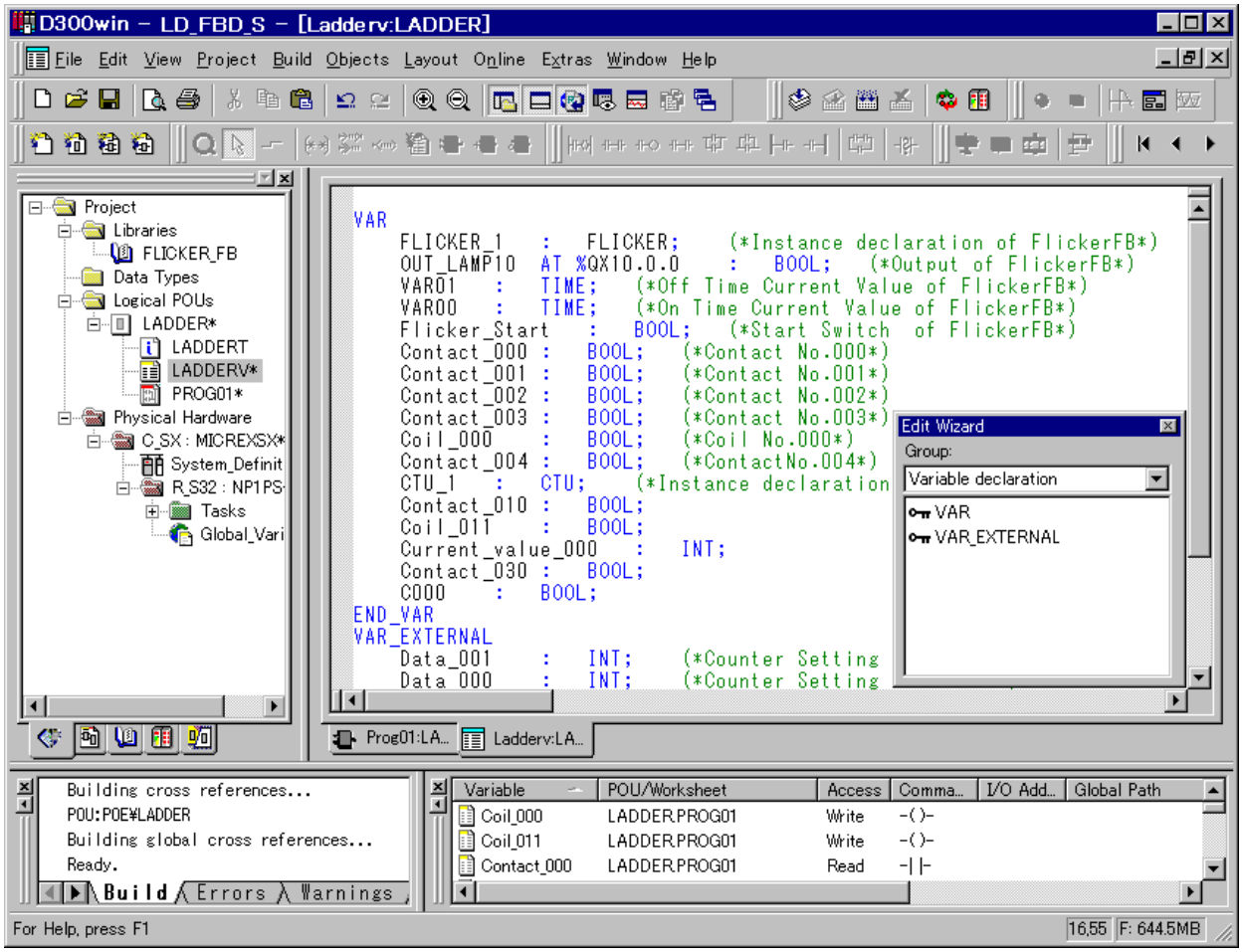
8-1-4 Variables declaration by the variables editor

The variables editor is a text editor which can edit variables declaration. It is possible to declare variables with this editor before coding.
There is no difference in basic operating method and functions between the variables editor and general text editors.

(1) Activating the variables editor

◊ Left-double-click the icon for variables worksheet under the POU in the project tree, and the variables editor will be displayed on the screen, together with the variables worksheet.

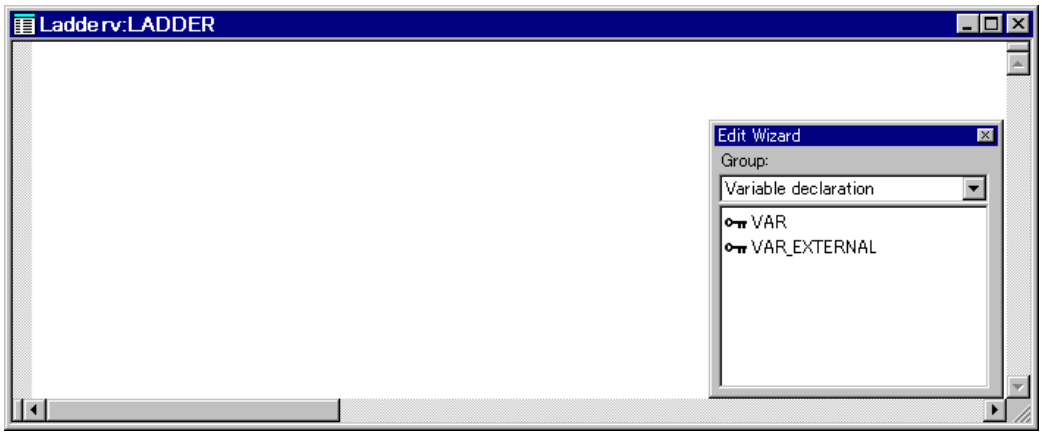
Variables editor



When text is input directly with the variables editor, use the following format. (When variables are declared with the {Variables} dialog box, texts are automatically written in the following format.

For editing the variables worksheet using both the variables editor and the {Variables} dialog box, it is recommended that you describe one variable per line when using the variables editor.

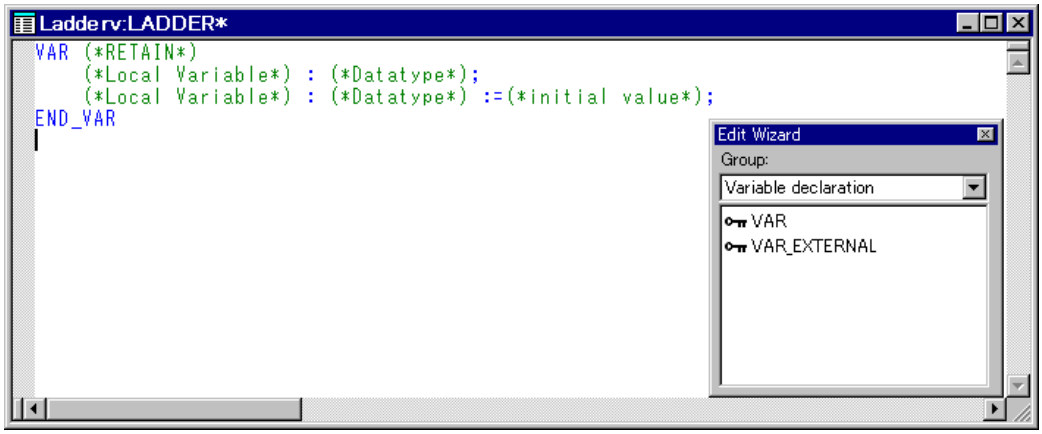
(2) Variable editor and Edit Wizard
If the [Edit Wizard] command is effective in the [View] menu, the {Edit Wizard} window for variables will appear as shown below when the variable editor is called.



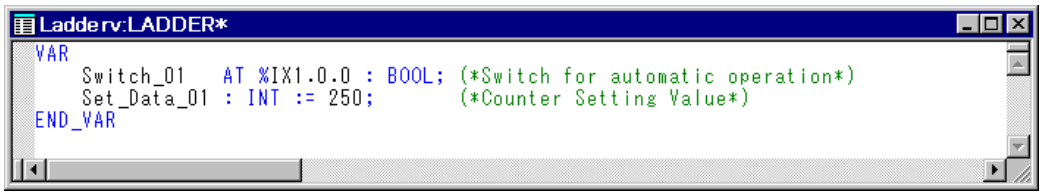
The “VAR” and “VAR_EXTERNAL” functions in the {Edit Wizard} window for variables are assigned variable formats. This will eliminate input steps and facilitate variable declaration when a proper format is unknown.

1) “VAR” action in the Edit Wizard
The “VAR” action is used to declare local variables (variables used only in one POU).

◊ Place the cursor in the variable editor, and left-double-click the [VAR] function in the {Edit Wizard} window. The variable editor will display the “VAR” ... “END_VAR” format as shown in the figure below.



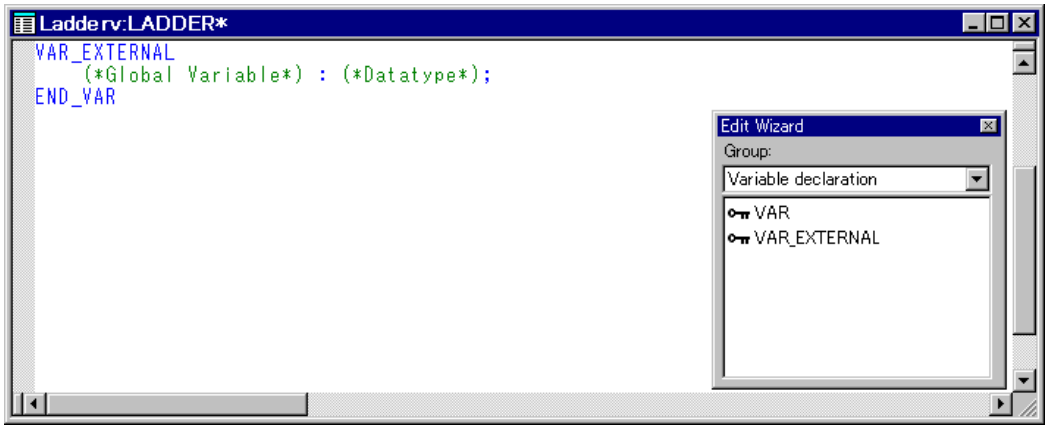
The variable declarations shown in the figure above cannot be used as is. Thus, modify them as shown below.



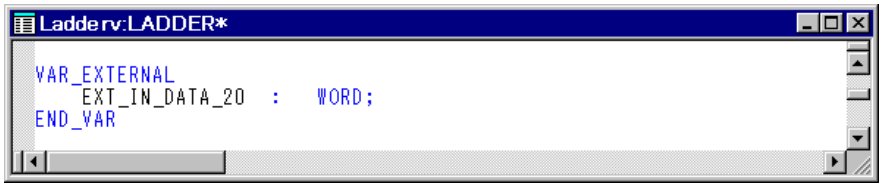
2) “VAR_EXTERNAL” function in the Edit Wizard

The “VAR_EXTERNAL” function is used to declare using global variables (registered in the global variable worksheet) in a POU.

◊ Place the cursor in the variable editor, and left-double-click the [VAR_EXTERNAL] function in the {Edit Wizard} window.
The variable editor will display the “VAR_EXTERNAL” ... “END_VAR” format as shown in the figure below.



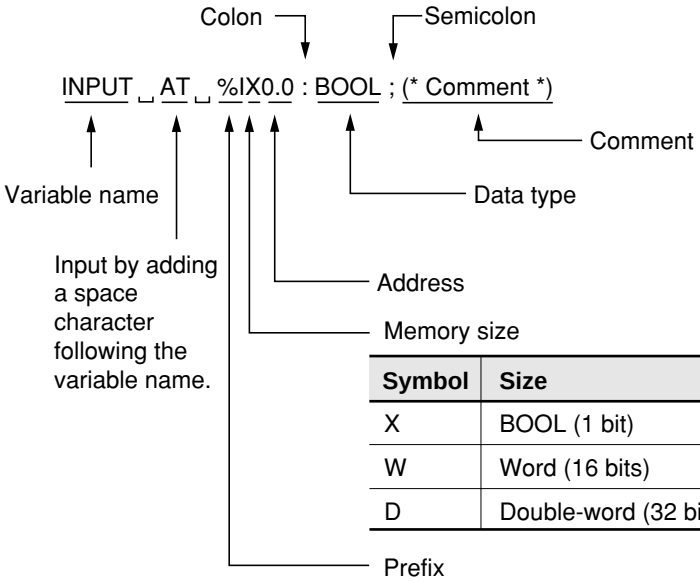
The variable declaration shown in the figure above cannot be used as is. Thus, modify it as shown below.



(3) Format for describing variables

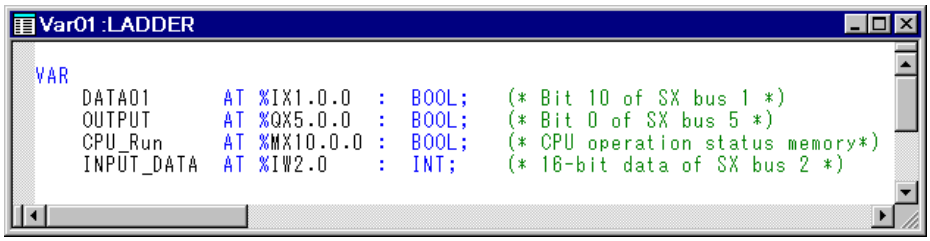
1) Directly represented variables

These variables are also called positional variables and used when the user assigns variables to physical addresses in CPU memory.



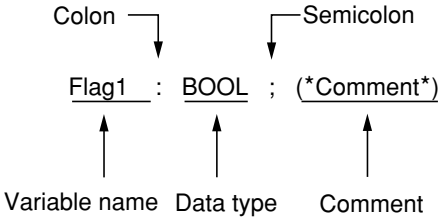
Symbol	Size
X	BOOL (1 bit)
W	Word (16 bits)
D	Double-word (32 bits)

Symbol	Meaning
%I	External input area
%Q	External output area
%M	Internal memory

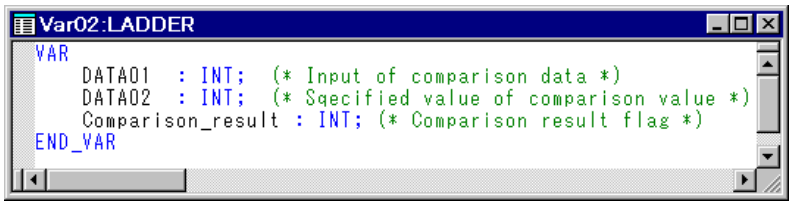


2) Symbolic variable

The symbolic variable does not designate a physical address (namely, input or output module address). It defines a memory location in which a variable value is stored. D300win automatically assigns CPU memory. The symbolic variable declaration consists of a variable keyword, variable name, and its data type as shown in the figure below.

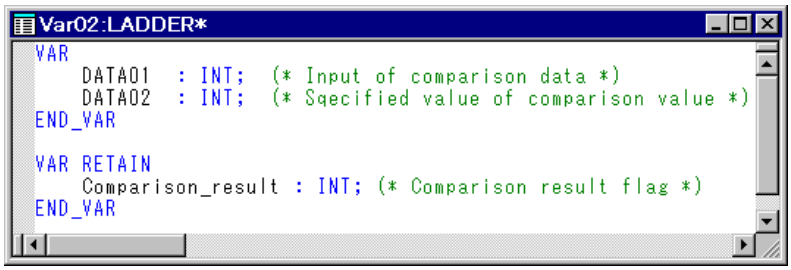


(*Input of comparison data*)
(*Specified value of comparison value*)
(*Comparison result flag*)



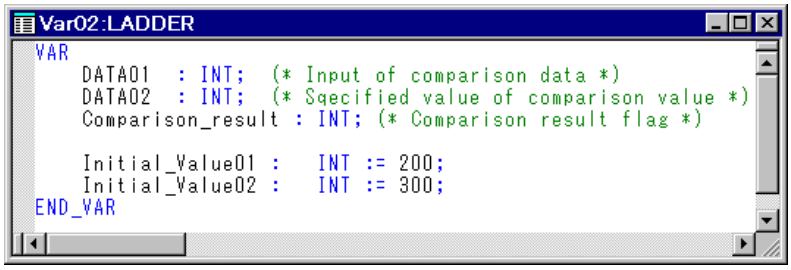
3) Retain variable
When data is declared as a retain variable, it is reset at cold run start or retained at warm run start.
The retain variable is declared by attaching the “RETAIN” statement after the “VAR” or “VAR_GLOBAL” statement. A variable declared as a retain variable is automatically assigned to the retain area of PC memory (retain memory).

<Sample retain variable declaration>

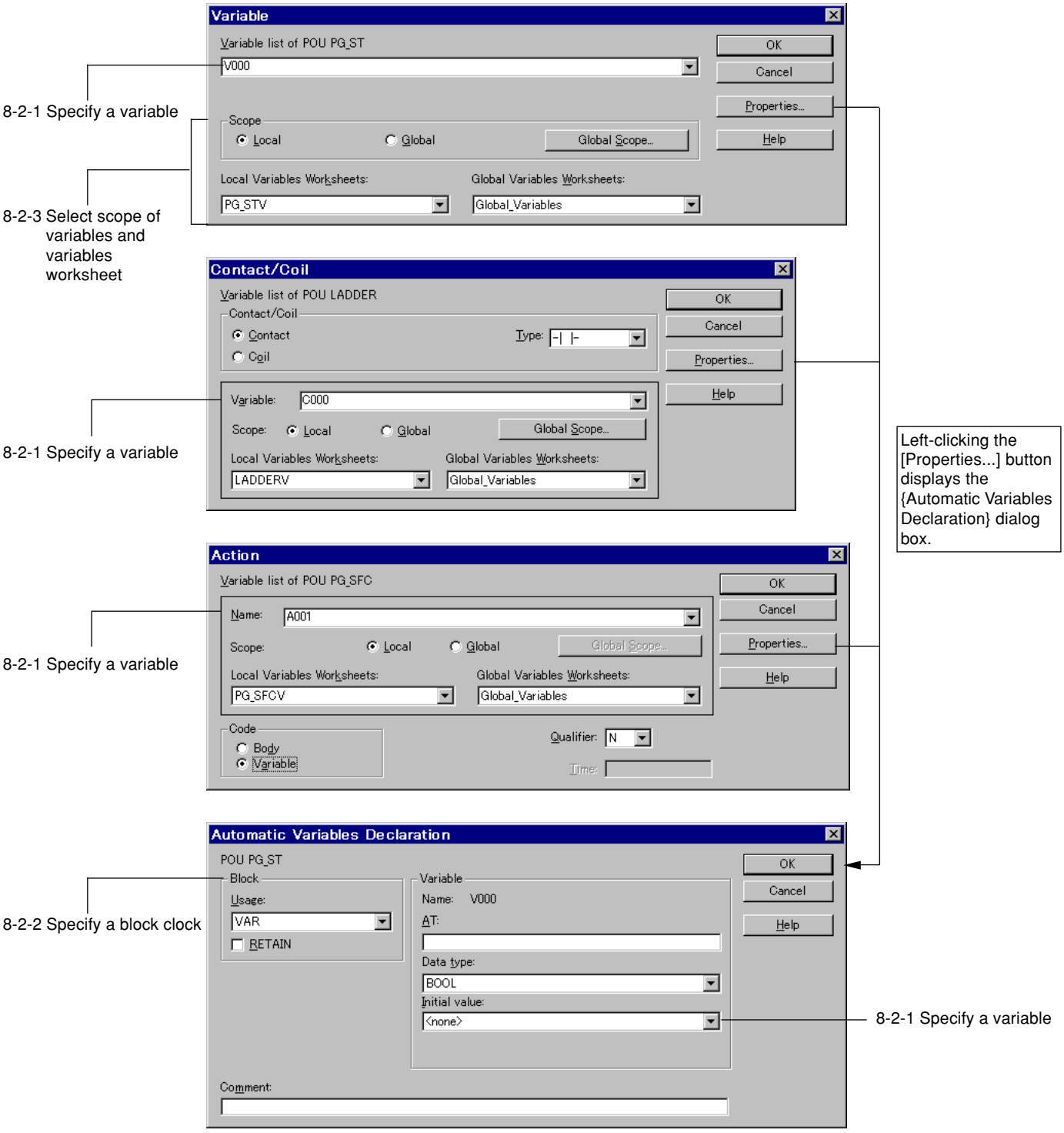


4) Initialize variable
The initialize variable enters a preset initial value to a variable used when a PC application program is started (during first scan). When a variable is specified for an initial value by “:=,” it becomes the initialize variable, which is automatically assigned to PC memory.
The initialize variable cannot be specified in the “VAR_EXTERNAL” declaration statement (global variable).

<Sample initialize variable declaration>



The dialog box used for variable declaration differs slightly depending on which language is used, but setting items and their content are the same. Setting items for the {Variables}, {Automatic Variables Declaration} and {Declaration of variables or FB instances} dialog boxes are shown below:
Explanations of the parenthesized items are given on the following pages.



8-2-1 Specification of variable

In the [Variable list of POU P_LD_FBD] box, the variable name and its attributes (directly represented variable, data type, initial value) are set.

(1) Variable name

The variable name can be input using single- and double-byte characters. Directly represented variables (%IX1.0.0, TIME#10s, etc.) can also be input. (For details, see "(2) AT specification".)
Maximum number of characters for variable name: 30 single-byte characters.

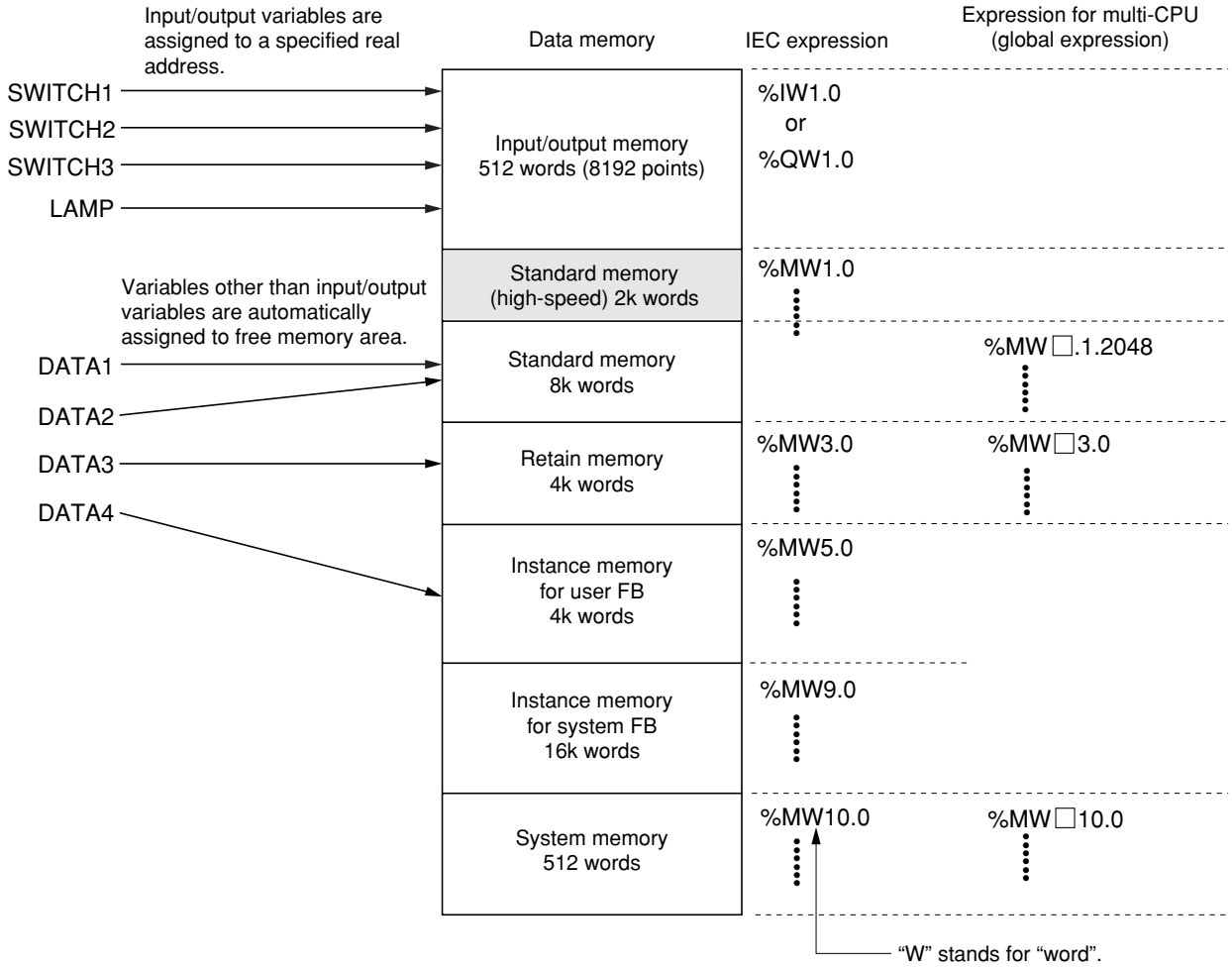
Note that the following characters cannot be used for the variable name:
\, /, :, ., ,, *, ?, ", <, >, |, and system-reserved words (for example, R, C, POE, COM, and PROGRAM)

* For details on the system-reserved word, see the Reserve Word List in the Instructions of the User's Manual <FEH200>.

(2) AT:

Specify directly represented variables.
Directly represented variables are used to specify specific memory in the PC. They are necessary especially when specifying the address of PC I/O areas (modules). When directly represented variable (AT:) is not specified (when the internal memory is used), variables are automatically and optimally assigned to the PC internal memory during compilation.
Directly represented variables are used only within the program.

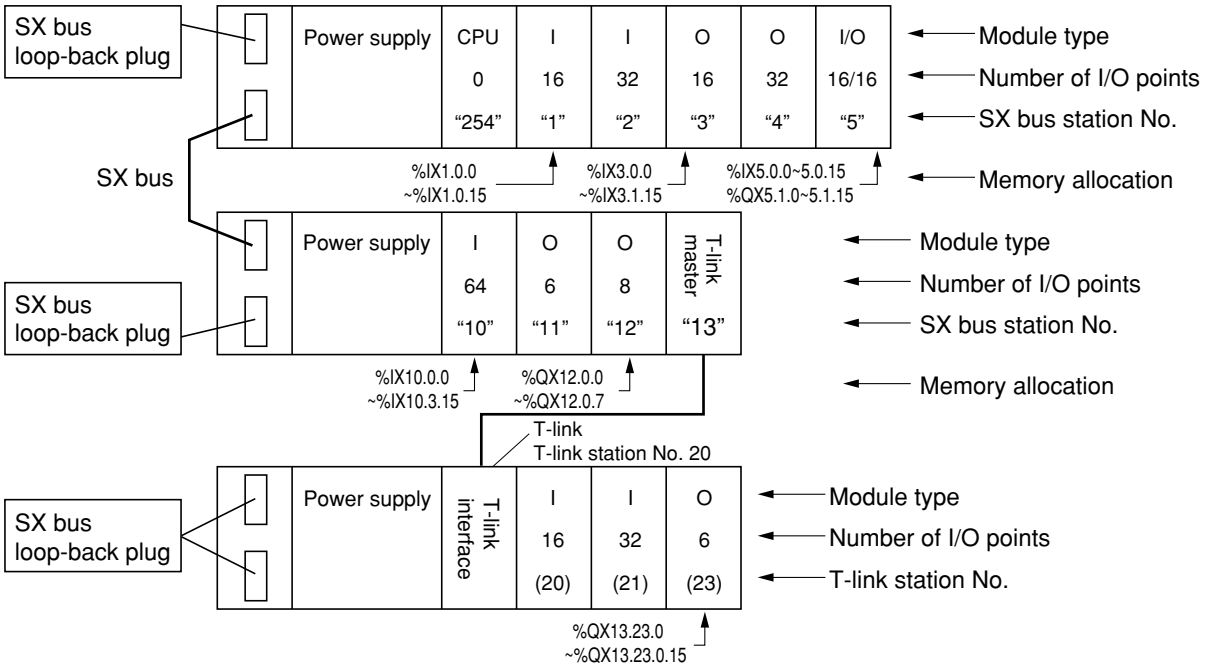
<Sample memory map>



Explanation is given using the memory map (default values) for the high-performance CPU module (NP1PS-32) as an example.
For a detailed explanation of individual memory, see the INSTRUCTION No. FEH200 volume.

<PC memory allocation>
A sample system configuration and memory map when MICREX-SX series high-performance CPU (NP1PS-32) is used as well as how to specify directly represented variables for I/O areas are explained next.
The assignment of input/output addresses is explained using the system configuration shown in the figure below for example.

<System configuration>



1) Address table
The table below shows the memory allocation for the I/O modules in the above system configuration.

<I/O address on SX bus expansion>

SX bus station No.	Module type	I/O points	Word address in SX bus station	Size	I/O address
1	I	16	0	X	%IX1.0.0~%IX1.0.15
				W	%IW1.0
				D	Unused
2	I	32	0~1	X	%IX2.0.0~%IX2.1.15
				W	%IW2.0~%IW2.1
				D	%ID2.0
3	O	16	0	X	%QX3.0.0~%QX3.0.15
				W	%QW3.0
				D	Unused
4	O	32	0~1	X	%QX4.0.0~%QX4.1.15
				W	%QW4.0~%QW4.1
				D	%QD4.0
5	I	16	0	X	%IX5.0.0~%IX5.0.15
				W	%IW5.0
				D	Unused
	O	16	1	X	%QX5.1.0~%QX5.1.15
				W	%QW5.1
				D	Unused

<I/O address on SX bus expansion>

SX bus station No.	Module type	I/O points	Word address in SX bus station	Size	I/O address
10	I	64	0~3	X	%IX10.0.0~%IX10.3.15
				W	%IW10.0~%IW10.3
				D	%ID10.0~%ID10.1
11	O	6	0	X	%QX11.0.0~%QX11.0.5
				W	%QW11.0
				D	Unused
12	O	8	0	X	%QX12.0.0~%QX12.0.7
				W	%QW12.0
				D	Unused

<I/O address on T-link interface>

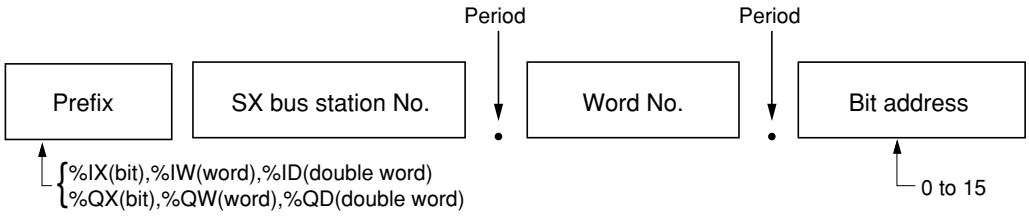
SX bus station No.	T-link station	Module type	I/O points	Word address in SX bus station	Size	I/O address
13	20	I	16	0	X	%IX13.20.0.0 ~%IX13.20.0.15
					W	%IW13.20.0
					D	Unused
	21	I	32	0~1	X	%IX13.21.0.0 ~%IX13.21.1.15
					W	%IW13.21.0 ~%IW13.21.1
					D	%ID13.21.0
	23	O	16	0	X	%QX13.23.0.0 ~%QX13.23.0.15
					W	%QW13.23.0
					D	Unused

As indicated in the “I/O address” column, the address expressed from the users’ standpoint becomes as follows:

2) Addressing rules

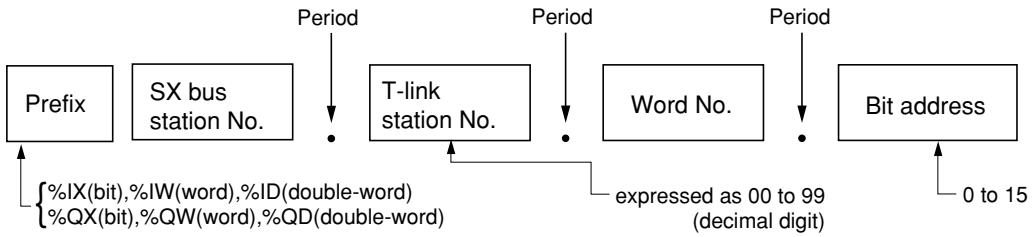
<Rules for addressing on SX bus>

For SPH, I/O addresses are assigned according to the following rules.



<Addressing on T-link>

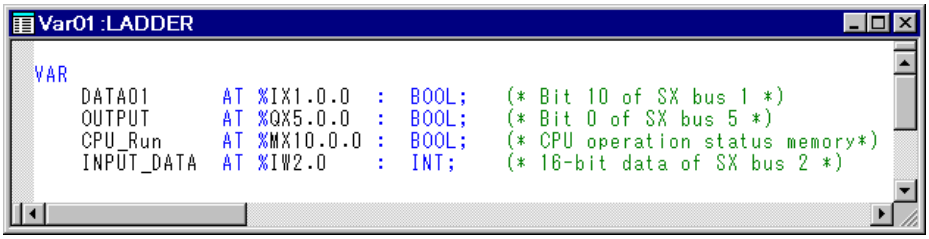
For SPH, I/O’s on a T-link are allocated in the same I/O area on the SX bus.
The applicable addressing rules are as follows.



Key-point:

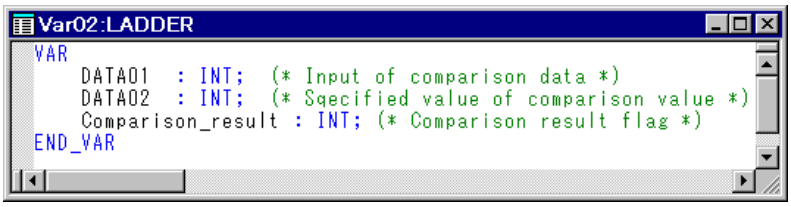
- Bit address is not needed in word expression and double-word expression.
- It is impossible to use double-word expression about 16 point or under I/O modules.
- Double-word expression for 64 point I/O module is as follows.
  Example: In the case of the third slot in the above figure (64 point input module):
  %ID3.0: %IX3.0.0 to %IX3.1.15 (Total 32 bits)
  %ID3.2: %IX3.2.0 to %IX3.3.15 (Total 32 bits)

<Sample declaration of directly represented variables with the variables editor>



* Becomes symbolic variable when not specified by “AT:”.

Symbolic variables are variables for which no physical address (specifically, the address of input and output modules) is specified. Symbolic variables define the location of memory for storing variable values.
D300win automatically performs the processing for such memory allocation.
Symbolic variables declaration consists of variable keyword, variable name and data type, as shown in the figure below:



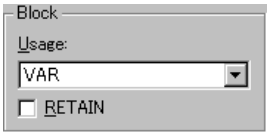
(3) Data type
Specify a keyword for data type. The basic data types defined in IEC 61131-3 and the derived data types created by the user can be specified. The keywords shown in the following table are specified for basic data types. Note that the keywords to be used depend on the PC or program command (function, function block) used. For how to register derived data types, see “8-3 Declaration of Derived Data”.

No.	Keyword	Data type	No. of bits	Value range
1	BOOL	Boolean	1	0 or 1
2	INT	Integer	16	– 32,768 to 32,767
3	DINT	Double integer	32	– 2,147,483,648 to 2,147,483,647
4	UINT	Unsigned integer	16	0 to 65,535
5	UDINT	Unsigned double integer	32	0 to 4,294,967,295
6	REAL	Real	32	$-2^{128} < N \leq -2^{-126}$, 0, $2^{-126} \leq N < 2^{128}$
7	TIME	Duration	32	0ms to 4,294,967, 295ms (0ms to 49 days, 17:02:47.295s)
8	DATE	Date	32	January 1st, 1970 to February 6th, 2106
9	TOD	Time of day	32	0:00:00 to 23:59:59
10	DT	Date and time of day	32	January 1st 0:00:00, 1970 to February 6th 6:28:15, 2106
11	STRING	Variable-length character string	–	–
12	WORD	Bit string of length 16	16	16#0000 to 16#FFFF (Note)
13	DWORD	Bit string of length 32	32	16#00000000 to 16#FFFFFFFF (Note)

For details on the data type, see the Instructions of the User’s Manual <FEH200>.

8-2-2 Specification of block

This [Block] box is used to set the type of variable (keyword) and retained variable.



(1) Usage

For variables declaration, fixed structure and variable declaration keywords (statement) are used. Available keywords and their meaning and scope are shown below.

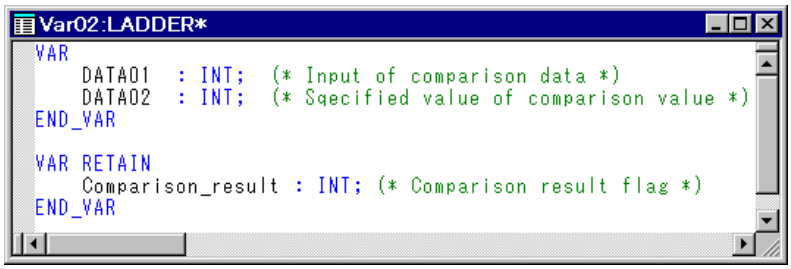
Keyword	Variable type and description
VAR	• For declaring internal variables which are used only in the POU. • Used to declare directly represented variables. • Used to declare instances for function blocks.
VAR_INPUT	• For internal variables which are used only in the POU of a function or function block. Used to declare a temporary input parameter (input terminal). • Can be used only for declaring symbolic variables. • Reading of the value of the variables declared by VAR_INPUT is limited within the same POU (function or function block). Writing of the value is disabled.
VAR_OUTPUT	• For internal variables which are used only in the POU of a function block. Used to declare a temporary output parameter (output terminal). • Can be used only for declaring symbolic variables. • Reading and writing of the value of the variables declared by VAR_OUTPUT are limited within the same POU (function block).
VAR_IN_OUT	• For internal variables which are used only in the POU of a function block. Used to declare a temporary I/O parameter (I/O terminal). (Normally used when handling complicated data types such as string, array and structured data.) • When the variable is referenced, its address is passed. • Can be used only for declaring symbolic variables. • Reading and writing of the value of the variables declared by VAR_IN_OUT are limited within the same POU (function block).
VAR_EXTERNAL	• When variables declared by the following VAR_GLOBAL are used in a POU, this variable declaration is made. • Value is given by the VAR_GLOBAL declaration but can be changed in a POU. • Can be used only for declaring symbolic variables.
VAR_GLOBAL	• Used for a global variable declaration which is valid in all programs and all function blocks of a project. • Can be used for the declaration of directly represented variables.
END_VAR	• Used to declare the end of a variable declaration.

For variable declaration, in addition to these keywords, 3 keywords (RETAIN for retaining variable, for initial value variable, and AT necessary for directly represented variable) can be used.

The structure of the variable declaration changes according to the variable type. Variable declaration is made using the variable worksheet for an individual POU, or the variable worksheet for a global variable.

(2) RETAIN
Retained variables. When the [RETAIN] box is checked, the variable is declared as a retained variable. And when declared as a retained variable, the data is reset when cold operation is started, and retained during warm operation.
A retained variable is declared by adding the “RETAIN” statement following the “VAR” or “VAR_GLOBAL” statement. Variables declared as retained variables are automatically assigned to the retained memory.

<Sample display with the variables editor>
Sample declarations of local, global and retained variables are shown below:

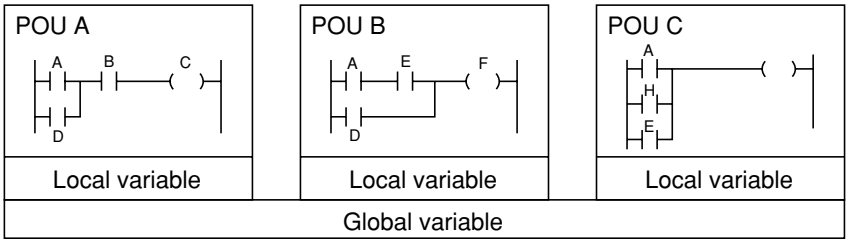


8-2-3 Selecting the scope of variables and the worksheet

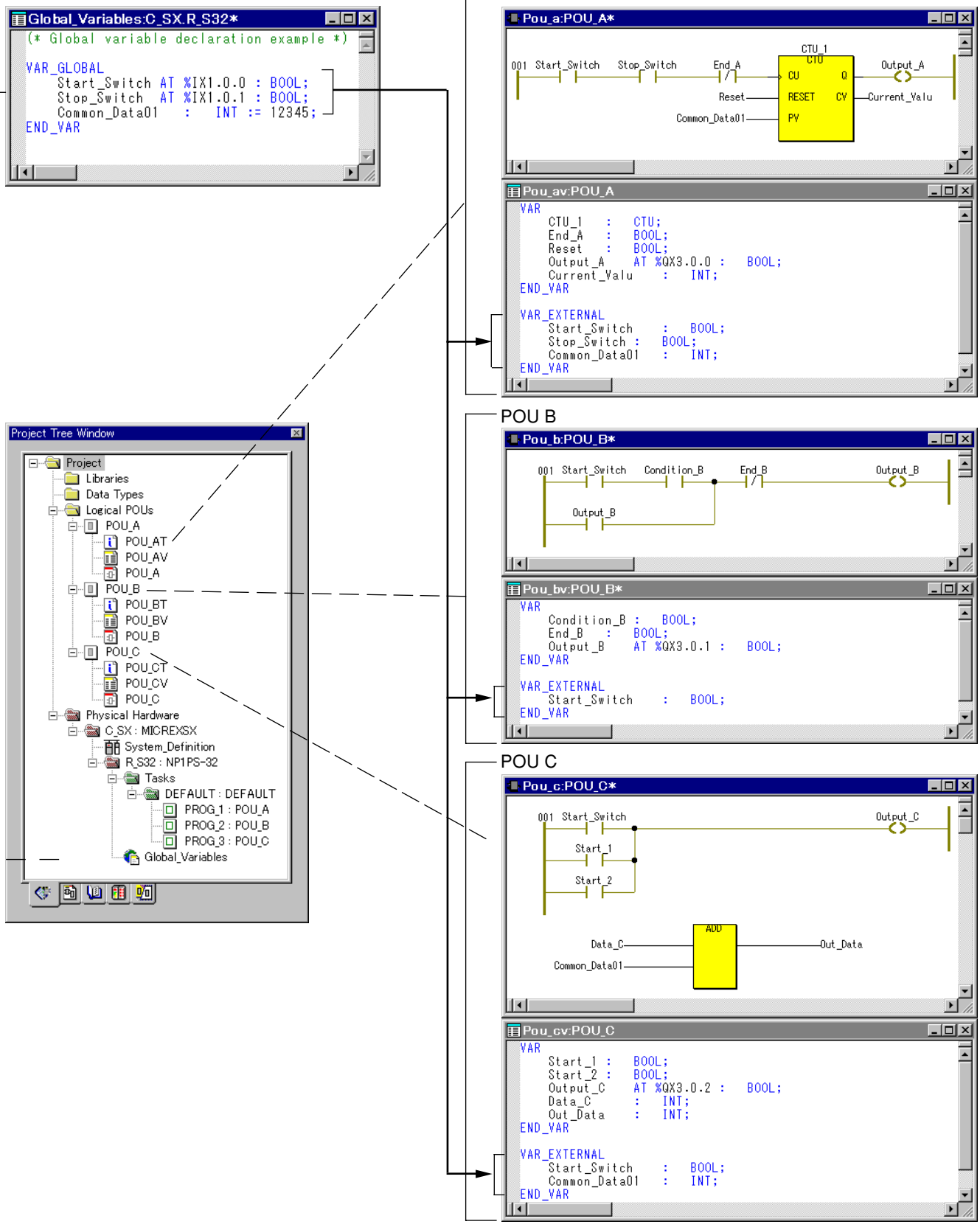
(1) Scope of variables
The content of settings made below determines whether or not to make the scope of individual variables effective for only the POU or for the entire project.

1) Local variables
When variables are used only in a POU, they are declared as local variables.
When used in different POUs, the same local variable names can be used.

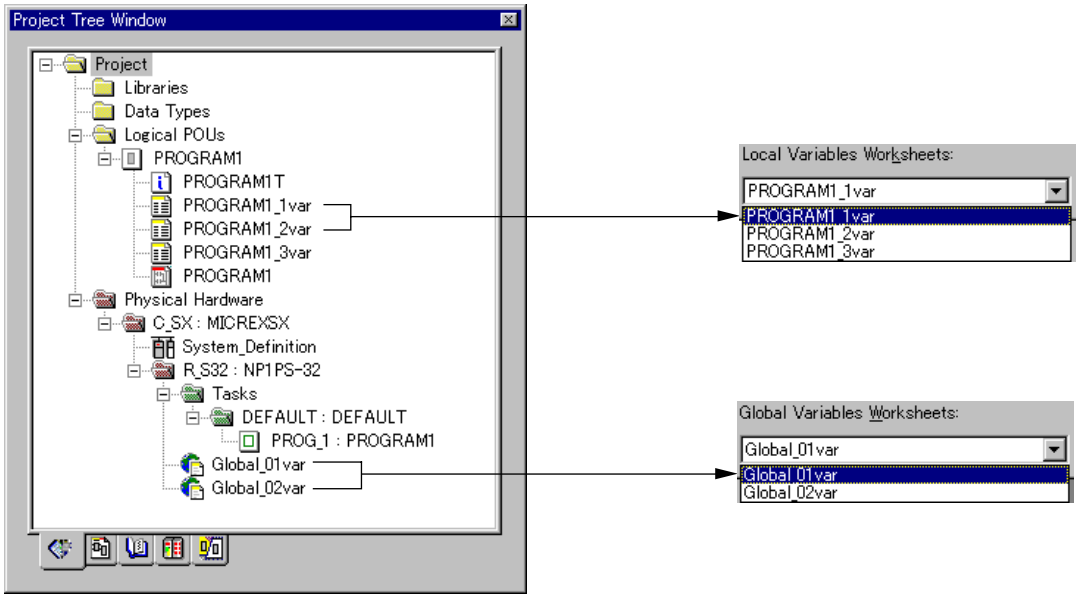
2) Global variables
When variables are used in the entire project, they are declared as global variables. For this, they need to be declared not only as “VAR_GLOBAL” in this worksheet but also as “VAR_EXTERNAL” in individual POUs that use them. Such variables are referred to as “global variables”.



<Sample declarations of local variables and global variables>
Global variables worksheet

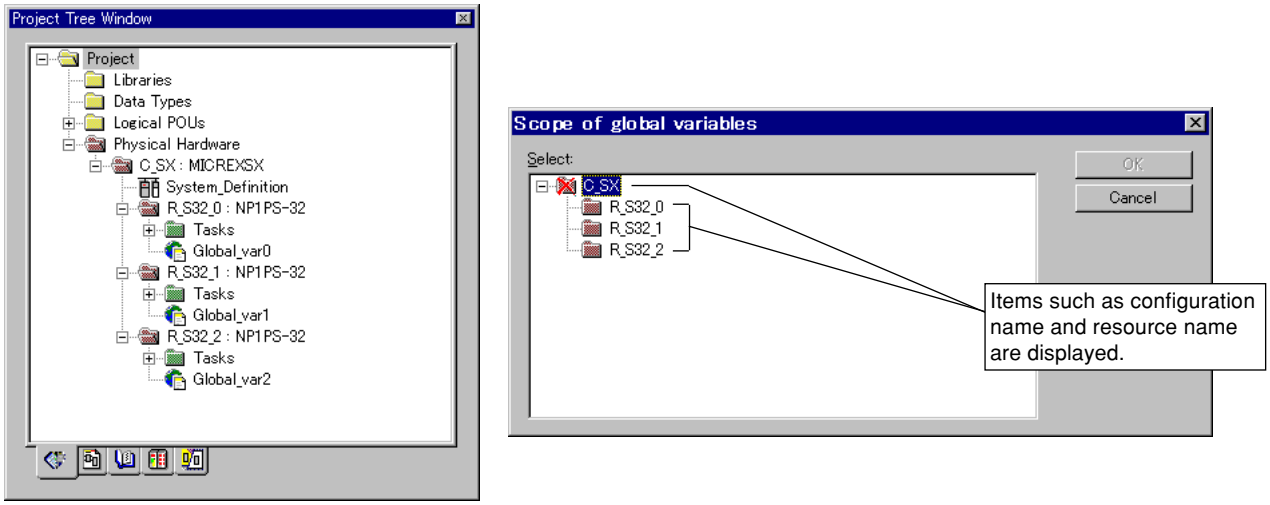


(2) Selecting a variables worksheet
It is necessary to select a worksheet to insert the variables specified by “Scope” (Local or Global variables) explained above. As shown in the figure below, when there are multiple global variables worksheets and local variables worksheets, you can select one from the list box.



(3) Global Scope ...
When multiple resources (CPU modules) are used, the resource to declare global variables for can be specified by the [Global Scope ...] button.

◊ Left-click the [Global Scope ...] button in the {Variables} dialog box or in the {Declaration of Variables or FB Instances} dialog box, and the {Resource Selection of Global Variables} dialog box will appear on the screen, as shown in the figure below.



As the standard setting, the first resource name in the [Physical Hardware] subtree in the program tree is selected.

A text file (extension: .csv) created with a word processor, spreadsheet software, or database software can be imported as variable definition data to a file. In addition, variable definition data defined on D300win can be exported to a text file (*.csv).
* About CSV-format data
CSV is an abbreviation for Comma Separated Value and is referred to as text data delimited with a comma (,).

This function can be used when the D300win system has been installed in the Custom method or [Import/Export Variable Names] has been selected with the Add Programs function.

8-3-1 File format of variable definition data

A text file to be imported as variable definition data must be described in the following formats:

(1) Text file format
In the text file format, multiple fields shown below are sequentially connected by delimiting with a comma (,).

1) Configuration name
2) Resource name
3) Task name
4) POU instance name
5) POU name
6) Variable worksheet name
7) Variable block type
8) Variable name
9) Address
10) Data type
11) Initial value
12) Comment

The fields from “Configuration name” to “Worksheet name” indicate positions on the project tree while those from “Variable block type” to Comment” show information of a single variable in a worksheet.
If a field has no corresponding value, the characters in the field are processed as a blank character string “ “ so that the field space will not be justified.

(2) Definition of each field
This paragraph describes how to define each field shown in (1) (available characters and variables).

- Configuration name
  This is the name of a configuration in which the global variable worksheet of a resource is contained.
  It can be input with a maximum of 8 alphanumeric characters (excluding a space character).

- Resource name
  This is the name of a resource in which the global variable worksheet of the resource is contained.
  It can be input with a maximum of 8 alphanumeric characters (excluding a space character).

- Task name
  This is the name of a task in which the POU instance of a resource is contained. This field is used for the variable address output function (currently not available).

- POU instance name
  This is the instance name of a POU registered in a task.
  This field is used for the variable address output function (currently not available). The line (record) in which this field exists is ignored during variable import.

- POU name
  This can be input with a maximum of 8 alphanumeric characters (excluding a space character).

- Variable worksheet name
  This can be input with a maximum of 24 alphanumeric characters (excluding a space character).

- Variable block type
  This is the type of a declared variable block.
  Any of the following types may be input:

Block type:	Meaning
VAR:	Declares a local variable of a POU.
VAR RETAIN:	Declares a retain-type local variable of a POU.
VAR_GLOBAL:	Declares a global variable between POUs.
VAR_GLOBAL RETAIN:	Declares a retain-type global variable between POUs. Declared in the global variable worksheet.
VAR_EXTERNAL:	Declares that a variable in a POU is a global variable.
VAR_INPUT:	Declares an input variable of a function or FB.
VAR_OUTPUT:	Declares an output variable of an FB.
VAR_OUTPUT RETAIN:	Declares a retain-type output variable of an FB.
VAR_IN_OUT:	Declares an I/O variable of an FB.

  Each variable is placed between a block type keyword listed above and the END_VAR keyword.

- Variable name
  This can be input with a maximum of 30 alphanumeric characters.

- Address
  This is an address assigned with the AT keyword.

- Data type
  This is the data type of a variable.
  Input data type BOOL, INT, TIME, or WORD.

- Initial value
  This is the initial value of a variable defined by the user.

- Comment
  This is a comment for a variable written by the user.
  The comment is placed between the comment start symbol “(*” and end symbol “*)” in the worksheet. These comment start and end symbols are deleted during variable export to a file while they are automatically added during import from a file.

(3) Correspondence between variable worksheet and CSV file
The following shows an example correspondence between the variable definition content in the D300win variable worksheet and that described with a word processor.

<D300win variable worksheet>

PROGRAM1_VAR:PROGRAM1 *

```
VAR
    Coil_200    AT %QX1.20.0    :   BOOL;   (*Coil No.200*)
    OFF_time_set    AT %MW1.3.10    :   INT := 500;
END_VAR

VAR RETAIN
    SET_DATA_50 :   INT := 1500;
END_VAR

VAR_EXTERNAL
    Contact_100 AT %QX1.10.0    :   BOOL;   (*Contact No.100*)
END_VAR
```

(Import) (Export)

<Variable definition with word processor>

PROJECT10.CSV - WordPad

File Edit View Insert Format Help

```
(* Configration, Resource, Task, Instance, POU, Work-sheet, Block type, Variable, Address,
 Data type, Init, Comments*)
,,,,PROGRAM1,PROGRAM1_VAR,VAR,Coil_200,%QX1.20.0,BOOL,,Coil No.200
,,,,PROGRAM1,PROGRAM1_VAR,VAR,OFF_time_set,%MW1.3.10,INT,500,
,,,,PROGRAM1,PROGRAM1_VAR,VAR RETAIN,SET_DATA_50,,INT,1500,
,,,,PROGRAM1,PROGRAM1_VAR,VAR_EXTERNAL,Contact_100,%QX1.10.0,BOOL,,Contact No.100
C_SX,R_S32,,,,Global_Variables,VAR_GLOBAL,Data_000,%IW20,INT,,External Input000
C_SX,R_S32,,,,Global_Variables,VAR_GLOBAL,Data_001,%IW50,INT,,External Input001
C_SX,R_S32,,,,Global_Variables,VAR_GLOBAL,Data_002,%IW30,INT,,External Input002
C_SX,R_S32,,,,Global_Variables,VAR_GLOBAL RETAIN,Contact_100,%IX1.100.0,BOOL,,Contact No.100
C_SX,R_S32,,,,Global_Variables,VAR_GLOBAL RETAIN,C014,%IX1.0.50,BOOL,,
```

For Help, press F1

<Variable definition with Microsoft Excel>

PROJECT10.CSV

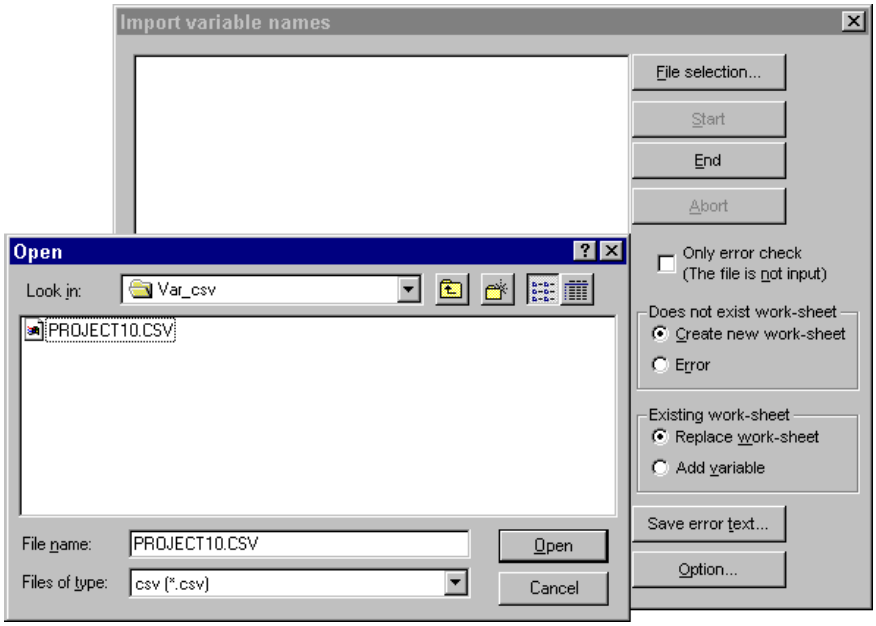
	A	B	C	D	E	F	G	H	I	J	K	L
1	(* Configration	Resource	Task	Instance	POU	Work-sheet	Block type	Variable	Address	Data type	Init	Comments*)
2					PROGRAM1	PROGRAM1_VAR	VAR	Coil_200	%QX1.20.0	BOOL		Coil No.200
3					PROGRAM1	PROGRAM1_VAR	VAR	OFF_time_set	%MW1.3.10	INT	500	
4					PROGRAM1	PROGRAM1_VAR	VAR RETAIN	SET_DATA_50		INT	1500	
5					PROGRAM1	PROGRAM1_VAR	VAR_EXTERNAL	Contact_100	%QX1.10.0	BOOL		Contact No.100
6	C_SX	R_S32				Global_Variables	VAR_GLOBAL	Data_000	%IW20	INT		External Input000
7	C_SX	R_S32				Global_Variables	VAR_GLOBAL	Data_001	%IW50	INT		External Input001
8	C_SX	R_S32				Global_Variables	VAR_GLOBAL	Data_002	%IW30	INT		External Input002
9	C_SX	R_S32				Global_Variables	VAR_GLOBAL RETAIN	Contact_100	%IX1.100.0	BOOL		Contact No.100
10	C_SX	R_S32				Global_Variables	VAR_GLOBAL RETAIN	C014	%IX1.0.50	BOOL		
11												
12												
13												
14												

PROJECT10

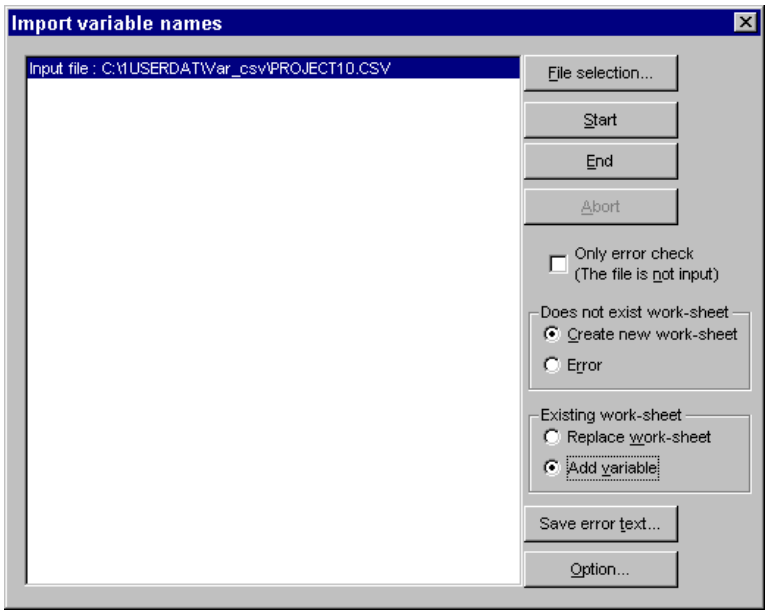
8-3-2 Import from a file

This paragraph describes how to import variable definition data created with a word processor or equivalent to a D300win variable worksheet.

◊ Left-click the [Import variable names] command in the [Extras] menu.
The {Import variable names} dialog appears on the screen, and then the {Open} dialog appears for selecting a file.



◊ Select a file (*.csv) which has already defined variables, and left-click the [Open] button. The path of the file selected in the {Open} dialog is displayed in the list area of the {Import variable names} dialog.



◊ After setting the necessary items, left-click the [Start] button.
The file import processing will be carried out.

<Explanation of the dialog>

[File selection...] ..... Activates the {File Open} dialog for selecting an import source file.

[Start] ..... Starts the import processing of the specified file.

[End] ..... Ends the import processing of the specified file.

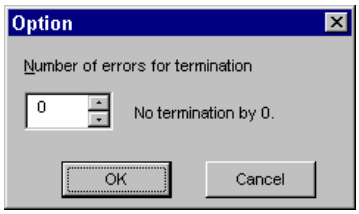
[Abort] ..... Interrupts the import processing of the specified file.

[Save error text...] ..... Activates the dialog box for saving an error (an error being displayed in the list box) which has occurred during file import processing in a text file.
[Only error check (The file is not input)] check box: When checked, error check is carried out for only variable definition data without executing the file import processing. When unchecked, error check is carried out for only variable definition data and the file import processing is executed.

[Does not exist work-sheet] ..... Specify the mode used when a worksheet which does not exist in the project appears in a loaded file.
When the optional [Create new work-sheet] button is turned on, a new variable worksheet is created and added to the concerned POU.
When the optional [Error] button is turned on, the worksheet name is reported as an error to prevent processing that worksheet.

[Existing work-sheet] ..... Specify the mode for editing the worksheet of the project.
When the optional [Replace work-sheet] button is turned on, the existing worksheet is deleted and overwritten with only new variables.
When optional [Add variable] button is turned on, variables are added to the end of the existing worksheet (duplication with the existing variables is not checked, thus, an error will occur during compilation on D300win if the same variable exists).

[Option...] ..... Activates the dialog box for setting the maximum error count.



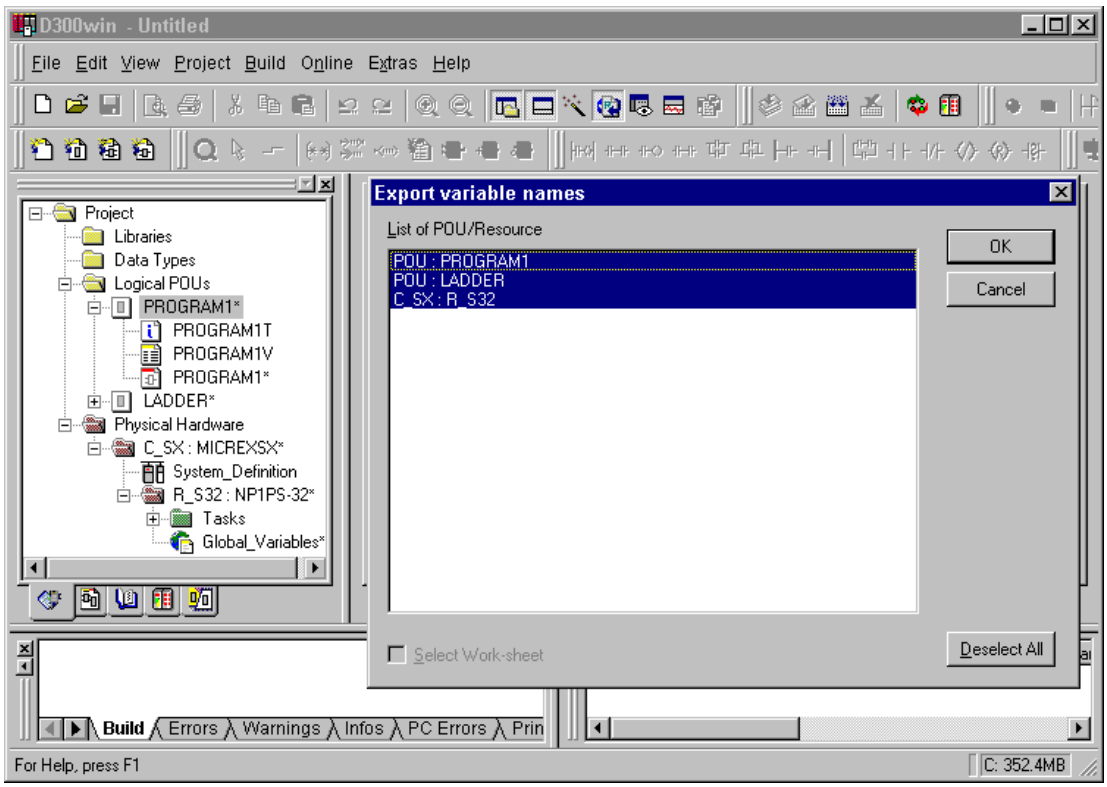
Specify the maximum error count for interrupting the processing if a large number of errors may be detected and it is not reasonable to complete the processing. When the number of errors exceeds this maximum error count, the import processing is interrupted. However, if “0” is set, the processing is carried out to the end without checking the error count; it is still possible to interrupt the processing using the [Abort] button.

8-3-3 Exporting to a file

This paragraph describes how to export data defined on a D300win variable worksheet to a file (extension: .csv) which can be handled with a word processor or equivalent application.

◊ Open a “project (file)” for the variable definition data export source.

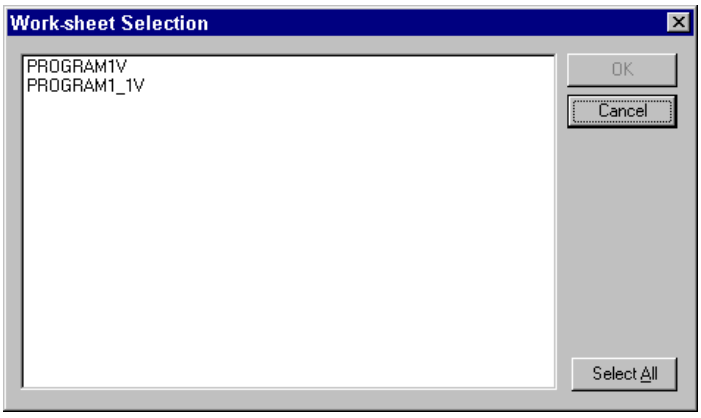
◊ Left-click the [Export variable names] in the [Extras] menu.
The {Export variable names} dialog will appear on the screen.



◊ Select POUs and resources to be exported from the [List of POU/Resource] list box. The default is “all are selected.”

<Explanation of the dialog>

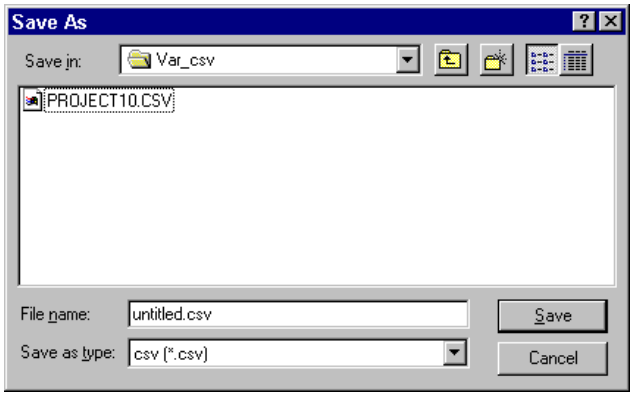
[Select Work-sheet] ..... This option is available when a single POU or resource has been selected. When checked, the {Work-sheet Selection} dialog appear on the screen as shown in the figure below, in which the listed worksheets can be individually selected.



[Select All] and [Deselect All] ..... Left-click the [Select All] button to select all items in the list box. When all items have been selected, this button toggles to the [Deselect All] button, which can be left-clicked to deselect all items.

[OK] ..... Activates the {Save As} dialog for specifying a file to which data is exported.
[Cancel] ..... Closes the {Export variable names} dialog.

◊ After selecting the items to be exported from the list box in the {Export variable names} dialog, left-click the [OK] button.
The {Save As} dialog will appear on the screen.



The extension of the file name will automatically be “project-name.csv.” However, the file name can be changed to another and saved.

◊ Left-click the [Save] button.
The file will then be processed.

8-4-1 Derived data types

Derived data types are the data types that are defined by the user or PC manufacturer. The definition is made in “Data Types” in the project tree.
For the MICREX-SX series, the following derived data types are available:

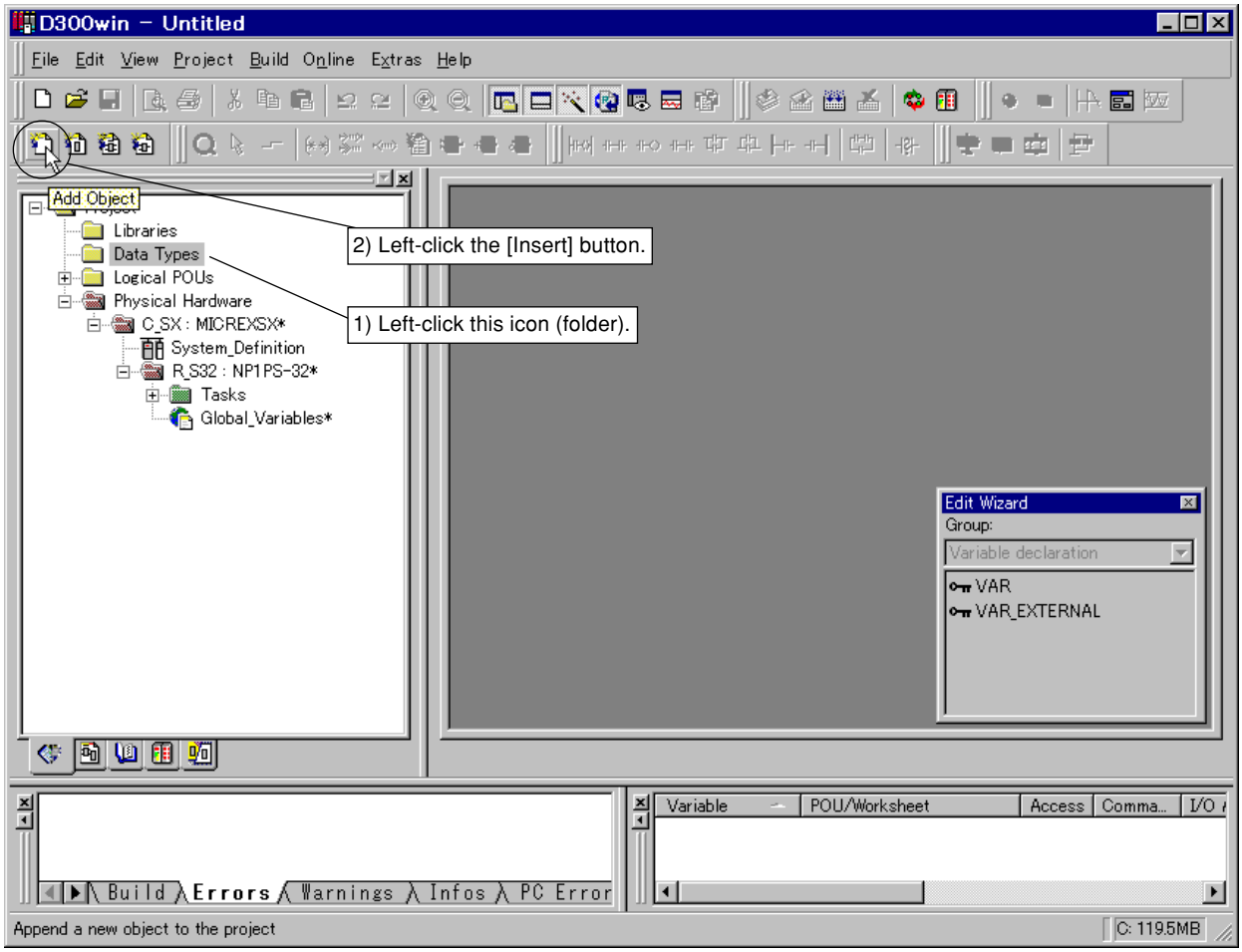
- Array data type (see “(1) Array data type” in 8-3-3 and the INSTRUCTION No. FEH200 volume.)
  - One-dimensional array
  - Two-dimensional array (an array of arrays)
- Structural data type
  - Structure
  - Array of structures
  - Structure of array
  - Structure of structure

(see INSTRUCTION No. FEH200 volume.)

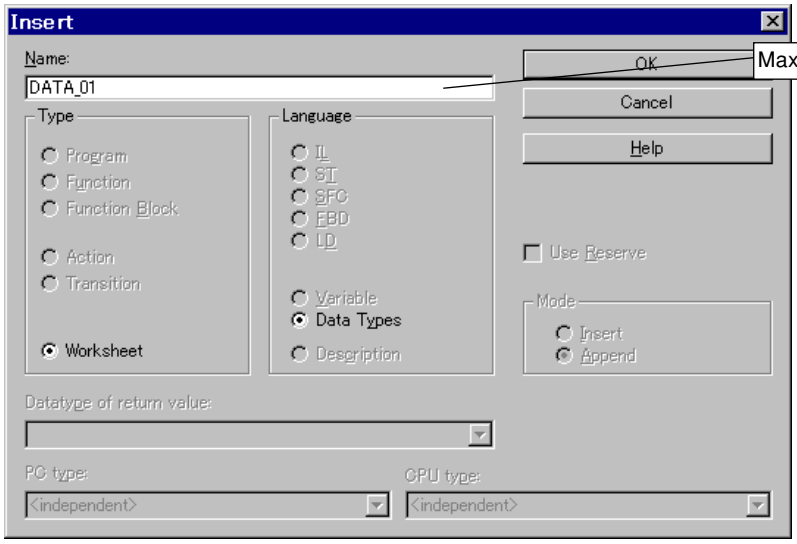
8-4-2 How to declare derived data types

(1) Inserting the data type worksheet

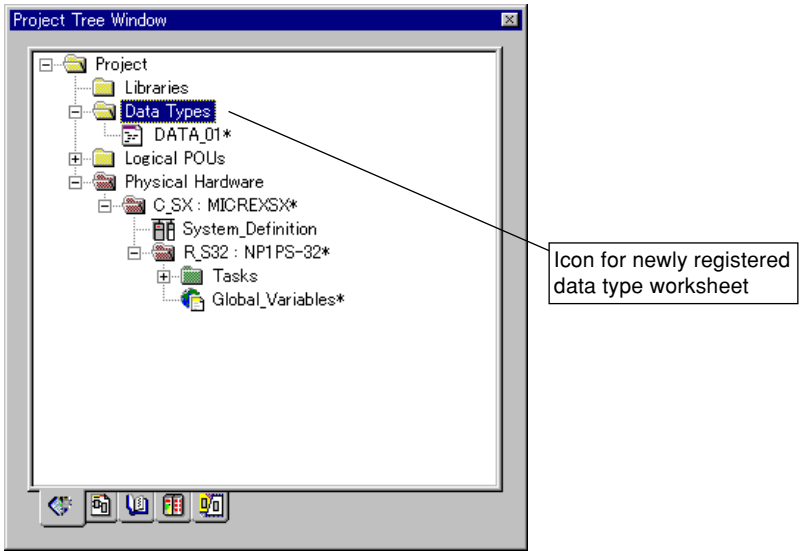
Insert the worksheet for declaring the data type under [Data Types] in the project tree.



◊ Select [Data Types] by left-clicking the icon.
◊ Left-click the [Add Object...] button. The dialog can also be displayed when the [Insert...] command is selected in the shortcut menu.



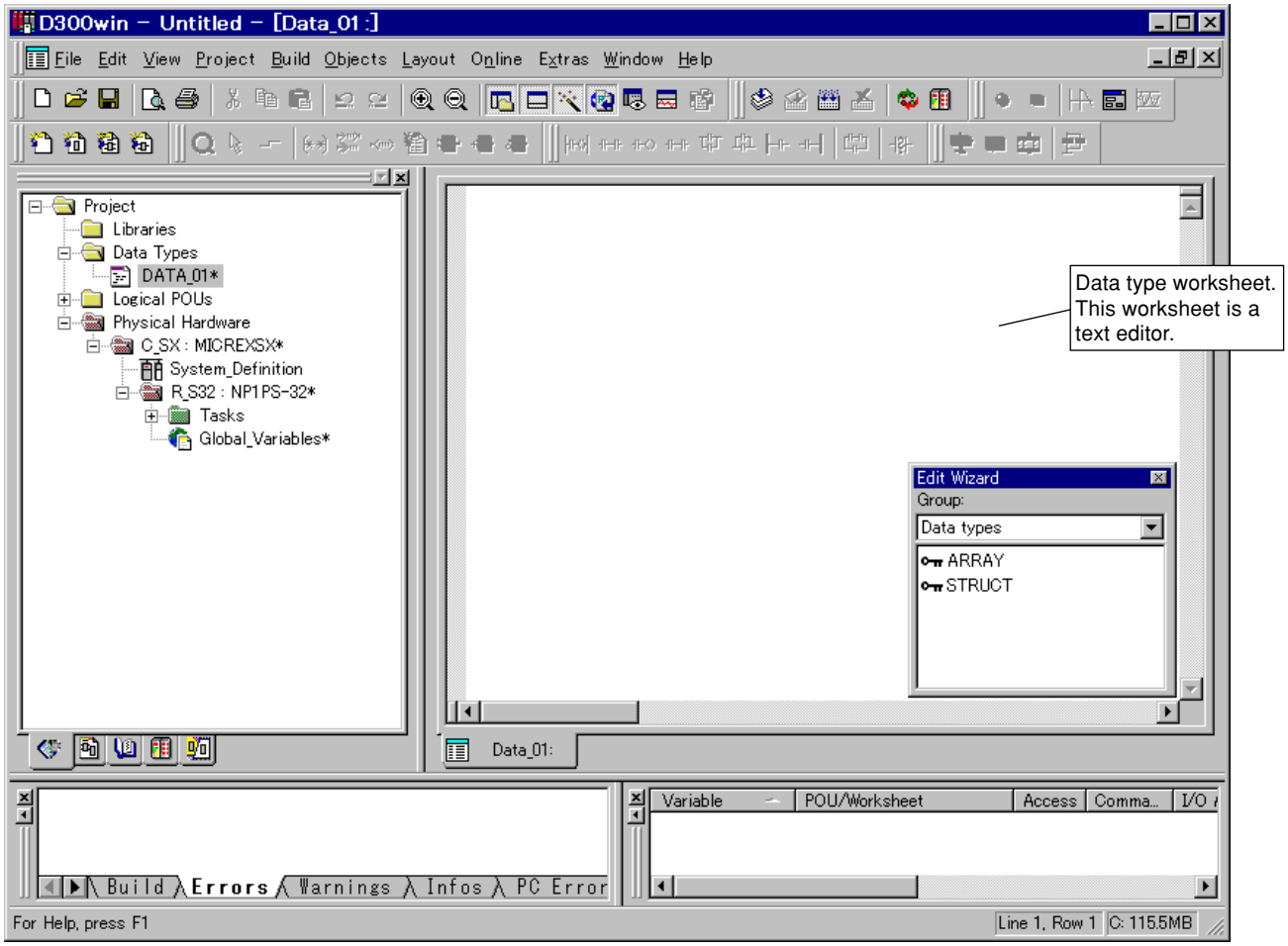
◊ Input the desired worksheet name in the [Name:] text box, and left-click the [OK] button.
The [Data type worksheet] icon “DATA_01” will be inserted under the [Data Type] folder in the project tree.



The data type worksheet name can be input with a maximum of 24 alphanumeric characters. (However, it may not be any of the names described in “3-2-3 (3) Restrictions on elements composing the project tree” and on the “Reserve Word List in the Instructions of the User’s Manual <FEH200>.”)

(2) Opening the data type worksheet

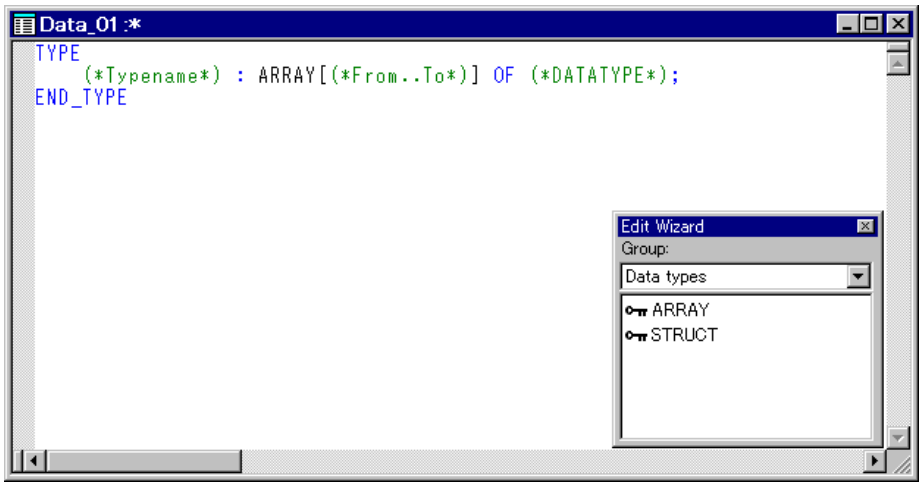
◊ Left-double-click the icon for data type worksheet (array data) in the project tree, or right-click the icon to display the shortcut menu and then left-click the [Open Worksheet] command in this shortcut menu. The worksheet (text editor) will then be opened.



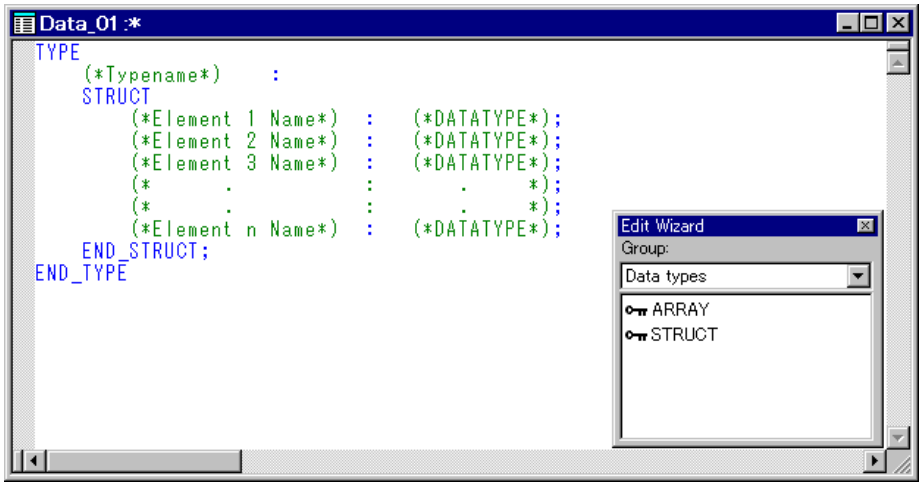
Operation of the data type editor is the same as that of ordinary text editors.

(3) Defining data type using the Edit Wizard
The D300win system provides the Edit Wizard dedicated to data type definition to facilitate data type definition and prevent input errors.
When the [ARRAY] or [STRUCT] function displayed in the {Edit Wizard} window is left-clicked, sample definitions of basic data types and comments (data type name, scope, and data type) are shown in the text editor. (However, the comments can be changed or deleted as necessary.)

1) Sample definition of ARRAY (array) data type



2) Sample definition of STRUCT (structure) data type



8-4-3 Sample declaration of the derived data type

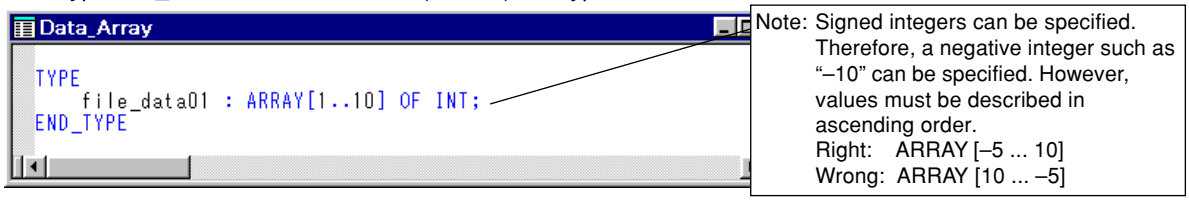
(1) Array data type

The array data type consists of multiple elements of same data type. For array data type, a one-dimensional array or two-dimensional array can be defined.

1) Sample use of one-dimensional array data type

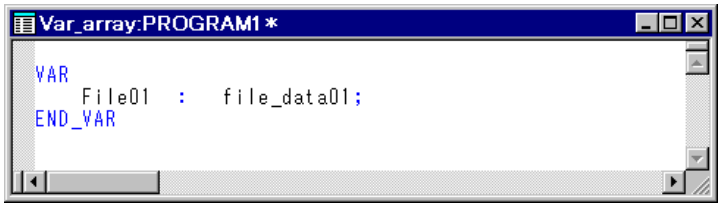
<Sample definition of data type>

Data type “file_data 01” consists of 10 (1 to 10) INT type data.



<Sample declaration of variables>

The data type of variable “file 01” is “file_data 01”.



1	INT type data
2	INT type data
3	INT type data
4	INT type data
5	INT type data
6	INT type data
7	INT type data
8	INT type data
9	INT type data
10	INT type data

← To access this data, specify “file 01[5]”.

Note: When an out-of-range value (for example, “file [11]”) is specified, accessing is impossible, but no error information is displayed.

For how to define and use two-dimensional array data type and structure data type, see the Instructions of the User’s Manual <FEH200>.

Section 9 User-Defined FCT/FB

page

Section 9 User-Defined FCT/FB

9-1 Difference between FCT and FB

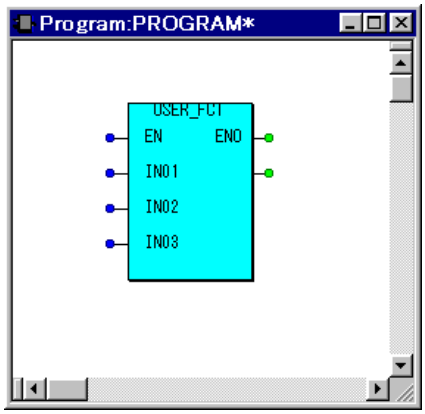
The standard functions (FCT) and function blocks (FB) that are defined in IEC 61131-3 as well as the functions and function blocks that are proposed and provided by Fuji Electric are available for D300win.
In addition to these, users can create unique functions and function blocks according to the specification of their machine or system.
How to create and use user-defined functions and function blocks is explained below.

9-1-1 Outline of function

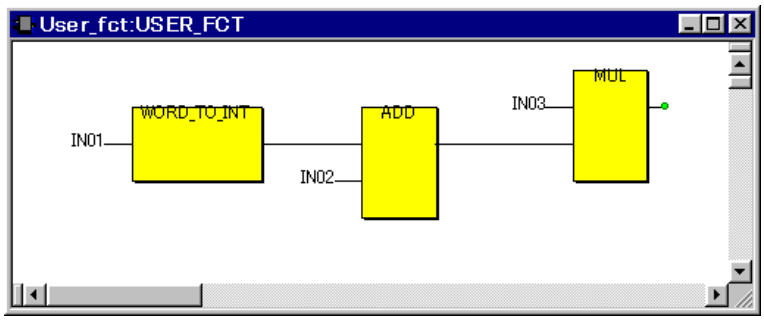
(1) Outline of operation of function
A function is a POU that has multiple input parameters and one output parameter. It has no internal memory. Namely, when a function is called by the same value, the same return value is always output. A return value exists for basic data type variables as well as for variables of derived data type such as structure.

(2) Sample user-defined function
A sample user-defined function and its internal code are shown below. How to create a user-defined function as in the figure below is explained as well.

Sample user-defined function



Internal code of function

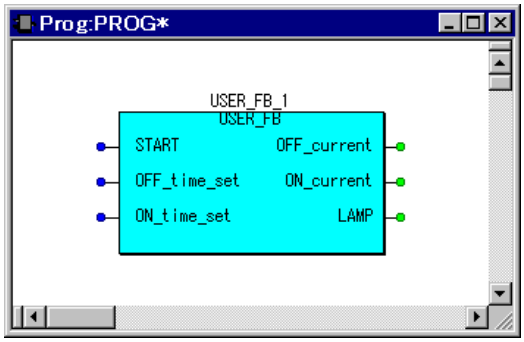


9-1-2 Outline of function block

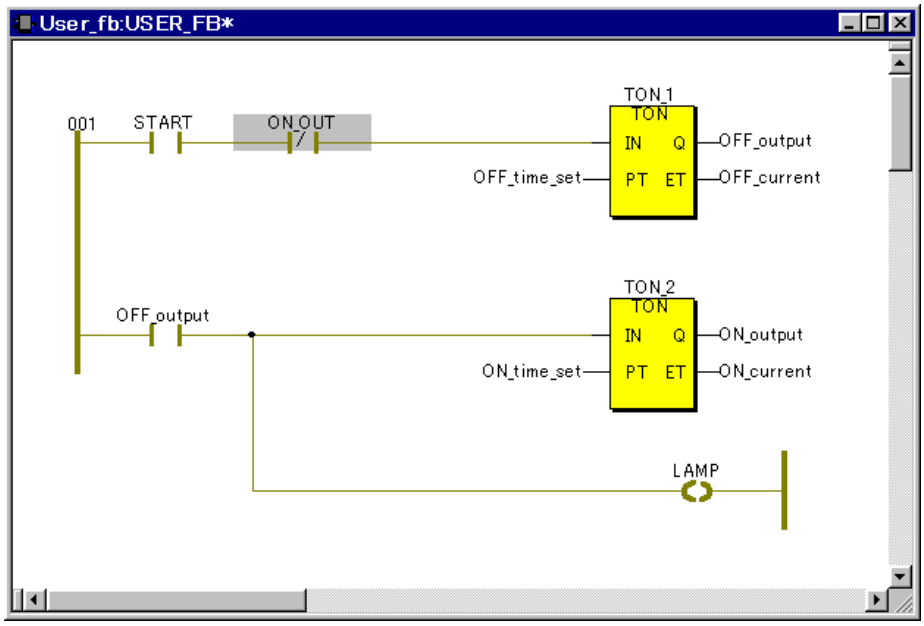
(1) Outline of operation of function block
A function block is a POU with multiple input and output parameters. It has a dedicated internal memory. The returned value of a function block depends on the value of the internal memory. (FB is the abbreviation for function block.)

(2) Sample user-defined function block
A sample function block defined by user and its internal program are shown below.
How to create the user-defined function block as shown below is explained as well.

Sample user-defined function block



Internal program of the function block



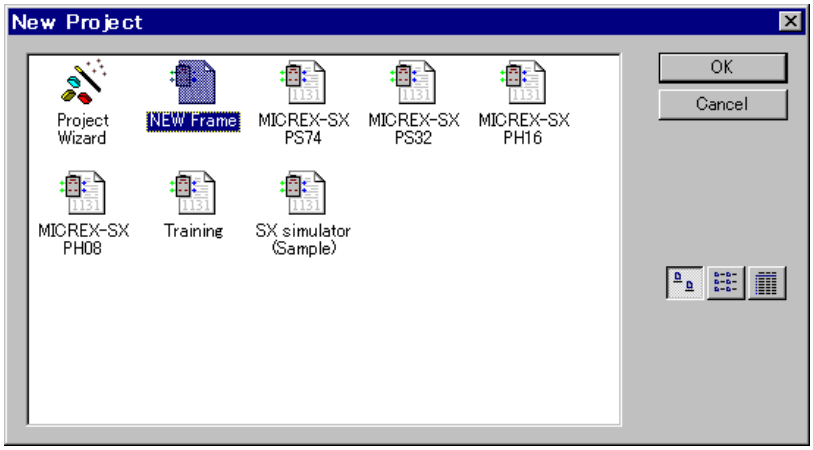
9-2-1 Creating a POU for function

First, a new project and a POU are created to define the function.

(1) Inserting a POU

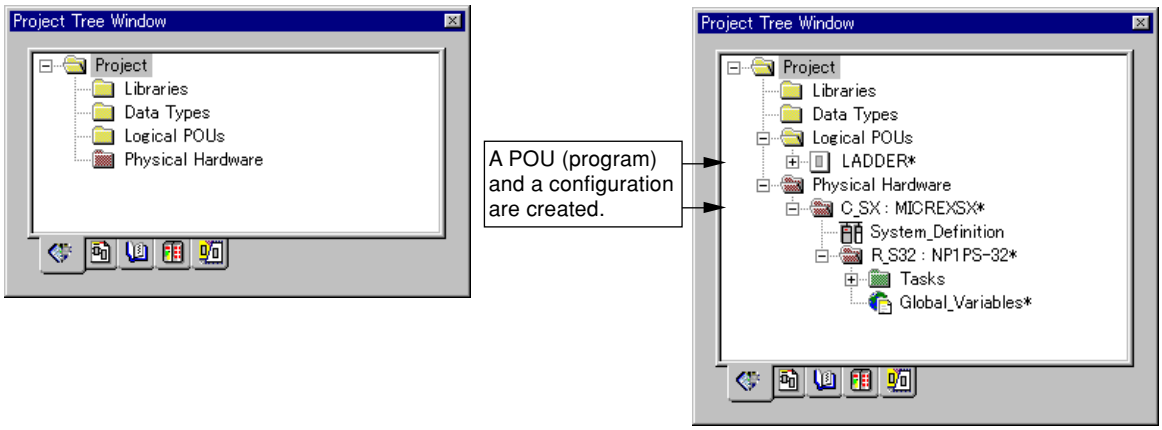
◊ Create a new project.

Select the [New Project] command in the [File] menu, and the {Project template} dialog box will appear on the screen.



◊ Select the [NEW Frame] template and left-click the [OK] button. The project tree editor will then be activated.

When a MICREX-SX series template is selected



When the [NEW Frame] template is selected, a project with no POU or configuration is created.

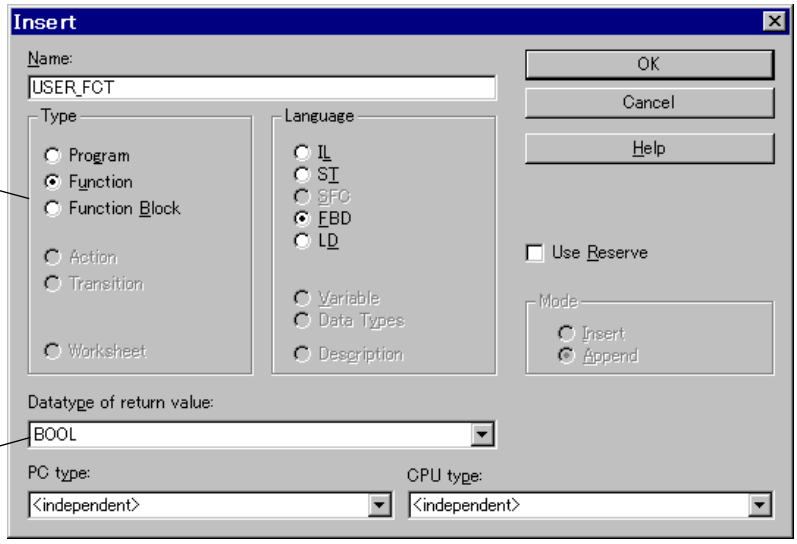
(2) Inserting a POU

◊ Select the [Logical POUs] subtree in the project tree by left-clicking it.

◊ The dialog can also be displayed when the [Insert...] command is selected in the shortcut menu. This screen can also be desplayed by left-clicking the [Insert] command in the shortcut menu.

Turn on the optional button for the type of a POU to be created.

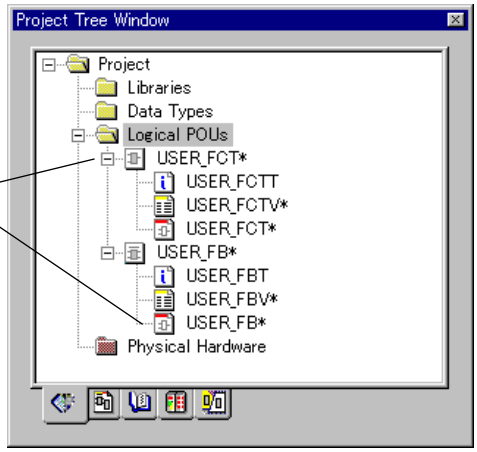
Effective when [Function] has been selected under [Type].



[Name] ..... Input the name of a POU to be created. (The name specified in this text box is used as the function name and function block name.)
[Group type] ..... Specify the POU group type.
[Language] ..... Specify a language for describing codes in the POU.
[Data type of return value] ..... Specify the data type for returned values. (This item can be specified only when “Function” is specified for “Group type”.
[Use Reserve] ..... This item takes effect only when the optional [Selected POU] button is turned on in the [Use Reserve] box in the {Define CPU memory size} dialog box. “Patch POU” can be executed even when variables are newly added to the memory area assigned to reserve area.
[Mode] ..... Specify whether the new object is inserted in front of or after the selected object.
[PC type] ..... Specify the type (series name) of PC.
[CPU type] ..... Specify the type of CPU module.

◊ After setting all items on the dialog box, left-click the [OK] button. A new POU will then be added in the project tree.

Pay attention to the POU icon for the function and function block.



9-2-2 Creating a user-defined function

(1) How to create a function

A user-defined function is created by the following procedure:

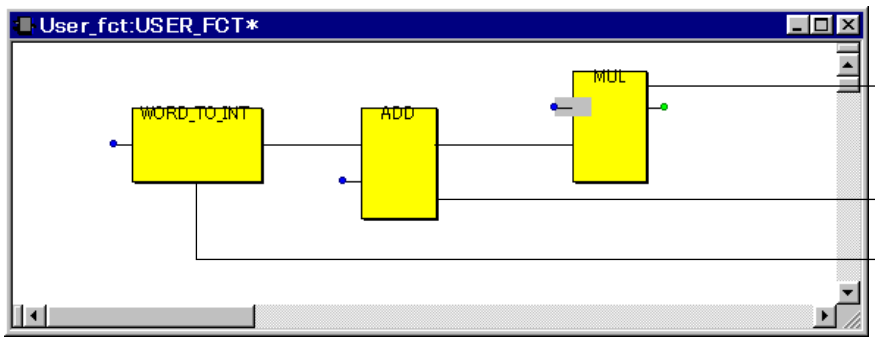
1) Create a POU for the function.
2) Create the internal code for the function.
3) Define the input terminals (parameters).
4) Create help information for the function (if necessary).

Precautions for creating a function

The variables (declared by “VAR ..... END_VAR”) which are used in user-defined function are assigned to a temporary area. This area is not cleared during execution. Therefore, be careful that the variables used in POU do not become undefined data during execution.
(To reference variables, reference after describing them.)

(2) Creating internal code for the function

Internal processing of the function is described by the programming language (FBD or LD) specified in 9-2-1(2).
How to describe is the same as in creating general programs (see “Section 4 FBD Language”).



Arithmetic function “MUL” (multiplication)

Arithmetic function “ADD” (addition)

Type conversion function “WORD_TO_INT”

Note: To define function output terminal, input the same name as the POU name from the [Variables] dialog box and then left-click the [OK] button. Do not define data type or block type. (When the [Properties ...] button in the [Variables] dialog box is left-clicked, the [Automatic Variables Declaration] dialog box is displayed. Close this dialog box without left-clicking the [OK] button in it.)

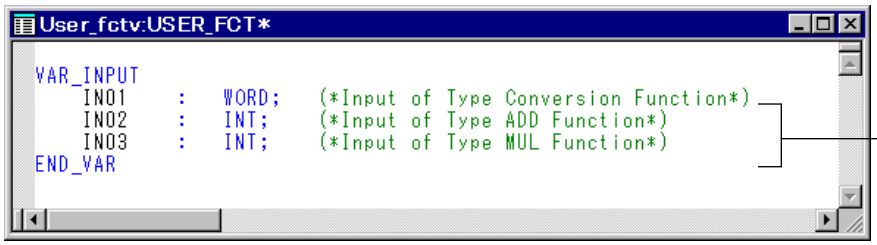
(3) Definition of input terminals (parameters)
Input terminals (parameters) of the function are defined by variables declaration.

1) How to describe variables
In the variables worksheet, describe as follows:

```
VAR_INPUT
      (* Input terminals are defined here. *)
END_VAR
```

Assigning real addresses to input parameters with the [AT] text box is disabled.
Variables declaration for the output terminal (parameter) is unnecessary.

2) Variables worksheet for the code
Variables are declared as shown below for the code created in (2).

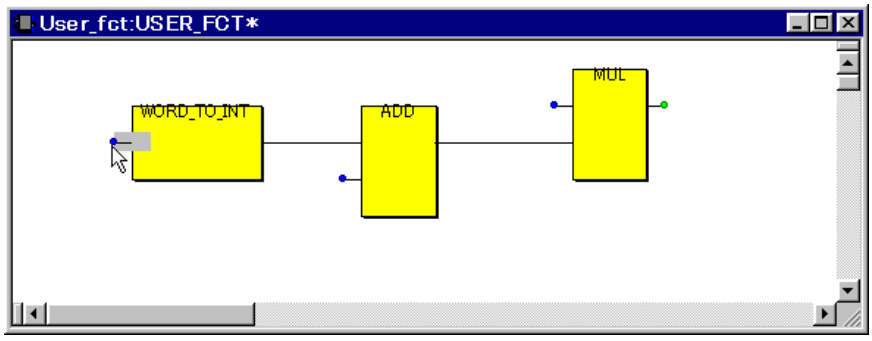


There are two methods for this: one is to input text in the variables worksheet (variables editor), as shown above; another is to use the {Variables} dialog box and the {Automatic Variables Declaration} dialog box to automatically inset in the variables worksheet, as shown on the next page.

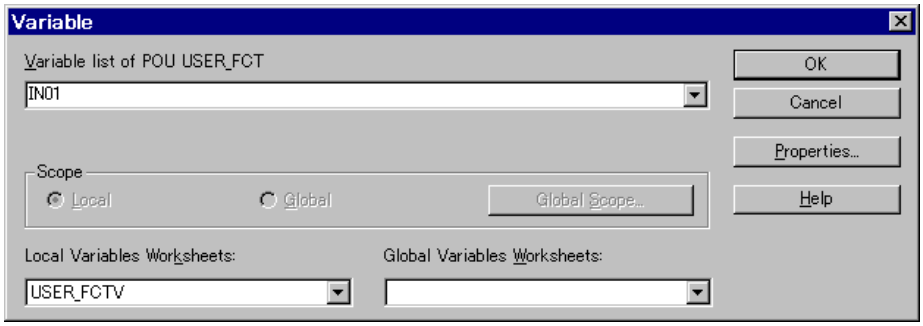
(4) Variables declaration using the dialog boxes

1) Variables declaration for input terminals (parameters)

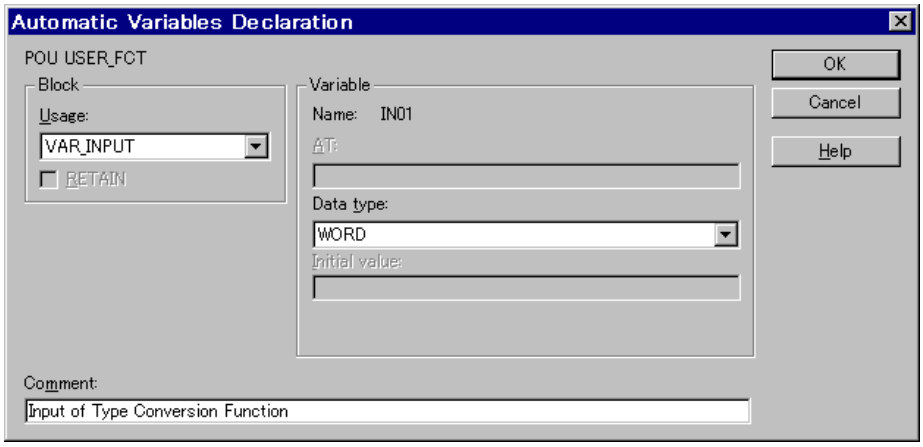
◊ Select input terminal of the type conversion function by left-clicking it.



◊ Left-double-click the input terminal or left-click the [Variables] button.
The {Variable} dialog will appear on the screen.



◊ Input a variable name in the [Name:] text box.
In this example, “IN01” is input.
◊ Left-click the [Properties ...] button, and the {Automatic Variables Declaration} dialog box will appear on the screen.



◊ Select a data type from the [Data type:] list box.
Select the proper data type to match the function and the commands.
◊ Select “VAR_INPUT” from the [Usage:] list box.
◊ After confirming the setting in this dialog box, left-click the [OK] button.
◊ Variables for the input terminals of arithmetic functions ADD and MUL are declared in the same way.

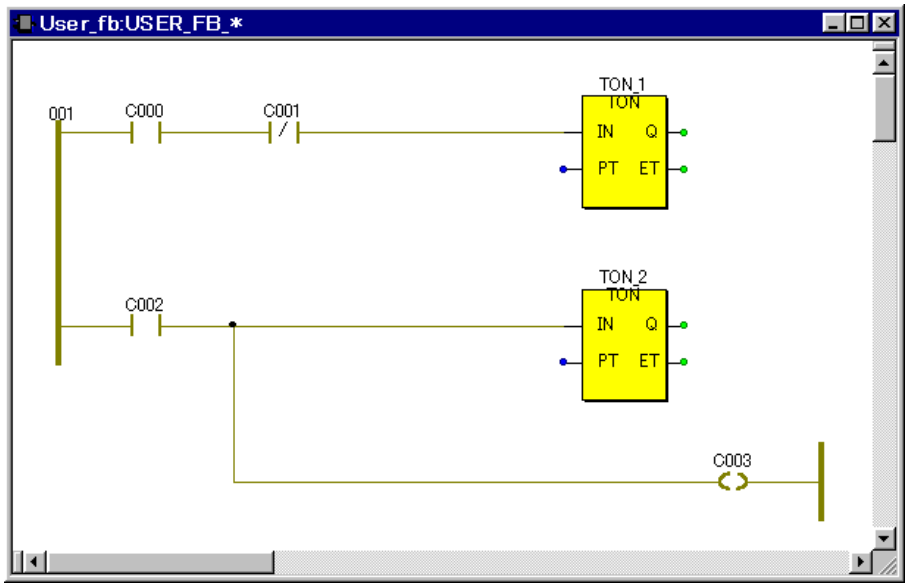
9-2-3 Creating User-Defind Function Block

(1) How to create a function block
A user-defined function block is created in the following procedure:

1) Create POUs for the function block.
2) Create the internal code for the function block.
3) Define the input and output terminals (parameters).
4) Create help for the function block (if necessary).

- Declaration of input variables.
- Declaration of output variables.
- Declaration of internal variables.

(2) Creating internal code for the function block
The internal processing of the function block is described by the programming language specified in 9-2-1(2).
How to describe is the same as for creating general programs.



(3) Definition of input/output terminals (parameters)/internal variables
Input terminals, output terminals, and internal variables of the function are defined by variables declaration.

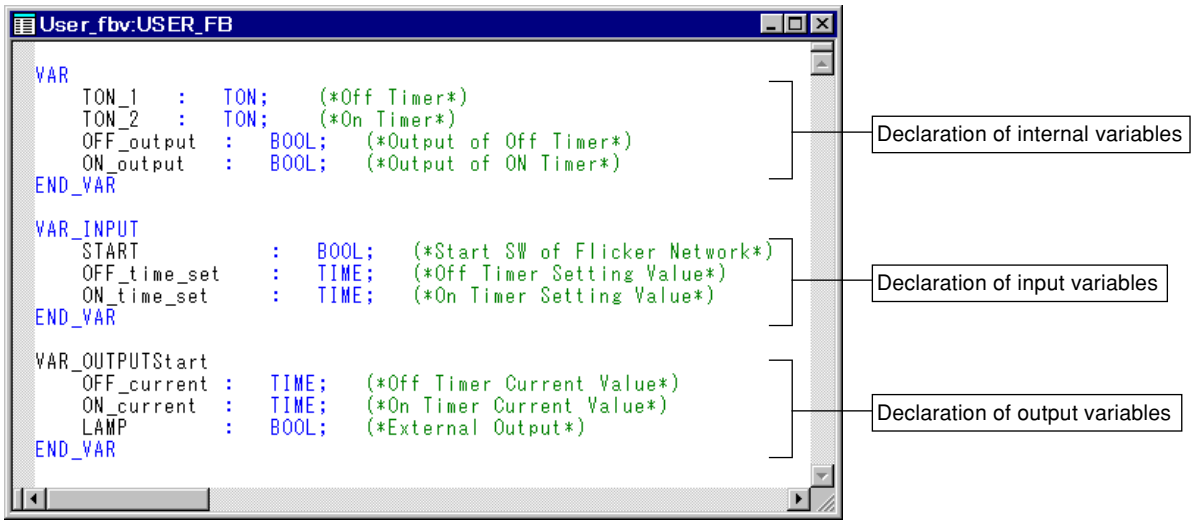
1) How to describe variables
In the variables worksheet, describe as follows:

```
VAR
      (* Internal variables are defined here. *)
END_VAR
VAR_INPUT
      (* Input terminals are defined here. *)
END_VAR
VAR_OUTPUT
      (* Output terminals are defined here. *)
END_VAR
```

2) What to describe in variables
The setting data for an individual variable name is shown below. Declare parameters (variables) for the object displayed on the screen.

Initial variable name (FB terminal name)		Variable name	Type of variable	Data type
TON_1 (timer)	PT	OFF_time_set	VAR_INPUT	TIME
	Q	OFF_output	VAR	BOOL
	ET	ON current	VAR_OUTPUT	TIME
TON_2 (timer)	PT	ON_time_set	VAR_INPUT	TIME
	Q	ON_output	VAR	BOOL
	ET	ON current	VAR_OUTPUT	TIME
C000		START	VAR_INPUT	BOOL
C001		ON_output	VAR	BOOL
C002		OFF_output	VAR	BOOL
C003		LAMP	VAR_OUTPUT	BOOL

3) Variables worksheet for the code
Variables are declared as below for the code created in (2).

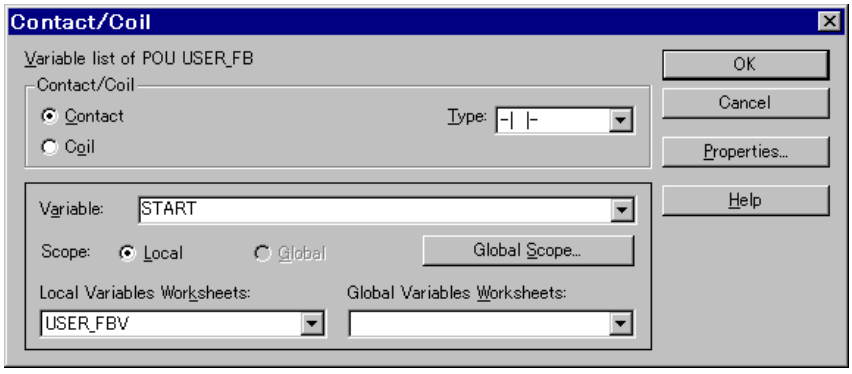


There are two methods for this: one is to input text in the variables worksheet, as shown above; another is to use the {Variables} dialog box or the {Contact/Coil} dialog box and the {Automatic Variables Declaration} dialog box to automatically insert in the variables worksheet, as shown below.

4) Variables declaration using the dialog boxes

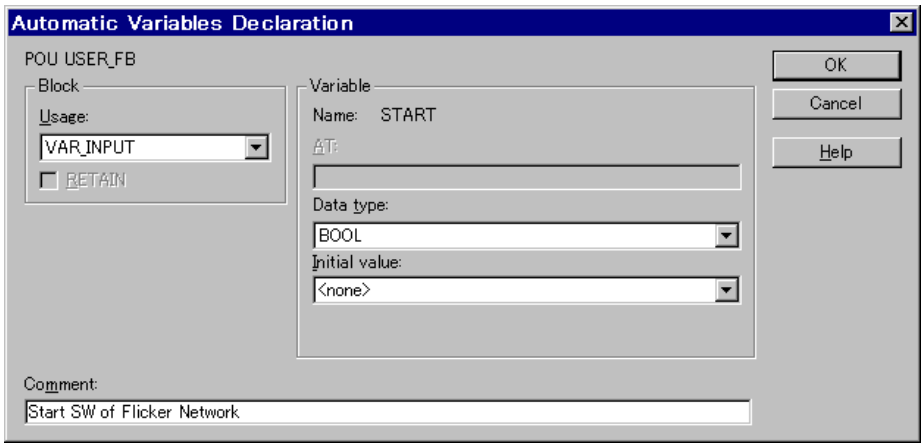
◊ Right-click a terminal of the object or the function block (timer).
In this example, "┤├C000" is selected.

◊ Select the [Object Properties ...] command in the shortcut menu, and the {Contact/Coil} dialog box will appear on the screen. (When variables are declared for a function or a function block, the {Variables} dialog box is displayed.)



◊ Input a variable name in the [Variable:] text box.
In this example, "START" is input.

◊ Left-click the [Properties ...] button, and the {Automatic Variables Declaration} dialog box will appear on the screen.



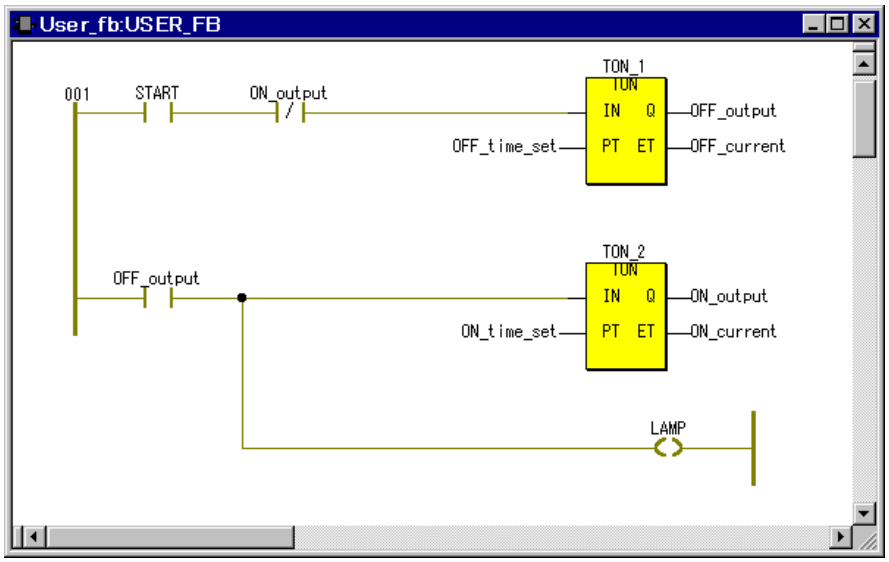
◊ From the [Data type:] list box, select a data type.
Select the proper data type to match the function and the commands.
In this example, "BOOL" is selected.

◊ From the [Usage:] list box, select a type of variable.
In this example, "VAR_INPUT" is selected.

◊ After confirming the setting in this dialog box, left-click the [OK] button.

◊ Declare variables for input and output terminals of other objects in the same way.
A sample program after declaring variables has been done is shown below.

Internal program of the function block



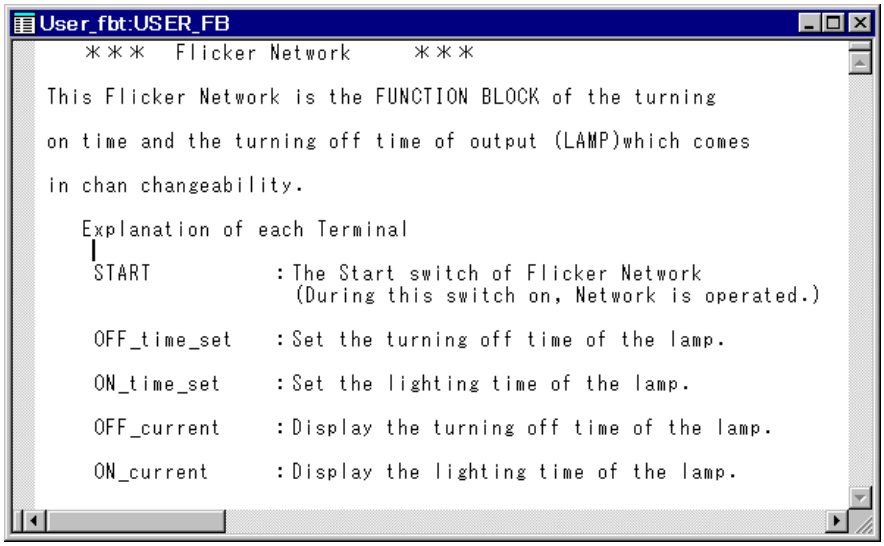
9-2-4 How to create and display help

Help can be created for a user-defined function and a user-defined function block. The content of the description worksheet in the POU is used as help information.

(1) Creating help

◊ Left-double-click the [Description Worksheets] icon in the POU of the user-defined function/function block to call the description worksheet (text editor).

◊ Describe help information in the description worksheet.
Sample help information is described in the figure below.



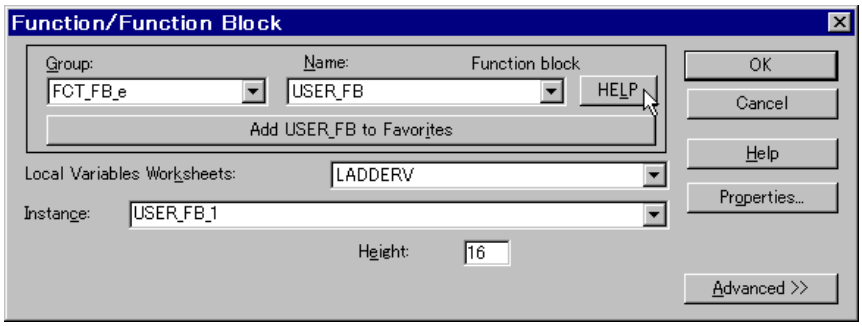
(2) Displaying help

Help is called from the {Function/Function Block} dialog or the {Edit Wizard} window when a function or function block defined by the user is inserted during code creation.

1) Calling help from the {Function/Function Block} dialog

◊ Open a code worksheet, and left-click in it to set the insertion pointer.

◊ Left-click the [Function/Function Block] button to activate the {Function/Function Block} dialog.



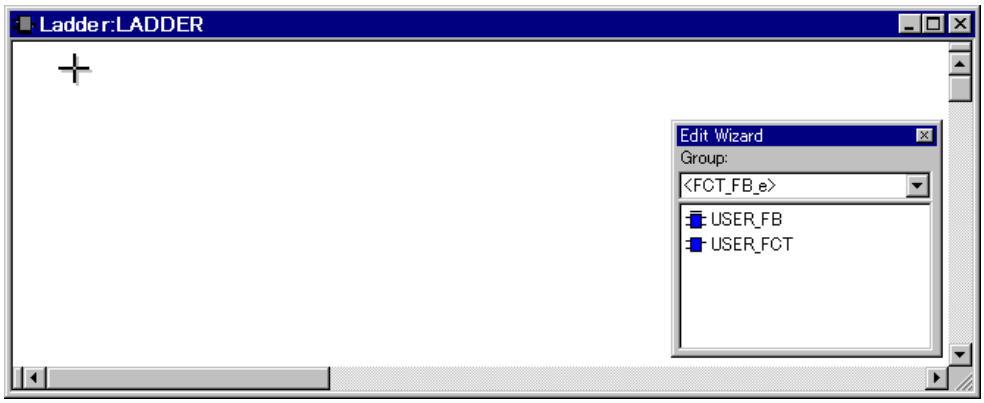
◊ Select a “project name” of the user-defined function/function block from the [Group:] list box.

◊ Select a “POU name” of the user-defined function/function block from the [Name:] list box.

◊ Left-click the [Help] button.

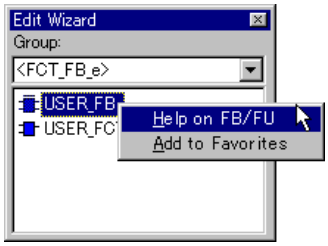
2) Calling help from the {Edit Wizard} window

◊ Open a code worksheet, and left-click in it to set the insertion pointer.

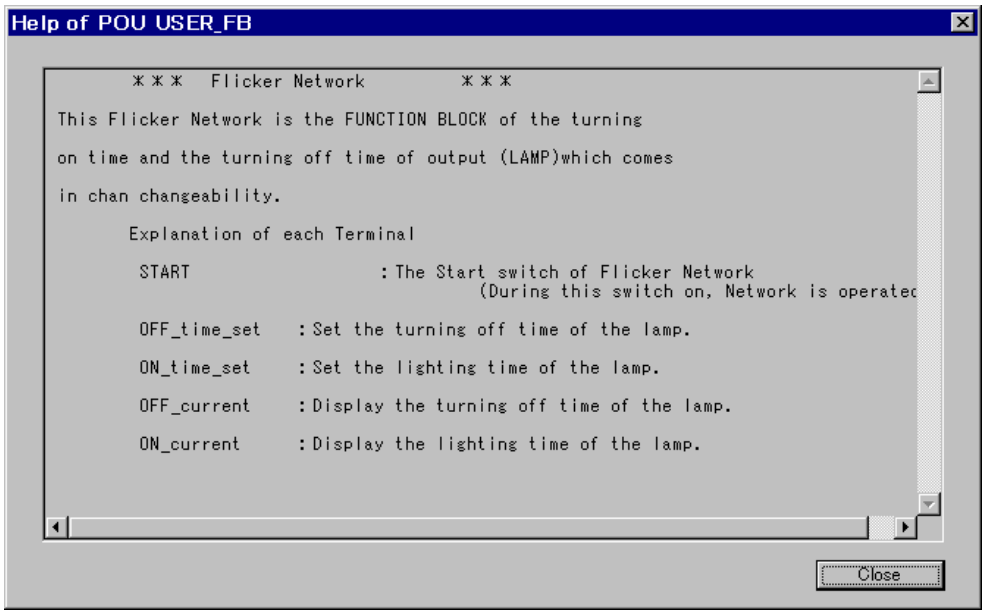


◊ Select a “project name” of the user-defined function/function block from the [Group:] list box.

◊ Right-click a “POU name” of the user-defined function/function block in the instruction list box to display the shortcut menu, and then left-click the [Help on FB/FU] command.



3) Sample help display
Sample display of help called by the method in 1) or 2) is shown in the figure below.



9-2-5 Compiling a POU and saving a project

(1) Compiling a POU

To use a created user-defined function or function block, it is necessary to compile the POU (project).

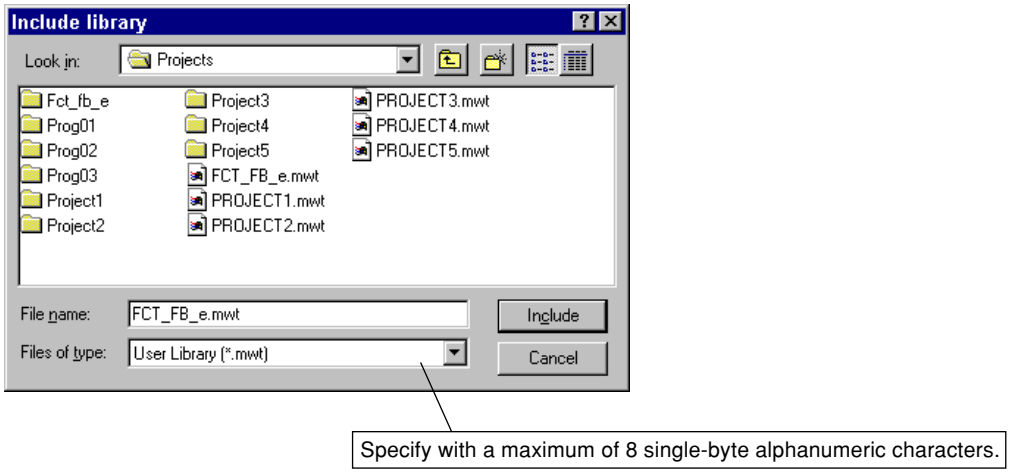
For details on compilation, see “12-1 Compiling Projects.”

◊ Left-click the [Make] button, or alternatively left-click the [Make] command in the [Build] menu. The “working box” is displayed during compilation. If the worksheet has an incorrect description, the "user error list" will appear on the screen. (Confirm the error content, correct the error, and then re-compile.)

(2) Saving a project

To use a project other than that in which a user-defined function or function block is registered, save the project so that it can be registered in the library of another project.

◊ Select the [Include library...] command in the [File] menu. The {Include library} dialog will appear on the screen.



◊ Specify a drive and a folder, and input a file name.

◊ Left-click the [OK] button, and the project will be saved.

How to use functions and function blocks that are defined (created) by users is explained below.

9-3-1 Using the library function

To use a user-defined function or function block in a project other than that for which it was created, it is necessary to register the user-defined function/function block in the library of the target project.

(1) Library registration

Either an existing or new project may be used. However, this example explains how to create a new project and register it in the library of another project.

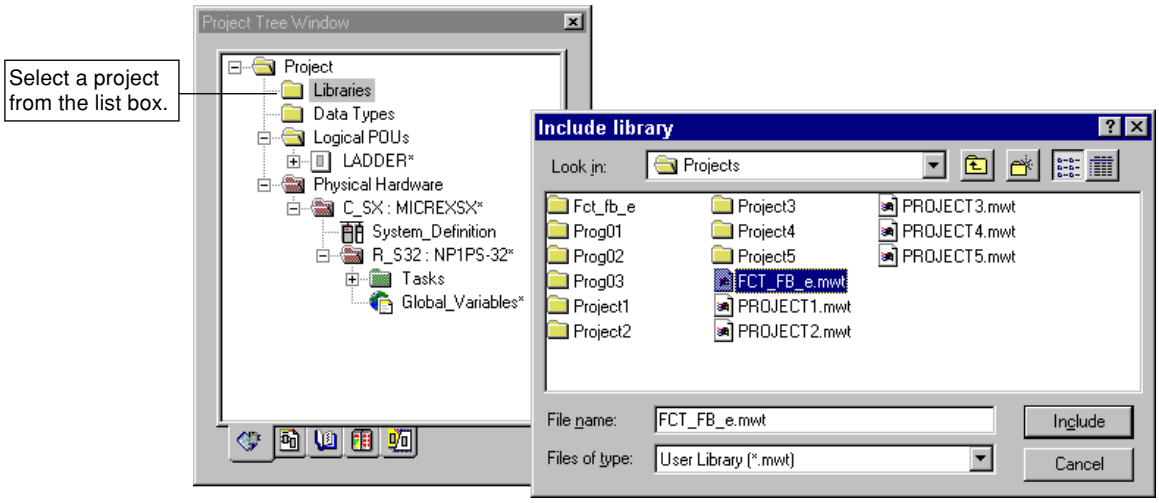
1) Create a new project

◊ Left-click the [New Project] command in the [File] menu, and the {Project template} dialog box will appear on the screen.

◊ Left-click a MICREX-SX series template and then left-click the [OK] button.
The project tree editor will then be activated.

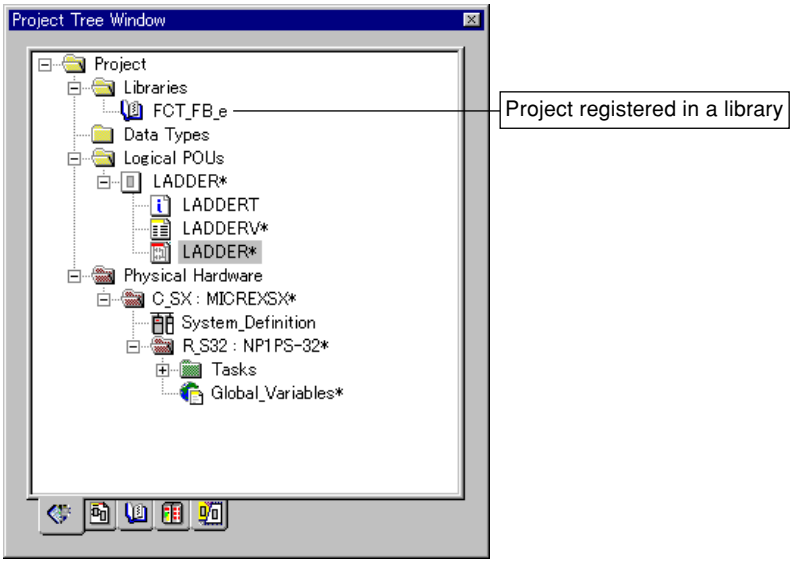
2) Register in the library

◊ Left-click the [Libraries] subtree in the project tree, and then left-click the [Insert] button to display the {Include library} dialog. This dialog can also be displayed when the [Libraries] subtree is right-clicked to display the shortcut menu and then the [Insert...] command is left-clicked in the menu.



◊ Set the [Look in:], [File name:], and [Files of type:] items, and then left-click the [Include] button in the {Include library} dialog.
The new project “FCT_FB.mwt” will then be registered under the [Libraries] folder in the project tree.

3) Project tree registered in library
When a project for user-defined function or function block is registered in a library, the following project tree is displayed.

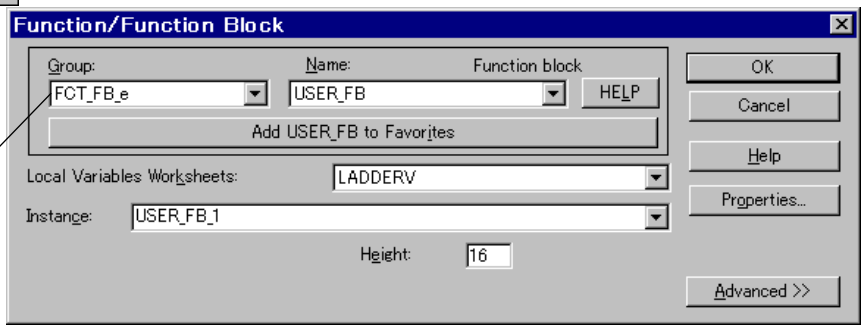


9-3-2 Calling a user-defined FCT/FB

How to describe user-defined functions and function blocks in the code worksheet of a POU is explained below.

1) Calling from the {Function/Function Block} dialog box

◊ Left-double-click the icon for the code worksheet to open the worksheet.
◊ Left-click in the code worksheet to set the insertion pointer.
◊ Left-click the [Function/Function Block] button to display the {Function/Function Block} dialog.



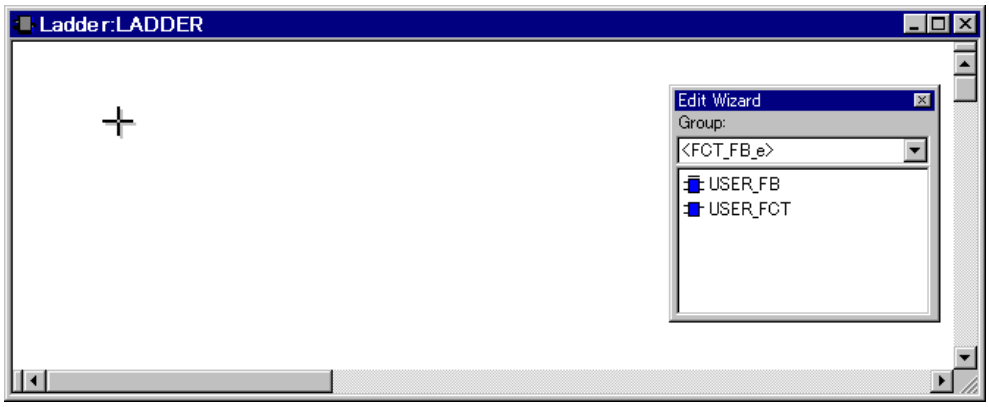
<Selecting user-defined function/function block>

◊ Select a “project name” of the user-defined function/function block from the [Group:] list box in the dialog.
◊ Select a “POU name” of the user-defined function/function block from the [Name:] list box in the dialog.
◊ When the function block has been selected, input an “instance name,” and left-click the [OK] button. The function/

function block will then be inserted in the code worksheet.

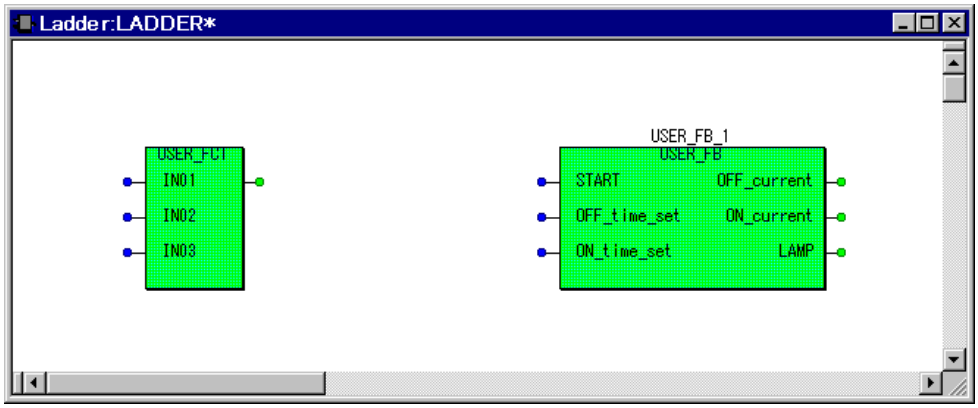
2) Calling from the {Edit Wizard} window

◊ Open a code worksheet, and left-click in it to set the insertion pointer.



◊ Select a “project name” of the user-defined function/function block from the [Group:] list box.

◊ Left-double-click a “POU name” of the user-defined function/function block in the instruction list box.
When the function block has been selected, the {Function Block Instance} dialog will appear on the screen. In this case, input an “instance name,” and left-click the [OK] button.
The function/function block will then be inserted in the code worksheet.



Section 10 Using an Existing Project

page

Section 10 Using an Existing Project

10-1 Copying a Project

You may occasionally wish to use an existing project in whole or in part (for example, a POU) to create a new project. This section focuses on the work of using an existing project to create a new one.

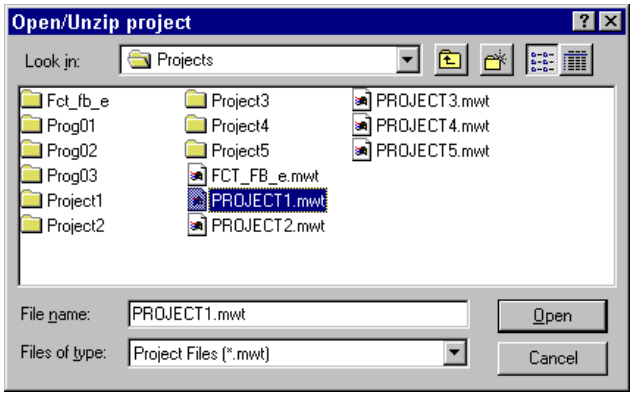
To change part of an existing project and use it as a new project with a different name while keeping the original project intact, save the existing project with a different name, and then change the saved project.

If an existing project is changed, its previous condition before being changed can no longer be saved. Before changing a project, be sure to make a copy.

10-1-1 Making a copy of a project

1) Open an existing project

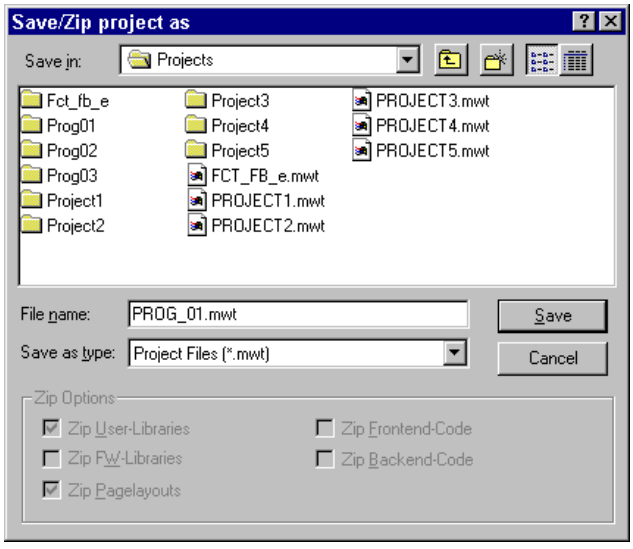
◊ Select the [Save Project As/Zip Project As ...] command on the [File] menu. The {Open/Unzip Project ...} dialog box will open.



◊ Select the [drive], [folder], and [file name] under which the existing project is stored and left-click the [OK] button.
The existing project (tree) will appear.

2) Save the new project under a different name

◊ Select the [Save Project As/Zip Project As ...] command on the [File] menu. The {Save/Zip Project as ...} dialog box will open.



◊ Select the drive and folder to which to save the edited version of the project, and type the file name in [File name].

◊ After confirming the dialog box, left-click the [OK] button.
The existing project appearing onscreen will be replaced with the new project you have just saved.

With D300win, you can register a library of up to existing projects, so that programs (POUs), user-defined function blocks, user-defined functions and data type definition which are used in registered projects can be reused (except for the [Physical Hardware] subtree). A library editor lets you reference (but not edit or print) the internal information.

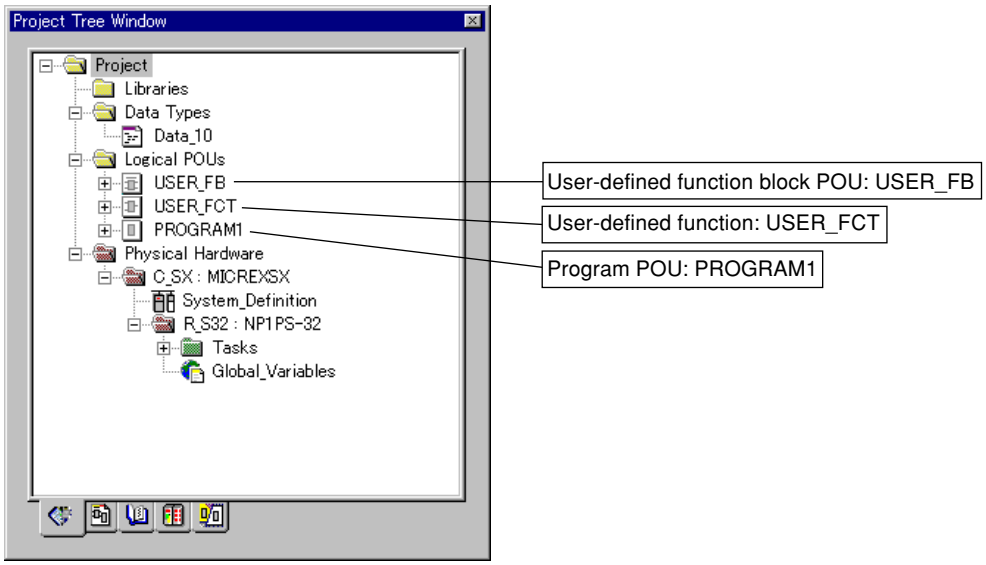
If a main program which has the same name as a POU in a registered project already exists, that POU will be disabled (cannot be used).

10-2-1 Library registration

This paragraph describes how to register a project (file) in a new project library (folder).

(1) Project to register and its contents

The project shown below is registered in a library.

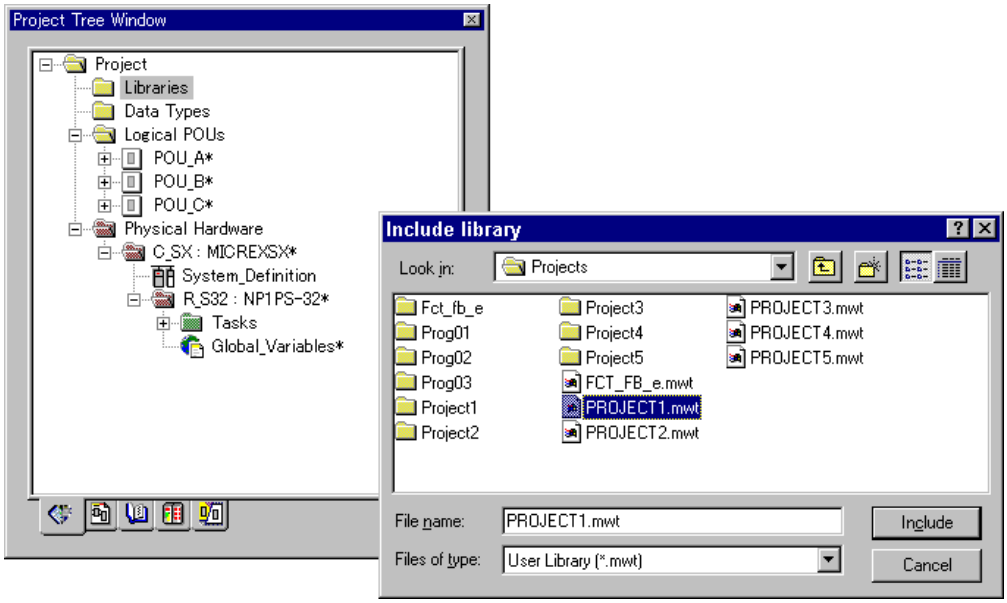


The project to be registered in the library must be compiled prior to registration. If a compile error is detected, correct the error before re-compilation.

(2) How to register a library

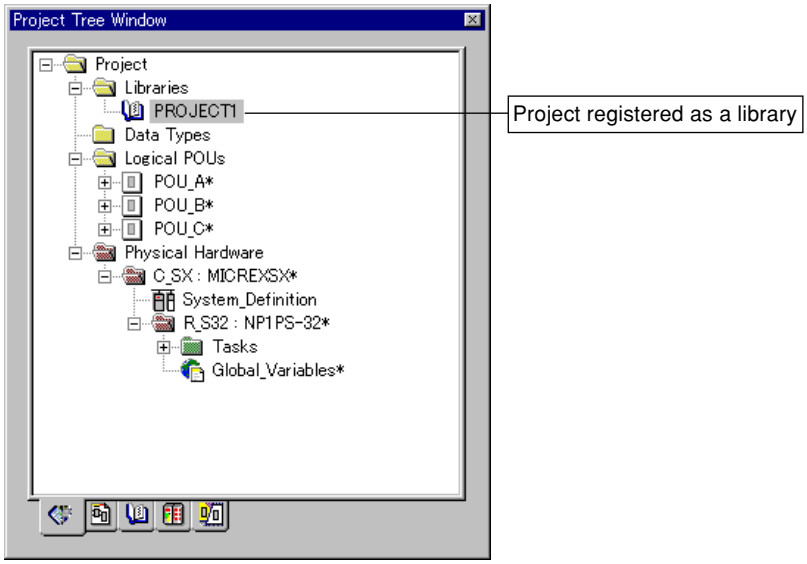
◊ Open a new or existing project.

◊ Left-click the [Libraries] subtree in the project tree, and left-click the [Insert] button. The {Include library} dialog will then appear on the screen. This dialog can also be displayed when the [Libraries] is right-clicked to display the shortcut menu and the [Insert...] command is left-clicked.



◊ Select a project to be registered as a library.
In this example, [PROJECT1.mwt] is selected.

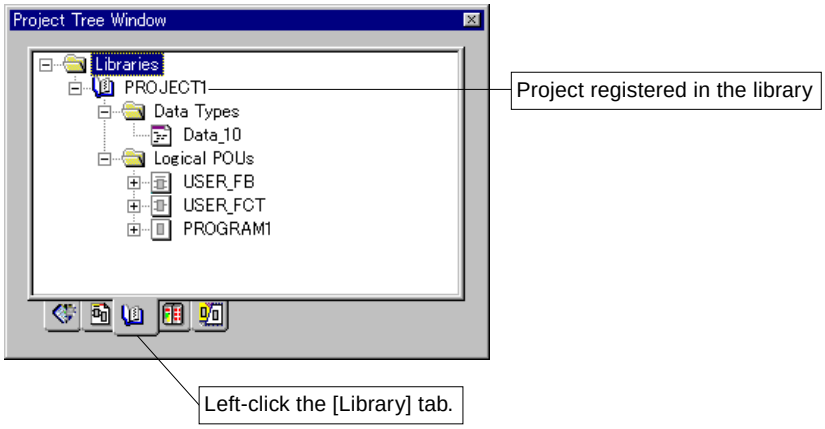
◊ Left-click the [Include] button.
The project named [PROJECT1.mwt] will then be inserted in the subtree of the project tree as shown in the figure below.



(3) Displaying the registered project

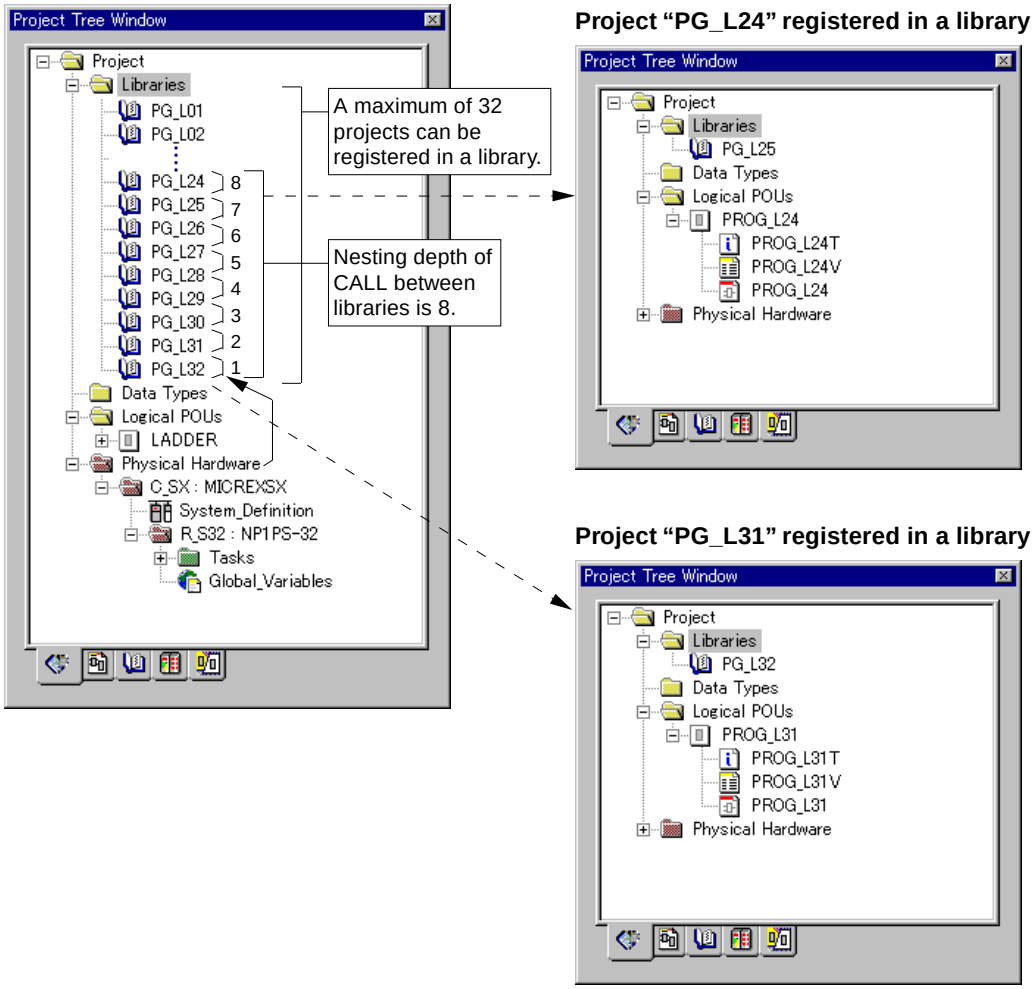
The project registered in a library can be displayed for confirmation. However, it cannot be edited.

◊ Left-click the [Library] tab to turn on the tab at the bottom of the project tree window. The project “PROJECT1.mwt” registered in the library will appear in the window.



(4) Precautions for registering projects in a library

There are some restrictions on registering projects in a library:



10-2-2 Using a library

(1) Using functions/function blocks

The user-defined functions and user-defined function blocks in a project that is registered in a library appear in [Name:] (name list) in the {Function Block/Function} dialog box that opens when you edit a code worksheet. Instructions on using a library are given below.

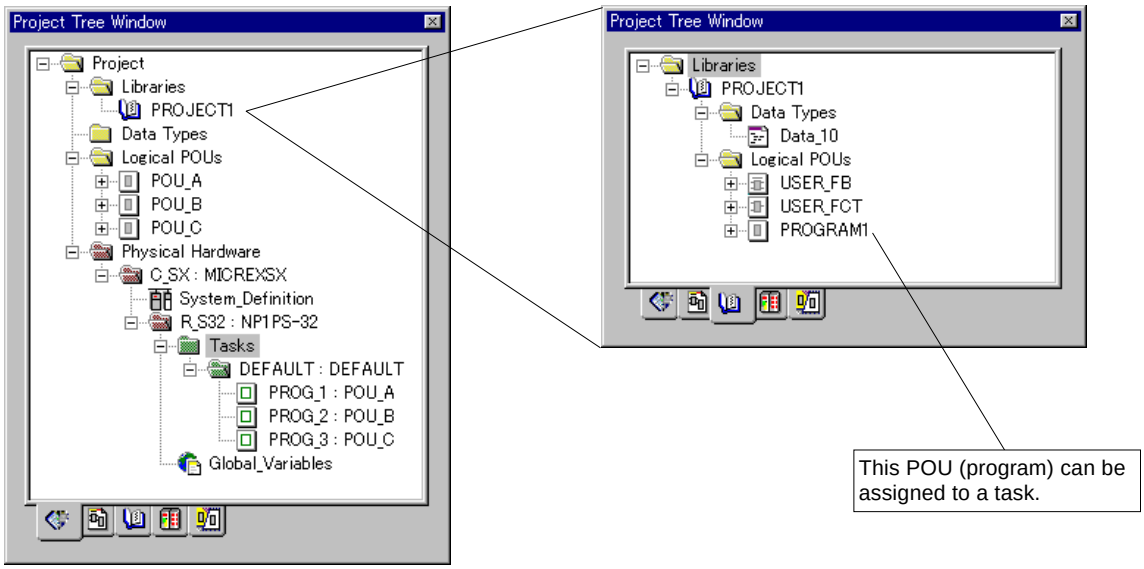
The user-defined functions and user-defined function blocks are also included in the name list during use of the Edit Wizard.

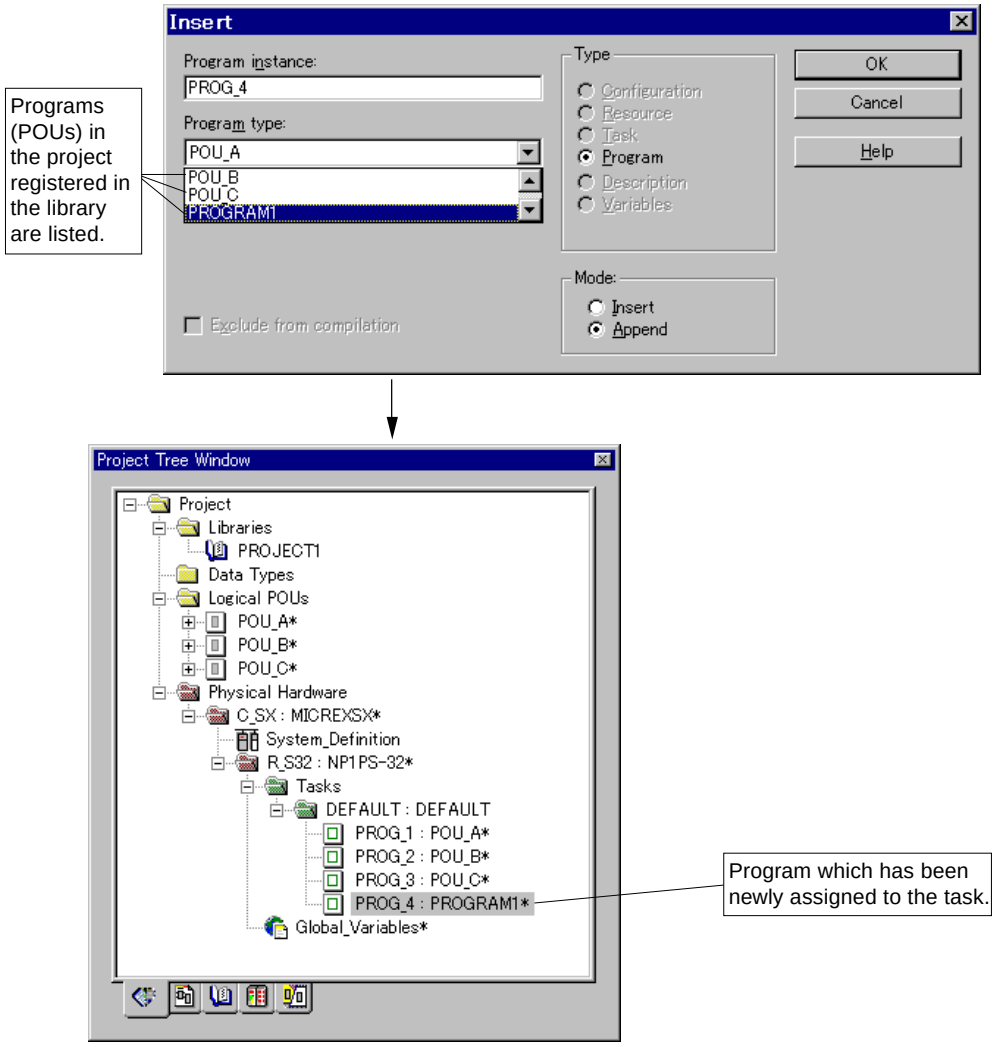
For details on how to describe a user-defined function and a user-defined function block in a code worksheet, see “9-3-2 Calling a user-defined FCT/FB.”

(2) Using programs

You can run programs (POU) that are in a project registered in a library by assigning them to tasks. An example of assigning programs to tasks is shown below.

The following project is used as an example for explanation.



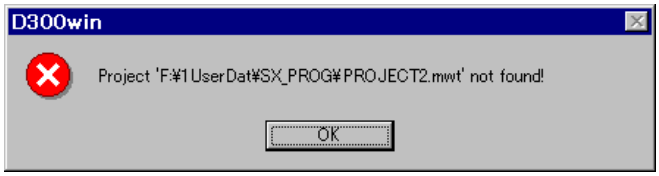


For information on assigning programs to tasks, refer to Section 11, “PC Structure/Operation Definition.”

10-2-3 Changing the path to a library file

Even when a library is registered in a project, no project file is saved in the library folder, but instead the path data (link data) for project files is set. Therefore, if the path to a project file registered in a library is changed (if the file storage location is changed), the project cannot be opened.

When the path data for a project file registered in a library is changed, the following message is displayed on the screen if you attempt to open the project.



◊ In this condition, left-click the [OK] button to close the message box.
The {project tree window} will then be displayed.

If the path information of the project file registered in the library has been changed, delete the file registered in the [Libraries] subtree in the project tree window, and then re-register it in the [Libraries] subtree.

10-2-4 Deleting a registered library

<How to delete a library>

◊ Right-click the icon of the library to be deleted, and left-click the [Delete] command in the shortcut menu.
The confirmation message is then displayed.

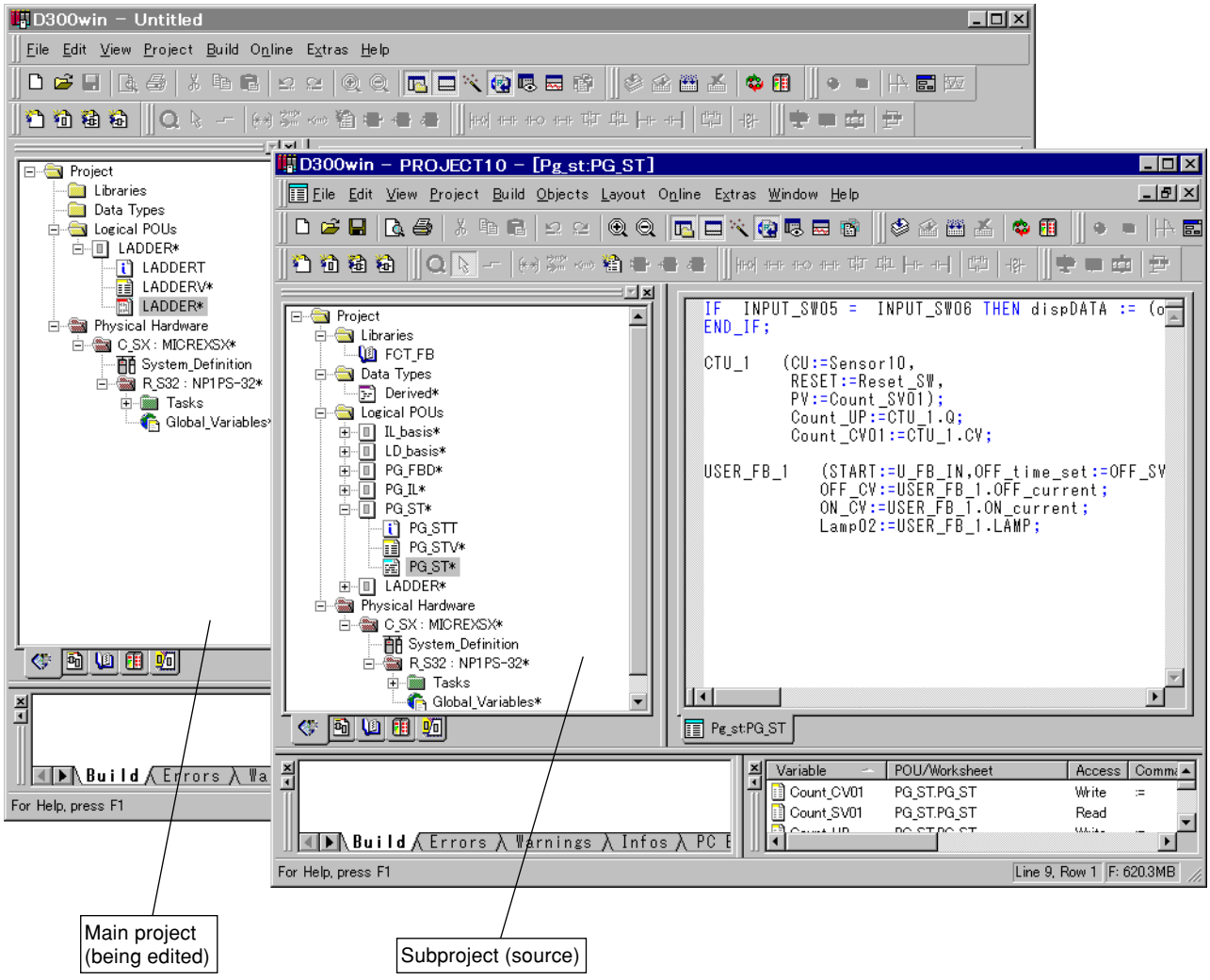
Left-click the [OK] button, and the registered library will be canceled (registration cancel).

Note: The moment a library is deleted, the FCTs and FBs that are used in the library (the FCTs and FBs that do not exist in the current project) are also deleted. Therefore, a program error will occur if this POU is used in a program.

When creating a project, it is possible to use a part (for example, POUs and worksheet) of the project. It is also possible to use part of another project.
In both cases, the clipboard function is used. In addition, when graphic language is used, code (program) can be copied into a file to be used.

10-3-1 Opening a project other than that being edited

In addition to a copy destination project (main project being edited), open a copy source project (subproject). However, it is possible in the D300win system to handle only one project. Thus, it is necessary to start another D300win system to open the subproject in addition to the D300win system currently used for project edit.



10-3-2 Using POUs

This paragraph describes an example for using POUs or individual worksheets (description worksheet, variable worksheet, and code worksheet) composing a POU.

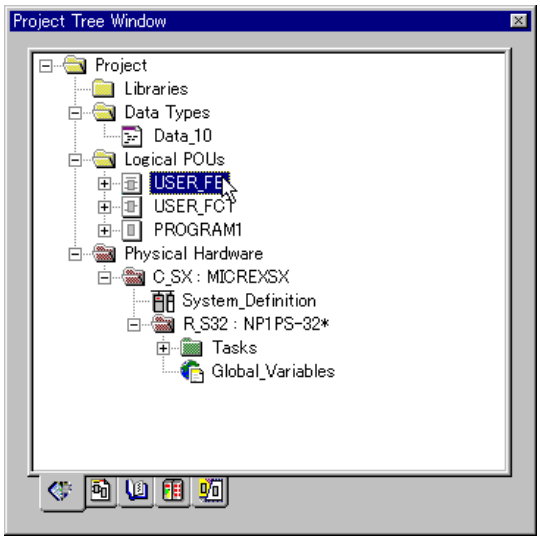
1) Copy and use a POU
2) Copy and use individual worksheets
3) Copy and use objects in the worksheet

(1) Selecting objects in the project tree

The following explains how to select the source object (POU or worksheet).

1) Selecting one object

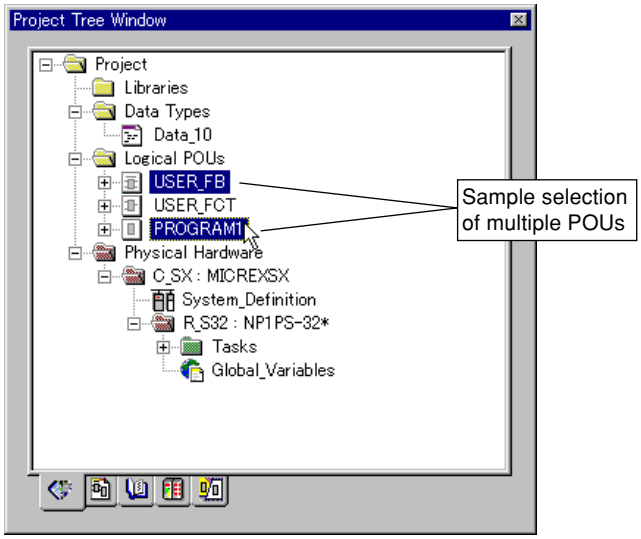
◊ Move the mouse pointer onto the object to be selected, and then left-click to select the object.

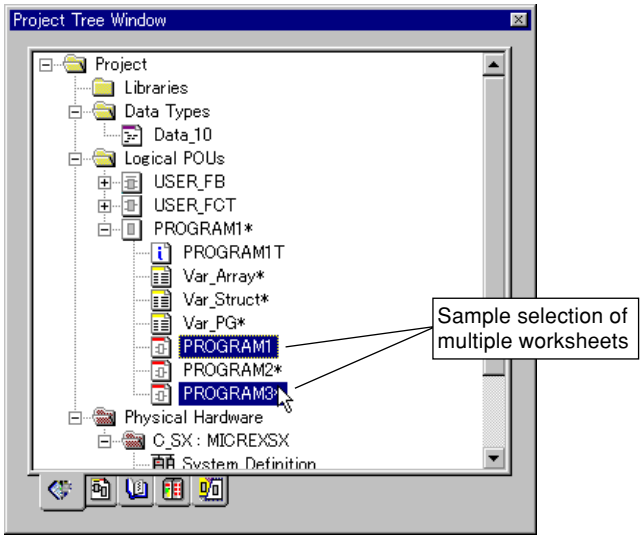


2) Selecting multiple objects individually

◊ Move the mouse pointer onto the first object to be selected, and then left-click to select it.

◊ While pressing <Ctrl>, move the mouse pointer onto another object to be selected, and then left-click to select it.

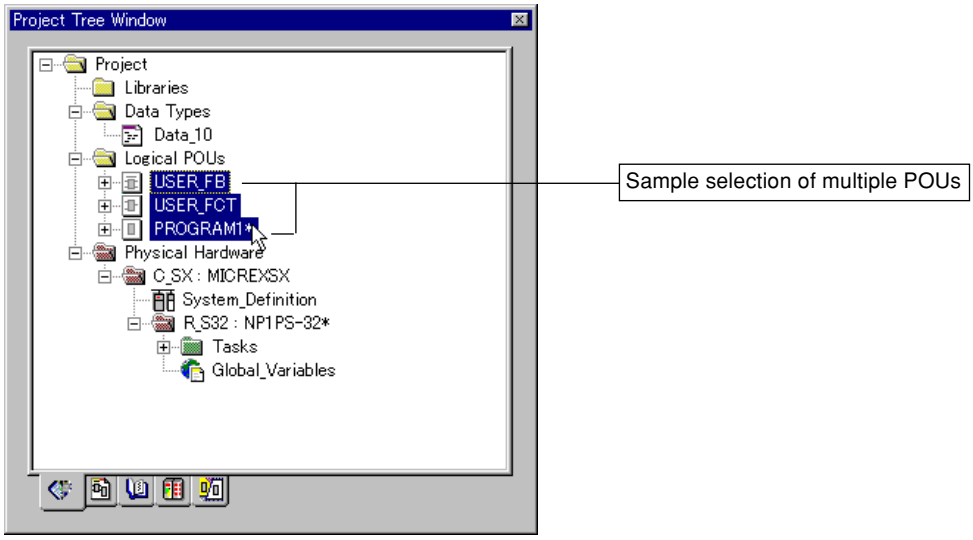




3) Selecting objects in series

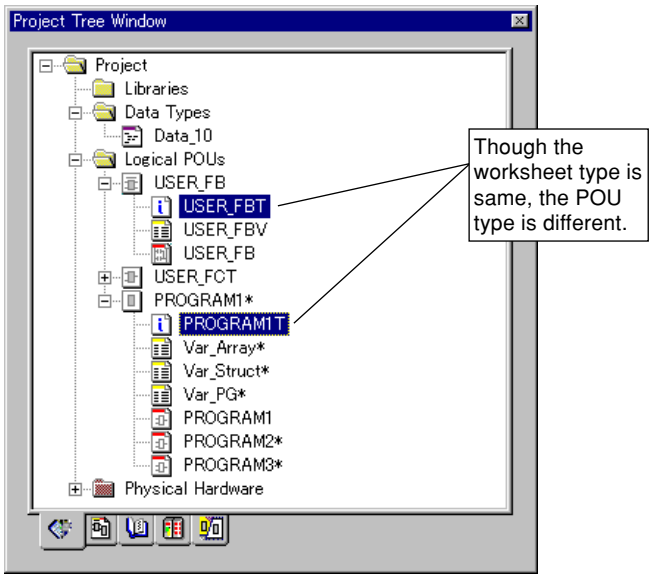
◊ Move the mouse pointer to the first object to be selected, and then left-click to select it.

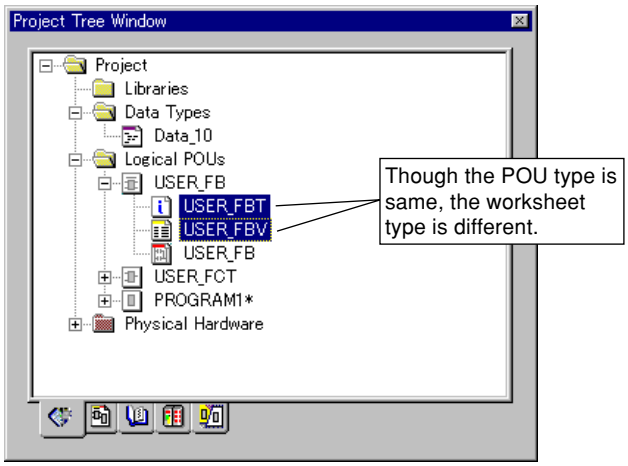
◊ While pressing <Shift>, move the mouse pointer onto the last object to be selected, and then left-click to select multiple objects.



4) Objects for which multiple selection is not possible

It is not possible to select multiple worksheets of different POUs or multiple worksheets (for example, variable worksheet and code worksheet) in the same POU. Examples are shown in the figures shown below.

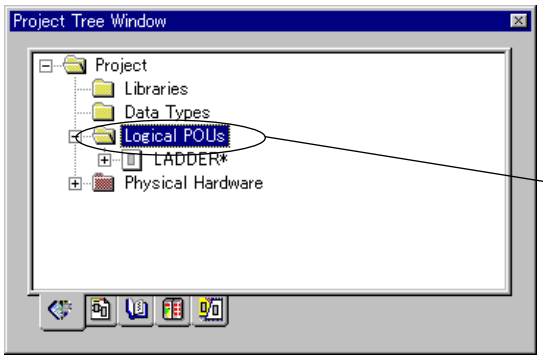




The copy or cut function cannot be used when the objects are selected as shown in the figures above.

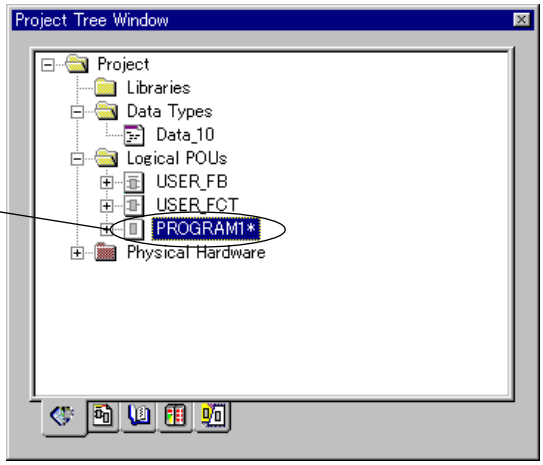
(2) Copying and using a POU
Copy one or more POUs in the subproject, and paste into the main project.

Main project

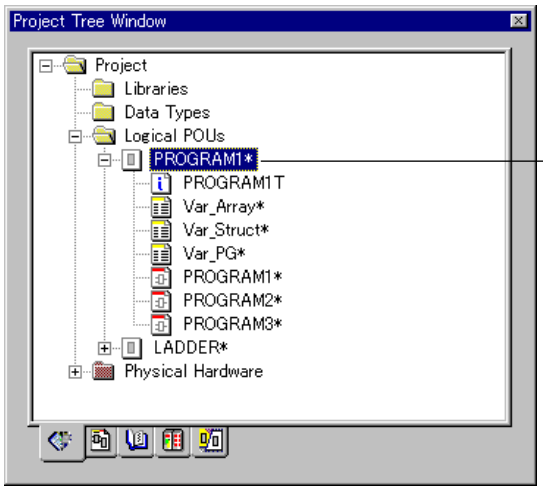


Copy and paste POU.

Subproject



◊ Left-click the icon of the target object to be copied in the subproject.
◊ Left-click the [Copy] button, or alternatively right-click to display the shortcut menu and left-click the [Copy] command in the menu.
◊ Left-click the destination [Logical POUs] icon in the main project to select it.
◊ Left-click the [Paste] icon, or alternatively right-click to display the shortcut menu and left-click the [Paste] command in the menu.



POU that has been added

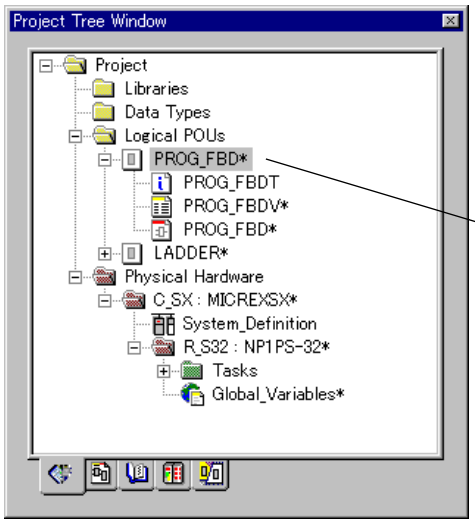
(3) Copying and using a worksheet

Copy one worksheet (description, variable, or code) composing a POU in the subproject, and then paste it in a POU in the main project.

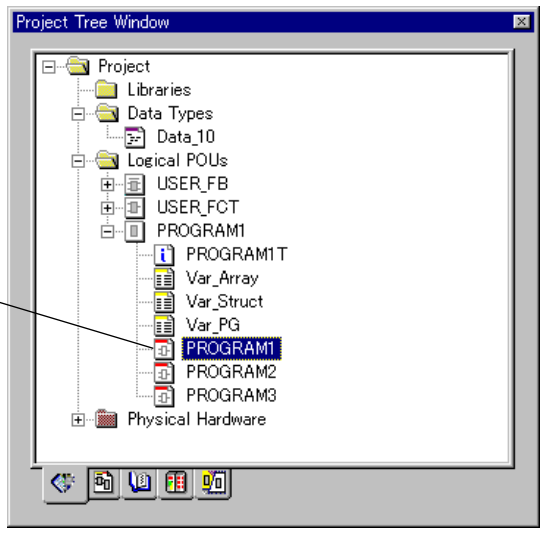
◊ Insert the destination POU into the main project beforehand. (Match the POU type.)

◊ Left-double-click a worksheet icon in the subproject to expand it.

Main project



Subproject



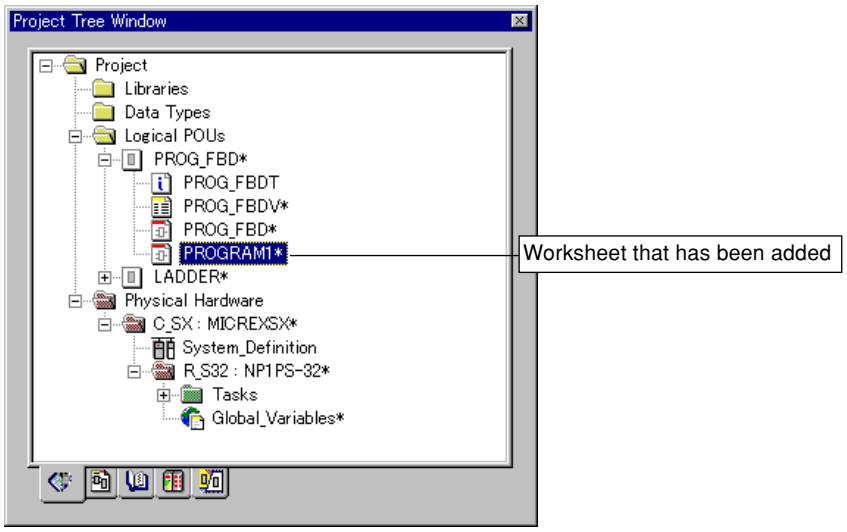
Copy and paste POU.

◊ Left-click the code worksheet icon in the POU to select it.

◊ Left-click the [Copy] button, or alternatively right-click to display the shortcut menu and left-click the [Copy] command in the menu.

◊ Left-click the destination POU icon in the main project to select it.

◊ Left-click the [Paste] button, or alternatively right-click to display the shortcut menu and left-click the [Paste] command.



Worksheet that has been added

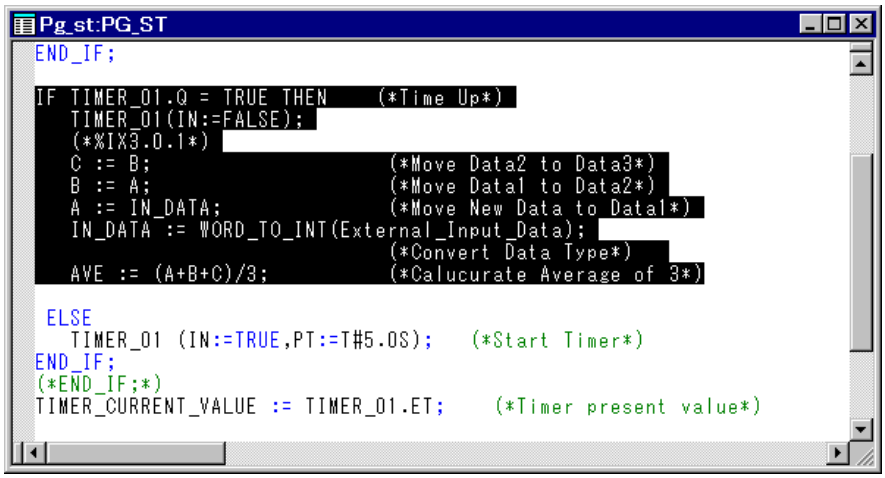
The POUs of a subproject that has been opened in the view mode have <Independent> properties for both “PC type” and “CPU type.” When copying POUs and worksheets to a MICREX-SX or MICREX-SX simulator project, change the properties of the destination POUs and worksheets before compiling them.

(4) Copying and using an object in a worksheet

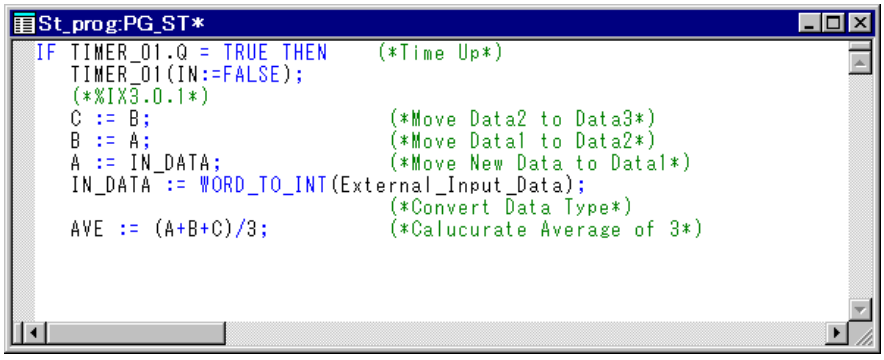
1) Using the copy&paste operation

You can copy and use an object or text in a worksheet (description, variable, or code) in a POU in the subproject.
The following shows an example of using a portion of a program written in the ST language.

◊ Insert the ST language POU into the main project.
◊ Open the source and destination worksheets (by activating the text editor).
◊ Select the source object to copy from.



◊ Left-click the [Copy] button, or alternatively right-click to display the shortcut menu and left-click the [Copy] command.
◊ Left-click in the destination worksheet to set the point of insertion.
◊ Left-click the [Paste] button, or alternatively right-click to display the shortcut menu and left-click the [Paste] command.



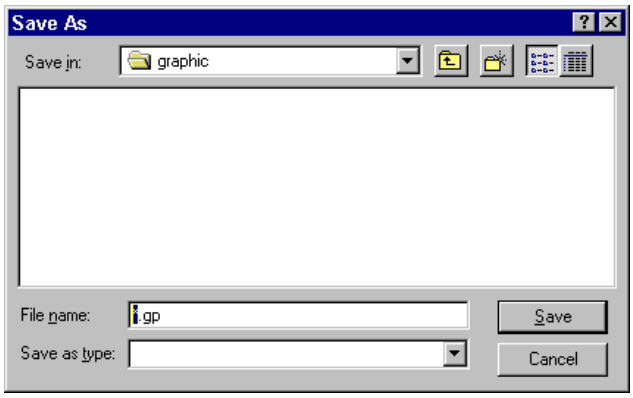
2) Using a graphics file

You can copy all objects in a code worksheet (languages which use the graphics editor: SFC element, FBD language, or LD language) which are in a POU in the subproject into a D300win graphics file(.gp) and use them.

* You can copy both main project and subproject graphics to graphics files.

◊ Open the destination worksheet (by activating the graphic editor).
◊ Select all objects in the code worksheet.
Activate the code worksheet, and then left-click the [Select All] command in the [Edit] menu.

◊ Left-click the [Copy to ...] command in the [Edit] menu. The {Save As} dialog will open for saving the objects in a graphic file.



◊ Select the archive drive and folder to save the objects, and type a file name.
◊ Left-click the [Save] button to save the objects.

<Pasting graphics>

◊ Open the destination code worksheet to copy to (which must be blank), and left-click the point of insertion.
◊ Left-click the [Import from...] command in the [Edit] menu.
The {Open File} dialog will open.
◊ Select the archive drive, folder, and file name to save the objects.
◊ Left-click the [Open] button.
Data from the graphics file will be pasted to the worksheet.

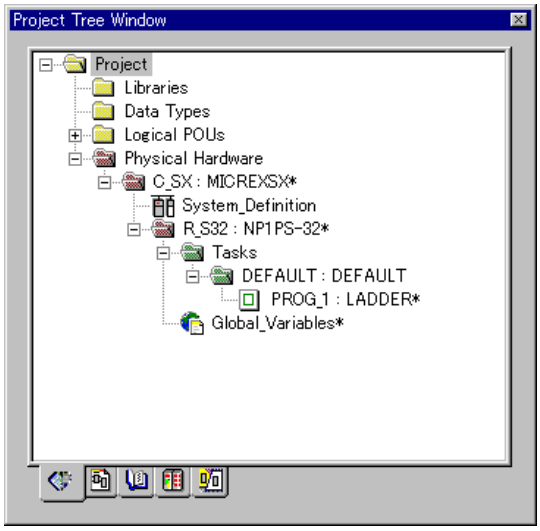
Section 11 PC Structure/Operation Definition

page

11-1-1 Physical hardware folder overview

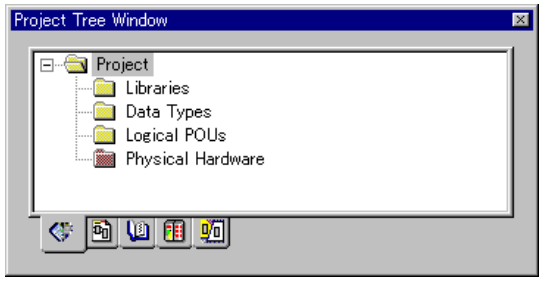
In addition to the program of a project, define the structure and operations of the PC system.
Definitions of the structure and operations of the PC system are configured in the [Physical Hardware] subtree in the project tree as shown below.

[MICREX-SX] template



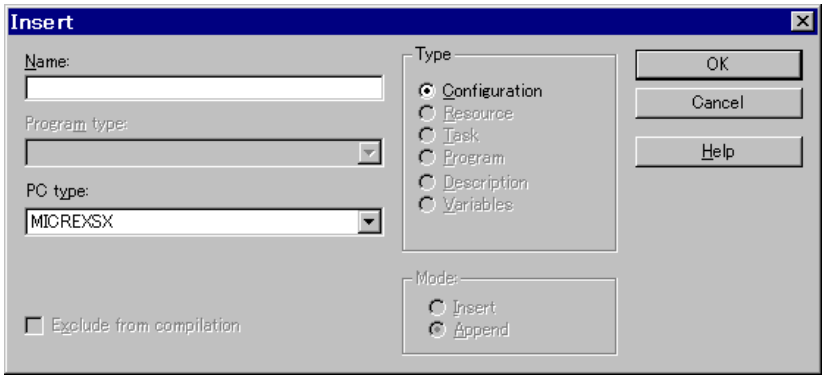
The figure at left shows the initial project tree structure that appears when you have selected [MICREX-SX Template] during new project creation.

[New] template



The figure at left shows the initial project tree structure that appears when you have selected [New Template] during new project creation.

When you create a new project using the [MICREX-SX Series] template, one configuration, one resource, and one task are created in the project tree as shown above. You can use the project tree editor to add additional configurations, resources, or tasks. Additional configurations, resources, and tasks are essentially inserted the same way, via the {Insert} dialog box shown below.



This section provides instructions on registering configurations and resources in a project tree that has been created using the [New] template (with the [Physical Hardware] subtree being left blank).

For further information about defining the operations of a CPU, refer to the “Instructions No. FH200”.

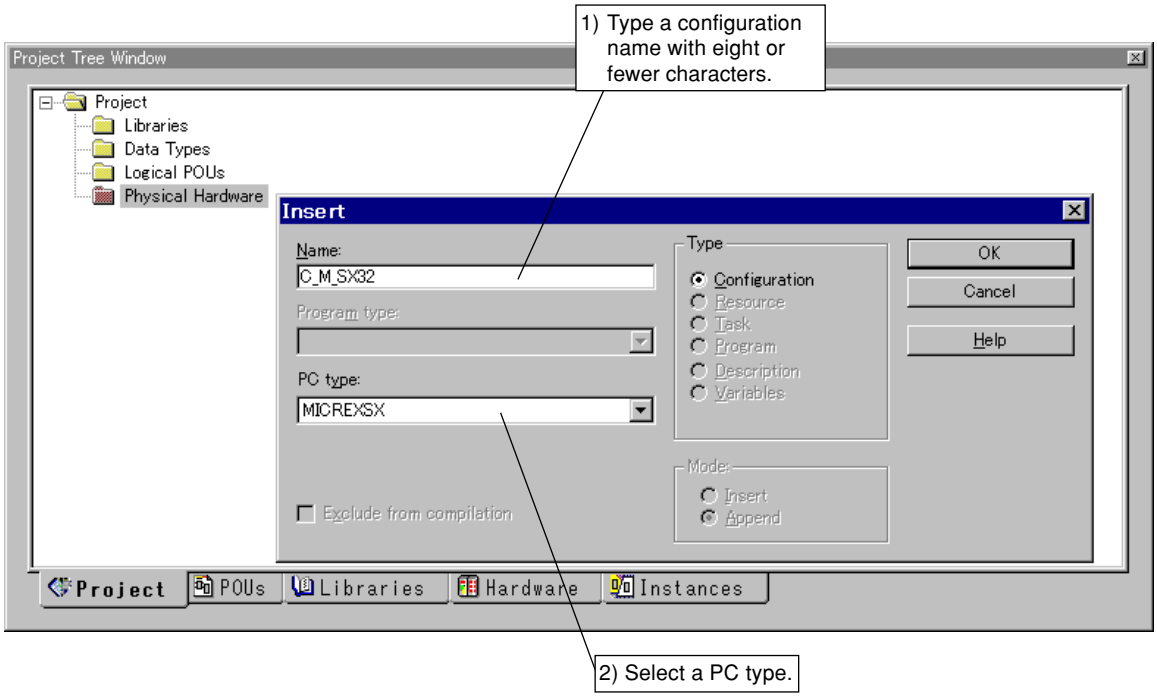
11-1-2 Editing the structure of the [Physical Hardware] subtree

The structure of the [Physical Hardware] subtree must be defined to reflect the structure of the working PC system.
The structure of the [Physical Hardware] subtree is programmed by using the project tree editor in the same way as when the [Logical POUs] folder is programmed.

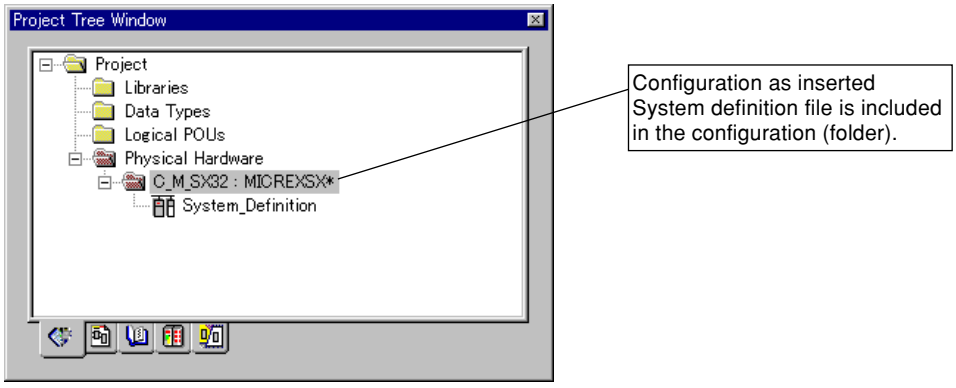
(1) Inserting a configuration

D300win allows the structure of the configuration elements that are defined on each PC to be displayed. Accordingly, the configuration elements that are available in the [Physical Hardware] subtree vary depending on the PC type.
One or more resources can be implemented (registered) in each configuration. Multiple programs which are assigned as multiple tasks can be used within these resources.

◊ Left-click to select the [Physical Hardware] icon.
◊ Left-click the [Insert] button, or alternatively right-click to display the shortcut menu, and then left-click the [Insert...] command in the menu.
The {Insert} dialog box will open.



◊ Type a configuration name in the [Name:] text box.
Specify with a maximum of 8 single-byte alphanumeric characters.
Type <C_M_SX32>.
◊ Select [MICREX-SX] from the [PC type:] list box.
◊ Left-click the [OK] button.
The configuration [C_M_SX32] and the system definition [System_Definition] icon will be inserted in the [Physical Hardware] subtree in the subtree.
To change the name of the inserted configuration, right-click the configuration to display the shortcut menu, and then left-click the [Property...] command in the menu to open the {Properties} dialog.

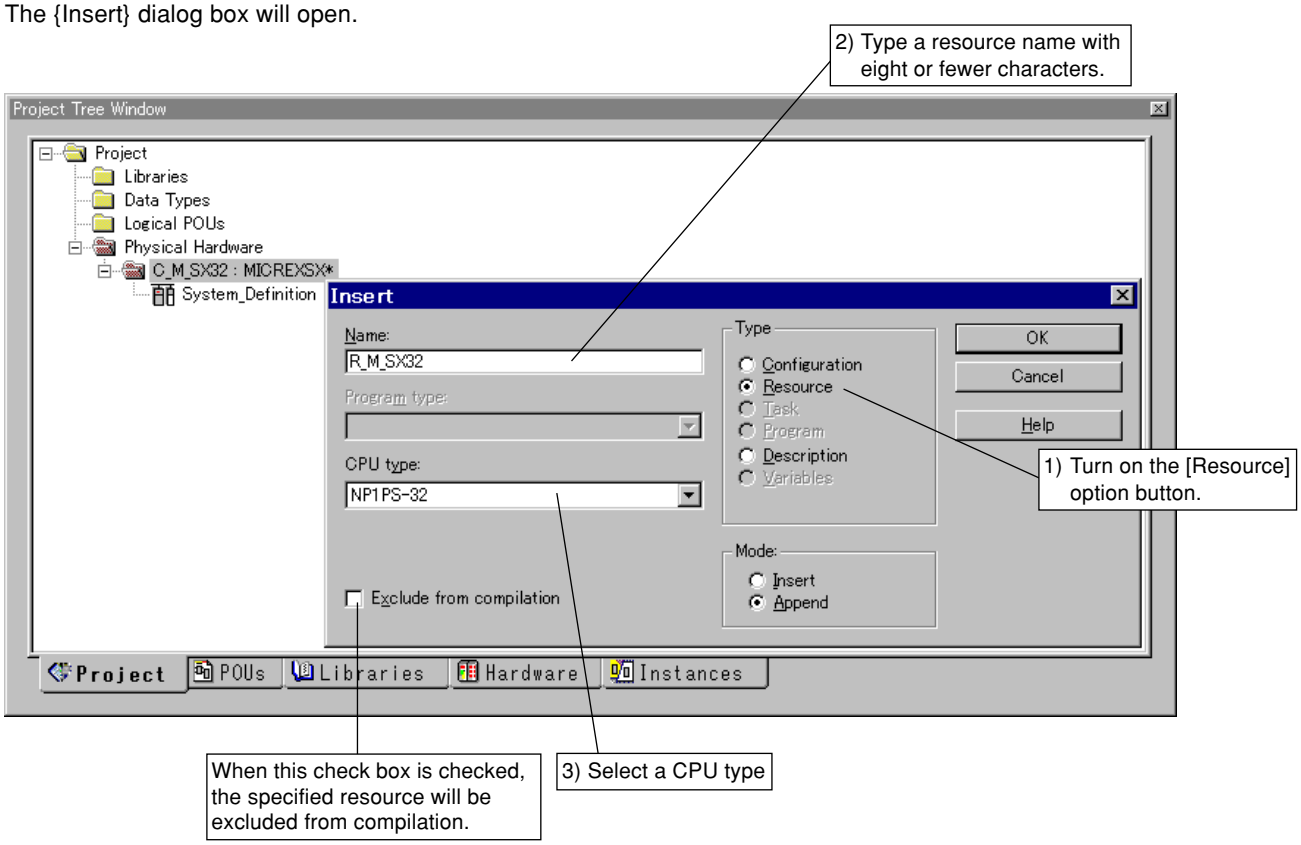


(2) Inserting a resource

Insert a resource (CPU module) into the configuration “C_M_SX32.”

◊ Left-click to select the configuration [C_M_SX32] icon.

◊ Left-click the [Insert] button, or alternatively right-click to display the shortcut menu, and then left-click the [Insert...] command in the menu.
The {Insert} dialog box will open.

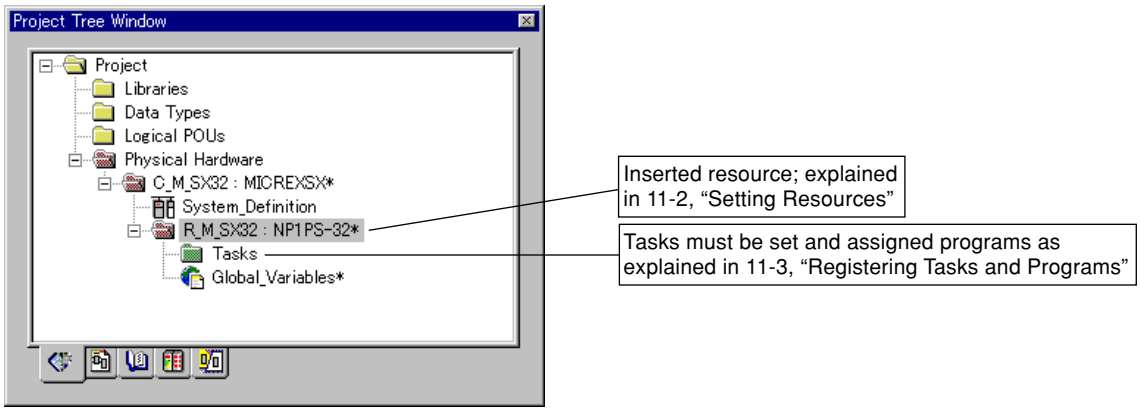


◊ Turn on the [Resource] option button in the [Group type] box.

◊ Type a resource name in the [Name:] text box.
Specify with a maximum of 8 single-byte alphanumeric characters.
Type <R_M_SX32>.

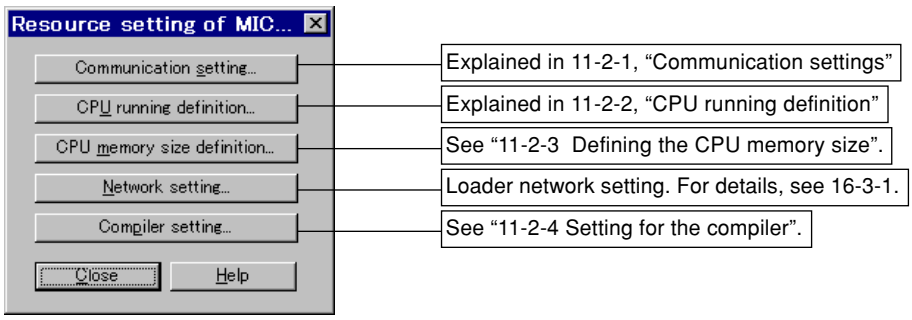
◊ Select [NP1PS-32] from the [CPU type:] list box.

◊ Left-click the [OK] button.
The resource [R_M_SX32] and the associated icon will be inserted in the configuration [C_M_SX32] as shown below.
To change the name of the inserted resource, right-click the resource to display the shortcut menu, and the left-click the [Property...] command in the menu to open the {Properties} dialog.



Program the basic settings of a resource (CPU module) and the settings needed to establish an online connection between resources and the D300win system. These settings are accomplished via the {Resource setting of MICREX-SX} dialog box shown below.

◊ Right-click the resource [R_M_SX32] icon to display the shortcut menu, and then left-click the [Settings...] command in the menu.
The {Resource setting of MICREX-SX} dialog box will open.



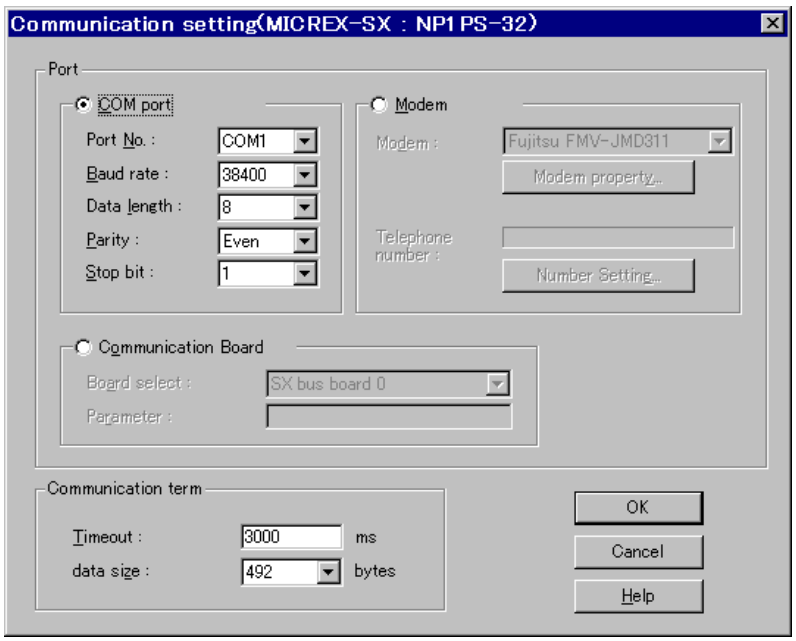
11-2-1 Communication settings

(1) D300win communications settings

There are two types of communication setting methods: connecting the D300win system and the PC main unit via RS-232C or via modem.

1) Fill in the {Communication setting} dialog box

◊ Left-click the [Communication setting ...] button in the {Resource setting of MICREX-SX} dialog box.
The {Communication setting (MICREX-SX: NP1PS-32)} dialog box will open.



For information about the entries in the dialog box, see 2).

◊ After confirming the dialog box, left-click the [OK] button.

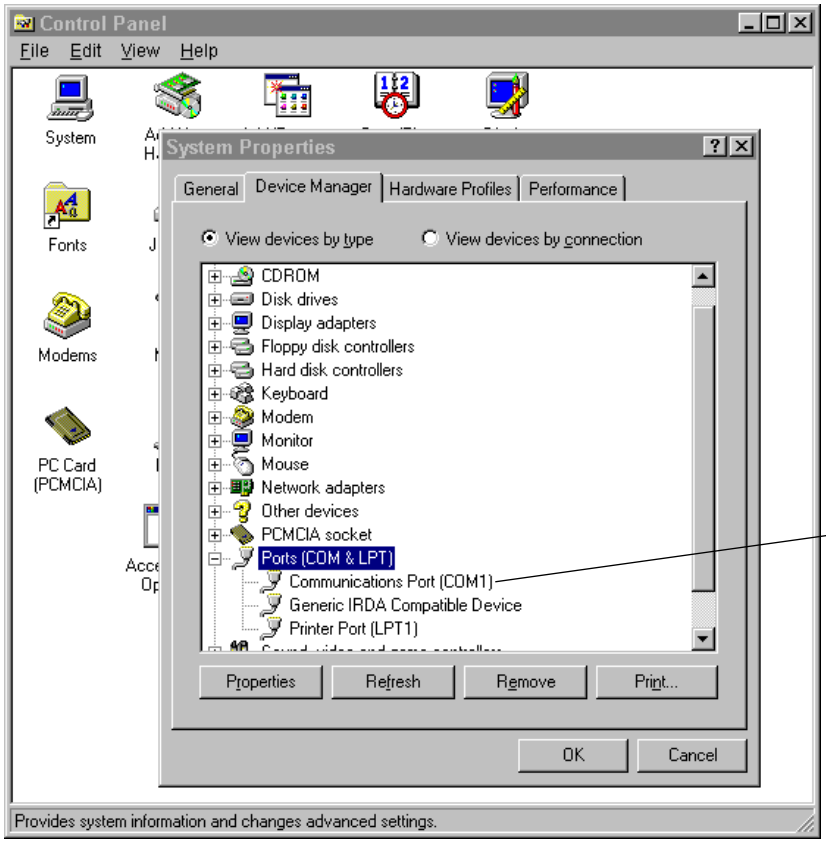
2) Communication settings

Dialog box field	Explanation
COM port	Indicates the COM port to which programs are transmitted. This port must agree with the COM port that has been assigned under Windows 95.
Baud rate	Specifies the baud rate for communication via the COM port. Select 38400 BPS to connect to a MICREX-SX PC.
Stop bit	Specifies the stop bit length for communication via the COM port.
Data length	Specifies the data bit length for communication via the COM port. This entry needs to be changed only when hardware requires different value. For details, see the PC hardware manual.
Parity	Indicates whether to use a parity bit for communication via the COM port.
Timeout	Specifies a timeout interval in milliseconds. D30win tries to establish a connection with the hardware during this interval. A timeout is indicated when this interval expires.
Communication data size	Set the maximum size of the data that is communicated with the PC.
Modem setting *	Selected for communicating with PC using the modem.
Modem	The model of the modem is selected. The modem set up to operating system is displayed.
Modem properties	The property of the modem is set. Please adjust this property when it is not possible to communicate well (not possible to connect, cut at the automatic operation etc.).
Number setting	The telephone number of the destination is input.
Type of communication board	Set when communicating with the PC using a path other than via the COM port.
Parameter	When communicating with the PC using a path other than via the COM port, necessary values are set. (1) When P-link board is used: Station No. of the other side Example: 15 (decimal) (2) When PE-link board is used: Station No. of the other side (Space) Local station No. Example: 63 0 (decimal) (3) When Ethernet is used: IP address of the other side (Space) Port No. Example: 192.0.0.7 507 (decimal) Note: When multiple parameters are input, insert a single-byte space character as the delimiter between parameters.

* The modem connection method uses the Windows standard TAPI (Telephony Application Programming Interface).

(2) Verify the personal computer settings
Set the COM port number selected in the {Communication setting (MICREX-SX: NP1PS-32)} dialog box to match to the RS-232C COM port number setting on the Windows 95 system to establish a connection between the D300win system (personal computer) and PC.

◊ Left-double-click the [System] icon in the [Control Panel].
The {System Properties} dialog box will open.
◊ Left-click the [Device Manager] tab.
◊ Left-double-click the [Ports (COM & LPT)] icon.
You can verify all the COM port settings under the Windows 95 system.
The screen shown below will appear.

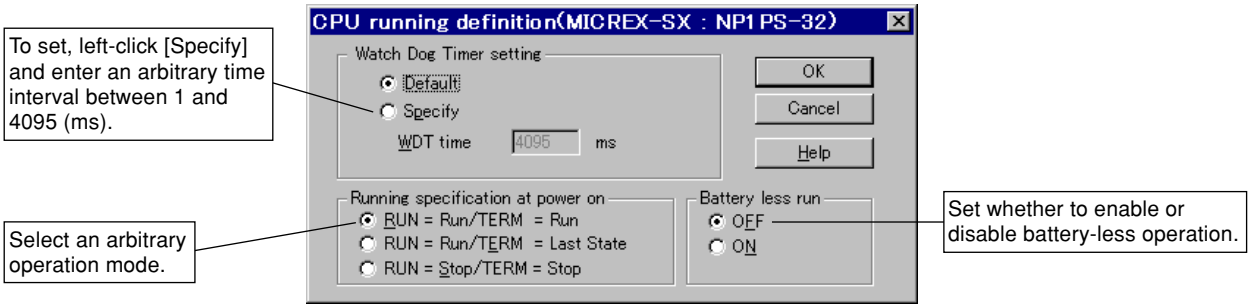


11-2-2 CPU running definition

In the CPU running definition process, program three items: watch dog timer setting, running specification at power on, and battery-less operation.

(1) CPU running definition settings

◊ Left-click the [CPU running definition ...] button in the {Resource setting of MICREX-SX} dialog box.
The {CPU running definition (MICREX-SX: NP1PS-32)} dialog box will open.



◊ Turn on either option button in the [Watch dog timer setting] box.
◊ If the optional [Specify] button is turned on, an arbitrary time interval can be input to the [WDT time] text box.
◊ Turn on either option button in the [Running specification at power on] box.
◊ Turn on either option button in the [Battery-less run] box.
◊ After finishing setting all the items, left-click the [OK] button.

(2) Definitions of setup items

1) Watch dog timer setting

The watch dog timer interval can be set between 1 and 4095 (ms). The default is 4095 ms.

2) Running specification at power on

Specify the way the CPU module works at system power-on when the key switch on the front panel of the CPU module is set at the RUN or TERM position.

The table below shows the operations of the CPU module relative to this setting and the position of the key switch on the front panel of the CPU module.

<Operations of the CPU relative to the key switch position>

System definition setting	Operation	
	RUN	TERM
RUN = Run/TERM = Run	Running	Running
RUN = Run/TERM = Last State	Running	Previous state (Note)
RUN = Stop/TERM = Stop	Stopped	Stopped

Note: The previous state is the state in which the CPU had been in when the system was shut down. The previous state is running if the CPU had been running, or it is stopped if the CPU had been stopped.

3) Battery-less operation

In battery-less operation, the CPU module will initialize the entire memory before starting an initial start sequence. Data backup errors are not monitored.

11-2-3 Defining the CPU memory size

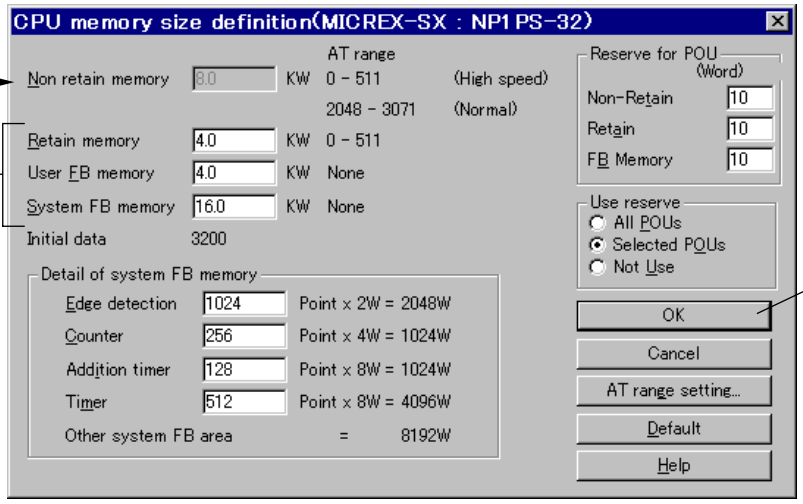
How to set the size of data memory in the CPU module is explained below.

The user memory area of 32k words is specified as the default size. However, the memory area including the user memory area can be changed in 0.5k-word steps as necessary.

(1) CPU memory size settings

◊ Left-click the [CPU memory size definition ...] button in the {Resource setting of MICREX-SX} dialog box, and the {CPU Memory Size Definition (MICREX-SX)} dialog box will appear on the screen.
The items to be set are [Retain memory], [User FB memory] and [System FB memory]. Set these memory capacities. The capacity of [Non retain memory] is the remaining capacity of the data memory. (These capacities can be set in 0.5k-word steps.)

For the high-performance CPU (NP1PS-□□), all the remainder after setting these 3 memory capacities will become the capacity of non-retain memory.
For the standard CPU (NP1PH-□□), the non-retain memory capacity can also be set by the user and the remainder will have initial data.

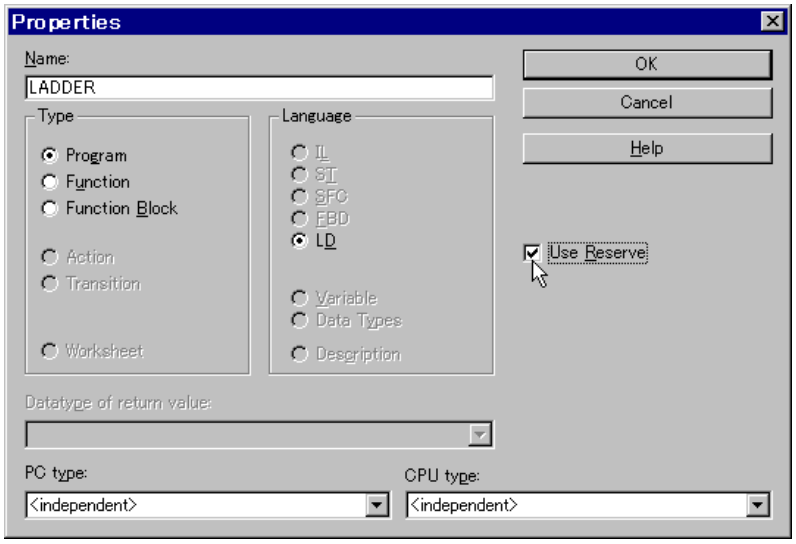


After setting the capacity of each memory area, left-click this button.

◊ Input the size of each memory in the text box. (For the input range, see “(2) Changing range of each memory area”.)

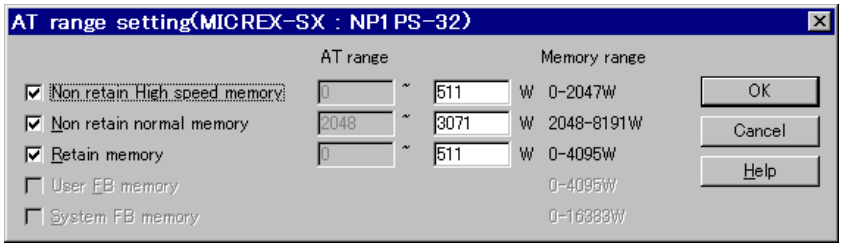
<Setting the reserve size of each POU>
Reserve size is the memory size used to add new variables with the POU change function (10 words are assigned to each memory as the default).

◊ Reserve size is specified in word size for each of non-retain memory, retain memory, and user FB memory
◊ The reserve usage mode is specified with the optional buttons in the [[Use reserve] box.
• [All POUs] ..... Reserve is used in all POUs in the project tree.
• [Selected POUs] ..... Reserve is used in the POUs for which the [Use reserve] box is checked in the {Properties} dialog box for the POUs.
• Do not use ..... Reserve is not used.



<Setting AT range>
AT range is the memory available for the user to specify memory allocation for variables (directly specifying with expression variables).
No variable is automatically assigned inn the memory area specified by [AT range].

◊ Left-click the [AT range setting ...] button in the {CPU Memory Size Definition (MICREX-SX)} dialog box, and the {AT range setting} dialog box will appear on the screen.



◊ After setting, left-click the [OK] button, and you will return to the {CPU Memory Size Definition (MICREX-SX)} dialog box.
◊ After setting each item, left-click the [OK] button.

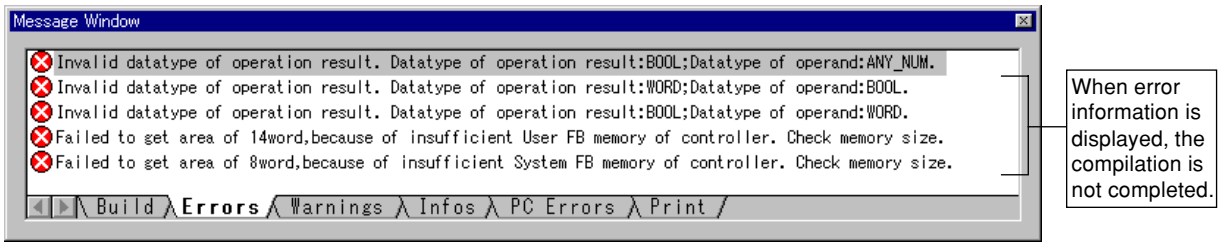
(2) Changing the range of each memory area
The size of user memory area can be changed in the following ranges. However, 32k words (total user memory area) is fixed. For example, when standard memory is set to 32k words, other memory areas are all set to zero.

Type of memory	Minimum value	Initial value	Maximum value
Standard memory (non-retained memory) (%MW1)	2k word	8k words	32k words
Retained memory (%MW3)	0k word	4k words	32k words
Instance memory for user FB (%MW5)	0k word	4k words	32k words
Instance memory for system FB (%MW9)	0k word	16k words	16k words

* The table above shows the memory setting range of “high-performance CPU (NP1PS-32).” When using the standard CPU, refer to the Instructions of the User’s Manual <FEH200>.

When a function block (system FB or user FB) is used, “2 words” of non-retain memory outside the AT range will be consumed. To use the function block, define the CPU memory size to reserve the necessary amount of non-retain memory capacity outside the AT range.

(3) Guideline for setting the size of each memory area
This can be checked on the {Error List} dialog box that is displayed when a project is compiled.



When the “memory shortage” error is displayed as shown in the above figure, change the setting by adding to the memory size to make up for the shortage, then re-compile.

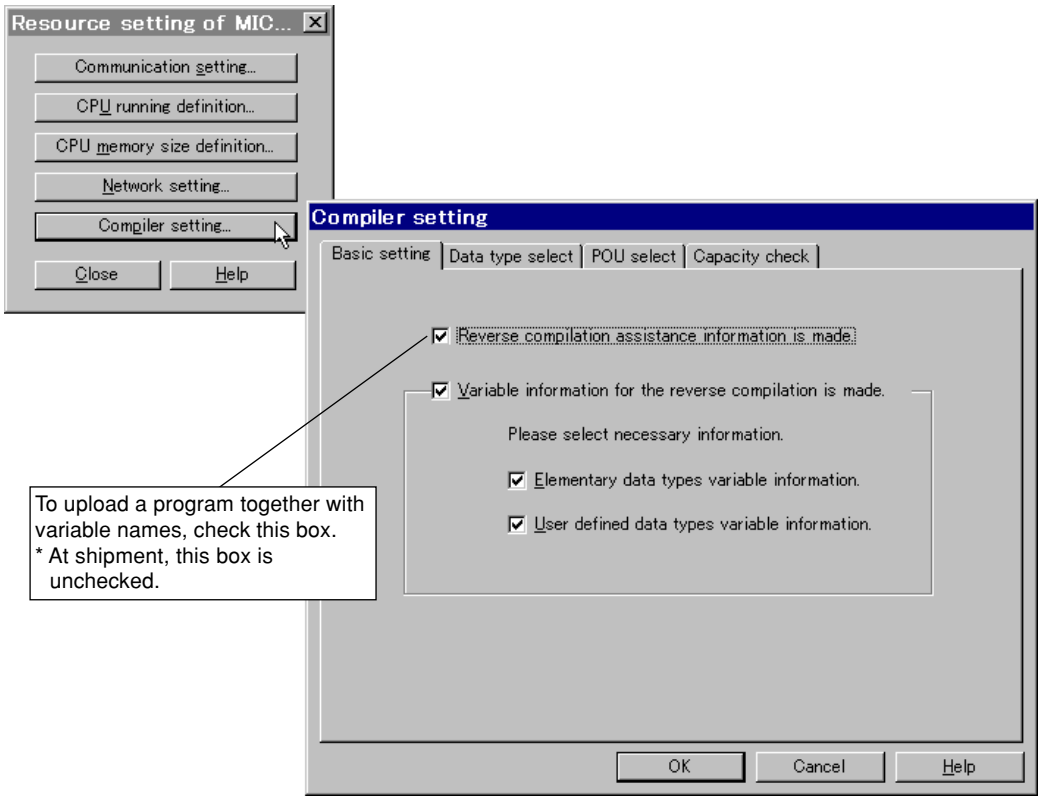
For a detailed explanation of compilation, see “12-1 Compiling projects”.

11-2-4 Setting for the compiler

This setting is necessary to upload a program and variable names (compressed file) which are downloaded from D300win into PC (CPU module).

When variables information is added, compilation time increases, and the data which is downloaded to the PC after compilation becomes larger in volume.

◊ Left-click the [Compiler setting ...] button in the {Resource setting of MICREX-SX} dialog box, and the {Compiler setting (MICREX-SX)} dialog box will appear on the screen.
The {Compiler setting} dialog will then appear on the screen (with the [Basic setting] panel open).
◊ After setting, left-click the [OK] button.



<[Basic setting] panel>

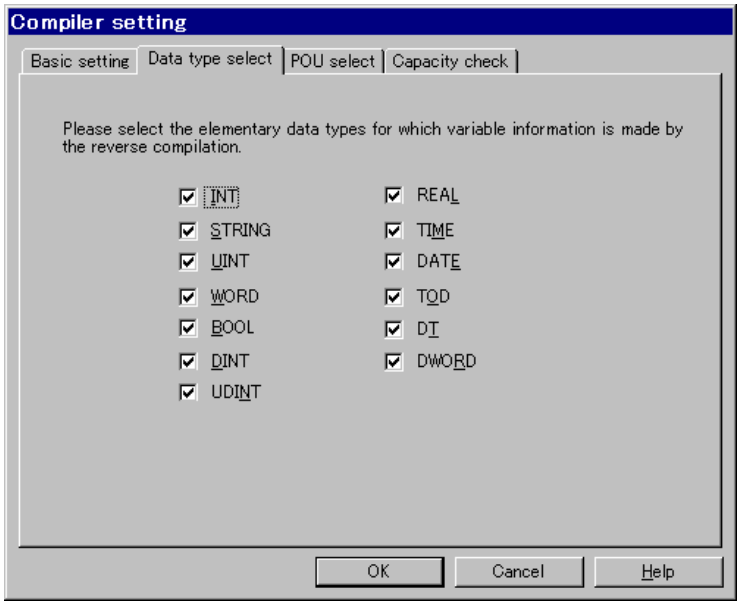
[Reverse compilation assistance information is generated] ..... When checked : Generates supplementary information required for reverse compilation during compilation.
When unchecked : Does not generate supplementary information required for reverse compilation during compilation.

[Variable information for the reverse compilation is generated] ..... When checked : Generates information required for restoring original variable names in reverse compilation so that it will be compiled in the format where it can be saved in the controller.
When unchecked : Does not generate variable information required for reverse compilation during compilation.

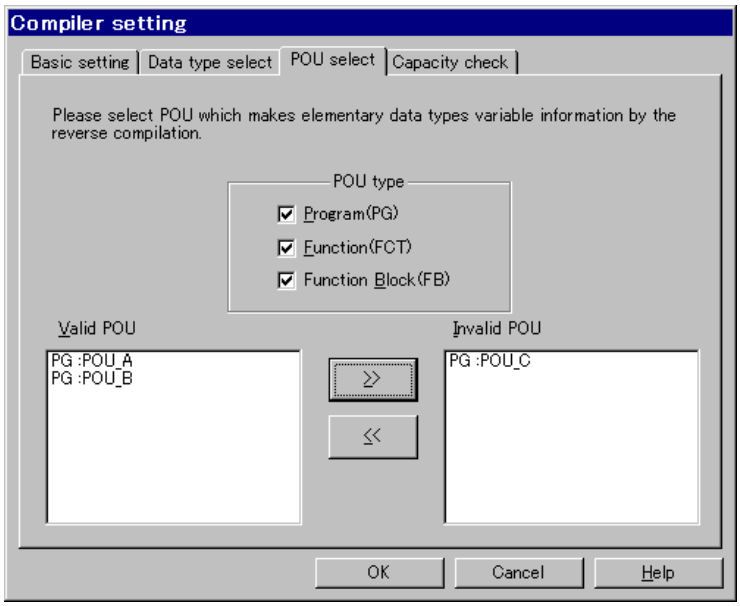
[Elementary data types variable information] ..... When checked : Generates variable information of the elementary data type. Details are specified in the [Data type select] panel.
When unchecked : Does not generate variable information.

[User defined data types variable information] ..... When checked : Generates variable information of array/structure data types.
When unchecked: Does not generate variable information.

<[Data type select] panel>
You can specify the elementary data types for adding variable information.
Variable information will be registered for the elementary data types whose check boxes are checked. This panel specification is effective only when the boxes of both [Variable information for the reverse compilation is made] and [Elementary data types variable information] are checked.

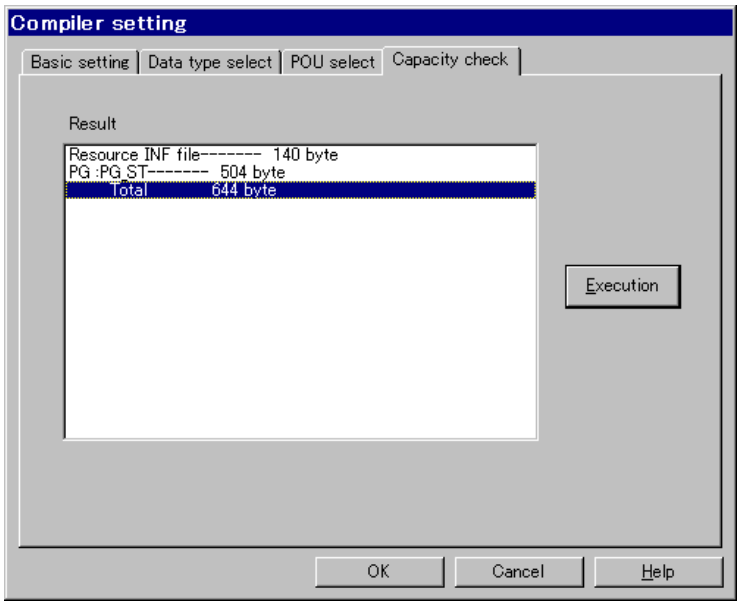


<[POU select] panel>
You can specify the POU (that has been registered in a resource) for which variable information is added to elementary data types.



[POU type] ..... Specify the POU type for generating variable information of elementary data types.
[Program(PG)]
[Function(FCT)]
[Function Block(FB)]
[Valid POU] ..... Generates variable information of elementary data types for respective registered POUs.
[Invalid POU] ..... Does not generate variable information of elementary data types for respective registered POUs.

<[Capacity check] panel>
This panel displays the amount of created variable information resulting from compilation.



[Result] ..... Displays the amount of created variable information resulting from compilation.
[Execution] ..... Checks the zip file capacity based on the amount of created variable information to confirm whether capacity is available for storage in the controller. (The controller storage zip file capacity is 64k words for the high-performance CPU or 32k words for the standard CPU.)

A task determines the programmed operation (execution time schedule) of a POU. The MICREX-SX supports three different modes of program execution: the cyclic processing default task, fixed-cycle task, and event task.
A POUs must be assigned to one of these three tasks before it can run.

11-3-1 Types and operations of tasks

(1) Task specifications

Item	Specification
Task type	Default task (Cyclic processing) Fixed-cycle interrupt task Event task
Number of tasks	1 (default) + 4 (sum total of fixed-cycle interrupts and events)
Dispatching priority	0 > 1 > 2 > 3 > Default

(2) Task operations

1) Default (DEFAULT) task
- A default task runs cyclically at all times. A POU that does not require a critical response time or periodicity during its computation process is assigned to a default task.
- Two or more POUs can be assigned to default tasks.

2) Fixed-cycle (FIXED_CYCLE) task
- A fixed-cycle interrupt task runs once during a specified interval (1 ms to 32 s). A POU that requires a high-speed response to track a controlled event or one that needs to run cyclically, such as a filter or integral instruction, is assigned to a fixed-cycle interrupt task.
- Set the task dispatching priority to one of three levels 0 to 3 (0 being the highest).
- Two or more POUs can be assigned to fixed-cycle interrupt tasks.
- The unit of the fixed cycle must be set in ms, in an integer multiple of the tact period (Note) (For example, if the tact period is 1 ms, then the minimum period of the fixed-cycle interrupt task will be 1 ms. In addition, if the tact period is 0.5 ms, the minimum period of the fixed-cycle interrupt task will be 1 ms.)

Note: A takt period is the communication period on the SX bus.

3) Event (EVENT) task
- An event task runs once when a specified Boolean variable changes to the true state. POUs that service interrupts arising from a communications module or high-speed counter module are typically assigned to event tasks.
- Set the task dispatching priority to one of three levels 0 to 3 (0 being the highest).
- Two or more POUs can be assigned to fixed-cycle interrupt tasks.

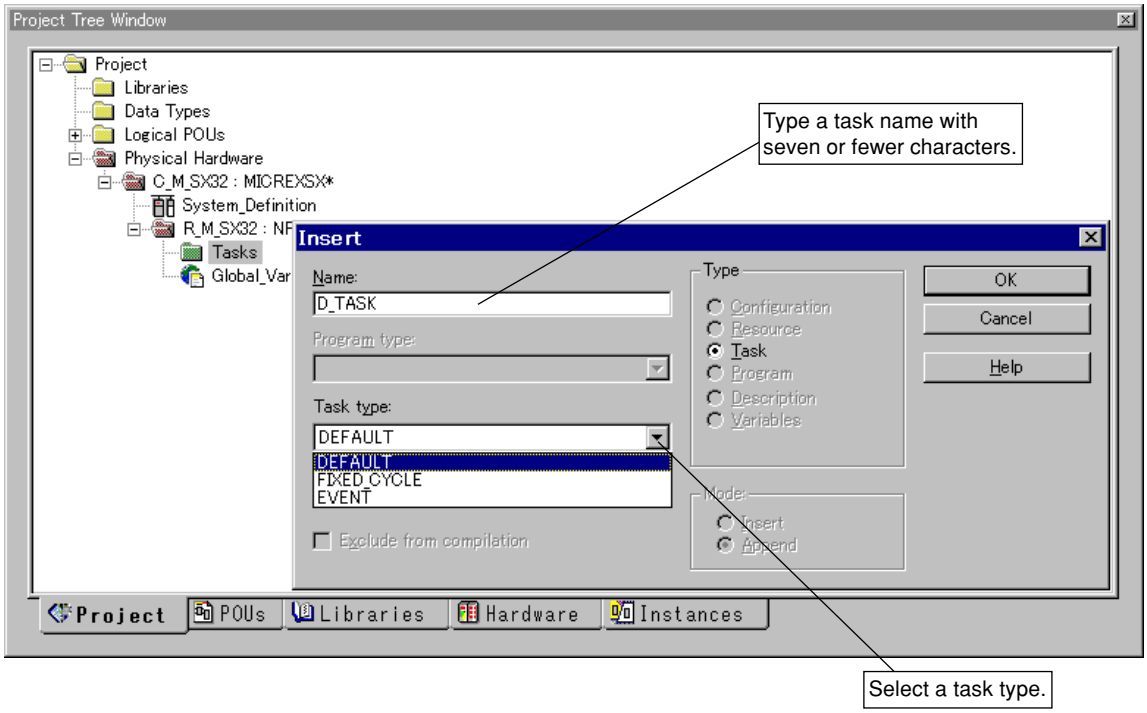
11-3-2 Inserting and setting tasks

Insert tasks at the [Tasks] icon level in the project tree. Tasks are inserted via the {Insert} dialog box shown below.

(1) Inserting a task

◊ Left-click to select the [Tasks] icon.

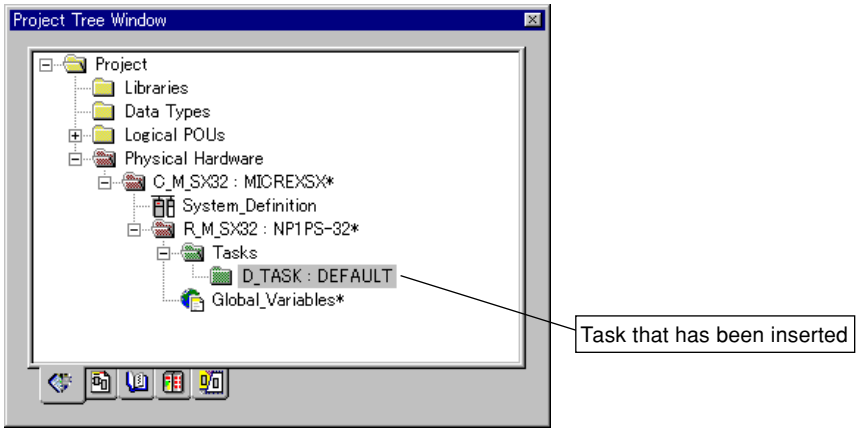
◊ Left-click the [Insert] button, or alternatively right-click to display the shortcut menu and left-click the [Insert...] command in the menu.
The {Insert} dialog box will open.



◊ Type a task name in the [Name:] text box.
Specify using a maximum of 7 single-byte alphanumeric characters.
Type <D_TASK>.

◊ Select a task type from the [Task type:] list box.
In this example, [DEFAULT] is selected.

◊ Left-click the [OK] button.
A [DEFAULT] icon named “D_TASK” will be inserted at the [Tasks] icon level in the project tree.



When “FIXED_CYCLE” task or “EVENT” task is selected, the dialog box for detailed setting is displayed. For a detailed explanation, see “(2) Setting a fixed-cycle task” or “(3) Setting an event task”.

(2) Setting a fixed-cycle task
As already explained in “(1) Inserting a task”, when task name is input, [FIXED_CYCLE] is selected for task type, and the [OK] button is left-clicked on this dialog box, the {Task setting (MICREX-SX)} dialog box is opened.

◊ Set a time value for interrupt intervals in the [Cyclic:] text box (in a range from 0.5ms to 32s).
◊ Select a priority level from the [Priority:] list box.
◊ Left-click the [OK] button.

* To change the setting of a [FIXED_CYCLE] task, right-click the task icon in the project tree to display the shortcut menu, and select the [Setting ...] command in this menu to display the task setting dialog box. Next, change the setting on this dialog box.

For setting items, see “(2) Task operations” in 11-3-1. For a detailed explanation of the operation of each task, see the INSTRUCTION No. FEH200 volume.

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(3) Setting an event task
As already explained in “(1) Inserting a task”, when task name is input, [EVENT] is selected for task type, and the [OK] button is left-clicked on this dialog box, the {Task setting (MICREX-SX)} dialog box is opened.

◊ Input a Boolean variable in the [Event variable:] text box .
◊ Select a priority level from the [Priority:] list box.
◊ Left-click the [OK] button.

* To change the setting of an [EVENT] task, right-click the task icon in the project tree to display the shortcut menu, and select the [Setting ...] command in this menu to display the task setting dialog box. Next, change the setting on this dialog box.

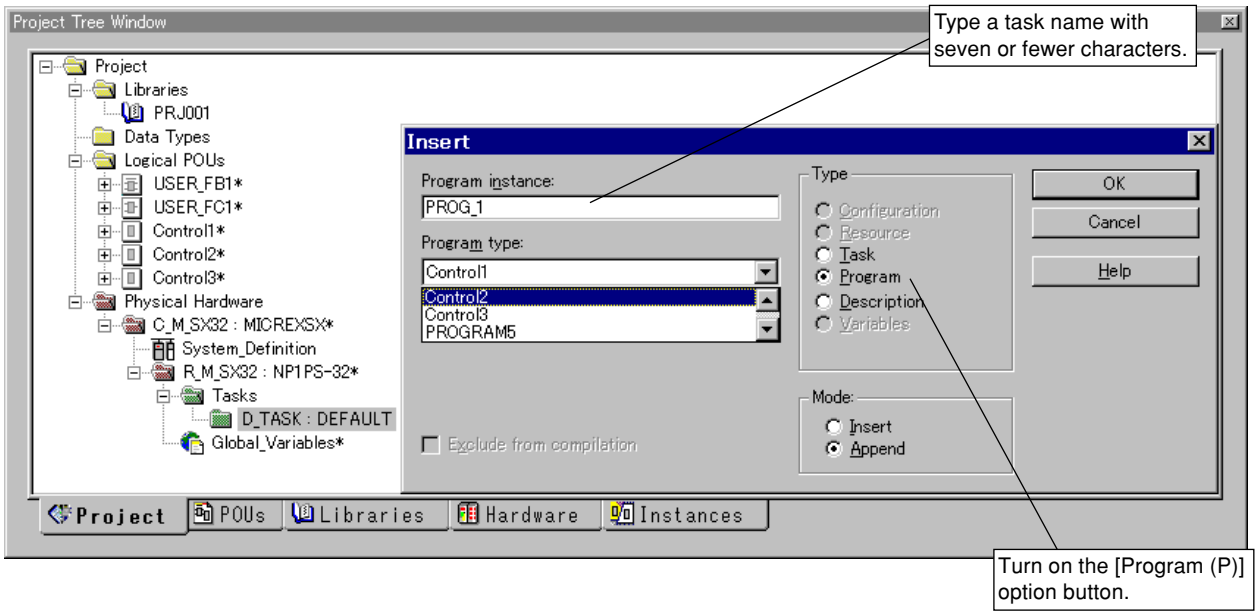
For setting items, see “(2) Task operations” in 11-3-1. For a detailed explanation of the operation of each task, see the INSTRUCTION No. FEH200 volume.

11-3-3 Program registration

Once you have inserted a task in the project tree, the next step is assigning a program to run during that task.

◊ Left-click the task icon which you want to assign a program to.

◊ Left-click the [Insert] button, or alternatively right-click to display the shortcut menu and left-click the [Insert...] command in the menu.
The {Insert} dialog box will open.

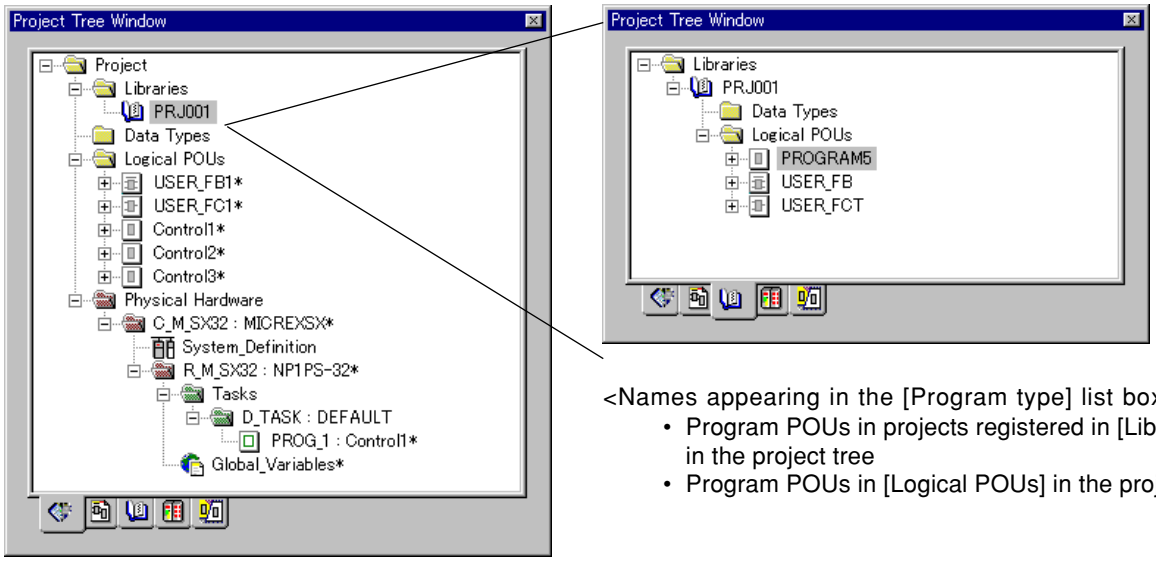


◊ Turn on the [Program] option button in the [Group type] box.

◊ Type an instance name in the [Program instance:] text box.
Use 8 alphanumeric characters to input the instance name. (However, it may not use any file name described in “3-2-3 (3) Restrictions on element names composing a project tree” or shown on the Reserve Word List in the Instructions of the User’s Manual <FEH200>.)

◊ Select a program (POU) from the [Program type:] list box.
The program names that appear in the [Program type:] list box are those that are in the states illustrated below.

◊ After confirming the dialog box, left-click the [OK] button.
The [Program] icon will be inserted under the [Tasks] icon.



<Names appearing in the [Program type] list box>

- Program POUs in projects registered in [Libraries] in the project tree
- Program POUs in [Logical POUs] in the project tree

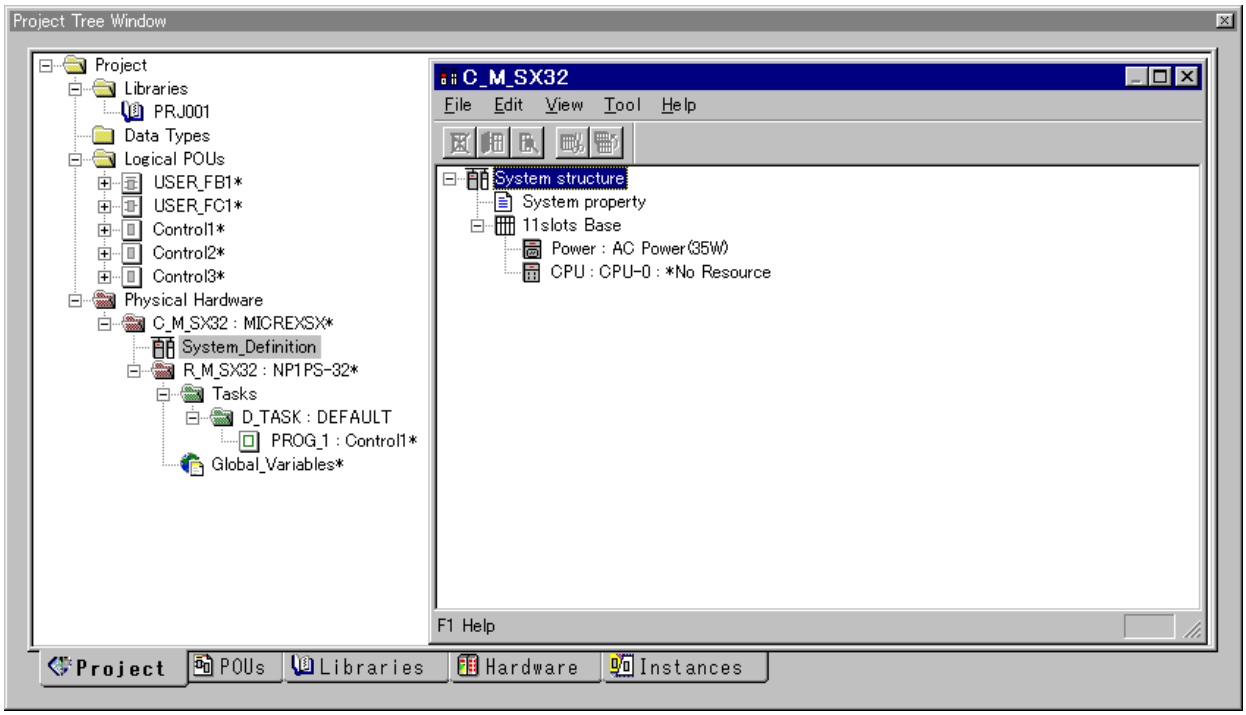
System definition refers to the work of programming a system structure and operations, and the operations of individual modules, needed to run a system made up of MICREX-SX PCs.
Structural information about the PC system (such as I/O variables) defined in the system structure definition window and I/O variables used within resource programs are linked together. For this purpose, the PC system must be defined prior to its compiling.

For further information about the system structure definition, refer to the “Instructions” and the user’s manuals pertaining to the individual modules.

11-4-1 Using the system structure definition window

(1) Call the system structure definition window

◊ Left-double-click the [System_Definition] icon in the [Physical Hardware] subtree.
The system structure definition window will open.



As shown above, the system structure is tree-shaped. When a new project is created, the default system structure is one power module and one CPU module mounted on the eleven-slot base.

(2) Operating the system structure definition window

1) Expand and collapse node modules

Represent the individual components in the current system structure, in the project tree as node modules. Left-double-click the node modules that have a subnode with a “+” or “–” sign on their left side, or left-click the “+” or “–” sign to expand or collapse them.

2) Toolbar buttons

[Delete] ..... Deletes a selected node module.

[Insert] ..... Inserts a node module.

[Properties] ..... Displays the properties of a node module.

[Structure definition] ..... Divides the structure defined on a single-button base into two bases.

[Combine] ..... Combines the structure defined on a two-button base into a single base.

3) Types and contents of icons in the project tree
The table below lists the node modules in the tree and those that may be inserted into the tree by following the steps explained in 11-4-3, “Inserting/changing a module.”

Icon	Explanation
	Indicates the system structure definition of a configuration.
	Sets system properties, such as SX bus tact time.
	Represents a baseboard.
	Represents a power module.
	Represents a CPU module.
	Represents an I/O module.
Red 	Represents a processor link module.
Green 	Represents a remote I/O master module.
Red 	Represents a remote I/O interface module.
Blue 	Represents a positioning module
Green 	Represents a function module.
	Indicates an individual module (POD, servo).

11-4-2 Setup items in the system structure definition window

The table below lists the items that can be programmed in the system structure definition window.

Name	Definition	See	Recognition timing
System structure definision	Entire system structure and SX bus station numbers	11-4-3	On configuration reset, during loder transer
System properties	SX bus takt, waiting time for structure check, initialization method selection	11-5	On configuration reset
System output definition	System output module	11-4-5	On configuration reset
CPU running definition	Watch dog timer setting, running specification at power on, battery-less operation	11-5-1	During loader transfer
CPU memory size definition	Size of data memory	11-2-3	On resource reset (Note 1)
CPU I/O group setting	I/O group information	11-4-4	On resource reset (Note 1)
Fail-soft operation setting	I/O fail-soft operation yes/no	11-4-4	During loader transfer
Direct I/O hold definition	Hold mode specification	11-4-5	During loader transfer
Direct I/O operation mode definition	Digital filter time	11-4-5	During loader transfer
T-link master module parameter	Individual output hold station definition	Note 2	On configuration reset
JPCN-1 (OPCN-1) master module parameter	Response time definition	Note 2	On configuration reset
P/PE link parameter	Operation definition, structure registration and definition, area setting	Note 2	On configuration reset

Notes:

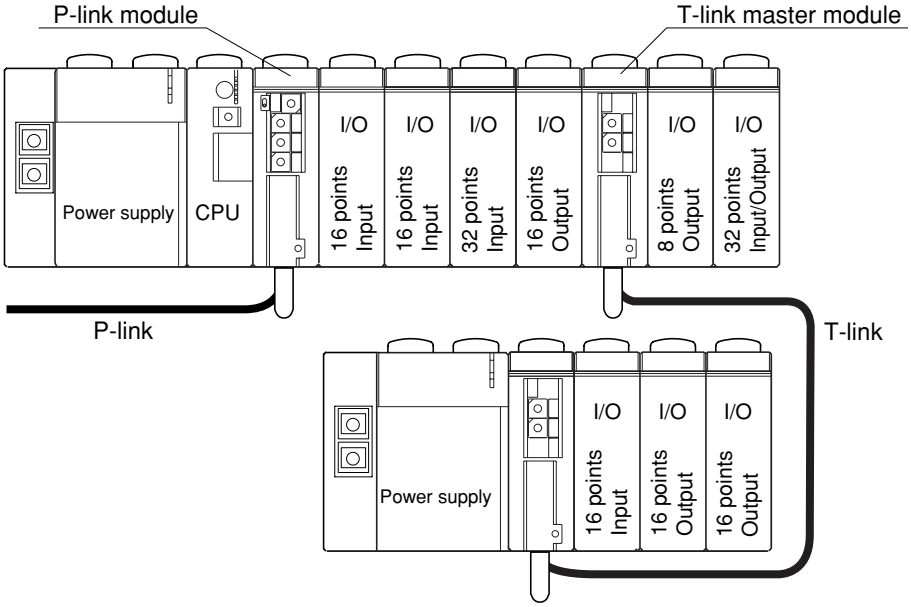
1. The system definition items with the recognition timing “On resource reset” are also recognized on configuration reset.
2. Refer to the user’s manuals pertaining to the individual modules.

Manual title	Manual number
MICREX-SX Series User's Manual T-Link Master Module	FEH204
MICREX-SX Series User's Manual JPCN-1 Master Module	FEH238
MICREX-SX Series User's Manual P/PE Link Module	FEH203
MICREX-SX Series User's Manual FL-net (OPCN-2) Module	FEH234
MICREX-SX Series User's Manual DeviceNet Module	FEH232
MICREX-SX Series User's Manual AS-Interface Master Module	FEH231
MICREX-SX Series User's Manual PC card Interface	FEH226

11-4-3 Inserting/changing a module

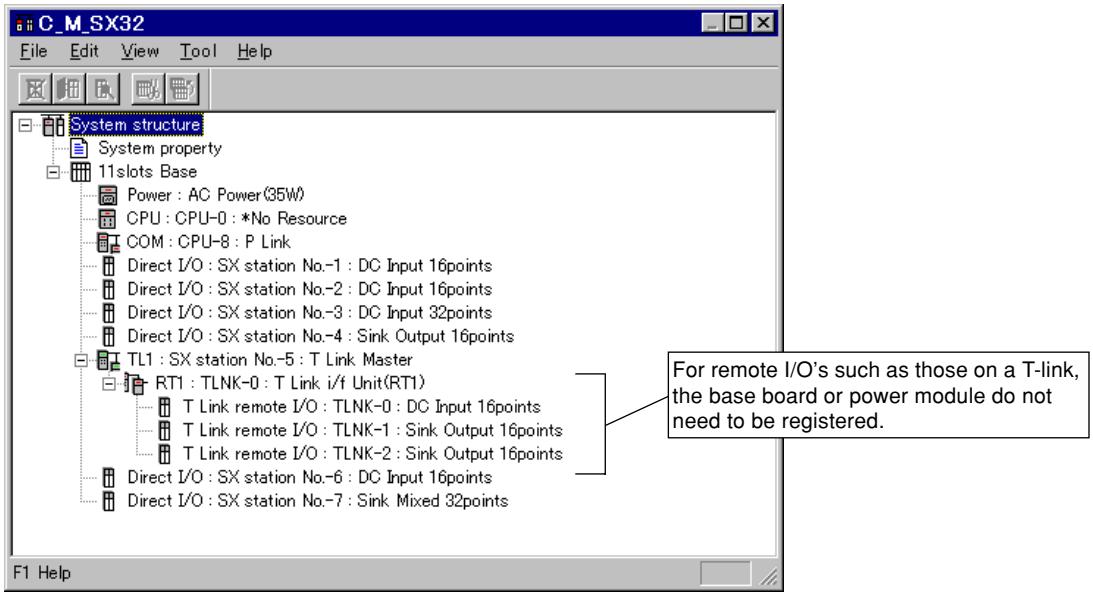
For the MICREX-SX series, it is necessary to register the PC system structure in the system structure definition in advance for all the modules to be used.

<Sample system structure>



<System structure definition tree screen>

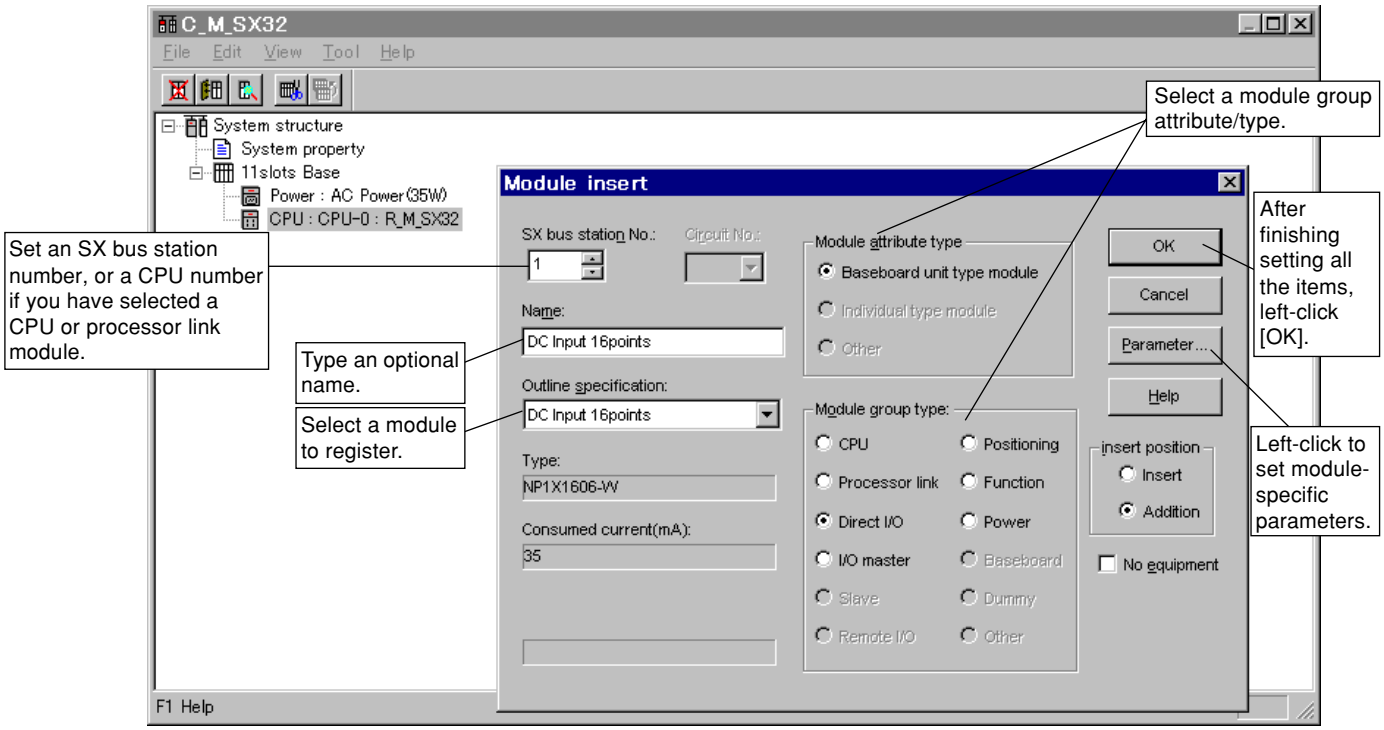
The system structure illustrated above is indicated in a system structure definition tree as shown below.



(1) Insert and add a module

Insert a new object above or below a selected module.

◊ Left-click a module in the system structure definition tree, and left-click the [Insert] button. Alternatively, right-click to display the shortcut menu and left-click the [Insert...] command in the menu.
The {Module insert} dialog box will open.



◊ Select the module group type of the module to insert by left-clicking the option button to the module name in the [Module attribute type] and [Module group type] box in the dialog box.
◊ Select the article name of the module to insert from the [Outline specifiration] list box.
The article names associated with the module group type selected are listed. When you select an article name, the type and consumed current are displayed.
◊ Specify a module name in the [Name:] text box (using a maximum of 27 single-byte characters.) For CPU module, select one from the declared resource names.
Type: The type corresponding to the article name.
Consumed current: Consumed current corresponding to the article name.
◊ Type or select an appropriate number in the {SX bus station No.} or [CPU No.] text box.

<Setting SX bus station numbers>
Each of the modules connected to the SX bus (except for the power module) must be assigned an SX bus station number which is entered in [SX bus station No.] in the {Module insert} dialog box shown above. (For a CPU or processor link module, set a CPU number.) The correspondence between the SX bus station numbers and CPU numbers is given below.

CPU number	SX bus station number
0	254
1	253
2	252
3	251
4	250
5	249
6	248
7	247

For CPU modules

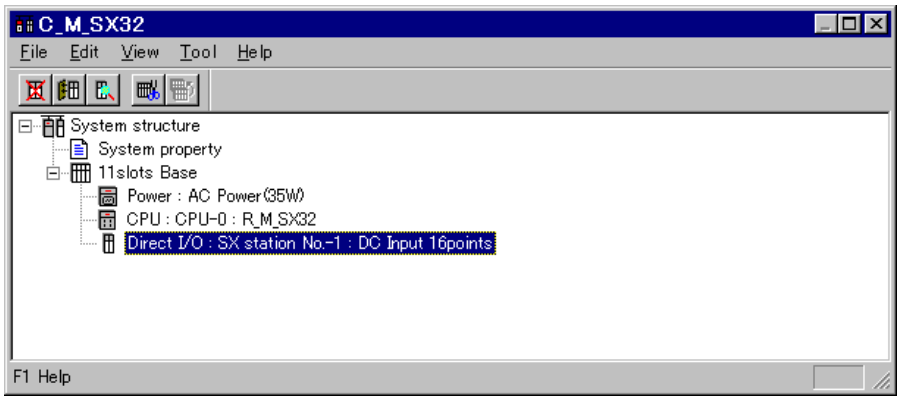
CPU number	SX bus station number
8	246
9	245
A	244
B	243
C	242
D	241
E	240
F	239

For processor link modules

Reserved

◊ Left-click the [parameter ...] button in the {Module insert} dialog box.
The parameters set here determine detailed operation of individual modules. Depending on what module is selected, it may be unnecessary to set parameters. In that case, the [Parameter ...] button will be disabled.
When the optional [Direct I/O] button is turned on in the [Module group type] box, the {Direct I/O parameter setting} dialog box is opened.
For a detailed explanation of the {Direct I/O parameter setting} dialog box, see “11-4-5 Input/output parameters”.

◊ After setting the necessary items in the parameters setting dialog box, left-click the [OK] button. As well, left-click the [OK] button in the re-displayed {Module insert} dialog box.
The module will then be inserted in the system structure definition tree.



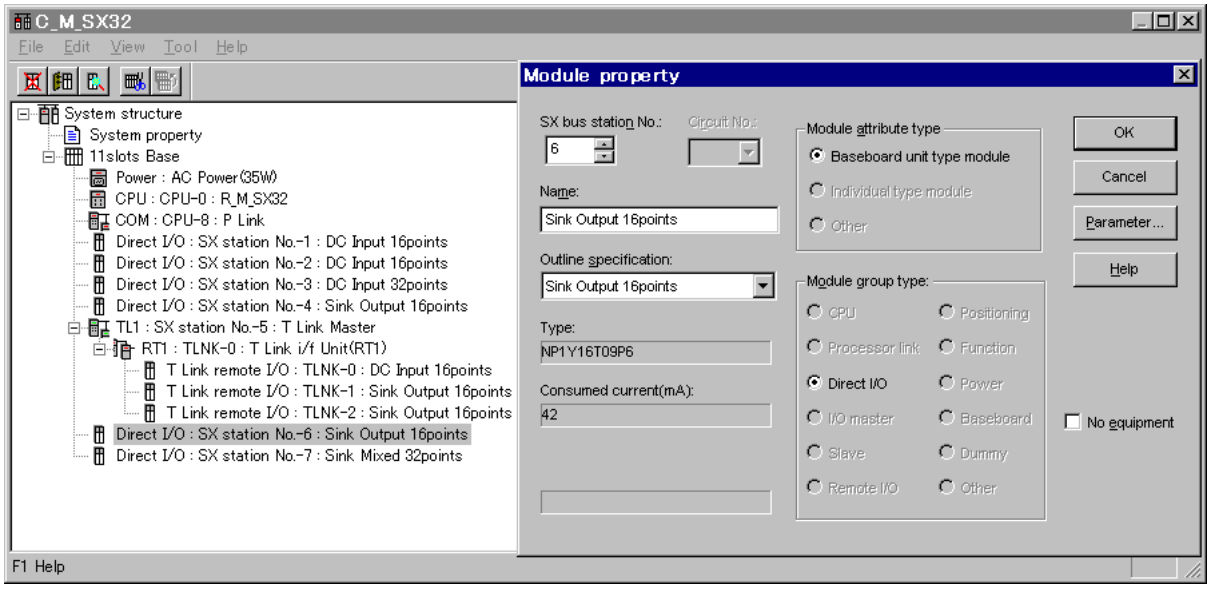
For a detailed explanation of the parameters for input/output modules and CPU module, see the INSTRUCTION volume of this manual as well as the user's manual for each module.

(2) Modify a module

To verify and modify properties of a module that has already been registered or inserted, follow these steps:

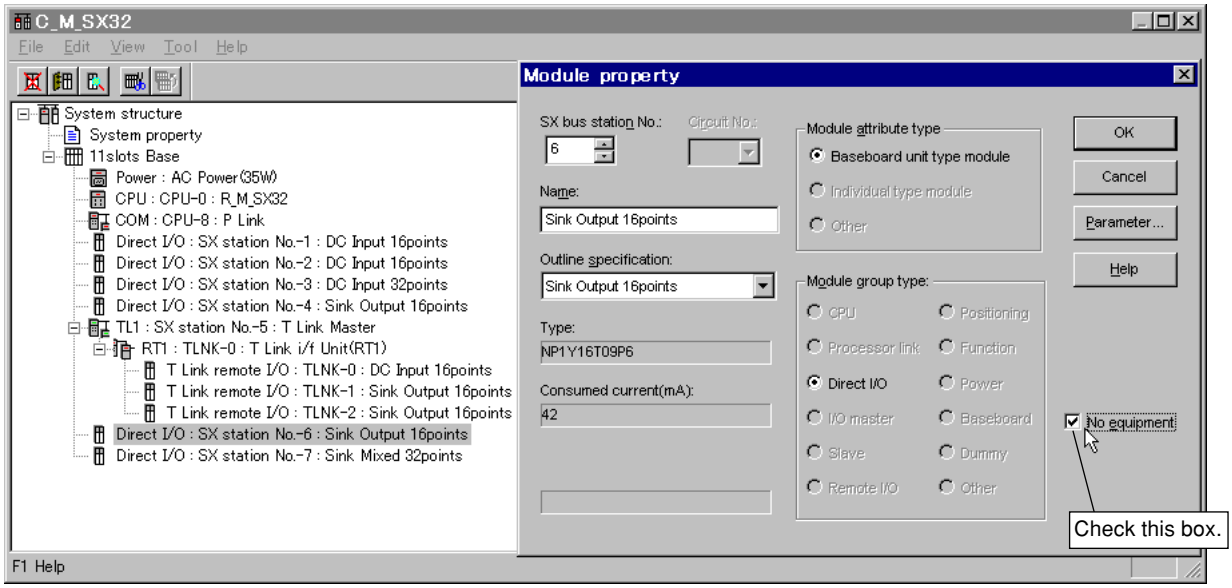
◊ Left-click to select the module that requires a modification.

◊ Left-click the [Property] button, or alternatively right-click to display the shortcut menu and left-click the [Property...] command in the menu.
The {Module property} dialog box will open.



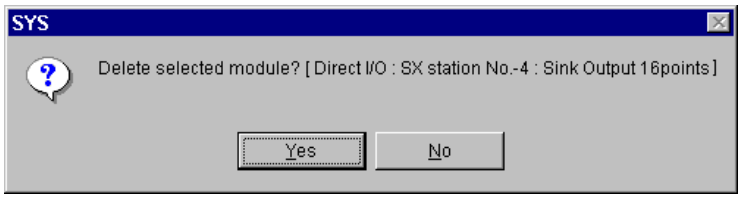
Modifications that can be made to a module via the {Module property} dialog box are limited to those within the same module group type (for example, a conversion from an input module to an output module). To change to a different type of module, first delete the module, and then insert a new module.

(3) Specifying “No equipment” (uninstalled) for a module
“No equipment” is specified when a module as a component of a system has been removed or is unusable for some other reason.
When “No equipment” is specified, system structure definition does not need to be changed later.



◊ Check the [No equipment] box.
◊ Left-click the [OK] button.

(4) Delete a module
To delete a module that has already been registered, follow these steps:
◊ Left-click to select the module to delete.
◊ Left-click the [Delete] button, or alternatively right-click to display the shortcut menu and left-click the [Delete...] command in the menu.
The message shown below will appear.



◊ Left-click the [Yes] button to delete the button or [No] button not to delete it.

Note: The base, power, and CPU modules on the basic system configuration cannot be deleted. An attempt to delete any of these modules will display the following message:

11-4-4 Setting parameters for a CPU module

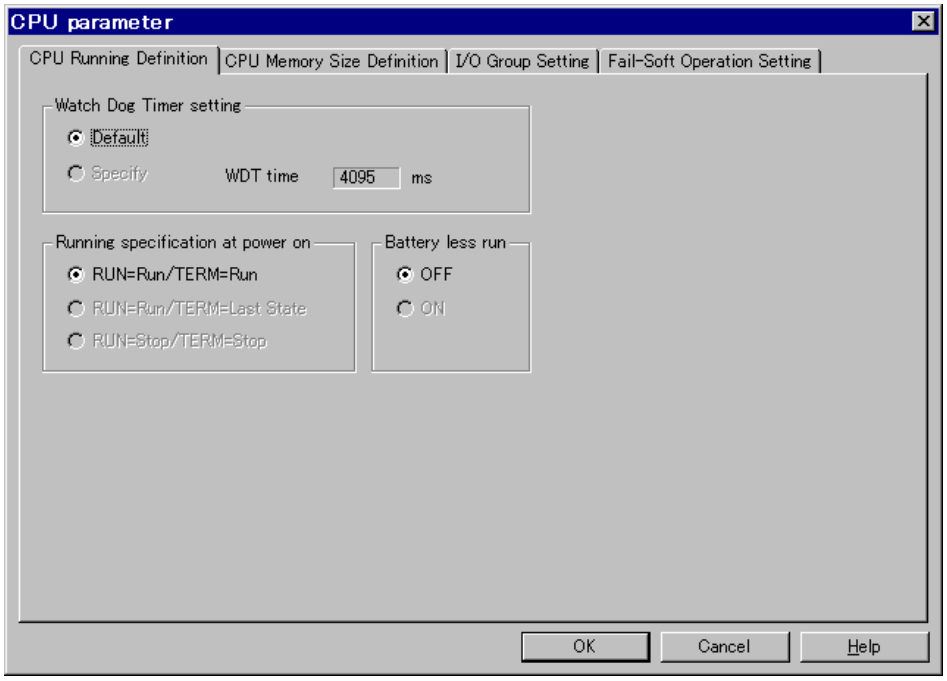
Parameters are set for the CPU module.
CPU module parameters are set with the {CPU parameter} dialog box, as shown below.

- ◊ Left-click to select the [CPU Module] icon.
- ◊ Left-click the [Property] button, or alternatively right-click to display the shortcut menu and left-click the [Property...] command in the menu.
  The {Module property} dialog box will open.
- ◊ Let-click the [Parameter ...] button.
  The {CPU parameter} dialog box will open. The {CPU parameter} dialog box comes up with the [CPU Running Definition] tab in the selected state.

(1) Displaying CPU running definition

The setting made in “11-2-2 CPU running definition” is reflected in the display shown below.

To change the setting, perform operation referring to “11-2-2 CPU running definition”.

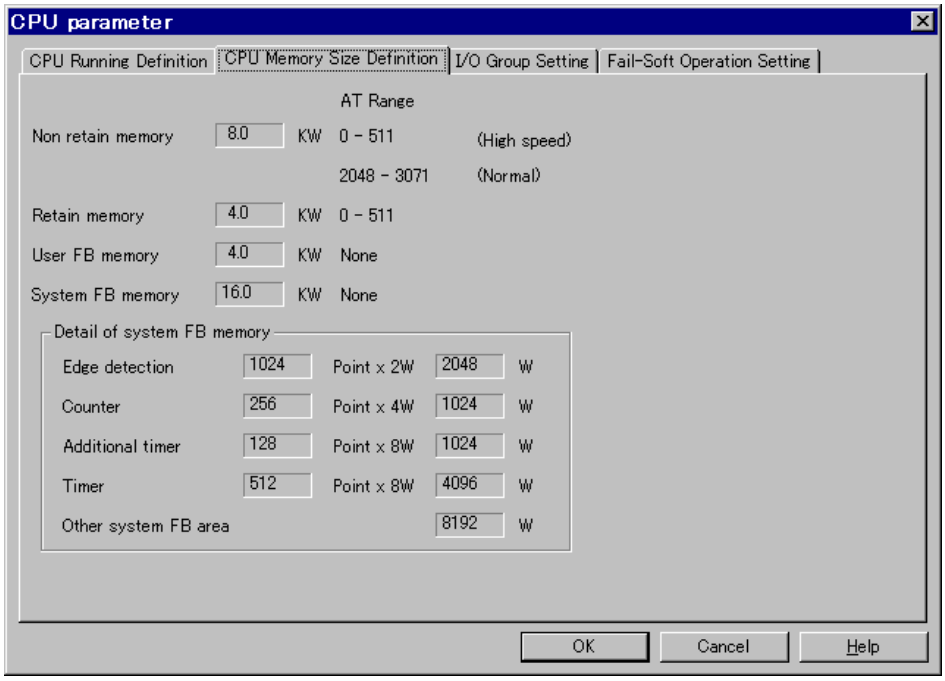


(2) Displaying CPU memory size definition

◊ Left-click the [CPU Memory Size Definition] tab in the {CPU parameter} dialog box.

The setting of “11-2-3 Defining the CPU memory size” is reflected in the display shown below.

To change the setting, perform operations referring to “11-2-3 Defining the CPU memory size”.

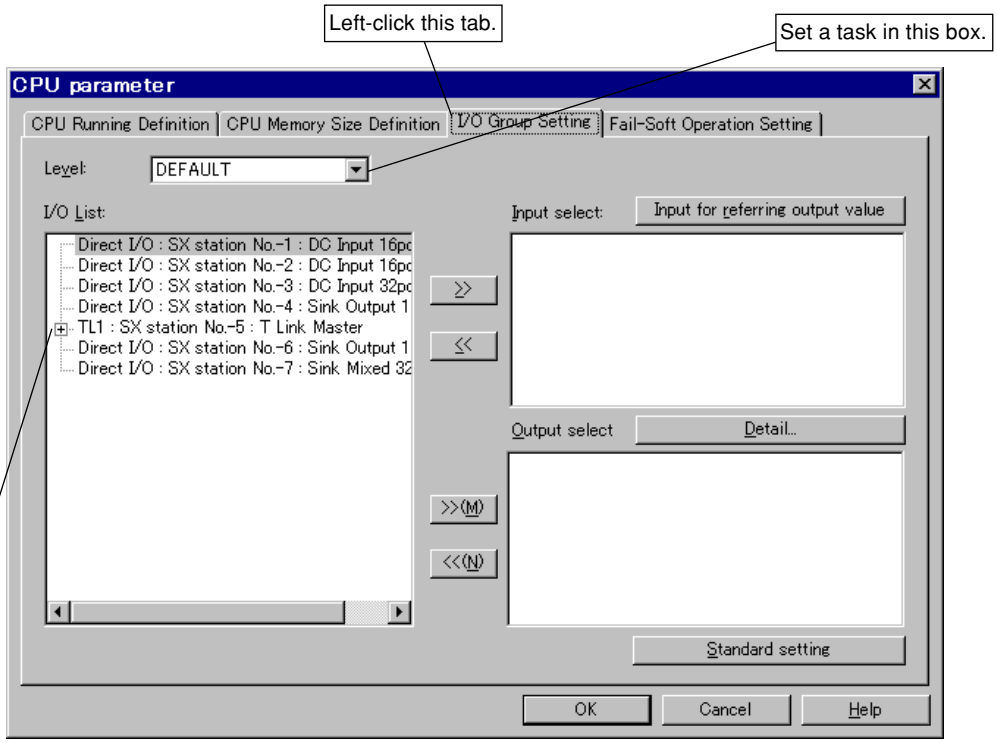


1) Set the value of each memory area: The value set for each memory area is displayed in 0.5k word units.
2) AT range of each memory area: The AT range value set for each memory area is displayed by the number of words from the top address.

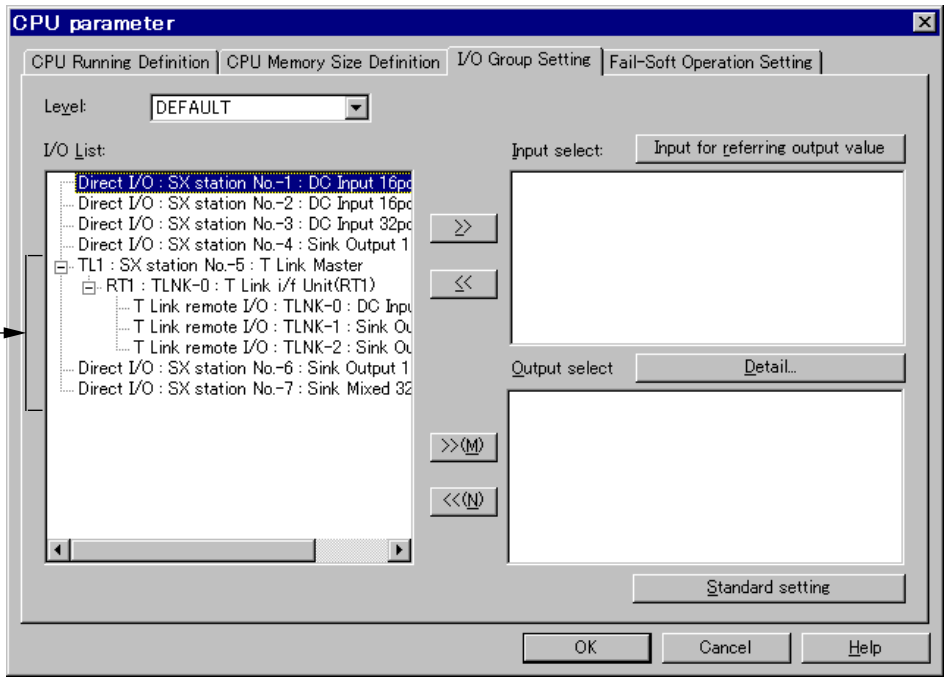
(3) I/O group setting
This setting determines a CPU and a CPU task to control the I/O modules in the configuration. This setting is important for the CPU module to control I/O modules.

If the I/O group is not correctly set, input/output control cannot be performed by the CPU modules.

◊ Left-click the [I/O Group Setting] tab in the {CPU parameter} dialog box, and the {I/O Group Setting} dialog box will be opened.

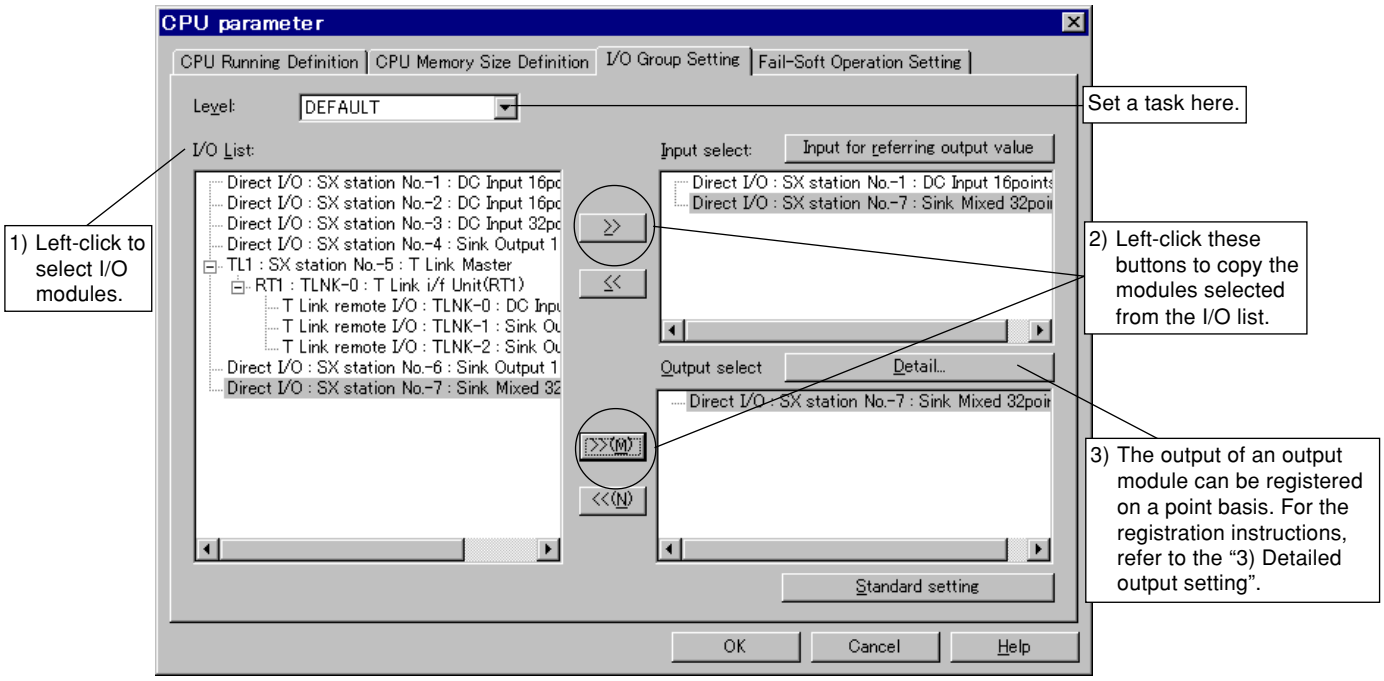


"+" (plus) mark means that there are modules and/or units to be connected to this module. Left-clicking the "+" mark displays modules and units on the lower level.



1) Individual module selection

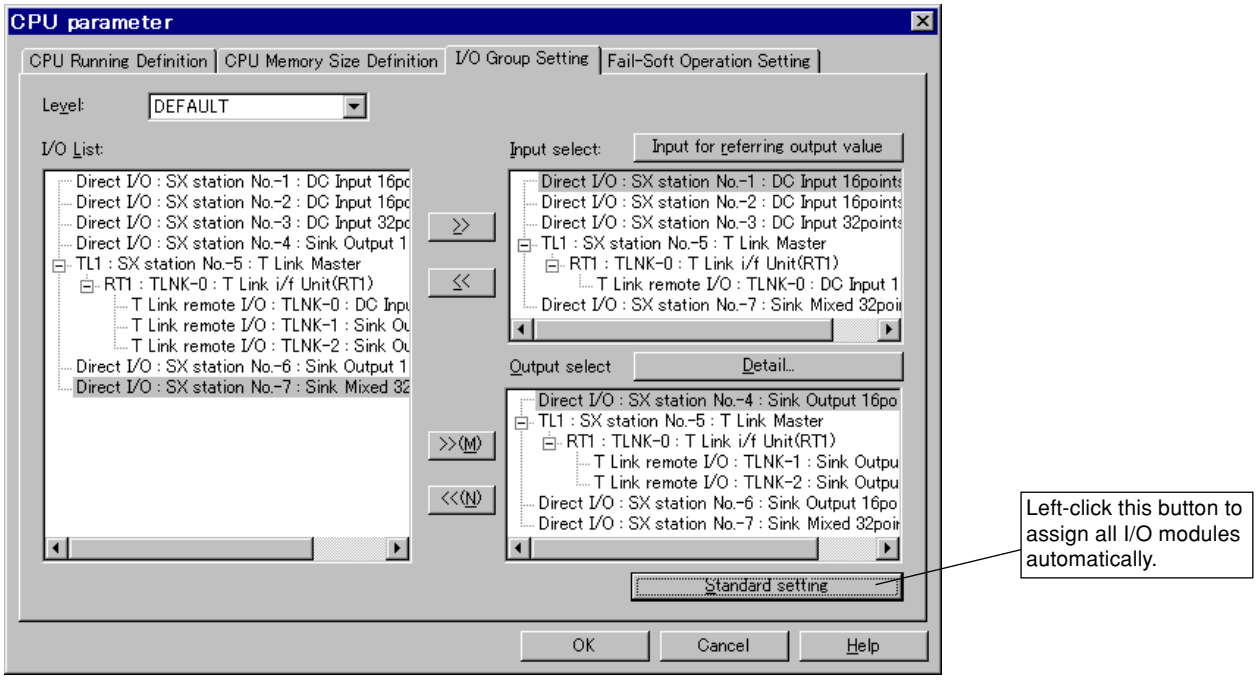
Select the I/O modules to be controlled by the CPU module from among those registered in the system structure definition tree, and register them.



◊ Left-click to select I/O modules in the [I/O list] box.
◊ Left-click the [>>] button on the input side or the [>>(M)] button on the output side.
◊ After registering all the modules to be controlled by the CPU module, left-click the [OK] button.

2) Batch standard selection

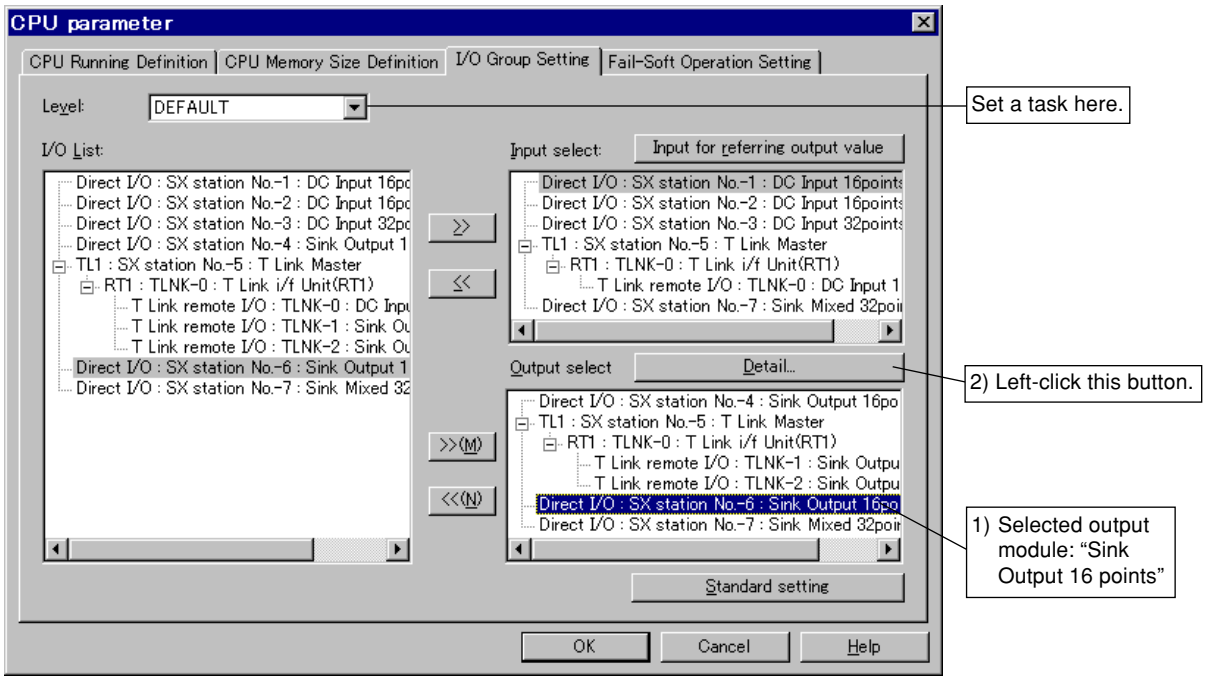
Select the I/O modules to be controlled by the CPU module from among those registered in the system structure definition tree, and register them in a batch. Care should be exercised, however, when the I/O modules to be controlled by CPU modules differ on a multi-processor system configuration.



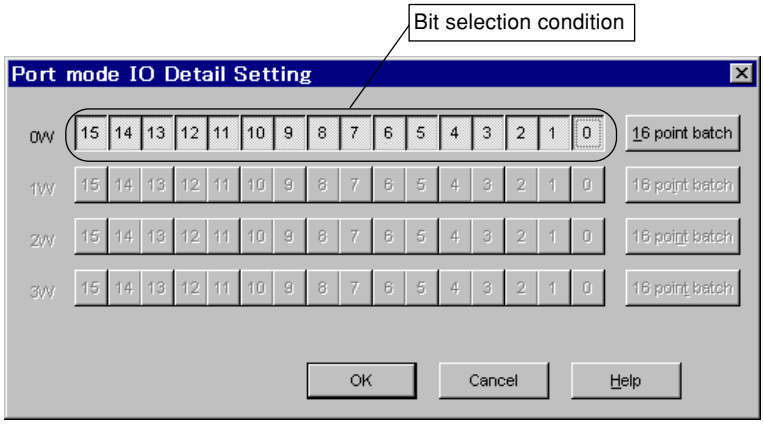
<Notes on programming I/O groups>
Modules which have an I/O area, such as high-speed counters and positioning modules, must be registered in both the [Input select] and [Output select] boxes.
To refer to an output module registered in a remote CPU module on a multi-processor system configuration, that output module must be registered in the [Input select] box. An output module registered in the [Output select] box for a remote CPU module cannot be registered in duplicate.

3) Detailed output setting
By I/O group registration for a multi-CPU system, output modules can be registered by their bit units.

◊ Of the output modules displayed in the [Output select] list box, select those to be registered by the bit units, and left-click the [Default ...] button.

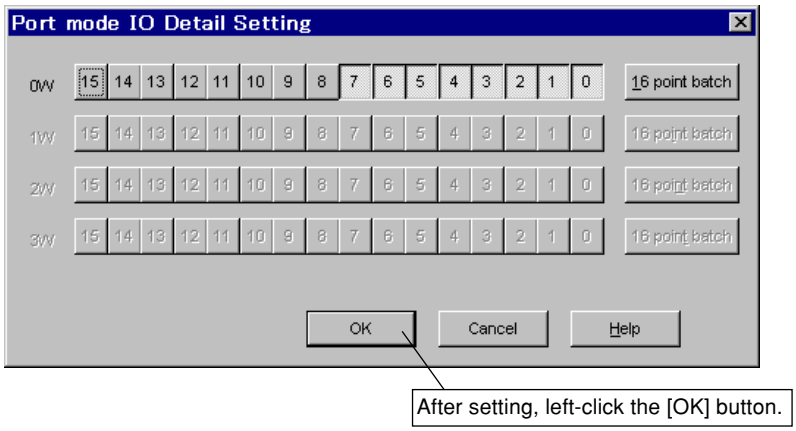


◊ The following window will then be opened. In the initial condition, all bits are selected.



* Pressed buttons indicate “Registered as I/O group”.

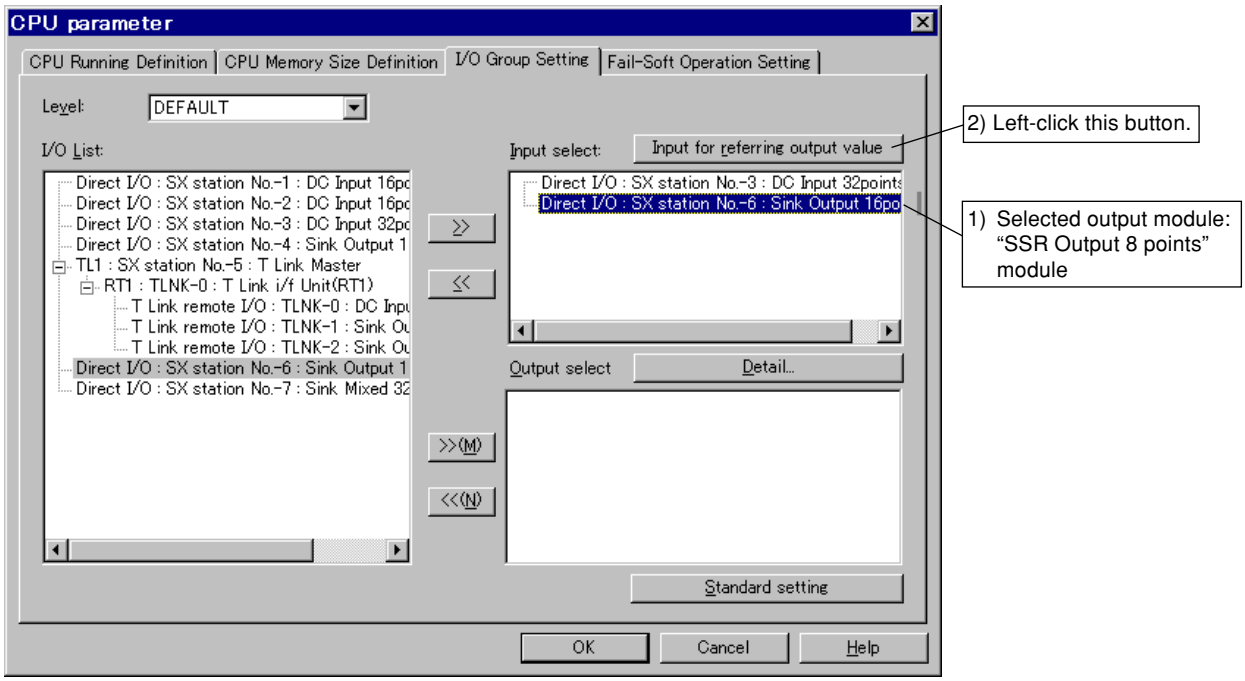
◊ Left-click the bits which will not registered as an I/O group to turn them off. In the following example, bits 8 to 15 are turned off.



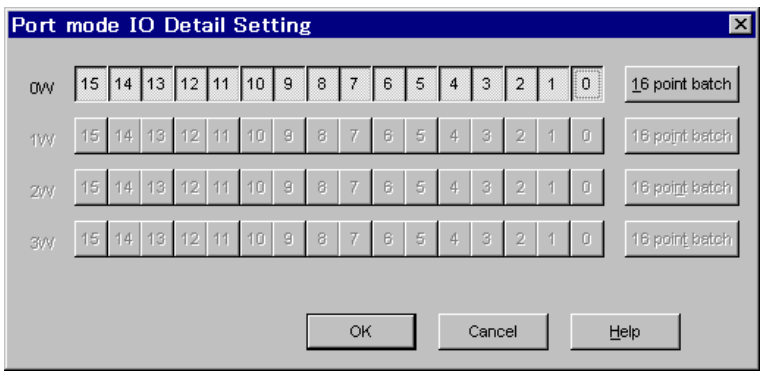
4) Input for referring output values

With a multi-CPU system, when you want to use the output of output modules that are used by another CPU as the “input” for the application program of the local CPU, those bits need to be registered in the [Input select] box for the I/O group setting for the local CPU.

◊ Select output modules, and left-click the [Input for referring output value] button.

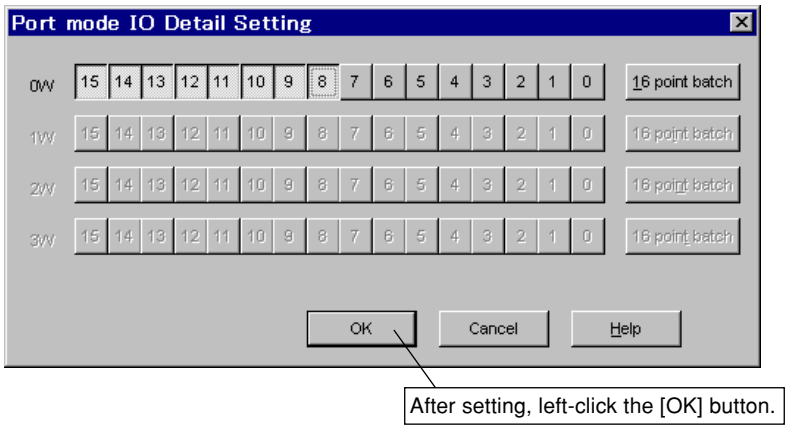


◊ The following window is opened. In the initial condition, all bits (bits 0 to 7) are selected.



* Depressed buttons indicate that they are registered as an I/O group.

◊ Left-click the bits whose output values are not referenced to turn them off. In the following example, bits 0 to 7 are turned off.



(4) Fail-soft operation setting

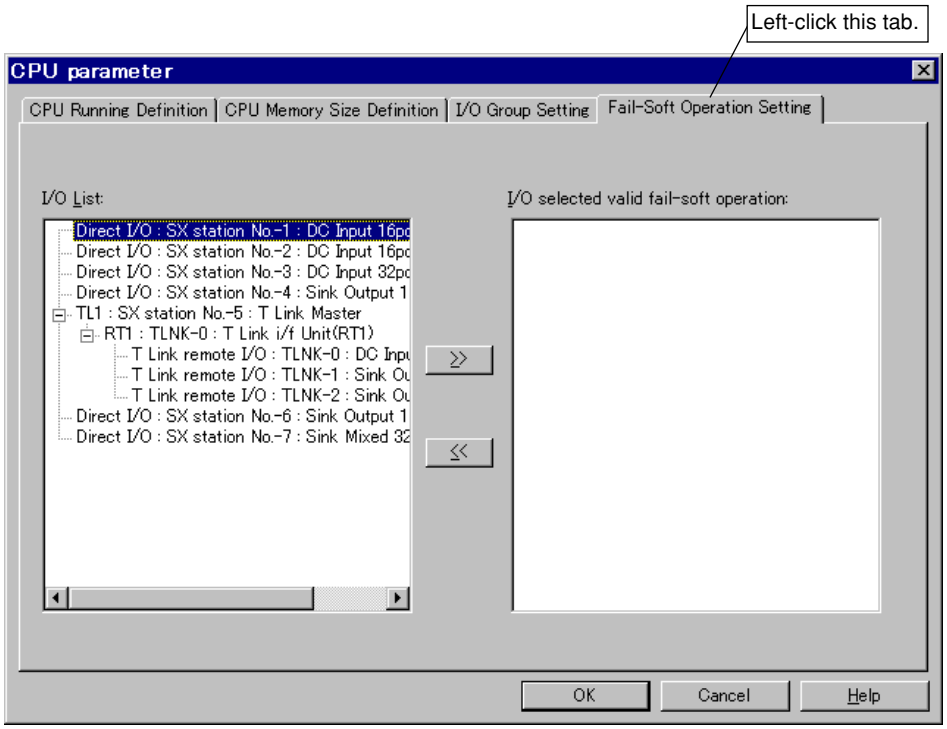
This tab is used to set fail-soft operation for modules in the configuration. The setting is made here also for the I/O's on T-link.

What is fail-soft operation?

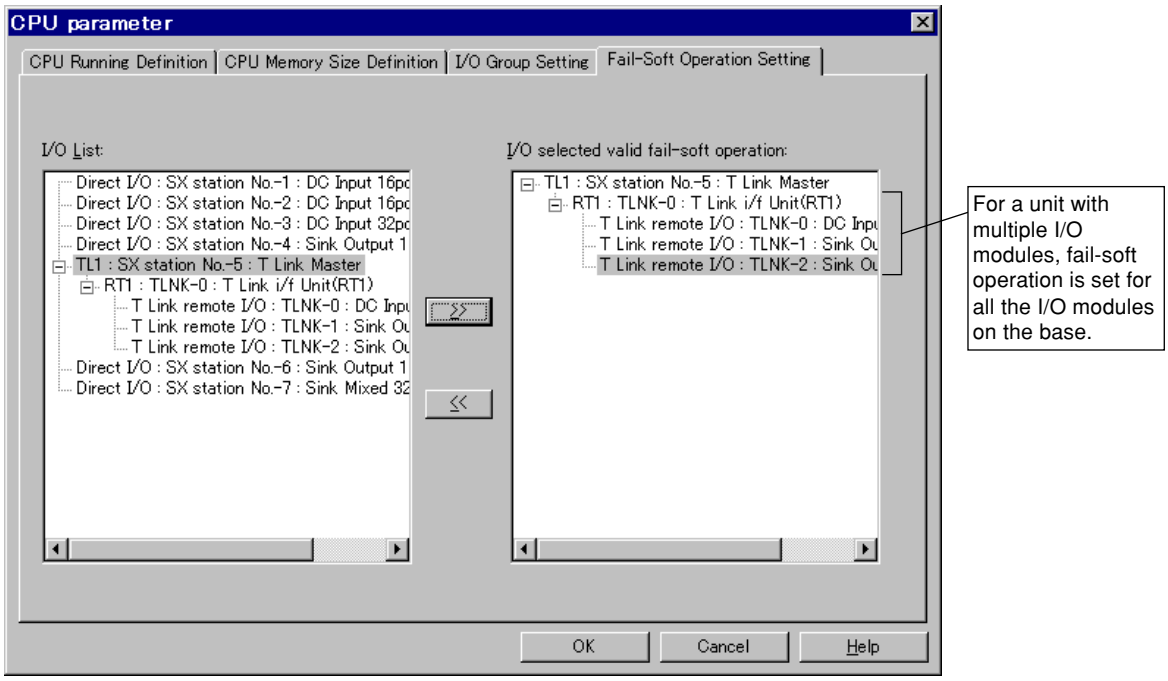
In a system (configuration) which is connected by SX bus or T-link, even when modules on the system become abnormal, other normal modules will continue to operate normally. This is referred to as "fail-soft" operation.

<How to set>

◊ Display the {CPU parameter} dialog box, and left-click the [Fail-Soft Operation Setting] tab.



◊ Left-click [RT1:TLNK-0: T Link i/f Unit(RT1)] in the [I/O List] list box, and then left-click the [>>] button.
The module will be registered as shown in the figure below.



- Fail-soft operation can be set for each module on the SX bus (base board).
- For the T-link expansion unit and JPCN-1 (OPCN-1) expansion unit, the fail-soft operation is set for each unit, but cannot be set for each module.

11-4-5 Input/output parameters

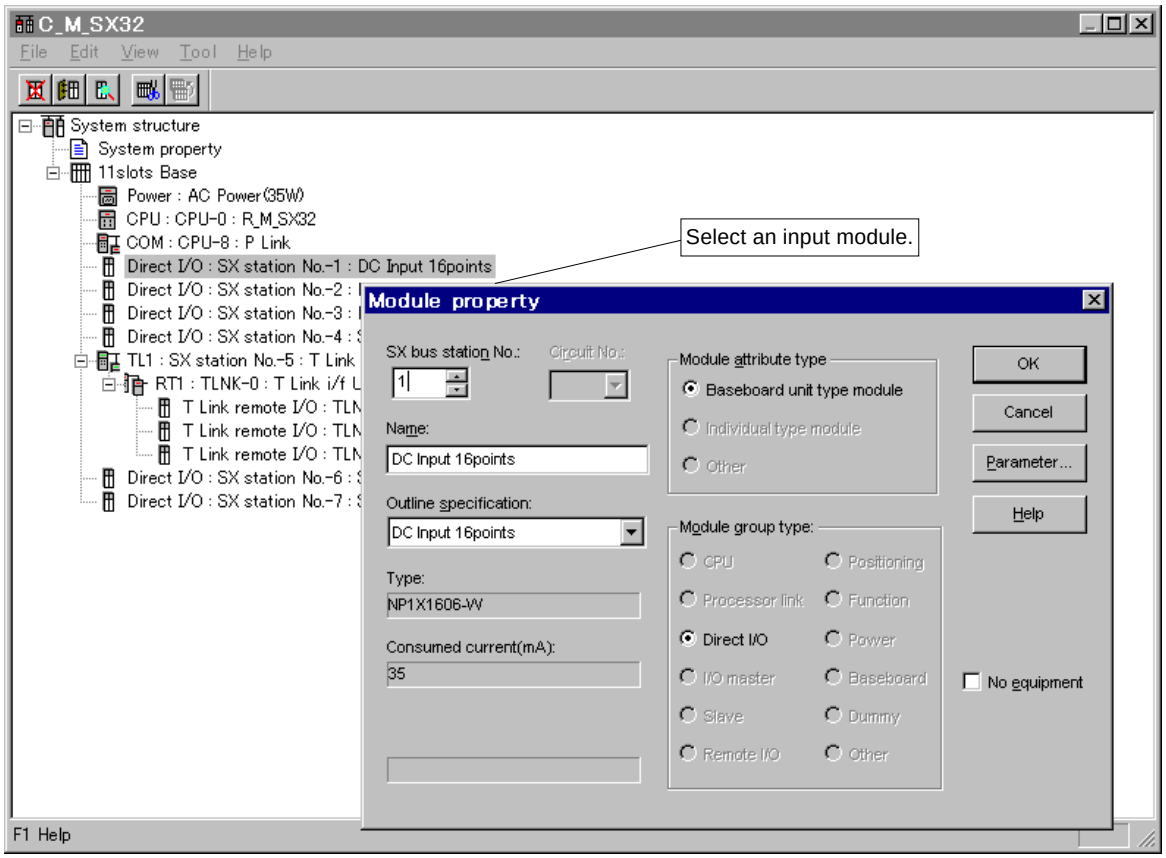
(1) Setting input parameters

Input filtering time is set for the DC type digital input modules.
With (OFF➡ON) – (ON➡OFF), the available settings are: 1–1 ms, 3–3 ms (default), 3–10 ms, 10–10 ms, 30–30 ms, and 100–100 ms.

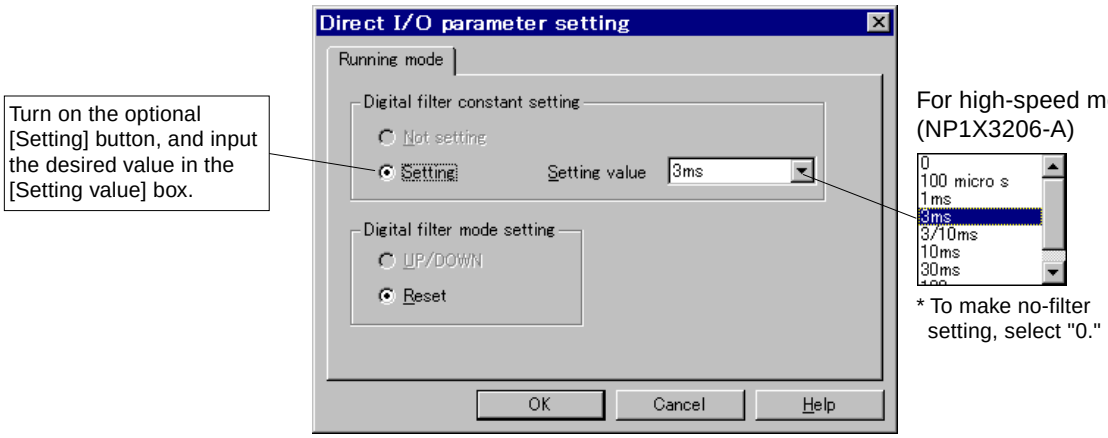
<How to set>

◊ In the system structure definition tree, left-click the digital input module for which input filtering time is set.

◊ Left-click the [Property] button, or alternatively right-click to display the shortcut menu and left-click the [Property...] command in the menu.
The {Module property} dialog box will be opened.



◊ Left-click the [Parameter ...] button, and the {Direct I/O parameter setting} dialog box will be opened.



◊ After setting, left-click the [OK] button.

(2) Setting output parameters

The following two items can be set in the parameters for output modules.

1) HOLD definition

This function is used when the CPU module is stopped due to system error and you want to hold the output condition just before the error occurrence, or when you want to hold the output condition just before CPU stoppage when the CPU stops.

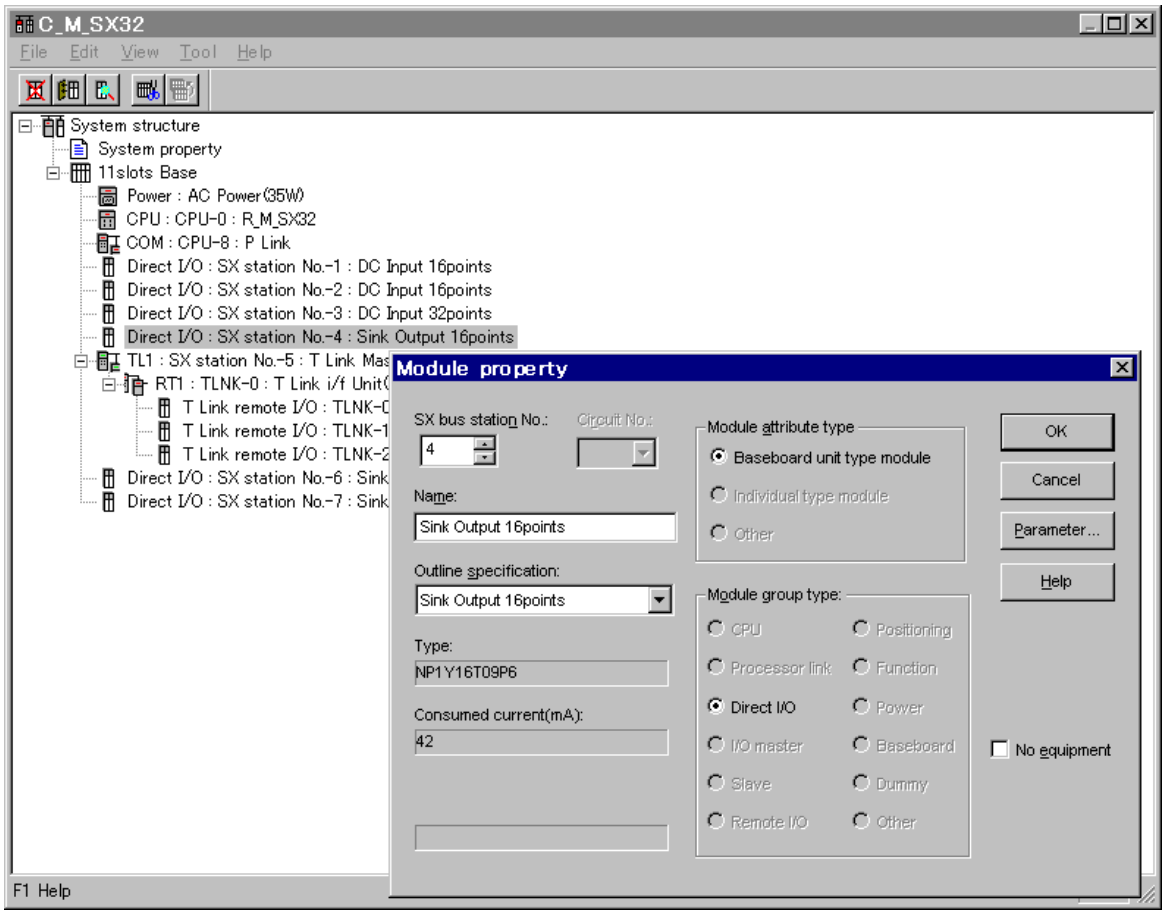
2) System digital output definition

For each configuration, one bit can be set so as to output system operating status independent of the application. This bit is turned on when the entire system is running normally, and is turned off when a system error occurs. Only bit zero of the output module can be set for this purpose.

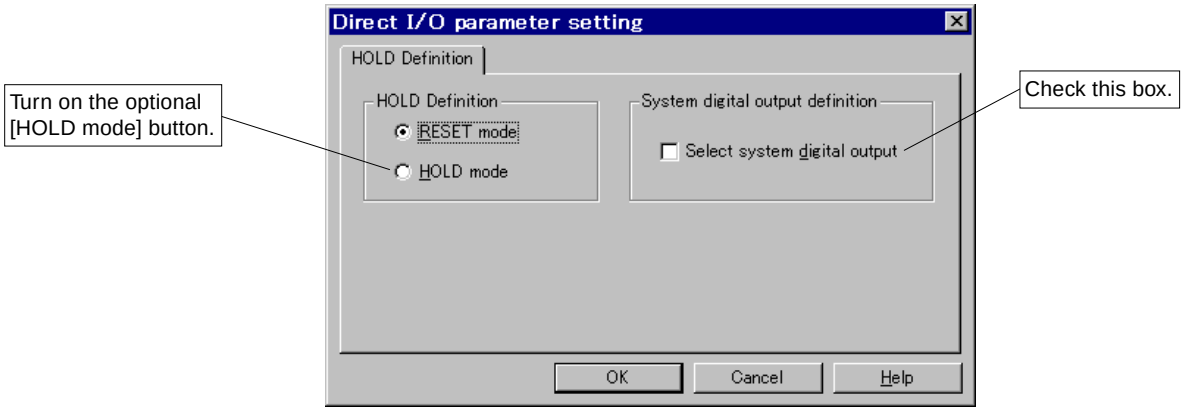
<How to set>

◊ In the system structure definition tree, select the digital output module for which the parameters are set by left-clicking it.

◊ Left-click the [Property] button, or alternatively right-click to display the shortcut menu and left-click the [Property...] command in the menu.
The {Module property} dialog box will be opened.



◊ Left-click the [Parameter ...] button, and the {Direct I/O parameter setting} dialog box will be opened.



◊ After setting, left-click the [OK] button.

The output HOLD mode cannot be set for remote I/O modules on a unit equipped with the JPCN-1 (OPCN-1) interface (NPIL-RJ1).

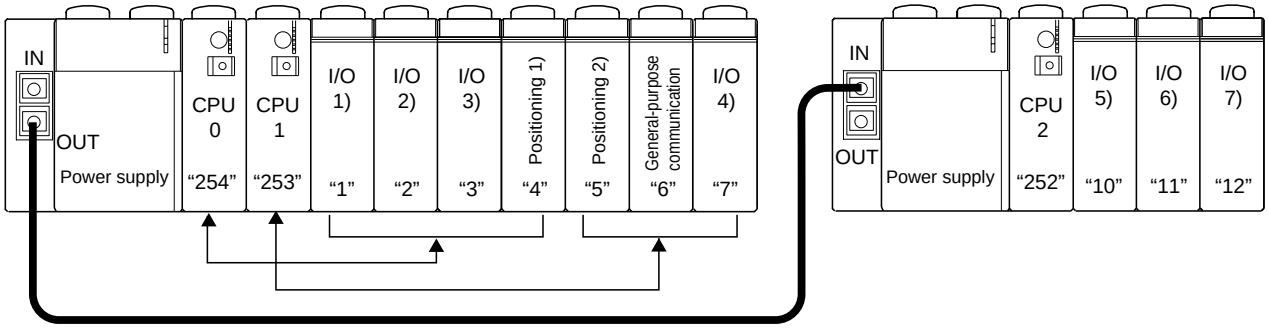
11-4-6 System structure definition for multi-CPU system

For the MICREX-SX series, a multi-CPU system can be constructed by connecting multiple CPU modules to a single SX bus. A sample multi-CPU system structure and the system structure definition of this system are shown below.

For a detailed explanation of multi-CPU system, see the INSTRUCTION No. FEH200 volume.

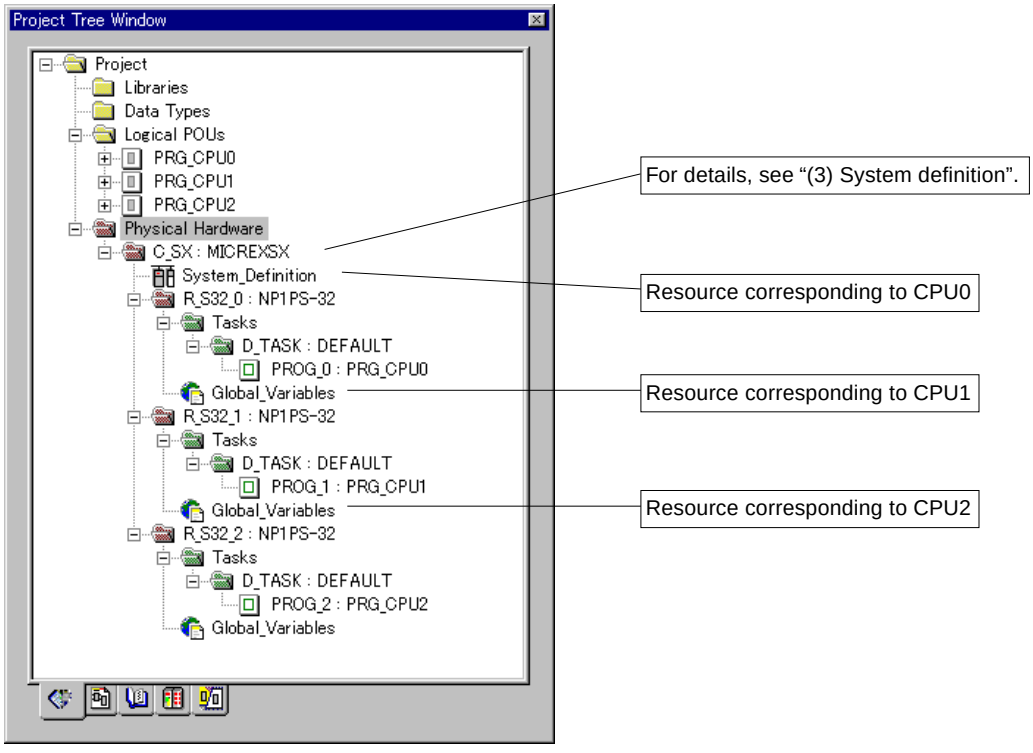
(1) Sample system structure

CPU0 controls I/O modules 1), 2), and 3), and positioning module 1). CPU1 controls positioning module 2), general-purpose communication module and I/O module 4). CPU2 controls I/O modules 5), 6), and 7).



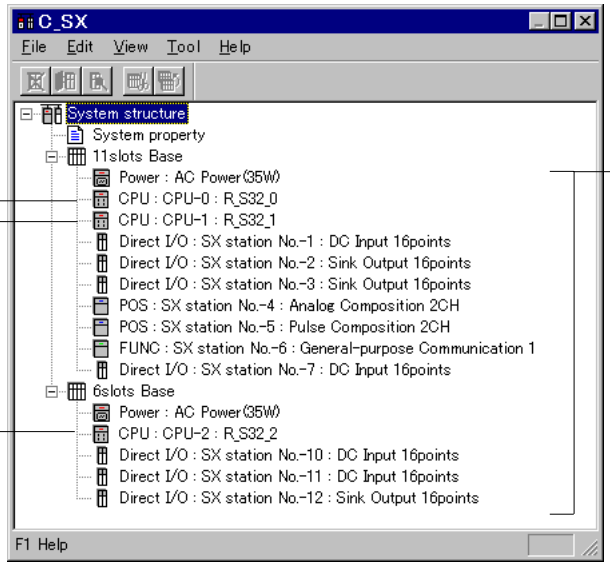
(2) Structure of project tree

The resources that correspond to CPU0 and CPU1 in the above figure are inserted in the same configuration in the project tree.



(3) System definition

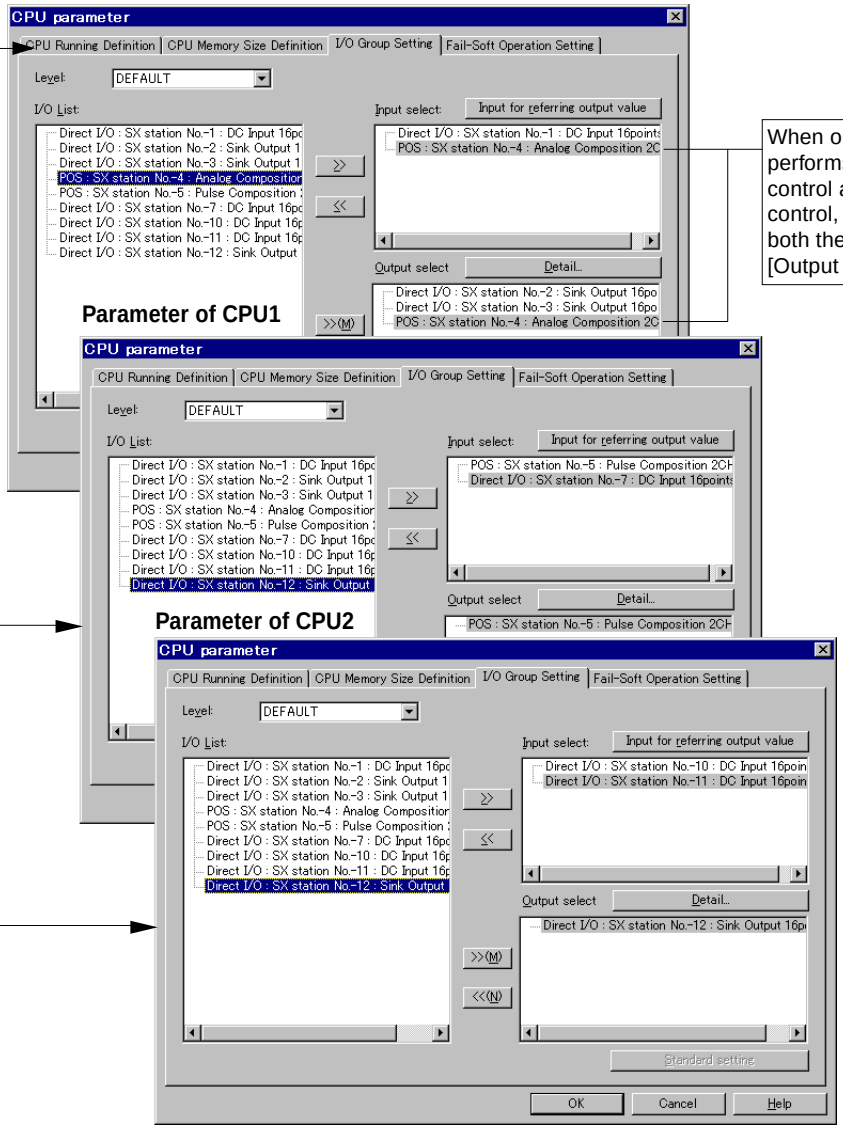
A sample system definition for the multi-CPU system explained above is shown below.



All the modules on the baseboard are registered.

Set CPU module parameters. An example of “I/O group setting” is shown below.

Parameter of CPU0



When one module performs both input control as well as output control, it is registered in both the [Input select] and [Output select} boxes.

System properties consist of 3 setting items (dialog boxes): “System Running Definition”, “Redundancy Setting”, and “Fail-soft operation setting”.

11-5-1 System running definition

System running definition includes 3 setting items: SX bus tact time, waiting time for structure check, and initialization method.

(1) SX bus tact period

The SX bus tact period is the period of a data transfer to and from a module (such as an I/O module) connected to the SX bus. The tact period is selectable from among 0.5, 1, 2, 3, ..., 18, 19, and 20 ms. (The default is 1.0 ms.)

(2) Waiting time for structure check

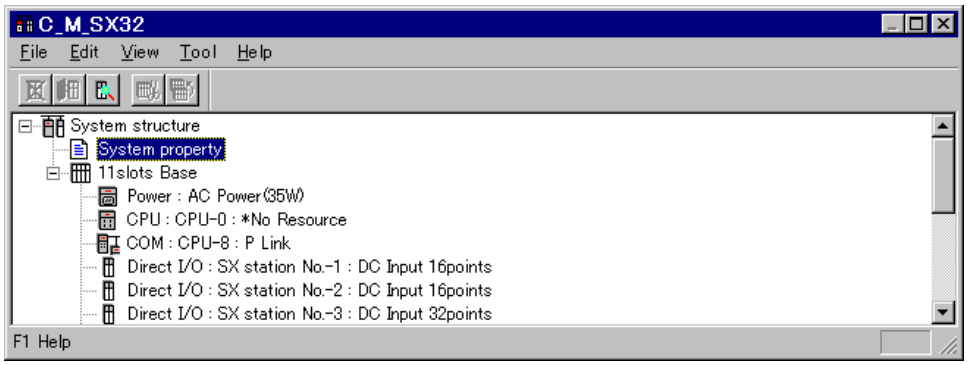
When the power supply for the system is turned on, the CPU module starts a structure check for all the modules on the SX bus. The system is started when all these modules are started within the “waiting time for structure check”. When the system consists of multiple bases and the power-on timing differs module by module, the difference can be adjusted by the “waiting time for structure check”.
(The default value for “waiting time for structure check” is 20 seconds. “Waiting time for structure check” can be set in a range from 1 to 180 seconds.)

(3) Initialization method selection

Specify whether an internal memory test should be performed on the CPU module when it is initialized after the system is turned on. The time needed to initialize the CPU module would be approximately 4.5 seconds if a memory test is run; otherwise, if would be approximately 2.5 seconds.

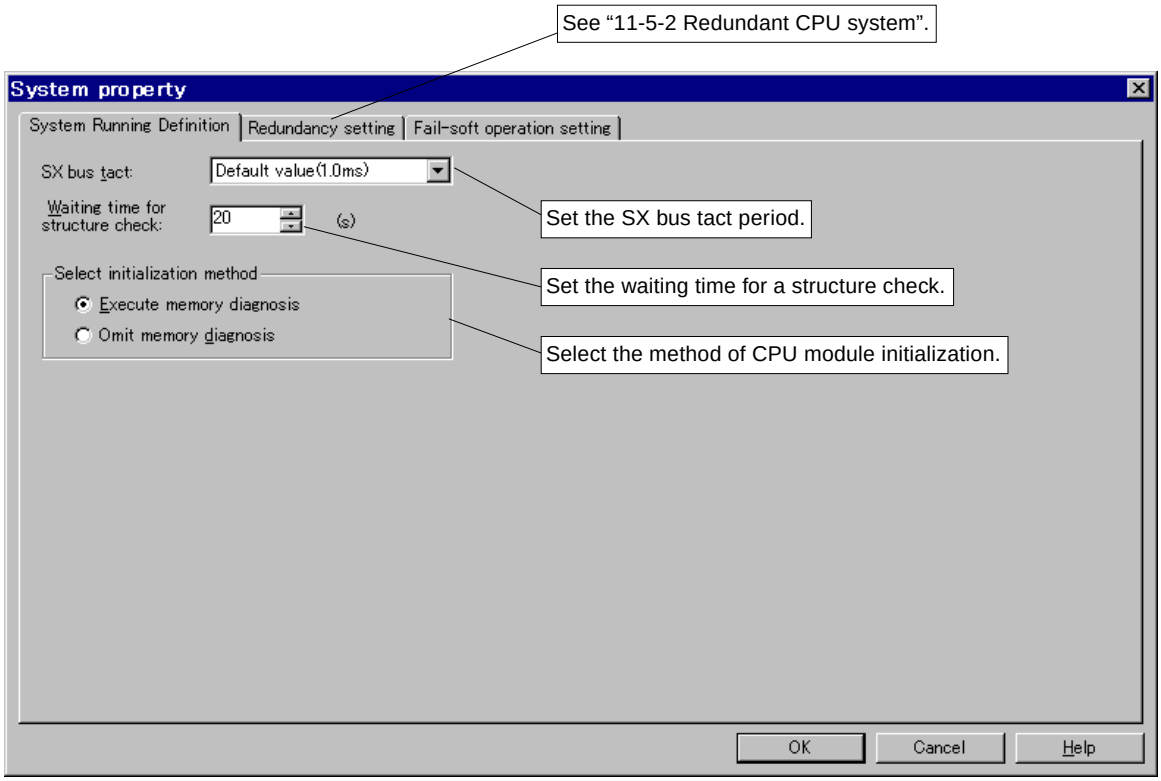
<Programming method>

◊ Left-double-click the [System_Definition] icon in the project tree to open the system structure definition window.



◊ The {System property} dialog box will open.

◊ Left-click the [Property] button, or alternatively right-click to display the shortcut menu and left-click the [Property...] command in the menu.
The {Module property} dialog box will be opened.
(This dialog box is opened with the [System Running Definition] tab selected.)



◊ After setting the individual items, left-click the [OK] button.

11-5-2 Outline of redundant CPU system

(1)Outline of redundant CPU system

A redundant CPU system is a system that runs a standby CPU module to continue operation if the working CPU module has failed.

With the MICREX-SX series, a multi-processor system that has multiple CPU modules can be constructed, and by including standby CPU modules in the system structure, a redundant CPU system can easily be constructed.

📖 For a detailed explanation of redundancy, see the INSTRUCTION volume (No. FEH200).

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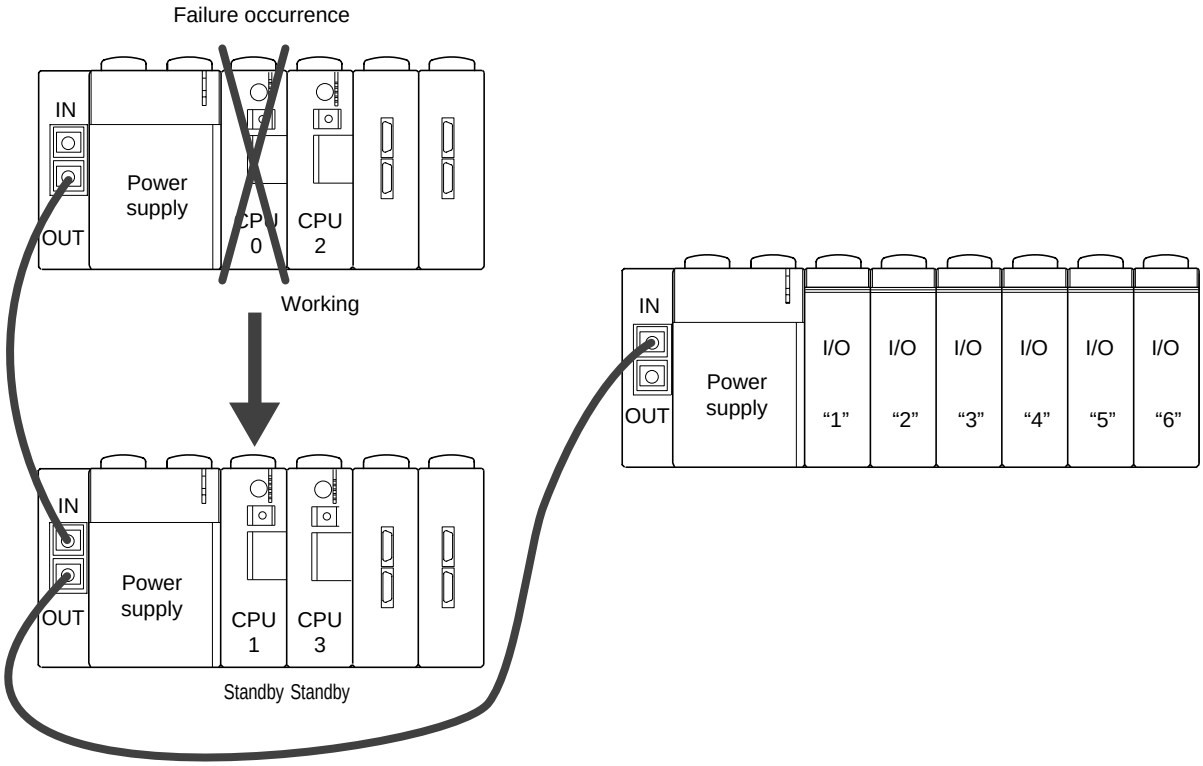
1) 1:1 backup system

As shown in the figure below, “1:1 backup system” has one standby (backup) CPU module for each working CPU module.



<How to continue operation>

For this, the following two methods are available:

• Cold-start method

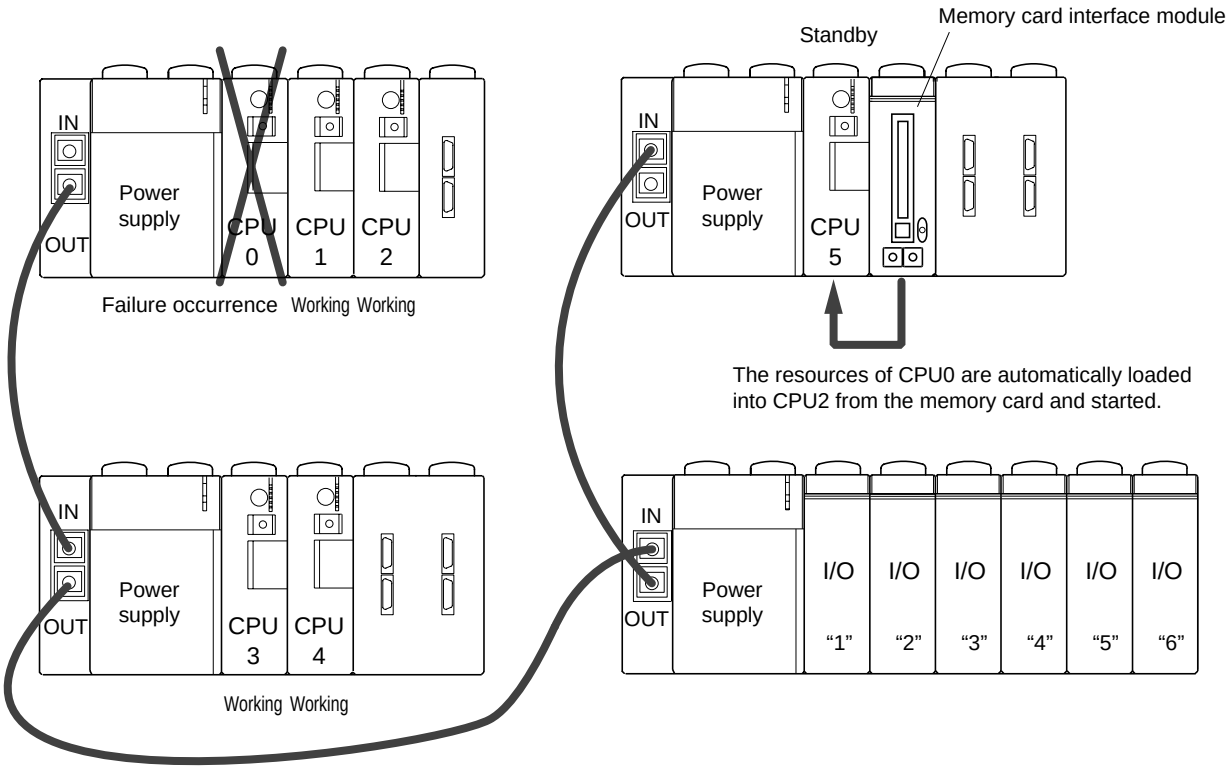
This method switches over to the standby CPU that is in the initialized condition if the working CPU has failed. (The data of the working CPU cannot be continued in the standby CPU.)

• Hot-start method

This method switches over to the standby CPU while preserving the control status. The standby CPU stops in the initialized condition, and the data of the working CPU is continuously and automatically copied into the standby CPU (referred to as “equalization”).

2) 1:N backup system

As shown in the figure below, with the “1:N backup system”, one standby CPU module and memory card interface module (model: NP1F-MM1) performs back up for multiple working CPU modules.



<How to continue operation>

Only the cold-start method is available. (The data of the working CPU module cannot be continued in the standby CPU module.)

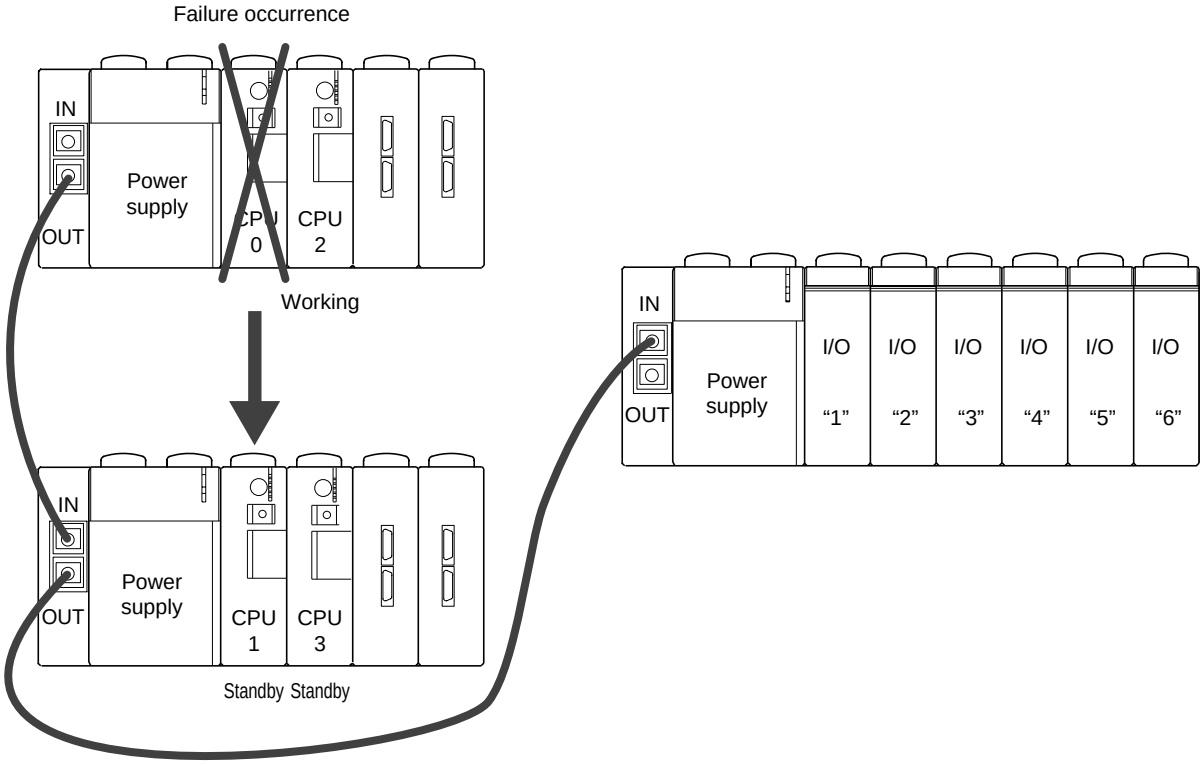
If a working CPU module has failed, the standby CPU module loads the resources (programs and system definitions) of the failed CPU module from the memory card inserted in its memory card interface module to perform a cold-start. (The resources of all the working CPU modules need to be registered in the memory card.)

(2) Setting and registration of a 1:1 redundant system

To construct a redundant CPU system, it is necessary to set redundancy in the system definition as well as to set and register how the redundancy will operate.

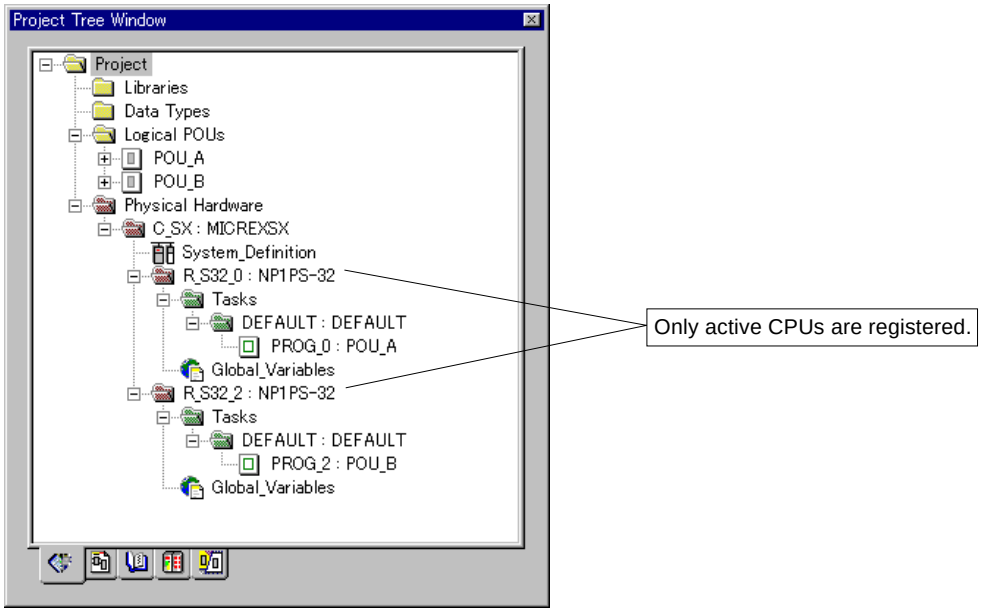
The setting for constructing a 1:1 redundant system is explained below, taking the following system structure for example.

1) Example of system configuration



2) Project tree structure

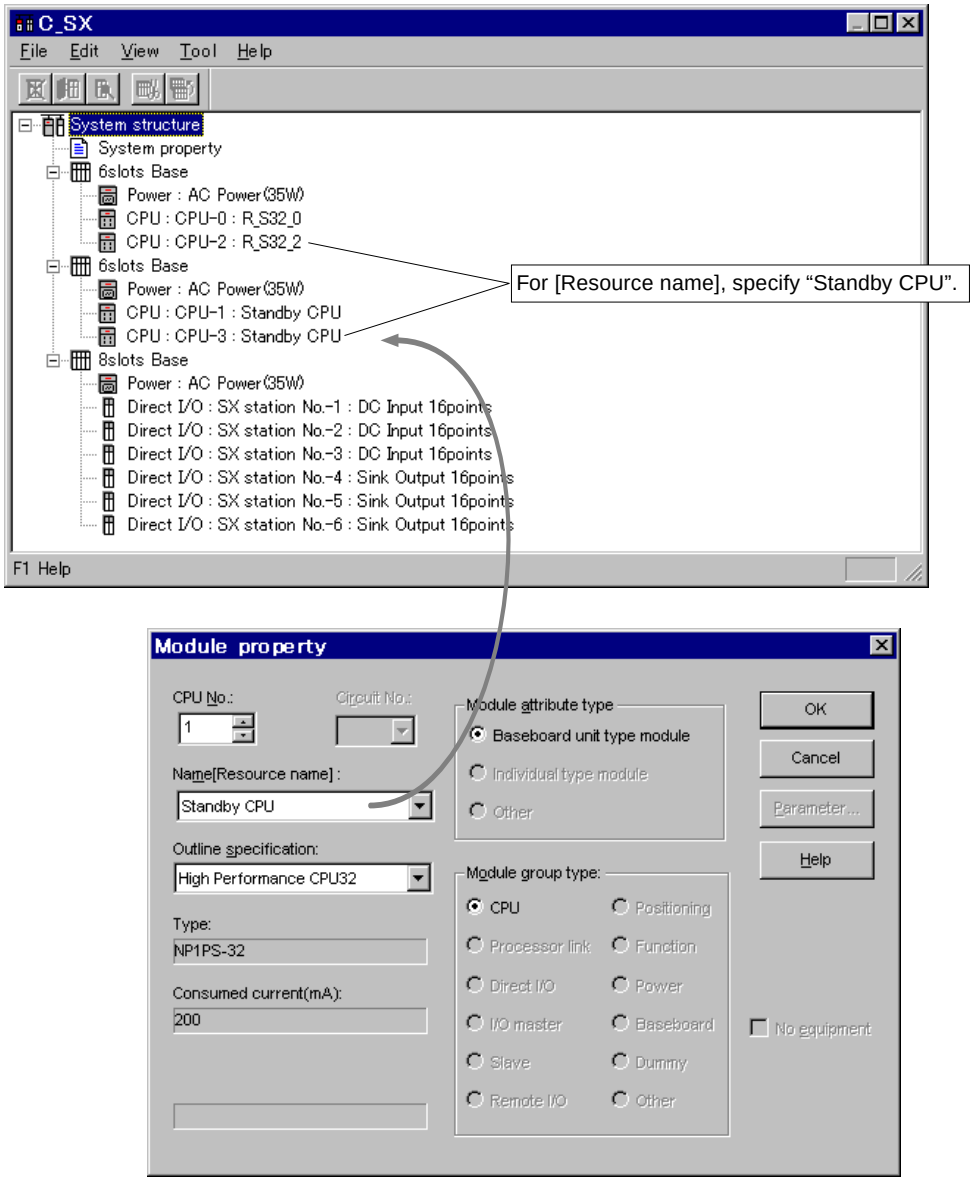
As shown in the figure below, only “working CPU modules (resources)” need to be registered in the project tree; “standby CPU module” does not need to be registered.



3) System definition

◊ Left-double-click the [System_Definition] icon in the project tree, and the {System Structure Definition} window will be opened.

◊ Define the system structure, as shown in the figure below.



<Setting CPU No. for 1:1 redundant system>

Redundancy (backup) can be achieved by the following combination of CPU numbers.

• Setting of CPU numbers

The following 4 combinations are available:

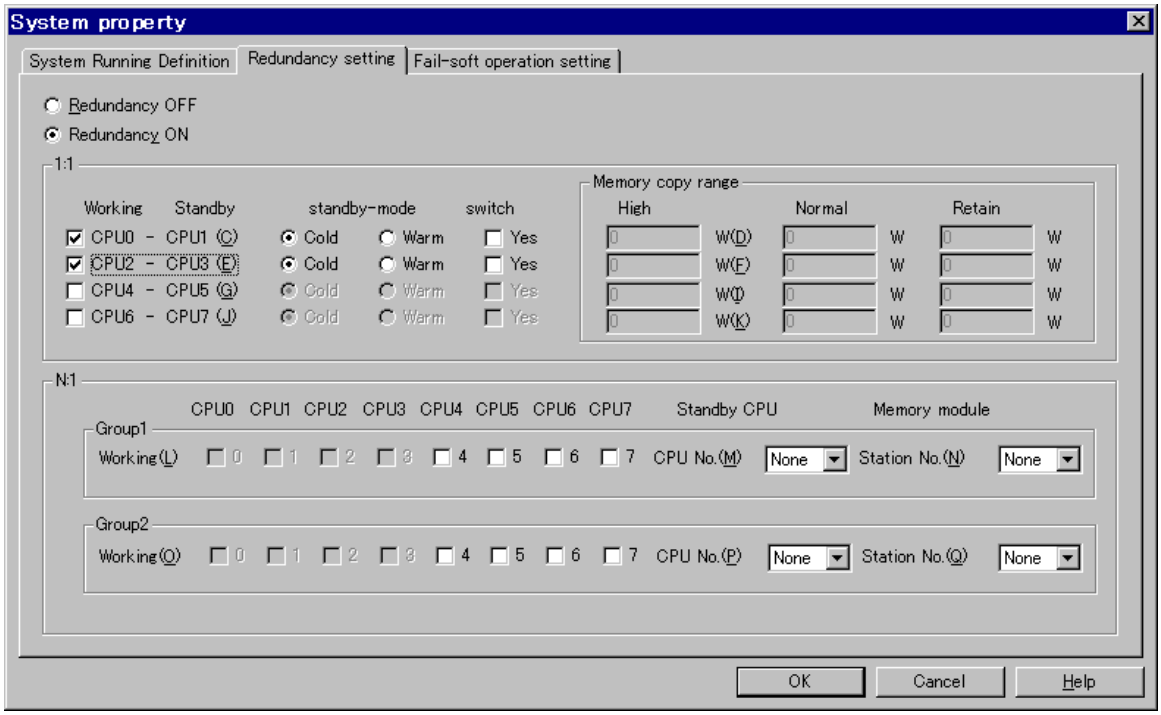
CPU0 (working) - CPU1 (standby), CPU2 (working) - CPU3 (standby), CPU4 (working) - CPU5 (standby)
CPU6 (working) - CPU7 (standby)

4) Definition of system redundancy

The type of system redundancy (backup) is set by user, in the following manner:

◊ Right-click the [System property] icon in the [System structure] tree to display the shortcut menu, and then select the [Properties ...] command in this menu. The {Properties} dialog box will then be opened.

◊ Left-click the [Redundancy setting] tab in the {System property} dialog box to open the following dialog box.



◊ Turn on the optional [Redundancy ON (B)] button to enable the setting of redundancy.

◊ After setting the items in the [1:1] box, left-click the [OK] button.
The system structure definition window [C_M_SX32] will appear on the screen again.

◊ Left-click the [Exit] command in the [File] menu to close the window.

<Explanation of the dialog>

• [Working - Standby] boxes

Check the box for the combination you want to select for redundancy.

• Optional [standby mode] buttons

Set the standby mode of the standby CPU when operation is changed over from working to standby CPU module.

[Cold]:

Starts running after clearing all the data stored in the CPU (including the retained memory area). (When initial values are specified by variables declaration, after clearing the memory, the initial values are set and then the CPU is started.)

[Warm]:

Operation is continued with the data of the memory areas set in the [Memory copy range] box retained.

• [Switch] box

When a switch is made between one CPU pair for which this box is checked, switching is also performed for other CPU pairs for which this box is checked.

• [Memory copy range] box

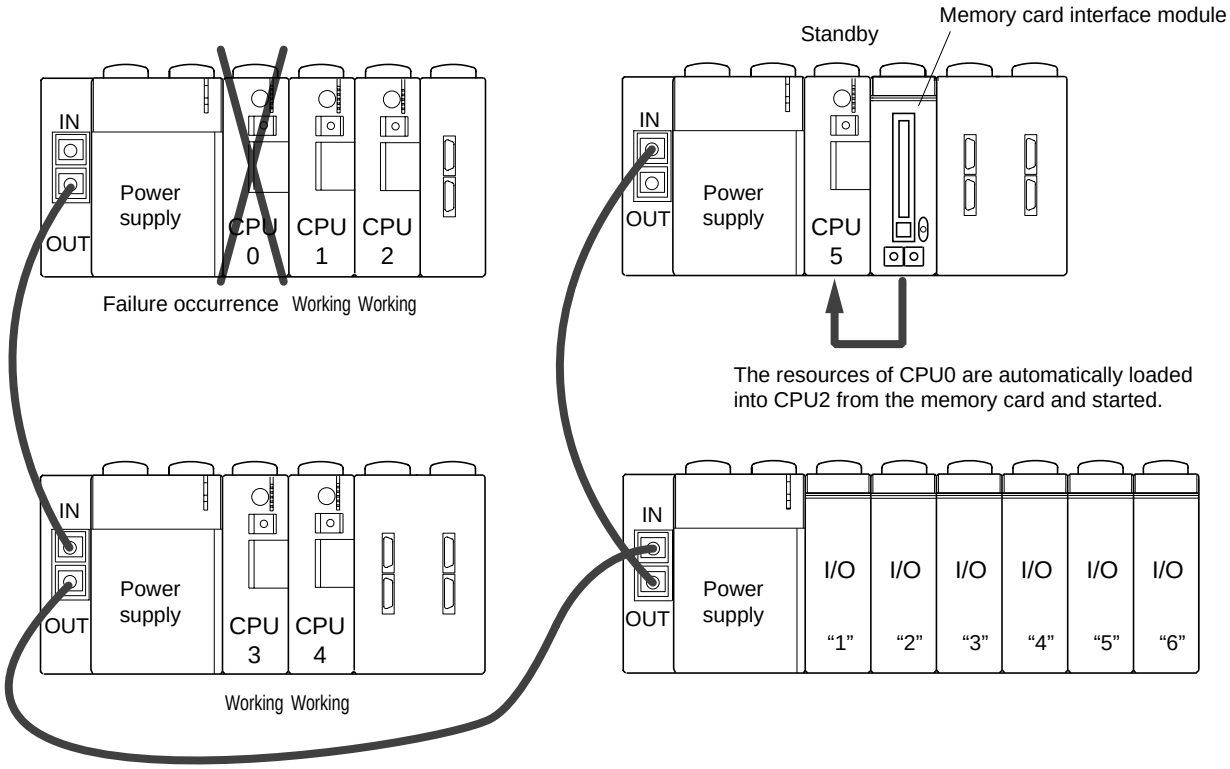
Specifies which range to equalize data in when warm standby is set.

(3) Setting and registration of N:1 redundant system

To construct a redundant CPU system, it is necessary to set redundancy in the system definition as well as to set and register how the redundancy will operate.

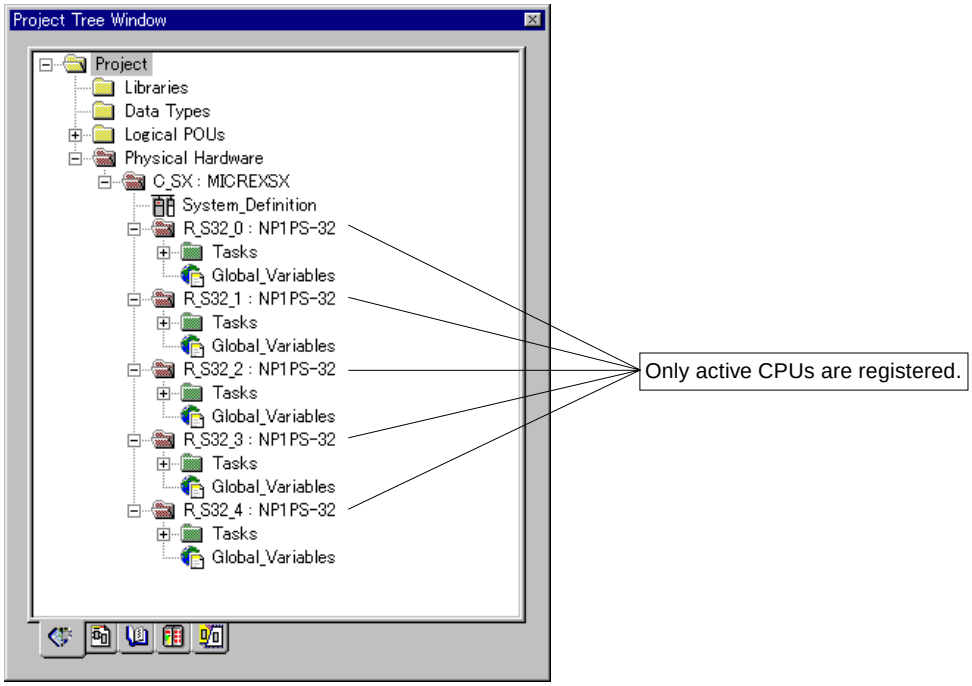
The setting for constructing an N:1 redundant system is explained below, taking the following system structure as an example.

1) Example of system configuration



2) Project tree structure

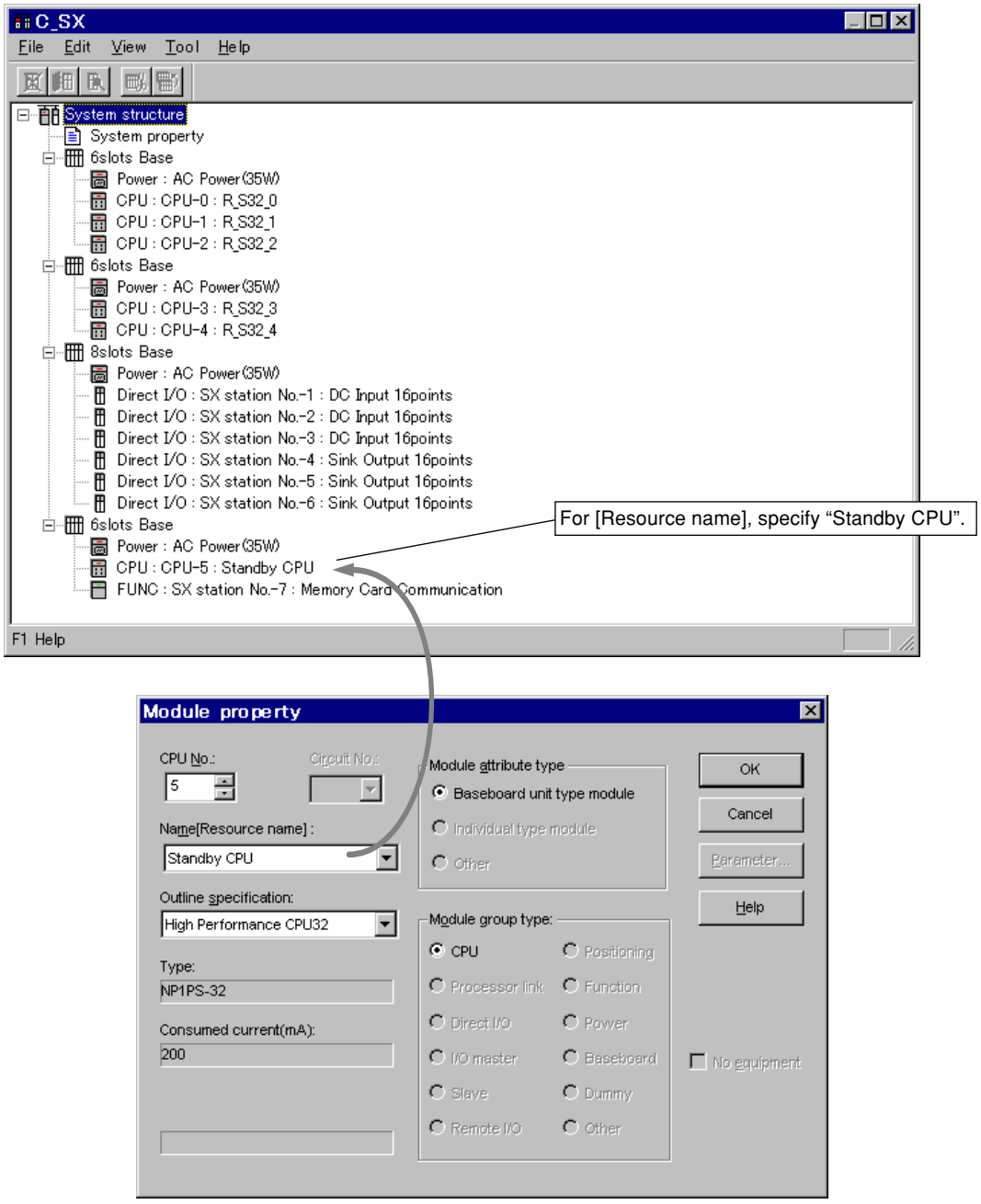
As shown in the figure below, only "working CPU modules (resources)" need to be registered in the project tree; the "standby CPU module" does not need to be registered.



3) System definition

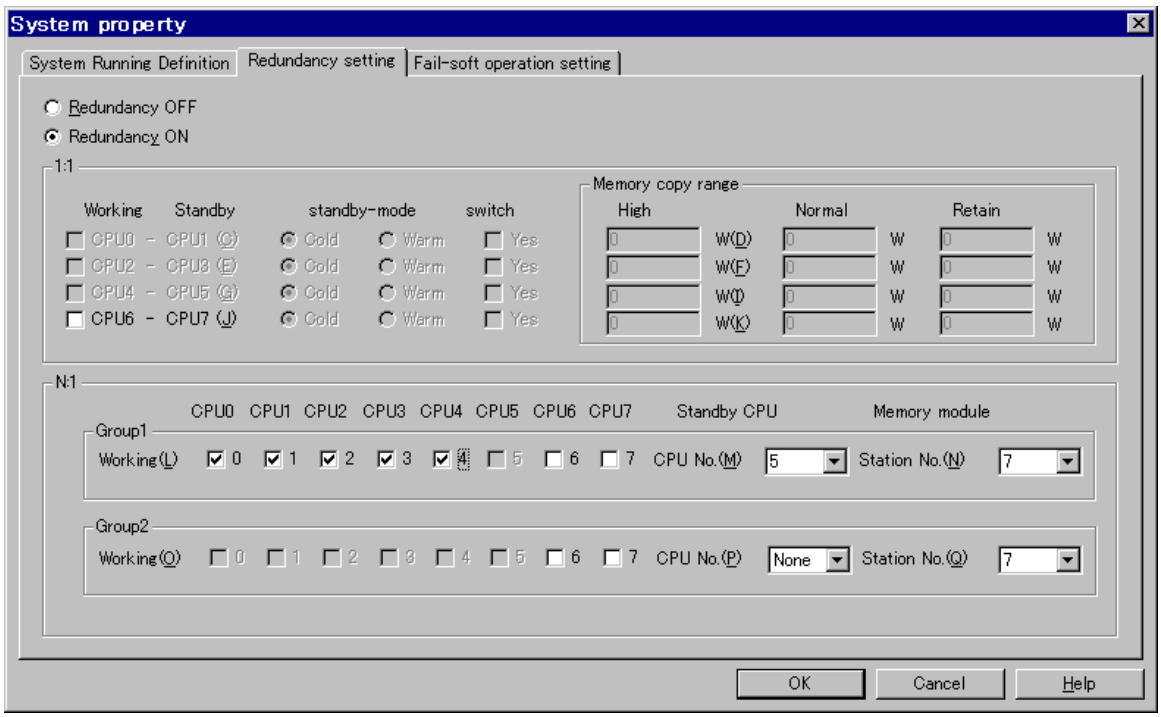
◊ Left-double-click the [System_Definition] icon in the project tree, and the {System Structure Definition} window will be opened.

◊ Define the system structure, as shown in the figure below.



4) Definition of system redundancy
The type of system redundancy (backup) is set by the user in the following manner:

◊ Right-click the [System property] icon in the [System structure] tree to display the shortcut menu, and then select the [Properties ...] command in this menu. The {System properties} dialog box will then be opened.
◊ Left-click the [Redundancy setting] tab in the {System property} dialog box to open the following dialog box.



◊ Turn on the optional [Redundancy ON (B)] button to enable the setting of redundancy.
◊ After setting the items in the [1:1] box, left-click the [OK] button.
The system structure definition window [C_M_SX32] will appear on the screen again.
◊ Left-click the [Exit] command in the [File] menu to close the window.

<Explanation of the dialog>

• [Working] boxes
Check the box for the CPU No. that is the object of redundancy setting.

• [Standby CPU] / [CPU No.] list box
Specify a CPU No. that is to be the standby.

• [Memory module] / [Station No.] list box
Specify “SX bus station No.” for the memory card interface module to be used by the standby CPU.

11-5-3 Fail-soft operation setting

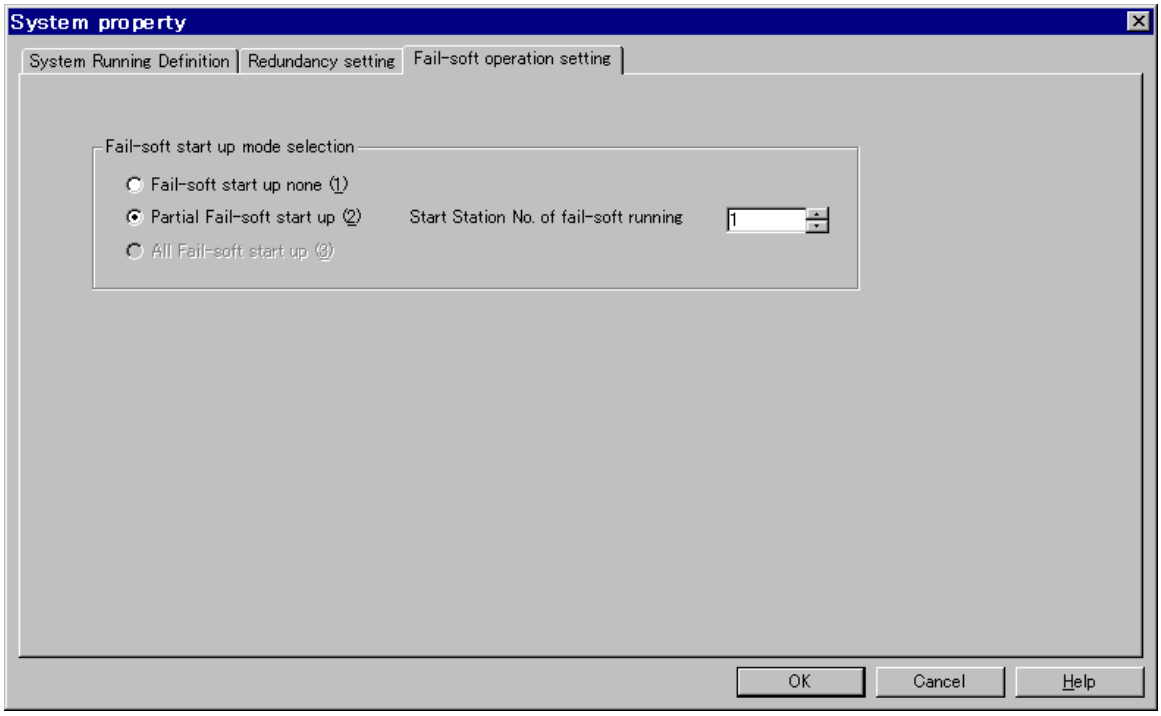
(1) No fail-soft startup
If all modules registered in the system structure definition do not completely start up within the system structure check wait time (default: 20 seconds), a system failure will occur (ALM on the CPU module will be lit).

(2) Partial fail-soft startup of modules with SX bus station No.
If some modules cannot be partially turned on during startup of the MICREX-SX system (those modules subject to fail-soft startup as servo modules), the system will be started up excluding those modules after the system structure check wait time elapses (RUN and ALM will be lit on the CPU module).

Devices subject to system fail-soft startup include Fuji POD (programmable operation display) and FALDIC-a (AC servo system) which have the SX bus station No. switch.

<Setting procedure>

◊ Left-click the [Fail-soft operation setting] tab in the {System property} dialog.



◊ Turn on the optional [Partial Fail-soft start up] button to select the fail-soft startup operation mode, and select the station number for fail-soft running start from the list box.

◊ After completing the setting, left-click the [OK] button.

<Explanation of the dialog>

[Fail-soft start up none (1)] : Prevents fail-soft startup of all devices connected to the SX bus.
[Partial Fail-soft start up (2)] : Activates fail-soft startup of the devices connected to the SX bus which have the sequential SX bus station numbers starting from the value specified in the [Start station No. of fail-soft running] text box.
[All Fail-soft start up (3)] : Activates fail-soft startup of the all devices connected to the SX bus.

Section 12 Compiling/Loading

page

12-1-1 Before compiling projects

Compiling means to translate worksheets into a PC-specific machine code. With D300win, you can compile a project in whole or in part.

(1) About the compilation process

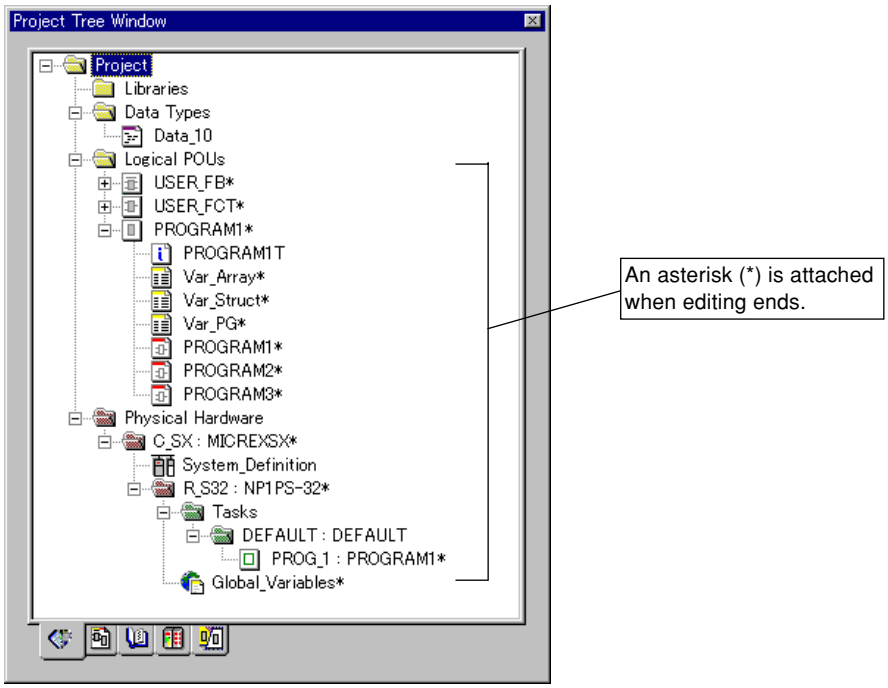
Compilation takes place in a number of successive steps. If you select [Build Project], D300win will run the complete sequence of steps. With other compile options, only some of these steps will be run. The compilation process begins by compiling the individual worksheets. In the second main step, the worksheets that have been compiled are linked together to generate an intermediate IEC code. In the last step, a PC-specific machine code is generated. The current step running is displayed in the working box.

(2) Compilation-time error handling

If D300win detects a programming error or memory or file error, the compilation process terminates and a user error list appears containing error messages that explain the kinds of error encountered. To view help, select an error and press <Shift>+<F1>. You may left-double-click the error message to view the program error in the worksheet directly. Having fixed the first error, press <Ctrl>+<F12> to open the next worksheet which contains an error.

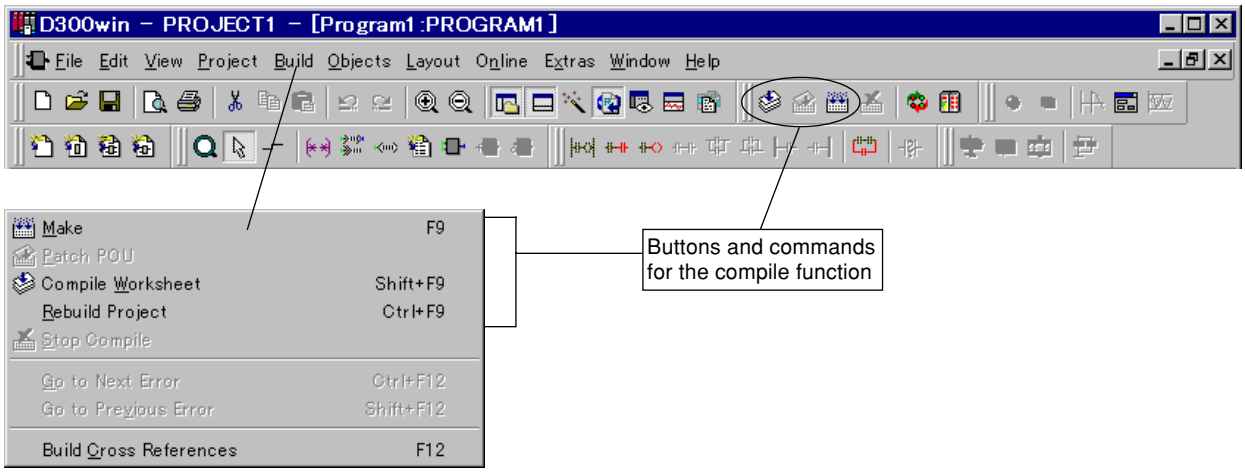
(3) Uncompiled project tree

Whether or not a project tree is compiled can be known by whether or not asterisk (*) is attached following the POU names in the project tree



12-1-2 D300win compilation functions

(1) Compile menu
The buttons or commands for the compile function are included in the menu or the tool bar, and are used according to different operations.



(2) Make mode
[Make] button = [Make] command
You can compile all the worksheets that have been edited in make mode. The edited versions of worksheets are marked by an asterisk (*) to the right of their worksheet icons in the project tree. Make mode is the standard mode of compilation that is typically used at the completion of editing.

(3) Worksheet compilation
[Compile Worksheet] button = [Compile Worksheet] command
You can compile worksheets using [Compile Worksheet] to check for syntax errors made during editing. When [Compile Worksheet] is selected, the currently edited worksheet is compiled along with all associated worksheets, and the compiler monitors them for syntax errors. The selection of [Compile Worksheet] will not cause machine code to be generated.

(4) Project re-compilation
[Rebuild Project] command
[Rebuild Project] is used to compile the entire project for the first time after editing. Use this command only when [Make] causes compiler errors. To unzip a project without PC machine code or to activate [Help on FB/FU] for a user-defined function/ function block, [Rebuild Project] must be used.

◊ Left-click the [Rebuild Project] in the [Build] menu.

For details on error messages displayed as a result of actual compilation, see “12-1-3 Running compilation.”

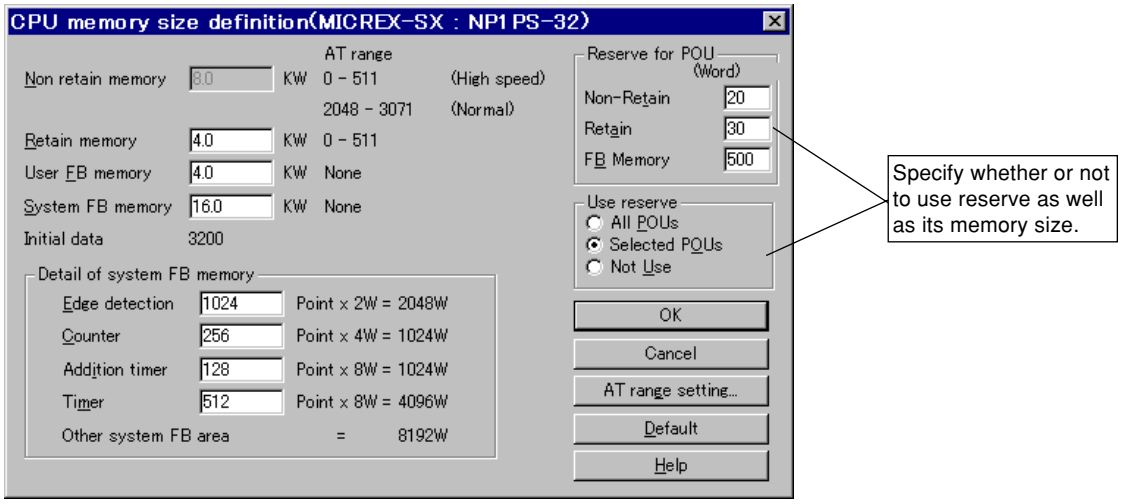
(5) POU patch
[Patch POU] button = [Patch POU] command
[Patch POU] is a function that reduces the time needed to make modifications to circuits or constants while monitoring the circuits in online mode. This function automatically compiles and downloads the modifications.
[Patch POU] can be used when any of the modifications shown in the following table are made.

The Patch worksheet function does not work on modifications made to variable declarations, on projects that are compiled for the first time, or on unzipped projects. In these situations, use [Rebuild Project].

1) Valid modification ranges
The table below delineates the scope of modifications on which the Patch POU function can be used.

Language	Modification
All languages	• Insertion of new local variables or global variables (However, reserve area needs to be registered. See “ Registration of reserve area.”) • Deletion of variables on a code worksheet • Insertion of new functions (for user-defined functions, only those that have already been registered in a project) • Deletion of functions • Insertion of new function blocks (for user-defined function blocks, only those that have already been registered in a project) • Deletion of function blocks • Insertion of blank lines or blank areas • Modification to or addition of comments
IL	• Modification to or insertion of IL operators • Modification to the level of nesting of parentheses
ST	• Modification to statements or expressions
FBD	• Modification to circuits
LD	• Modification to circuits
SFC	• Modification to an FBD circuit, LD circuit, or variable directly connected to a transition • Modification to the time interval of a time action qualifier • Modification to the variable name of an action block

<Registration of reserve area>
When using the Patch POU function for a POU to which new variables, functions, or function blocks have been added, compile the worksheet so that the reserve area pre-allocated in memory for each POU can be used as a variable area.
For this purpose, check the [Use reserve] box beforehand in the {Resource setting of CPU memory size definition} dialog box or in the POU {Property} dialog box. Set the area of reserved memory to use in the {CPU memory size definition} dialog box.



2) Invalid modification area
The following describes the scope of modifications on which the Patch POU function cannot be used.

<Code worksheet>
The modifications shown below cannot be made on the code worksheet.

- Modification or addition of character constants
- Addition of activation of user-defined functions unregistered in a project
- Addition of activation of user-defined function block instances unregistered in a project
- Modification to formal parameters of functions
- Modification to formal parameters of function blocks (VAR_INPUT, VAR_OUTPUT, VAR_IN_OUT)

<Variable worksheet>
The following modifications cannot be made on the variable worksheet.

- Modification, addition, or deletion of variables
  Modification, addition, or deletion of addresses
  Modification, addition, or deletion of initial values
  Modification to data types
- Modification or deletion of variable declaration keywords

<Project tree>
The following modifications cannot be made to a project tree.

- Modification, addition, or deletion of subtrees under {Physical Hardware]
- Modification, addition, or deletion of POUs or inside of the POUs (worksheets) of subtrees
- Modification, addition, or deletion of libraries to/from the project tree
- Modification, addition, or deletion of data type worksheets to/from the project tree

The [Patch POU] command can be used only after setting the worksheet to the monitor mode by left-clicking the [Monitor On/Off] icon on the tool bar.

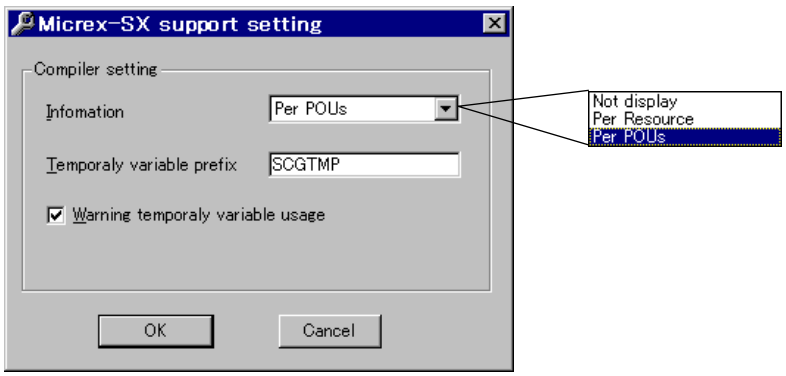
12-1-3 Running compilation

Instructions on using the [Rebuild Project] command to compile a newly created command are given below. Be sure to save all edited versions of worksheets and physical hardware setup files.

(1) Setting for executing compilation

Though a default setting is available for executing compilation, the following items can be set.

◊ In the [Extras] menu, and select the [Micrex-SX support setting] command.
The {Micrex-SX support setting} dialog box will then be opened.

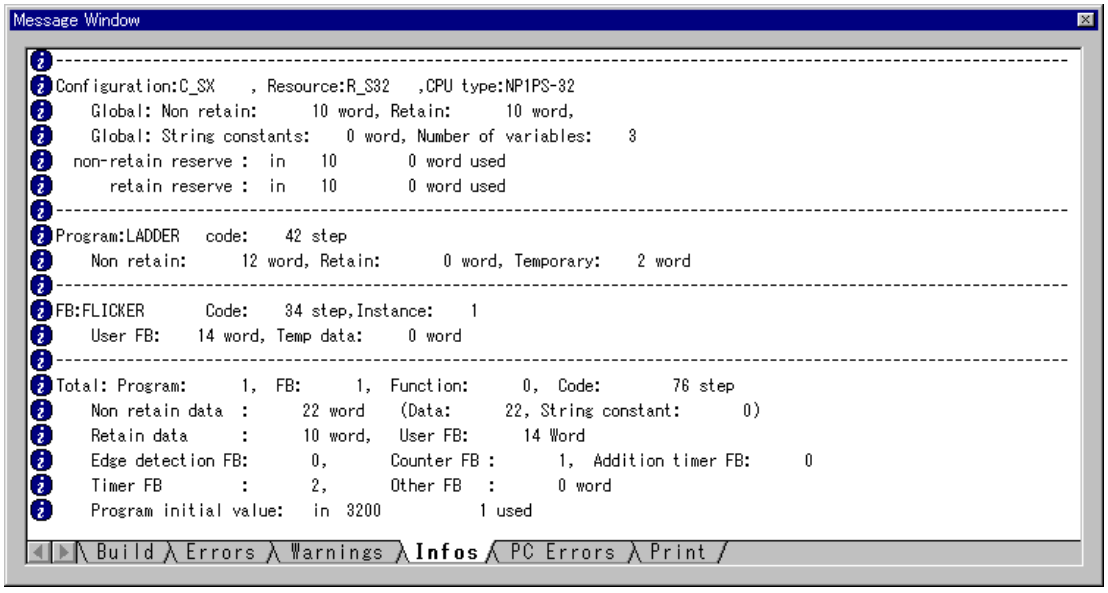


[Information] list box:

This box is used to specify what to display in the error window as the compilation result after completion.
Sample displays are shown below. Items 1), 2), 3) and 4) may or may not be displayed depending on the display mode setting. Items 2), 3) and 4) are displayed only for the number of POUs.

Compilation data display	Display lines
Do not display	None
Display by resource	1)
Display by POU	1), 2), 3), 4)

<Example of compilation data display>



1) Resource-related data is displayed.
2) Program POU-related data is displayed. The (two) lines related to reserve memory are displayed only when reserve memory is used.
3) Function block-related data is displayed. The (one) line related to reserve memory is displayed only when reserve memory is used.
4) Function-related data is displayed. Because function output is included, the number of parameters displayed here is increased by one. For functions, because variables declared internally are assigned to the temporary memory, reserve memory is not secured and no data is displayed.

[Temporary variable prefix] test box:
The compiler may use temporary memory area to create codes. In addition, a project that is uploaded from the CPU module into D300win creates the program by making this temporary area for system temporary variables. If the created program is re-compiled, the number of variables used for the original program increases, consuming a larger memory area. To avoid this, the prefix of variable name can be set to recognize these temporary variables. Variable names which have the prefix added are not assigned to retained memory, non-retained memory or FB memory. They are assigned to the temporary area.

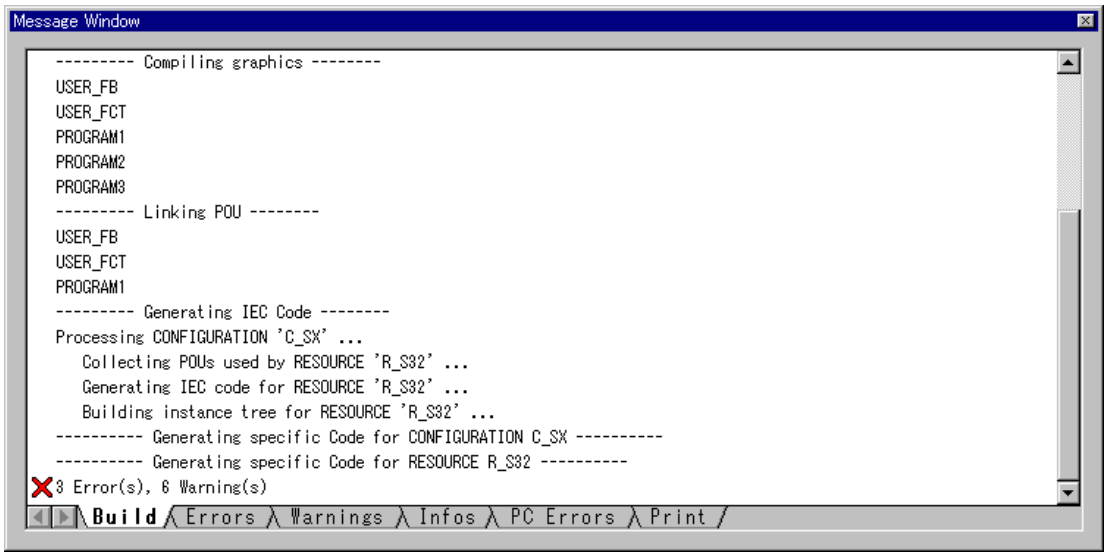
* Available characters for system temporary variable names are single-byte alphanumeric characters, the single-byte underscore character "_" . However, the variable name may not begin with a numeric character, and the single-byte underscore character may not be used consecutively, as"__". In addition, system temporary variable names may not be a blank.
  If [Make] is executed without executing [Rebuild Project] after modification, POUs that are not coded may remain, and the following message will be displayed:

  Message: Code generation setting changed! You have to build!

[Warning temporary variable usage] check box:
Whether or not to display warning message for the variable names that use system temporary variable names is set in this box. If system temporary variable names are used unknowingly by the user, they become local variables in the POU and cannot be retained during program scanning. To prevent this, the compiler displays a warning message. However, when an uploaded program is compiled, too many of these variables may be created, and other important warning messages may be buried under the warning messages. To set a filter for preventing this message type from being displayed, check this box.

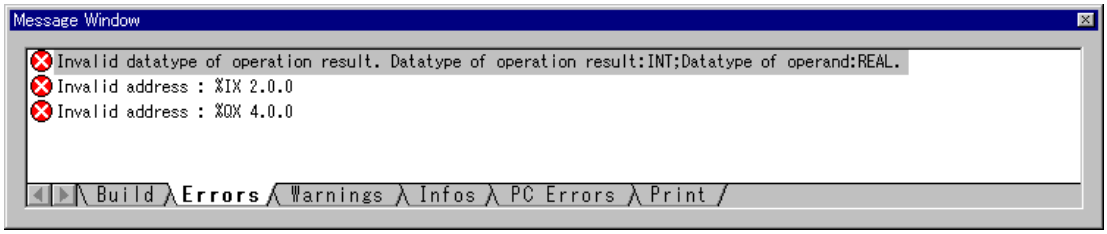
(2) Executing compilation

◊ Left-click the [Rebuild Project] command in the [Build] menu to compile the entire project.
The compilation process will be indicated in the message window during compilation. An example display is shown in the figure below. The numbers of errors and warnings, if any, will be indicated.



(3) Compilation error

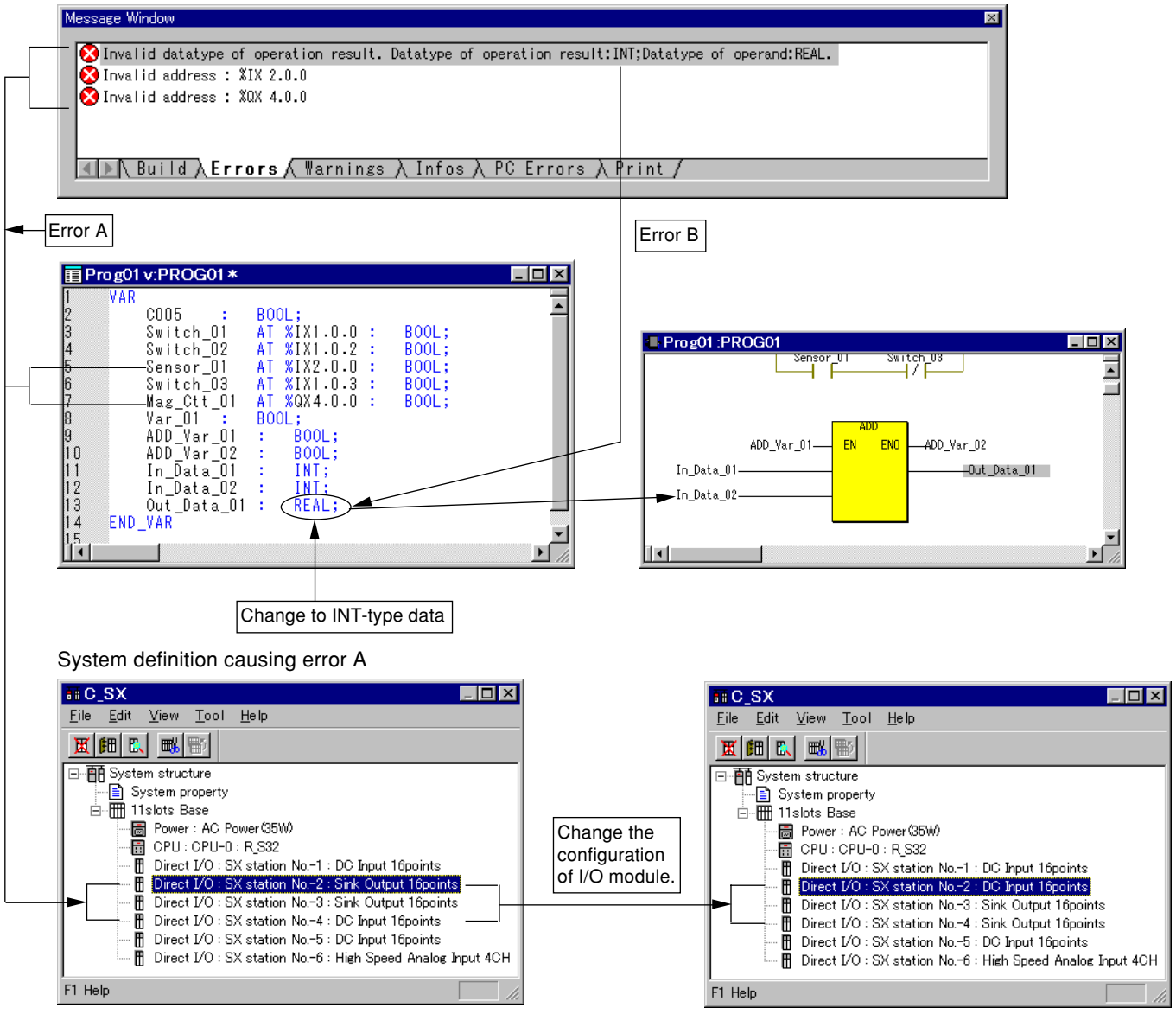
◊ If the same variable name is declared in duplicate or the compiler detects a type error, a compilation error will occur to interrupt the current compilation. The error content can be displayed by left-clicking the [Errors] tab of the {Message Window}.



◊ Left-double-click an error item in the error list, and the worksheet containing a program creation error will directly open to select a line or object with the program creation error. Press <Shift>+<F1> with the error display marked to display a help topic describing the error cause and how to deal with the error.

- Since D300win checks projects in multiple stages of compilation, it may display identical error messages occasionally.
- After correcting an error, press <Ctrl>+<F12> to open the worksheet containing the next error.
- If an error occurs, the compilation is interrupted. It is necessary to correct the error and start re-compilation.

1) Errors and probable causes
Typical probable causes of compilation errors and the suggested corrective actions are explained below.

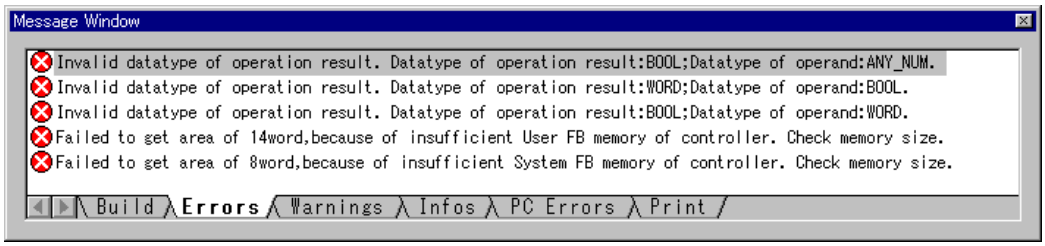


<Error A>
- Input address “%IX...” has been declared for the output module “SX No. 2” (address range %QSX.0.0 to %QX2.0.15) as programmed in the system structure definition.
- Output address “%QX...” has been declared for the input module “SX station No. 4” (address range %IX4.0.0 to %IX4.0.15) programmed in the system structure definition.

<Error B>
- This error indicates that the output terminal has data type REAL declared, while the input terminals have data type INT. The input and output terminals for the ADD function must be declared to have a uniform data type.

◊ Correct the error and recompile the worksheet.
When the “error-count, warning-count” is displayed on the status bar, the compilation ends, allowing downloading.
(At this point, the asterisks (*) which appear to the right of all worksheet icons in the project tree disappear.)

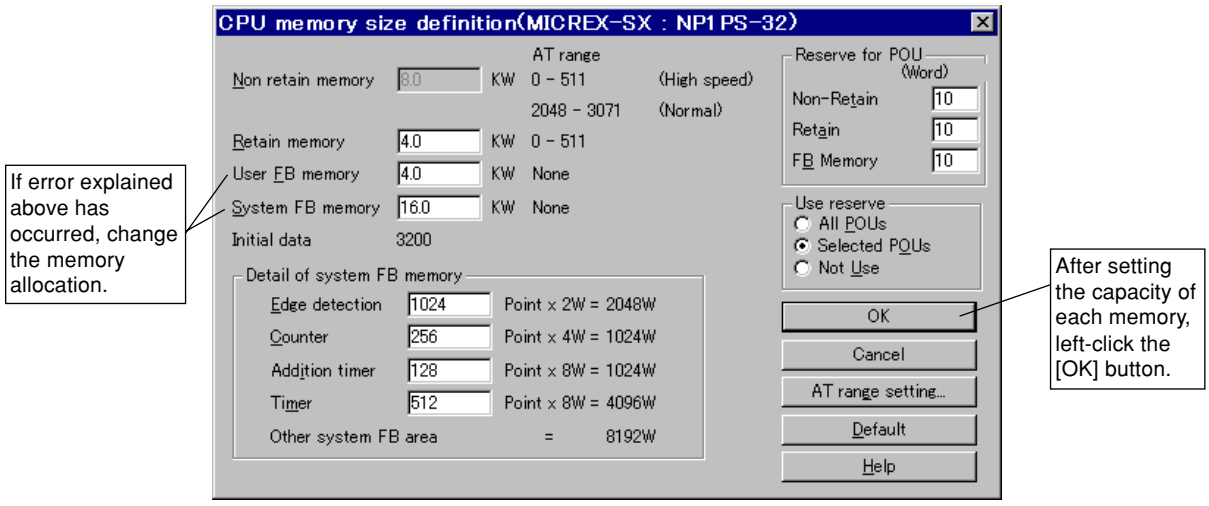
2) When memory shortage error occurred
When the “memory shortage” error is displayed in this list, as shown in the figure below, it is necessary to change the memory allocation of the resource (CPU module).



To change the memory allocation, do as follows:

◊ Right-click the icon for the resource in the project tree to display the shortcut menu, and left-click the [Set] command in this menu.
The {Resource setting of MICREX-SX} dialog box will then be opened.

◊ Left-click the [CPU memory size definition ...] button in the {Resource setting of MICREX-SX} dialog box. The {CPU Memory Size Definition (MICREX-SX)} dialog box will then be opened.
In this dialog box, set the capacity of [Retained memory], [User FB] memory, and [System FB] memory. The remainder of the data memory becomes the capacity of non-retained memory (%MW). The capacity of each memory can be set in 0.5K-word steps.



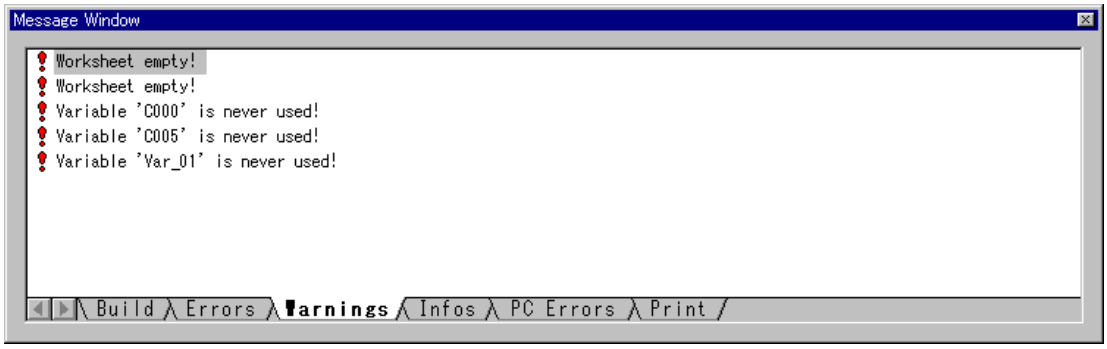
◊ Input the size of each memory in the text box. (For the input range, see “(2) Changing range of each memory area”.)

To change memory allocation, perform operation referring to “11-2-3 Defining the CPU memory size”.

---

(4) Warning

A warning is fixed information for the user. For example, a warning occurs when variables are already declared but not used in a program or when the concerned worksheet is blank. If only warning information occurs without any error, the current compilation ends normally in all stages so that the program will also operate normally.
The warning content can be displayed by left-clicking the [Warnings] tab of the {Message Window}.



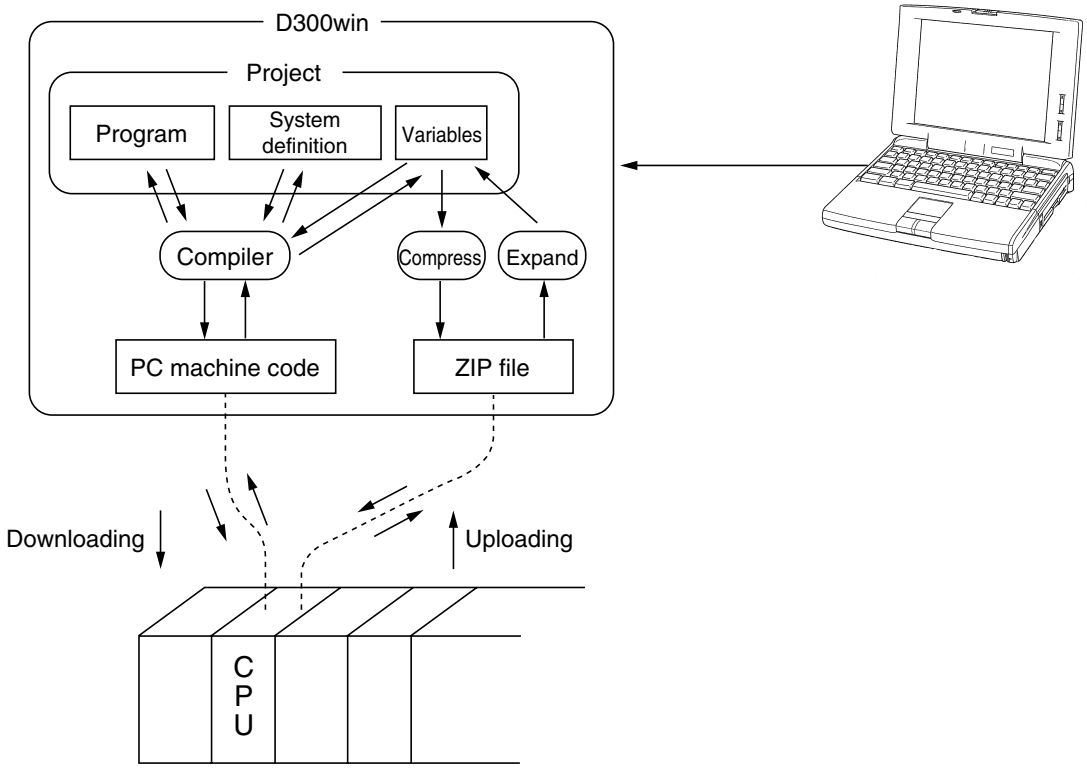
Left-double-click a warning item in the warning list, and the worksheet corresponding to the warning item is directly opened to select the concerned line or object. Mark the warning and press <Shift>+<F1> to display a help topic describing the warning cause and how to deal with the warning.

12-2-1 Outline of loading

There are two types of loading: downloading and uploading.

- Downloading is the operation to write program or system definition from D300win into PC.
- Uploading is the operation to read program or system definition from PC into D300win.

The outline operation flow is shown below:



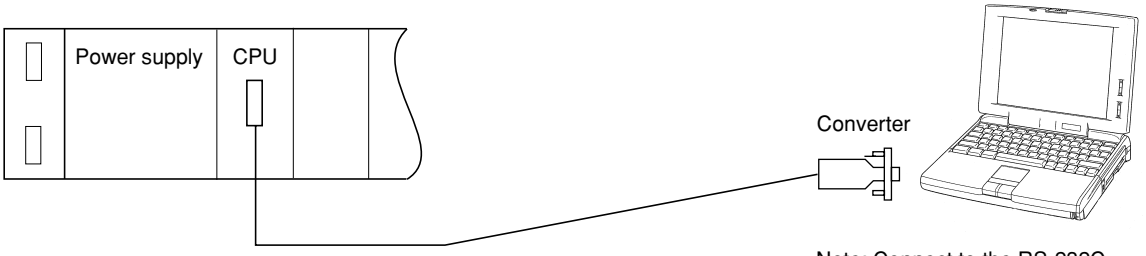
* Variables files are downloaded into the CPU module after being compressed.

For a detailed explanation of compilation, downloading and uploading, see “12-1 Compiling projects”, “12-3 Downloading” and “12-4 Uploading”, respectively.

12-2-2 Checking the connection between D300win and the PC

(1) Checking the hardware connections
Check the connections according to “1-1-2 Connecting D300win to the MICREX-SX series”. Basic connections between D300win (personal computer) and PC are shown below.

<The method to connect to the loader connector (RS-485 connector) of the CPU module>



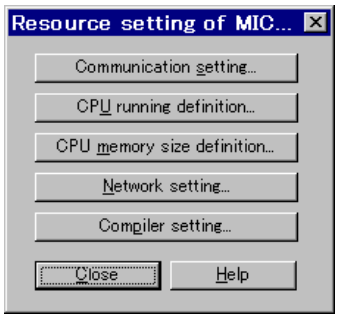
Dedicated cable
NP4H-CA2 (without converter) (See note.)
NP4H-CNV (with converter)

Note: Connect to the RS-232C connector of the personal computer.

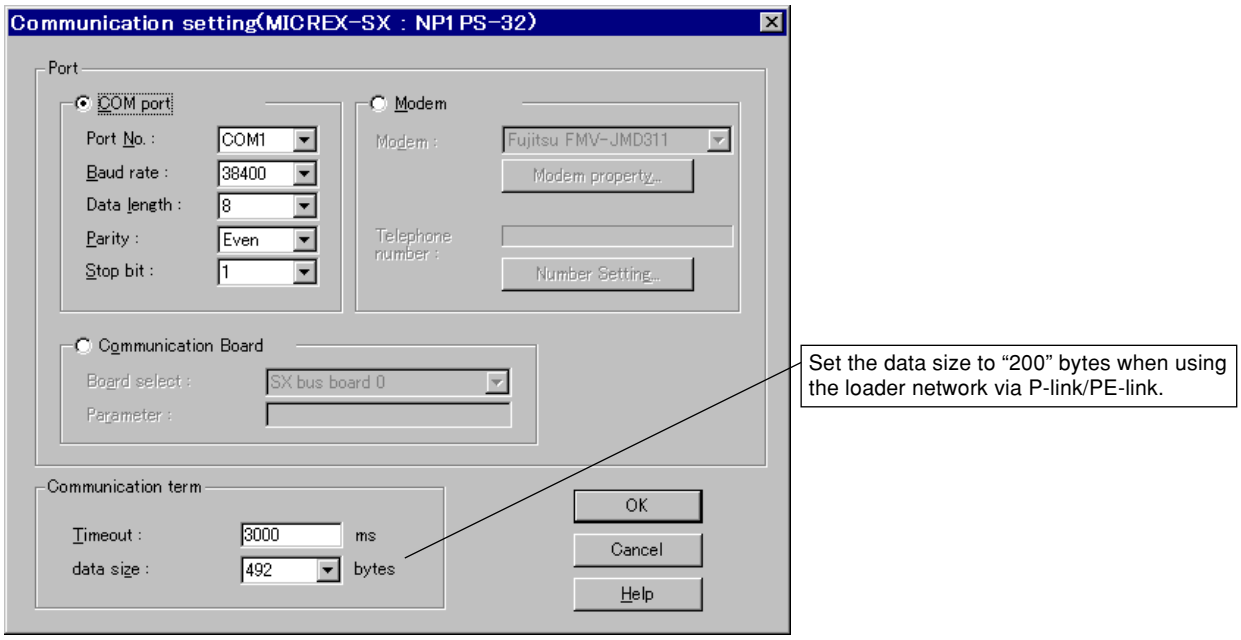
Note: When NP4H-CA2 is used, a converter (type code: ME777A-FSP) from BLACK BOX CORPORATION is necessary.

(2) Checking the communication setting
The RS-232C communication setting for connecting between a Windows95/98 (or V.4.0 or newer version of Windows NT) system and the D300win system (project to be downloaded) is shown below.

1) Check the communication setting for the D300win system.
- ◊ Right-click the resource icon [R_32].
- ◊ Left-click the [Set] command in the shortcut menu, and the {Resource setting of MICREX-SX} dialog box will be opened.



◊ Left-click the [Communication setting ...] button, and the {Communication setting (MICREX-SX)} dialog box will be opened.



For a detailed explanation of the setting items in this dialog box, see 3).

◊ After confirming the settings in this dialog box, left-click the [OK] button.

2) Check the settings on the personal computer.

To connect D300win to the PC, it is necessary to make the settings for the communication port (RS-232C) in the Windows95/98 system coincide with the resource setting.

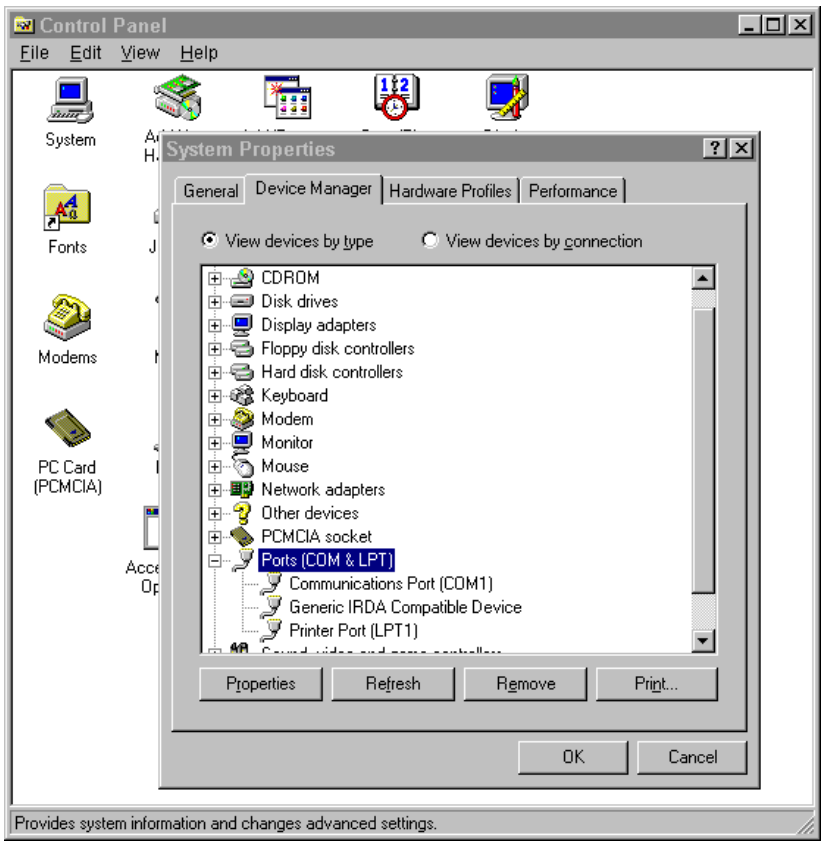
◊ Left-double-click the [System] icon on the [Control Panel] window, and the [System Properties] window will be opened.

◊ Left-click the [Device Manager] tab.

◊ Left-click the [Ports (COM & LPT)] icon.

All the items registered for the communication port can then be checked.

The following windows are opened.



3) Communication setting

Dialog box field	Explanation
COM port	Indicates the COM port to which programs are transmitted. This port must agree with the COM port that has been assigned under Windows 95.
Baud rate	Specifies the baud rate for communication via the COM port. Select 38400 BPS to connect to a MICREX-SX PC.
Stop bit	Specifies the stop bit length for communication via the COM port.
Data length	Specifies the data bit length for communication via the COM port. This entry needs to be changed only when hardware requires different value. For details, see the PC hardware manual.
Parity	Indicates whether to use a parity bit for communication via the COM port.
Timeout	Specifies a timeout interval in milliseconds. D300win tries to establish a connection with the hardware during this interval. A timeout is indicated when this interval expires.
Communication data size	Set the maximum size of the data that is communicated with the PC.
Modem setting *	Selected for communicating with PC using the modem.
Modem	The model of the modem is selected. The modem set up to operating system is displayed.
Modem properties	The property of the modem is set. Please adjust this property when it is not possible to communicate well (not possible to connect, cut at the automatic operation etc.).
Number setting	The telephone number of the destination is input.
Type of communication board	Set when communicating with the PC using a path other than via the COM port.
Parameter	When communicating with the PC using a path other than via the COM port, necessary values are set. (1) When P-link board is used: Station No. of the other side Example: 15 (decimal) (2) When PE-link board is used: Station No. of the other side (Space) Local station No. Example: 63 0 (decimal) (3) When Ethernet is used: IP address of the other side (Space) Port No. Example: 192.0.0.7 507 (decimal) Note: When multiple parameters are input, insert a single-byte space character as the delimiter between parameters.

* The modem connection method uses the Windows standard TAPI (Telephony Application Programming Interface).

<Precautions for communication between the PC and D300win>
If the online function is used when D300win is not connected to a PC, the processing speed of D300win and other applications will be reduced to a large extent.

When the compilation of a project is complete, the next step is to download it into a PC via the {Control} dialog box. The {Control} dialog box contains all the items needed to run the PC, including start, stop, and download. It also displays the current status of the PC. The {Control} dialog box can be displayed at all times. The download procedure depends on your PC type.

For further information about the {Control} dialog box, see Section 13, “Online Test Functions.”

12-3-1 Downloading

When the connection between and the D300win system and PC (CPU modules) and their setups are complete, proceed with downloading.

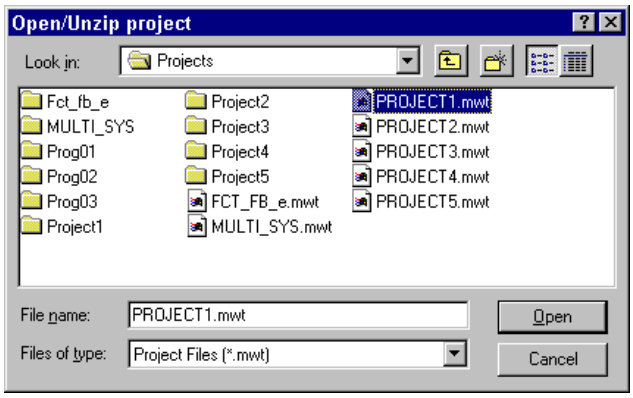
⚠ CAUTION	Verify complete safety before attempting to make program changes while running the PC system or to start or stop it. Operator errors could result in damage to the equipment or accidents.

(1) Prepare for downloading

1) Call the project to download

Call (open) the project to download.

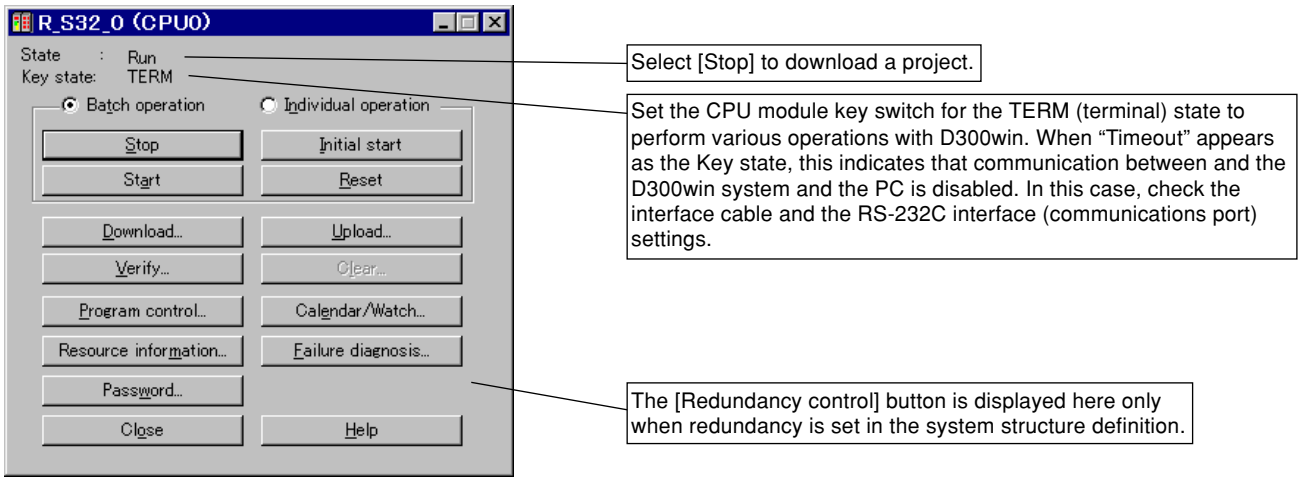
◊ Left-click the [Open project/Unzip Project ...] command on the [File] menu.
The {Open/Unzip project} dialog box will open.



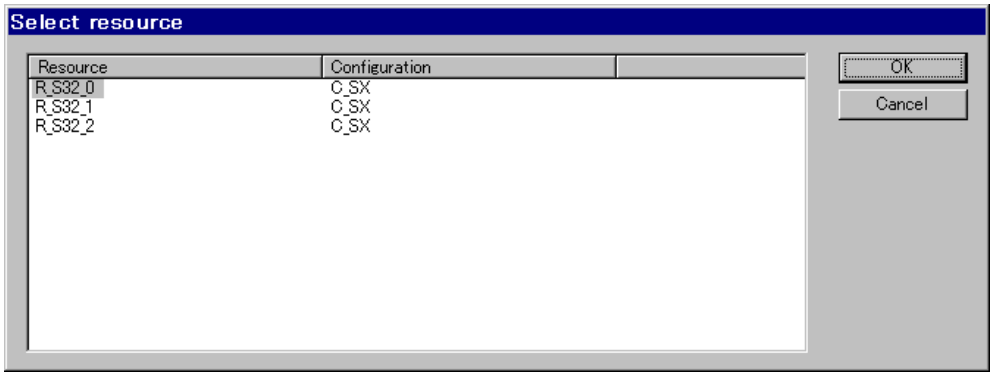
◊ Select the [drive], [folder], and [file name] under which the existing project is stored and left-click the [OK] button.
The project tree editor will appear.

2) Call the {Control} dialog box.

◊ Left-click the [Control] button or left-click the [Control...] command in the [Online] menu.
The {Control} dialog box will open.



If a "multi-CPU system" has been configured, the {Select resource} dialog will appear on the screen as shown below.



◊ Left-click the "resource (CPU module)" subject to control in the list box, and left-click the [OK] button to display the {Control} dialog.

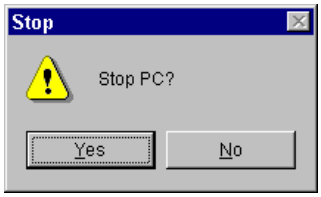
For a detailed explanation of the dialog boxes that are opened when the corresponding function or option button in the {Control} dialog box is pressed, see "Section 13 Online Test Function".

---

3) Stop the PC

Shut down the PC (CPU module) if it is running, otherwise data cannot be downloaded.

◊ Left-click the [Stop] button to shut down the PC.
The {Stop} dialog will appear on the screen.

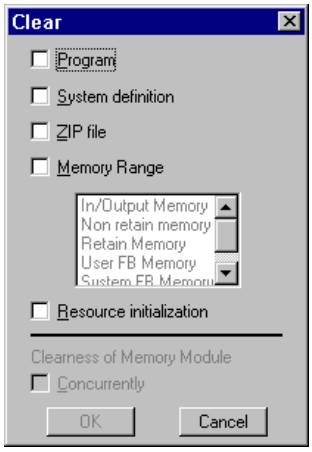


◊ To stop the PC, left-click the [Yes] button. Not to stop the PC, left-click the [No] button.
The [State] indication in the dialog will change from [Run] to [Stop].

4) Clear PC memory

When running the PC for the first after it was purchased, it may enter the [Stop] (fatal failure) state. In this case, clear the memory in the PC by performing the following:

◊ Left-click the [Clear ...] button in the {Control} dialog box to clear the memory in the PC.
The {Clear} dialog box will open.

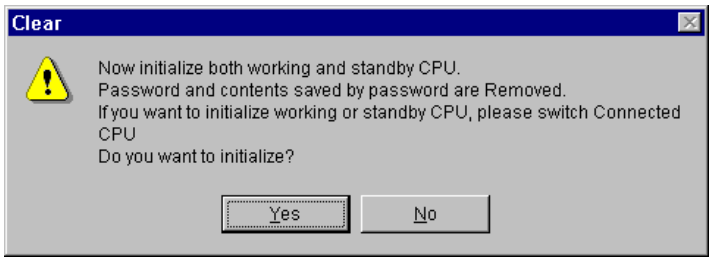


◊ Check the check boxes corresponding to the items of memory you want cleared.
◊ If the [Memory Range] check box is checked, select the kind of memory to clear from the list box below by left-clicking it.
◊ Left-click the [OK] button.

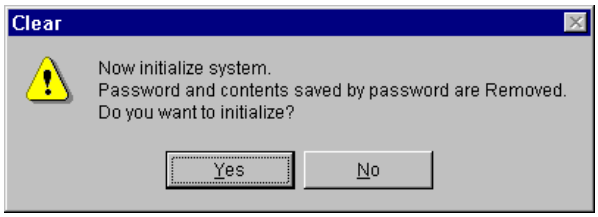
<When the [Resource initialization] box is checked>

The message displayed in the message box is different between when D300win is connected to a CPU set to be redundant, and when connected to a CPU not set to be redundant, as shown below.

- When set to be redundant

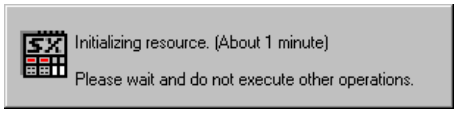


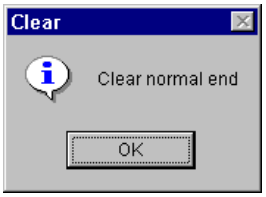
- When not set to be redundant



Caution:

This function clears the user memory of the PC (resource). When this function is executed, the following image is displayed. Execute with great care.





About the time required to initialize a resource:
It takes about 30 seconds to 2 minutes 45 seconds (depending on the memory capacity of resource) to initialize a resource. A multi-CPU system (comprising a maximum of 8 CPU modules) requires about 4 to 22 minutes to be initialized.

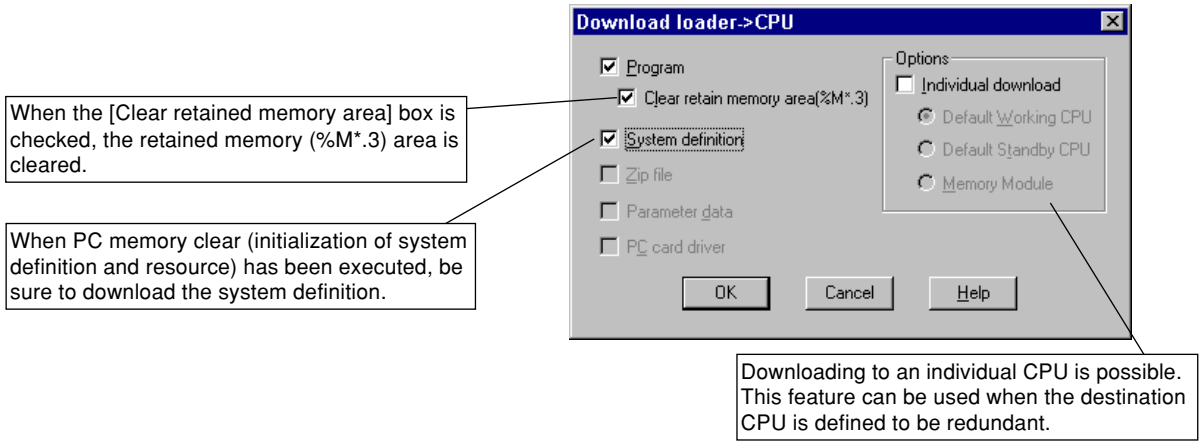
---

(2) Download the project

Make sure that the PC is in the [Stop] state.

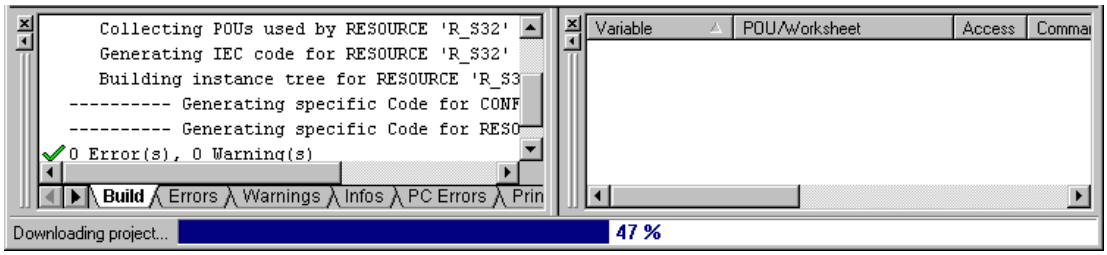
◊ To download the project, left-click the [Download ...] button in the {Control} dialog box.
The {Download loader -> CPU} dialog box will appear on the screen.

◊ Select the items of the project to download.

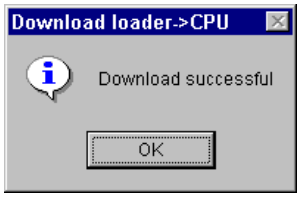


Note: The current value of the counter and the total counter as well as the previous value of the differentiation command are assigned to the previous value retain area. This retained memory area is allocated in the system FB instance memory (%M*.9) area and differs in operation from retained memory (%M*.3) area, therefore is cleared to zero when a project is downloaded.

◊ Left-click the [OK] button.
The processing progress status will be displayed on the status bar at the bottom of the window while the download is in progress.



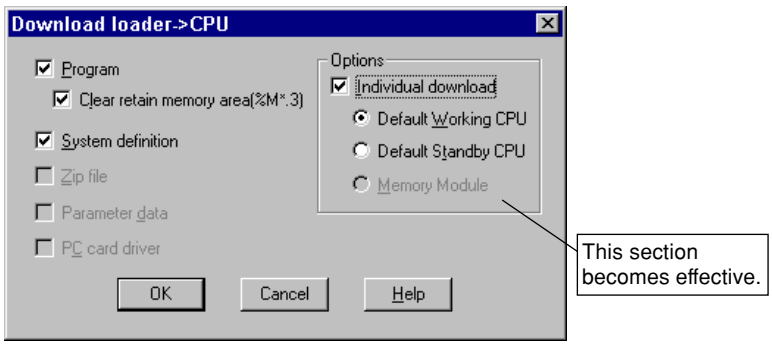
Upon completion of downloading, the message box shown below will appear on the screen. Left-click the [OK] button to close the message box.



(3) Download to a redundancy system
This paragraph explains downloading when a redundancy system has been configured.

◊ Left-click the [Download...] button in the {Control} dialog.
The {Download loader->CPU} dialog will appear on the screen.

◊ Left-click the [Project download] button.
The {Download loader->CPU} dialog will appear on the screen.



<Batch download>
When the [Individual download] box is unchecked, the "batch download" mode is activated, allowing the one-time operation to download data to both working CPU and standby CPU. (In the N:1 redundancy system, data is also downloaded to the memory card interface module.) In a system consisting of multiple working CPUs (multi-CPU system), it is necessary to download to each CPU.

◊ Check the box for the items (including [Program], [Clear retain memory area], [System definition]) to be downloaded, and left-click the [OK] button.
The selected items are downloaded to the CPU (resource), standby CPU, and memory module (in the N:1 redundancy system) specified in the {Select resource} dialog.

◊ Next, select the working CPU (resource) to which data is downloaded in the {Select resource} dialog to display the {Control} dialog. Then, download the project.

<Individual download>
Data can be downloaded individually to the working CPU, standby CPU, and memory card interface module (in the N:1 redundancy system).
(For example, use this mode when it is necessary to replace a CPU module due to failure or when the user intentionally downloads programs.)

◊ Check the box for [Individual download] in the [Option] box, and turn on the optional button for the download destination.

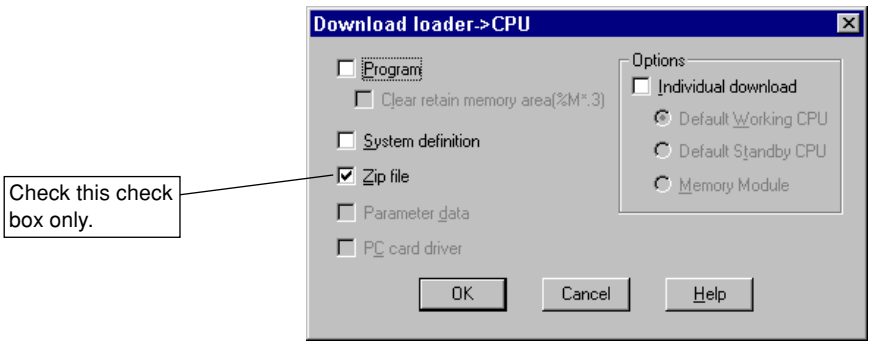
◊ Check the box for items (including [Program], [Clear retain memory area], [System definition]) to be downloaded, and left-click the [OK] button.
The data will be downloaded to the CPU (resource) selected in the {Select resource} dialog.

(4) Download variables

With variables have been downloaded in the PC beforehand, projects can be displayed with the variable names when they are uploaded from the PC into the D300win system.

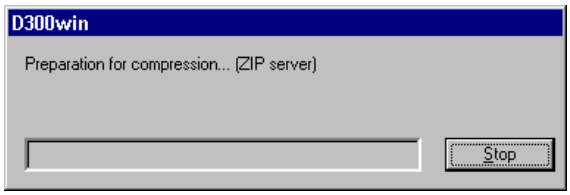
Make sure that the PC is in the [Stop] state.

◊ To download variables, left-click the [Download ...] button in the {Control} dialog box.
The {Download} dialog box will open.
The {Download loader->CPU} dialog box will open.



◊ Check the [Zip file] check box, and then left-click the [OK] button.
The {Confirmation} dialog will appear on the screen.

◊ Left-click the [OK] button.
Only variable files in the project will be zipped and downloaded to the PC.
The working box shown below will appear on the screen during downloading.



When the working box closes, the download is complete.

To download a variables file, the compiler needs to be set by resource setting before compilation is started. For details, see “11-2-4 Setting for the compiler”.

12-4 Uploading (under development)

Projects (programs, system definitions, and compressed files of variables) downloaded in the CPU modules can be uploaded for display or editing.

12-4-1 Upload execution

Projects downloaded into the PC can be uploaded from the PC. An uploaded program is displayed (converted) in IL language. (It is possible to convert into LD or FBD language by the IL-to-LD/FBD conversion function.)

(1) Preparation for uploading

1) Create a new project

Create a new project as the upload destination.

- ◊ Left-click the [New Project] command in the [File] menu, and the {Project template} dialog box will be opened.
- ◊ Select the desired MICREX-SX template from the dialog box and left-click the [OK] button. A new project (tree) will then be displayed on the screen.

2) Check the connection between D300win and the PC

Check the connections and the setting of D300win and the PC.

Check the connections referring to “12-2-2 Checking the connection between D300win and the PC”.

3) Open the {Control} dialog box

- ◊ Left-click the [Control] button or left-click the [Control...] command on the [Online] menu.

The {Control} dialog box will be opened.

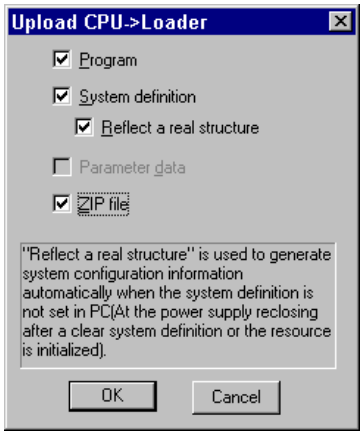
To execute various operations with D300win, it is necessary to set the key switch on the CPU module to “TERM” (terminal mode). When “Time-out” is indicated in the [State:] and [Key stat:] fields, communication between the PC and D300win is impossible. Check the cable connections and the setting of RS-232C (communication port).

For a detailed explanation of the dialog boxes that are opened when the corresponding function or option button in the {Control} dialog box is clicked, see “Section 13 Online Test Functions”.

(2) Uploading a project and variables

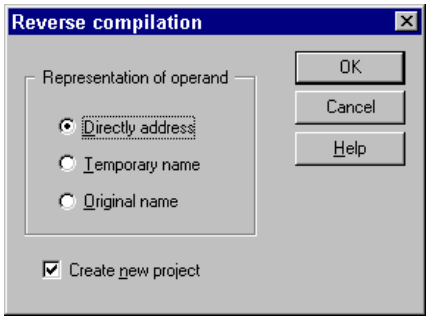
This paragraph explains how to upload projects (programs, system definitions, or variable compression files) from CPU modules to D300win.

◊ Left-click the [Upload ...] button in the {Control} dialog box, and the {Upload] dialog box will be opened.



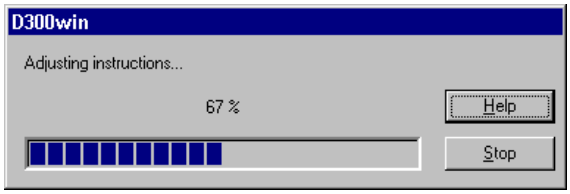
◊ Select items to be uploaded, and left-click the [OK] button.
In this example, the [Program], [System definition] and [ZIP file] boxes are checked. The working box will then be opened to start uploading. When uploading ends, the {Reverse compilation} dialog box is opened.

◊ Turn on the optional [Original name] button in the [Representation of operand] box, and left-click the [OK] button.

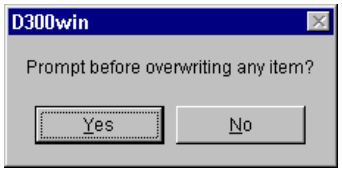


[Directly address] ..... Programs and variables declarations will use direct address according to system structure.
[Temporary name] ..... Programs and variables declarations will use temporary variables in the form “V000”.
[Original name] ..... Programs and variables declarations will use declared variables (however, this mode is enabled when the variables ZIP file is downloaded in the PC.)
[Create new project] ..... Specifies the project creation method. When this box is checked, an uploaded project is restored as a new project. When unchecked, the uploaded project is restored by overwriting the currently displayed project.

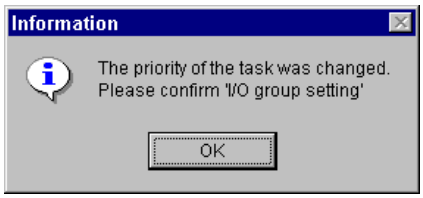
The working box will then be opened to start reverse compilation.



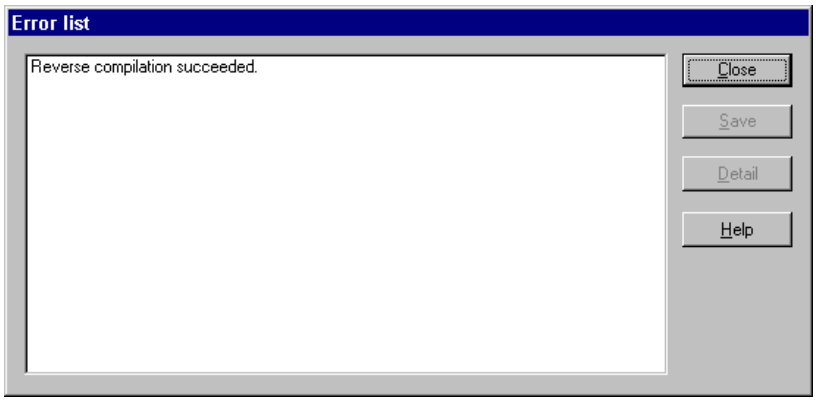
◊ The message box will appear on the screen inquiring how to handle the existing projects.



◊ Left-click the [Yes] or [No] button.
The {Information} dialog will appear on the screen.

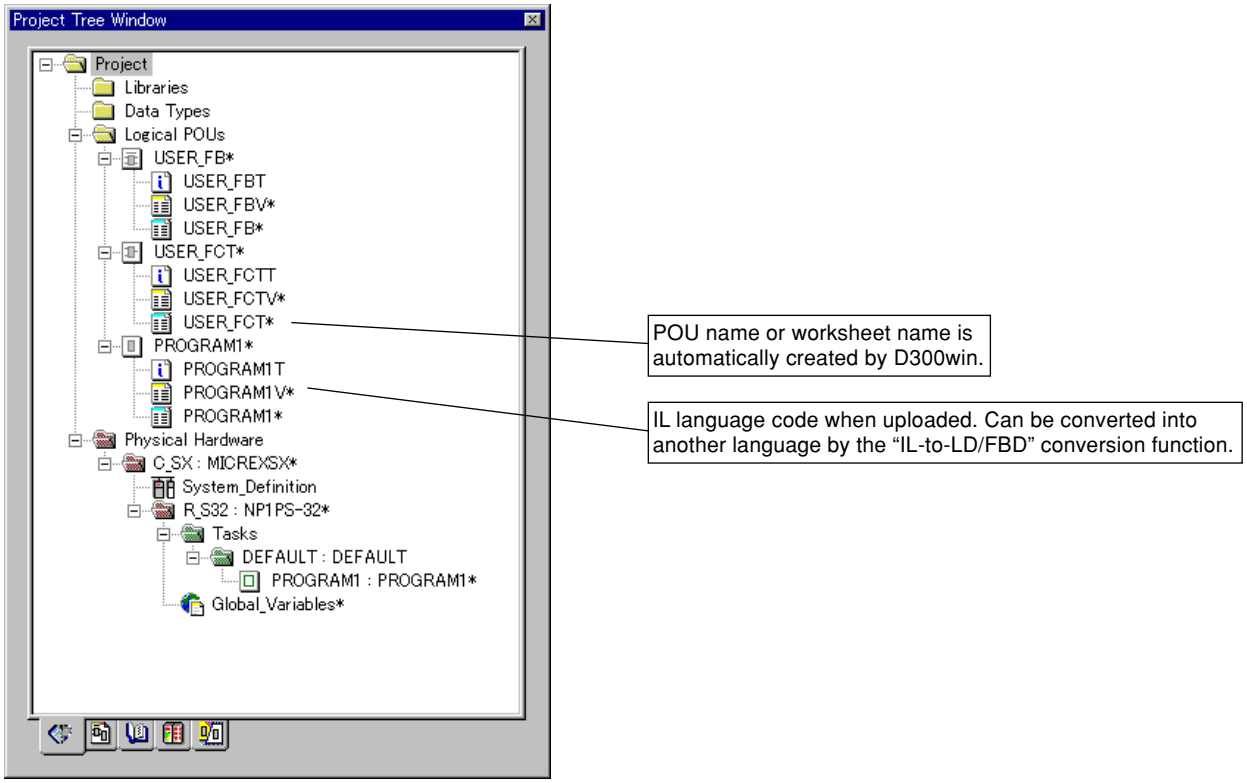


◊ Left-click the [OK] button to close the {Information} dialog.
The {Error list} dialog will appear on the screen.



[Error list] ..... Displays errors and warnings which have occurred during reverse compilation.
[Save] ..... Saves the content of the error list in a file.
[Detail] ..... Displays help for detailed information of errors and warnings.

2) Project tree after uploading



(3) Restrictions on uploading

Note that the use of the uploading function has the following restrictions:

1) All program codes are restored in IL language.

2) Variables in a program POU are restored in direct address expression or as variables with AT specification.

3) Comments are not restored.

4) Data in the description worksheet is not restored.

5) The jump label is not restored to the original name.

6) The worksheet name is not restored to the original name.

7) Variables unused in the code worksheet are not restored.
However, if initial values have been set, the variables will be restored under the rules shown below.
   - If [Directly address] or [Temporary name] has been selected
     The variables are restored in the global variable worksheet. They are restored in either data type of BOOL, WORD, or DWORD.
   - If [Original name] has been selected
     The variables are restored in the local variable worksheet in the original POU. They are restored in the original data type.

8) When a derived data type (array/structure) is used, make reverse compilation by selecting [Original name].
If [Directly address] or [Temporary name] has been selected, data is not restored to the original array/structure. In this case, note that a compilation error may occur in the project after reverse compilation.

9) To make reverse compilation by selecting [Directly address] or [Temporary name], the following restrictions apply:
   - Variable names, data type names, and POU names are restored as temporary names.
   - STRING-type constants are restored as STRING-type variables with initial value specification.
   - Global variables are restored as local variables in the referenced POU.

10) The POUs using the names shown below are not restored. Change the POU names or select [Temporary name] to make reverse compilation.
   - Same name as system-reserved words (such as LD and ST)
   - Name ending with the underscore (such as ABC_)

11) When uploading data from multiple configurations to a single project, select [Original name] and make reverse compilation.

12) When the VAR_IN_OUT variable is used or when variables are used by connecting to the VAR_IN_OUT terminal, select [Original name] and make reverse compilation.
If [Directly address] or [Temporary name] has been selected, data is not restored to the original data type. In this case, note that a compilation error may occur during project compilation after reverse compilation.

12-4-2 Language conversion function

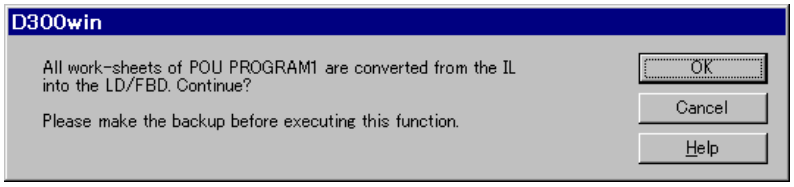
The language conversion function converts the codes written in IL language to those in LD and FBD languages. In particular, when a program has been uploaded, it is written in IL language. Use this function to convert it to the codes in the LD and LBD languages.

(1) Using the language conversion function

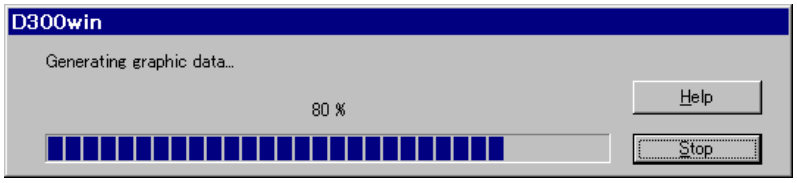
◊ Prior to using the language conversion function, left-click the [Make] command or [Rebuild Project] command in the [Build] menu to compile the POU.

◊ Left-click to select the icon of a POU having the codes written in IL language (POU in the uploaded state).

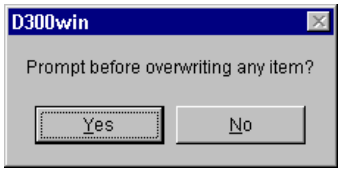
◊ Left-click the [Convert IL to LD/FBD] in the [Extras] menu.
The {D300win} dialog will then appear on the screen.



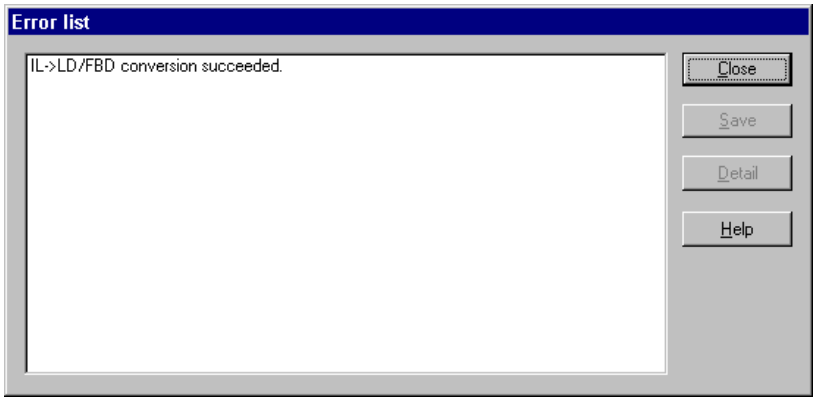
◊ Left-click the [Yes] button.
The working box for conversion in progress will be displayed to start language conversion.



◊ The message box will appear on the screen inquiring how to handle the existing project.



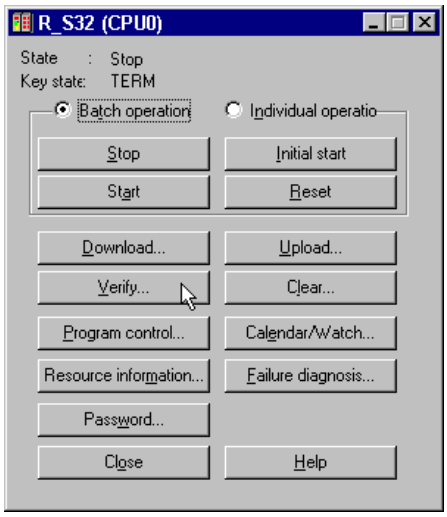
◊ Left-click the [Yes] or [No] button.
Upon completion of language conversion, the {Error list} dialog will appear on the screen indicating the presence of errors.



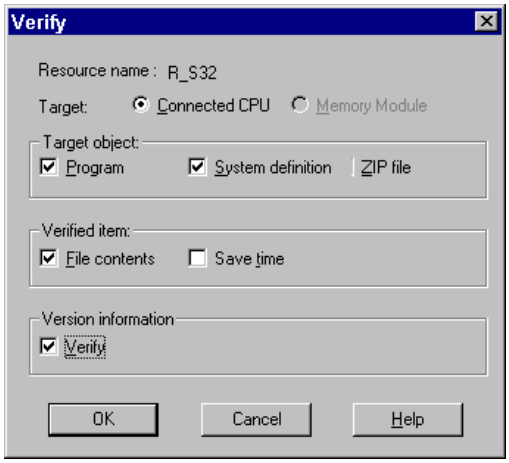
How to collate a project stored in the PC with the corresponding one is stored in D300win for verification is explained below.

◊ Activate the project stored in D300win that is to be verified.

◊ Left-click the [Control] button or left-click the [Control...] command in the [Online] menu.



◊ Left-click the [Verify ...] button in the {Control} dialog box, and the {Verify} dialog box will be opened.



◊ Select the destination.

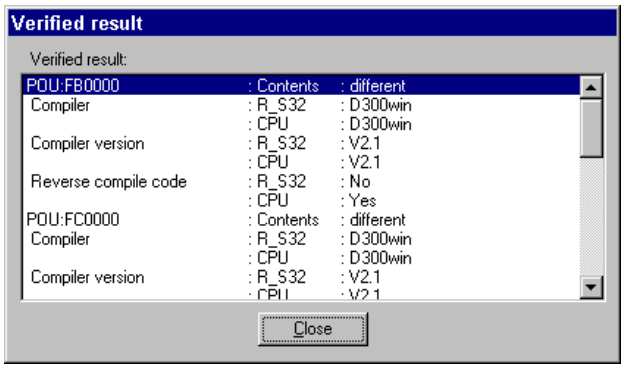
◊ Set the object to be verified.

◊ Set item to be verified.

◊ When [Program] is selected as the object to be verified, check the version box.

◊ Left-click the [OK] button.

The “verifying” working box and then the {Verification result} dialog box will then be opened in order.



Section 13 Online Test Functions

page

Section 13 Online Test Functions

13-1 Online Test Function Overview

After a project has been compiled and downloaded into a CPU module, run the D300win test functions to verify if the project (including the program and variable definitions) works successfully.
Summary descriptions of the D300win test functions follow.

13-1-1 Individual CPU test functions

(1) CPU (resource) information display function
Collects and displays CPU module information on D300win, such as the scan period of each task, takt period, and program size.

(2) Monitoring function
1) Individual monitors
   LD monitor, FBD monitor, ST monitor, SFC monitor, IL monitor, and variable monitor
2) Multi-processor simultaneous monitoring function
3) Data display format change function
   Binary, decimal, hexadecimal, and default display

(3) Data change function
1) Forced set and reset function
   Data in the input memory and output memory can be set on or off.
2) Overwrite function
   User-input data can be set to selected memory locations in the CPU module (the data is displayed in a monitor window).

(4) Initialization function
Clears programs, data, and system definition items individually.

(5) Stepping function
Runs programs in the CPU module instruction by instruction.

(6) Monitoring condition halt function
Freezes the D300win monitor display under a specified set of conditions.

(7) Breakpoint function
Halts CPU module processing under a specified set of conditions.

(8) Temporary program deletion function
1) Temporarily removes a specified program from the management of a task and suspends it.
2) Returns the halted program to the task.

(9) Trace/traceback function
1) Collects time-related changes in the status of signals and displays them in a timing chart and in a program window.
2) Saves trace data.

(10) Calendar and watch display/setup function
Displays and sets the date (year, month, day) and the time (hour, minute, second) of the CPU module calendar and watch.

13-1-2 Configuration batch control function

(1) Start, stop, and reset function

On a multi-processor system configuration, check the [Batch operation] button in the {Control} dialog box to run the following functions from the {Control} dialog box for each CPU:

1) Batch cold start function
   - The TERM state of the CPU module key switch cold-starts the PC system while it is stopped.
   - After the PC starts, its status is displayed in a resource control dialog box.
2) Batch warm start function
   - The TERM state of the CPU module key switch warm-starts the PC while it is stopped. After the PC starts, its status is displayed in a resource control dialog box.
3) Batch stop function
   - The TERM state of the CPU module key switch halts the PC in the running state.
   - After the PC stops, its status is displayed in a resource control dialog box.
4) Batch reset function
   - The PC can be reset, regardless of the CPU module key state.
   - Its status is displayed in a resource control dialog box.

13-2-1 Running the CPU module

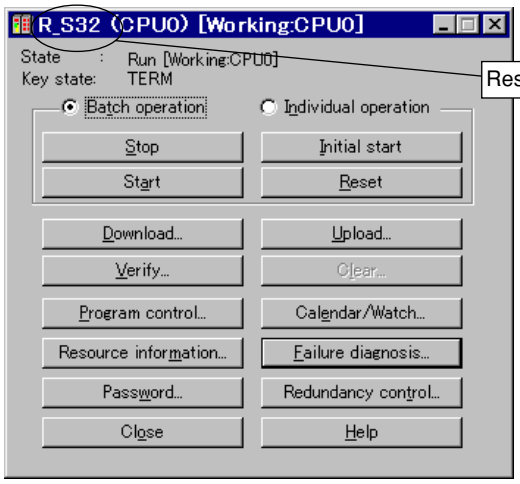
Essential functions needed to run the CPU module from the D300win system are contained in the {Control} dialog box.

(1) Open the {Control} dialog box (in normal condition)

With an online connection is established between the D300win system and CPU module, do the following:

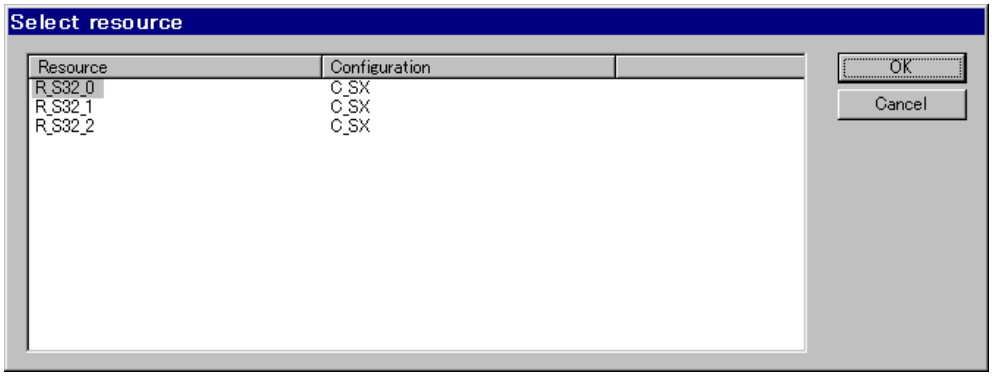
◊ Left-click the [Resource Control...] button or left-click the [Control...] command in the [Online] menu. The {Control} dialog box will open.

1) The {Control} dialog box



<Precautions for communication between the PC and D300win>
If the online function is used when the PC and D300win are not connected, the processing speed of D300win and other applications will decrease to a large extent.

If a "multi-CPU" system has been configured, the {Select resource} dialog will appear as shown in the figure below.



◊ Select the "resource (CPU module)" subject to control from the list box, and then left-click the [OK] button. The {Control} dialog will then appear on the screen.

2) Display and buttons in the dialog box

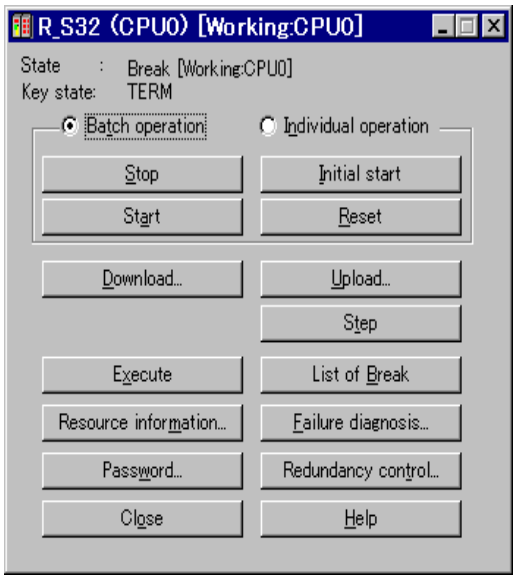
State ..... Indicates the state of the PC (such as running, stopped, or failure).
Key state ..... Indicates the state (position) of the CPU module key (RUN, TERM, or STOP).
[Individual operation] ..... Runs one CPU module (resource) individually.
[Batch operation] ..... Runs one PC (configuration) (multiple resources) individually.
[Individual operation] + [Stop] ..... Stops the connected CPU module.
[Individual operation] + [Initial start] ... Cold-starts the CPU module (in the same way as turning on the power switch), initializing all the data in the CPU module.
[Individual operation] + [Start] ..... Warm-starts the CPU module, initializing only the non-retained data.
[Individual operation] + [Reset] ..... Initializes the connected CPU module.
[Batch operation] + [Stop] ..... Stops the CPU module.
[Batch operation] + [Initial start] ..... Cold-starts the CPU module system (in the same way as turning on the power switch), initializing all the data in the CPU module.
[Batch operation] + [Start] ..... Warm-starts the CPU module, initializing only the non-retained data.
[Batch operation] + [Reset] ..... Initializes the CPU module.
[Download] ..... Transfers data from D300win to the CPU module.
[Upload] ..... Transfers data from the CPU module to D300win.
[Verify] ..... Verifies project in the CPU module against that in D300win.
[Clear ...] ..... Deletes selected memory from the CPU module.
[Program operation] ..... Enables or disables programs. Only enabled programs can be debugged.
[Calendar/Watch] ..... Displays and sets and date and time of the CPU module calendar and watch.
[Resource information ...] ..... Displays current CPU module information.
[Failure diagnosis] ..... Displays failure information.
[Password ...] ..... Used to set a password to protect the project.
[Redundancy control] ..... Opens the dialog box for changing the connected CPU module or for switching between the working and standby CPU modules in a redundant system. The operation result (CPU status) can be checked with the indication of [State].

(2) Opening the {Control} dialog box (during execution of the test function)

While the {Control} dialog box is opened in the normal condition as explained in (1), the dedicated {Control} dialog will appear on the screen as shown in the figure below when the test function is executed.

- When the “break point” function is executed ..... See 13-3-2.
- When the “Step-by-step execution” function is executed ..... See 13-3-3.

1) {Control} dialog box



2) Indications and buttons on the dialog box

State ..... Indicates the state of the PC (such as running, stopped, or failure).
Key state ..... Indicates the state (position) of the CPU module key (RUN, TERM, or STOP).
[Individual operation] ..... Runs one CPU module (resource) individually.
[Batch operation] ..... Runs one PC (configuration) (multiple resources) individually.
[Individual operation] + [Stop] ..... Stops the connected CPU module.
[Individual operation] + [Initial start] ... Cold-starts the CPU module (in the same way as turning on the power switch), initializing all the data in the CPU module.
[Individual operation] + [Start] ..... Warm-starts the CPU module, initializing only the non-retained data.
[Individual operation] + [Reset] ..... Initializes the connected CPU module.
[Batch operation] + [Stop] ..... Stops the CPU module.
[Batch operation] + [Initial start] ..... Cold-starts the CPU module system (in the same way as turning on the power switch), initializing all the data in the CPU module.
[Batch operation] + [Start] ..... Warm-starts the CPU module, initializing only the non-retained data.
[Batch operation] + [Reset] ..... Initializes the CPU module.
[Download] ..... Transfers data from D300win to the CPU module.
[Upload ...] ..... Fetches data from CPU module into D300win.
[Step] ..... Executes a program step by step.
[Execute] ..... Resumes program execution from the point stopped by the break point function.
[List of Break] ..... Displays a list of the variables that set a break point.
[Resource information ...] ..... Displays current CPU module information.
[Failure diagnosis] ..... Displays failure information.
[Password ...] ..... Used to set a password to protect the project.
[Redundancy control] ..... Opens the dialog box for changing the connected CPU module or for switching between the working and standby CPU modules in a redundant system. The operation result (CPU status) can be checked with the indication of [State].

(3) Starting the CPU module system

The operations of the PC system (CPU module) when the individual buttons ([Initial start], [Start], and [Reset]) are turned on in the {Control} dialog box are described below. There are two major modes for starting the PC system as described below.

1) PC system start modes

Cold start:

Starts the PC by clearing the retained memory area. (After the memory clears, those variables that have been declared as having initial values are loaded with those initial values.)

Warm start:

Starts the PC without clearing the retained memory area.
(The whole memory is cleared, except for retained memory areas.)

2) Initial start

Check the [Initial start] button in the {Control} dialog box to set an unconditional cold start.

3) Start

Check the [Start] button in the {Control} dialog box to set a basic warm start. On the following occasions, however, the PC system will cold-start:

- After the completion of a download
- After the occurrence of a fatal failure
- After data clearing

Note: If you have downloaded without having selected the [Clear retain memory] check box in the {Download} dialog box, the retained memory area is not cleared. (The retained portions of the FM and SFM areas will be cleared, though.)

---

4) Reset/Power on/off

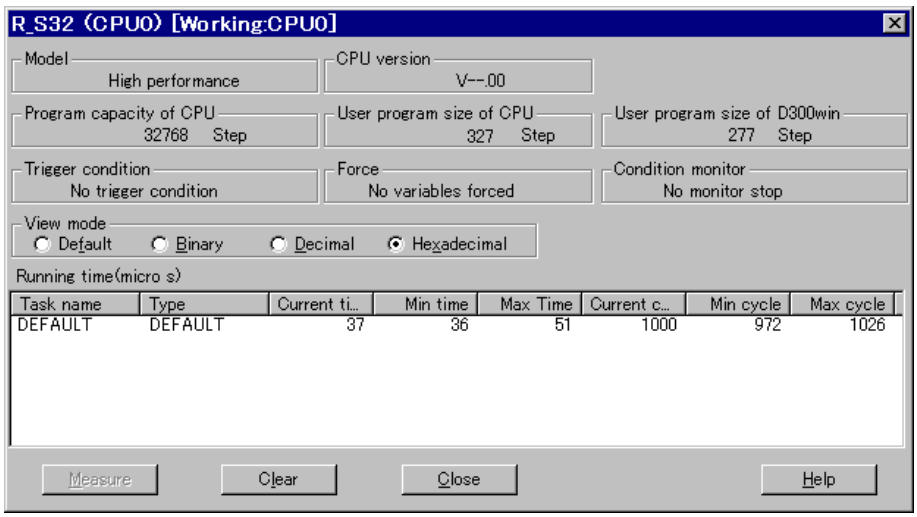
Selecting the [Reset] button in the {Control} dialog box (turning on the [Batch operation] option button) will reset the system as a whole. Then, the entire PC system can be turned on and off at the same time. (A configuration reset will arise in both cases.) After these procedures, the PC system stops or starts running depending on the setting of the [Running specification at power on] (see 11-2-2, “CPU running definition”) and the key switch state. By default, the PC system will start running as it would warm-start as described in 2) above. It would cold-start, however, in the situations outlined in 2).

* The system definition is reflected when a configuration reset occurs.

13-2-2 Resource information

The current condition of the CPU module can be checked.

◊ Left-click the [Resource Information...] button in the {Control} dialog. The {Resource} dialog will appear on the screen so that you can check the CPU module information.



<Explanation of the dialog box>

[Model] ..... Shows the model of the CPU module.
[CPU version] ..... Shows the firmware version.
[Maximum program capacity of CPU] ..... Shows the storage capacity of the CPU module.
[User program size of CPU] ..... Shows the size of the programs stored in the CPU module.
[User program size of D300win] ..... Shows the size of programs in the project displayed by D300win (offline).
[Trigger condition] ..... Shows trigger conditions. When trigger conditions are set, the check box is displayed so that you can cancel all conditions at the same time.
[Force] ..... Shows whether or not variables are forcibly set. When forcibly set, the check box is displayed so that you can cancel them all at the same time.
[View mode] ..... View mode can be selected by the option button.
[Task Running time (micro s)] ..... Scan time and tact time (SX bus) of the CPU are measure and displayed in this box..
[Measure] ..... [Measure] Starts measurement of task running information.
[Clear] ..... [Clear] Clears the running time and tact cycle of the task being displayed, and then displays new values after measuring them again.

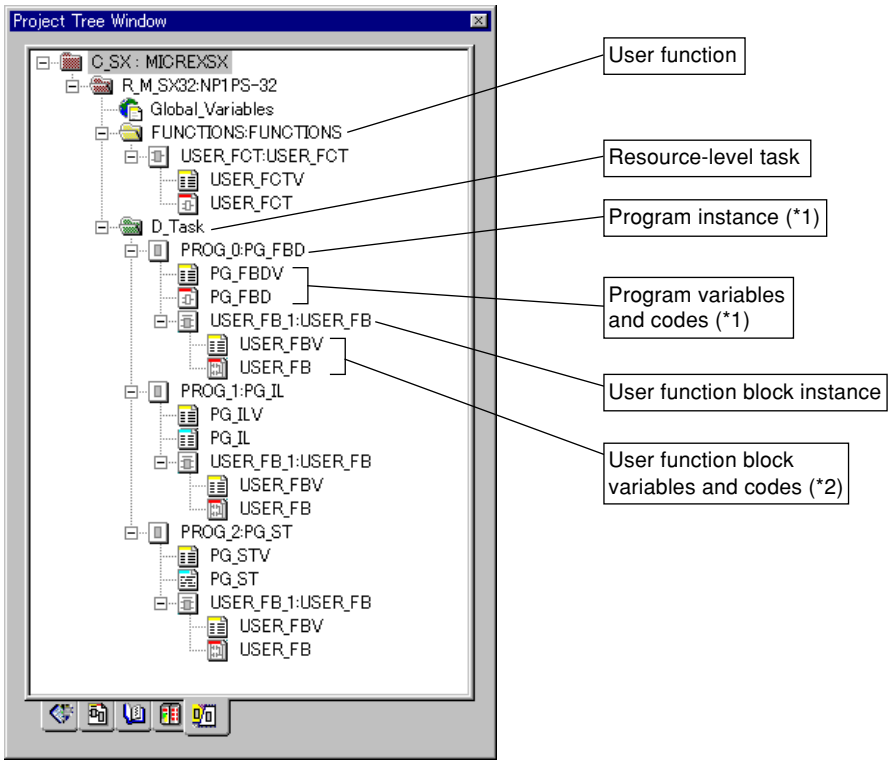
Note: If a break point is set in the SPH200 series, the task running time and running cycle will not be displayed.

13-2-3 Program/variable monitor basic operations

Programs and variables can be displayed online by setting the online mode after opening a worksheet in the [Logical POUs] subtree. Basically, the instance tree is used to display them. An instance tree is a tree of all the functions and function blocks in a resource, and programs assigned to tasks. Because instance trees are generated during resource compilation, they cannot be edited.

(1) Call an instance tree

◊ click the [Instance] tab at the bottom of the project tree window. The {Instance tree} window will then appear on the screen.



A number that is not defined by the user is added and displayed. This is an instance No., which allows you to understand how many instances are used in each POU.

---

*1 The program monitoring procedure and the variable monitoring procedure are introduced in 1), (2) and in (3), respectively.
*2 The program monitoring procedure is introduced in 2), (2).

---

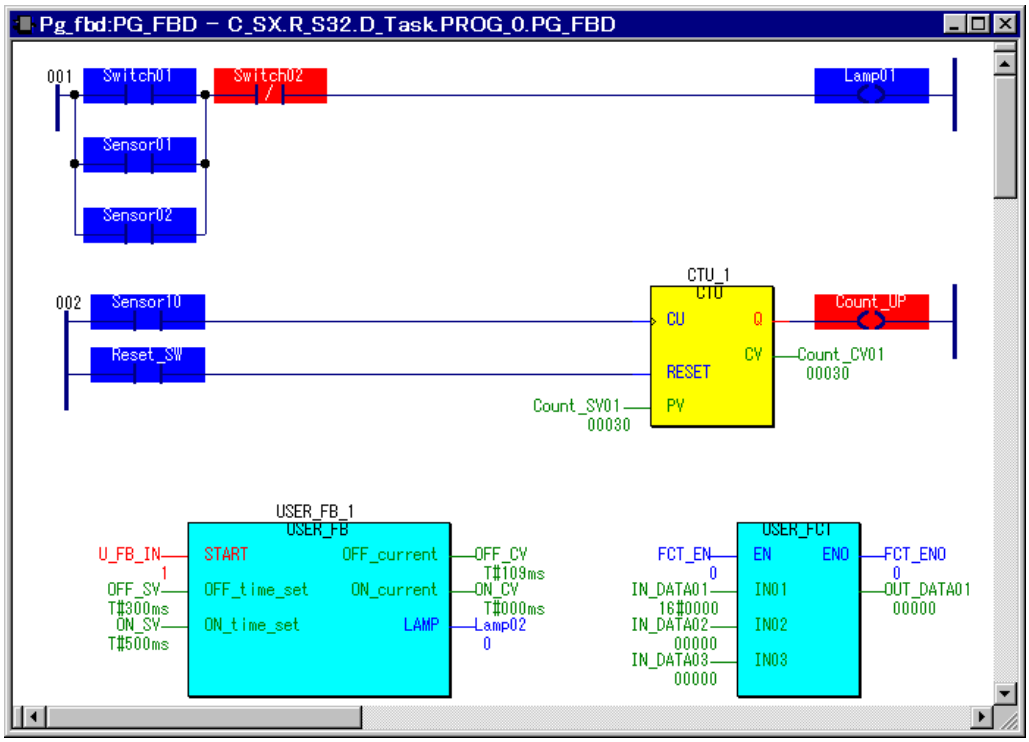
(2) Program (code) online monitor

This paragraph shows an example of the online monitor of program worksheets [PG_FBD], [PG_IL], and [PG_ST] in the instance tree.

The following explains how to start the online monitor of a code worksheet.

◊ Left-double-click the worksheet icon to open a worksheet.

◊ Left-click the [Monitor] button or left-click the [Monitor] command in the [Online] menu to activate the online mode.



<Display colors>
The following explains the default display colors when a program is monitored.

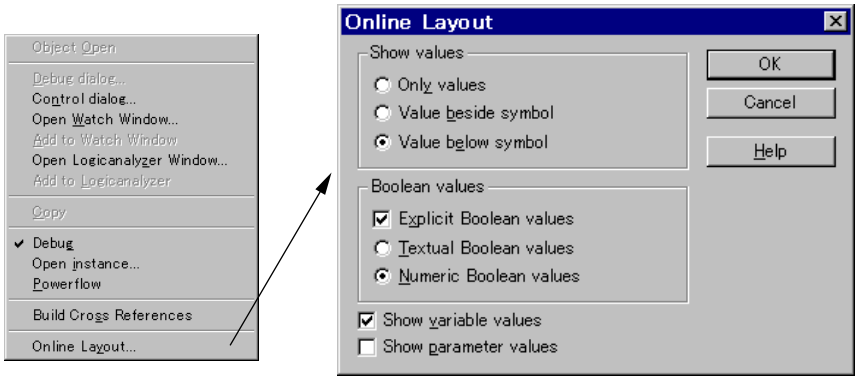
- Objects which have a Boolean variable value specified appear in red or blue.
  Red: TRUE: '1'
  Blue: FALSE: '0'
- Objects which have a non-Boolean variable value specified appear in green.

Note: If an object's online value overlaps with any object connected to the input or output block of a function or function block, relocate the terminal or the object connected to it to generate a circuit.

To change the display colors, see "2-7-11 Graphic editor colors."

<Changing the display modes >
You can change the mode in which object variables are displayed in online graphic worksheets, including the true or false states and the display position of each Boolean variable.

◊ Right-click anywhere in the graphic worksheet to see the shortcut menu. Left-click [Online Layout ...] command.
The {Online Layout} dialog box will open.
The factory settings are shown here.



Display settings

• [Show values] box

[Only values] ..... Display only variable values, hiding the variable names.
[Values beside symbol] ..... Display variable values next to the variable names.
[Value below symbol] ..... Display variable values under the variable names.

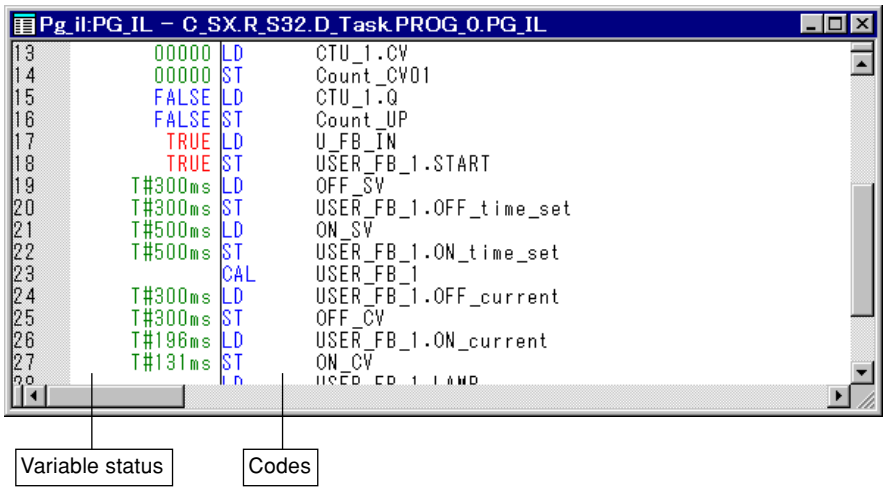
• [Boolean values] box

[explicit Boolean values] ..... Display the values of Boolean values, other than contacts and coils.
[textual Boolean values] ..... Display TRUE and FALSE in addition to red and blue.
[numeric Boolean values] ..... Display the digits '0' and '1' in addition to red and blue.
[show variable values] ..... Display the values of all variables.
[show parameter values] ..... Display the values of all formal parameters.

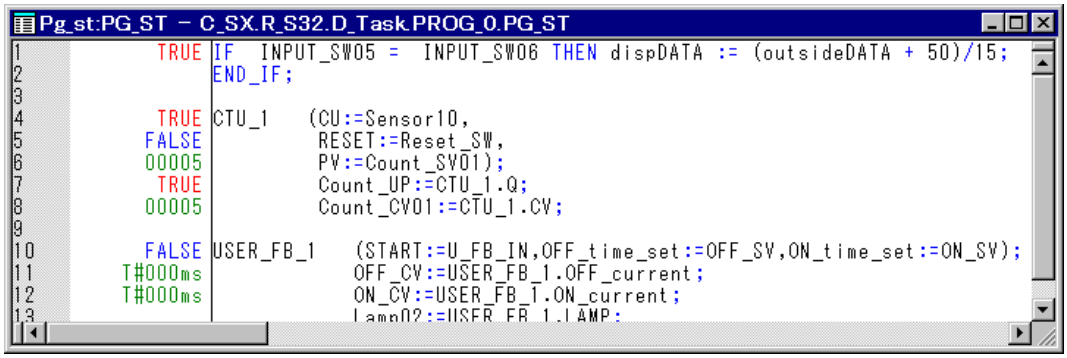
2) Text language online monitor

The following shows an example of the online monitor of a worksheet written in IL or ST language.

<Sample IL language monitor>



<Sample ST language monitor>



<Display colors>

The following explains the default display colors when a code worksheet is monitored.

- Objects which have a Boolean variable value specified appear in red or blue.
  Red: TRUE: '1'
  Blue: FALSE: '0'
- Objects which have a non-Boolean variable value specified appear in green.

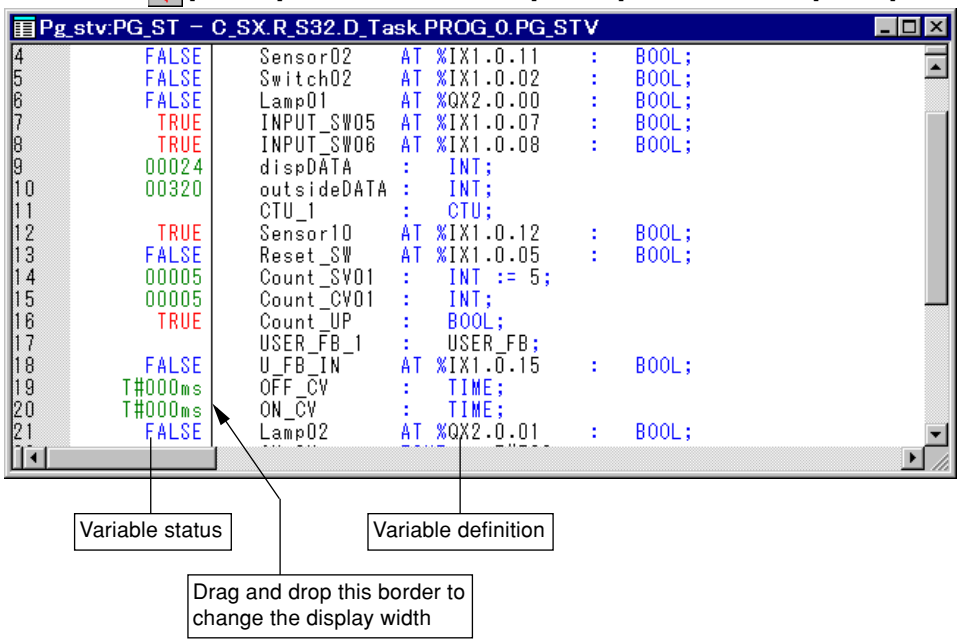
To change the display colors, see "2-7-9 Setting text colors."

(3) Variable monitor

This paragraph explains how to set a variable worksheet to online mode.

◊ Left-double-click the variable worksheet icon [PG_FBDV] to open the worksheet.

◊ Left-click the [Monitor] button or left-click the [Monitor] command in the [Online] menu to activate the online mode.



<Display colors>

The following explains the default display colors when a variable worksheet is monitored.

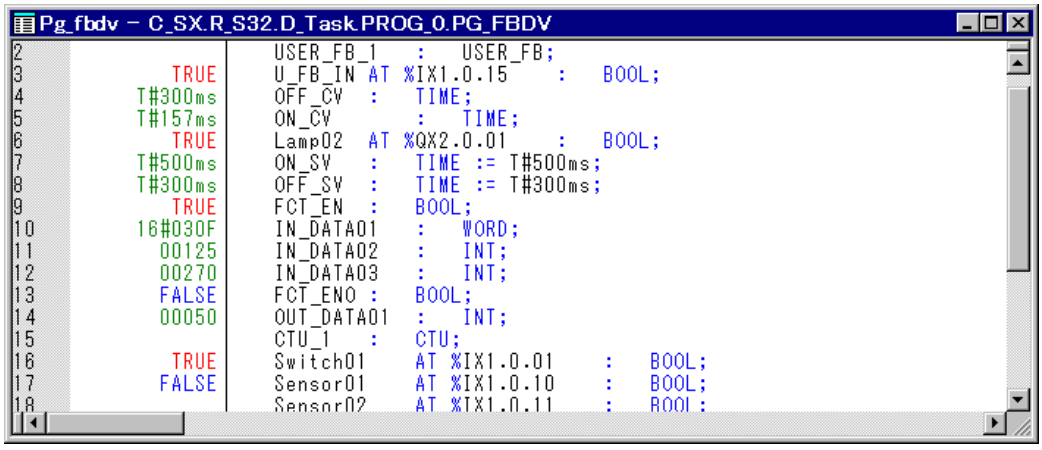
- Objects which have a Boolean variable value specified appear in red or blue.
  Red: TRUE: '1'
  Blue:FALSE: '0'
- Objects which have a non-Boolean variable value specified appear in green.

(4) Changing over view mode (Binary/Decimal/Hexadecimal)

The view mode changeover function changes over the display method for numeric values (binary, decimal or hexadecimal) while monitoring programs and variables. (Basic view mode for variables depends on their data type.)

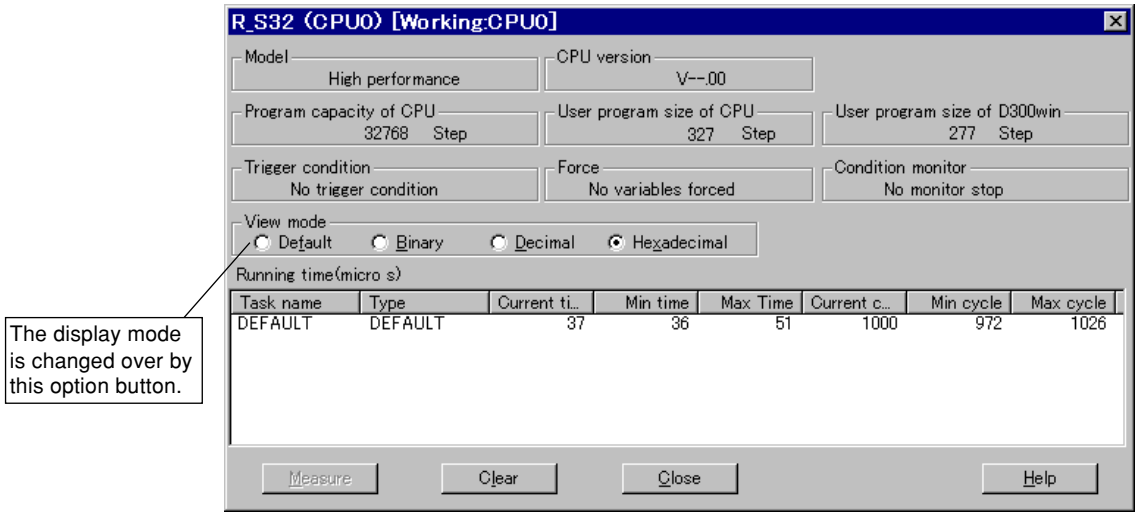
1) Display in the initial (default) mode

When variables are monitored, their values are displayed by the data type that is specified in variables declaration, as shown below.



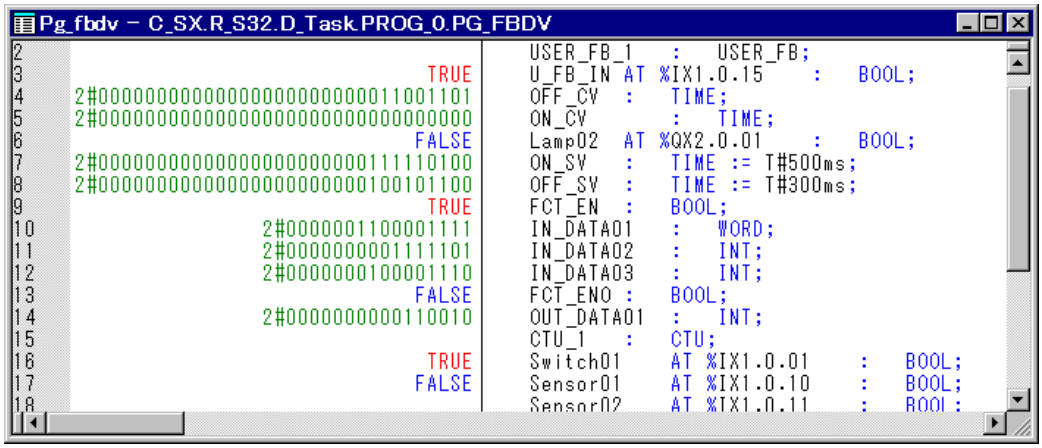
<Changing view mode>
To change the view mode, the {R_S32} (resource information) dialog box is used.

◊ To open the {R_S32} (resource information) dialog box, left-click the [Resource information ...] button in the {Control} dialog box.

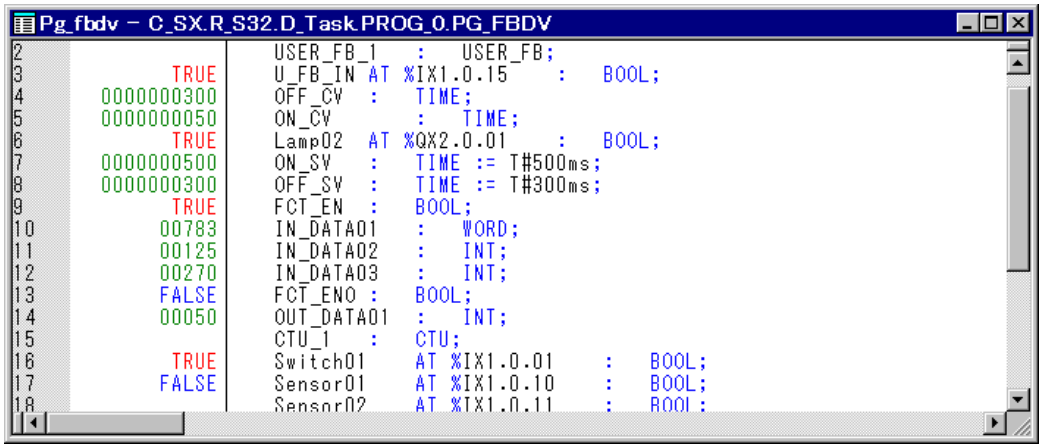


Sample screens when the view mode is changed over to Binary, Decimal or Hexadecimal are shown below:

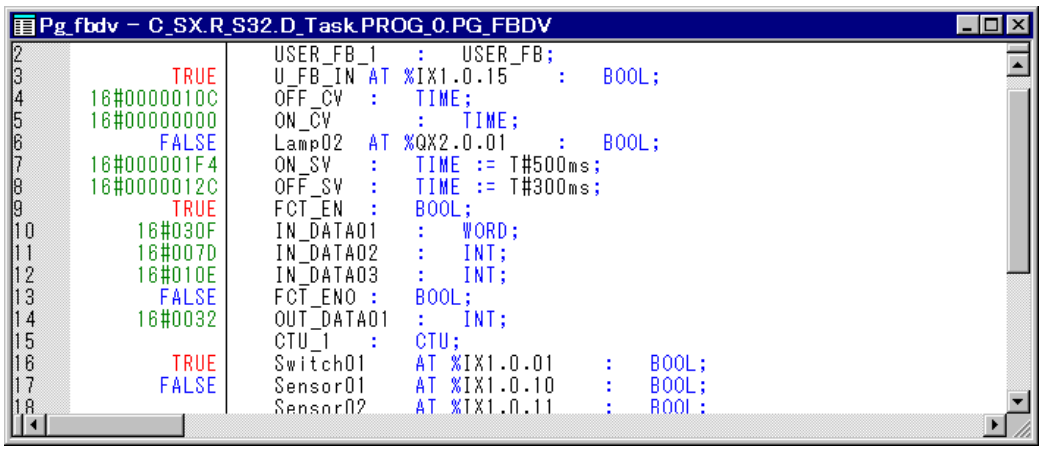
2) Display in Binary mode



3) Display in Decimal mode



4) Display in Hexadecimal mode



13-2-4 Using a watch window

A watch window is a type of editor enabling you to combine variables from different worksheets into a single window and debug them. Variables registered in a watch window can be deleted and reordered. In addition, user-defined data, such as arrays and structures, can be debugged using a watch window.

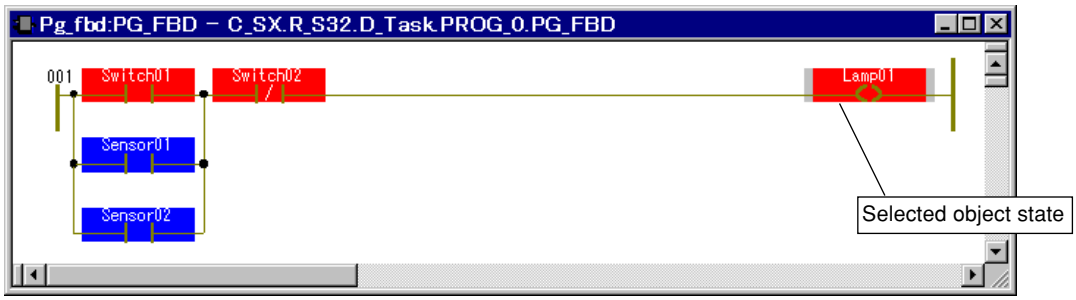
(1) Register variables in a watch window

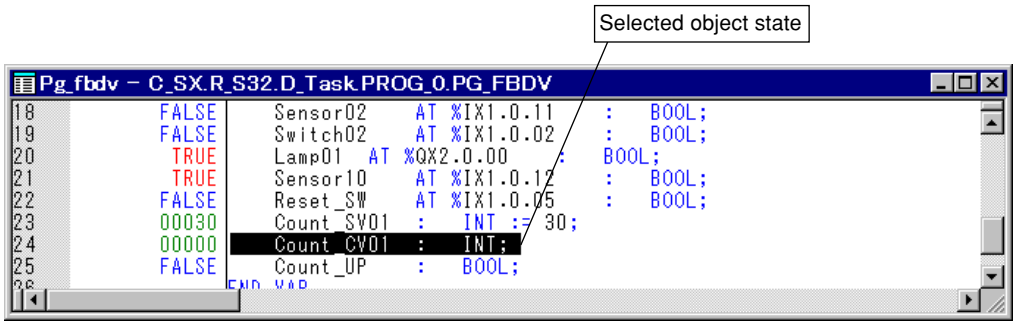
How to take variables from the program worksheets [PG_FBD] and [PG_IL] in the instance tree explained in 13-2-3 (1) and register them in one watch window is explained

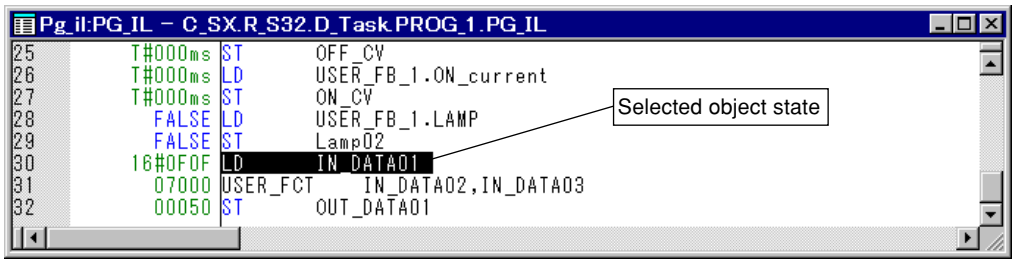
(Variables declared as derived data type can be registered in a watch window by the same method.)

◊ Set the worksheet display mode to the online monitor state.

◊ Open the program worksheet [PG_FBD] and the variable worksheet [PG_FBDV].







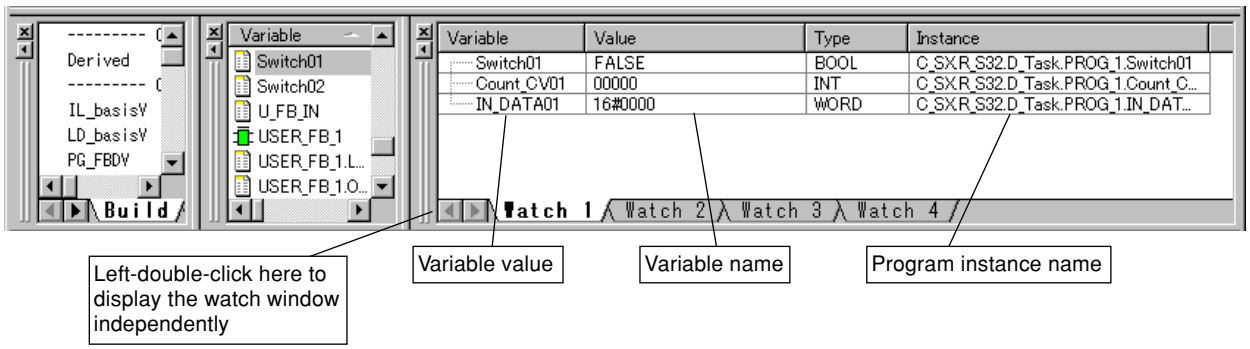
The watch window entry procedure is the same for both graphic and text worksheets.

◊ Right-click the target object to display the shortcut menu, and then left-click the [Add to Watch Window] command in the menu. The selected variable will be inserted to the watch window.

Up to 99 variables can be registered in a watc window.

(2) Display the watch window

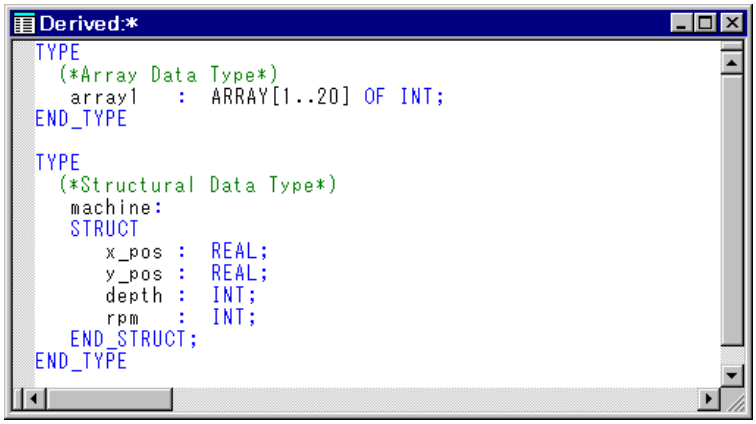
◊ To display the watch window registered in (1), left-click the [Watch window].
The watch window will appear as shown below.



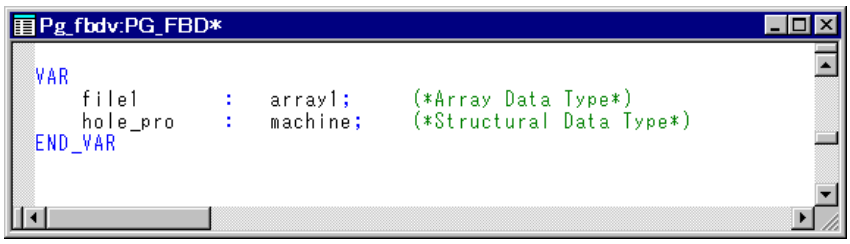
(3) Registering derived data type variables in a watch window

Registration when derived data type declaration and variables declaration are made is explained below.

<Sample declaration of derived data type>



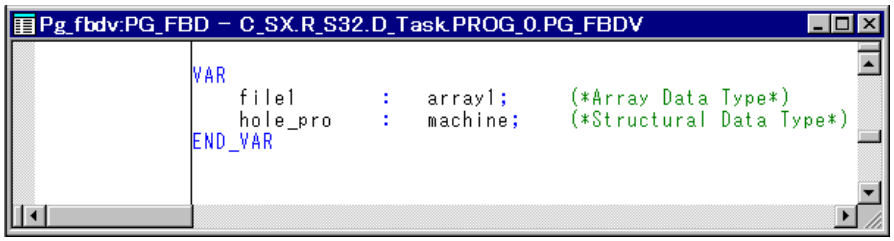
<Sample declaration of variables>



<How to register>

◊ Display the instance tree, and open the variables worksheet in which the array data to be monitored (registered) are declared.

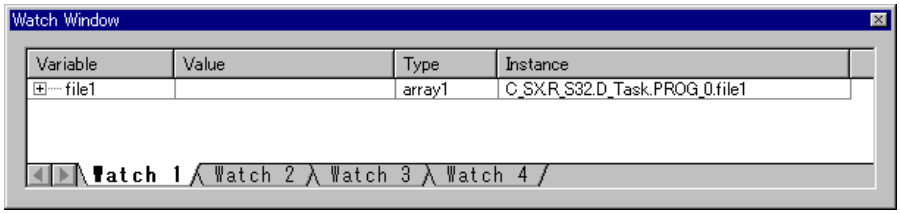
<Variables worksheet in the instance tree>



◊ Left-click the variables to be registered in the watch window to select them.
In this example, right-click "file1: array1" for which array data has been declared, and left-click the [Add to Watch Window] command in the shortcut menu. The selected variables will then be inserted to the watch window.

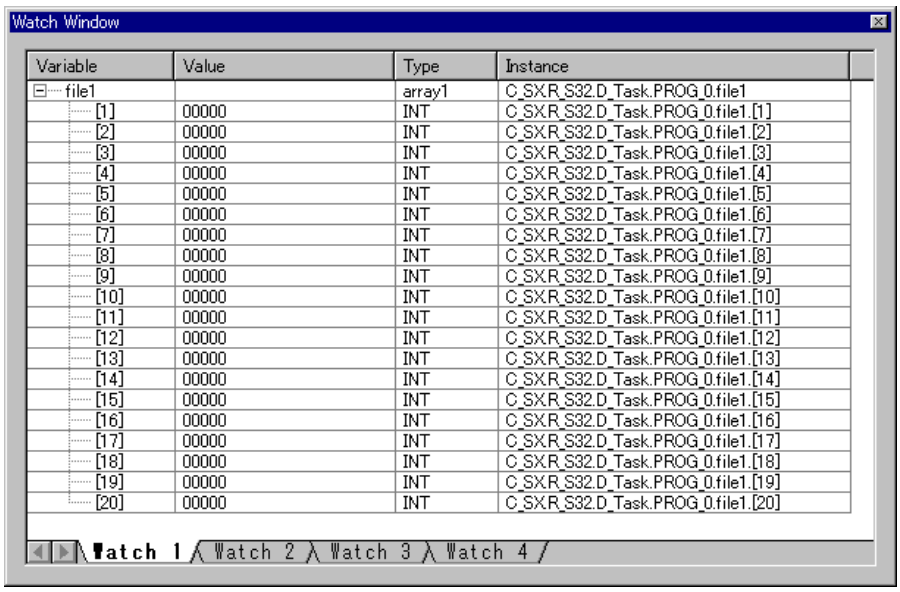
(4) Displaying derived data type in the watch window

◊ To display the watch window which was registered in above (3), left-click the [Watch Window] button. The watch window will then be displayed as shown below.



◊ Left-click the plus symbol (+) on the left of "file1" displayed in the watch window. The array will be expanded so that the respective elements can be monitored.

As shown in the figure below, the value of each array element will be displayed



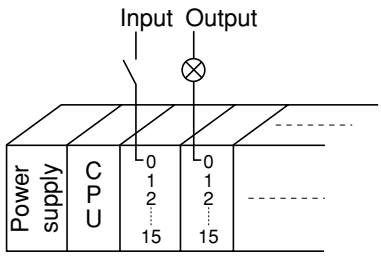
13-3-1 Forced ON/OFF and overwrite

You can force I/O relays, internal auxiliary relays (standard memory, retained memory, and instance memory for user FB) to ON (TRUE) or OFF (FALSE), or overwrite them.
During online monitoring forced ON/OFF and overwrite can be performed in the same way on program worksheets, variable worksheets, and watch windows.

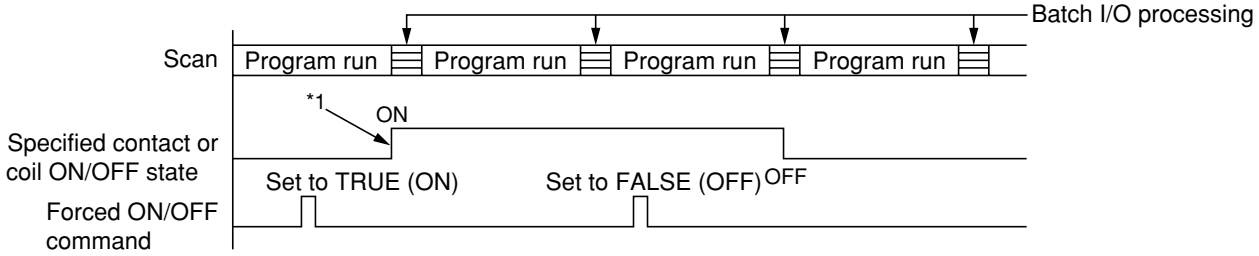
- Use maximum care when performing forced ON/OFF and overwrite while the PC system is running. The PC program is run using the values of variables that are forced ON/OFF or overwritten.
- Only physical I/O can be forced ON and OFF.

(1) Behavior of the PC during forced ON/OFF and overwrite operations

Contact/coil category		Operation mode		Remarks
		Overwrite (instantaneous)	Forced ON/OFF (continued retention)	
I/O relay area	Actual input		○	
	Actual output	○	○	
Internal relay area		○		

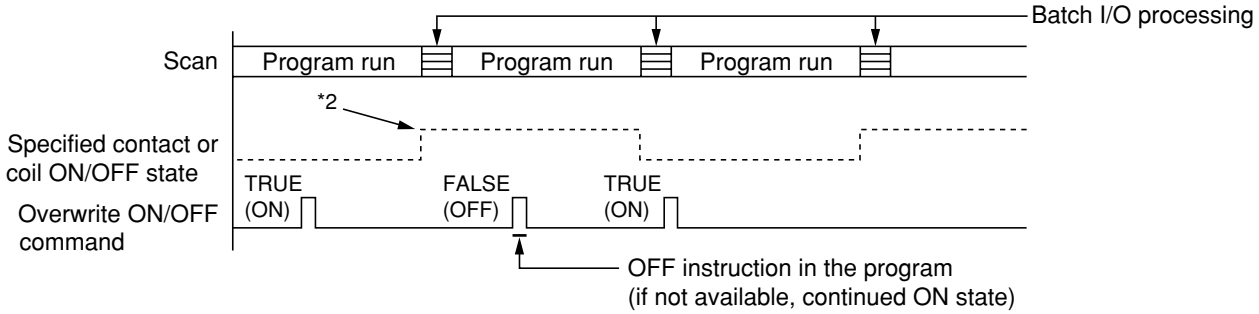


1) I/O relay area forced ON/OFF timing chart



*1 The requested (forced ON/OFF) state is retained, independently of the program. The forced ON/OFF state is reset by either clicking the [Forced reset] button in the {Online debug} dialog box for an individual reset or by checking the [Forced reset] check box in the {Resource information} dialog box for a batch reset. (The forced ON/OFF state is also reset during a PC power-on reset.)
(During an individual reset, the forced ON/OFF state of only the specified contact (cursor position) is reset. This function does not work when the program has been modified.)

2) Internal memory area instantaneous overwrite ON/OFF timing chart

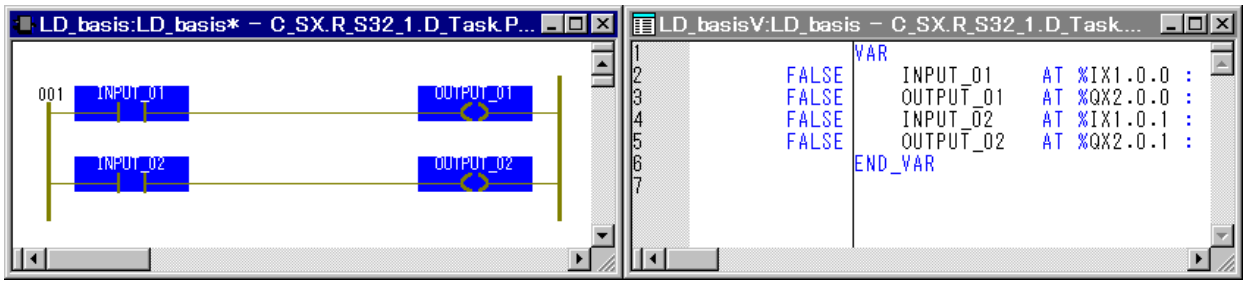


*2 The contact coil state that is turned ON or OFF is affected by the subsequent execution of the program. This means that the overwrite ON/OFF time is less than the execution time of the associated program. The specified ON/OFF state will be retained if there is no program to alter it.

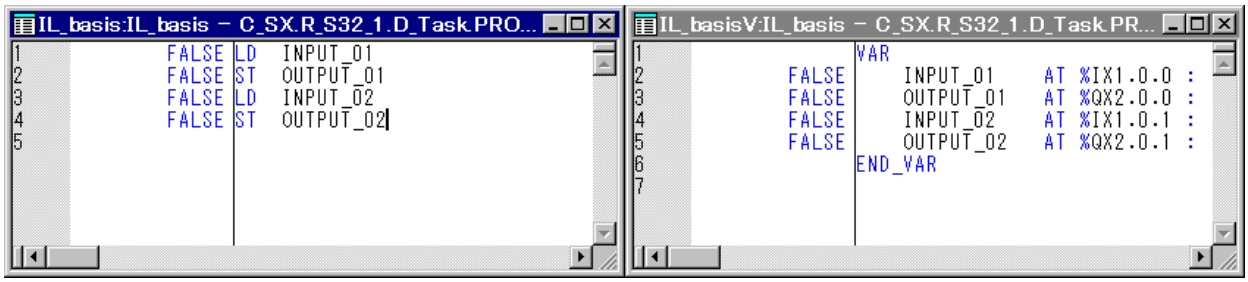
(2) Boolean variable forced ON/OFF and overwrite

The operating procedure for forcing Boolean variables ON and OFF and overwriting them are illustrated below with reference to basic circuitry generated in the two different graphical languages: LD and FBD.

<Example of a program written in the LD language and variable definition>



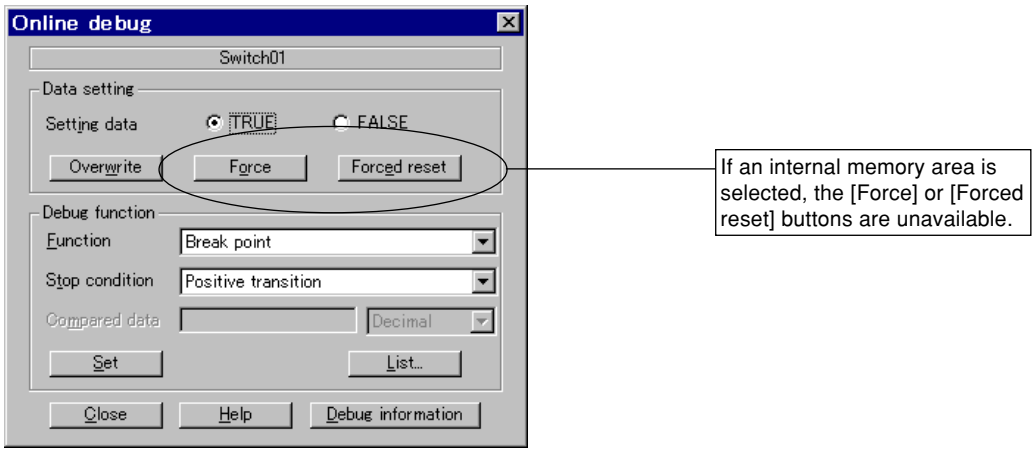
<Example of a program written in the IL language and variable definition>



1) Operating procedure

◊ Right-click anywhere on the object that you want forced ON or OFF or overwritten (Examples of LD language: external INPUT_01).

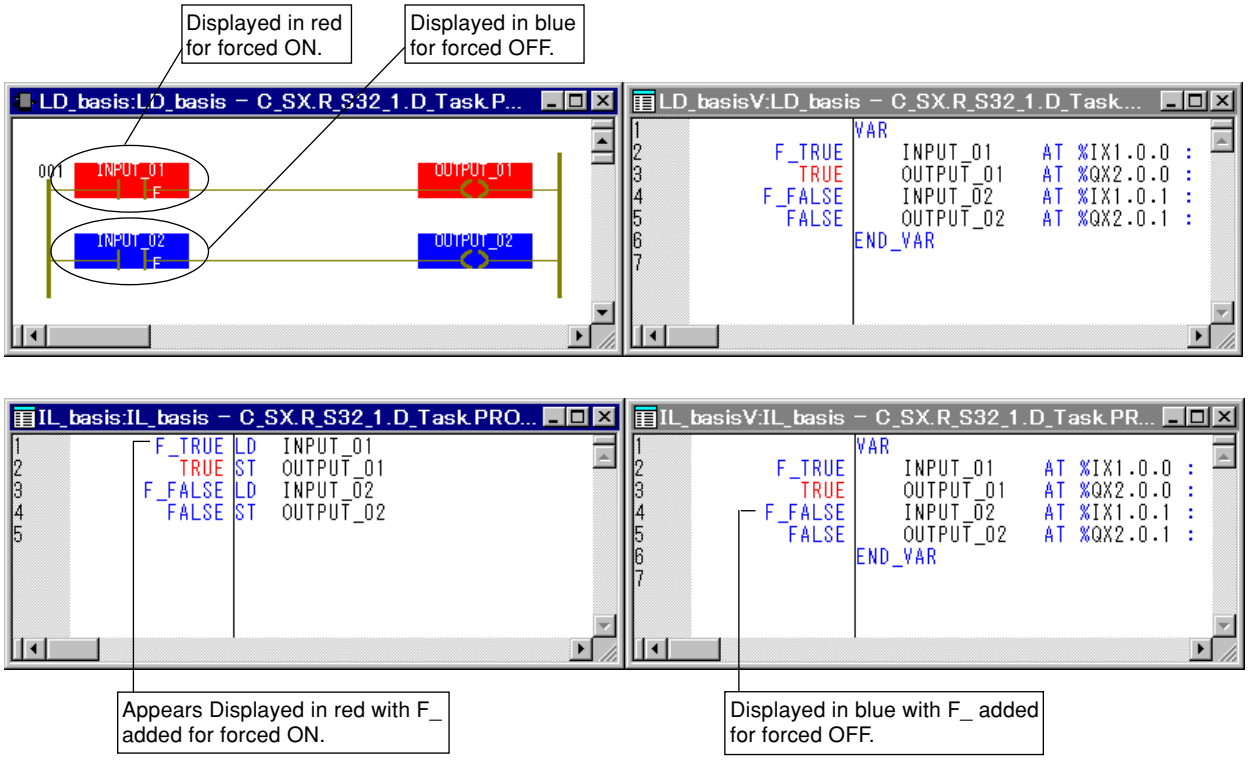
◊ Left-double-click on the object.
The {Online debug} dialog box will open.



◊ Turn on the setting data [TRUE] (ON) or [FALSE] (OFF) option button in the [Data setting] box in the dialog box.

◊ Left-click the [Force] button.
The object will then be forced ON (TRUE) or OFF (FALSE) or overwritten with the set data.

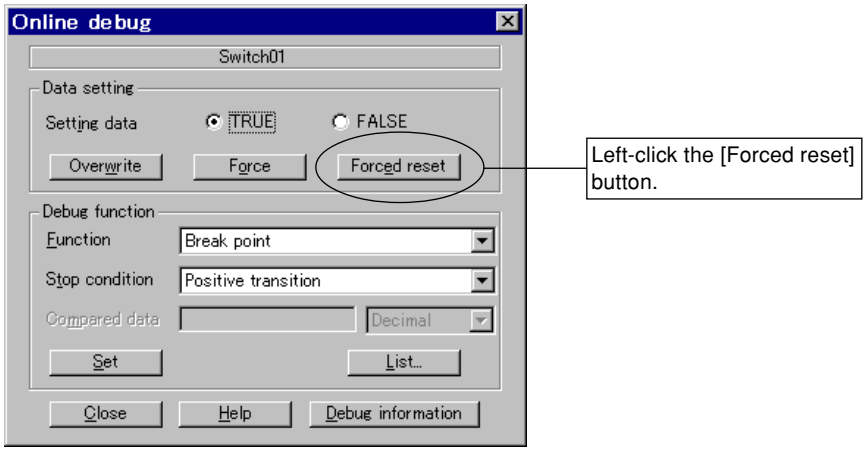
2) Displaying a program which has been forced ON/OFF and its variables
As shown below, objects that have been forced ON are marked by the letter “F” (Force) which appears in the instruction and variable display sections. When forcibly turned off, prefix “F” is added in blue.
(The letter “F” is not displayed for an overwrite.)



3) Forced ON/OFF reset

<Individual reset>
Select an object (instructions and variables) that has been forced ON or OFF individually and reset its state.

◊ Left-double-click anywhere on an object that has been forced ON or OFF.
◊ The {Online debug} dialog box will open.



◊ Left-click the [Forced reset] button in the dialog box.
The forced ON/OFF state will be reset.

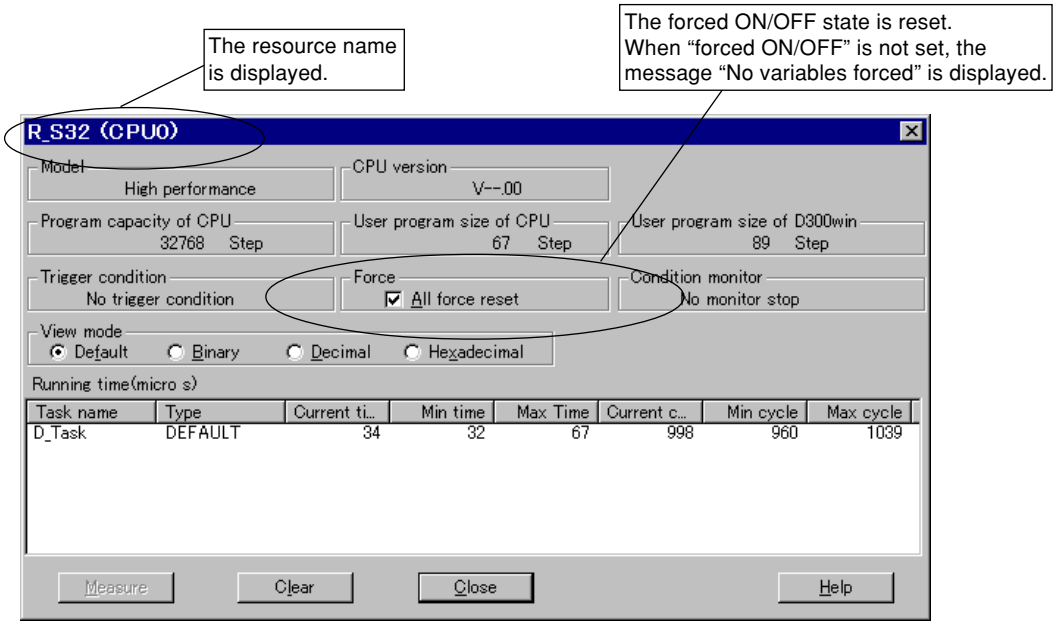
<Batch reset>
To save the need to repeat individual resets, use a batch reset to reset multiple objects that have been forced ON or OFF.

* A batch reset is possible for one single PC (resource) at a time (not a single program but all the programs in that PC).

◊ Left-double-click anywhere on an object that has been forced ON or OFF.

◊ The {Online debug} dialog box will open.

◊ Left-click the [Debug information] button in the dialog box.
The {Debugging information} dialog box will open.



◊ Check the [All force reset] check box in the dialog box and left-click the [Close] button.

◊ Left-click the [Forced reset] button or [Close] button in the {Online debug} dialog box. The forced ON/OFF states of all the objects will then be reset.

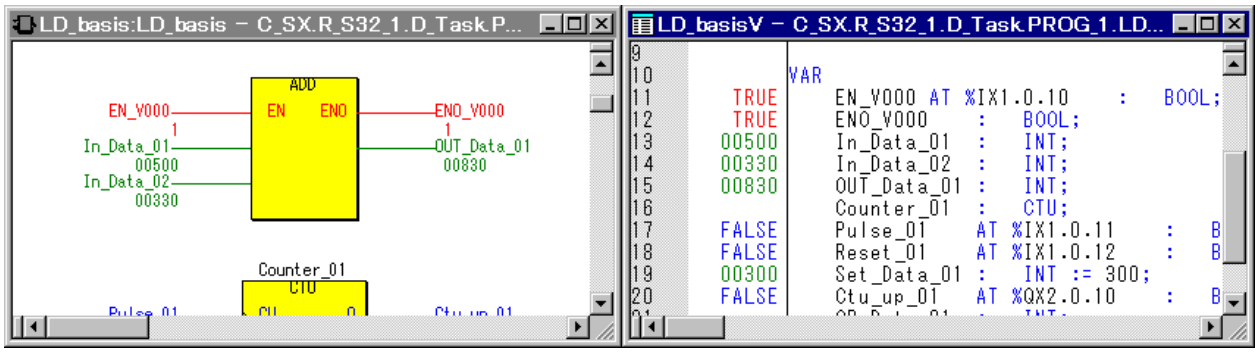
In addition to the use of the {Debugging information} dialog, the batch reset can also be executed in the {Resource Information} dialog opened by left-clicking the [Resource information...] button in the {Control} dialog.

---

(3) Overwriting variable values

The operating procedure for overwriting variable values is illustrated below with reference to basic circuitry (created with add function and counter function block) generated in the FBD language as shown below.

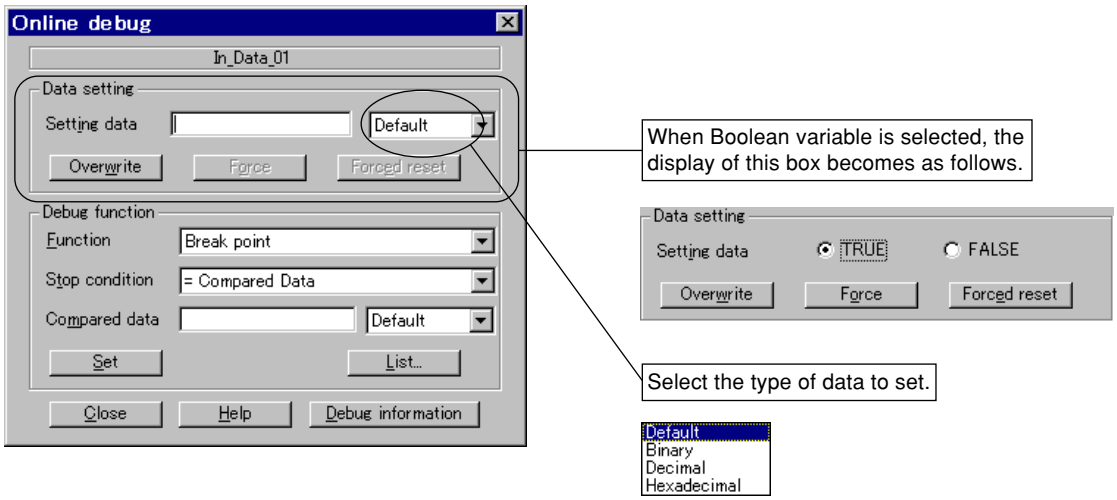
<Examples of a program written in the FBD language, and a variable definition>



1) Operating procedure

◊ Right-click anywhere on the object that you want overwritten (for example, “In_Data_01”).

◊ The {Online debug} dialog box will open.



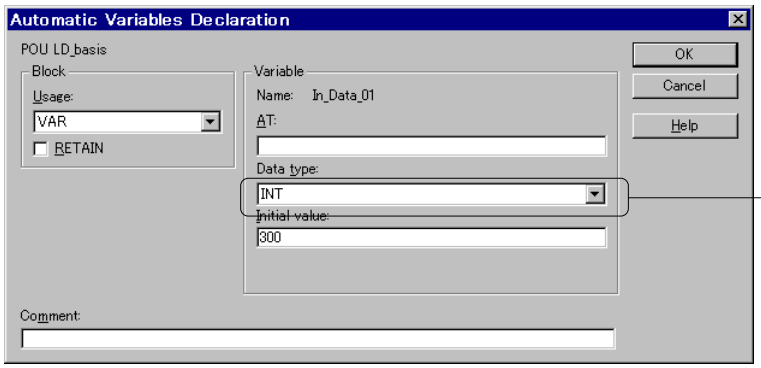
◊ Select a data type to be set from the list box in the [Data setting] box.

◊ Input data in the [Setting data] text box.

◊ Left-click the [Overwrite] button, and the data in the variable value display section will be overwritten by the input data.

Key-points:

1) Note that if the PC is turned off, then on again or if a TERM procedure is carried out in the {Control} dialog box or by the CPU module key switch, overwritten variables will be reset to their original values, or those specified as initial values in the variable declaration.



2) Data cannot be set at an address in an I/O area where an input module is mounted.
3) Data of the type STRING (variable-length character string data) can be set up to a column width of 80.
4) For the REAL data type, values up to the 7th decimal place can be set or displayed on the monitor. For example, 3.4028235E+38 is displayed on the monitor. However, because the actual data is 3.402823466E+38 , an error occurs if 3.4028235E+38 is set as the data.

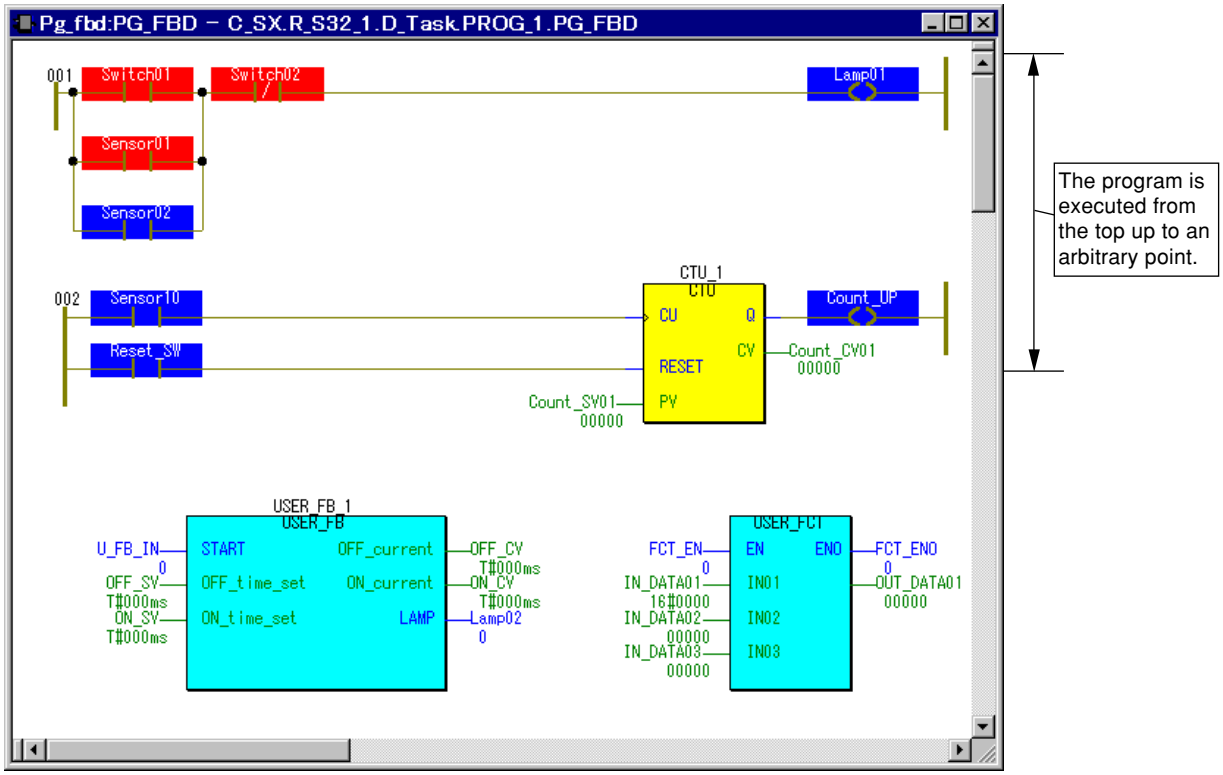
13-3-2 Break point function

The break point function detects changes in the value of a variable specified by the user while processing user program in the CPU module (during operation). If any change is detected, the function immediately halts program execution (stops the object CPU module).

Program execution from the position where the processing has been stopped is resumed from the break point when the [Execution] button in the {Control} dialog is left-clicked. To execute the program from the top, left-click the [Start] or [Initial start] button in the dialog box.

The use of the break point function while the PC is running requires a great care. Break point means that the processing of a program stops at a point where a break point is set.

No break point can be set for function block instances. If a break point is set in an instance, program processing is stopped each time the function block is used.



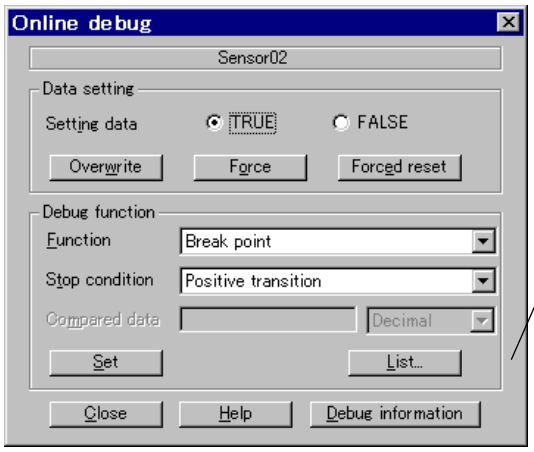
(1) Basic operation of the break point function

The method to process a program from the top to an arbitrary point where a break point is set and then to stop the CPU is explained below.

◊ Activate the worksheet to set a break point.
(Any worksheet that is being monitored online will do, whether it is a program worksheet, a variables worksheet, or a watch window. The following operation does not change according to the type of worksheet.)

◊ Left-double-click the object (variable) which is to be set a break point.

◊ The {Online debug} dialog box will then be opened.



Stop conditions:

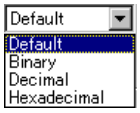
<Boolean variable>
- Positive transition
- Negative transition
- = 1
- = 0
- READ (see note)
- WRITE
- READ/WRITE
- REACHED

<Numeric variable>
- =
- ≠
- <, >, ≤, ≥
- READ (see note)
- WRITE
- READ/WRITE
- REACHED

Note: In the SPH300 series, data written in the Boolean variable where "Read" has been set as the stop condition is also regarded as meeting the conditions, and therefore program processing is stopped.

◊ Select stop conditions from the [Stop] list box.

◊ When a numeric variable is selected as a break point, comparison data is input in the text box. (The data type of the compared data to be input can be selected from the box shown below.



◊ Left-click the [Set] button. (When the CPU is running, the break point function works the moment the [Set] button is left-clicked. When the CPU stops, the break point function will work after the CPU starts running.)

For how to cancel a set break point, see “(3) Canceling the break point”.

For a function block in a program that is assigned to a fixed-cycle task (FIXED_CYCLE), the value is output when the function block is called and executed after the fixed-cycle task is started. For example, when “10 ms” is set for a fixed-task, the program that is assigned to the task is executed at 10-ms intervals. As well, when timer FB is used in the program, the current value of the timer is updated every 10 ms. Therefore, if a break point (stop conditions: =, compared data: 5 ms) is set for the current value of the timer, the PC does not stop. (When “=” is set for stop conditions, a multiple of the period of the fixed-cycle task (10 ms) needs to be set for compared data, or “>” (greater than) or “≥” (equal to or greater than) should be set as the stop conditions.

(2) Using the break point list

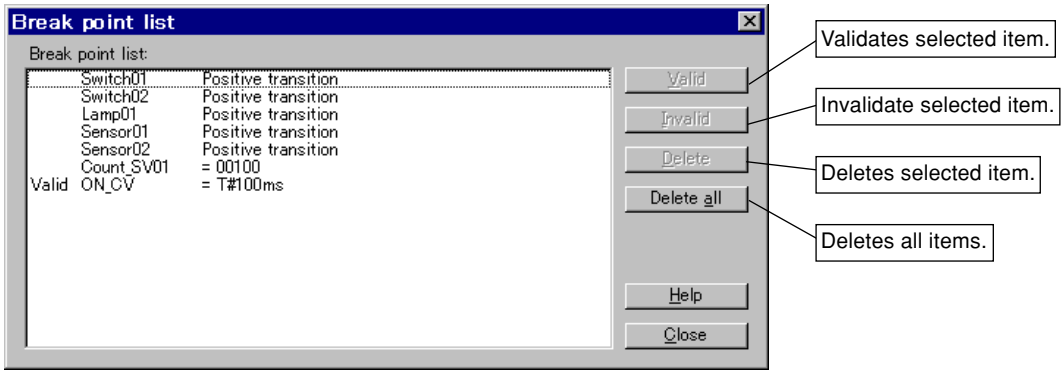
The content of set break points is stored (until they are deleted) in the break point list in the project. You can use the break point function by selecting one from the list.

<Displaying the list from the {Online debug} dialog box>

◊ Left-double-click a variable.
◊ The {Online debug} dialog box will then be opened.
◊ Left-click the [List ...] button in this dialog box, and the {Break point list} dialog box will be opened.

<Displaying the list from the {Control} dialog box>

◊ Left-click the [Resource Control...] button, and the {Control} dialog box will be opened.
◊ Left-click the [List of Break] button, and the {Break point list} dialog box will be opened.



1) Setting a break point

◊ From the list, select one item by left-clicking it.
◊ Left-click the [Valid] button.
◊ Left-click the [Close] button.
◊ Left-clicking the [Set] button in the {Online debug} dialog box sets the break point.
(When the {Break point list} dialog box is opened from the {Control} dialog box, a break point can be set only by left-clicking the [Close] button after selecting and validating a break point.)

2) Canceling a break point

How to cancel a break point is explained below.

<Canceling from the {Break point list} dialog box>

◊ Select a valid variable (for which “Valid” mark is indicated in the list) by left-clicking it.
◊ Left-click the [Invalid] button.
The “Valid” mark will then disappear from the list to cancel the break point.

(3) Canceling a break point

How to cancel a break point is explained below.
The method differs between before and after the break point function is executed.

1) Canceling the setting before the break point function is executed

There are two methods for canceling a break point: one is to use the {Break point list} dialog box as explained on the preceding page, and another is to use the {R_S32} (resource information) dialog box. The latter is explained below.

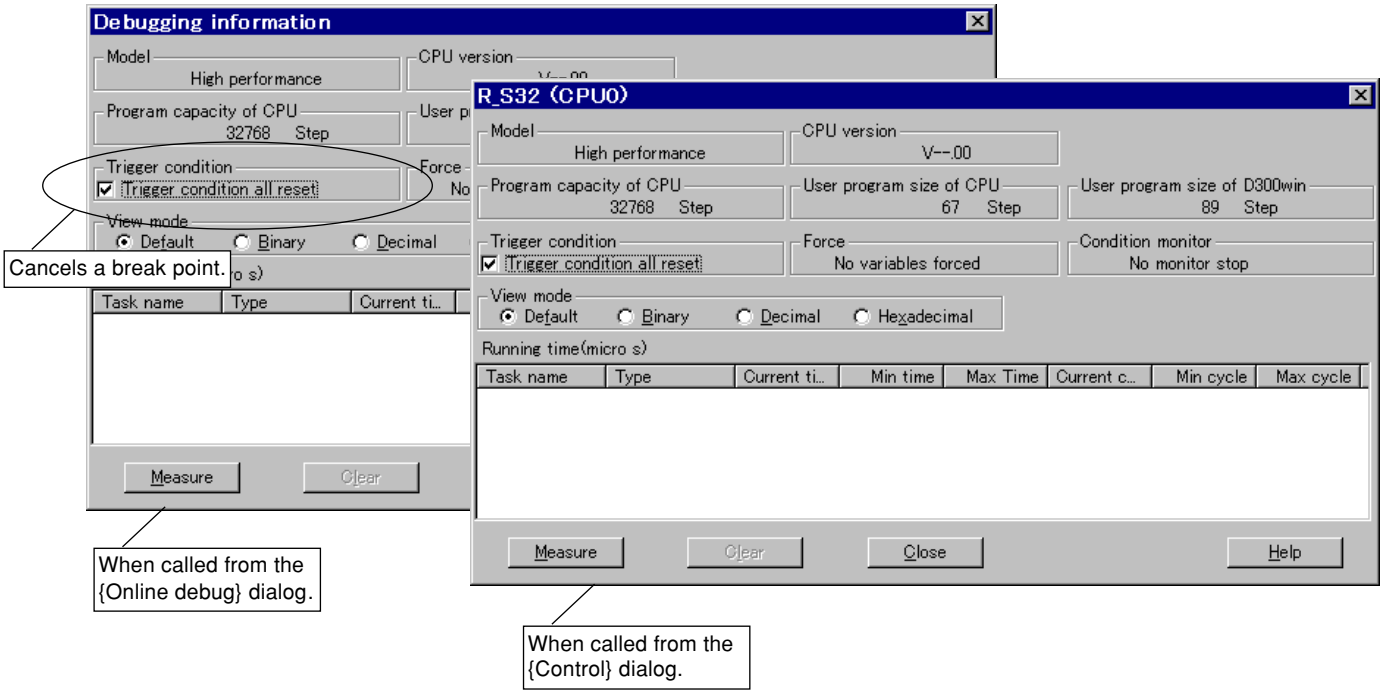
<Using the {Control} dialog box>

◊ Left-click the [Resource information ...] button in the {Control} dialog box, and the {R_S32} (resource information) dialog box will be opened.

<Using the {Online debug} dialog box>

◊ Right-click a variable.
◊ The {Online debug} dialog box will then be opened.
◊ Left-click the [Debug information ...] button in this dialog box, and the {debugging information} dialog box will be opened.

<Canceling from the {R_S32} (resource information) dialog box>

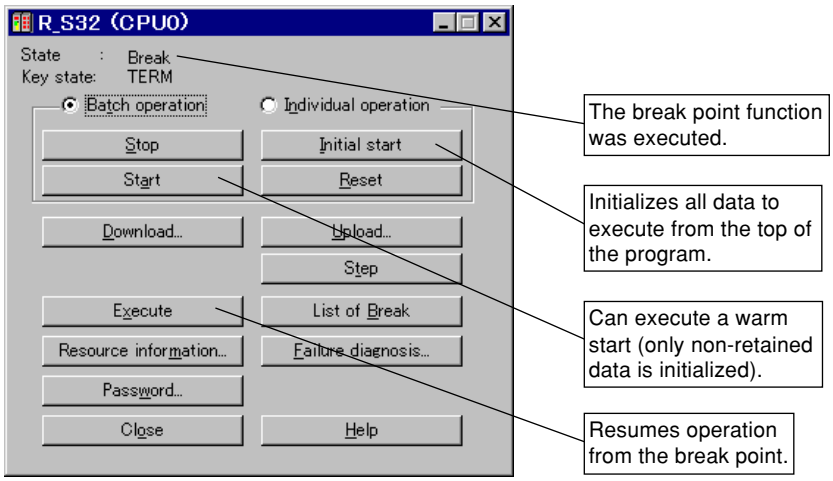


◊ Check the [Trigger condition all reset] box in this dialog box, and left-click the [Clear] button.
The break point will then be canceled.

2) Canceling the setting after the break point function is executed

After the break point function is executed, the PC (CPU module) stops. As well, program processing is halted at a point where the break point is set. Depending on circumstances, it may be necessary to resume operation from the break point or to restart from the top of the program. The methods for these are explained below.

◊ Left-click the [Resource Control...] button, and the {Control} dialog box will be opened.



◊ Left-click the [Start], [Execute] or [Initial start] button.

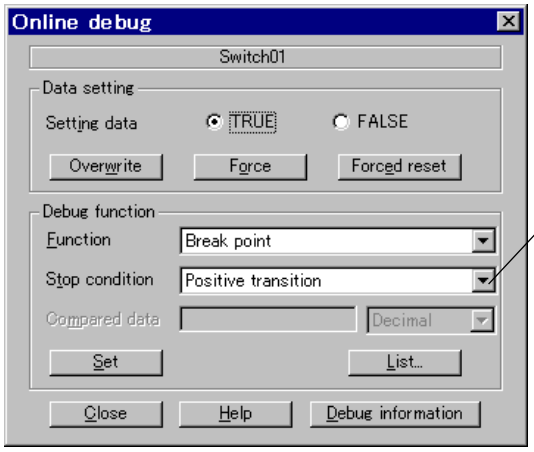
13-3-3 Step-by-step execution

The step-by-step execution function executes a user program stored in the CPU module command by command.
To use this function, with the CPU module running, use the break point function to stop program processing under the set conditions. Then, each time the [Step] button is left-clicked, the program is executed step by step.

(1) Setting the starting point of step-by-step execution

Using the break point function, determine the starting point of step-by-step execution.

◊ Activate the worksheet to set a break point.
(Any worksheet that is being monitored online will do, whether it is a program worksheet, a variables worksheet, or a watch window. The following operation does not change according to the type of worksheet.)
◊ Left-double-click the object (variable) which is to be set a break point.
◊ The {Online debug} dialog box will then be opened.



Stop conditions:

<Boolean variable>
- Positive transition
- Negative transition
- = 1
- = 0
- READ (see note)
- WRITE
- READ/WRITE
- REACHED

<Numeric variable>
- =
- ≠
- <, >, ≤, ≥
- READ (see note)
- WRITE
- READ/WRITE
- REACHED

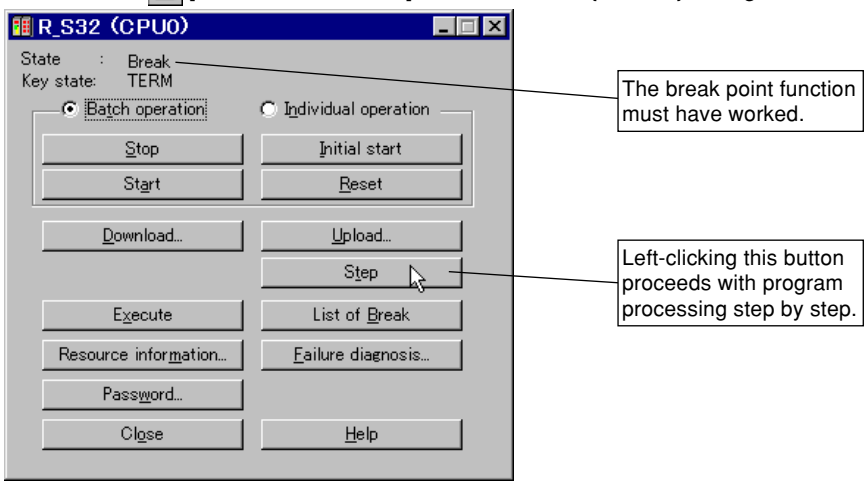
◊ Select stop conditions from the [Stop] list box.
◊ When a numeric variable is selected as a break point, compared data is input in the text box.
◊ Left-click the [Set] button. (When the CPU is running, the break point function works the moment the [Set] button is left-clicked, and program processing (CPU) stops at the set point. When the CPU stops, the break point function will work after the CPU starts running.)

📖 For a detailed explanation of the break point function, see 13-3-2.

(2) Operation for step-by-step execution

Step-by-step execution is operated from the {Control} dialog box.

◊ Left-click the [Resource Control...] button, and the {Control} dialog box will be opened.



◊ Left-click the [Step] button, and only one step of the program will be executed.

(3) Canceling the step-by-step execution mode

1) To resume operation

Left-clicking the [Execute] button in the {Control} dialog box resumes operation from the point currently stopped.

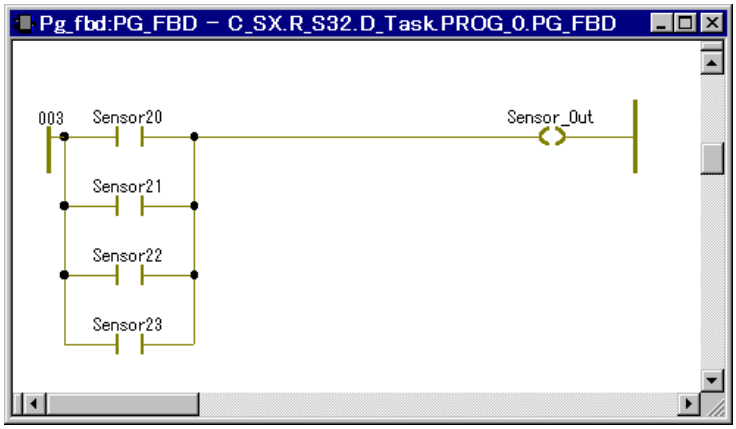
2) To restart from the top of the program

To execute from the top of the program, left-click the [Start] or [Initial start] button in the {Control} dialog box.

Note: For executing a function block step by step, the number of instances must be one.

13-3-4 Condition monitor

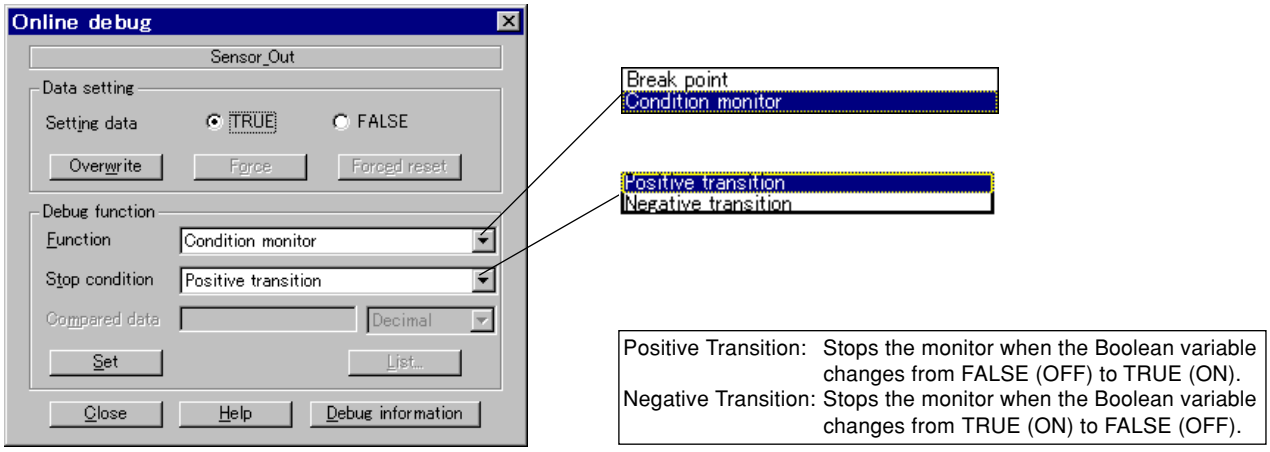
The condition monitor function detects positive or negative transitions of the value of the Boolean variable for an arbitrary (set) contact, coil, etc., to freeze the monitor screen during online monitoring. Here, even when the monitor screen is frozen, the PC continues to run.
The condition monitor function is explained below, supposing that the following program is written.



Sensors 20 to 23 are limit switches, photoelectric switches, etc. If they turn on accidentally, stop conditions are set for the “Sensor_Out” coil to pinpoint which contact is on.

(1) Operation of the condition monitor

◊ Activate the worksheet.
(Any worksheet that is being monitored online will do, whether it is a program worksheet, a variables worksheet, or a watch list. The following operation does not change according to the type of worksheet.)
◊ Left-double-click the object (defined by Boolean variable) for which the condition monitor is to be set, and the {Online debug} dialog box will be opened.



Positive Transition:	Stops the monitor when the Boolean variable changes from FALSE (OFF) to TRUE (ON).
Negative Transition:	Stops the monitor when the Boolean variable changes from TRUE (ON) to FALSE (OFF).

◊ Select “Condition monitor” from the [Function] list box.
◊ Select “Positive Transition” from the [Stop] list box.
◊ Left-click the [Set] button.
The monitor will then be stopped at a transition point at which the value of the object variable (Boolean variable) changes from FALSE to TRUE. To resume the monitor, move the scroll bar provided in the editor.

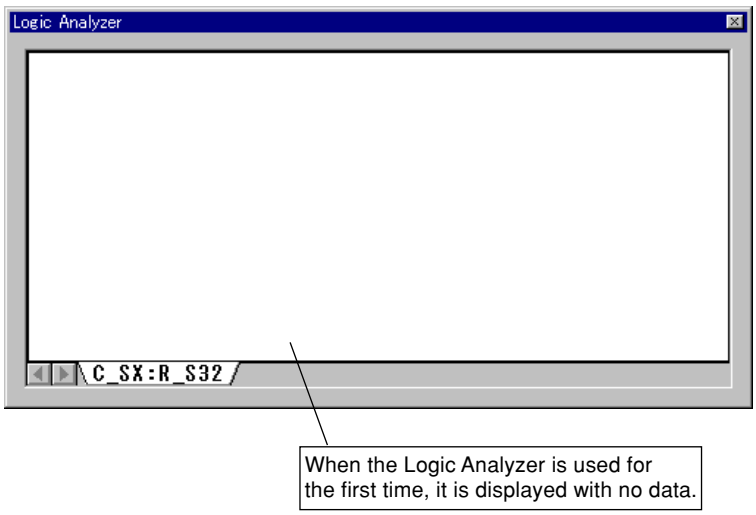
• The stop condition for condition monitor can be set at only one point for one execution.
• After executing the condition monitor, it is necessary to set the stop condition again.

13-3-5 Logic Analyzer (under development)

The Logic Analyzer detects changes in the value of specified variables at a given interval to display the result of sampling in a time chart. With this function, you can check the ON/OFF timing of contacts and coils or changes of numeric data.

(1) Initial display of the {Logic Analyzer} window

◊ Left-click the [Logic Analyzer] button or turn on the [Logic analyzer] icon in the [View] menu.
The {Logic Analyzer} window will appear on the screen.

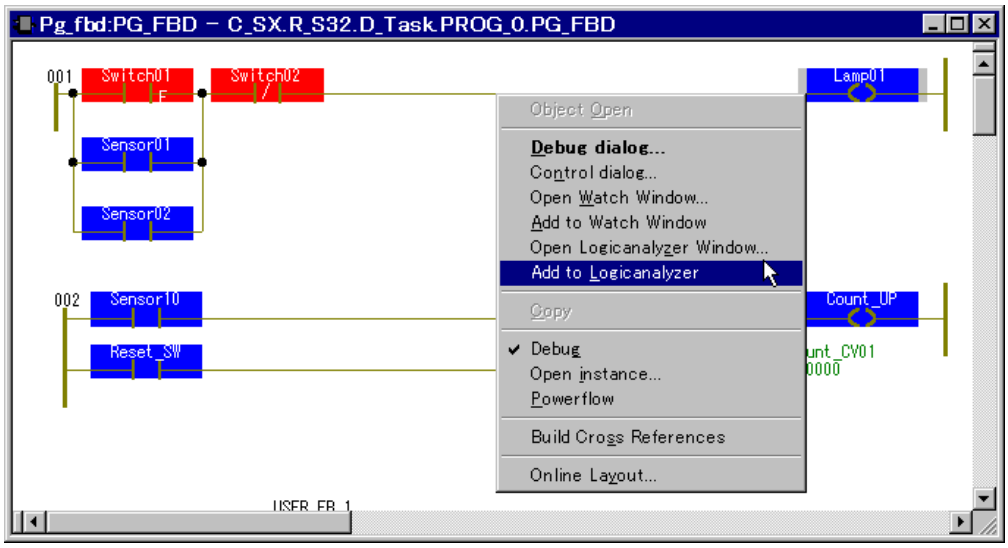


(2) Registration of variables in the Logic Analyzer

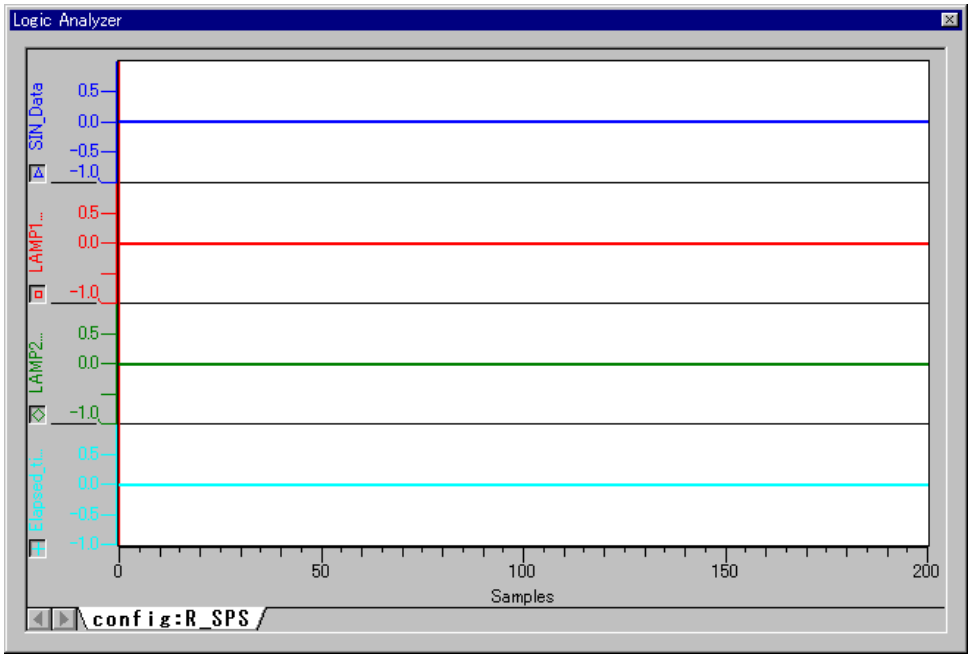
This paragraph describes how to register variables to be sampled in the Logic Analyzer.

1) Registration of new variables

◊ Open a code worksheet or variable worksheet, and then turn on the [Monitor ON/OFF] button to set the online (monitor) state.

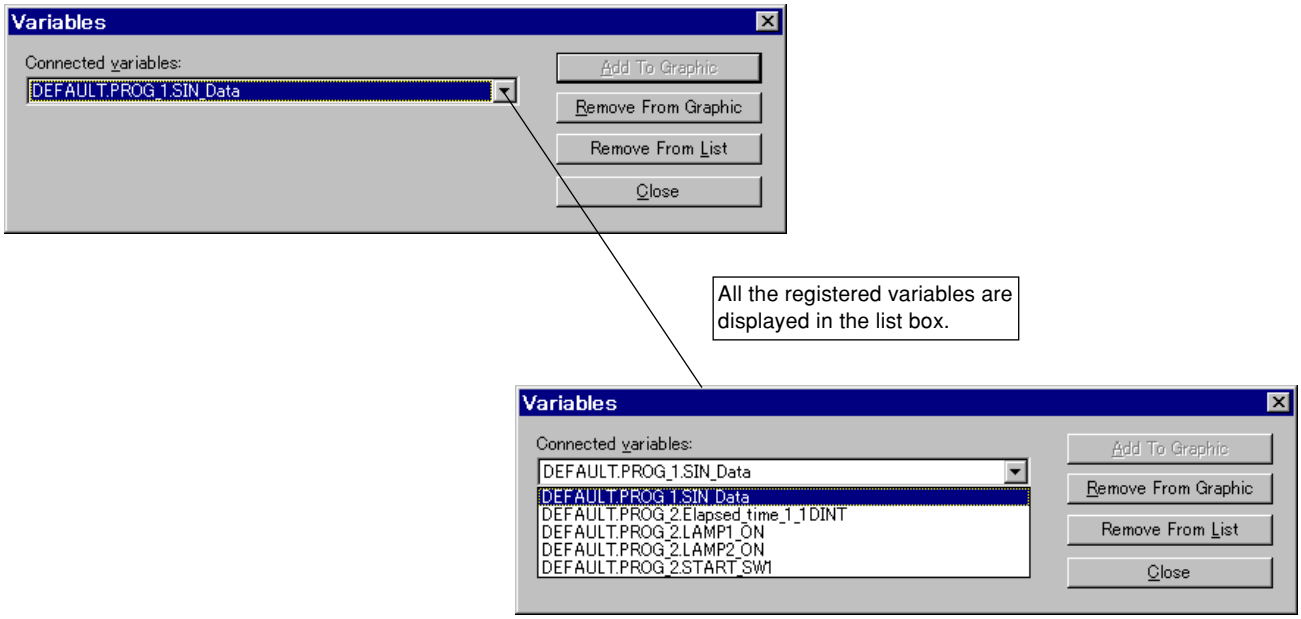


◊ Right-click a variable to be registered in the Logic Analyzer to display the shortcut menu, and left-click the [Add to Logic Analyzer] command in the menu.
The variable will be registered in the Logic Analyzer. Use the same procedure to register additional new variables. The following shows a sample display of the {Logic Analyzer} window with variables registered.



2) Addition/deletion of variables to/from the Logic Analyzer
When the variable registration described in 1) is carried out, all the registered variables are displayed in the {Logical Analyzer} window. This paragraph explains how to delete unnecessary variables from or add other variables to the Logical Analyzer.

◊ Left-click the [Insert/Delete Variables] button or left-click the [Insert/Delete Variable...] command under [Logical Analyzer] in the [Online] menu. The {Variables} dialog will appear on the screen.

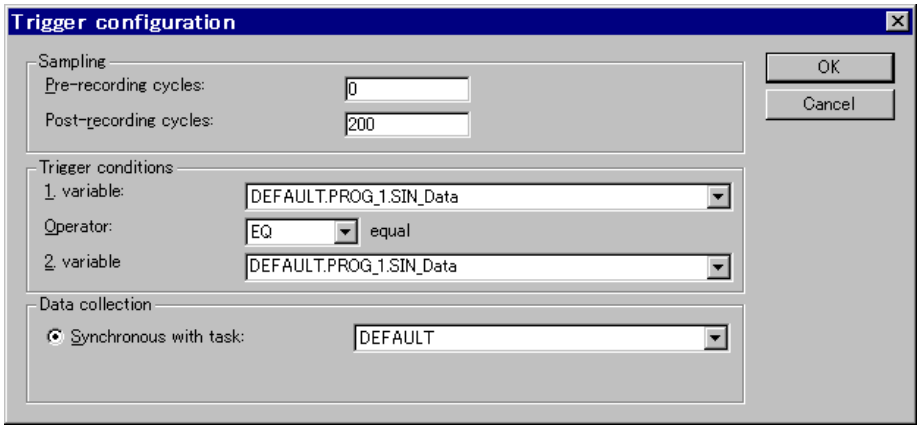


[Add to graphics] ..... Re-displays the variables, which have been deleted (non-display specified) by the [Delete from graphics] button, in the {Logical Analyzer} window.
[Delete from graphics] ..... Deletes (specifies non-display of) a variable from the {Logic Analyzer} window.
[Delete from list] ..... Deletes a variable from the variable list in the {Logic Analyzer} window. To re-register the deleted variable, use the steps in "1) Registration of new variables."

(3) Setting sampling conditions

This paragraph describes how to set the sampling count and cycle.

◊ Left-click the [Trigger Configuration] button or left-click the [Trigger Conditions...] command under [Logic Analyzer] in the [Online] menu. The {Trigger Configuration} dialog will appear on the screen.

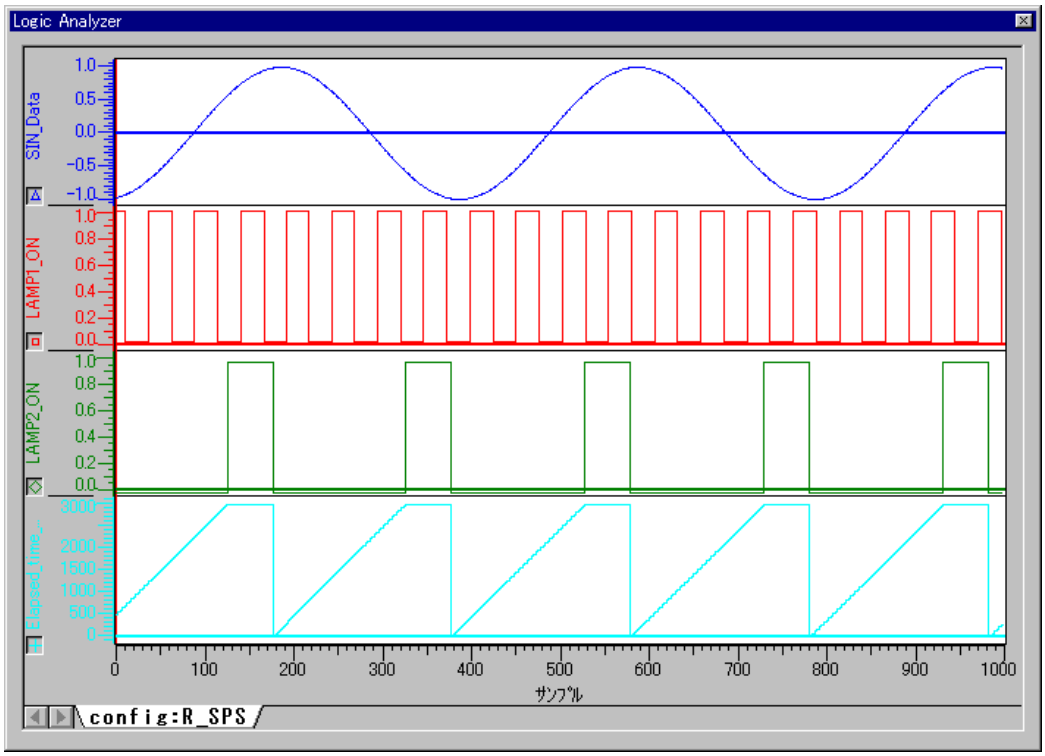


◊ Set the sampling count following the sample recording start in the [Post-recording cycle time] text box.
◊ Set the sampling cycle (interval) in the [Interval] text box.
◊ Upon completion of value setting, left-click the [OK] button to register the sampling conditions.

(4) Starting sampling

After registration of the variables to be sampled and the conditions, start sampling.

◊ Left-click the [Start Recording] button. To stop sampling, left-click the [Stop Recording] button.
Upon completion of sampling, the time chart will be displayed in the {Logic Analyzer} window as shown in the figure below.
Data collection is completed when the working box is closed, displaying the following time chart on the screen.



13-3-6 Program control

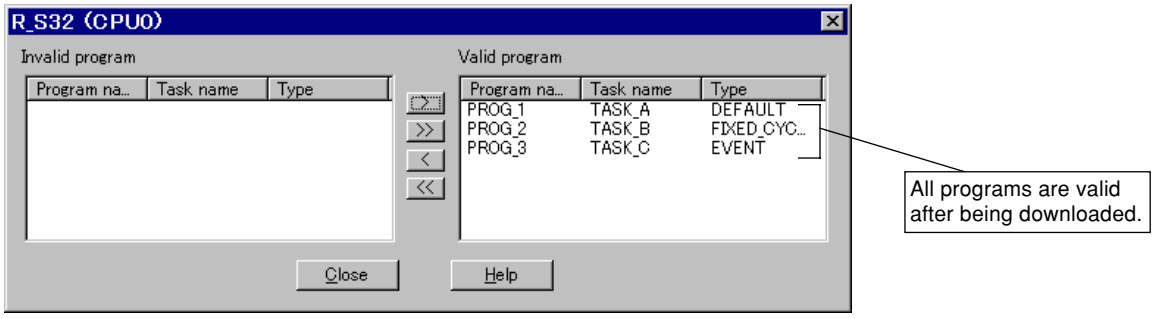
When there are multiple programs (POUs) in one resource (CPU module), the program control function is used to selectively execute one or more programs. (Debugging can be made for individual POU units.)

The program control function is disabled when another test function (break point, step-by-step execution, or condition monitor) is running. After executing the program control function, other test functions can be executed.

(1) Executing the program control function

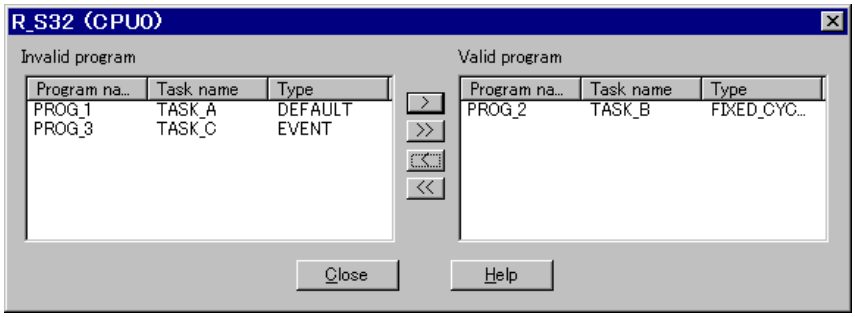
◊ Left-click the [Resource Control...] button or left-click the [Control...] command in the [Online] menu. The {Control} dialog will then appear on the screen.

◊ Left-click the [Program control ...] button in this dialog box, and the dialog box for program control will be opened.



[>] button ..... Moves selected programs from the [Invalid program] box to the [Valid program] box.
[>>] button ..... Moves all programs from the [Invalid program] box to the [Valid program] box.
[<] button ..... Moves selected programs from the [Valid program] box to the [Invalid program] box.
[<<] button ..... Moves all programs from the [Valid program] box to the [Invalid program] box.

◊ Leave only the programs which you want to debug, and move other programs into the [Invalid program] box. (A sample program movement is shown below.) You can then debug the remaining programs.



The programs moved into the [Invalid program] box return to the original [Valid program] box when the power of the PC (resource) is reset (turned off and on), and all programs in the PC are executed.

13-4 Calendar Function

For the MICREX-SX series, a clock is integrated in each CPU module to provide a calendar function.
Calendar values can be monitored or set by D300win or application programs.

13-4-1 Range of calendar

Range of calendar: 00:00:00 of January 1st, 1970 to 23:59:59 of December 31, 2069

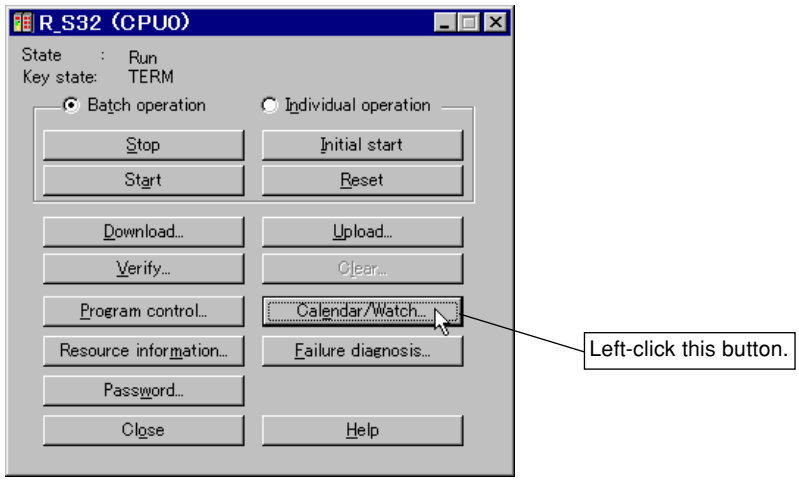
13-4-2 Accuracy of the calendar function

Accuracy of the calendar function (clock) built in the CPU module is 27 seconds per month (ambient temperature: 25˚C)

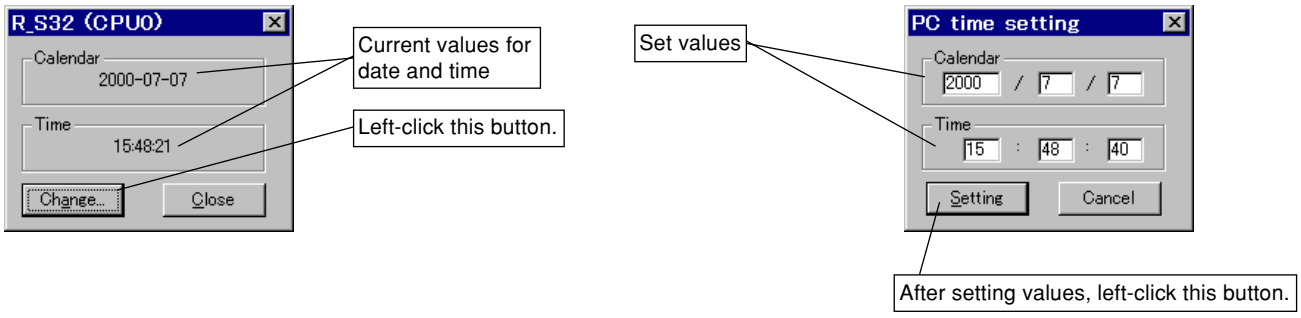
Note: Accuracy of the calendar function depends on the ambient environment (ambient temperature, etc.) When your system requires a high-accuracy calendar function, please determine the inspection cycle (the timing to correct the clock) by measurement under actual conditions.

13-4-3 How to set the monitor from D300win

1) Left-click the [Resouce Control...] button to display the {Control} dialog.



2) Left-click the [Calendar/Watch ...] button, and the current value will be displayed.



3) Left-click the [Change ...] button, and the {PC time setting} dialog box will be opened. On this dialog box, you can set any desired value.

13-5-1 Outline of SX control utility

SX control utility is a function to monitor the I/O data of the input/output modules comprising MICREX-SX series hardware, change the data, or back up PC data. This function can be used even when no project is downloaded in the resource (CPU module). Therefore, this function can be used for checking I/O after I/O devices are connected to the module.
This function operates independently of D300win.

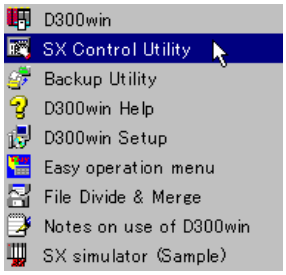
13-5-2 Starting SX control utility

There are two methods for starting SX control utility.

(1) Starting SX control utility

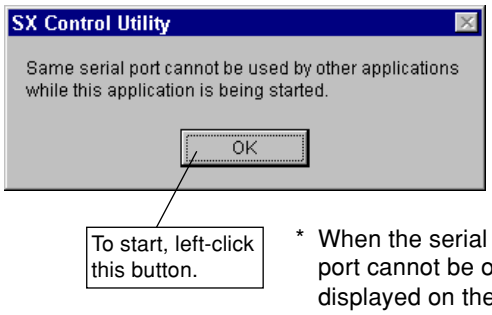
1) Starting from the Windows' [Start] menu
This method starts SX control utility from the Windows' [Start] menu without activating the D300win system. The SX control utility registered in the program group of D300win is activated.

[Program] submenu under [Start] menu



2) Starting from the main menu of D300win
With the D300win system activated, select the [SX Control Utility] command from the utilities menu under the [Extras] menu under the main menu.

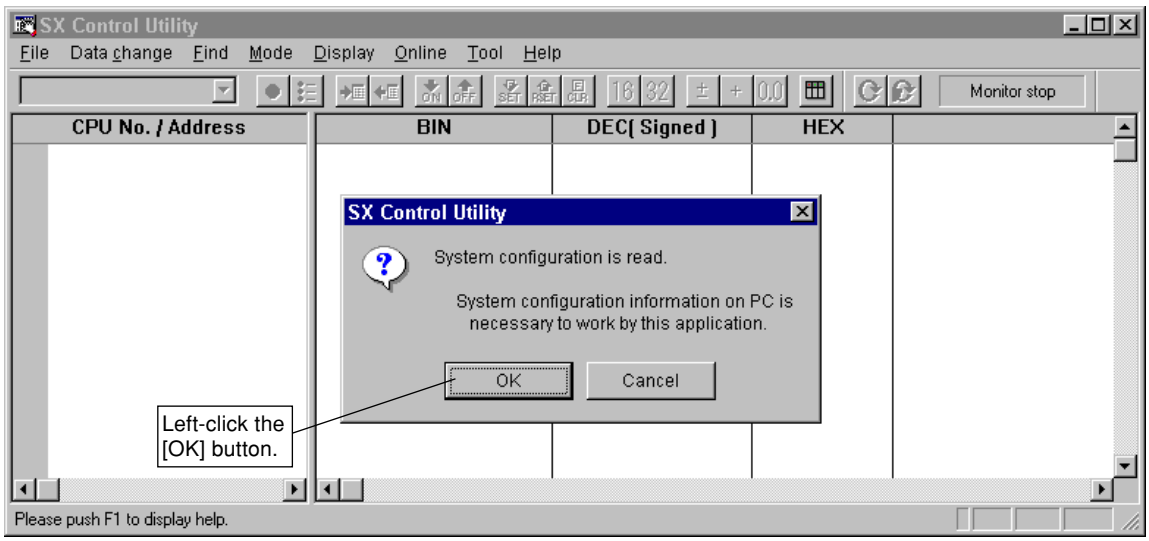
3) Display after the [SX Control Utility] command is executed
When the [SX Control Utility] command is executed, the following message box appears on the screen.



* When the serial port is being used by another application program, the message “Serial port cannot be opened. Terminate other applications that are using the serial port.” is displayed on the screen.

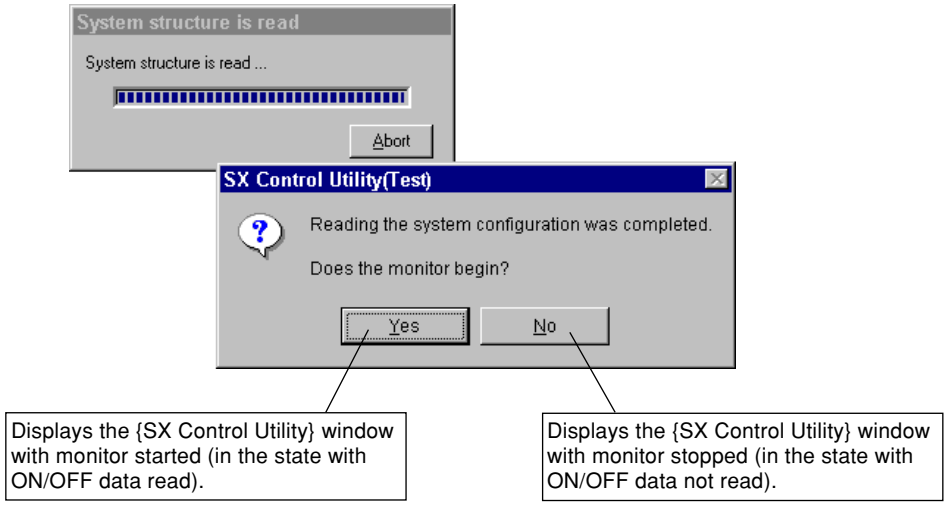
◊ Left-click the [OK] button.

(2) Loading the system structure
When the SX control utility is started, the message box for loading PC system structure data is displayed first.

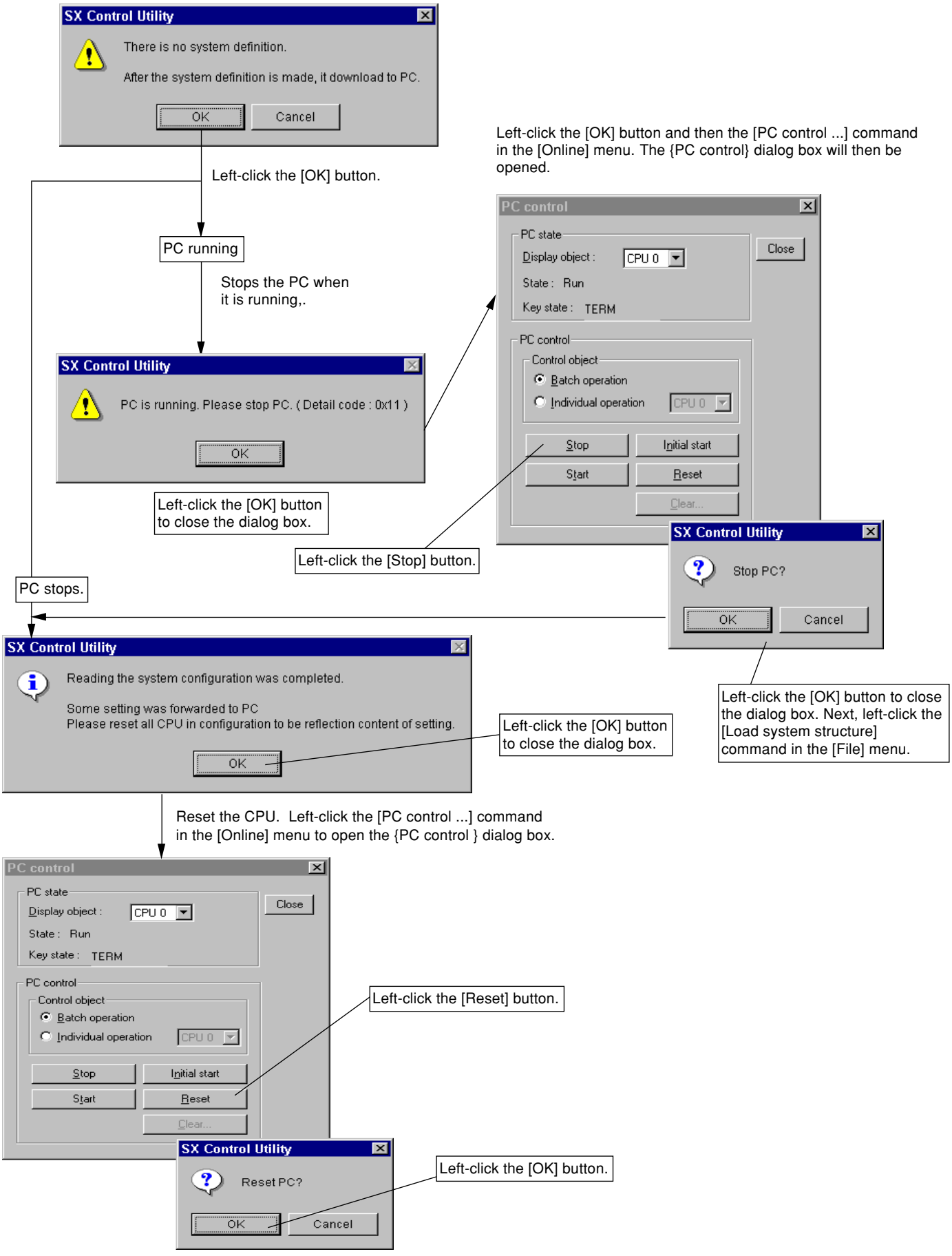


◊ Left-click the [OK] button in the dialog box for loading system structure.
The figure as shown in 1) or 2) will then be displayed.

1) When the system structure is registered in the resource



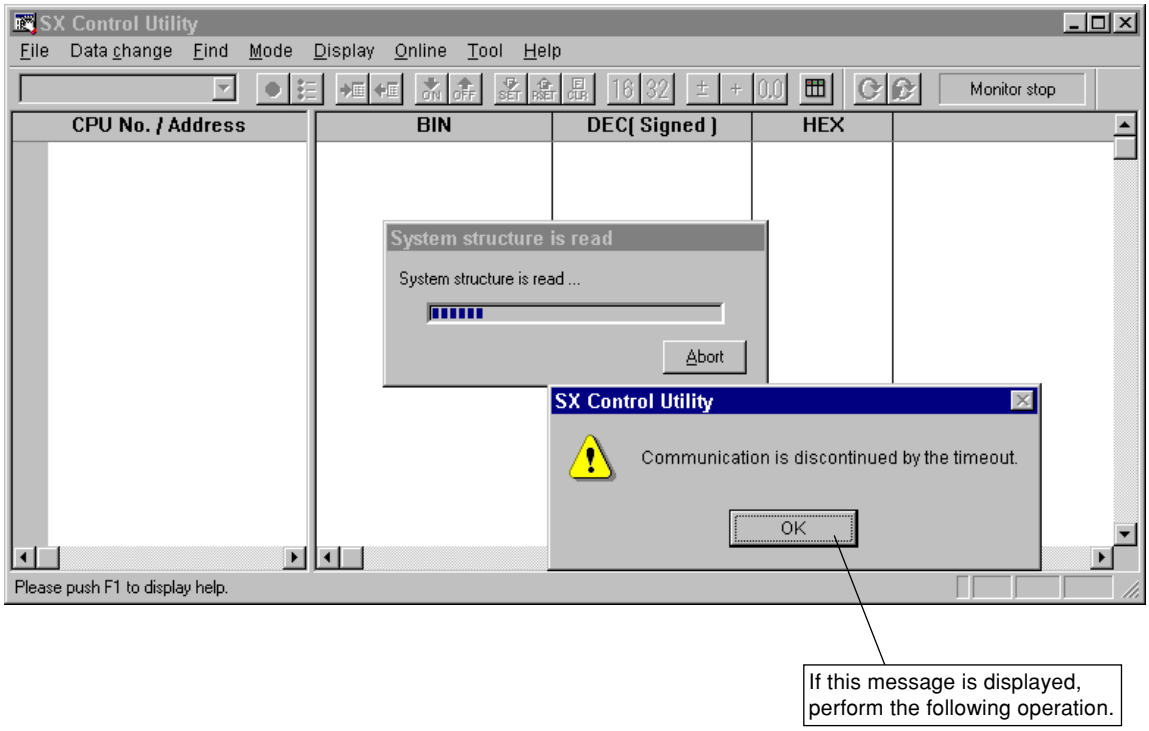
2) When the system structure is not registered in the resource
The SX control utility has the function to automatically recognize I/O modules and register “I/O group setting” to the resource.
For a multi-CPU system, I/O modules are registered only to CPU0.



3) Setting the connection to the PC

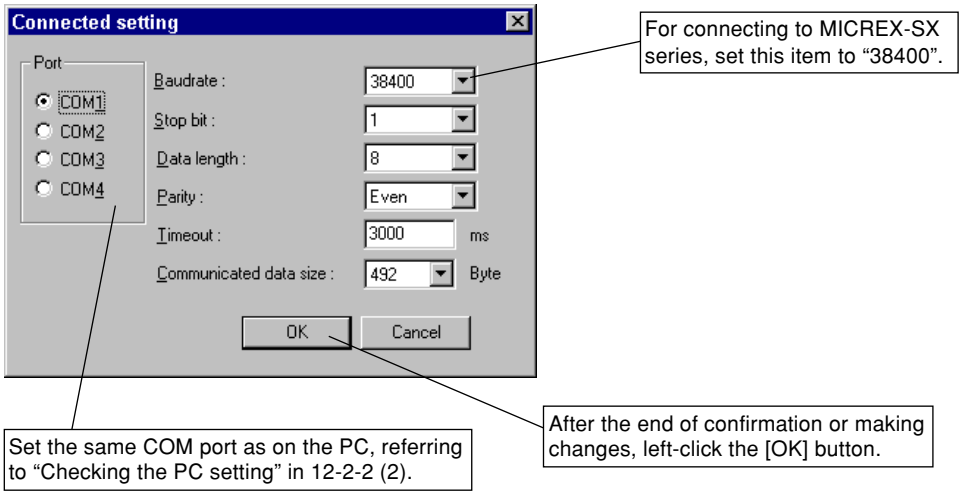
The online setting for connecting between the SX control utility and the PC is explained below. (When D300win is already connected online to the PC, the SX control utility and PC can generally be connected without changing the regular setting.)

If the following message is displayed when the SX control utility is started, it is necessary to check or change the online setting.



<Checking/changing the online setting>

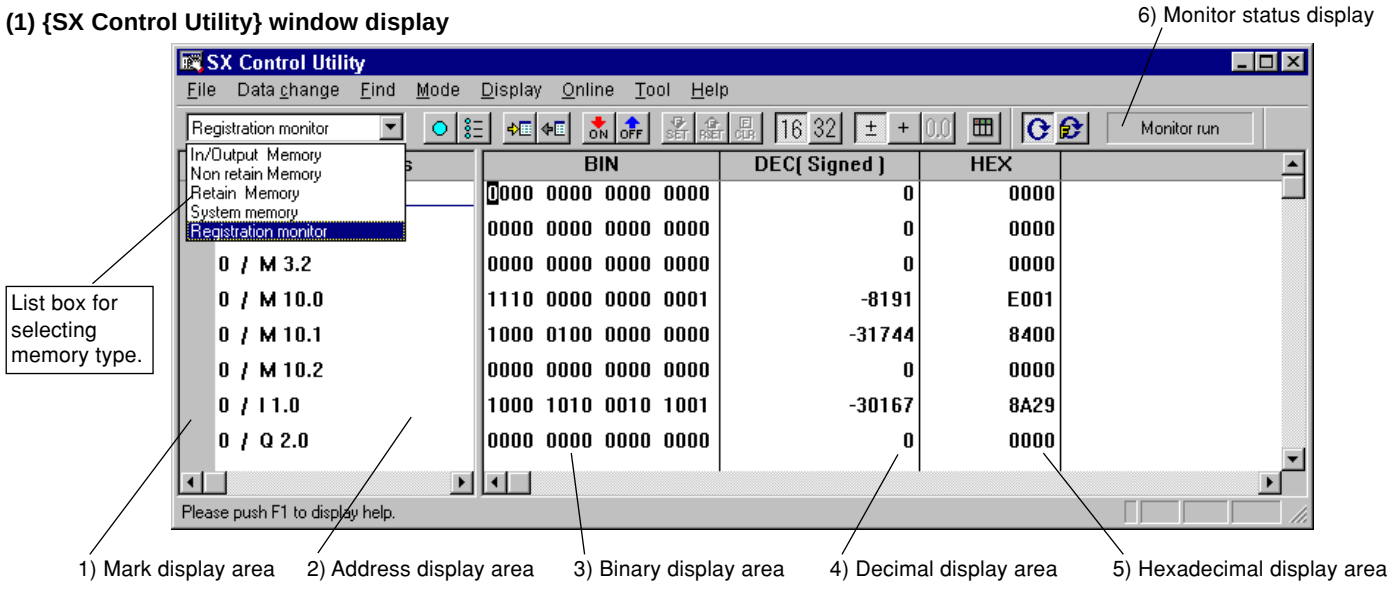
◊ Select the [Connected setting ...] command in the [Online] menu, and the {Connected setting} dialog box will be opened.



13-5-3 The {SX Control Utility} window

Displays, menus and tool bar of the {SX Control Utility} window are explained below.

(1) {SX Control Utility} window display



1) Mark display area

- Display of mark setting status
  When a mark is set for an address, the marker (blue circle) is indicated in this area.
- Display of reference input specification for output address
  When the output area is defined as a reference input by the I/O group setting in system definition, “R” is displayed for the address.

2) Address display area

I/O module addresses are displayed in the order of CPU Nos. or addresses according to the I/O group setting in the system definition.

3) Binary display area

Data of the I/O modules that correspond to the addresses shown in the “address display area” are displayed by binary value.

- Display of detailed I/O group setting
  Detailed I/O group setting data can be displayed in this area as well. When bits are displayed in the normal color (black), they are assigned I/O groups; when displayed in gray, they are not assigned any I/O group.
- Display of forced setting status (only when “variables forced” is set)
  When forced ON/OFF is set, the corresponding bits are underlined.

4) Decimal display area

Data of the I/O modules that correspond to the addresses shown in the “address display area” are displayed by decimal value (selectable from among signed integers, unsigned integers and real numbers).

5) Hexadecimal display area

Data of the I/O modules that correspond to the addresses shown in the “address display area” are displayed by hexadecimal value.

6) Monitor status display

The current status of the monitor is indicated here (“Monitor stop” or “Monitor run”).

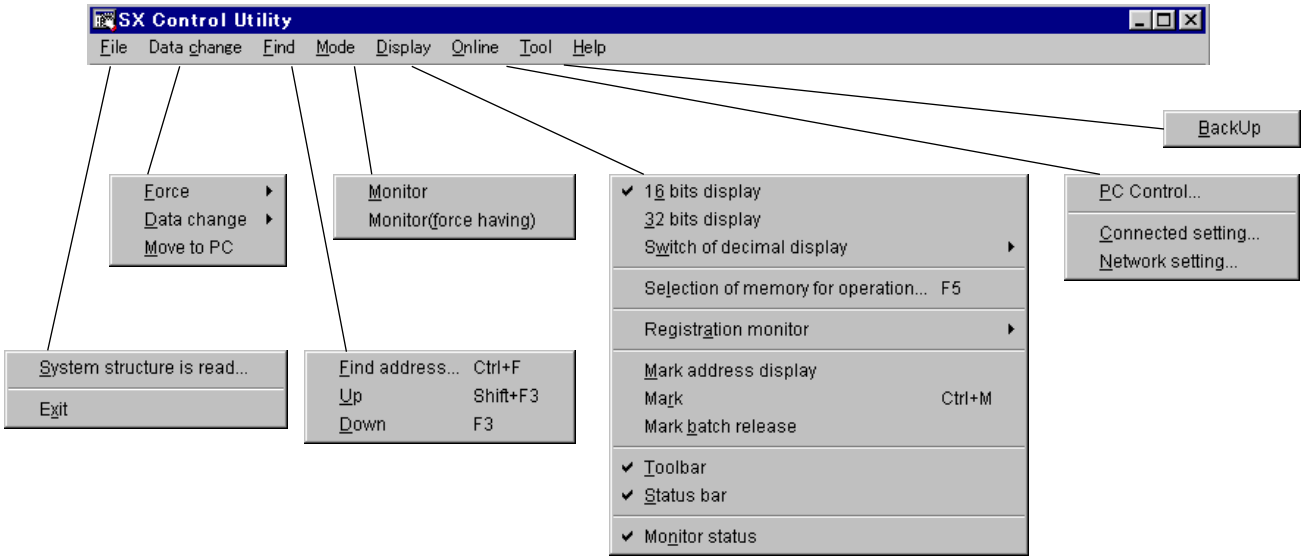
(2) Tool bar and menus of the {SX Control Utility} window

1) Tool bar

The tool bar of the {SX Control Utility} window contains buttons related to data setting or monitoring. These buttons are displayed only when the {SX Control Utility} window is active.

2) Menus

The main menus (commands) which are used for operating the {SX Control Utility} window are as follows:



3) Function of menu commands and tool bar buttons

Command name (button name)	Button	Menu name	Description (use)
Read system structure... (R)	–	File (F)	Loads system structures and system definitions from all the PCs in the configuration that can be registered as resources.
Exit (X)			Ends the I/O monitoring function.
Set		[Force] in the [Data change (E)] menu	Forcibly sets, and retains until cleared, ON (1) bit data in the output area in dependent of the result of PC operation.
Reset			Forcibly sets, and retains until cleared, OFF (0) bit data in the output area independent of the result of PC operation.
Release			Clears the forced setting of specified address.
Batch release	–		Clears forcibly set data all at once. (For a multi-CPU system, the individual CPU can be selected.)
Bit ON		[Data change (D)] in the [Data change (E)] menu	Sets ON (1) bit data in an output area. The data is retained until the operation result is rewritten by the program.
Bit OFF			Sets OFF (0) bit data in an output area. The data is retained until the operation result is rewritten by the program.
Data rewrite	–		Sets numeric data in an output area. The data is retained until the operation result is rewritten by the program.
Move to PC	–	[Move to PC] in [Change data (E)] menu	Transfers, as a batch, all the data that was set when the monitor stopped.
Address search (F)	–	Search (S)	Displays the {Search} dialog box, and searches for specified address to display matching data.
UP (T)			According to the value set from the {Search} dialog box, searches for specified address upwards from the cursor position to display matching data.
Down (B)			According to the value set from the {Search} dialog box, searches for specified address downwards from the cursor position to display the data.
Monitor (X)		Mode (M)	Changes over a specified area on the screen to an online monitor. When checked, communication with PC is started.
Monitor (with forced display) (E)			Changes over a specified area on the screen to an online monitor. When checked, communication with PC is started.
16-bit display (W)		Display (V)	When this item is checked, data is displayed in 16-bit units.
32-bit display (D)			When this item is checked, data is displayed in 32-bit units.
Signed integer			When this item is checked, data is displayed by signed integers.
Unsigned integer			When this item is checked, data is displayed by unsigned integers.
Real			When this item is checked in 32-bit display mode, data is displayed by real numbers.

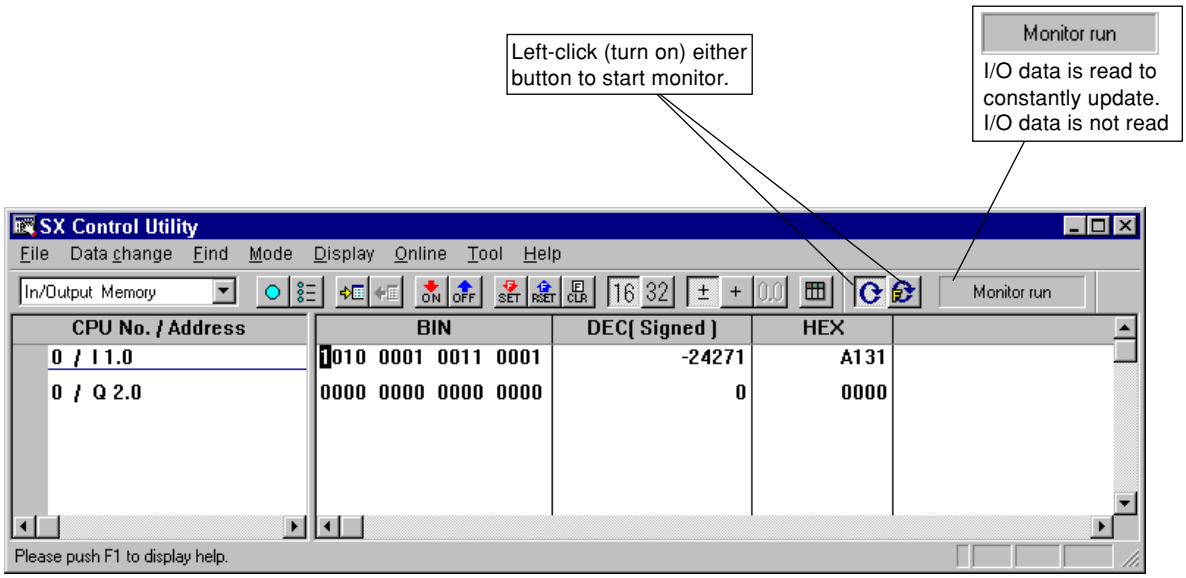
Command name (button name)	Button	Menu name	Description (use)
Mark address display (M)		Display (V)	Displays only the lines that have a checkmark set.
Mark (E)			Sets/cancels checkmark.
Mark batch release (A)	–		Cancels all set check marks.
Connection setting	–	Online	Displays the {Connected setting} dialog box to set conditions for connecting with PC.
PC control			Displays the {Control} dialog box for starting/stopping the PC or initializing the memory.

13-5-4 Operation of the SX control utility (Memory check)

How to rewrite the data (bits/numeric values) of Memory modules or to forcibly set/reset variables with the SX control utility (I/O check) is explained below.

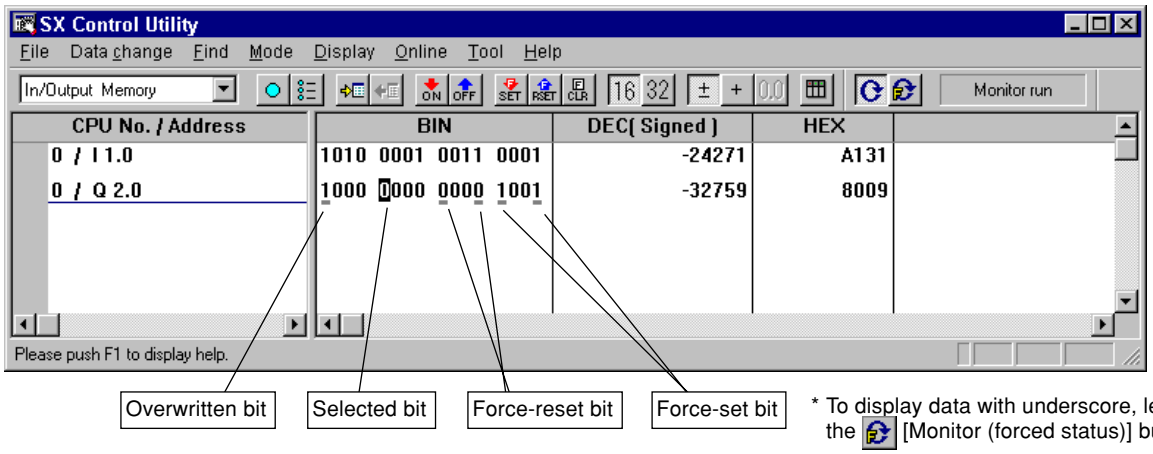
(1) Changing the online/offline mode of the monitor

This paragraph describes how to set the monitor state to the online state (monitor in progress) or offline state (monitor stopped).



(2) Updating the bit data

How to set “bit ON/OFF” or “force set/reset” for the bit data displayed in the “binary display area” of the {SX Control Utility} window is shown below.



* To display data with underscore, left-click the [Monitor (forced status)] button.

◊ Move the cursor to the position where you want to set data, and left-click the mouse.
◊ Left-click one of the following buttons.

[Bit ON] button

[Bit OFF] button

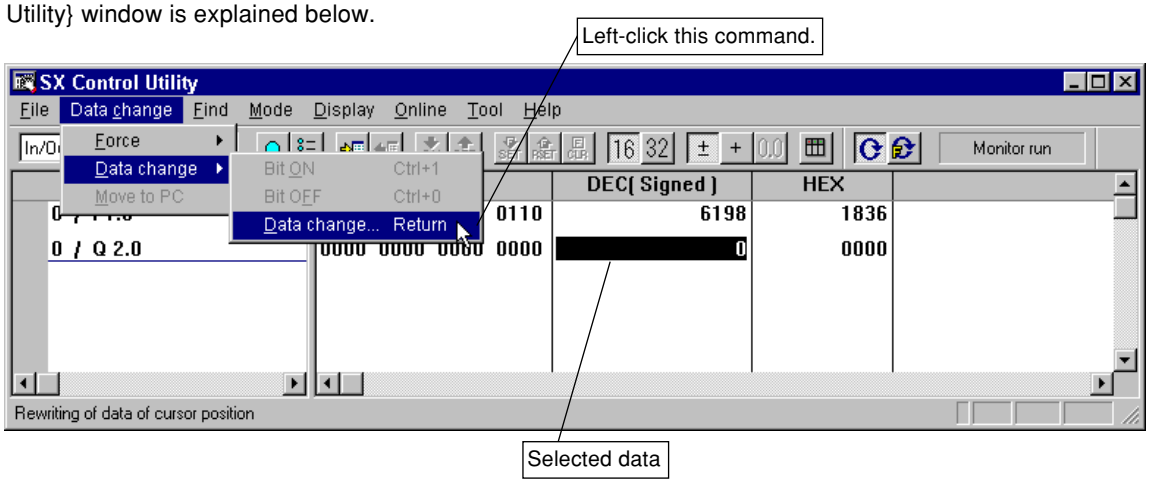
[Force set] button

[Force reset] button

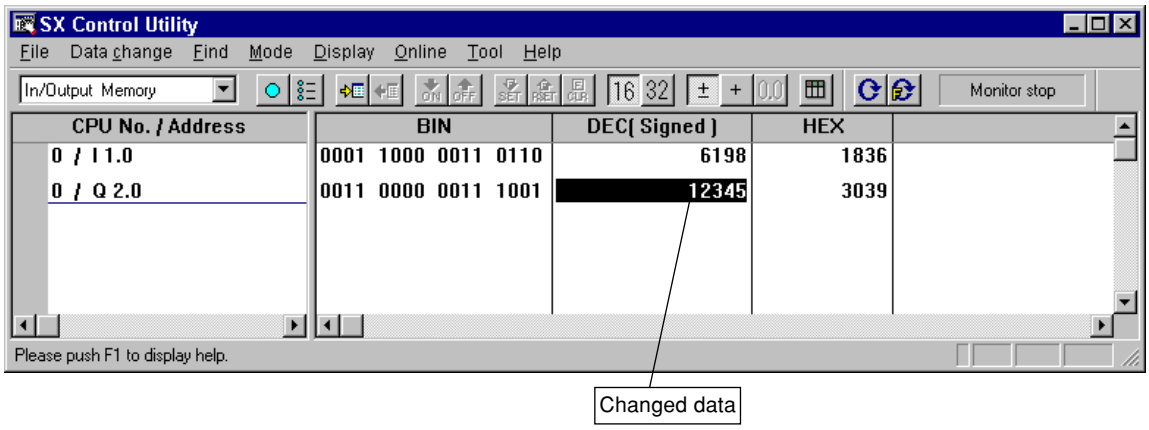
[Force release] button (used to cancel “forced set/reset”.)

(3) Changing word data

How to change and overwrite the word data displayed in the “decimal display” and/or “hexadecimal display” areas of the {SX Control Utility} window is explained below.



◊ Move the cursor to an arbitrary data in the decimal or hexadecimal display area, and left-click the mouse.
◊ Left-double-click the area ([DEC] or [HEX]) for changing data, or alternatively left-click the [Data change...] command in the [Data change] submenu under the [Data change] menu.
◊ Specify the arbitrary data and press the [Enter] key.
(Be careful here, as pressing the [Esc] key destroys the data.)
If monitoring is in progress, the set data will be transferred to the CPU module to update the data



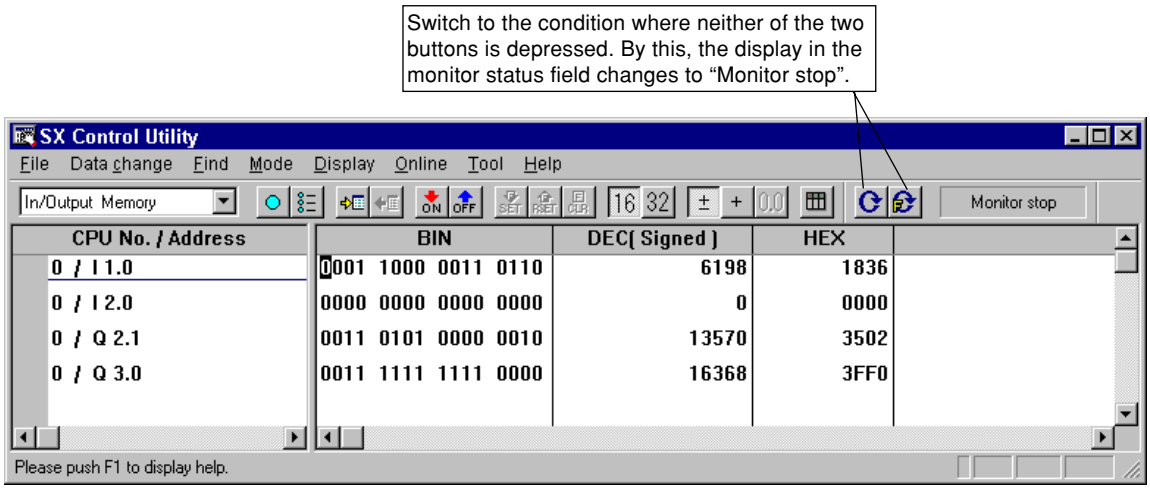
(4) Batch change of data

This paragraph explains how to change bit data or word data as a batch for multiple output modules.

Batch change of data is available only when the concerned CPU module is in the stop state. If the CPU module is in the run state, be sure to stop the CPU module prior to the batch data change operation.

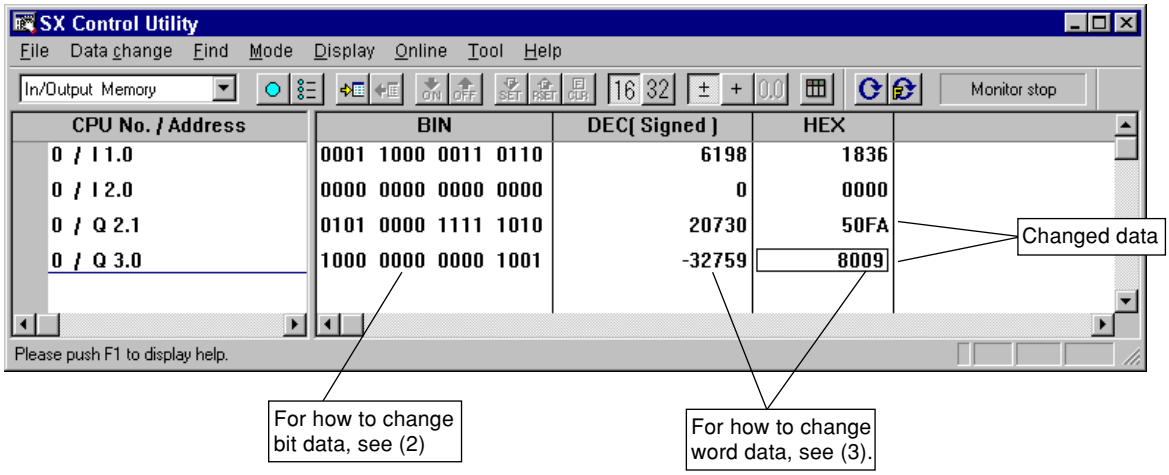
1) Switching to offline mode.

Change the mode of the [SX Control Utility] to “offline”.

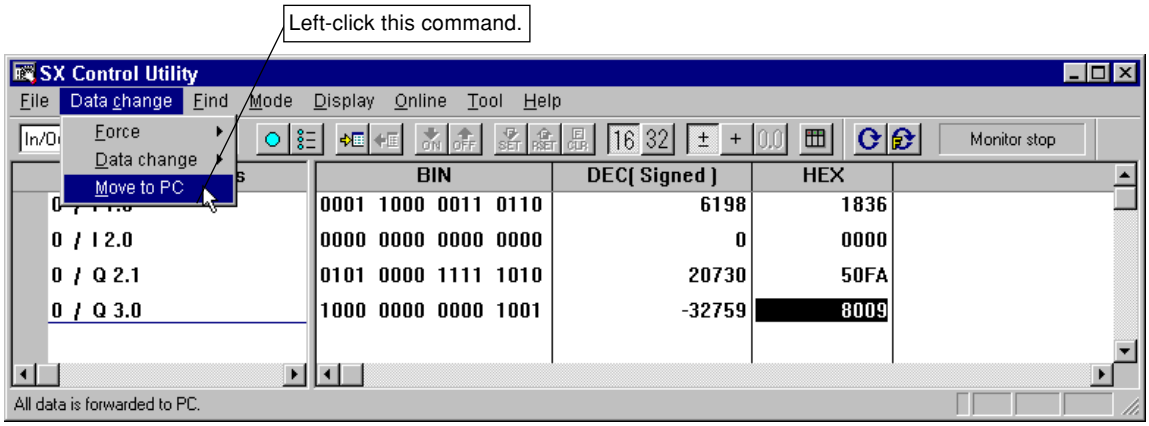


2) Set data

In the offline monitor, set the data that is to be set to the CPU module. (Force set/reset cannot be used.)



3) Transfer the data to the CPU module
To transfer the data that was set offline to the CPU module as a batch,



◊ Left-click the [Move to PC] command in the [Data change] menu.
The {Move to PC} dialog will appear on the screen.

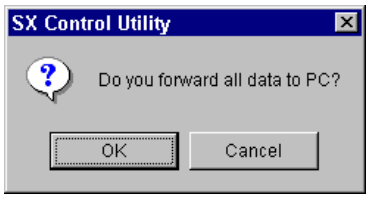
[Object CPU:] list box:
Select a CPU for data setting from the list box. Multiple CPUs can be selected.

[All select] button:
Selects all the CPUs that are displayed in the [Object CPU:] list box.

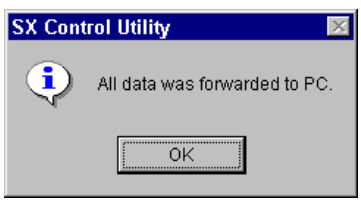
[OK] button:
Transfers the set data to the selected CPU module.

[Cancel] button:
Closes this dialog without data transfer.

◊ Select the object CPU module at the data transfer destination, and left-click the [OK] button. The message box will appear on the screen for confirmation.

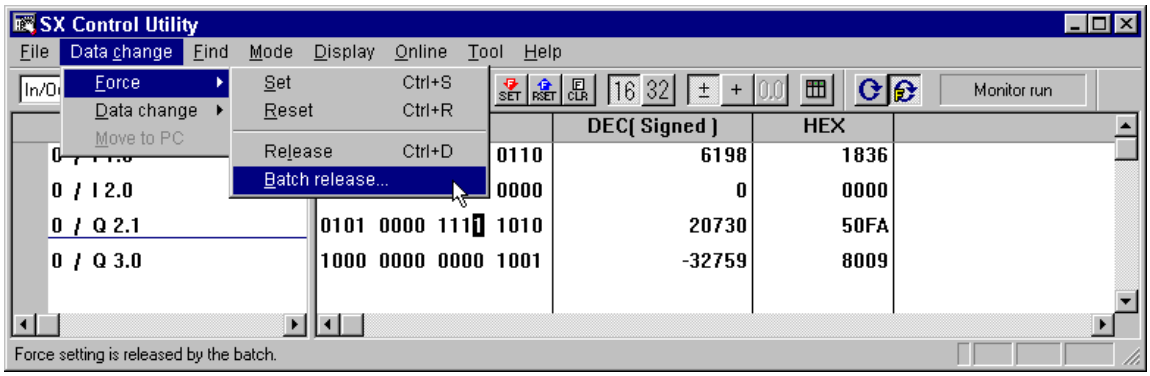


Left-click the [OK] button to execute the data transfer. Left-click the [Cancel] button to cancel the data transfer.
The data will be transferred to and set in the selected CPU module, and the following message box will be displayed.



(5) Batch release of forced set/reset

When there are many forced set/reset inputs and outputs, “forced set/reset” mode can be canceled at the same time for all of them in the following manner:



◊ Left-click the [Force] command in the [Data change] menu, and then left-click the [Batch release] command. The {Force batch release} dialog box will then be opened.

[Object CPU:] list box:
Select a CPU for batch release from forced set/reset from the list box. Multiple CPUs can be selected.

[All select] button:
Selects all the CPUs that are displayed in the [Object CPU:] list box.

[OK] button:
Executes batch release of forced set/reset for the selected CPU module.

[Cancel] button:
Closes this dialog without batch release of forced set/reset.

◊ Upon completion of forced set/reset batch release, the following message box will be displayed. Left-click the [OK] button to close the message box.

13-5-5 Backup of PC memory

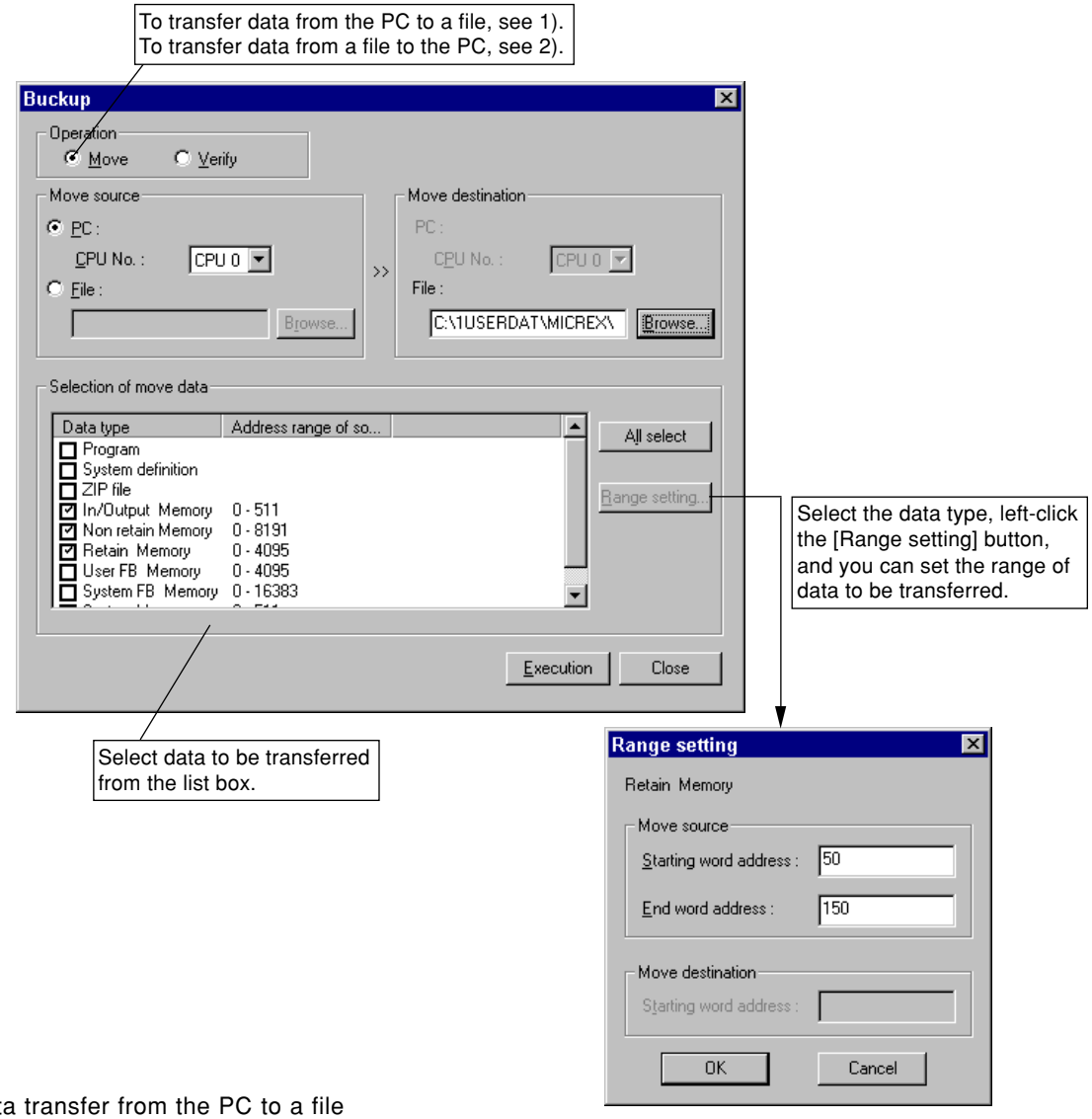
The PC memory backup function makes a backup copy of the data stored in the program memory, system definition and data memory areas of the CPU module that is connected online to the SX control utility.

Even when programs and system definitions stored in the CPU module are transferred to a file, the file cannot be opened by D300win. (The data stored in the file is written in machine code dedicated for the PC.)

(1) Backup of data

◊ Left-click the [Backup] command in the [Tool] menu of the {SX Control Utility} window, and the {Backup} dialog will be opened.

* To execute the backup function, stop the monitor.



1) Data transfer from the PC to a file

◊ Turn on the optional [Move] button.
◊ Turn on the optional [PC] button in the [Move source:] box.
◊ Select the CPU No. of the object CPU from the [CPU No.] list box.
◊ In the [File:] edit box in the [Move destination:] box, input the path to the file where the transferred data is to be stored.
◊ From the [Selection of move data] list box, select a data type for the transferred data.
To select all the displayed data types, left-click the [All select] button.

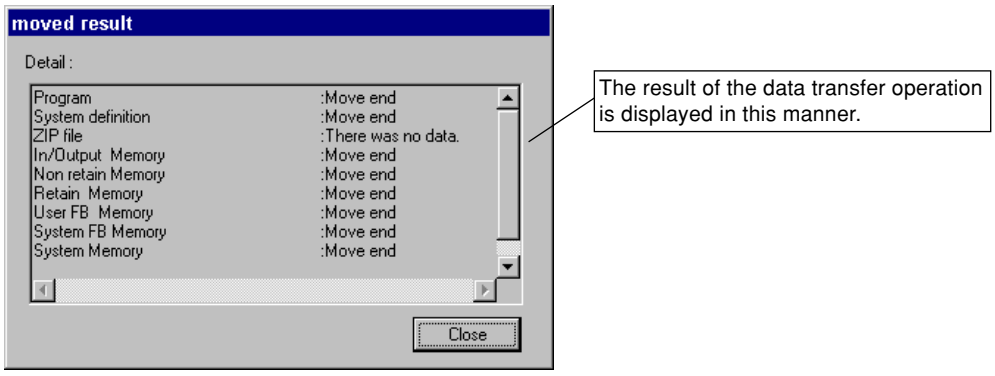
◊ Left-click the [OK] button.
The message box will be displayed for confirmation. Left-click the [OK] button to execute the data transfer.

2) Data transfer from a file to the PC

◊ Turn on the optional [Move] button.
◊ Turn on the optional [File] button in the [Move source:] box.
◊ In the [File:] edit box in the [Move source:] box, input the path to the file where the data to be transferred is stored

◊ From the [CPU No.] list box in the [Move destination] box, select the CPU No. of the object CPU.
◊ From the [Selection of move data] list box, select a data type for the transferred data.
To select all the displayed data types, left-click the [All select] button.
◊ Left-click the [OK] button.
The message box will be displayed for confirmation. Left-click the [OK] button to execute the data transfer.

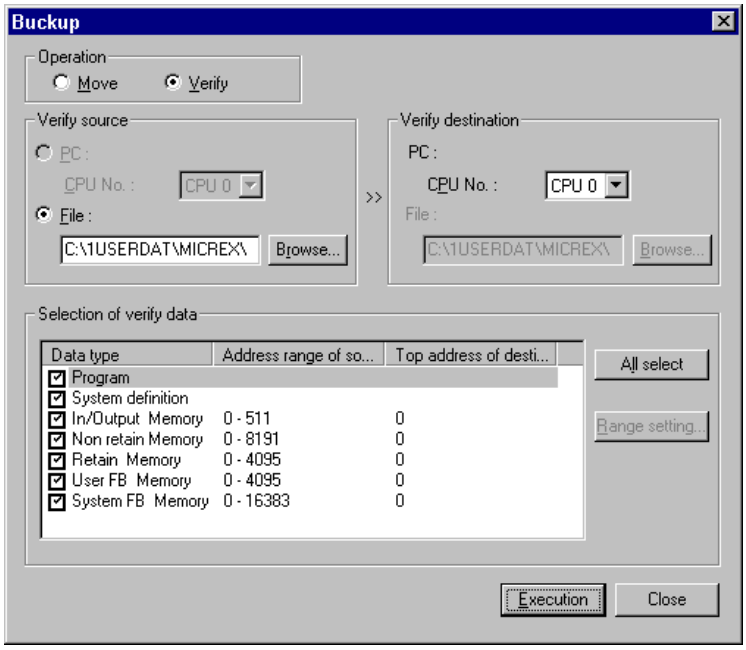
<Displaying the result of data transfer>
When data transfer from the PC to a file or from a file to the PC ends, the following {moved result} dialog is opened.



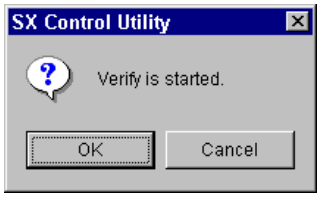
(2) Verification of data

How to collate the data stored in the object PC memory with data stored in files is explained below.

◊ Left-click the [Backup] command in the [Tool] menu for the {SX Control Utility} window, and the {Backup} dialog box will be opened.

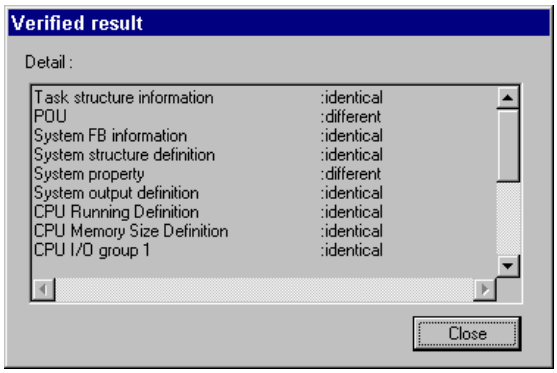


◊ Turn on the optional [Verify] button.
◊ In the [File:] edit box in the [Verify source] box, input the path to the file which is to be verified.
◊ From the [CPU No.] list box in the [Verify destination] box, select the CPU No. of the object CPU.
◊ From the [Selection of verify data] list box, select a data type for the data to be verified.
To select all the displayed data types, left-click the [All select] button.
◊ Left-click the [OK] button.
The message box will be displayed for confirmation. Left-click the [OK] button to execute the data transfer.



<Displaying the result of data transfer>

When the verification of data is completed, the following {Verified result} dialog box is opened.



Section 14 Page Layout and Printing

page

Section 14 Page Layout and Printing

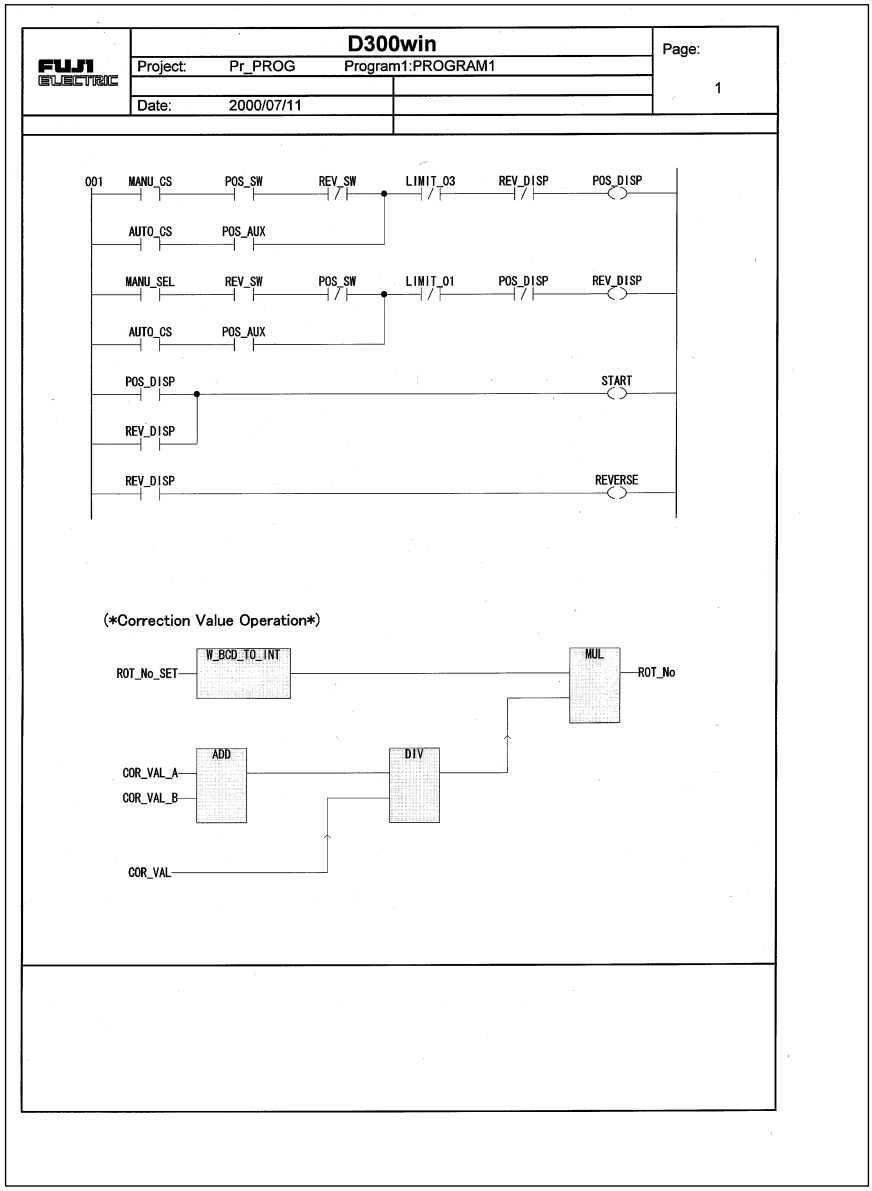
14-1 Page Layout

14-1-1 Page layout editor

The page layout editor is used to design pages for printing out projects and worksheets. Objects, such as date and page number, can be added to the pages after they are printed. You have the option of designing a single-page layout for the entire project or designing separate pages for each part of the project.

The figure below shows a sample printout where one POU is assigned to the page layout file “DEFAULT.PLT” which is included in D300win. The objects shown in this figure can be defined individually. How to define the objects as well as the printing methods are explained below.

<Sample print>



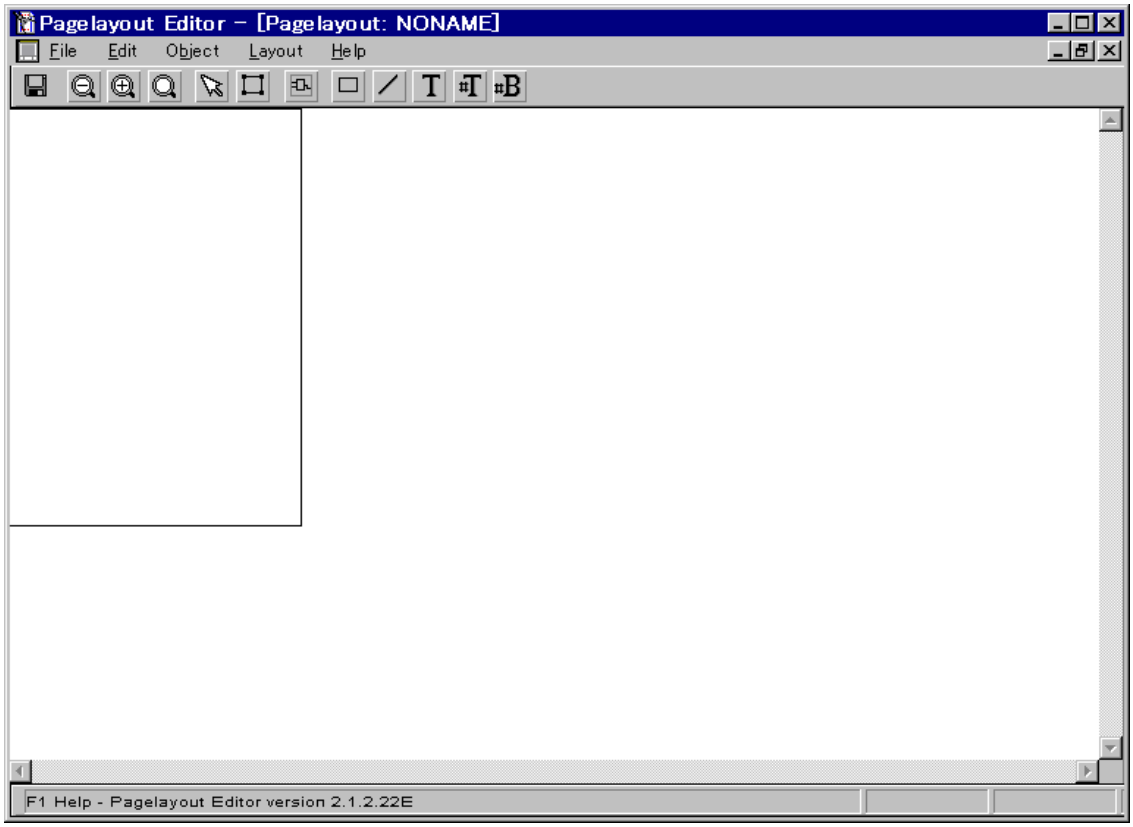
14-1-2 Editing a page layout

(1) Work with the page layout editor

When the [Page layout editor] command is selected from the [Extras] menu, the page layout editor (window) is activated. A page layout opened at that time is a page layout file with the name “untitled” assigned and only rectangular frames are displayed.
This paragraph describes how to arrange objects in this blank page layout.

<How to activate the page layout editor>

◊ Left-click the [Page layout editor] command in the [Extras] menu.
The page layout editor will be activated to open a “untitled” blank page layout without settings as shown below.



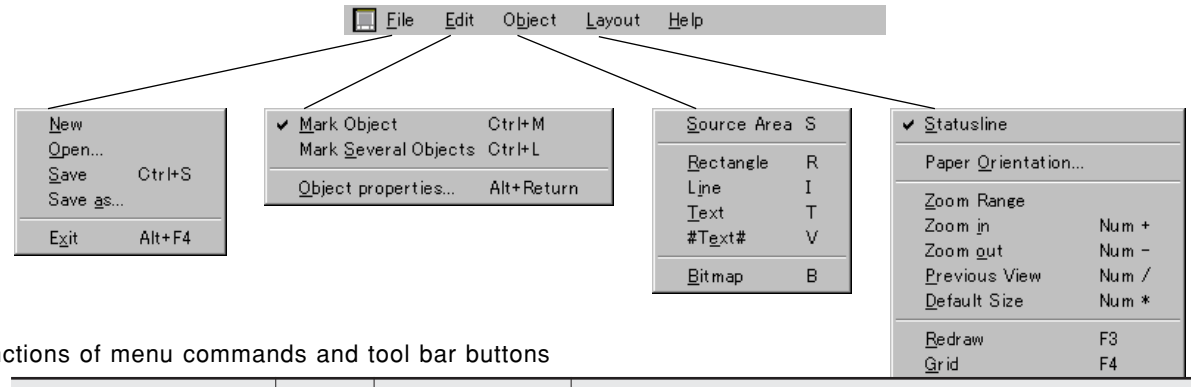
(2) Tool bar and menus for the page layout editor

1) Tool bar

The tool bar for the page layout window includes not only common buttons but also multiple dedicated buttons.

2) Menus

The main menus (commands) used to edit for page layout are shown below. These menus are displayed only when the window for the page layout editor is opened.

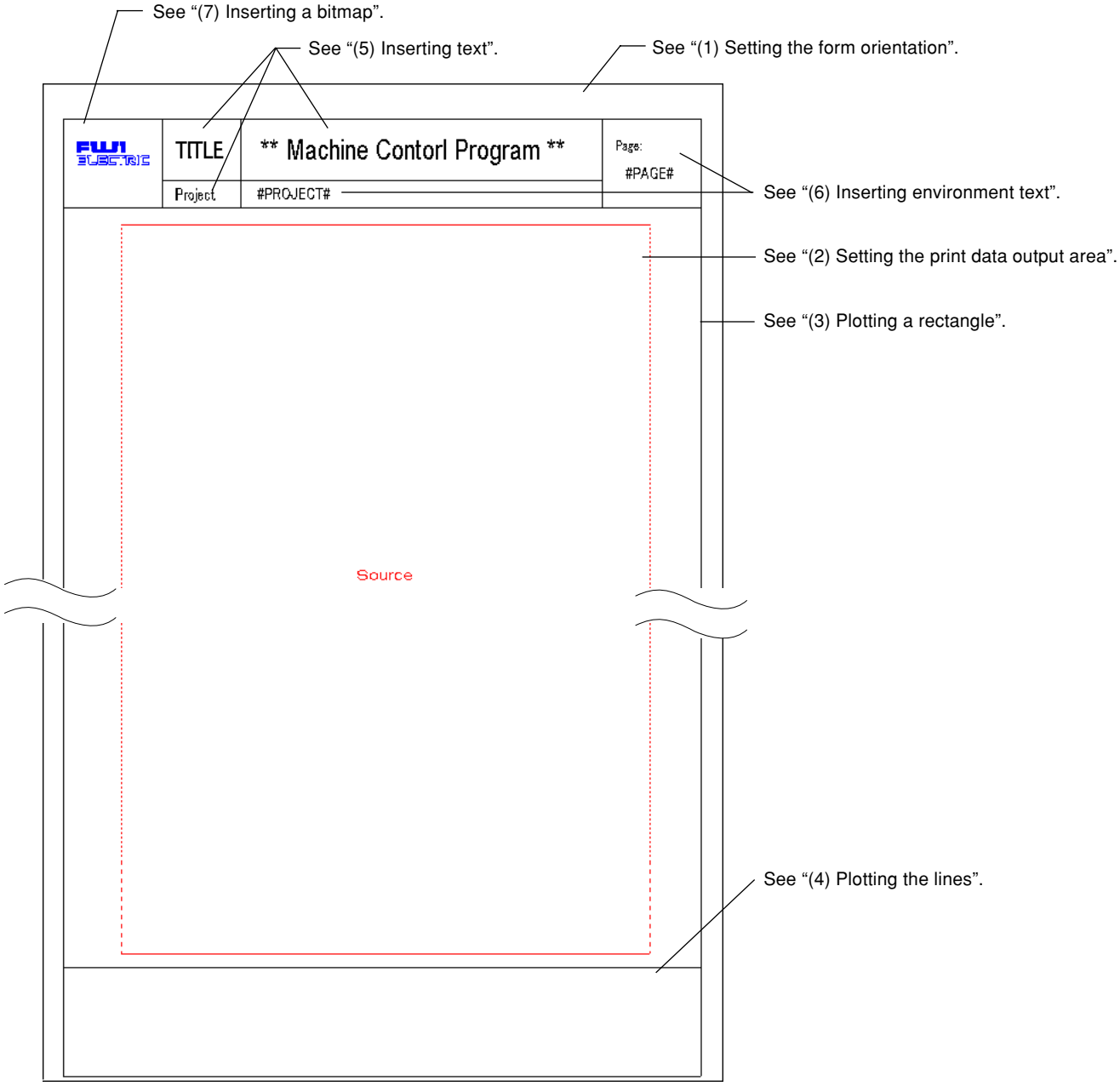


3) Functions of menu commands and tool bar buttons

Command name (button name)	Button	Menu name	Description (use)
Save		File	Saves the currently displayed page layout file by overwriting the existing saved file. To save it as a new file or with a new name, left-click the [Save as...] command in the [File] menu.
Zoom out		Layout	Reduces the size of the currently displayed page layout.
Zoom in			Enlarges the size of the currently displayed page layout.
Zoom Range			By dragging the rectangle, the selected range can be enlarged or reduced.
Mark Mode		Edit	Used to switch to "object select" mode. In this mode, arbitrary objects can be selected by left-clicking.
Mark Several Objects		Object	Used to change to "multiple objects selection" mode. In this mode, multiple objects can be selected.
Source Area			Specifies the destination of printout data.
Rectangle			Plots a rectangle.
Line			Plots a line
Text			Used to input a character string.
Bitmap			Inserts a BMP-type image.
Environment Text			Used to insert environmental items. User-defined items can be inserted in addition to the date, printing time and page No.

14-1-3 Starting page layout

In this paragraph, the procedure for creating the following page layout is explained.

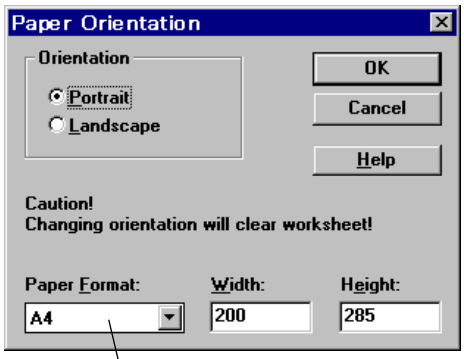


(1) Setting the form orientation
The orientation and type (size) of form are set in the following procedure:

Note: When this function is used, all of the input objects are deleted and cannot be restored.

<How to change the form orientation>

◊ Select the [Paper Orientation ...] command from the [Layout] menu, and the {Paper Orientation} dialog box will be opened.



Select either “A4” or “A3” for [Paper Format:].

[Orientation] ..... Specify either “Vertical” (lengthwise) or “Horizontal” (widthwise).
[Paper Format:] ..... Specify the size of form.
[Width:] ..... Specify the print width of form.
[Height:] ..... Specify the print height of form.

◊ Select the orientation and format of the form.

<How to specify [Width:] and [Height:]>

◊ Input print width of the form in mm.
◊ Input print height of the form in mm.

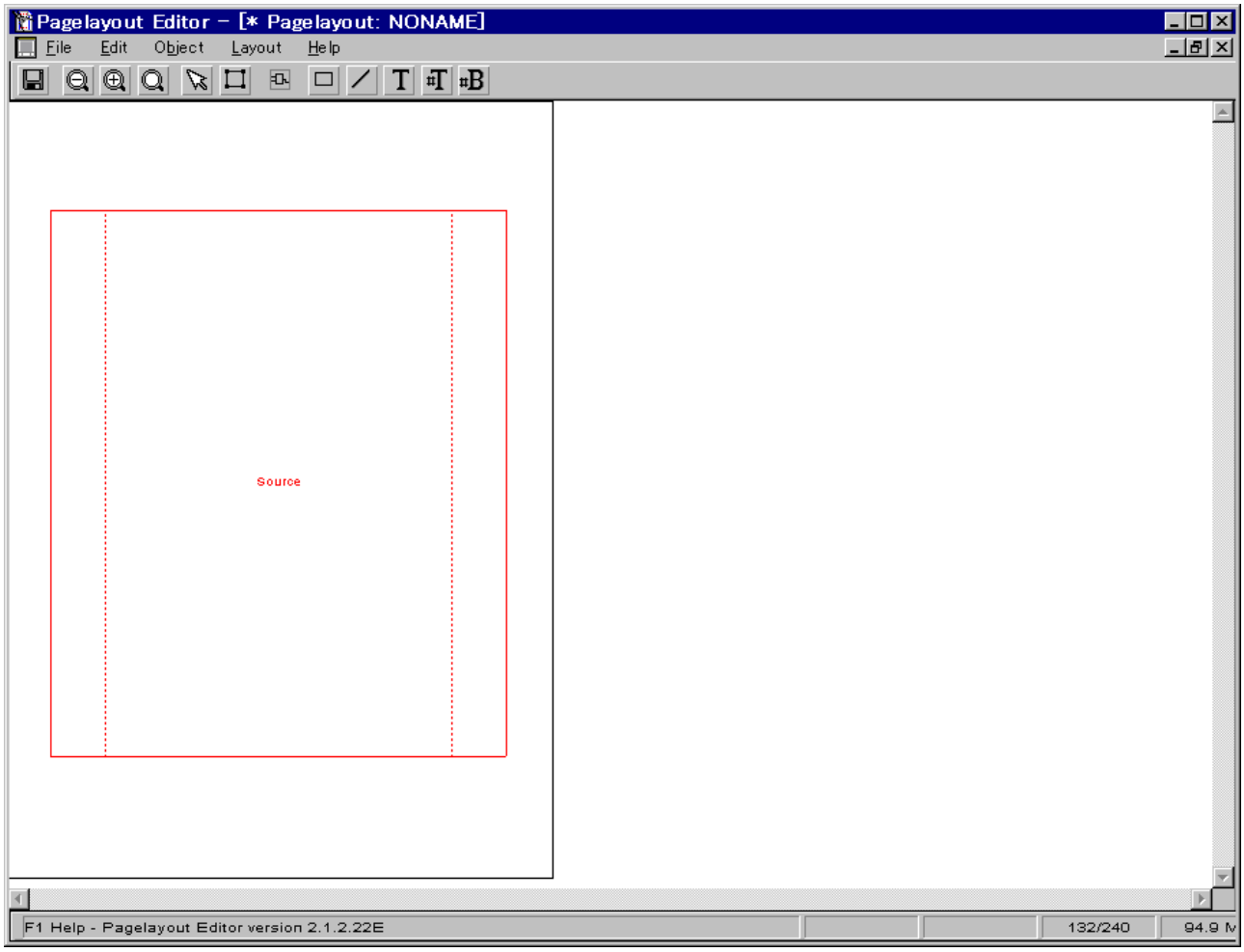
When inserting a new element in the page layout, the coordinates for the cursor position are indicated in the status bar.

(2) Setting the print data output area
Where to print out the worksheet or the project tree can be decided. This range is called “print data output area” and is indicated by a red rectangle. Only one output area can be specified for each single page layout.

<How to set the print data output area>

◊ Left-click the [Source Area] button.
◊ Left-click a point for the upper left corner of the print data output area, then drag the mouse to the desired point until the rectangle for print data output area becomes the desired size.
◊ Take your finger off the mouse.

The print data output area is indicated by a red rectangle.

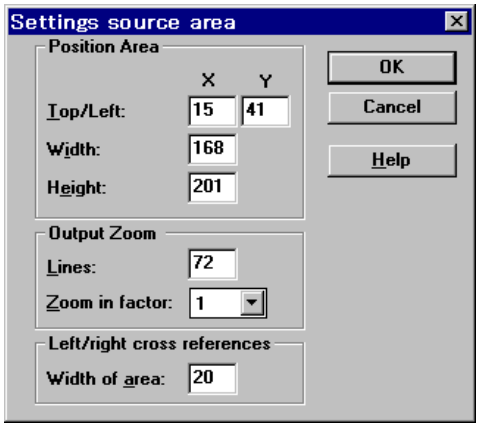


Key-point:

The size of the print data output area corresponds to the size of the page boundary (indicated on the worksheet).

<How to change the properties of the print data output area>

◊ After selecting the print data output area, right-click the rectangle to display the shortcut menu, and select the [Object properties ...] command from this menu. The {Settings source area} dialog box will then be opened.



[Top/Left] ..... Specify the upper left corner position of the output area.
[Width:] ..... Specify the width of the output area.
[Height:] ..... Specify the height of the output area.

[Lines:] ..... Specify the number of print lines on one page.
[Zoom in factor:] ..... Specify the zoom factor for the graphic worksheet.
[Width of area:] ..... Specify the width of landscape cross-reference area in the graphic worksheet.

The height and width of the print data output area correspond to the size of the worksheet. Therefore, if “301” and “1” are input for [Height:] and [Zoom in factor], respectively, when the dimension of the worksheet is 301x301, the content of the worksheet is printed out in a scale of 1:1. When the worksheet is larger than the print data output area, use the zoom factor to reduce the objects so as to fit in the print data output area.

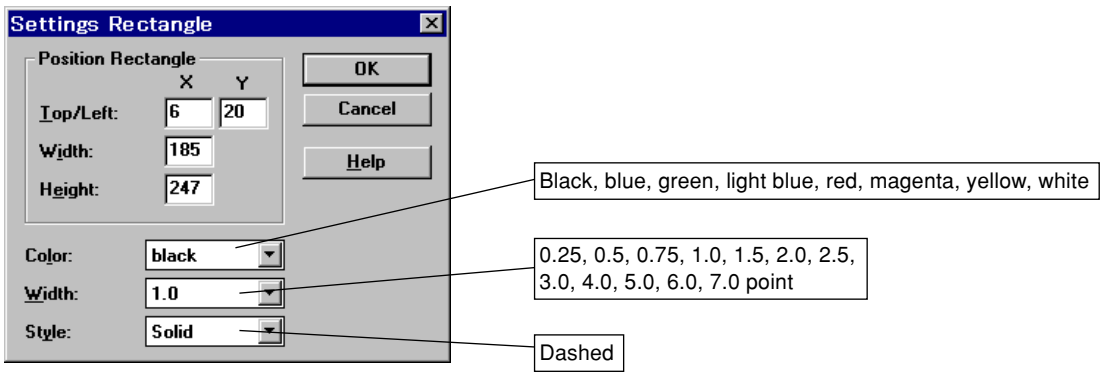
(3) Plotting a rectangle
A rectangle can be plotted in a page layout.

<How to plot a rectangle>

◊ Left-click the [Rectangle] button.
◊ Left-click a point for the upper left corner of the rectangle, and drag the mouse until a rectangle which covers the desired area is obtained.
◊ Take your finger off the mouse button.
A rectangle will then be plotted.

<How to change the properties of a rectangle>

◊ After selecting a rectangle, right-click it to display the shortcut menu, and select the [Object properties ...] command from this menu. The {Settings rectangle} dialog box will then be opened.



[Top/Left] ..... Specify the upper left corner position of the rectangle.
[Width:] ..... Specify the width of the rectangle.
[Height:] ..... Specify the height of the rectangle.
[Color:] ..... Specify the line color of the rectangle.
[Width:] ..... Specify the line width of the rectangle.
[Style:] ..... Specify solid line, or dotted line.

◊ Input values for the setting items as necessary.

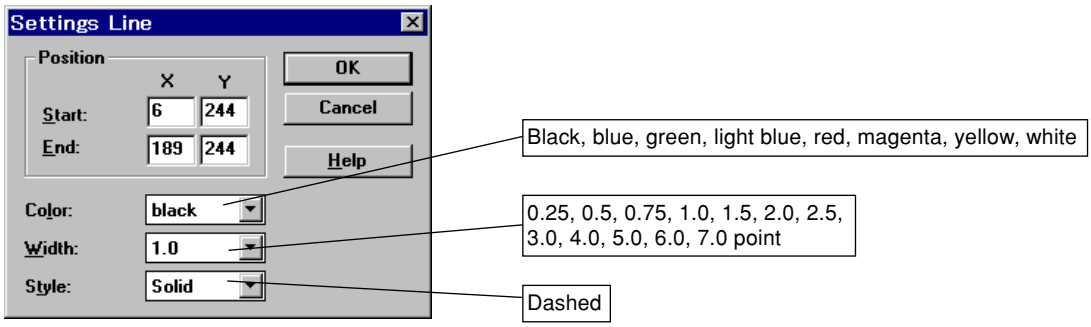
(4) Plotting the lines
Lines can be plotted in the page layout.

<How to plot a line>

◊ Left-click the [Line] button, and the line symbol will be added to the cursor.
◊ Left-click a point for the starting point of the line, and drag the mouse to the desired point to plot a line.
◊ Take your finger off the mouse, and a line will be plotted.

<How to change the properties of a line>

◊ After selecting a line, right-click it to display the shortcut menu, and then select the [Object properties ...] command in this menu. The {Settings Line} dialog box will then be opened.



[Position] ..... The starting and end points of the line in the X or Y direction are displayed in this box.
[Color:] ..... Specify the line color.
[Width:] ..... Specify the line color at each position.
[Style:] ..... Specify solid line, or dotted line.

◊ Input new values for each setting item as necessary.

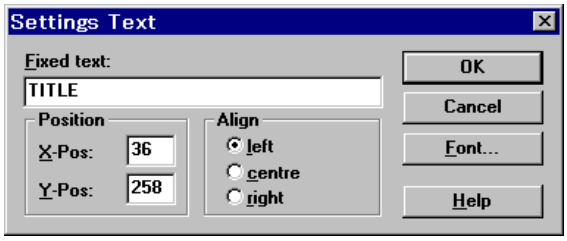
(5) Inserting text

Text can be inserted in the page layout.

<How to insert text>

◊ Left-click the [T] [Text] button, and the character “T” will be added to the cursor.

◊ Left-click a point where you want to insert text, and the {Settings Text} dialog box will be opened.

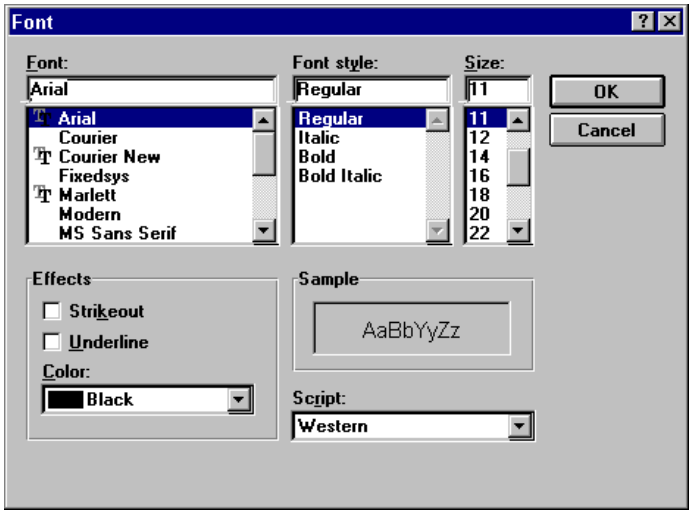


[Fixed text:] ..... Input a comment.
[Position] ..... Specify the position of the comment in the X and Y directions.
[Align] ..... Specify whether the comment is to be right-justified, left-justified, or centered.
[Font ...] ..... Opens the {Font} dialog box for selecting other fonts.

◊ Input the text to be inserted.

◊ Set the position and alignment as necessary.

◊ Left-clicking the [Font ...] button opens the {Font} dialog box.



◊ Specify font name, style, size, etc. as necessary.

<How to change an existing text>

◊ Select text which you want to change, and right-click it.
◊ Left-click the [Object properties ...] command in the shortcut menu, and the {Settings Text} dialog box will be opened.
◊ Change the text, its position and/or alignment as necessary.

(6) Inserting environment text

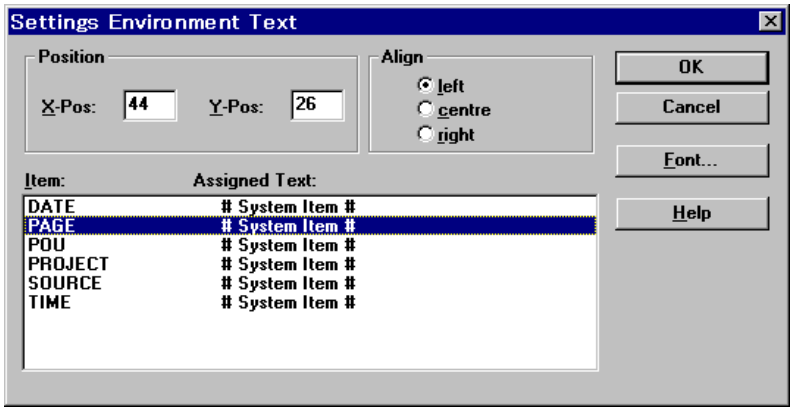
By inserting an environment text, it becomes possible to automatically read and print the data of the D300win system and PC, such as the date, page number and project name.
These items are basically classified into two groups: system items and user-defined items.

- For system items, folder positions are inserted in the page layout, and the data can be displayed with the preview function.
- For user-defined items, assigned texts are inserted directly in the page layout.

The items that are selectable from the list box in the {Settings Environment Text} dialog box can be defined.

<How to insert an environment text>

◊ Left-click the [Environment text] button, and the character “T” will be added to the cursor.
◊ Left-click the point where you want to insert a page number, and the {Settings Environment Text} dialog box will be opened.



[Position]..... Specify the position to insert environment text in the page layout.
[Align] ..... Specify whether the text is to be right-justified, left-justified, or centered.
[Item:] ..... Specify the item name.

[Assigned text:] ..... Specify text to be displayed in the page layout.
[Font ...] ..... Opens the {Font} dialog box for changing the font.
[Edit ...] ..... Opens the {Environment setting} dialog box for editing the environment item.

◊ Select an item to be inserted from the list box by left-clicking it.
In this example, “PAGE” is selected.
◊ Change the position to insert the item as necessary.
◊ After confirming the setting on this dialog box. left-click the [OK] button.
“# PAGE #” will then be inserted in the page layout.

<System items and their functions>

- # DATE #
  System item “DATE” is a position folder for printing the date.
  The printing format of date corresponds to the setting of “Area” on the control panel.

- # PAGE #
  System item “PAGE” is a position folder for printing page numbers.
  For page numbers, either “consecutive” or “hierarchical” can be specified. This setting is executed by the {Print Project} dialog box. The starting page number can also be set from this dialog box.

- # POU #
  System item “POU” is a position folder for printing the POU name. The content of this position folder can be displayed for confirmation with the preview function.

- # PROJECT #
  System item “PROJECT” is a position folder for printing the project name. The content of this position folder can be displayed for confirmation with the preview function.

- # SOURCE #
  System item “SOURCE” is a position folder for printing the path to a worksheet file, etc. The content of this position folder can be displayed for confirmation with the preview function.

- # TIME #
  System item “TIME” is a position folder for printing the printout starting time. The content of this position folder can be displayed for confirmation with the preview function. The print time corresponds to the setting of “Area” on the control panel.

(7) Inserting a bitmap

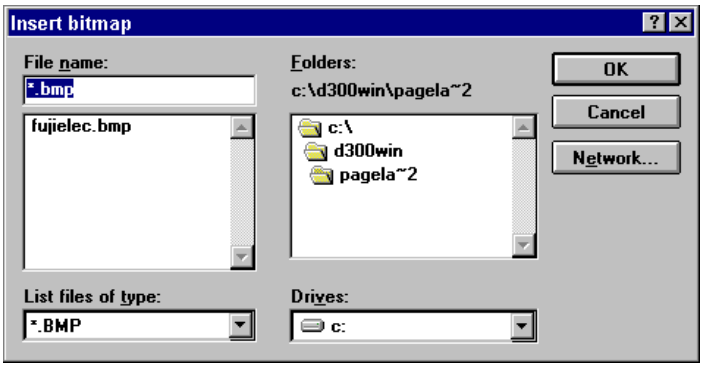
A bitmap file (for selecting a company logo, etc.) can be inserted in the page layout.

Note: • The path to a bitmap is fixed. To copy a bitmap to another directory, first delete the bitmap from the page layout, and then re-insert it. When a bitmap is inserted in directory “pagelayo”, the path will be automatically changed by D300win.
• The data format which can be inserted in the page layout is *.bmp graphics (bitmap data).

<How to insert a bitmap in the page layout>

◊ Left-click the [Bitmap] button on the tool bar, and a rectangle will be added to the cursor.

◊ Plot a rectangle on the page layout editor.
The {Insert bitmap} dialog box will then be opened.

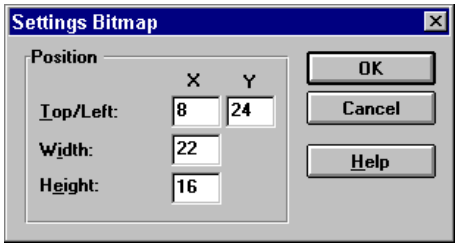


◊ Select a bitmap to be inserted.
The bitmap is displayed in the rectangle.
Next, limits on the bitmap data are described.

Note: • Maximum size of bitmap: 59 KB
• The folder name for storing a bitmap must be specified by a maximum of 8 single-byte alphanumeric characters.

<How to change a bitmap>

◊ After selecting a bitmap, right-click it, and then left-click the [Object properties ...] command. The {Settings Bitmap} dialog box will then be opened.



[Top/Left:] ..... Specify the upper left corner position of the bitmap.
[Width:] ..... Specify the width of the bitmap.
[Height:] ..... Specify the height of the bitmap.

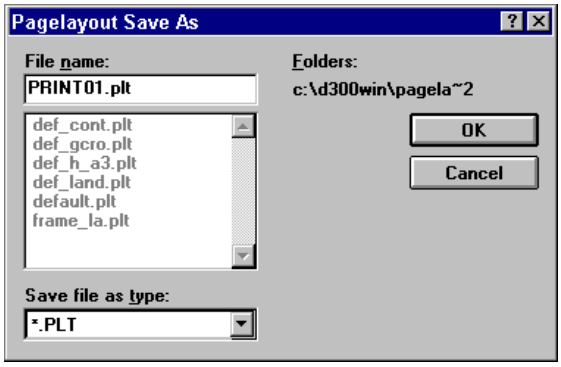
◊ Input the new position or size of the bitmap.

14-1-4 Saving a page layout

How to name and save a created page layout is explained below.

<How to name and save a page layout>

◊ Select the [Save as ...] command from the [File] menu, and the [Pagelayout Save As] dialog box will be opened.



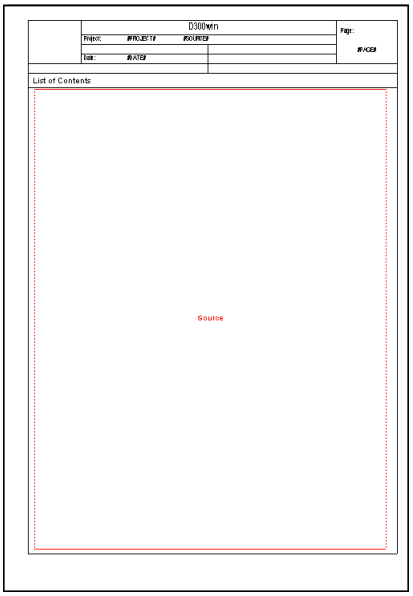
◊ Input a new name for the page layout.

◊ Left-click the [OK] button, and the page layout will be saved by the new name.

14-1-5 Page layouts prepared for D300win

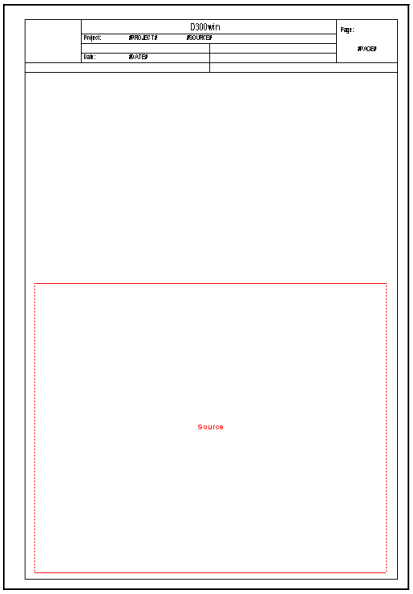
6 types of page layout are prepared in the D300win system, and you can select the one that best matches your purpose. The content of each individual page layout is shown below.

File name: DEF_CONT.plt



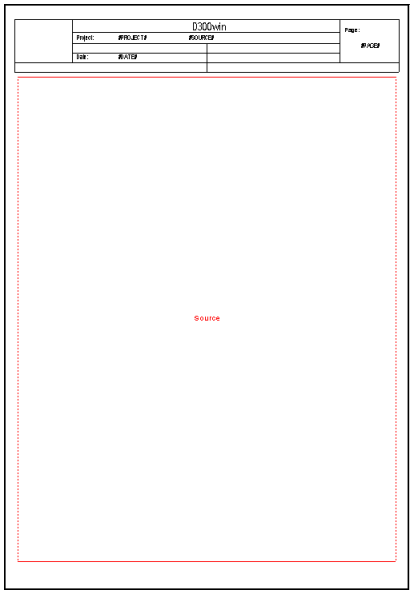
Form size: A4

File name: GEF_GCRO.plt



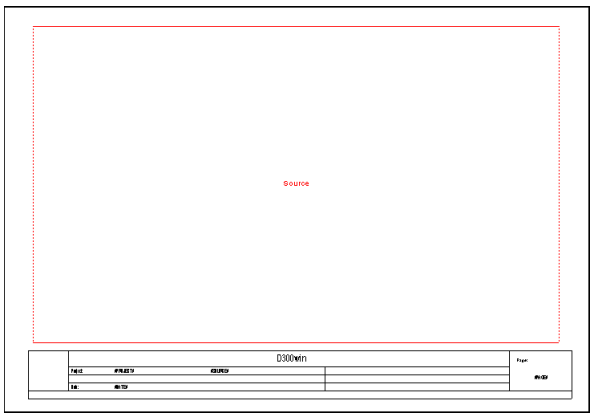
Form size: A4

File name: DEF_h_A3.plt



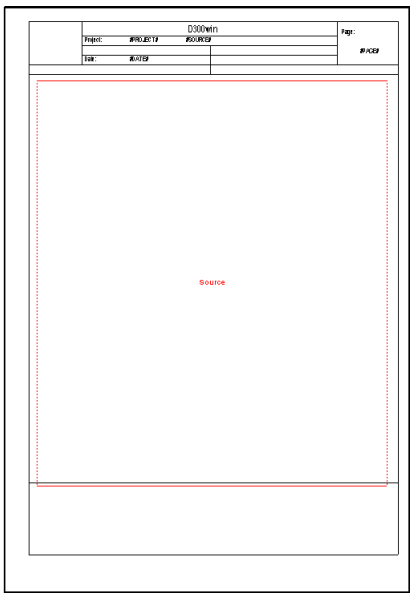
Form size: A3

File name: DEF_LAND.plt



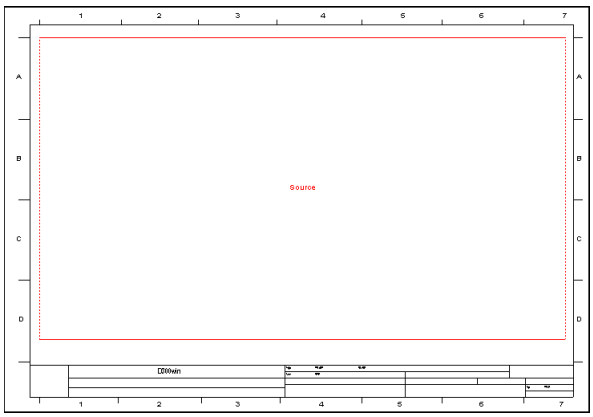
Form size: A4

File name: DEFAULT.plt



Form size: A4

File name: FRAME.plt



Form size: A4

14-2-1 Printing overview

D300win print functions are as follows:

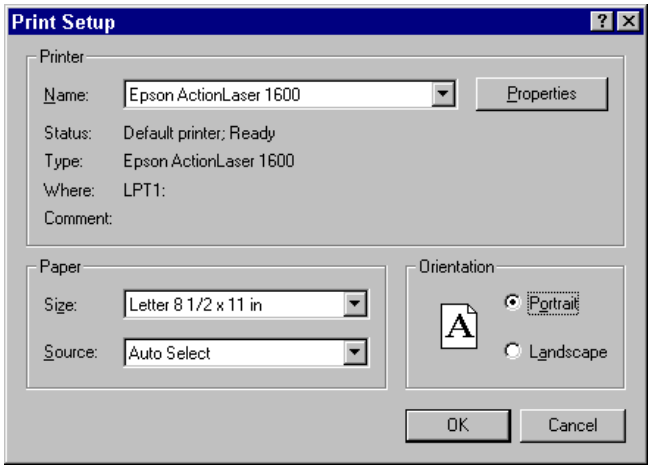
- Print preview
- Printing individual worksheets
- Printig an entire project
- Printing part of a project
- Printing a cross-reference table

14-2-2 Confirmation and modification of printer settings

Select the printer to use.

<Printer selection procedure>

◊ Left-click the [Printer Setup...] command in the [File] menu of D300win, and the {Printer Setup} dialog will appear on the screen.



◊ Select the printer to be used from the [Name:] list box.

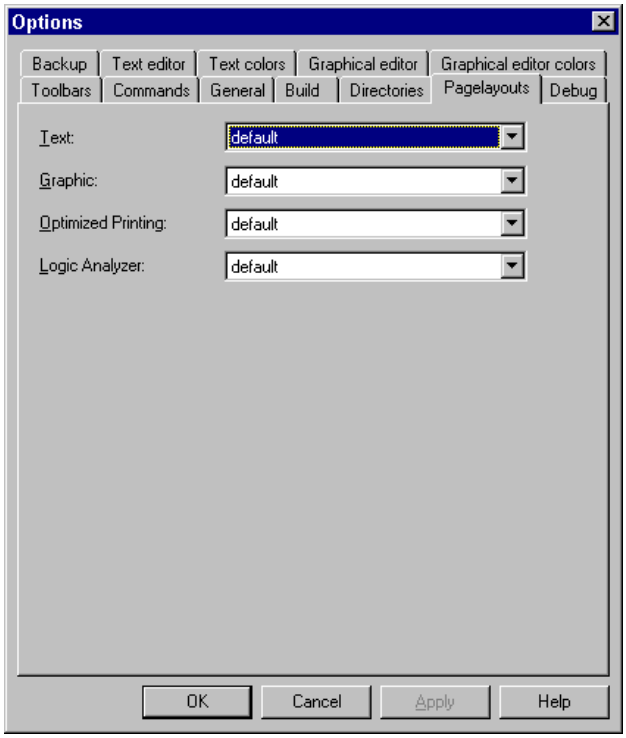
◊ After setting the necessary items such as [Paper], [Orientation], and [Properties...], left-click the [OK] button.

14-2-3 Assigning page layouts

Assign a page layout to a worksheet or project for printing.

◊ Left-click the [Options...] command in the [Extras] menu.

◊ When the {Options} dialog is displayed, open the [Pagelayout] panel.



◊ Select the page layout to be assigned in each text box of [Text:], [Graphics:], [Optimum print:], and [Logic Analyzer:].

◊ Left-click the [OK] button to close the dialog.

14-2-4 Print preview

[Print Preview] command on the [File] menu is used to call a print preview. With a print preview, you can check what the resultant page will look like before actually printing it.

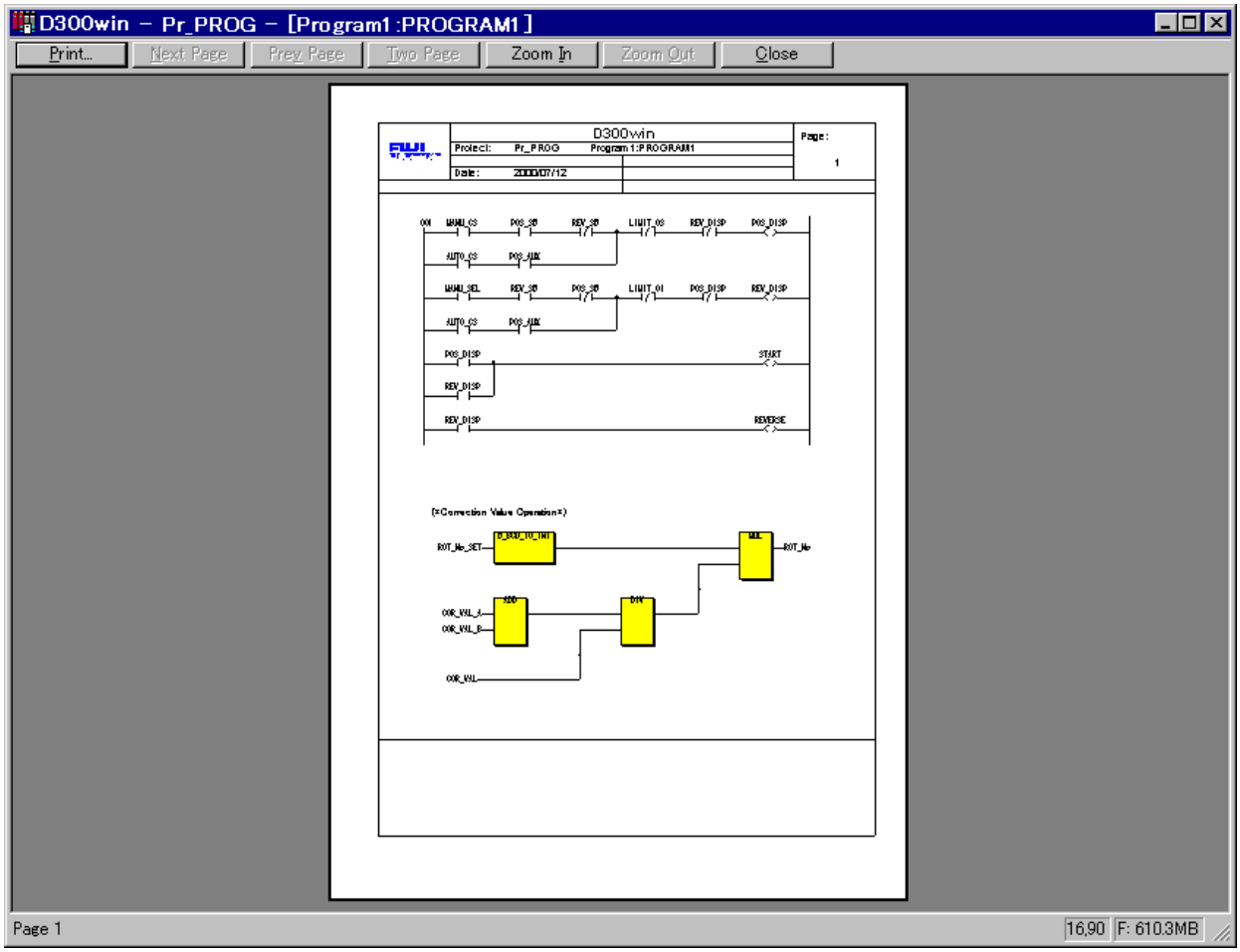
Note: When you call the preview function, a print preview of the currently active window always appears.

The active window displays the assigned page layout, or the default page layout if a page layout has not been explicitly assigned.

<Code worksheet preview>

◊ Left-double-click a program worksheet icon in the project tree to call the associated worksheet.

◊ With the worksheet kept active, select the [Print Preview] command on the [File] menu.
A print preview will appear.



In the preview, the following five buttons are available instead of a toolbar:

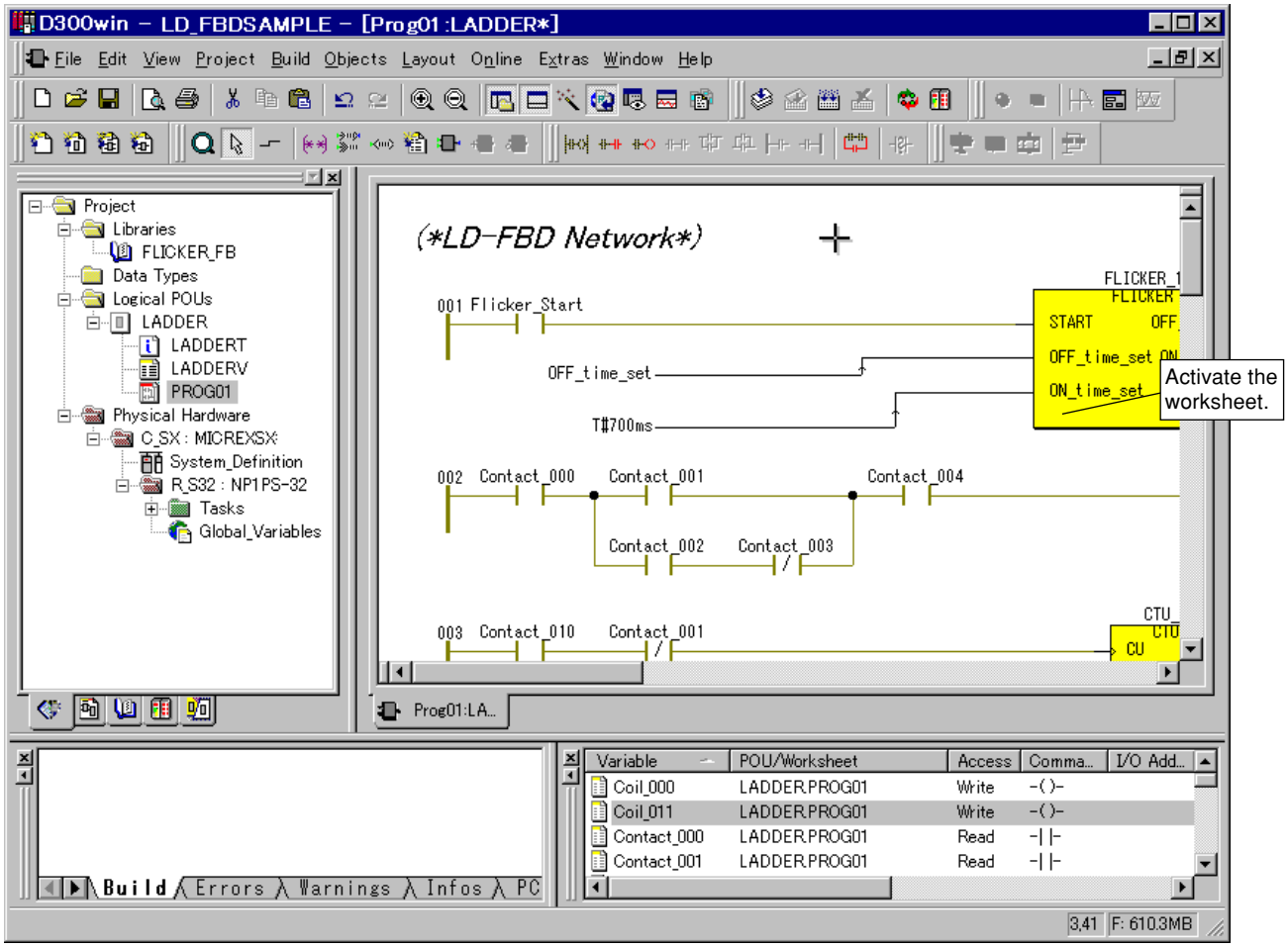
[Print] ..... Prints the worksheet.
[Next] ..... Moves to the next page.
[Previous] ..... Returns to the previous page.
[Page 2] ..... Displays the second page.
[Zoom in] ..... Enlarges the display size.
[Zoom out] ..... Reduces the display size.
[Close] ..... Closes the preview.

14-2-5 Printing individual

Using the graphics editor, the text editor or the project tree editor enables you to print individual worksheets. Worksheets are printed in the assigned page layout.

(1) Printing individual worksheets

◊ Left-double-click a worksheet icon in the project tree to call the associated worksheet.



◊ With the worksheet kept active, select the [Print] command on the [File] menu.
The {Print} dialog of the Windows system will appear on the screen.

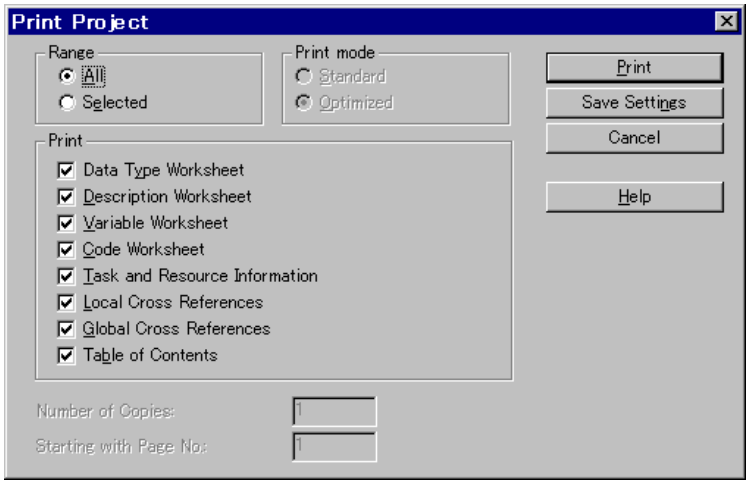
◊ Change the settings in the {Print} dialog as necessary, and then left-click the [OK] button. Printing will then be started

14-2-6 Printing an entire project/project part

You can print an entire project, or only a specific part in a single print operation.

<Project print procedure>

◊ Select the [Print Project ...] command on the [File] menu.
The {Print Project} dialog box will open.



For the setup items in the {Print Project} dialog box, see the next page.

◊ Change the settings in the {Print Project} dialog as neccesary, and then left-check the [Print] button.

<Setup items in the {Print Project} dialog box>

[Scope:]

[All] ..... Specifies printing all worksheets in the project.
[Selected] ..... Specifies printing only the configuration elements of a selected worksheet, POU, or project tree.

[Print:]

[Data Type Worksheet] ..... Specifies printing data type worksheets.
[Task and Resource Information] ..... Specifies printing task and resource information, system definitions, and parameter settings.
[Description Worksheet] ..... Specifies printing description worksheets.
[Variable Worksheets] ..... Specifies printing variable worksheets.
[Code Worksheets] ..... Specifies printing code worksheets.
[Local Cross Reference] ..... Specifies printing cross-references among local variables.
[Global Cross Reference] ..... Specifies printing cross-references among global variables.
[Table of Contents] ..... Specifies printing a table of contents.

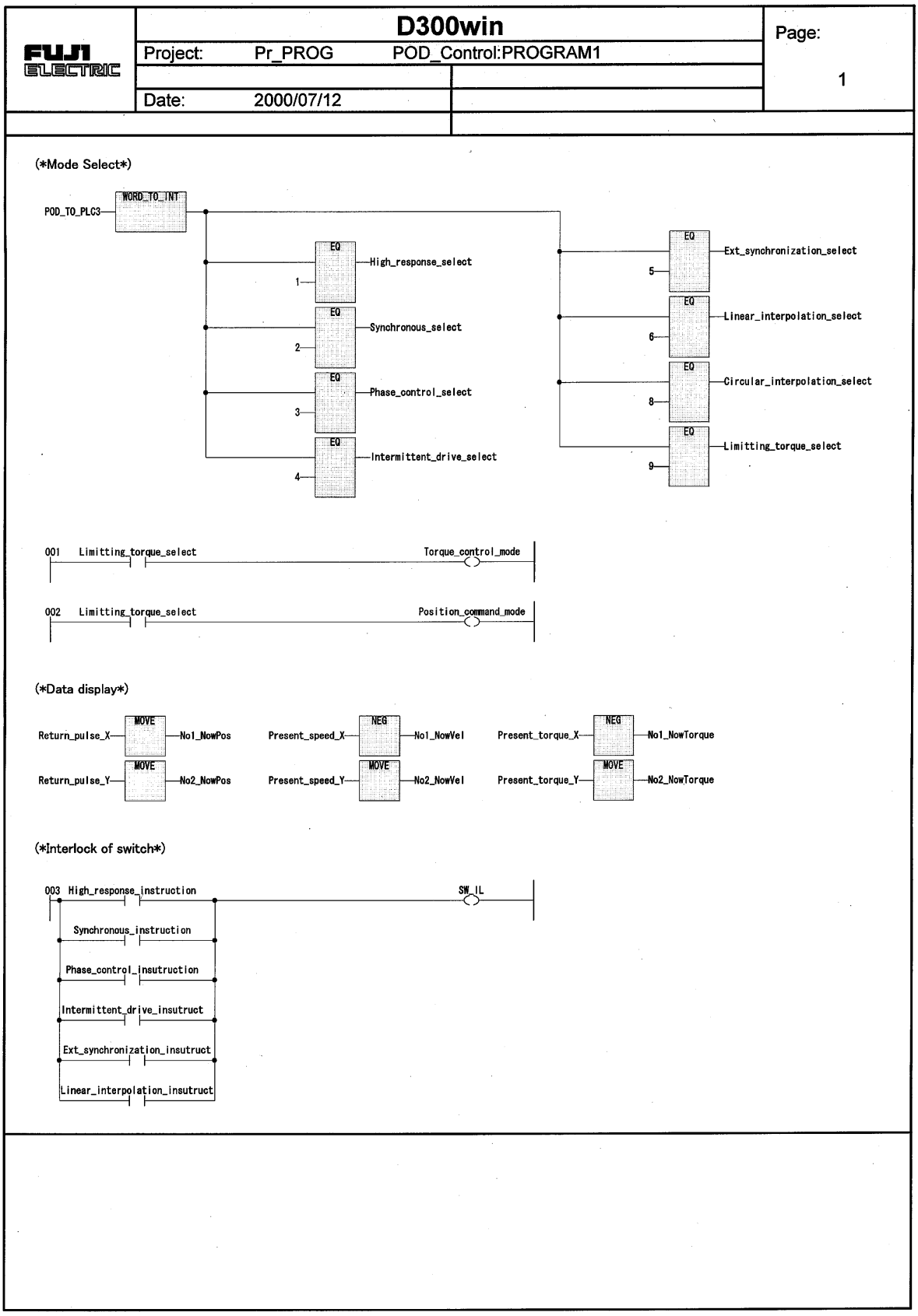
[Print mode:]

[Standard] ..... Treats the page layout specified in the {Default Pagelayouts} dialog box as a default layout.
[Optimized] ..... Prints the project in a single page layout (specified in the {Default Pagelayouts} dialog box) in a compact format, without separate forms for each worksheet. (In this format, however, object characters may appear too small to view comfortably.)
[Starting with page No.:] ..... Specifies the starting page number.
[Number of copies] ..... Specifies the number of copies to print.
[Print] ..... The print starts.
[Save Settings] ..... The content set by the dialog box is preserved in the project(file).

14-2-7 Sample prints

This paragraph introduces sample prints made from the D300win system. Use them for reference.

(1) Sample print of the code worksheet (LD/FBD language)



(2) Sample print of the variable worksheet

This sample is an example print of the variable worksheet. However, any other worksheet created with the text editor can also be printed in the same way including the data type worksheet, description worksheet, IL code worksheet, and ST code worksheet.

FUJI ELECTRIC

D300win

Project: Pr_PROG POE\PROGRAM1\PROGRAM1V.VB

Date: 2000/07/12

Page: 1

POU: PROGRAM1, Description: PROGRAM1T

POU: PROGRAM1, Variables: PROGRAM1V

```
VAR
    Return_pulse_X  :   INT;
    MANU_CS         :   BOOL;
    POS_SW          :   BOOL;
    REV_SW          :   BOOL;
    LIMT_03         :   BOOL;
    LIMIT_03        :   BOOL;
    REV_DISP        :   BOOL;
    POS_DISP        :   BOOL;
    AUTO_CS         :   BOOL;
    POS_AUX         :   BOOL;
    MANU_SEL        :   BOOL;
    LIMIT_01        :   BOOL;
    START           :   BOOL;
    REVERSE         :   BOOL;
    ROT_No_SET      :   WORD;
    COR_VAL_A       :   INT;
    COR_VAL_B       :   INT;
    COR_VAL         :   INT;
    ROT_No          :   INT;
END_VAR

VAR_EXTERNAL
    High_response_select        :   BOOL;
    Synchronous_select          :   BOOL;
    Phase_control_select        :   BOOL;
    Intermittent_drive_select   :   BOOL;
    Ext_synchronization_select  :   BOOL;
    Linear_interpolation_select :   BOOL;
    Circular_interpolation_select   :   BOOL;
    Limitting_torque_select     :   BOOL;
    Torque_control_mode         :   BOOL;
    Position_command_mode       :   BOOL;
    Return_pulse_Y              :   INT;
    No1_NowPos          :   INT;
    No2_NowPos          :   INT;
    Present_speed_X     :   INT;
    Present_speed_Y     :   INT;
    No1_NowVel          :   INT;
    No2_NowVel          :   INT;
    No1_NowTorque       :   INT;
    No2_NowTorque       :   INT;
    Present_torque_X    :   INT;
    Present_torque_Y    :   INT;
```

(3) Sample print of task/resource information

1) Sample print of the system structure/system definition

FUJI ELECTRIC	D300win	Page: 1
	Project: Pr_PROG C\C_SX\TEF_CN00.PRN	
	Date: 2000/07/12	

```
Configuration: C_SX, Settings
[System structure]

   : Configuration name          =  C_SX
   : Number of module structure information =  7
   : Number of SX bus module     =  7
   : SX bus tact time            =  1.0ms(default value)
   : SX bus station No. of system digital output = No setting
   : Initial mode
                        Initialization method = Execute memory diagnosis(default)
         Waiting time for structure check = 20s


[Redundancy setting]

   : Redundancy = OFF


[Fail soft operation setting]

   :Fail-soft start up mode = Fail-soft start up none


[Module structure information]

         001:Name                    =  11slots Base
             Outline specification   =  11slots Base
             Type                    =  NP1BS-11

         002:Name                    =  AC Power(35W)
             Outline specification   =  AC Power(35W)
             Type                    =  NP1S-22

         003:Name                    =  R_S32
             Outline specification   =  High Performance CPU32
             Type                    =  NP1PS-32
             CPU No.                 =  0

         004:Name                    =  DC Input 16points
             Outline specification   =  DC Input 16points
             Type                    =  NP1X1606-W
             SX bus station No.      =  1
             Number of input word    =  1
             Number of output word   =  0
             No equipment specification = OFF
             <Running mode definition>
               Digital filter mode       =  Reset mode
               Digital filter constant setting value = Valid( 3 ms )
```

2) Sample print of the resource (settings) information

FUJI ELECTRIC

D300win

Project: Pr_PROG C\C_SX\R\R_S32\TEF_RES.PRN

Page: 4

Date: 2000/07/12

```
Configuration: C_SX, Resource: R_S32, Settings
Resource information

[Module structure information]
    Name    = R_S32
    Type    = NP1PS-32
    CPU No. = 0

    [CPU running definition]
       : Watch Dog Timer setting = 4095 ms(default)
       : Running specification at power on = RUN=Run / TERM=Run
       : Battery less run        = OFF

    [CPU memory size definition]                (AT range)
       : Non retain memory =    8.0 KW           0 -     511(High speed)
                                8.0 KW        2048 -    3071(Normal)
       : Retain memory     =    4.0 KW           0 -     511
       : User FB memory    =    4.0 KW      None
       : System FB memory  =   16.0 KW      None
       : Number of initial data =    3200

       : Detail of system FB memory
          Edge detection =   1024 x 2W =    2048 W
          Counter        =    256 x 4W =    1024 W
          Addition timer =    128 x 8W =    1024 W
          Timer          =    512 x 8W =    4096 W
          Other system FB area         =    8192 W

       : Reserve size of each POU
          Reserve mode      = Selected POUs
          Non retain memory = 10
          Retain memory     = 10
          User FB memory    = 10

    [Communication setting(MICREX-SX)]
          Port No.             : COM1
          Baud rate            : 38400
          Data length          : 8
          Stop bit             : 1
          Parity               : Even
          Timeout              : 3000 ms
          Data size            : 492 Bytes

    [Compiler setting]
          Reverse compilation does not.

    [Direct I/O fail-soft operation setting]
      Station No. of fail-soft operation control object
```

(4) Sample print of the cross-reference list

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D300win

Project: Pr_PROG CROSSREF.DOP

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Global Cross References

Variable	Worksheet	Access	Command	Type	I/O Address.	Global Path	Page	Count
Circular_inte...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.7	C_SX.R_S32	3	1
Ext_synchroni...	PROGRAM1.POD_...	Read	-| |-	BOOL	%IX1.0.4	C_SX.R_S32	4	1
Ext_synchroni...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.5	C_SX.R_S32	3	1
High_response...	PROGRAM1.POD_...	Read	-| |-	BOOL	%IX1.0.0	C_SX.R_S32	4	1
High_response...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.0	C_SX.R_S32	3	1
Intermittent_...	PROGRAM1.POD_...	Read	-| |-	BOOL	%IX1.0.3	C_SX.R_S32	4	1
Intermittent_...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.3	C_SX.R_S32	3	1
Limitting_tor...	PROGRAM1.POD_...	Read	-| |-	BOOL	%QX3.0.8	C_SX.R_S32	3	2
Limitting_tor...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.8	C_SX.R_S32	3	1
Linear_interp...	PROGRAM1.POD_...	Read	-| |-	BOOL	%IX1.0.5	C_SX.R_S32	4	1
Linear_interp...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.6	C_SX.R_S32	3	1
No1_NowPos	PROGRAM1.Moto...	Read		INT	%QW4.0	C_SX.R_S32	4	1
No1_NowPos	PROGRAM1.POD_...	Write		INT	%QW4.0	C_SX.R_S32	3	1
No1_NowTorque	PROGRAM1.Moto...	Read		INT	%QW5.0	C_SX.R_S32	5	1
No1_NowTorque	PROGRAM1.POD_...	Write		INT	%QW5.0	C_SX.R_S32	3	1
No1_NowVel	PROGRAM1.Moto...	Read		INT	%QW4.2	C_SX.R_S32	4	1
No1_NowVel	PROGRAM1.POD_...	Write		INT	%QW4.2	C_SX.R_S32	3	1
No2_NowPos	PROGRAM1.Moto...	Read		INT	%QW4.1	C_SX.R_S32	4	1
No2_NowPos	PROGRAM1.POD_...	Write		INT	%QW4.1	C_SX.R_S32	3	1
No2_NowTorque	PROGRAM1.Moto...	Read		INT	%QW5.1	C_SX.R_S32	5	1
No2_NowTorque	PROGRAM1.POD_...	Write		INT	%QW5.1	C_SX.R_S32	4	1
No2_NowVel	PROGRAM1.Moto...	Read		INT	%QW4.3	C_SX.R_S32	4	1
No2_NowVel	PROGRAM1.POD_...	Write		INT	%QW4.3	C_SX.R_S32	3	1
Phase_control...	PROGRAM1.POD_...	Read	-| |-	BOOL	%IX1.0.2	C_SX.R_S32	4	1
Phase_control...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.2	C_SX.R_S32	3	1
Position_comm...	PROGRAM1.POD_...	Write	-()-	BOOL	%QX3.0.11	C_SX.R_S32	3	1
Present_speed_X	PROGRAM1.Moto...	Read		INT	%IW2.0	C_SX.R_S32	4	1
Present_speed_X	PROGRAM1.POD_...	Read		INT	%IW2.0	C_SX.R_S32	3	1
Present_speed_Y	PROGRAM1.Moto...	Read		INT	%IW2.1	C_SX.R_S32	4	1
Present_speed_Y	PROGRAM1.POD_...	Read		INT	%IW2.1	C_SX.R_S32	3	1
Present_torque_X	PROGRAM1.Moto...	Read		INT	%IW2.2	C_SX.R_S32	4	1
Present_torque_X	PROGRAM1.POD_...	Read		INT	%IW2.2	C_SX.R_S32	3	1
Present_torque_Y	PROGRAM1.Moto...	Read		INT	%IW2.3	C_SX.R_S32	4	1
Present_torque_Y	PROGRAM1.POD_...	Read		INT	%IW2.3	C_SX.R_S32	4	1
Return_pulse_Y	PROGRAM1.POD_...	Read		INT	%QW3.1	C_SX.R_S32	3	1
Synchronous_i...	PROGRAM1.POD_...	Read	-| |-	BOOL	%IX1.0.1	C_SX.R_S32	4	1
Synchronous_s...	PROGRAM1.POD_...	Write		BOOL	%QX3.0.1	C_SX.R_S32	3	1
Torque_contro...	PROGRAM1.POD_...	Write	-()-	BOOL	%QX3.0.10	C_SX.R_S32	3	1

(5) Sample print of the content list

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D300win

Project: Pr_PROG Table of Contents

Page: 1

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Section 15 Saving and Calling a Project

page

Section 15 Saving and Calling a Project

15-1 Saving a Project

15-1-1 Project save overview

With D300win, you can save edited versions of worksheets and also save all the files required for a project to a single archive file. You may also zip project files and save them to a single floppy disk. Project files include any files that make up a project, associated project files, and code files, as well as variable declaration files and internal files. Files that are created at compilation time are optionally zipped. Zipped files can be unzipped to be restored to the original project.

To guard against possible loss of data, zipping files periodically, (for example, once a day,) and saving them to a floppy disk is recommended.

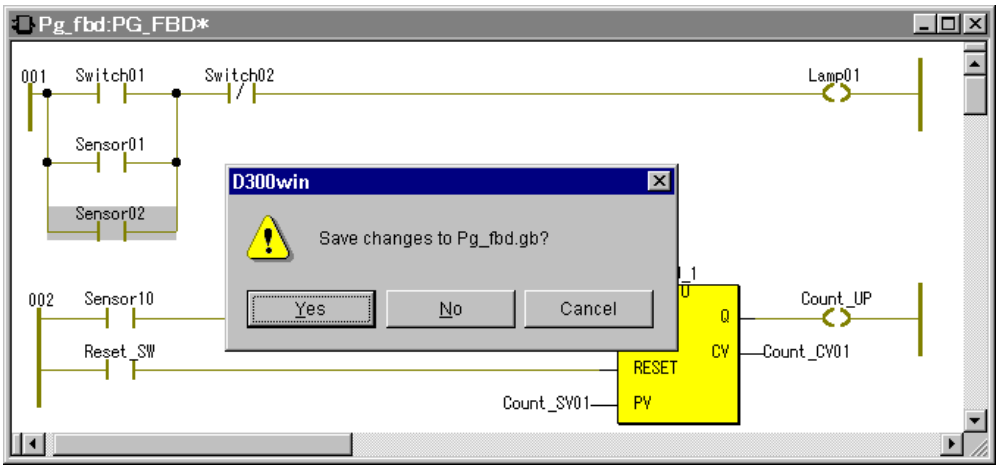
15-1-2 Saving the edited version of a worksheet

<Worksheet save procedure>

◊ Left-click the [Save] button, or left-click the [Save] command in the [File] menu.
The edited version of the worksheet is saved.

<Closing a worksheet>

If you attempt to close the window without saving changes to the worksheet, the message shown below will appear. Respond by left-clicking the appropriate button.



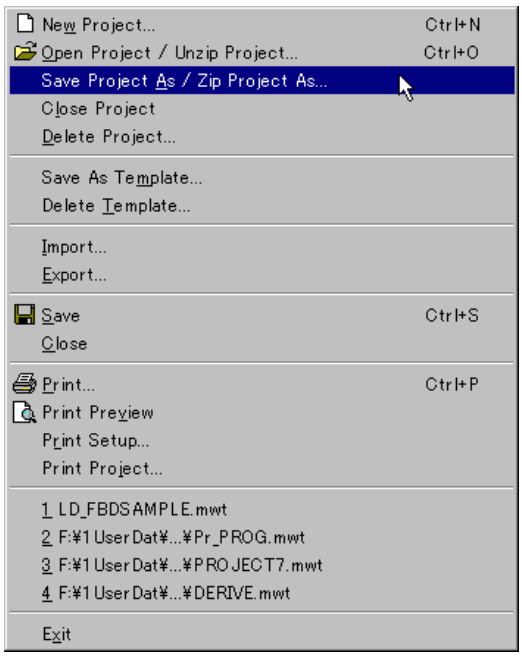
◊ Left-click the [Yes] button to save changes to the worksheet.
The worksheet will close after the changes have been saved.

15-1-3 Saving projects

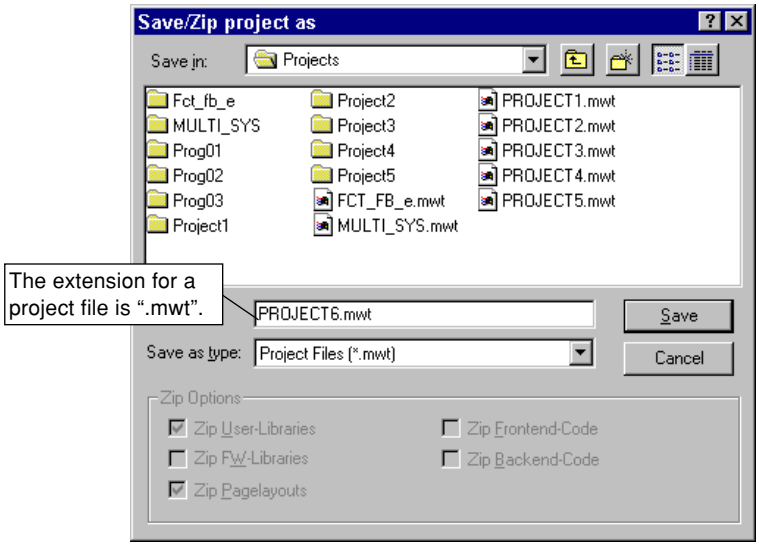
You can save new and old projects under other file names, or to other paths or drives.

◊ Left-click the project tree editor to activate the project tree.

◊ Left-click the [Save Project As/Zip Project As ...] command on the [File] menu.



The {Save/Zip project as} dialog box will open.



◊ If necessary, input a file name in the [File name:] text box, and specify a drive and a folder in the [Drives:] and [Folders:] list boxes.

◊ Left-clicking the [OK] button saves the project tree.

- The folder name and the file name of the project save destination are limited to a maximum of 8 characters, respectively. (However, do not use any of the names shown "3-2-3 (3) Restrictions on element names composing a project" and in the Reserve Word List of the Instructions of the User's Manual <FEH200>.)
- To save a project, be sure to attach extension ".mwt" to the project file name. The file may not be saved correctly without the extension.

- If an old project has been saved under a new name, it will be preserved on the hard disk.
- You can save all the files required for a project to a single zipped archive file. For further information, see 15-2, "Zipping and Unzipping Project Files."

15-2 Zipping and Unzipping Project Files

You can zip all project files in a single archive file or unzip the zipped archive file.

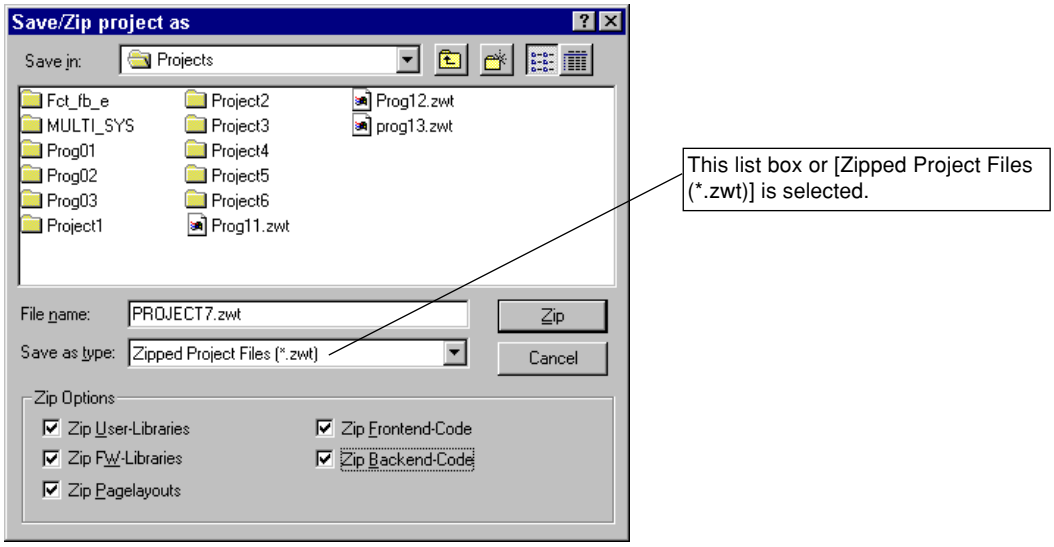
Note: Check the [Zip User-Libraries] check box in the [Zip Options] box to unzip a user library. With this method, there is no need to compile the user library after it is unzipped.

15-2-1 Zipping project files

Instructions on zipping project files to a single archive file are given here.

<Zip procedure>

◊ With the project tree activated, left-click [Save Project As/Zip Project As ...] on the [File] menu to open the {Save Project As/Zip Project As} dialog box.



<Explanation of Option Compression>

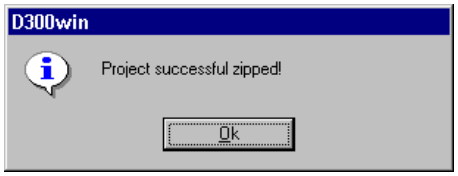
[Zip User-Libraries] ..... Zips all user libraries.

[Zip Page-Layout] ..... Zips all the page layouts used in the project as well as all the bitmaps used in the page layouts when the files have been saved in directory "pagelayouts."

[Zip Frontend-Code] ..... Zips all files created during compilation. When libraries are zipped, check this check box so that it is not necessary to compile after being unzipped. However, since the PC-dedicated machine code is not contained, it is necessary to compile with the [Make] command.

[Zip Backend-Code] ..... Zips all files created during compilation. When libraries are zipped, check this check box so that it can be downloaded without compilation after unzipped. However, the PC-dedicated machine code is also zipped. (The zipped file size becomes larger.)

◊ Select [Zipped project file (*.zwt)] in the [Types of file:] list box.
◊ Enter the archive path name and file name. (For saving on a floppy disk, it is recommended to zip first and save once on the hard disk, and then to save on a floppy disk using the file utility or equivalent function.)
◊ Check the box for the necessary zip mode in the [Option Compression] box.
◊ Left-click the [Zip] button.
Upon completion of file compression, the following message box will appear on the screen.



◊ Left-click the [OK] button to close the message box.

- The folder name and the file name of the project save destination are limited to a maximum of 8 characters, respectively.
- It may be that a zip file is too large to fit into the available space on a single floppy disk. In that case, it is possible to divide the zip file into multiple files of smaller volume and save these files on multiple floppy disks, using the function explained in “15-3-1 Dividing a zipped project file”.

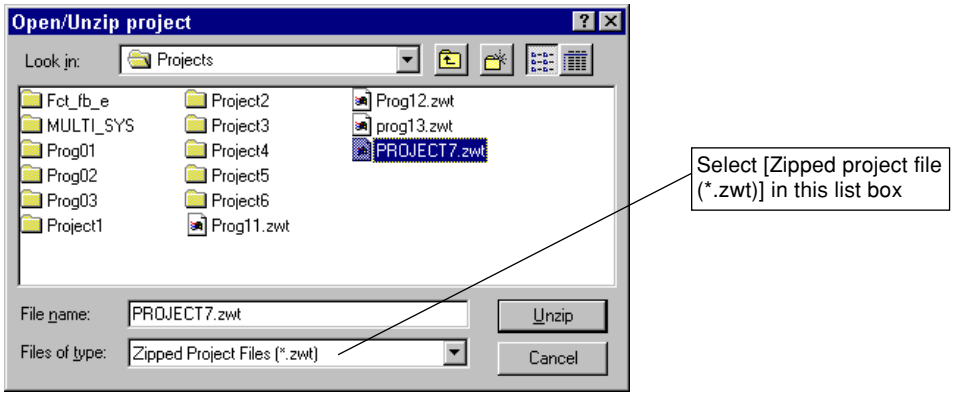
15-2-2 Unzipping project files

This paragraph explains how to unzip zipped project files.

Note: After unzipping the project, be sure to copy and save the project prior to starting compilation and downloading. (If the unzipped project is saved after compilation and downloading, the saved project is not compiled.

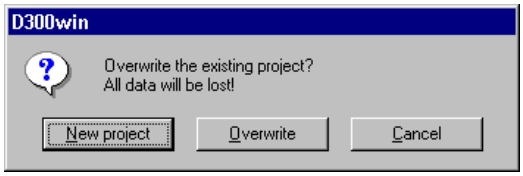
<How to unzip zipped files>

◊ Left-click the [Open project/Zip project ...] command in the [File] menu. The {Zip/Unzip Project} dialog will appear on the screen.

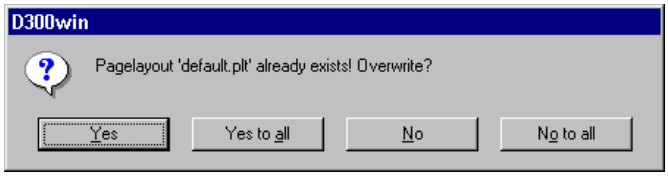


◊ Select the zipped file name and path.

◊ Left-click the [Unzip] button.
The message box will be displayed for confirming the unzip.



◊ Left-click the [Yes] button to start unzipping. According to the content of the zipped project or the zipping method, the following message is displayed during unzipping.

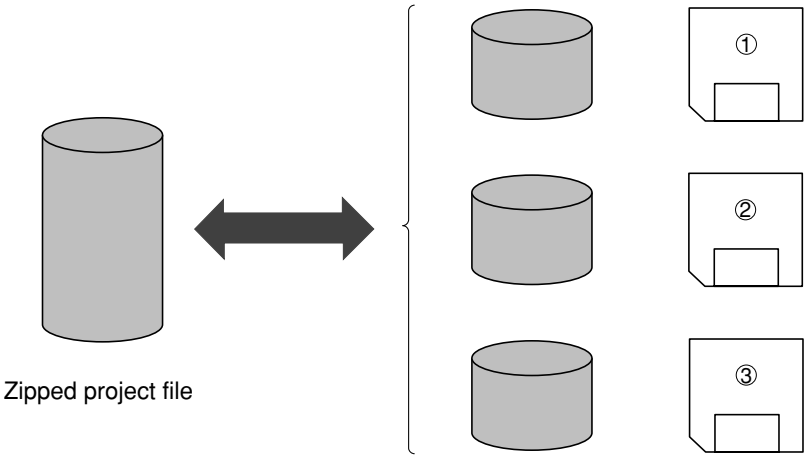


◊ Left-click the [Yes] button to overwrite only the file indicated in the message box. Left-click the [All Yes] to overwrite all files shown in this and subsequent message boxes.
Left-click the [No] button to cancel overwriting the file indicated in the message box. Left-click the [All No] button to cancel overwriting all files shown in this and subsequent message boxes.

Note: When a project is unzipped, it is in an un-compiled state. Compile the project before downloading it into the PC system. For compiling instructions, see 12.1, “Compiling Projects.”

15-3 Dividing and Merging a Zipped Project File

Floppy disks are often used to transfer or save zipped project files. However, in some cases, the volume of a single zipped file exceeds the capacity of a floppy disk (1.44M bytes, for example), and the file cannot be saved on one disk. In this case, using the Divide/Merge function, a zipped project file can be divided into multiple smaller files and saved on multiple floppy disks. This function can also restore the saved divided files to the original single file.



Zipped project file

Divided zipped project files.

15-3-1 Dividing a zipped project file

How to divide a zipped project file is explained below.
(For how to zip a project file, see “15-2-1 Zipping project files”.)

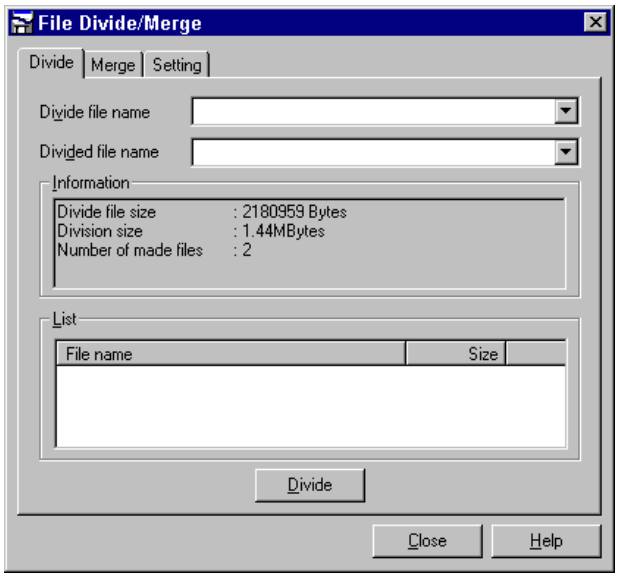
(1) Setting in the {File Divide/Merge} dialog box

First, set necessary items in the dialog box that is opened for file dividing/merging. Once set, the content is stored in the D300win system.

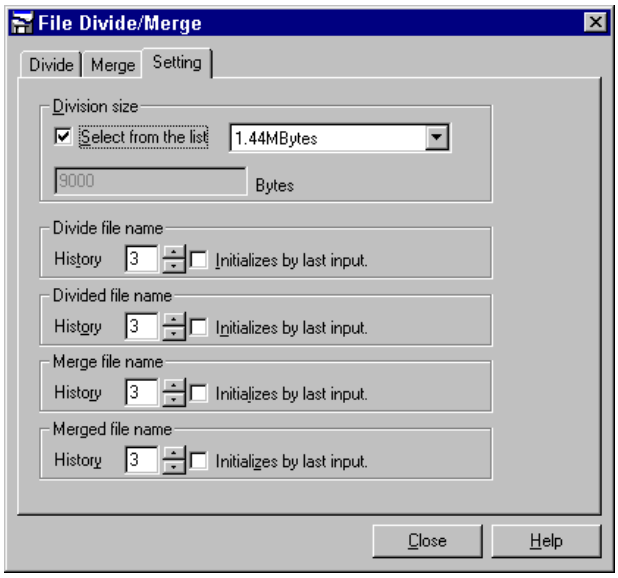
◊ Start the D300win system.

◊ Left-click the [File Divide/Merge] command in the [Extras] menu, and the {File Divide/Merge} dialog box will be opened. (This dialog box can be opened also by left-clicking [File Divide/Merge] in the [D300win] program folder under the [Start] menu.)

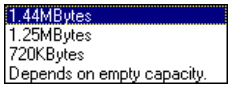
15-3 Dividing and Merging a Zipped Project File



◊ Left-click the [Setting] tab in the {File Divide/Merge} dialog box, and the following screen will be displayed.



[Division size] box:
Specify the division size by selecting one from the list box (fixed values) or inputting the desired value in the box.
To select from the list box, check the [Select from the list] box and then select a value from the list.



When [Depends on empty capacity.] is selected from the list box, 8K bytes or more free space is necessary.
To input a numeric value for the division size, uncheck the [Select from the list] box. (8K bytes or larger size can be specified.)
The setting takes effect immediately.

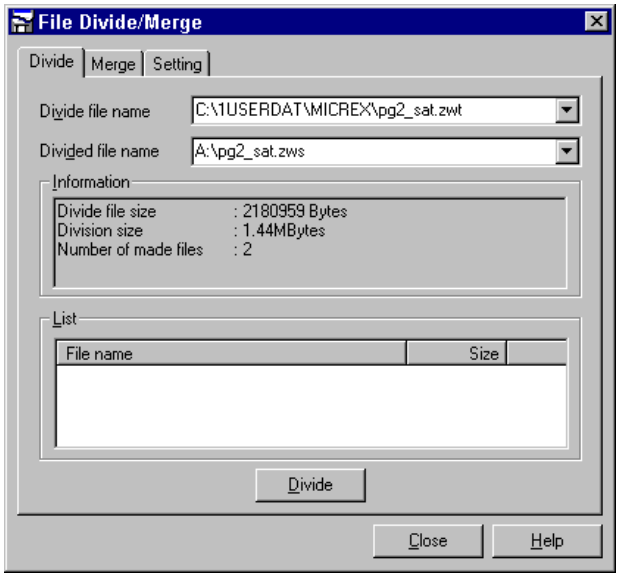
[History] list box:
Specify here the number of times to record the file name history. Setting range is 1 to 10. The setting immediately takes effect.

[Initializes by last input.] list box:
To use the current file name when this function is activated next time (as default name), check this box. To make the file name field empty when this function is activated next time, uncheck this box. The setting will take effect when this function is activated next time.

(2) Dividing a file

After the setting for dividing a file is completed, the operation for dividing is started.

◊ Start the D300win system.
◊ Select the [File Divide/Merge] command in the [Extras] menu, and the {File Divide/Merge} dialog box will be opened.
◊ Left-click the [Divide] tab in the {File Divide/Merge} dialog box, and the following screen will be displayed.



[Divide file name] list box:
Specify a file to be divided, together with the path. The history, destination for saving a zipped D300win project, and other items (arbitrary) can be selected from the list.

[Divided file name] list box:
Specify a file name after division together with the path. History and other items (arbitrary) can be selected from the list. An extension is automatically added to the file.

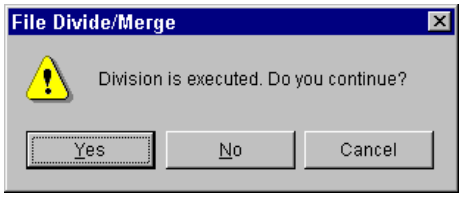
[Information] box:
Displays the following data before dividing is started:

- File size to divide: Size of the file to be divided
- Division size: The currently set division size.
- Number of made files: The number of files to be made after division

[List] box:
When the dividing of a file is completed, the files that were created to store the divided data are listed in this box. The extension for the last file is ".ZWS".

[Divide] button:
Starts dividing a file.

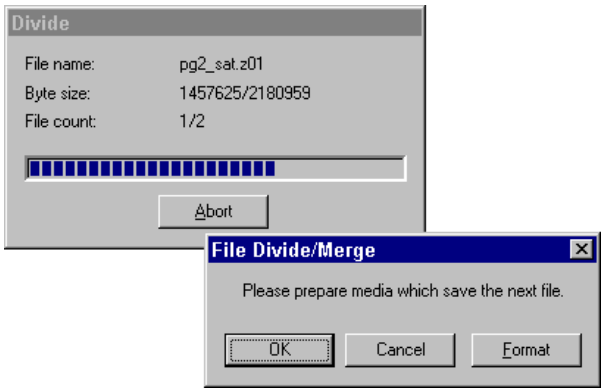
◊ Left-click the [Divide] button.
The message box shown below will appear on the screen.



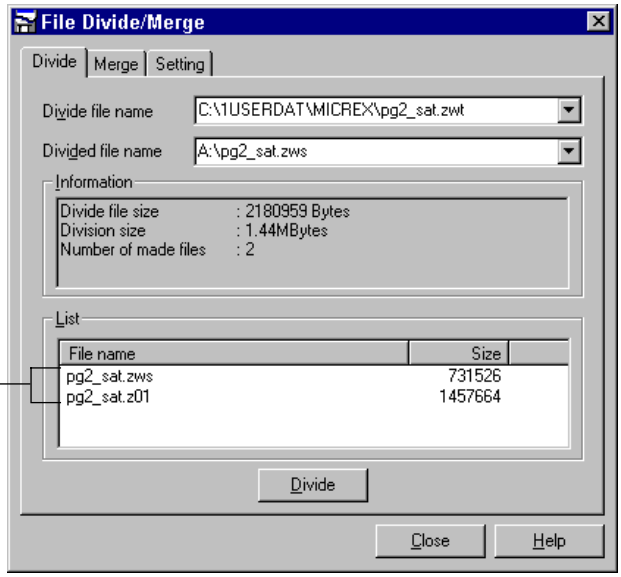
15-3 Dividing and Merging a Zipped Project File

◊ To start dividing the file, left-click the [Yes] button. The message box shown below is displayed. To cancel dividing the file, left-click the [No] or [Cancel] button.

Simultaneous formatting of media can be specified from the “media insertion confirmation” message box.
When file saving to the first floppy disk is completed, the following message is displayed, prompting you to change the floppy disk.



◊ Change the floppy disk, and left-click the [OK] button.
◊ Repeat the above operation to write the remaining files to floppy disks and thus complete file dividing. When file dividing is completed, the created files are displayed in the [List] box in the [Divide] tab of the {File Divide/Merge} dialog box, as shown below.
◊ Left-click the [Close] button to close the dialog box.



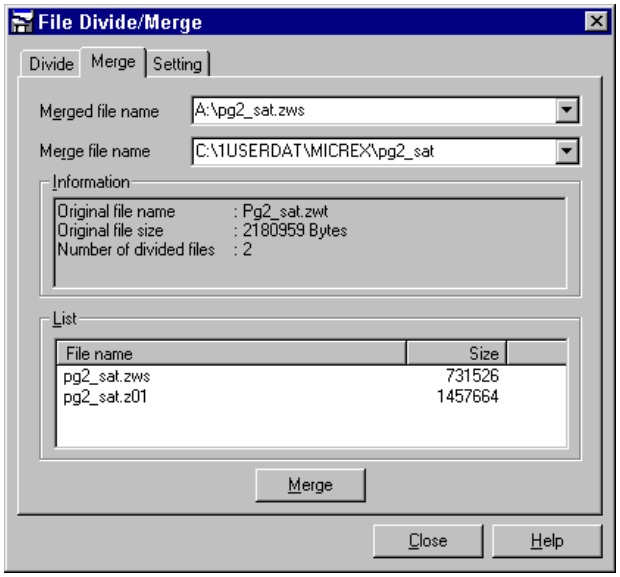
About file name (extension)

◊ *.zws: This extension is attached to the files in which divided information is saved.
◊ *.z01, *.z02, ..., *.z1906: The numeric value following “*.z” shows the order of divided files (corresponding to the number of divided files).

15-3-2 Merging files

How to merge divided project files is explained below:

◊ Start the D300win system.
◊ Select the [File Divide/Merge] command in the [Extras] menu to open the {File Divide/Merge} dialog box. (This dialog box can be opened also by left-clicking the [File Divide/Merge] in the [D300win] program folder under the [Start] menu.)
◊ Left-click the [Merge] tab in the {File Divide/Merge} dialog box, and the following screen will be displayed.



[Merged file name] list box:
Specify a file to be merged together with the path. History and other items (arbitrary) can be selected from the list. Files other than those with extension ".zws" cannot be specified.

[Merge file name] list box:
Specify a file name after merging, together with the path. History, the destination for saving zipped D300win project, and other items (arbitrary) can be selected from the list.

[Information] box:
Displays the following data before merging is started:

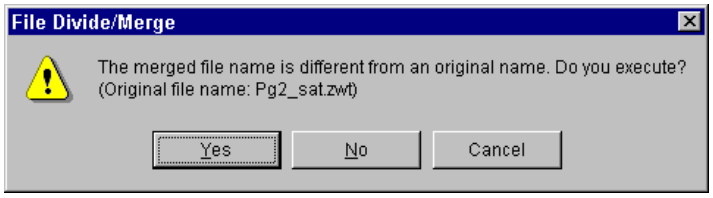
- Merged file name: Original file name before being divided
- Merged file size: Original file size before being divided.
- Number of divided files: The number of files after division

[List] box:
Before merging is started, the necessary files are listed in this box.

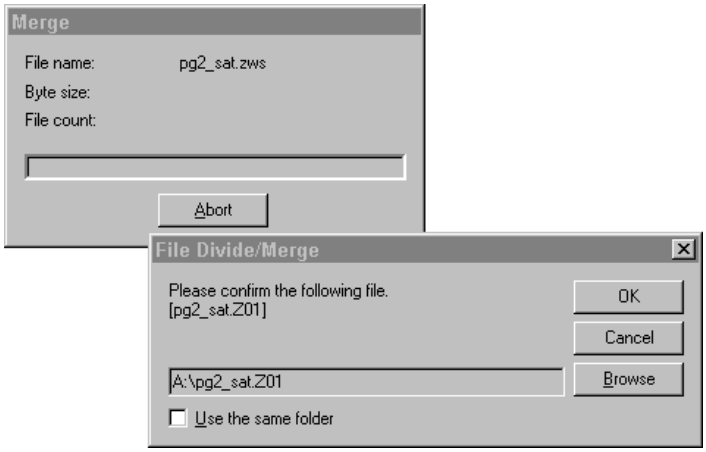
[Merge] button:
Starts merging the divided zipped files.

◊ Insert the first floppy disk (the disk in which a file with extension "zws" is stored) in the floppy disk drive.
◊ Select or enter the file name in the [Merged file name] list box.
◊ Select or enter the file name in the [Merge file name] list box.
◊ Left-click the [Merge] button. If the original file name and the merged file name differ from each other, the following message box will be displayed. Left-click the [OK] button if OK.

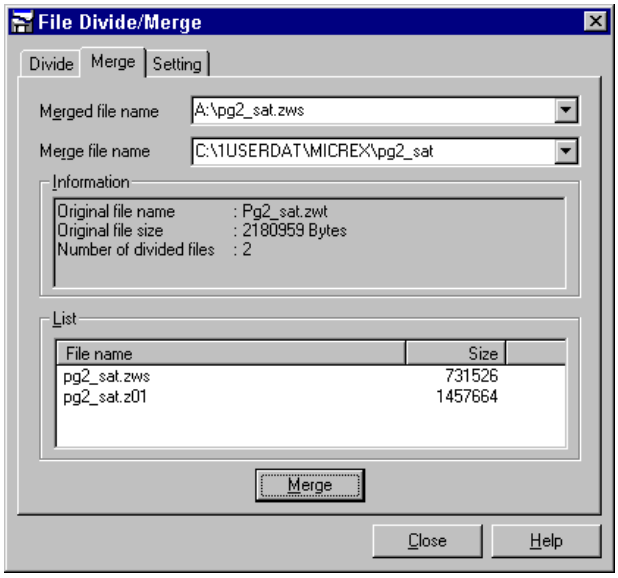
15-3 Dividing and Merging a Zipped Project File



When the reading of the first file is completed, the following message is displayed, prompting you to change the floppy disk.



◊ Change the floppy disk, and left-click the [OK] button.
◊ Repeat above operation to read the remaining divided files and thus complete merging. When merging is completed, the following {File Divide/Merge} dialog box is opened with the [Merge] tab activated.



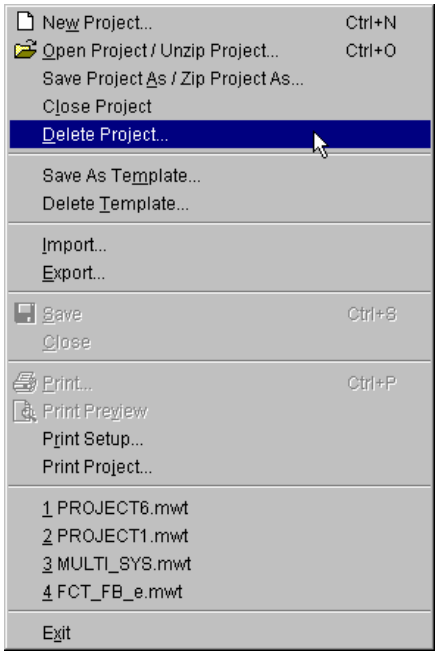
◊ Left-click the [Close] button to close the dialog box.

How to delete unnecessary projects is explained below.

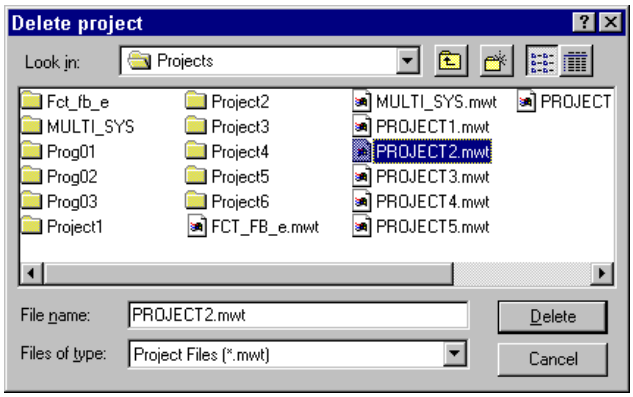
Note: Use this function carefully because once deleted, the files can no longer be restored. They are completely deleted from the disk.

<How to delete a file>

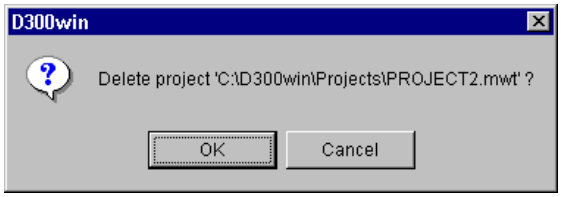
◊ Select the [Delete Project ...] command in the [File] menu.



The {Delete project} dialog box will be opened.



◊ Select the destination path and the file name to be deleted, and left-click the [OK] button. The confirmation dialog box will then appear on the screen.



◊ To delete the file, left-click the [Yes] button; otherwise, the [No] button.

Section 16 Auxiliary Functions

page

Section 16 Auxiliary Functions
16-1 Password Function

By registration of a passwords for a resource (CPU module), it becomes possible to keep unauthorized third parties from accessing the resource. This function prevents programs and system definitions from being uploaded or changed (downloaded) or the memories from being initialized, thus protecting the PC system.
The password function becomes effective when a project is closed and then displayed again

16-1-1 Validity of password

This function restricts online operation according to the password registered for the resource and thus protects the data stored in it.

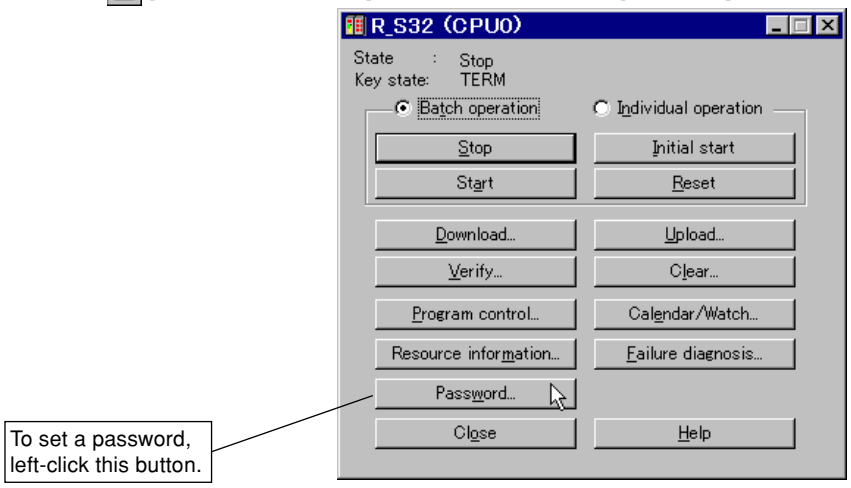
Enabled/disabled states of individual buttons (function) of the {Control} dialog box when a password is registered are as follows:

- Enabled buttons (functions):
  [Stop], [Start], [Initial start], [Reset], [Calendar/Watch ...], [Resource information ...]. [Failure diagnosis ...], [Help]
- Disabled buttons (functions):
  [Download ...], [Upload ...], [Verify ...], [Clear ...]

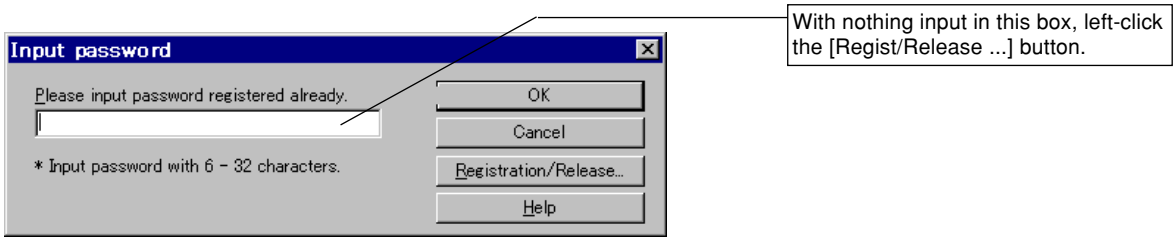
16-1-2 Registration of a new password

How to register a new password is explained below.

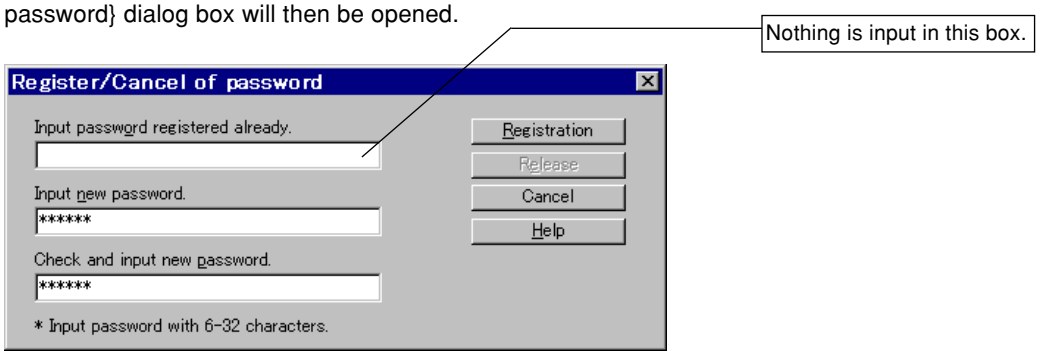
◊ Start D300win and open a project of a resource for which a password is to be registered.
◊ Left-click [Resource Control...] button or left-click the [Control...] command in the [Online] menu.



◊ Left-click the [Password ...] button in the {Control} dialog box, and the {Input password} dialog box will be opened.



◊ In this dialog box, with nothing input in the box, left-click the [Regist/Release ...] button. The {Register/Cancel of password} dialog box will then be opened.



◊ Input a password to be registered in the [Input new password.] text box.
◊ In order to confirm the input password, in the [Check and input new password.] text box, input the same password as is input above in the [Input new password.] text box.
(If the two passwords do not coincide with each other, the [Regist] button is disabled. Re-input the password.)
◊ Left-click the [Regist] button.
The password is immediately registered for the resource.

Precautions for registering a password:
For a multi-CPU system or redundant CPU system (of same configurations), the same password must be set for all the CPU modules.

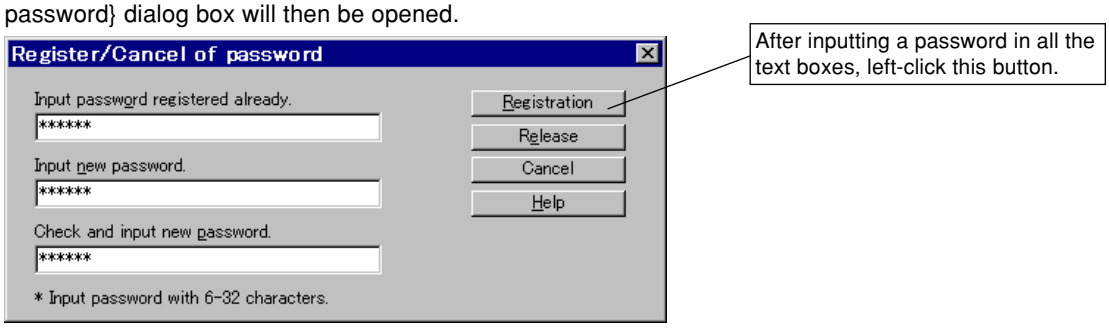
Caution

If a password is input when no password is registered for the PC, and download, upload or other operation is executed, the message “No password registered” will be displayed on the task bar, disabling the operation. In such cases, the previously input password can be canceled by left-clicking the [OK] button with nothing input in the password input field.

16-1-3 Changing the password

How to change the password previously registered for a resource is explained below.

◊ Open a project of a resource for which a password is to be changed.
◊ Left-click [Resource Control...] button or left-click the [Control...] command in the [Online] menu.
The {Control} dialog box will be opened.
◊ Left-click the [Password ...] button in the {Control} dialog box to open the {Input password} dialog box.
◊ In this dialog box, with nothing input in the box, left-click the [Regist/Release ...] button. The {Register/Cancel of password} dialog box will then be opened.

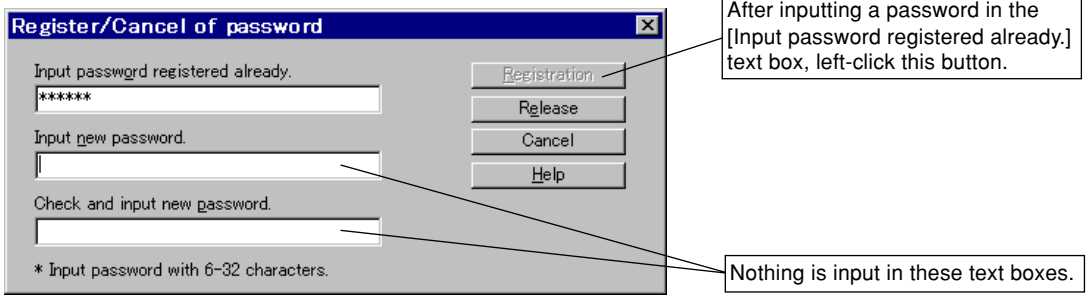


◊ Input the previously registered password in the [Input password registered already.] text box.
◊ Input a password to be newly registered in the [Input new password.] text box.
◊ In order to confirm the input password, in the [Check and input new password.] text box, input the same password in the [Input new password.] text box.
(If the two passwords do not coincide with each other, the [Regist] button is disabled. Re-input the password.)
◊ Left-click the [Regist] button.
The password is immediately registered for the resource.
If the password previously registered for the resource does not coincide with that input in the [Input password registered already.] text box, the following message is displayed. After checking these passwords, re-input the correct password.

16-1-4 Canceling the password

How to cancel the password that has been previously registered for the resource is explained below.

◊ Open a project of a resource for which a password is to be canceled.
◊ Left-click [Resource Control...] button or left-click the [Control...] command in the [Online] menu.
The {Control} dialog box will be opened.
◊ Left-click the [Password ...] button in the {Control} dialog box to open the {Input password} dialog box.
◊ In this dialog box, with nothing input in the box, left-click the [Regist/Release ...] button. The {Register/Cancel of password} dialog box will then be opened.



◊ Input the previously registered password in the [Input password registered already.] text box.
◊ Left-click the [Cancel] button, and the password registered for the resource will be canceled (deleted).
If the password previously registered for the resource does not coincide with that input in the [Input password registered already.] text box, the following message is displayed. After checking these passwords, re-input the correct password.

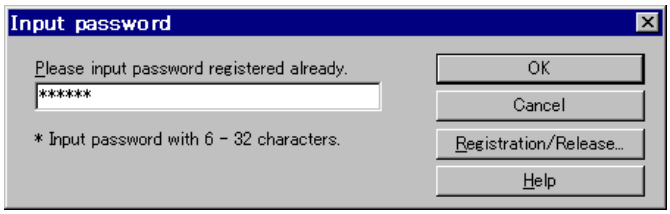
16-1-5 Temporarily canceling a password

If you attempt to use an online function, the use of which is limited by D300win due to a registered password, for a resource for which the password is registered, the following message is displayed. In such case, the password can temporarily be canceled to use the function.
While the project is opened, the temporarily canceled state continues. (When the project is closed, the password stored in D300win changes to the “unregistered” condition.)

(1) Temporarily canceling the password

How to temporarily cancel the password that has been previously registered for a resource is explained below.

◊ Open a project of a resource for which the password is to be temporarily canceled.
◊ Left-click [Resource Control...] button or left-click the [Control...] command in the [Online] menu.
The {Control} dialog box will be opened.
◊ Left-click the [Password ...] button in the {Control} dialog box to open the {Input password} dialog box.

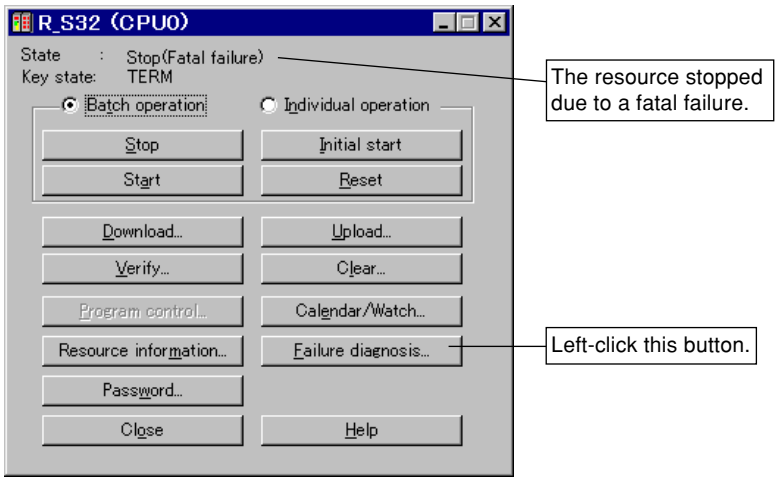


◊ Input the previously registered password in the [Please input password registered already.] text box.
◊ Left-click the [OK] button.
(If the incorrect password is input, the [OK] button is disabled. In that case, re-input the correct password.)
The password will then be temporarily canceled, enabling all the buttons in the {Control} dialog box.

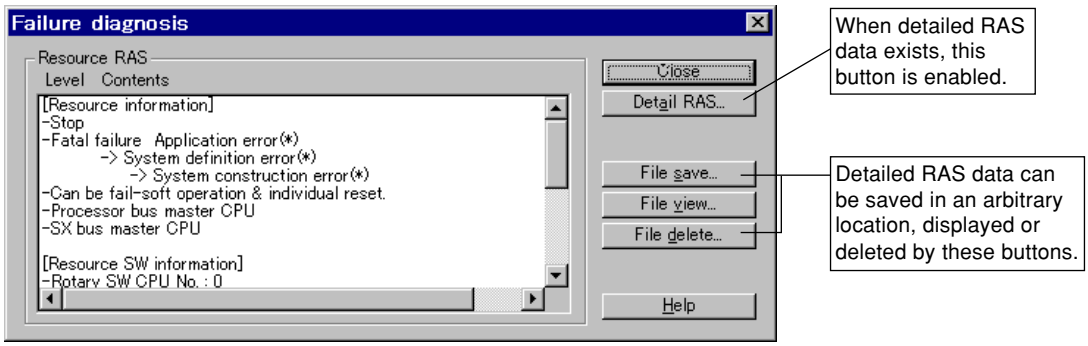
The CPU module has two diagnostic functions: the function to diagnose errors which currently occur (displaying current values) and the function to diagnose errors which have occurred in the past (displaying previous values).
D300win can save diagnostic data on floppy disks to display or analyze the data offline.

16-2-1 Using the failure diagnostic function

(1) Displaying the {Detail RAS} dialog box
Failure diagnosis is executed from the {Resource RAS} dialog box which is opened by left-clicking the [Failure diagnosis ...] button in the {Control} dialog box.

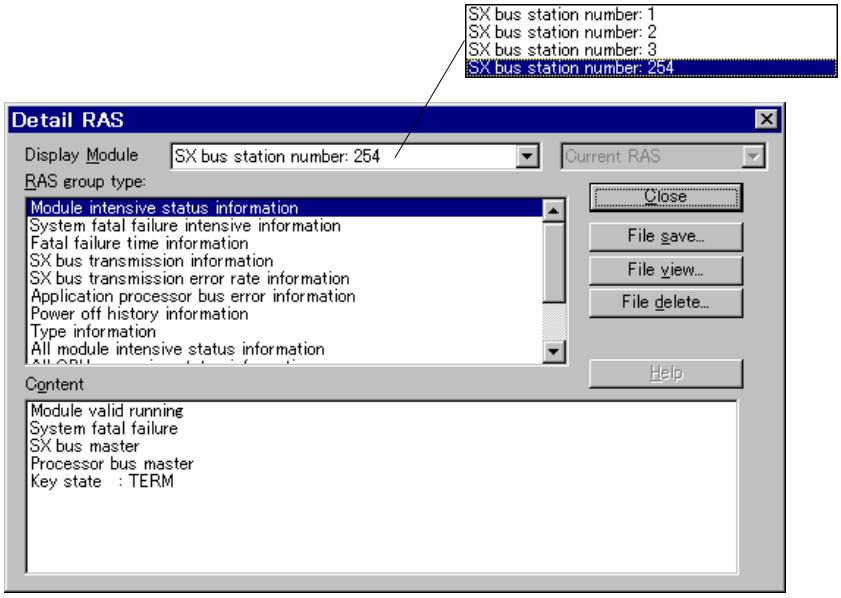


◊ Left-click the [Failure diagnosis ...] button in the {Control} dialog box, and the {Failure diagnosis} dialog box will be opened.

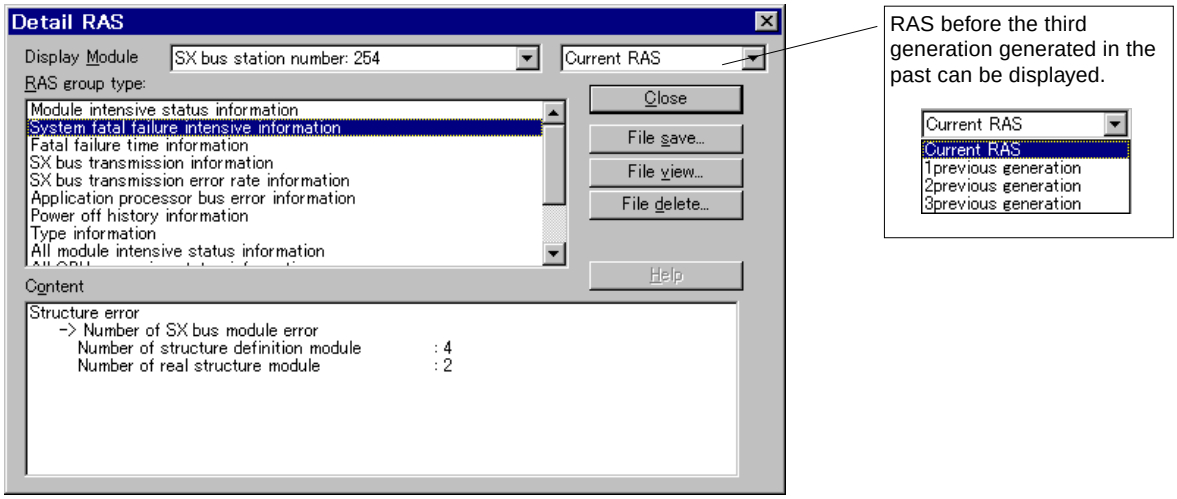


(2) Detailed RAS data

When “Rotary SW CPU No.: 0” is selected from the [Level Contents] list box in the {Failure diagnosis} dialog box and then the [Detailed RAS ...] button is left-clicked, the following screen is displayed.



When {System fatal failure intensive information } is selected from {RAS group type} list box, details of the content of the error are displayed in {Ccontent} list box.



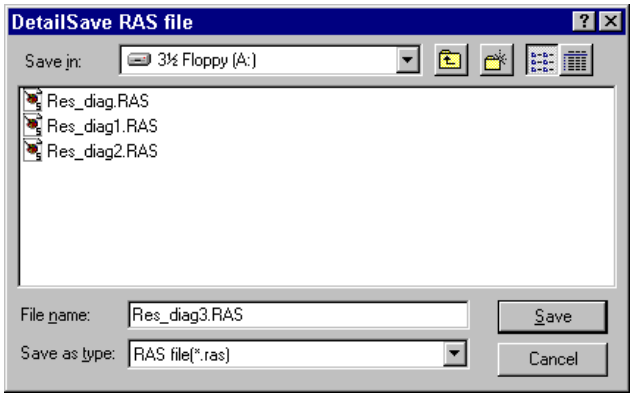
* The error (fatal failure) occurred because of an inconsistency between the content registered in the system definition and that when the CPU module checked the structure.

16-2-2 Saving and displaying RAS information

(1) Saving a RAS information file

How to save RAS information in a CPU module to a file is explained below.

◊ Left-click the [Save...] button in the [Failure diagnosis] dialog.
The {RAS file save} dialog will appear on the screen.



◊ Specify a file path and a file name, and then left-click the [Save] button.
(The RAS file will have the extension ".ras.")

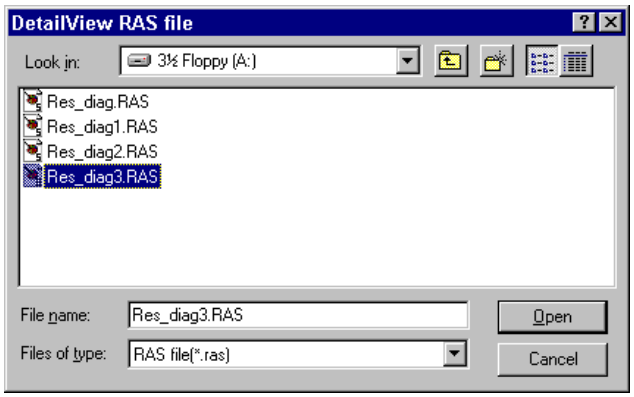
(2) Displaying a RAS information file

How to display RAS information saved in a file is explained below.

1) Opening from the {Failure diagnosis} dialog

When checking the past RAS information during online connection, the RAS information can be displayed by using the [File view...] button in the {Failure diagnosis} dialog.

◊ Left-click the [File view...] button in the {Failure diagnosis} dialog.
The {RAS file view} dialog will appear on the screen.



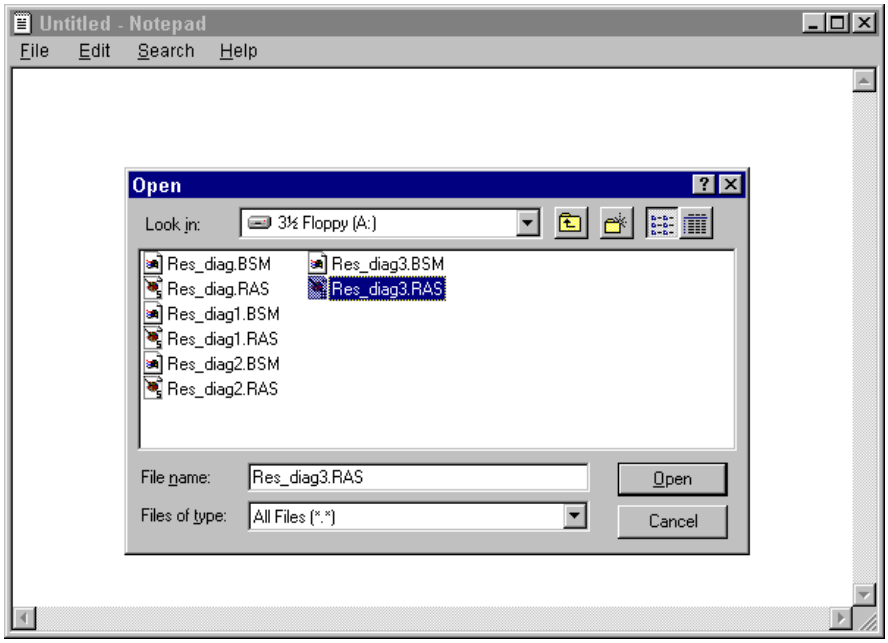
◊ Specify a file path and a file name, and then left-click the [Open] button.
The {RAS file view} dialog will be displayed allowing confirmation of the RAS information.

2) Displaying RAS information online

The RAS information file is saved in text format. Therefore, it can be displayed or printed with the general text editor.

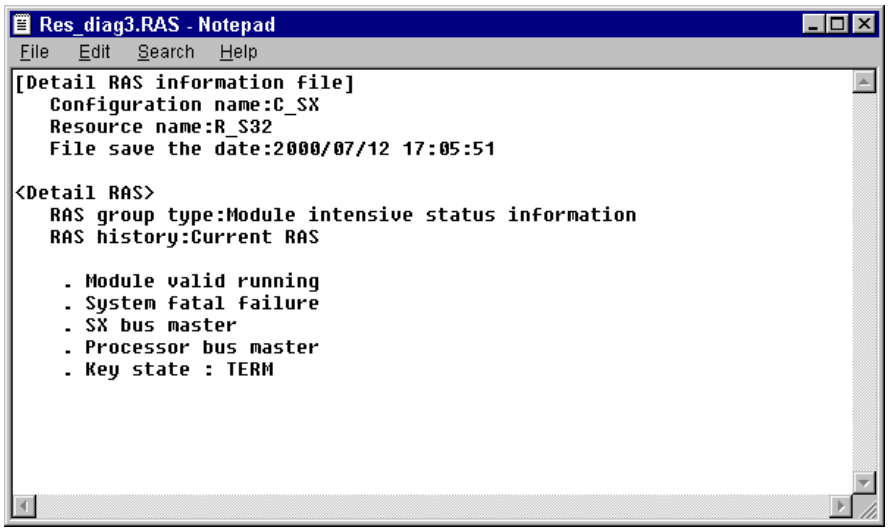
◊ Activate the text editor (MemoPad is used in this example).

◊ Left-click the [Open...] command in the [File] menu to display the {Open} dialog.



◊ Specify the RAS file path in the [Look in:] text box, and select [all files (*.*)] from the [Types of file] list box.

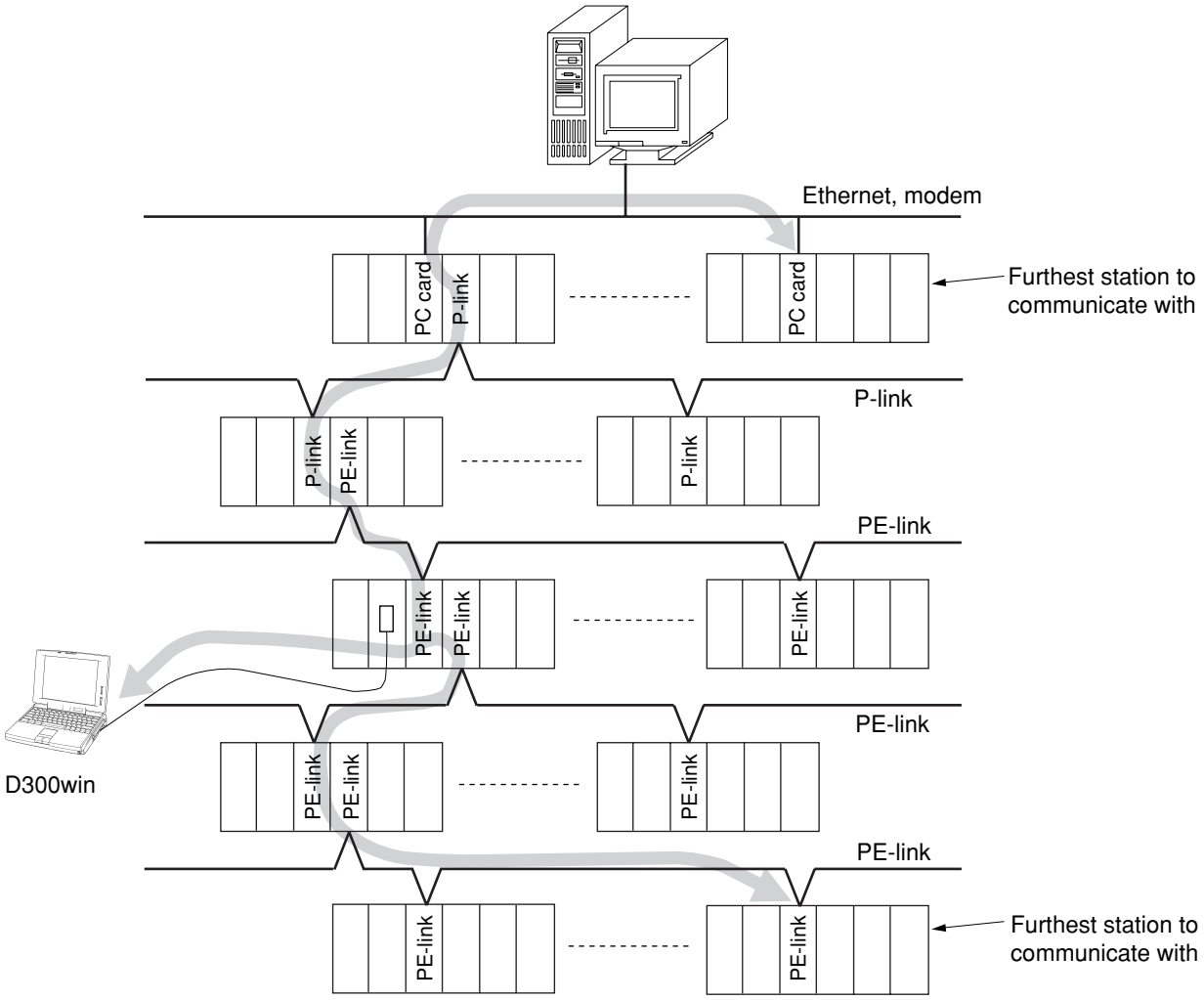
◊ Specify the RAS information file (*.ras), and left-click the [Open] button. The content of the specified RAS information file will be displayed by MemoPad.



16-3-1 Outline of loader network

With a link system that uses a MICREX-SX series P-link or PE-link module or a PC card interface module (using an Ethernet or modem card), a D300win connected to a CPU module can remotely control (program downloading/uploading, monitoring, testing, etc.) a CPU module of a different configuration in three hierarchical stages.
In addition, the same remote control can be carried out from a D300win connected to another CPU module. Thus, a maximum of 2 remote control routes can be established (in case of simultaneous operation).

1) Sample system structure



2) Number of connected units
4 CPU modules can be simultaneously monitored from D300win.

3) Compatible versions

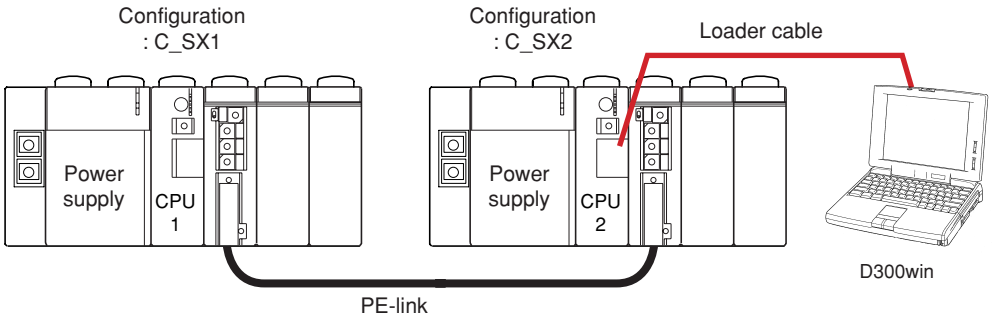
For the remote operation with a loader network of "3-stage hierarchy (2 routes)," the D300win, CPU module, and communication module must conform to the versions listed in the table below.

		Version
D300win system		Ver. 2.1.0.0 or later
CPU module	High-performance	Ver. *.*.38 or later
	Standard	Ver. *.*.37 or later
Communication module	P-link	Ver. 33 or later
	PE-link	Ver. 33 or later
	FL-net (OPCN-2)	Ver. 30 or later
	PC card	Ver. 31 or later

16-3-2 Setting a network

This paragraph describes how to connect a D300win connected to module CPU2 to module CPU1 in the sample system structure shown below.

(1) Sample system structure



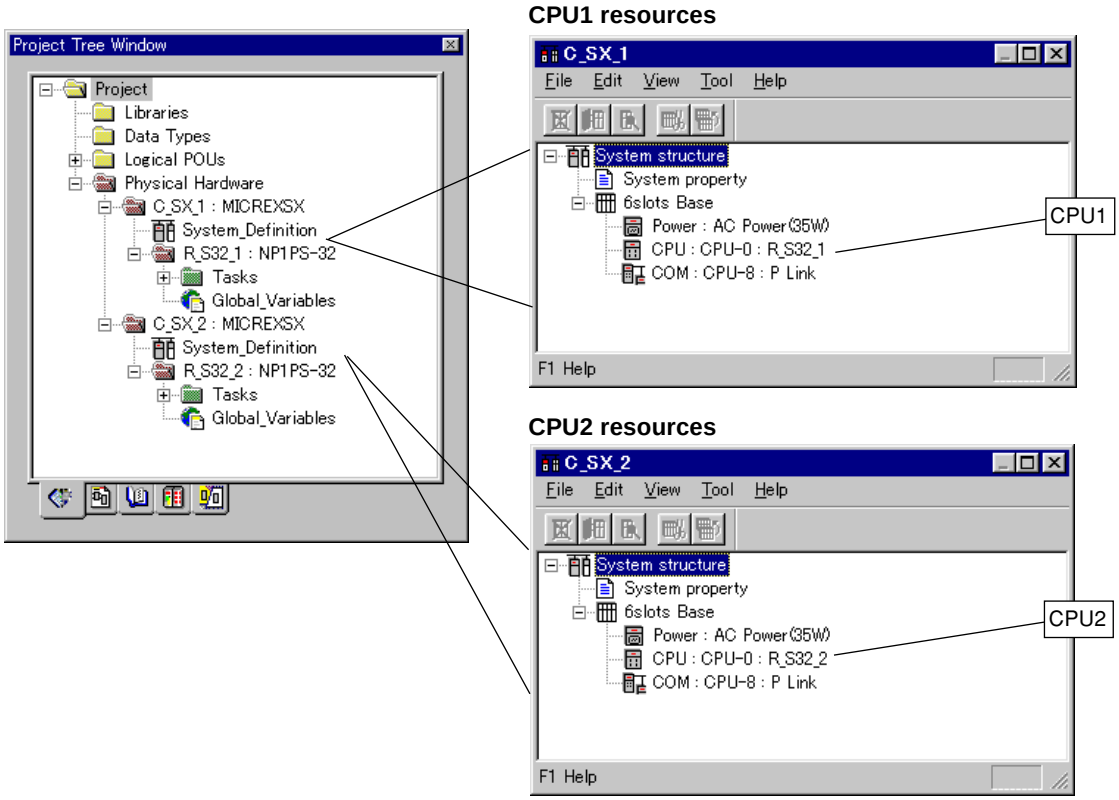
The network that can be used in this system includes the PE-link, P-link, RS-485, and Ethernet FL-net.

When using the P-link or PE-link, be sure to set the [Communicated data size:] value to 200 in the {Communication setting MICREX-SX} dialog described in "12-2-2 (2) Checking the communication setting."

(2) Network setting

1) Creating a project

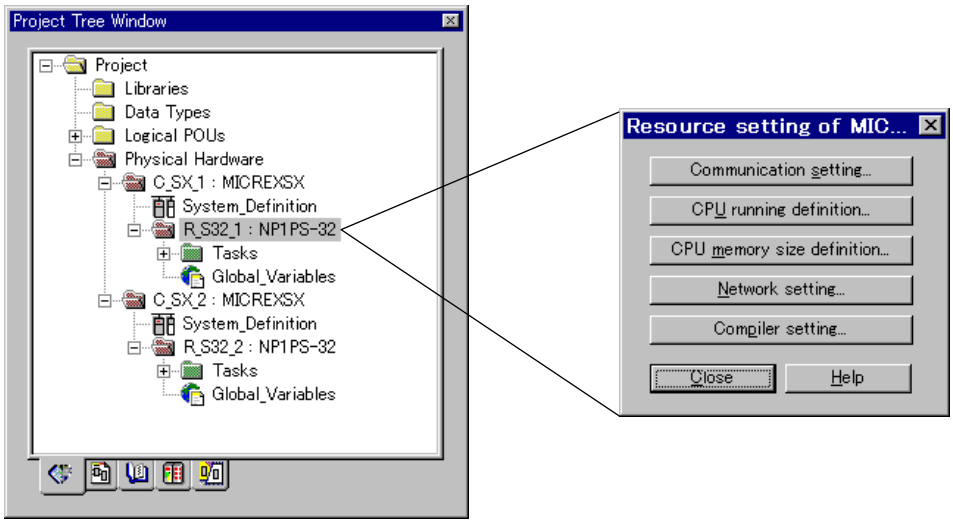
Create each configuration of the CPU module for communication ("CPU1" in the figure shown on the previous page) and CPU module "CPU2" which is connected to the D300win system, respectively, as one project.



2) Setting a network

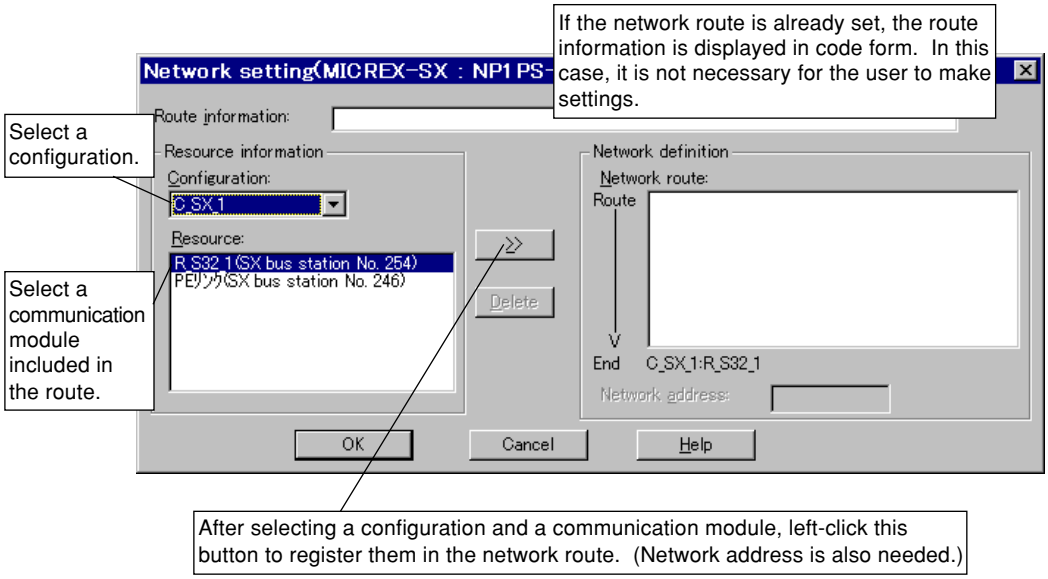
Set the communication route of the network to be used. To communicate with CPU1 (R_S32_1), make network settings in the {MICREX-SX resource setting} dialog for CPU1.

Right-click the CPU1 resource icon [R_S32_1] to display the shortcut menu, and then left-click the [Setting...] command in the menu. The {MICREX-SX resource setting} dialog will then appear on the screen.

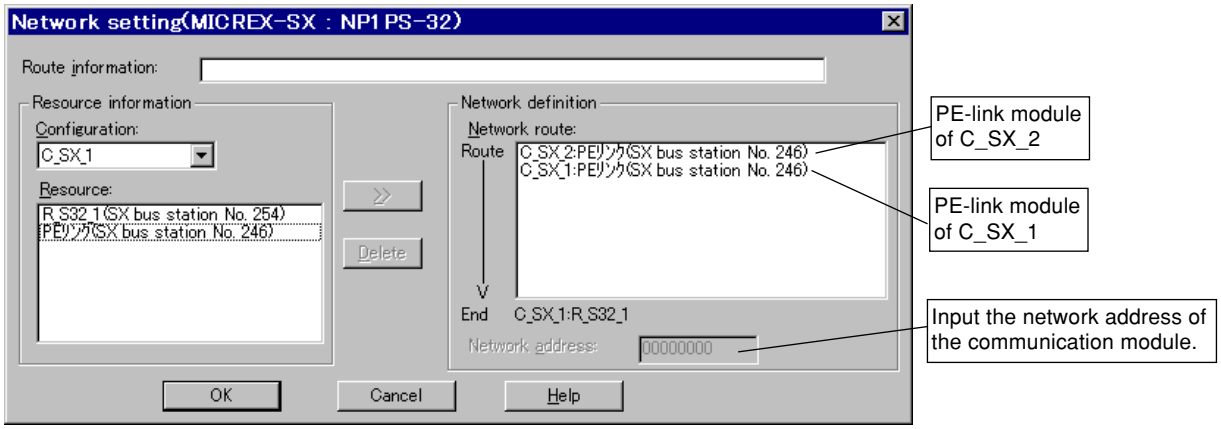


Left-click the [Network setting...] button, and the {Network setting} dialog will be displayed.

3) Setting a network (setting a route)
Specify the network route in the {Network setting} dialog. Set the communication module included in the route under [Network definition] in the {Network setting} dialog. Start registration beginning with the configuration which connects the D300win system.



In the previously described sample system structure, the communication route goes [CPU2 in C_SX_2] → [PE-link module in C_SX_2] → [PE-link module in C_SX_1] → [CPU1 in C_SX_1]. In this case, make the settings as shown below.

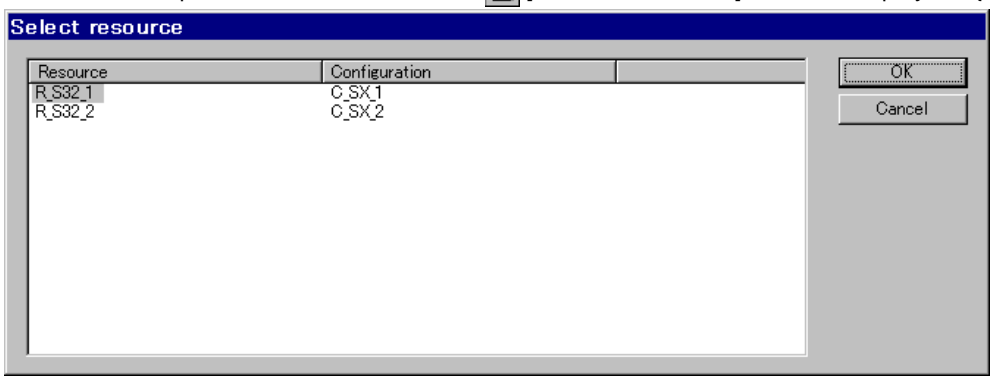


Note: The value set for the network address varies with the network to be used. The network address of each module is shown below.
P-link or PE-link => P-link or PE-link station No.
Ethernet => IP address
Ex.) For 10.59.2.100, input each value by converting to a hexadecimal value (10 → 0A, 59 → 3B, 2 → 02, 100 → 64). Thus, input 0A3B0264.
RS-485 => RS-485 station No.
For the resource (CPU module), it is not necessary to set the route. After the route setting, left-click the [OK] button. This completes the network setting.
* The route setting is processed based on the SX bus station No. Thus, if the station No. has been changed, the route setting will not be correctly processed.
(If the station No. has been set with the system definition, changing that station No. or clearing the system definition will disable correct route setting processing.)

4) D300win online operation

Execute the online operation with CPU2 connected to D300win.

Use the normal online operation. First, left-click the [Resouce Control...] button to display the {Select resource} dialog.



Select [R_S32_1] from the resource list, and then left-click the [OK] button. The {Control} dialog will then appear on the screen.

The subsequent operations are the same as the normal online operation.

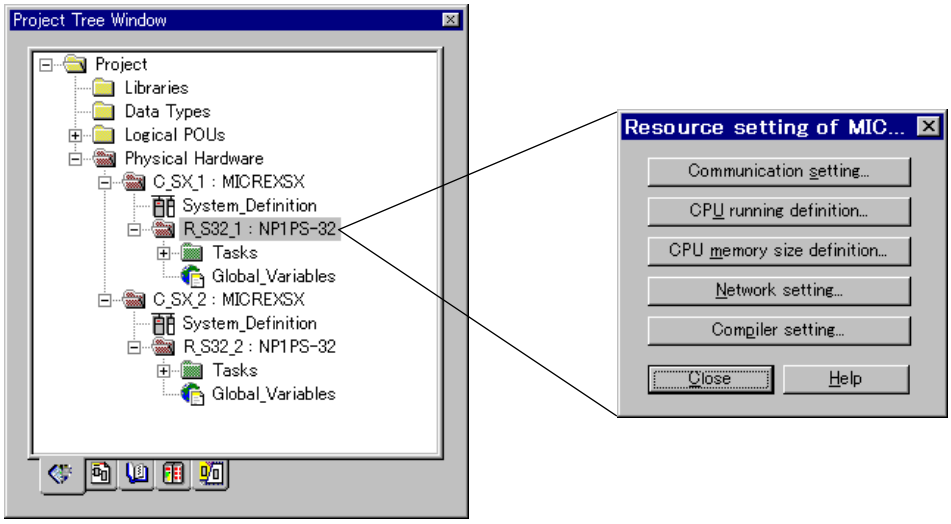
(3) When an error has occurred during use of the loader network

When the power to the CPU module or communication module on the communication route is reset or the cable on the communication route is disconnected during use of the loader network, D300win may occasionally be disconnected. In such a case, verify that the communication route is normal, wait for approximately 2 minutes, and then re-execute the operation.

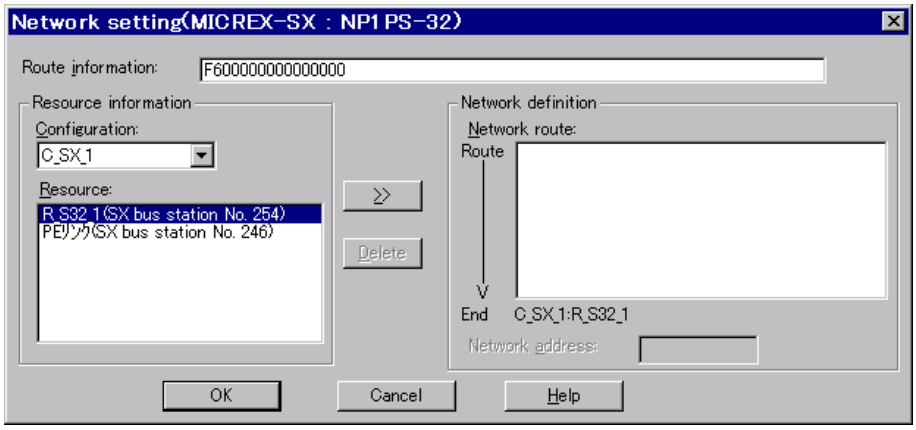
(4) Canceling the network

How to cancel the network settings is explained below.

Right-click the CPU1 resource [R_S32_1] icon for which the network settings have been made in (2), and left-click the [Setting...] command in the menu. The {Resource setting} dialog will then appear on the screen.



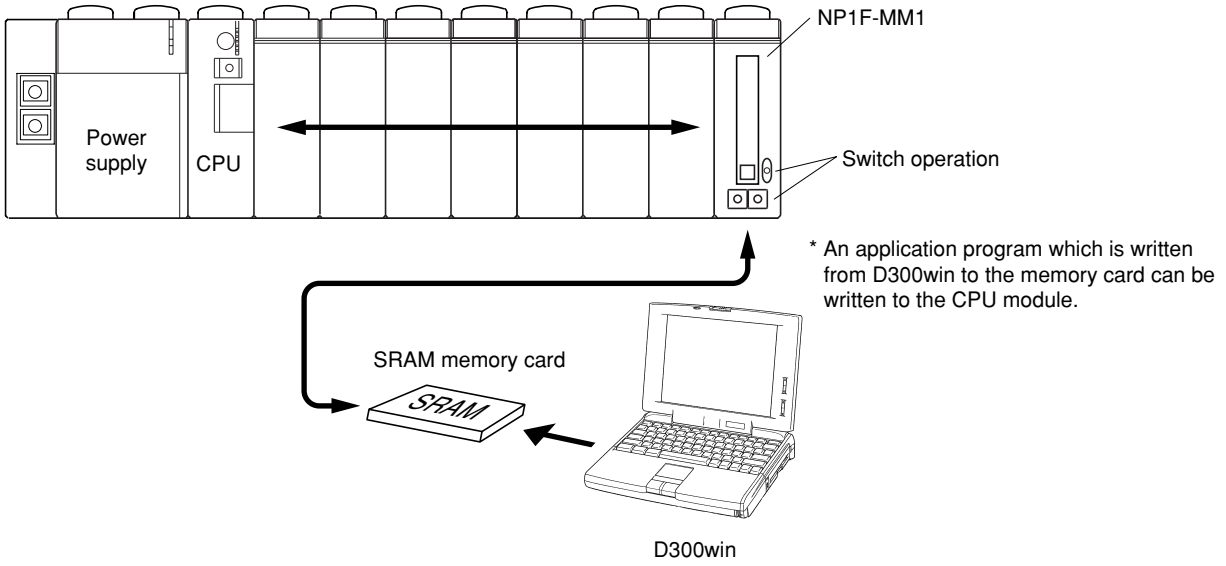
Left-click the [Network setting...] button, and the {Network setting} dialog will appear on the screen.



Delete the "route information code" from the [Route information:] text box, and left-click the [OK] button to close the dialog. This operation cancels the network settings.

16-4-1 Outline of the function

With this function, programs and/or system definitions can be saved from a compiled project in an SRAM memory card (TYPE I/TYPE II of 5-VDC specification). When an SRAM card is inserted in the memory card interface module (NP1F-MM1), programs and/or system definitions can be read from or written in the CPU module that is connected to the base board (SX bus).



16-4-2 How to handle/operate the memory card

(1) Usable memory cards

Memory cards that can be used with NP1F-MM1 are TYPE I and TYPE II SRAM cards (of 5-VDC specification).

Classification	Manufacturer	Model	Capacity	Access time
SRAM	maxell	ML-256TB4N	256KB	200 (300) ns
		ML-512TB4N	512KB	200 (300) ns
		ML-1M-TB4N	1MB	200 (300) ns
		ML-2M-TB4N	2MB	200 (300) ns
		ML-4M-TB4N	4MB	200 (300) ns

* Availability of these SRAM memory is confirmed by Fuji Electric.

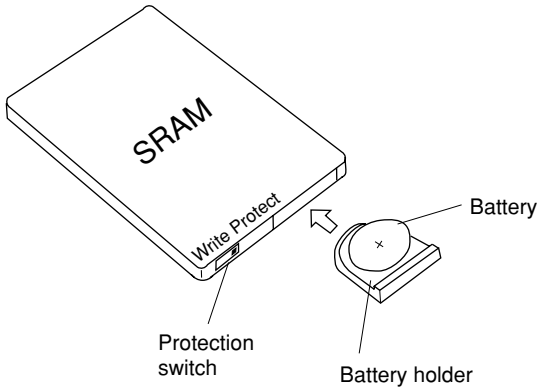
Notes:

(1) There are various types of memory card, for example, SRAM, FLASH, ATA and MINI. Of these, only SRAM cards of the 5-VDC specification can be used with the memory card interface module; SRAM cards of the 3-VDC specification cannot be used.

(2) The maximum memory capacity of the SRAM cards available with NP1F-MM1 is 32M bytes.

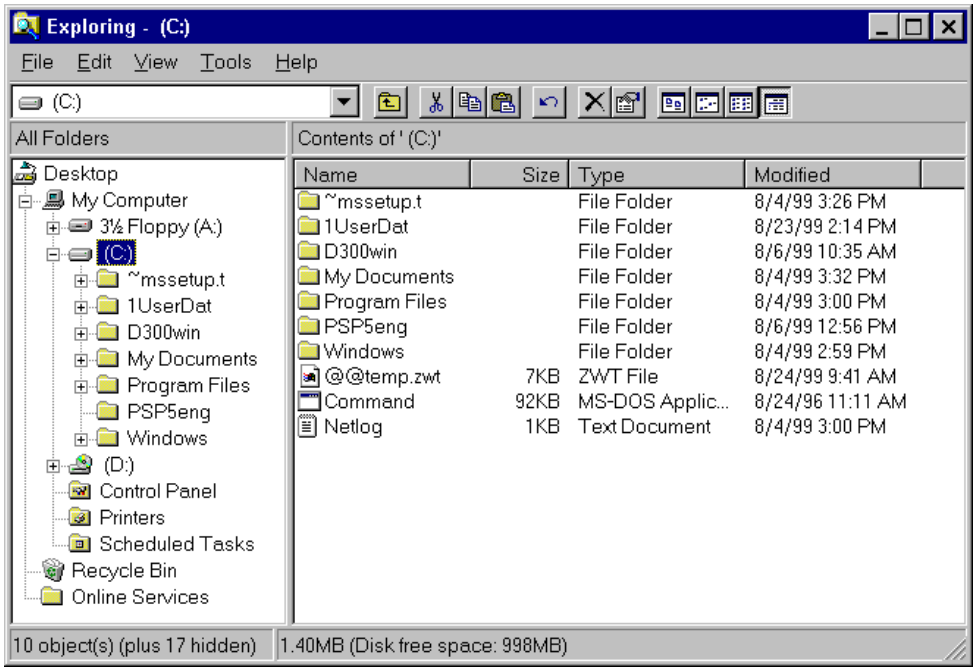
(2) Initialization of memory card
An SRAM card to be used must be initialized in MS-DOS FAT (File Allocation Table) format.

(3) Preparation of SRAM memory card
This preparation includes setting a battery in the SRAM memory card and releasing the memory protection switch.



(4) Computer setting for using the SRAM memory card
For a computer with a PC card slot, first the software for using SRAM memory card needs to be registered in the “config.sys” file.

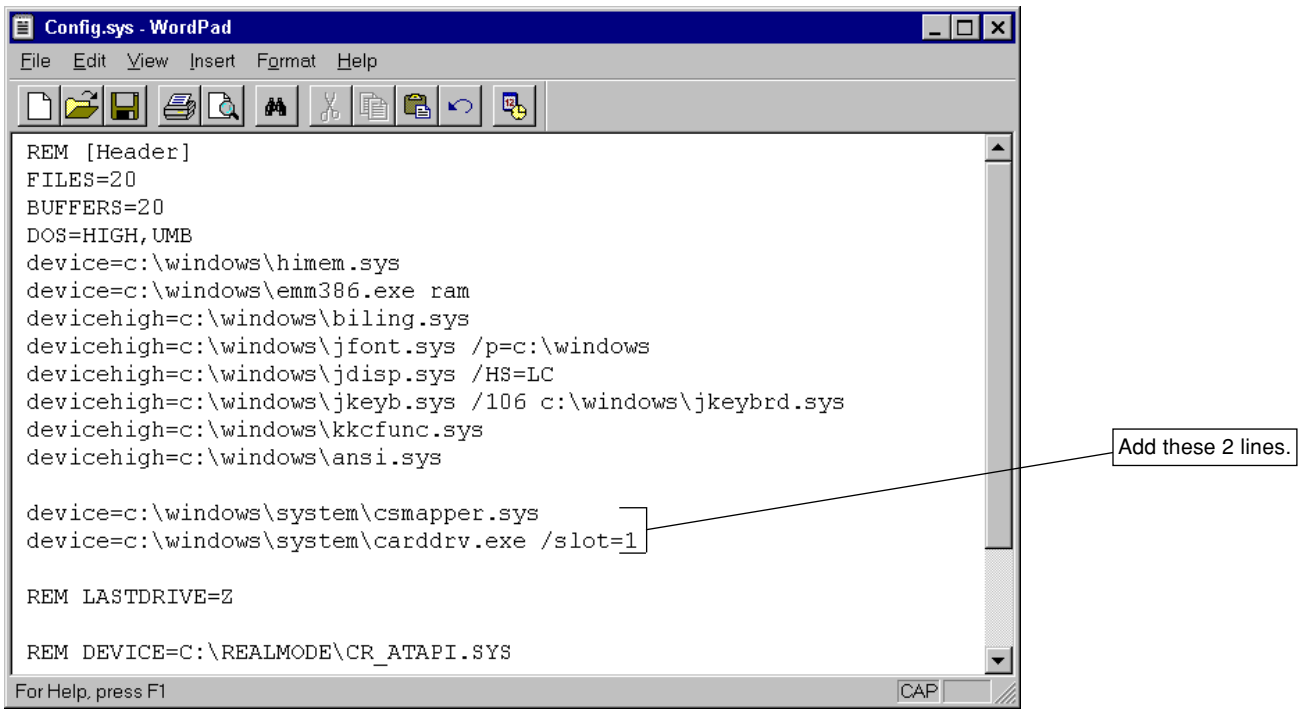
1) Check where “config.sys” file is located.
In general, the “config.sys” file exists in the route directory for drive C (startup drive).



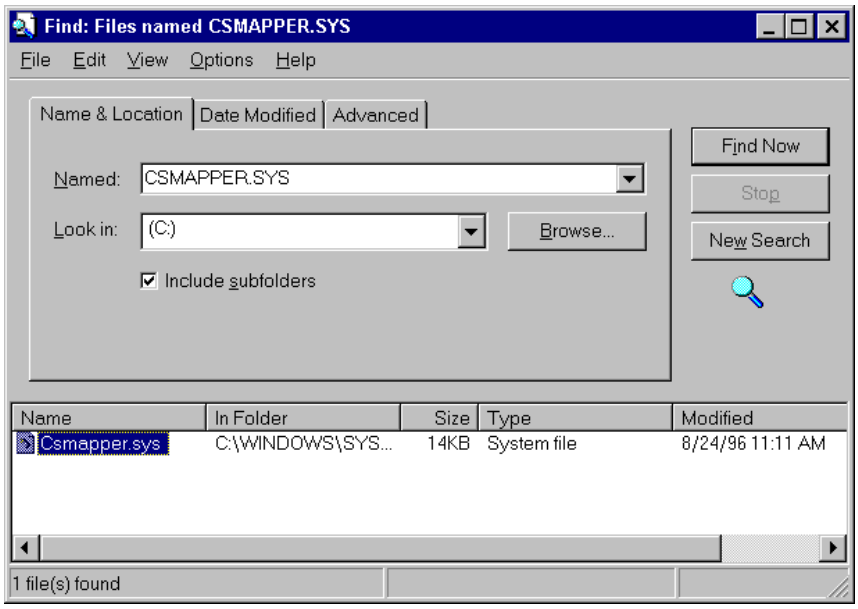
2) Open the “config.sys” file by a text editor such as a memo pad to add the following lines at the end of the file (when Windows is set up in the Windows folder in drive C).

```
device=C:\windows\system\csmapper.sys
device=C:\windows\system\carddrv.exe/slot=n
```

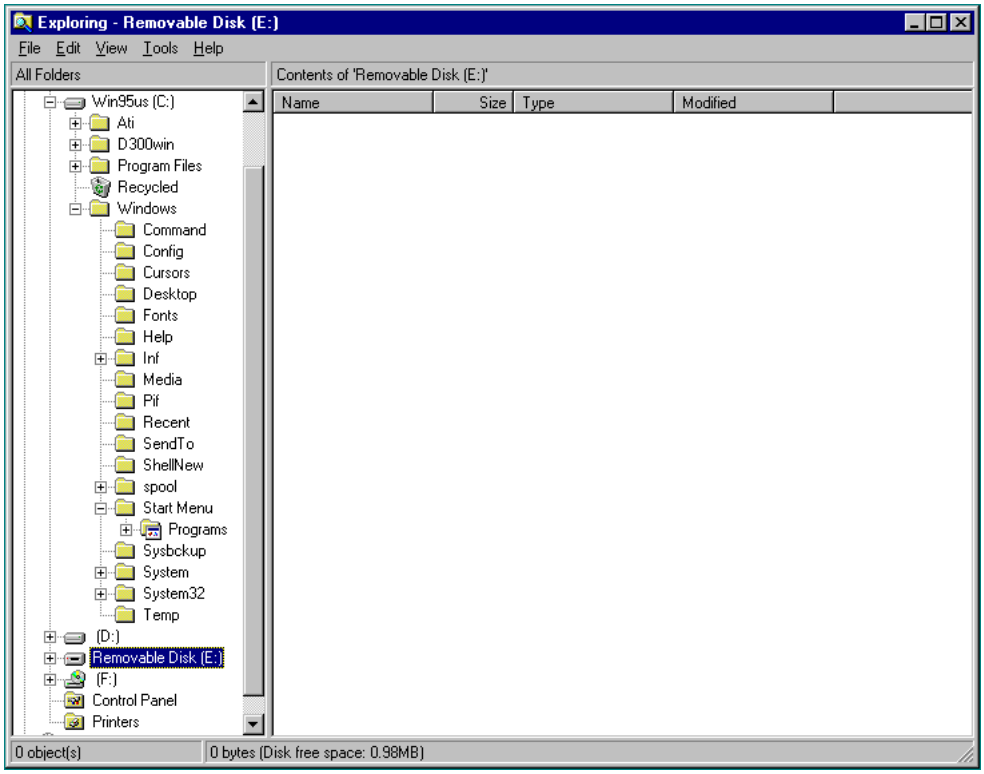
For the value of “n”, input the number of PC card slots (generally “1” or “2”) in the computer used.



3) Overwrite the changes in “config.sys” file and store the data.
4) Make sure that files “CSMAPPER.SYS” and “CARDDRV.EXE” exist in the “WINDOWS\SYSTEM” folder. For this, right-click the [Start] command of Windows and left-click the [File and Folder] in the [Find] menu, specify “CSMAPPER.SYS” and “(C:)” in the [Named:] and [Look in:] boxes, and left-click the [Find Now] button. It is OK when the display becomes as follows.



5) Restart the computer.
This completes the setup for using the SRAM memory card.
6) Insert the SRAM card in the PC card slot of the computer, and check the status of the microcomputer by the Explorer. The system is ready when the “Removable disk” is indicated in the window, as shown below. (This removable disk is the SRAM.)



(5) Initialization of SRAM memory card

1) Make sure that the SRAM memory card to be initialized is inserted in the PC card slot of the computer.
2) Open the MS-DOS window by MS-DOS prompt of Windows95, and execute the file format command on the drive where the SRAM memory card is inserted.

<Sample input of format command when SRAM memory card is set on drive D>
Input “format d:” and press the “Enter” key.

C : \ > format ␣ d :

Format command

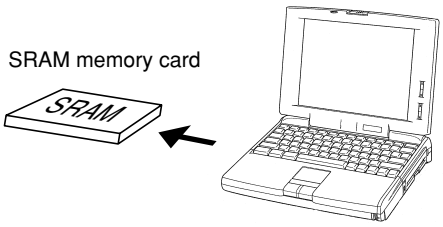
The drive name in which the memory card is set

After this, operate according to instructions on the screen.

```
C:\WINDOWS>cd:\

C:\>format E:
Insert new diskette for drive E:
and press ENTER when ready...

Checking existing disk format.
Verifying 1.02M
Format complete.

Volume label (11 characters, ENTER for none)?

    1,036,800 bytes total disk space
    1,036,800 bytes available on disk

          512 bytes in each allocation unit.
        2,025 allocation units available on disk.

Volume Serial Number is 2874-19DF


C:\>
```

16-4-3 Writing programs/system definitions to the memory card

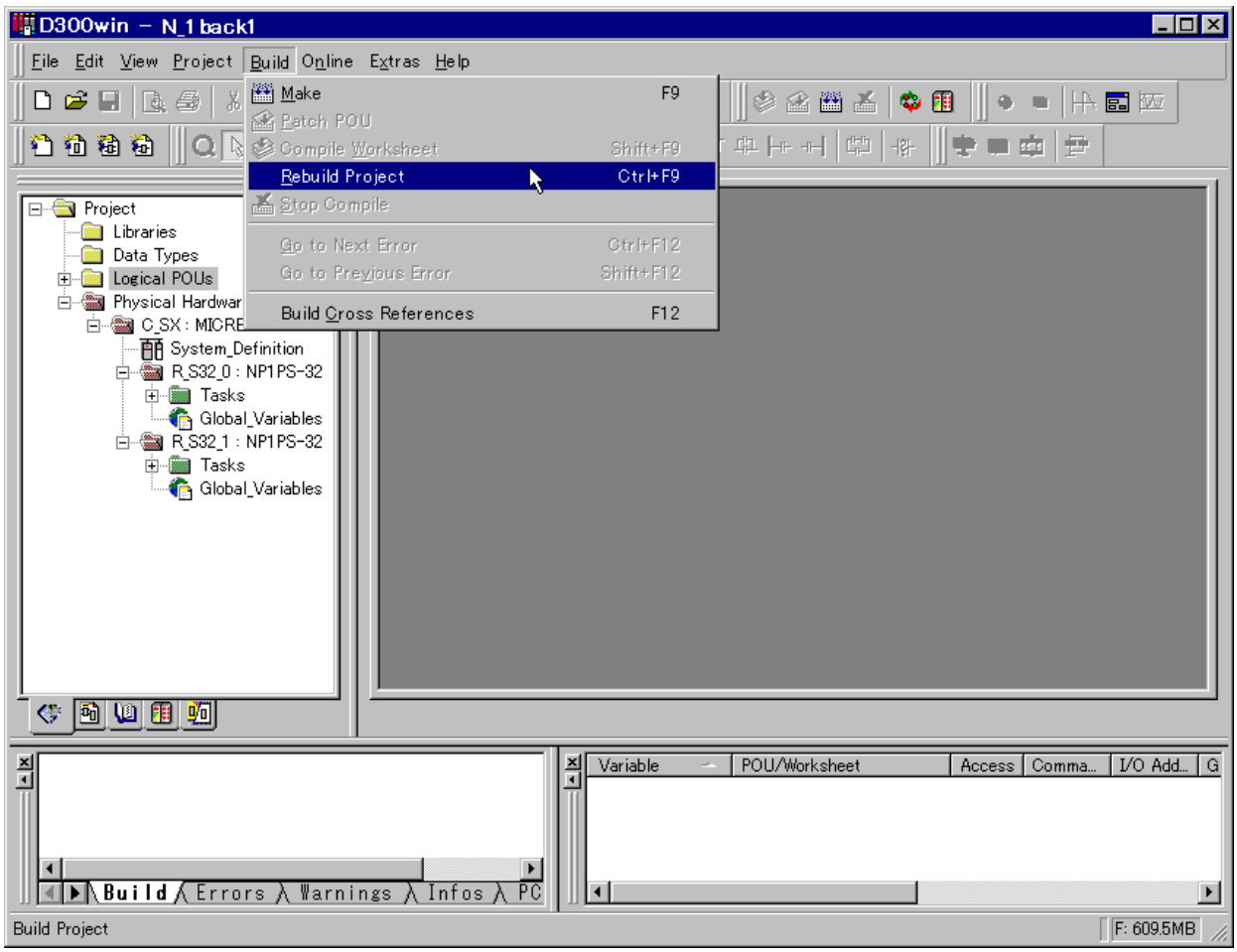
Programs and system definitions in the compiled project are written to the memory card in the PC card socket of the personal computer with the D300win system installed.



D300win

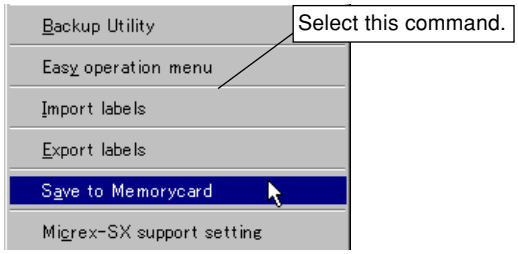
The procedure for this is as follows:

- ◊ Insert the memory card in the PC card socket of the personal computer. (For how to insert the memory card, see the instruction manual for the personal computer.)
- ◊ Start the D300win system.
- ◊ Open the project file which is to be stored in the memory card.
- ◊ When the project is not yet compiled, compile it.

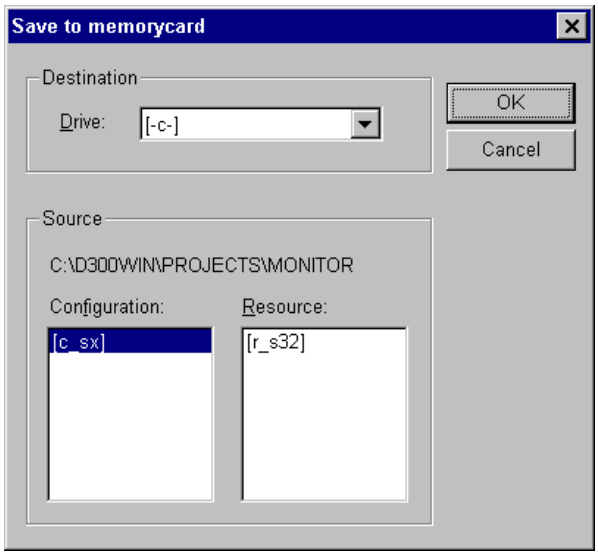


16-4 Function to Save Projects In a Memory Card

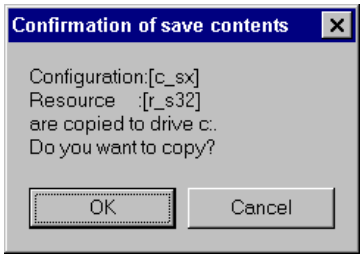
◊ Left-click [Utility] in the [Extras] menu, and then left-click the [Save to Memory card] command.



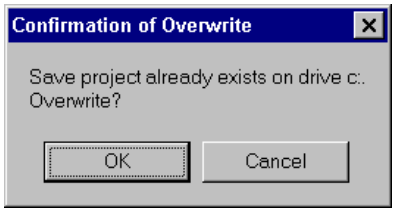
The {Save to memory card} dialog box will then be opened.



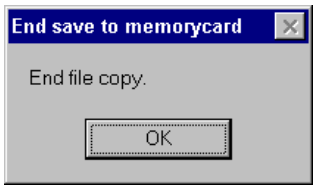
◊ From the [Drive:] list box in the [Destination] box, select the drive No. where the memory card is inserted.
◊ From the [Configuration:] list box in the [Source] box, select the configuration to be saved.
* For a multi-CPU system or redundant CPU system, multiple resources can be selected.
◊ From the [Resource:] list box in the [Source] box, select a resource to be saved.
Left-clicking the [OK] button opens the [Confirmation of save contents] message box as shown below.



◊ When the content of this message box is correct, left-click the [OK] button.
If the project file has already been created in the memory card, the following message box is displayed.



◊ To overwrite the file data, left-click the [OK] button; otherwise, left-click the [Cancel] button.
◊ When file overwriting is completed normally, the following message box is displayed.



◊ Left-click the [OK] button to close the message box.

Appendix 1 Expansion Function Block (FB)

page

Appendix 1-1 Expansion Function Block List

(1) Products included with D300win (model: NP4H-SEDV2)

Project Name	FB Name	Function	Applicable Manual (No.)	Applicable Module Model
_MHCNT	_MHCNTR	High-speed counter FB (multi-functional)	High-speed counter module (FEH210)	NP1F-HC2
	_MHCNTH	High-speed counter FB		
	_MHCNTM	8-channel counter FB		NP1F-HC8
	_MHCNTD	High-speed DI FB	Digital high-speed input module (FEH211)	NP1X3209-A
_MSPOS	_MSMOV	Easy positioning FB	Compact 1-axis position-ing FB package (FEH219-1)	NP1Y32T09P1-A
	_MSMVDA	Data setting FB for easy positioning		
_C_free	_C_free	General-purpose communication (free protocol) FB	General-purpose communication module (FEH225)	NP1L-RS1 NP1L-RS2 NP1L-RS4
_C_fr256	_C_fr256			
_C_fr128	_C_fr128			
_C_fr64	_C_fr64			
_C_fr32	_C_fr32			
_CfdFRN	_CfdFRN	Fuji inverter communication protocol interface FB (FRENIC5000)	FA equipment general-purpose communication package (FEH240)	
_CfdFVR	_CfdFVR	Fuji inverter communication protocol interface FB (FVR11)		
_CfdPKX	_CfdPKX	Fuji barcode reader interface FB for general-purpose communication module (PK2/PK3)		
_CfdPYX	_CfdPYX	Fuji temperature controller master interface FB for general-purpose communication module (PYK)		

(2) Optional expansion function block (FB) package

Package Name	Model (Product Code)	Content
Positioning FB	NP4N-PTPFV2	Positioning FBs + Assistant utilities
Electronic cam FB	NP4N-CAMFV2	Electronic cam FBs + Assistant utilities
Failure diagnosis FB	NP4N-TRBFV2	Failure diagnosis FBs + Assistant utilities
PID FB	NP4N-PIDFV2	PID FBs + Assistant utilities
FA equipment general-purpose communication FB	NP4N-COMFV2	FA equipment general-purpose (RS-232C) communication FBs + Assistant utilities

Appendix 1-2 Install/Uninstall of Expansion Function Blocks

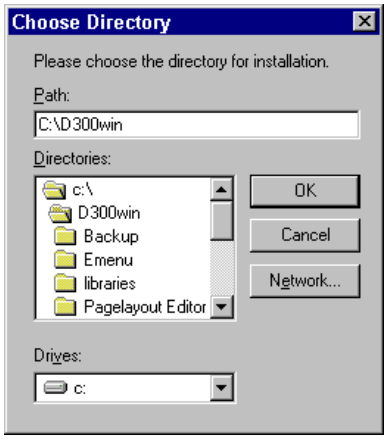
(1) Standard expansion FB package

The D300win system set (model: NP4H-SEDV2) includes the "standard expansion FB diskettes" in addition to the D300win system software.
The first diskette includes the installation program which automatically executes operations required for installation and registration.

(2) Installing the standard expansion FB

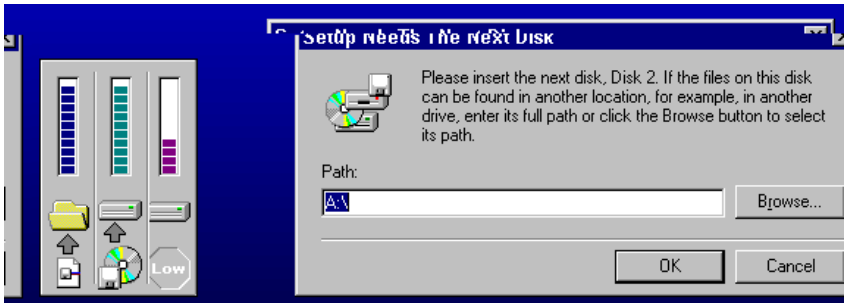
☝	Installation of the standard expansion FB requires approximately 120MB of free space on the hard disk.

1) Disable any virus detection software and screen saver.
2) Select [Control panel] from the [Settings] submenu under the Windows95/98 [Start] menu.
3) Left-double-click the [Add/Remove Programs] icon in the {Control panel} dialog box.
4) Left-click the [Install...] button.
5) Insert the No. 1 system disk, which contains the installation program, into the floppy disk drive.
6) Left-click the [Next >] button.
7) Make sure that “A:\SETUP.EXE” is displayed in the {Command line for installation program : } text box. If not, left-click the [Browse...] button, select the drive No. for the floppy disk drive, and select file name [Setup.exe]. Left-click the [Finish] button.
8) {Install Shield Wizard Preparing} working box appears on the screen. A dialog box appears in which installation related information and how to operate this program are displayed.
   Left-click the [Next >] button.
   The {Choose Destination Location} dialog box appears.
9) When you want to change the default directory for installation (C:\D300win), left-click the [Browse...] button, designate the desired directory for installation in the {Choose Directory} dialog box, and left-click the [Yes] button.

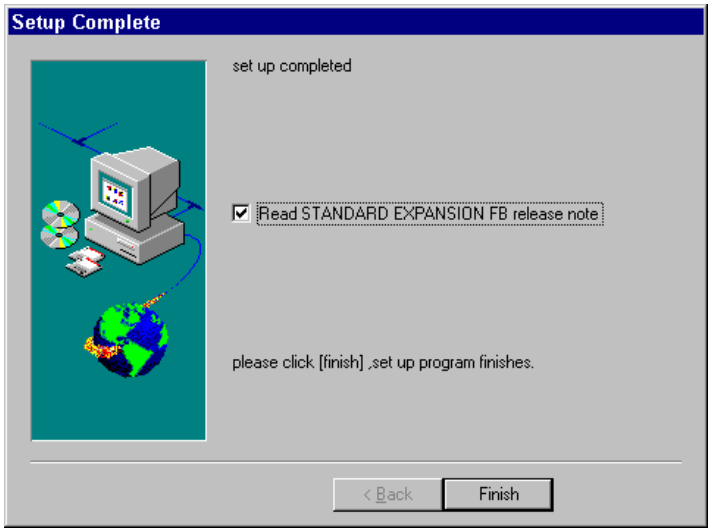


If the designated installation directory for does not exist, the following message box will appear on the screen.
After confirming the message, left-click the [OK] button.

10) The {Start file copying} dialog box appears on the screen. After checking the contents, left-click the [Next >] button, and file copying will be started.
11) When the installation of the first system disk ends, the {Setup Needs The Next Disk} dialog box as shown below appears on the screen.
Insert the second disk, and left-click the [OK] button. Install the third and following disks in the same manner.



12) When setup completes, the following screen appears.



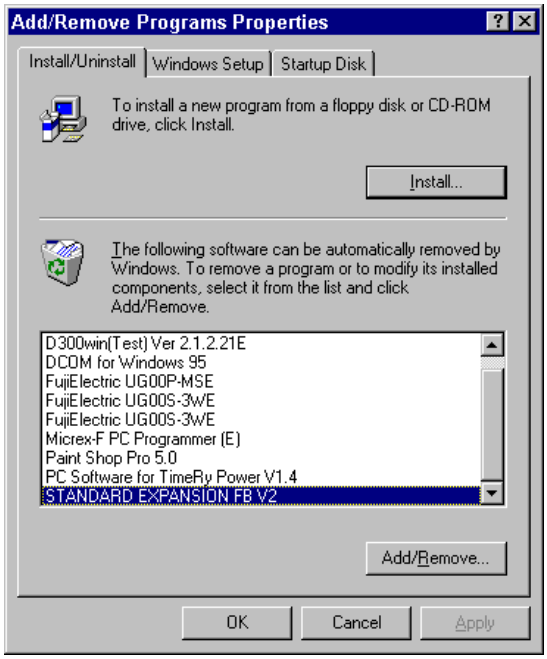
To [Read the product information of the standard expansion FB], left-click the [Finish] button with the check box checked. To finish the installation without reading the product information, left-click the [Finish] button with the check box unchecked.

Appendix 1-2 Install/Uninstall of Expansion Function Blocks

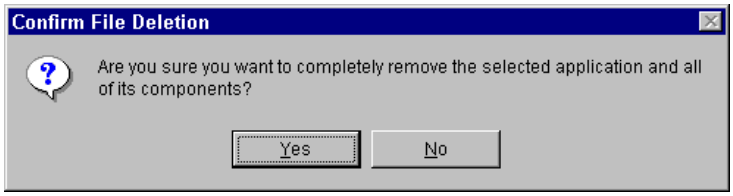
(3) Uninstalling the standard expansion FB

Delete the files associated with the standard expansion FB from the hard disk. Use the following procedure.

1) Select the Windows 95/98 [Start] menu, and select [Control panel] from the [Settings] submenu. The {Control panel} dialog will appear on the screen. Left-double-click the [Add/Remove programs] icon.

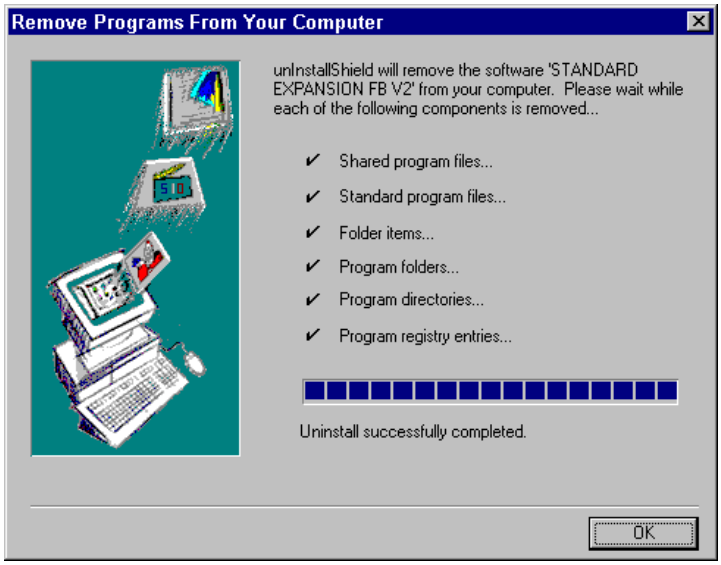


Select [STANDARD EXPANSION FB] from the list on the [Install/Uninstall] panel in the {Add/Remove Programs Properties} dialog, and then left-click the [Add/Remove...] button.



To execute program deletion, left-click the [Yes] button.

2) Deletion is executed.
Upon completion of the deletion, the window shown below will appear and the check mark will be displayed for the items which have been deleted.



3) Left-click the [OK] button to close the {Remove Programs From Your Computer} dialog.

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