

# MotionSuite™ Series Machine Controller Software Manual

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# 1 Outline of Programing Unit

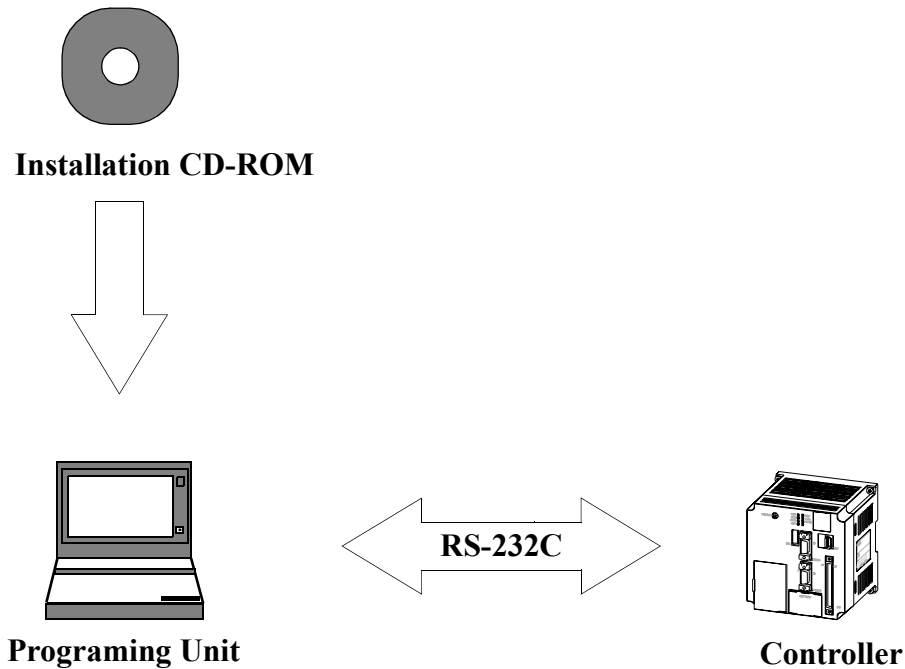
This chapter explains the MotionWorks™ programing unit and outlines its function using the MP9xx.

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## 1.1 Basic Specifications

MotionWorks™ is a programming software used to program the MotionSuite™ series machine controller on a PC.

MotionWorks™ and the controller are connected by an **RS-232C** communication interface.



### 1.1.1 Recommended PC Specifications

The recommended PC specifications for operating MotionWorks™ are shown as follows:

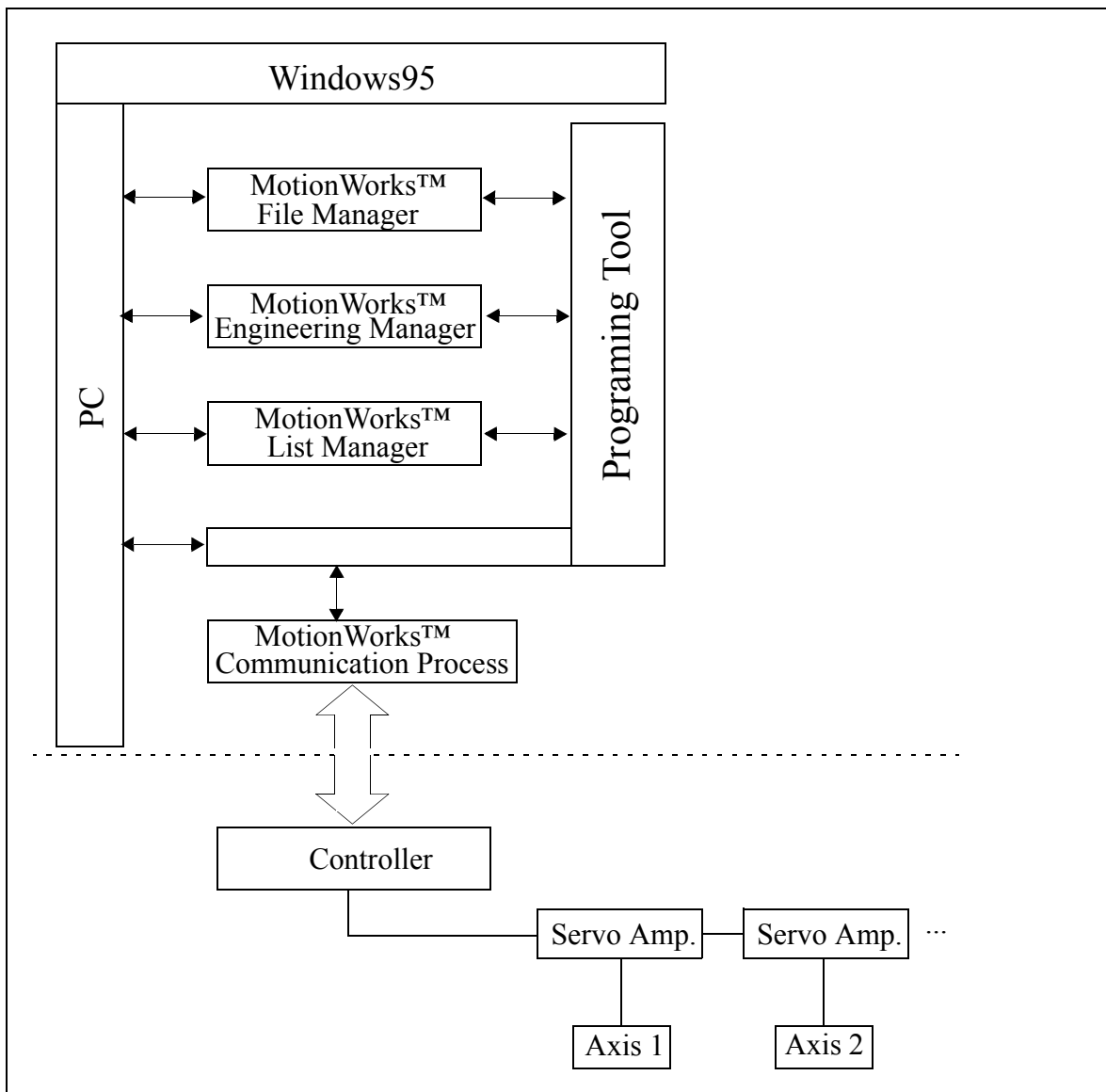
Hardware/Software	Specifications
PC Architecture	IBM PC compatible
CPU	Pentium 133MHZ or greater (or equivalents)
Display Resolution	800 × 600 dot or greater
Memory	32MB or greater
Hard Disk	100MB Free space
Operating System	Windows95/98/NT

## 1.2 System Configuration

This section explains the MotionWorks™ system configuration in a Windows95 environment. MotionWorks™ is composed of **File Manager**, **Engineering Manager**, and **List Manager** which are in charge of user interface, as well as the **Communication Process** which handles communication with the controller. Various programming tools are included in these management programs.

### 1.2.1 MotionWorks™ System

The MotionWorks™ software runs multiple programs simultaneously in a Windows environment.



## 1.3 Basic Functions

In this section, all functions provided by MotionWorks™ are shown in the following list.

### 1.3.1 Basic Functions List

MotionWorks™ basic functions can be classified in nine (9) primary functions. The nine primary functions are further categorized into secondary and tertiary functions.

Number	Primary Function	Secondary Function
1	File Manager	File Management
		User Management
		File Transfer
2	System Configuration	System Configuration
		Scan Time Set-up
		Application Information
		Fault Monitor
		Data Trace
		Group Definition
		Motion Parameter
3	Module Configuration	Configuration Definition
		General Serial Definition
		Local I/O Definition
		Network Definition
4	Tools	Register List
		Cross Reference
		Disable Coil List
		Register Number Search/replace
		Comment Bar
5	Document	Print
6	Ladder Programing	Property Set-up
		Main Program Creation
		Table Format Program Creation
		Tuning Panel Creation
7	C Register	C Register Creation
8	Table Data Definition	Table Data Creation
9	Motion Programing	Motion Edit
		Position Monitor
		Task Monitor
		Motion Alarm

### 1.3.2 Detailed Function List

In addition to the primary and the secondary functions, the tertiary functions are listed as follows:

Primary Functions	Secondary Functions	Tertiary Functions
File Manager	File Management	Rename
		New PLC Registration
		PLC Information Change
		Folder/file Deletion
		Log On/log Off To CPU
		On-line/off-line Mode Switching
		CPU Status Switching
		Dwg/function Program Edit
		Information Update
	User Management	User Management
		Default User Set-up
	File Transfer	Batch Transfer
		Individual Transfer
		Continuous Transfer
		Flash Memory Transfer
Multi-CPU Transfer		
System Configuration	System Configuration	System Configuration
		Configuration Data Save
	Scan Time	PLC Selection
		Scan Time Set-up
		Set-up Data Save
	Application Information	Information Set-up
		Information Save
	Fault Monitor	Fault Definition
		Annunciator Signal Definition
		Fault Status Display
		Fault Display During Operation
		Fault Trace Display
		Definition Data Save
		Definition Data Deletion

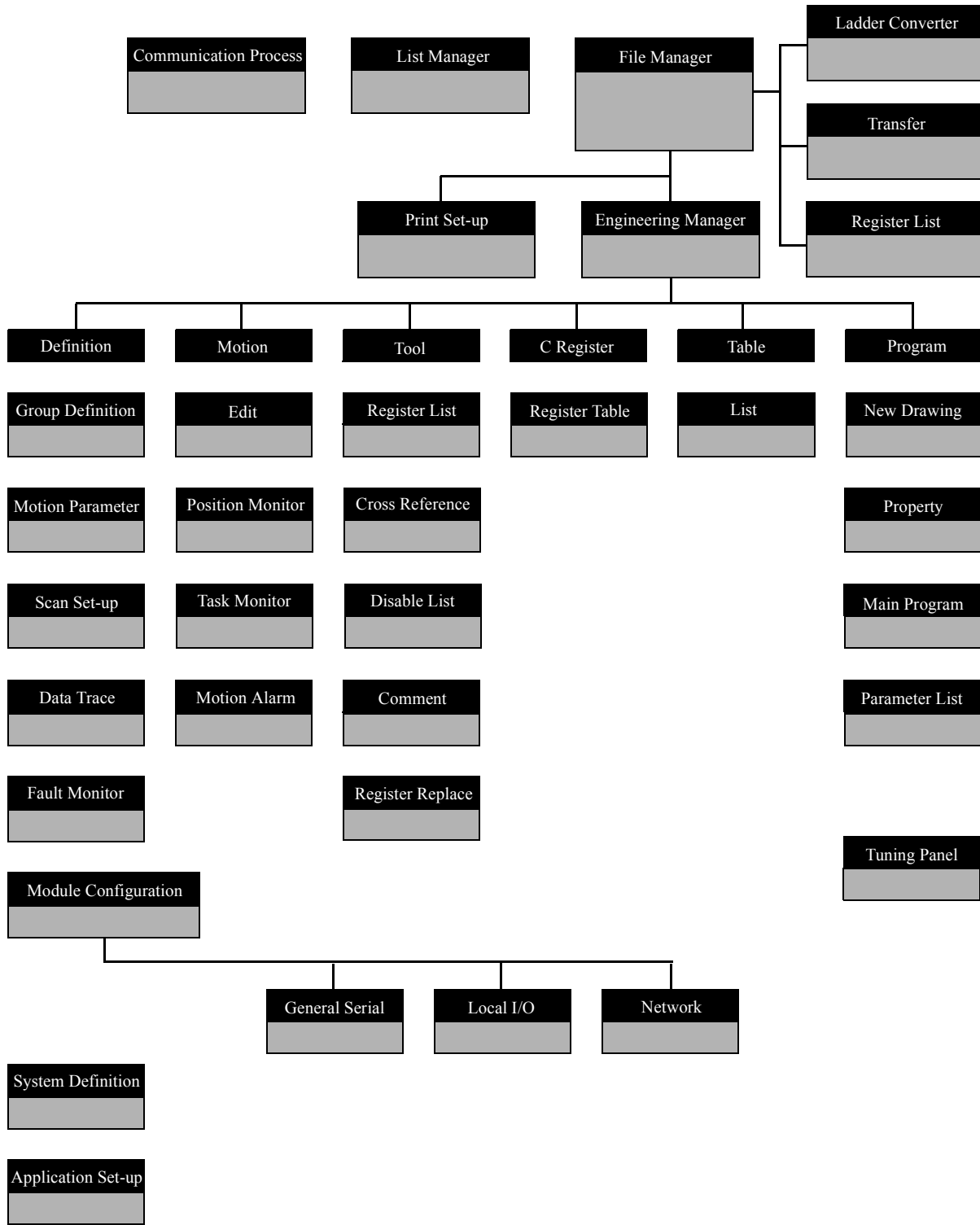


System Configuration	Data Trace	Trace Data Definition
		Definition Data Save
		Definition Data Deletion
		Trace Data Write
		Trace Data Read
		Data Trace Start
		Trace Data List Display
		Trend Graph Display
	Group Definition	Group Set-up
		Save
		Delete
	Motion Parameter	Parameter Set-up
Save		
Delete		
Monitor		
Module Configuration	Configuration Definition	Configuration Set-up
		Save
		Delete
	General Serial Definition	Serial Port Set-up
		Save
		Delete
	Local I/O Definition	Local I/O Set-up
		Save
		Delete
	Network Definition	Network Set-up
		Save
		Delete
Tools	Register List	Monitor Register Value
		Change Display Format
		Change Register Value
	Cross Reference	Cross Reference Execution
	Disable Coil List	Disable Coil Search
	Register Number Search/Replace	Data Input
		Search/Replace Execution
Comment Bar	Comment Creation	
	Update Comment Information	
Document	Print	Print Data Set-up
		Print Execution
		Print Status Display
		Print Set-up File Edit
		Print Result Sample

Ladder Programing	Property Set-up	Information Definition
		Input/Output Definition
		Symbol Definition
		#Register List
		Revision History
		Property Set-up Data Save
	Main Program Creation	Display Mode Switch
		Command Input
		Program Save
		Program Print
	Table Format Program Creation	Input Mode Switch
		Table Data Input
		Table Edit
		Table Format Program Save
	Tuning Panel Creation	Input Mode Switching
		Definition Data Input
Tuning Panel Edit		
Tuning Panel Save		
C Register	C Register Creation	C Register Table List
		C Register Table Creation
Table Data Definition	Table Data Creation	Table Data List
		String Data Attribute Set-up
		Table Data Set-up
Motion Programing	Motion Edit	Motion Property
		Import/export
		Text Edit
		Debug
		Position Instruction
	Position Monitor	Display Current Position
	Task Monitor	Display Task Status
Motion Alarm	Display Error	

### 1.3.3 Function Tree

Each function unfolded from the File Manager Window is shown as follows:



## 2 Installation

This chapter explains how to install the MotionWorks™ system on the PC, as well as the communication settings necessary for connecting to the PLC.

2.1	Installation Procedures .....	2-2
2.1.1	Preparing the Installation Disk .....	2-2
2.1.2	Set-up Preparation .....	2-2
2.1.3	Starting Set-up .....	2-3
2.1.4	User Registration .....	2-4
2.1.5	Selecting Destination Directory .....	2-5
2.1.6	Selecting Program Folder .....	2-6
2.1.7	Modifying Input Information .....	2-7
2.1.8	Starting File Copy .....	2-8
2.1.9	Completing File Copy .....	2-9
2.1.10	Completing Set-up .....	2-10
2.1.11	Created Folders Upon Installing .....	2-10
2.2	Communication Settings .....	2-12
2.2.1	Calling up Communication Manager .....	2-12
2.2.2	Setting Communication Port .....	2-13
2.2.3	Saving Communication Port Setting Values .....	2-14
2.2.4	Communication Process Completion .....	2-14

## 2.1 Installation Procedures

This section explains how to install the MotionWorks™ software.

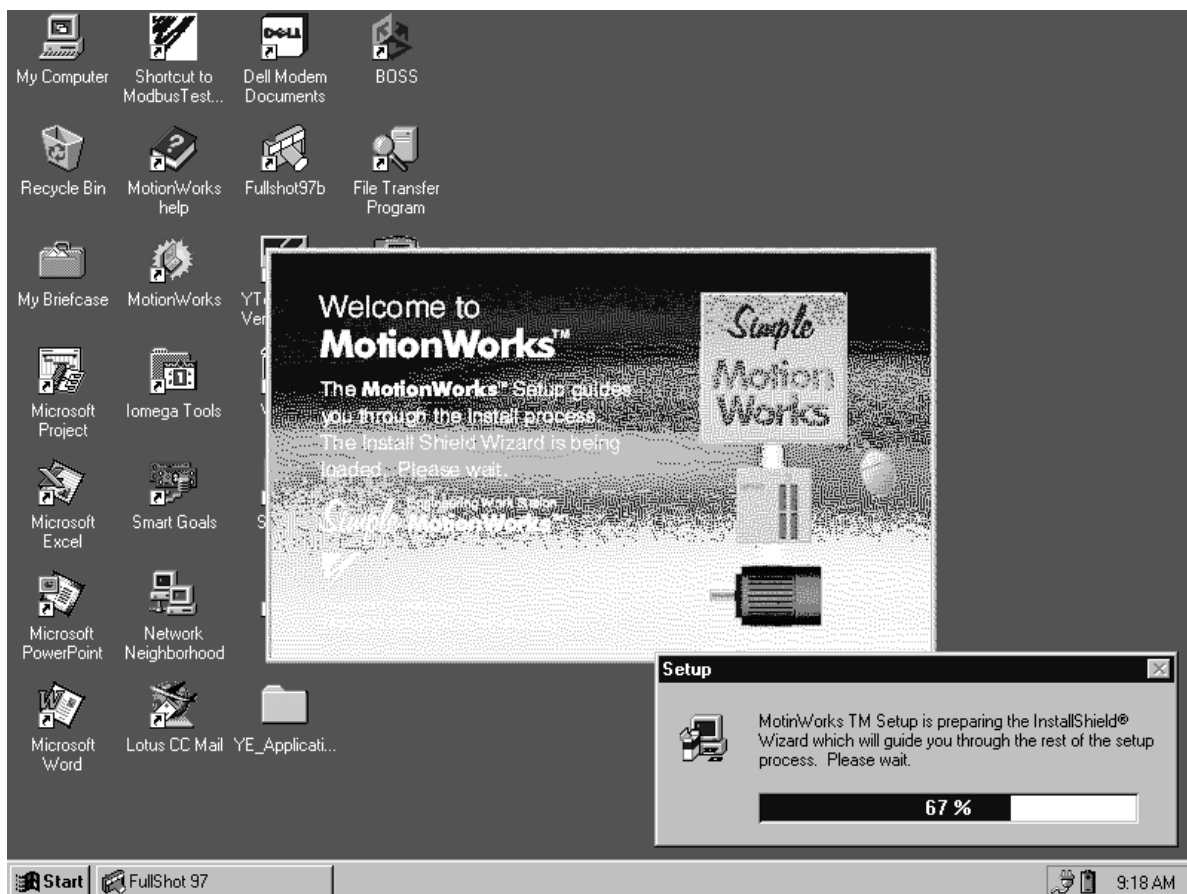
### 2.1.1 Preparing the Installation Disk

#### ■ Starting the CD-ROM

Double-click the “set-up.exe” to start the installation.

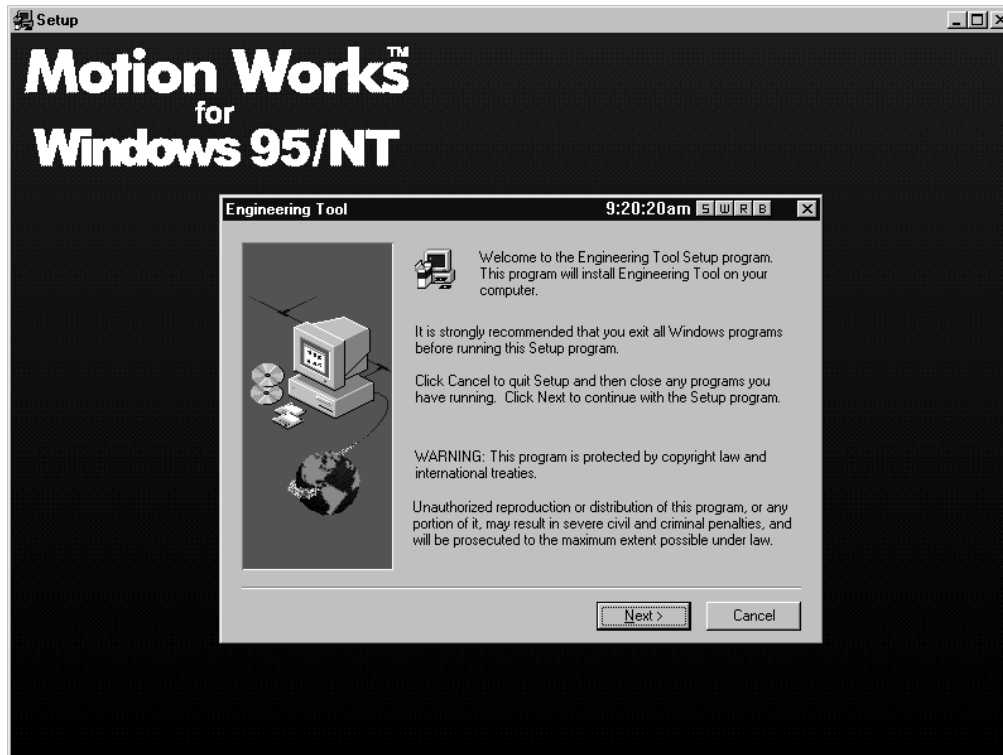
### 2.1.2 Set-up Preparation

The preparation screen of the set-up is shown as follows. Wait during the installation preparation until the next screen is displayed.



### 2.1.3 Starting Set-up

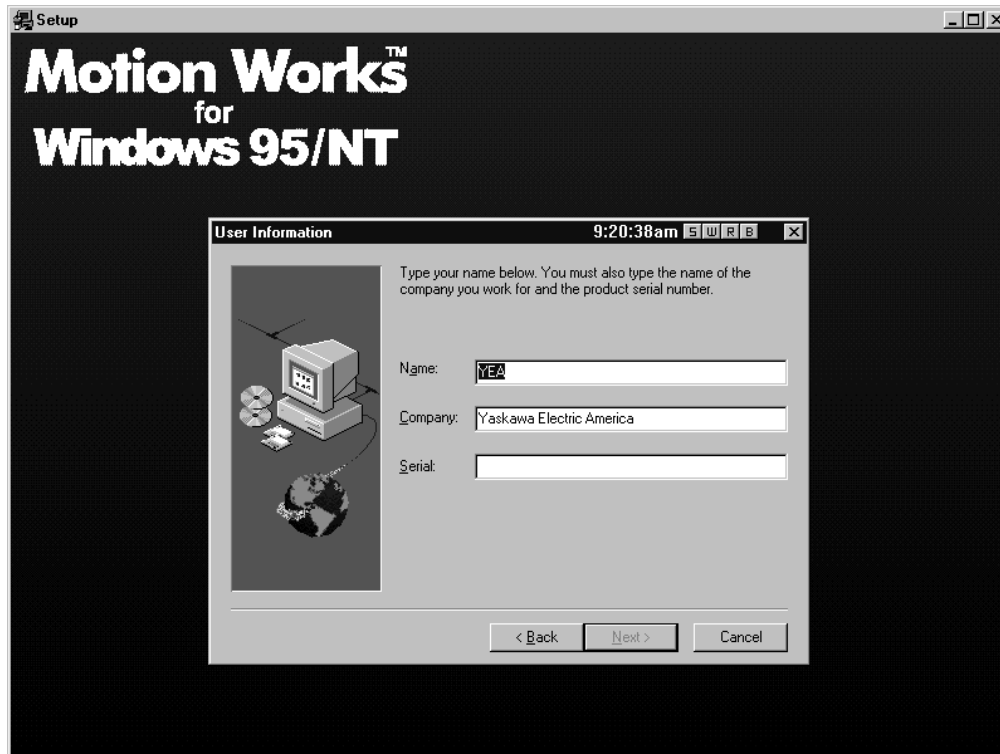
When the preparation is complete, the whole screen is initialized; and the installation is started. Read the message displayed on the screen, then click the **Next** button to start the set-up. The set-up can be terminated by clicking the **Cancel** button.



## 2.1.4 User Registration

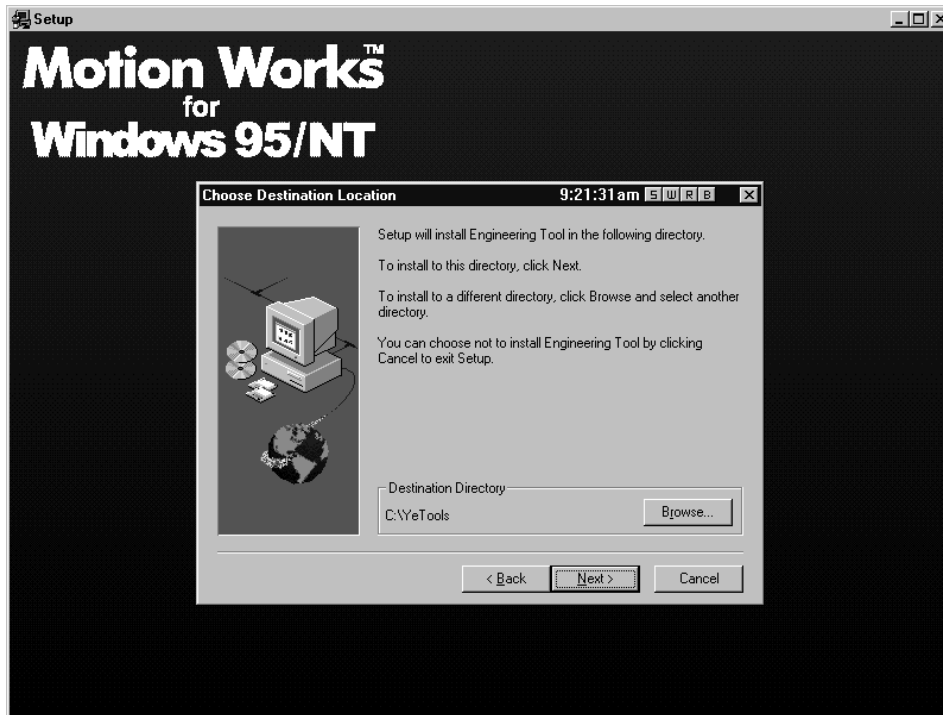
The user registration screen is displayed. Input name, company name, and serial number.

As in item 2.1.3 above, the process moves forward when the **Next** button is clicked, returns to the previous screen when the **Back** button is clicked; and the set-up operation terminates when the **Cancel** button is clicked.



## 2.1.5 Selecting Destination Directory

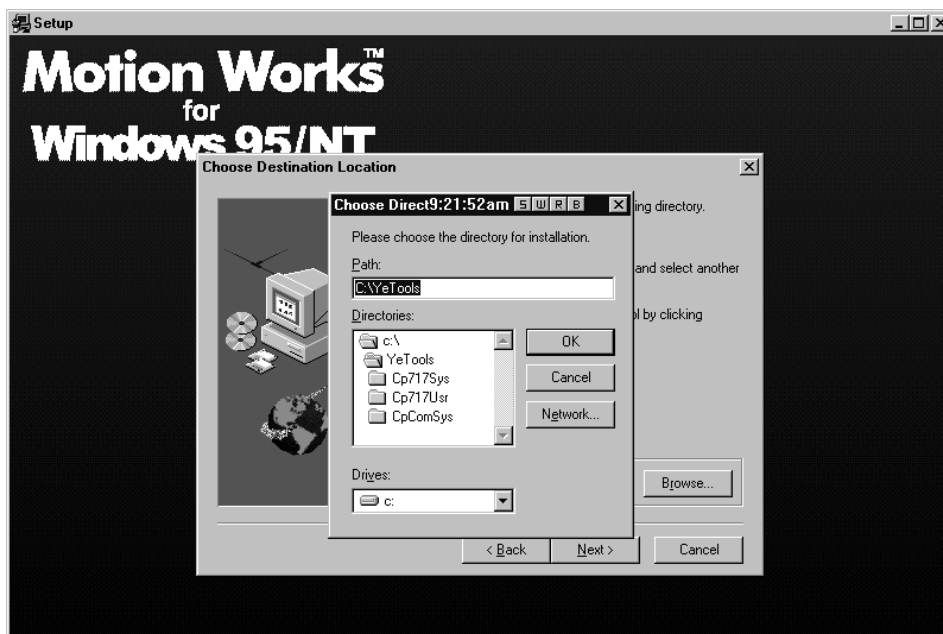
The destination directory can either be default or chosen.



The above screen shows the installation destination directory.

C:\YeTools\ is the system default. User designation is available by clicking the **Browse** button; however, using C:\YeTools\ is recommended.

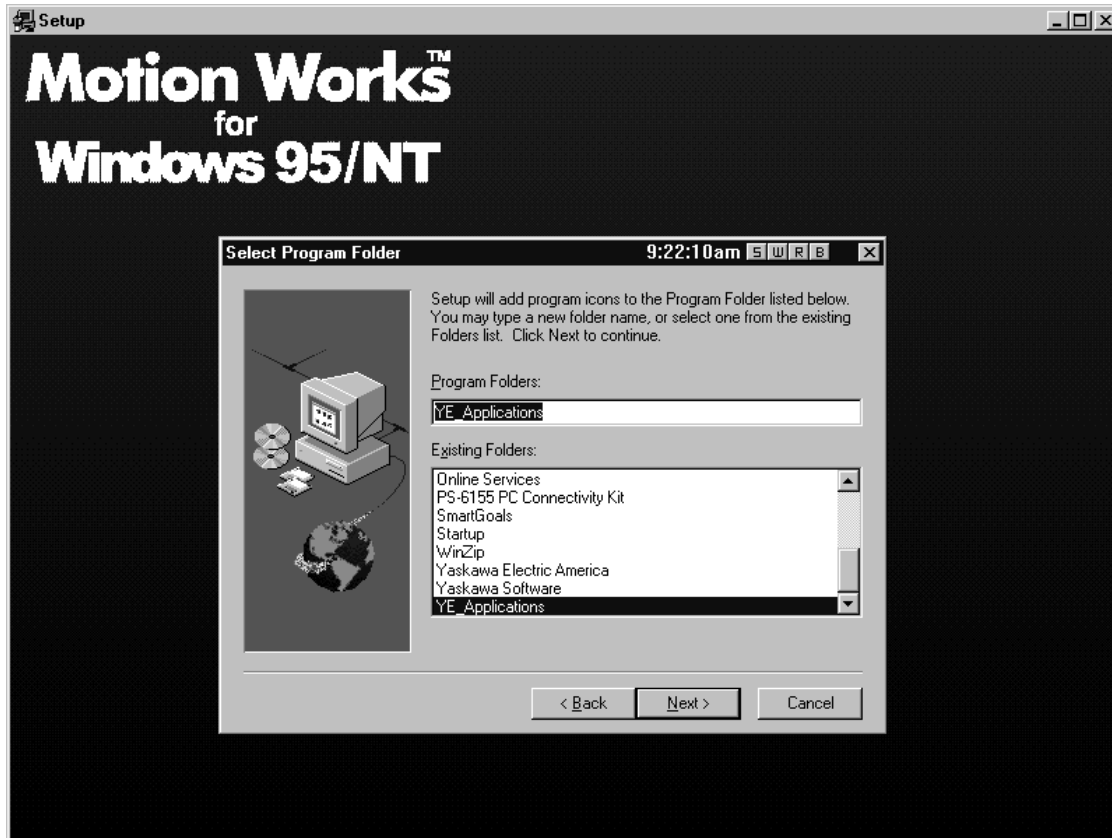
When **Browse** is selected, the following directory selection screen is displayed. Any of these directories can be selected.





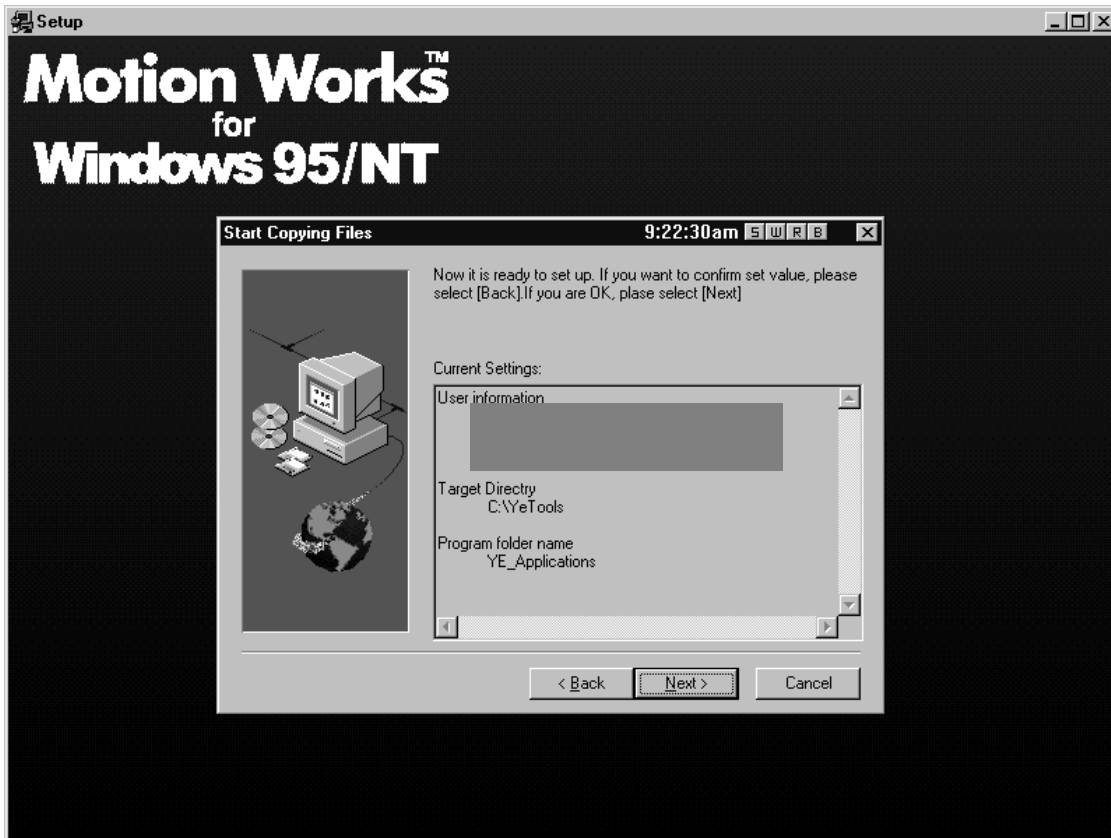
## 2.1.6 Selecting Program Folder

The program folder selection screen is shown below. Designate the program folder to register a group of applications. It is possible to select an existing folder other than the default, but the default “YE-Applications” is recommended.



## 2.1.7 Modifying Input Information

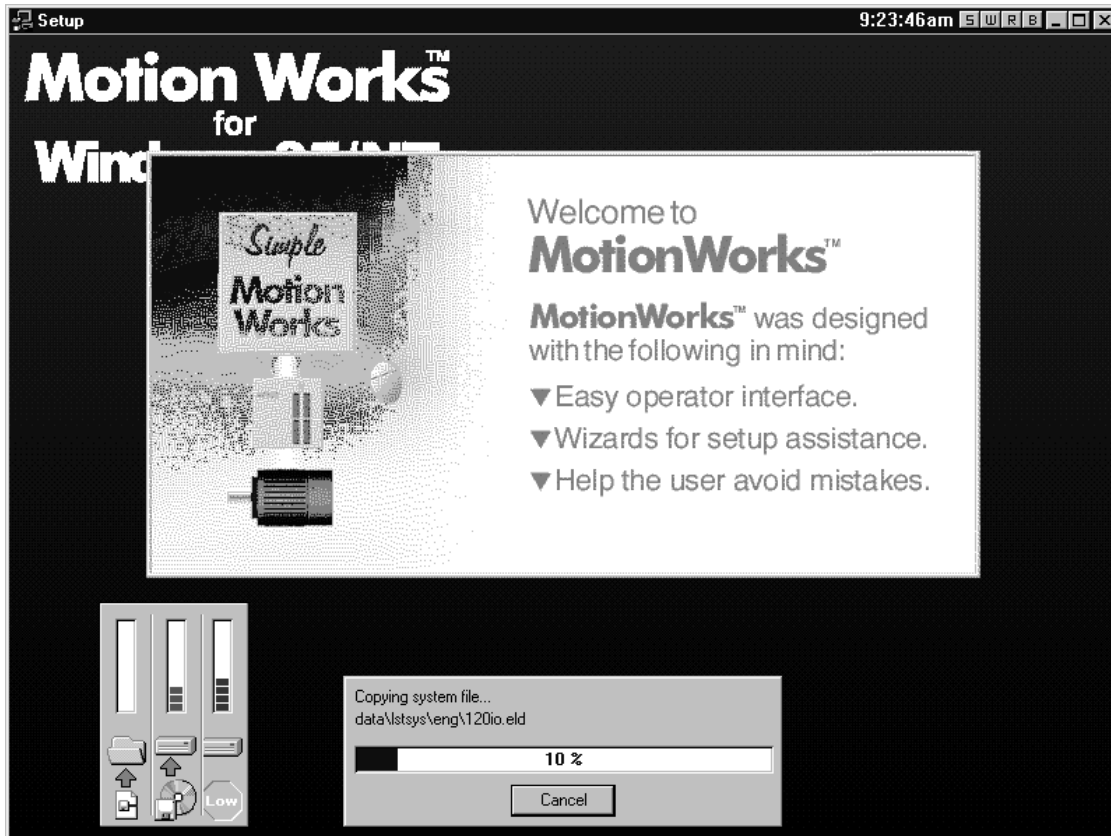
The information input until now is displayed when starting to copy files. Move forward if modification is not needed; click the **Back** button to return to the appropriate screen if modification is necessary.



## 2.1.8 Starting File Copy

File copying starts.

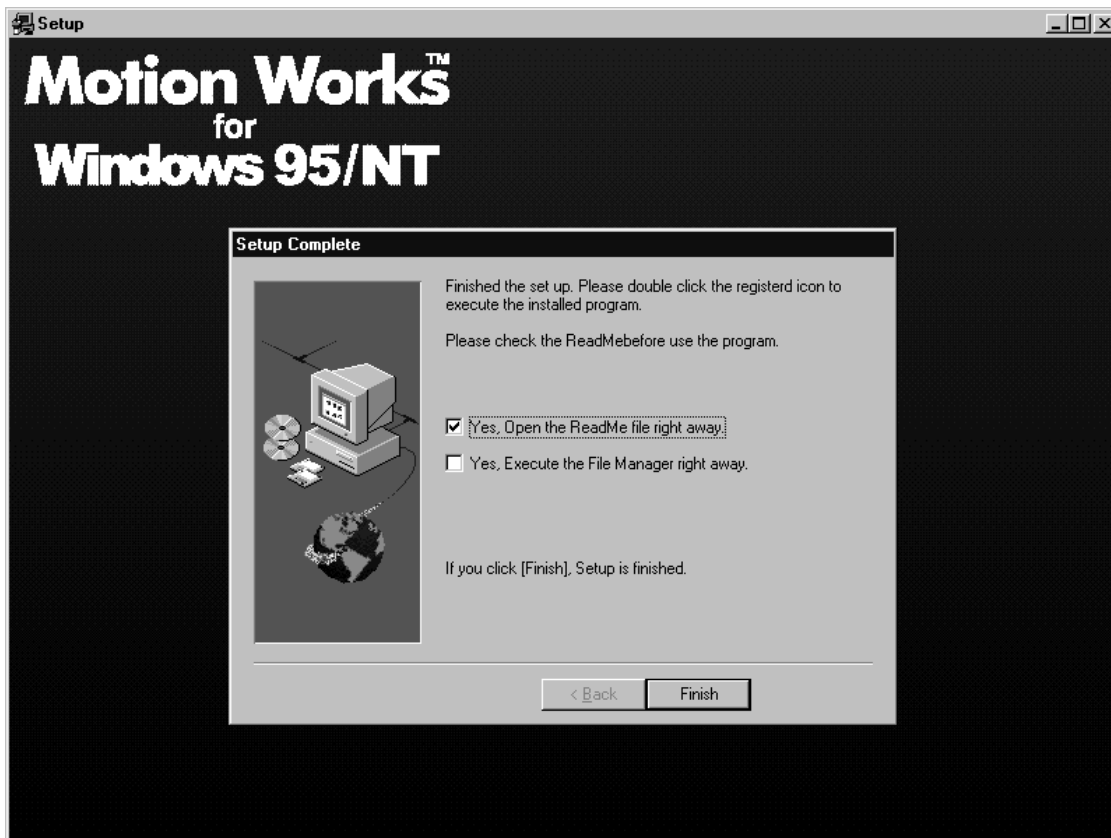
The status of the copying progress can be viewed on the bottom of the screen. Wait until copying is complete.



## 2.1.9 Completing File Copy

When copying is complete, the set-up completion screen is displayed. There are 2 check items on the screen. Choose the necessary one, then click the **Finish** button.

- a. “Open the Readme File”  
Displays the Readme file in which the updated information is written. Do not check this item if it is not necessary.
- b. “Execute the File Manager”  
Starts applications after the set-up is complete.

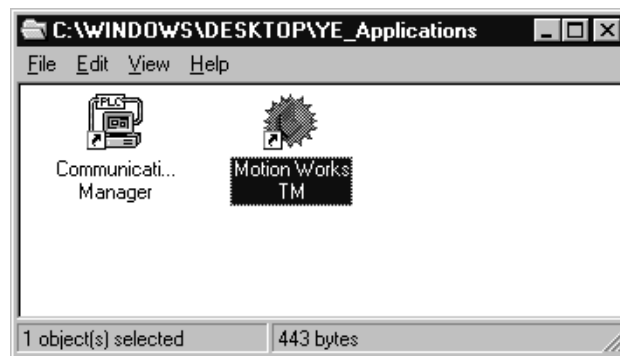


### 2.1.10 Completing Set-up

When the set-up is complete, the program folder (default: YE-Application), which is the platform of the application group, is built in your PC.



When the YE-Applications program folder is clicked, the following contents are displayed.



Click on the **Start** button on the lower-left corner of the screen; program menus are displayed. The application can also be started by selecting from the menus.

### 2.1.11 Created Folders Upon Installing

During installation, the file corresponding to the folder created for each file component\* was copied.

	File Component	Created Folder
1	Readme (update information) file, etc.	\...\YeTools
2	MotionWorks™ program file	\...\YeTools\Cp717sys
3	MotionWorks™ data file	\...\Yetools\Cp717usr
4	WindowsNT communication driver	\...\WINDOWS\system32\Drives
5	Windows95 communication driver	\...\WINDOWS\system
6	Joint DLL	\...\WINDOWS\system32 (NT) \...\WINDOWS\system (95)
7	MotionWorks™ communication program file	\...\YeTools\CpComSys

\* The files are divided by group according to function unit.

a. \...\YeTools

This is the most important folder because it is the base of the MotionWorks™ system. Most files are installed in this folder. The folder name can be changed, but using this standard name is recommended.

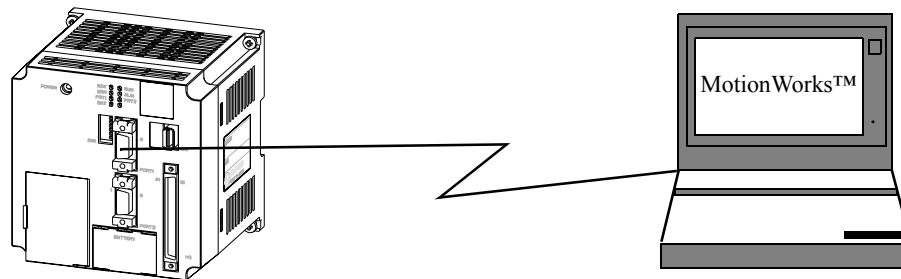
b. \...\WINDIR

This is the folder installed in the Windows 95/NT system. It is indicated as “\...\Windows” in the standard Windows installation. Files such as the communication driver or joint DLL which depend on the Windows system are installed.

## 2.2 Communication Settings

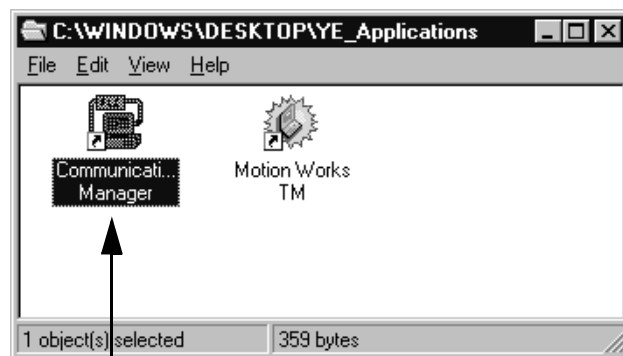
This section explains how to set communication between the MotionWorks™ system and the controller. When the installation is complete, the communication settings of the general serial ports on the MotionWorks™ side must be executed. The standard setting values are baud rate: 19.2Kbps; data bits: 8bit; parity: even; stop bits: 1Stop bit.

Once the values are set, they are saved as the MotionWorks™ system information. Therefore, it is not necessary to set them again unless it is needed.



### 2.2.1 Calling up Communication Manager

The communication setting is executed in the communication process. As explained in Section 2.1: Installation Procedures, when the software installation is complete, the communication process icon (Communication Manager) has been registered in the Ye-Applications program folder. Double-click to call it up.

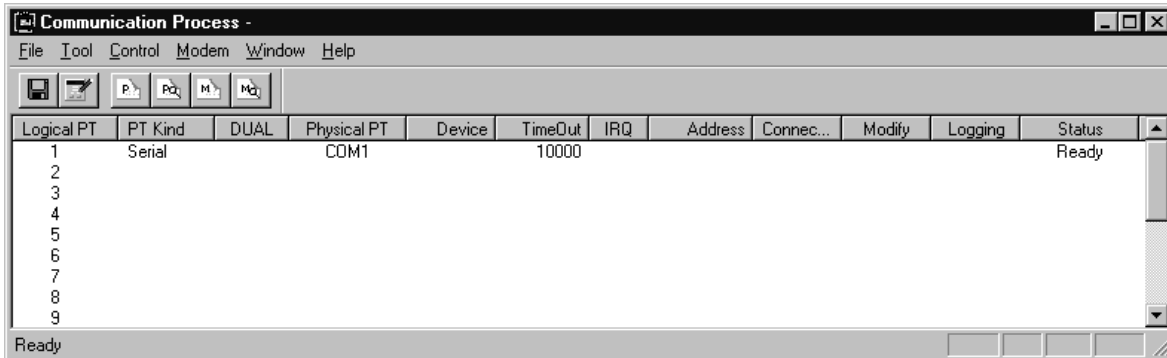


Double-click this icon to call up the Communication Manager.

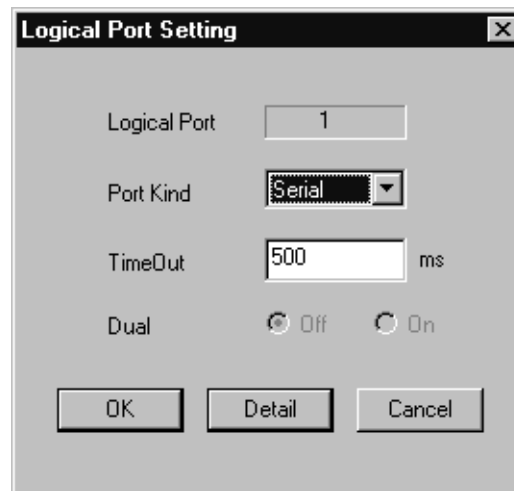
## 2.2.2 Setting Communication Port

The main screen of the communication process is shown as follows. As the RS-232C setting is the standard setting, the logical port1 is the serial.

Either double-click the logical port number, or, select a logical port, then select **Setting (E)** from the **File (F)** menu.

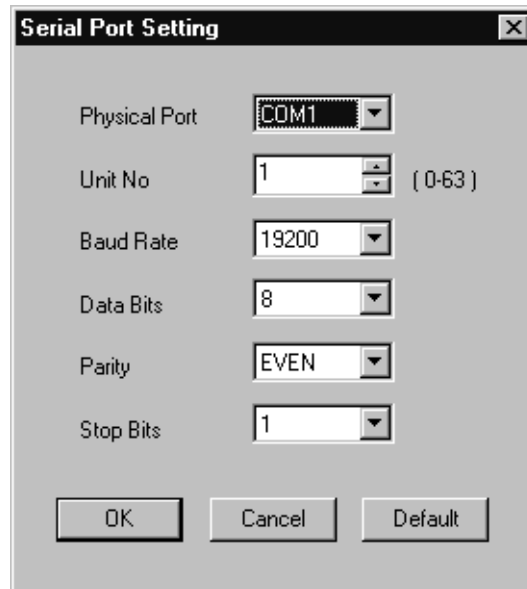


The logical port setting screen is displayed. Select the port kind (type), then click the **Detail** button.





When the **Detail** button is selected, the following screen is displayed. Set up the parameters of the serial port, then choose the **OK** button.



The logical port setting screen returns. Choose the **OK** button to return to the main screen of the communication process. At this point, since the parameter setting is complete, the setting contents must be saved in the file.

### 2.2.3 Saving Communication Port Setting Values

Save the communication port setting values to the file.

The confirmation message window is displayed when selecting **Save (S)** from the **File (F)** menu. Choose the **Yes** button to save the information.



### 2.2.4 Communication Process Completion

Select **Exit (X)** from the **File (F)** menu to close the communication process screen.

## 3 Basic Operation

This chapter explains methods of starting and closing MotionWorks™.

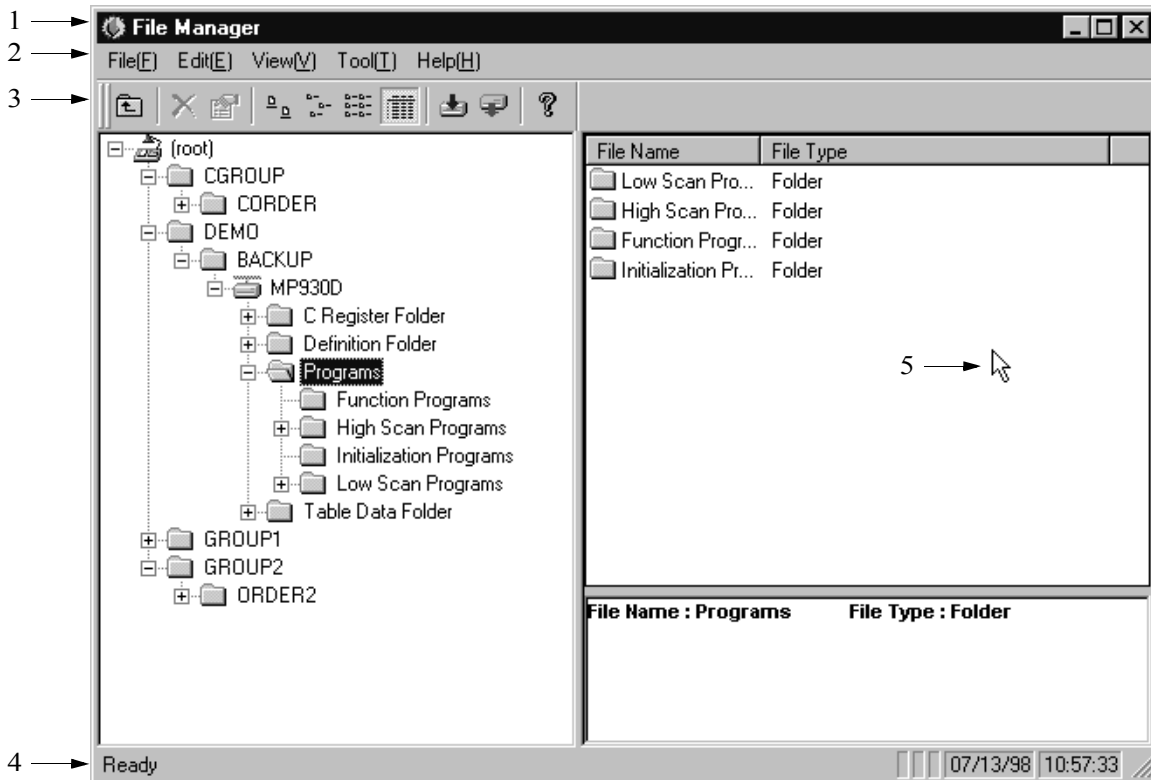
3.1	MotionWorks™ Basic Operation .....	3-2
3.1.1	Basic Structural Elements of the MotionWorks™ Window .....	3-2
3.1.2	Keyboard and Mouse .....	3-4
3.1.3	Cursor .....	3-4
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3.1.5	Connection Information Bar .....	3-6
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3.3.4	System Shut-off .....	3-17
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3.4.5	Help (H) Menu .....	3-23

### 3.1 MotionWorks™ Basic Operation

In this section the basic structural elements of the MotionWorks™ window and operations are explained using the File Manager screen.

#### 3.1.1 Basic Structural Elements of the MotionWorks™ Window

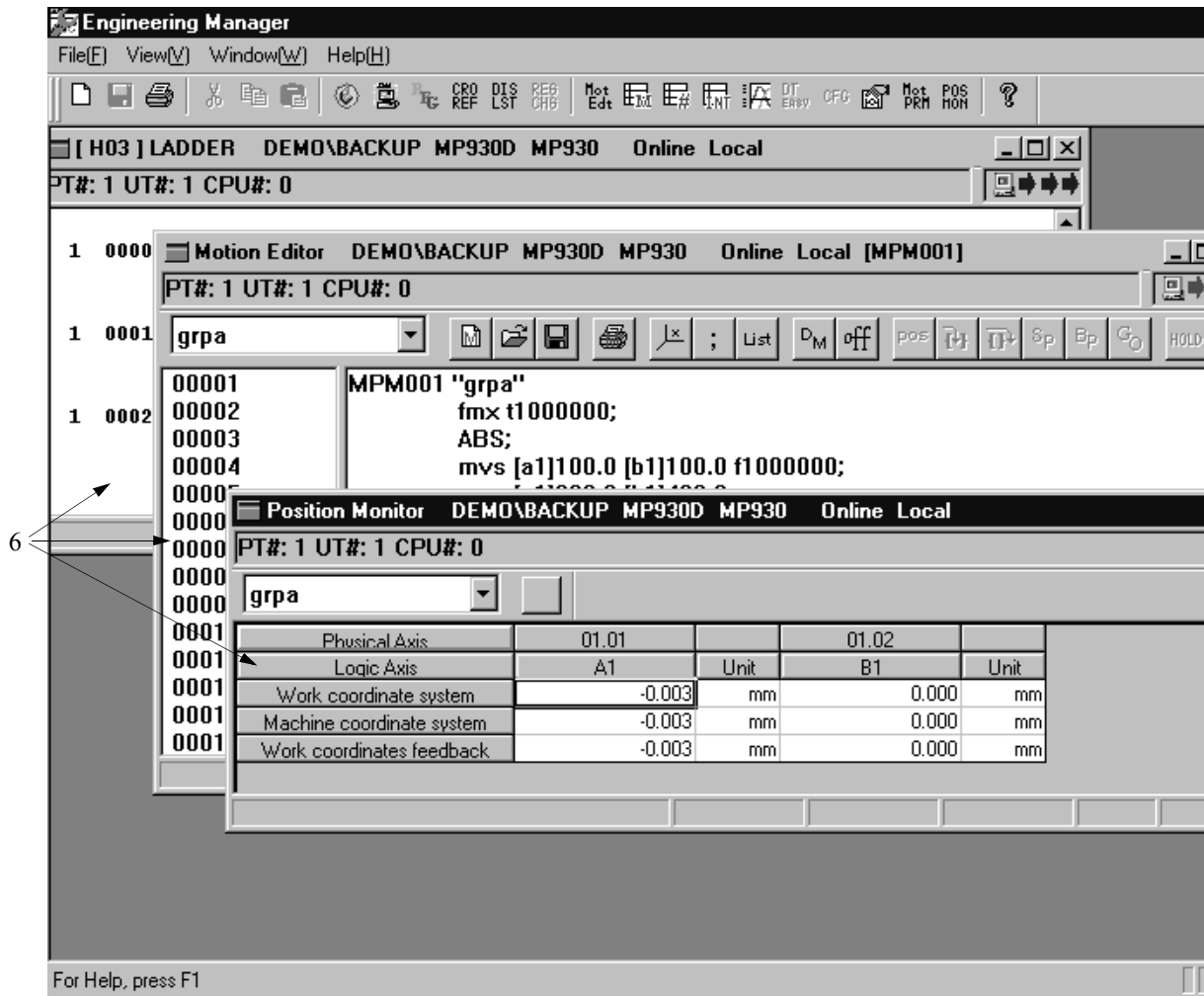
Names and functions of the elements that compose the MotionWorks™ window are shown as follows.



**MotionWorks™ File Manager Window**

1. Title Bar  
Displays a title that represents the function of a main window or a function window.
2. Menu Bar  
Displays a group of function menus. Further detailed functions can be selected in the pull-down menus.
3. Tool Icon  
Displays frequently used functions shown in the pull-down menus as icons so that they can be performed with one click.

4. Status Bar  
Displays a message from the system.
5. Cursor  
Indicates the position of the mouse used to select a function or input an item.
6. Function Window  
The function window is opened by selecting a function. Multiple windows can be opened simultaneously.



### 3.1.2 Keyboard and Mouse

MotionWorks™ is operated with the keyboard and mouse.











Characters and values are input by using a combination of alphabetical characters, numbers, punctuation marks, symbols, and control keys on the keyboard. All functions can be selected by the function keys and shortcut keys.

The mouse determines item input position and selects function. Words frequently used when operating the mouse are shown as follows.

Word	Meaning
Click	Press and quickly release a mouse button
Left-click	Press and quickly release the left mouse button
Right-click	Press and quickly release the right mouse button
Double-click	Quickly press the left mouse button twice and quickly release it
Pointing	Move the mouse cursor to the desired position then press and quickly release the left mouse button
Drag	Press and hold the left mouse button, move the object to the desired position, and quickly release the mouse button

### 3.1.3 Cursor

There is a mouse cursor and a key cursor. The shape of the cursor varies according to the operation status. General cursor shapes are shown as follows.

Cursor Type	Cursor Shape	Operation Status
Mouse Cursor		All functions can be selected. A window can be moved by dragging the title bar.
		These cursor shapes appear at the borders of windows, by dragging them the size of the window can be changed.
		
		
		
		It appears when the cursor is at a field in a dialog box.
		It appears when a window can be moved.
		It appears when an execution is processed.
Key Cursor		It appears when typing data in a field of a dialog box.
		It appears when typing data in a main window.

### 3.1.4 Title Bar

#### ■ Main Window Title Bar

MotionWorks™ is composed of several independent main windows. Each main window is further categorized into several function windows.

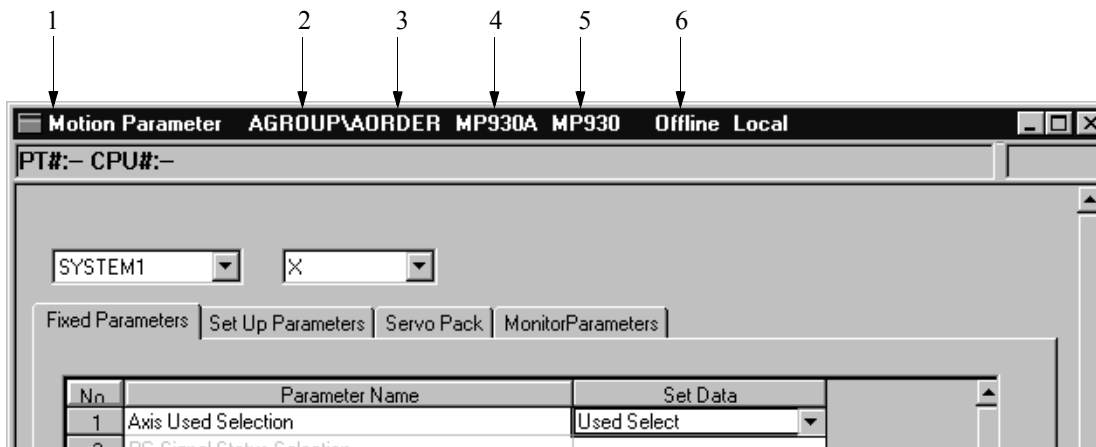
A function name is displayed in the title bar of each main window. MotionWorks™ includes the following main windows.

1. File Manager Window
2. Engineering Manager Window
3. Print Monitor Window
4. Print Set-up Window
5. Data Transfer Window
6. Register List Window
7. Ladder Source Convert Window

The above main windows are explained in Chapter 4 and subsequent chapters.

#### ■ Function Window Title Bar

Individual function names are displayed in the title bar of function windows. Moreover, on-line/off-line information is also shown.



#### Part of the Function Window

1. Function Window Name
2. Group Name
3. Order Name

4. PLC Name
5. PLC Type
6. On-line/Off-line Information

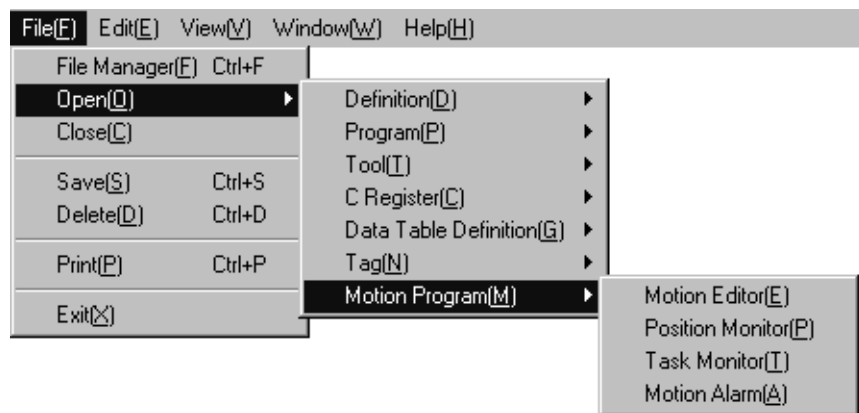
### 3.1.5 Connection Information Bar

Information about MotionWorks™ and the MotionSuite™ series machine controller connection is displayed in this bar. It contains a port number (PT#), a network number (NT#), a station number (ST#), and a CPU number (CPU#). However, these numbers do not show in off-line mode.

PT#01 NT#000 ST#01 CPU#0

### 3.1.6 Menu Bar

The menu bar lists a group of functions. Each function (menu) can be clicked to unfold a pull-down menu. Concrete functions are provided in this pull-down menu. Menu items vary depending on which window is currently active (see item 3.1.7 Window). They change automatically when a different window is activated.



The above window screen shows that the **File (F)** menu in the Engineering Manager window is unfolded to 3 levels. The menu item with a triangle mark at the right side does not result in any action itself, but if a cursor is put on one of these items a group of sub-menus appears automatically.

As shown in **File (F)**, the letter within parentheses indicates that the menu selection can be executed on the keyboard. By pressing the **Alt** key and the **F** key, a pull-down menu appears in which the functions can be selected with the arrow keys on the keyboard.

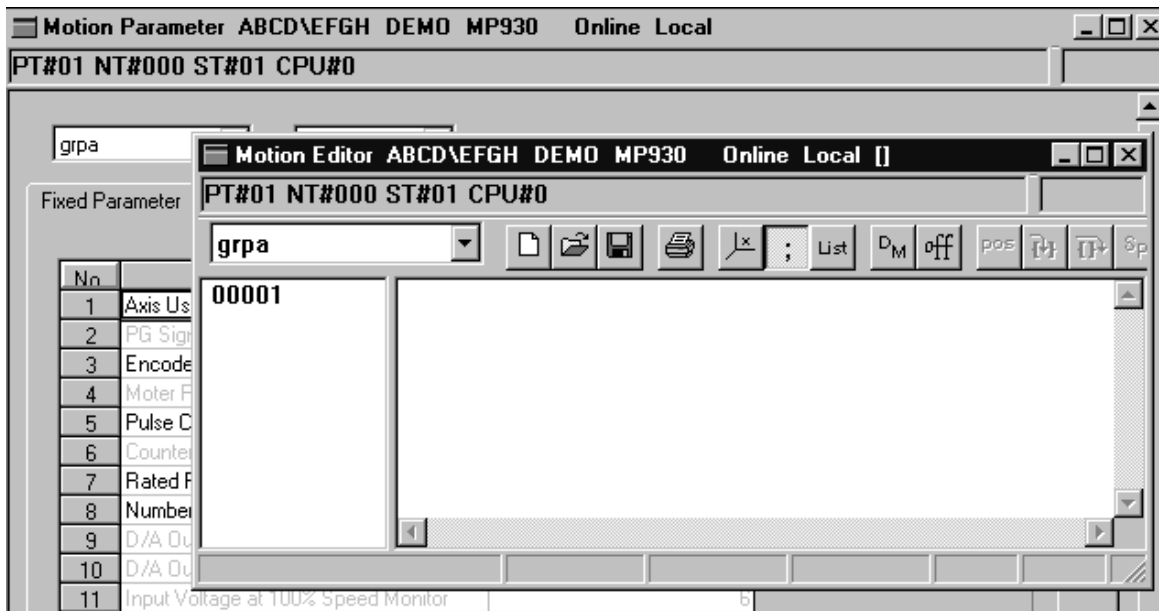
In the following explanations, if **File (F)→Print (P)** is written, it means selecting **Print (P)** from the **File (F)** pull-down menu. If **File (F)→Open (O)→Motion Program (M)→Motion Edit (E)** is written, it means selection of the **Motion Edit (E)** from the sub-menu of the **File (F)** pull-down menu.

### 3.1.7 Window

A window is prepared for each function. Multiple windows can be displayed on screen but only one can be functional, this is the active window. If a window is active, the color of its title bar becomes darker than that of other windows.

#### ■ Switching Windows

When multiple windows are displayed, activate a window by clicking anywhere in the window.

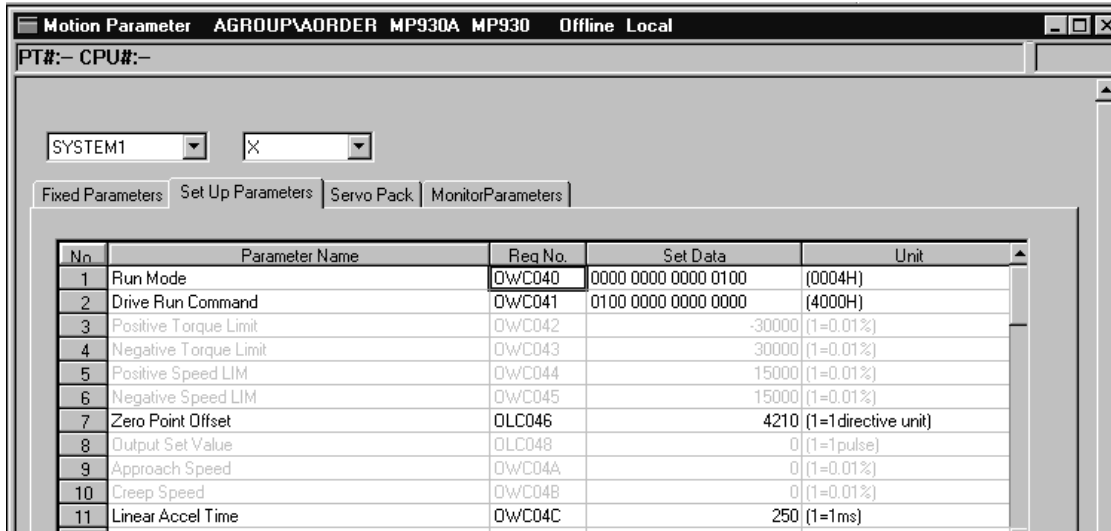


**When Motion Edit Window is Active**



## ■ Switching Tabs

The tab is used to indicate a detailed function in the window. Click the tab to open the tab window.



**When Set-up Parameter Tab is Active**

### 3.1.8 Boxes

Boxes are roughly categorized as either message boxes or dialog boxes.

#### ■ Message Box

The message box appears when the system needs the user to select **Yes** or **No**, or to confirm an important message.



#### ■ Dialog Box

The dialog box is similar to the message box, but unlike the simple confirmation message, the dialog box asks the user to set up more information. The set-up methods are shown as follows.

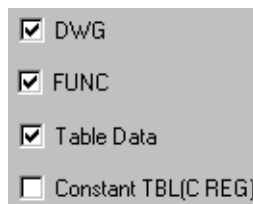
a. Radio Button Box

The radio button box is used to select only one option. A black dot appears on a radio button when it is selected by clicking.



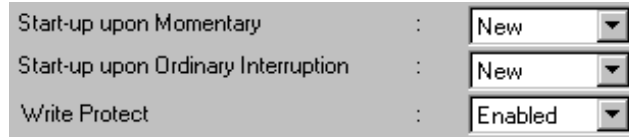
b. Check Box

Unlike the radio button box, the check box is used to select more than one option. A check mark appears in a small box at the left side of the selected item.



## c. Combo-box

The combo-box is a box that contains several groups of functions. In each group, only one option can be selected. Click the triangle mark at the right side of each group to display all the options, then select one.



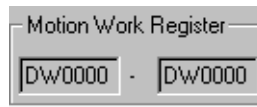
## d. Edit Box (Value)

The edit box (value) is used to input a value. The value can either be input from the keyboard or by clicking a spin button (if available) at the right side of the box.



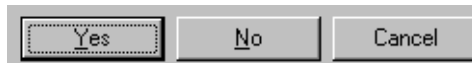
## e. Edit Box

The edit box is used to input character strings or values from the keyboard. If there is no cursor at the head of the box, click the box to display the cursor.



## f. Press Buttons

The press buttons are used to select a simple instruction like **Yes**, **No** or **Cancel**. Click the proper button to give an instruction.



### 3.1.9 Scroll

It may be necessary to scroll (move) the window horizontally or vertically to view or edit the program easily. Operate the scroll bars located at the right side and bottom of the window to find the desired position. The window also can be scrolled using the arrow keys on the keyboard.

### 3.1.10 Go to Page

**Go to Page** can be operated by pressing the **PageUp** and **PageDown** keys.

## 3.2 Shortcut Keys

In the event that the mouse cannot be used or that the user prefers to keep his/her fingers on the keyboard, keyboard equivalents, or shortcuts, are available. In this section, several shortcut keys used in MotionWorks™ are explained.

### 3.2.1 Major Keys Generally Used in Windows

Purpose	Shortcut Key
Displays start menu	Ctrl+Esc
Close program window	Alt+F4
Switch selected program	Alt+Tab
Switch program by order	Alt+Esc
Switch program by reverse order	Shift+Alt+Esc
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Delete	Del
Return	Ctrl+Z
Switch sub-drawing window	Ctrl+F6

### 3.2.2 Major Keys Used in Dialog Boxes

Purpose	Shortcut Key
OK button	Enter
Cancel button	Esc
Switch tab by order	Tab
Switch tab by reverse order	Shift+Tab
Switch tab page by order	Ctrl+Tab
Switch tab page by reverse order	Shift+Ctrl+Tab
Switch check box on/off	Space
Switch radio button selection	Arrow keys
Switch list box or combo-box selection	Arrow keys
Switch press button	Arrow keys

### 3.3 Starting and Closing MotionWorks™

#### 3.3.1 Starting MotionWorks™

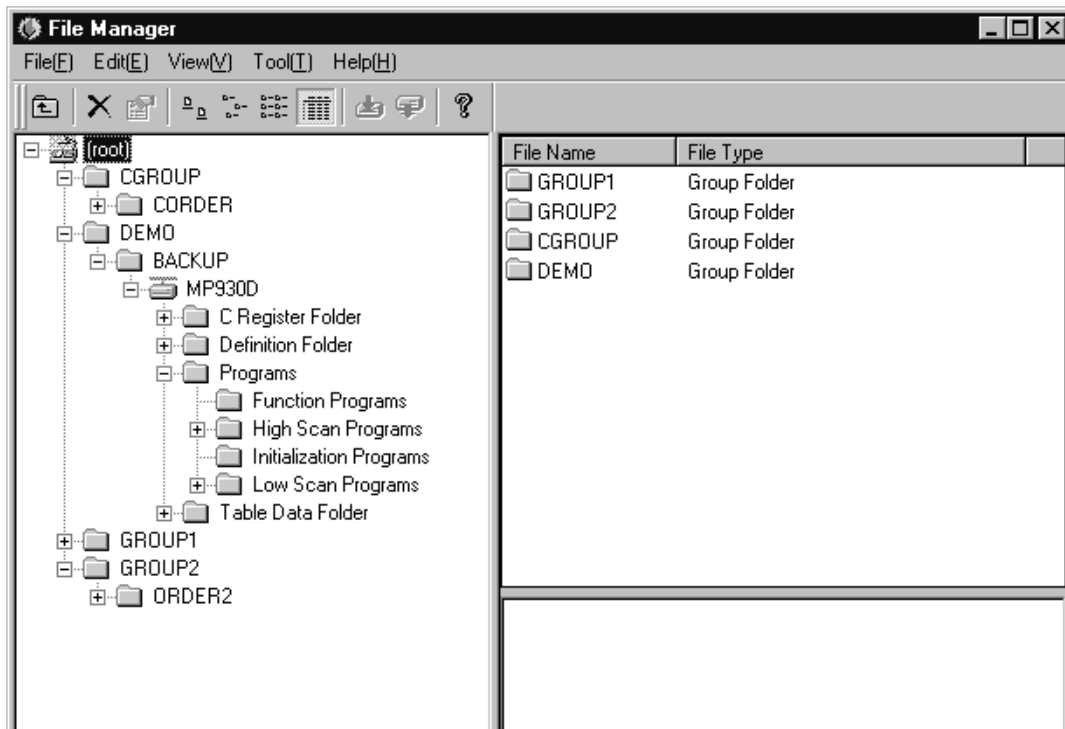
- a. Plug in the PC to start Windows95.
- b. Double-click the **YE-Applications** icon.



- c. Double-click **MotionWorks™** in the **YE-Applications** group to start the MotionSuite™ series machine controller File Manager Window.



- d. The MotionWorks™ **File Manager Window** (main screen of MotionWorks™) is displayed.

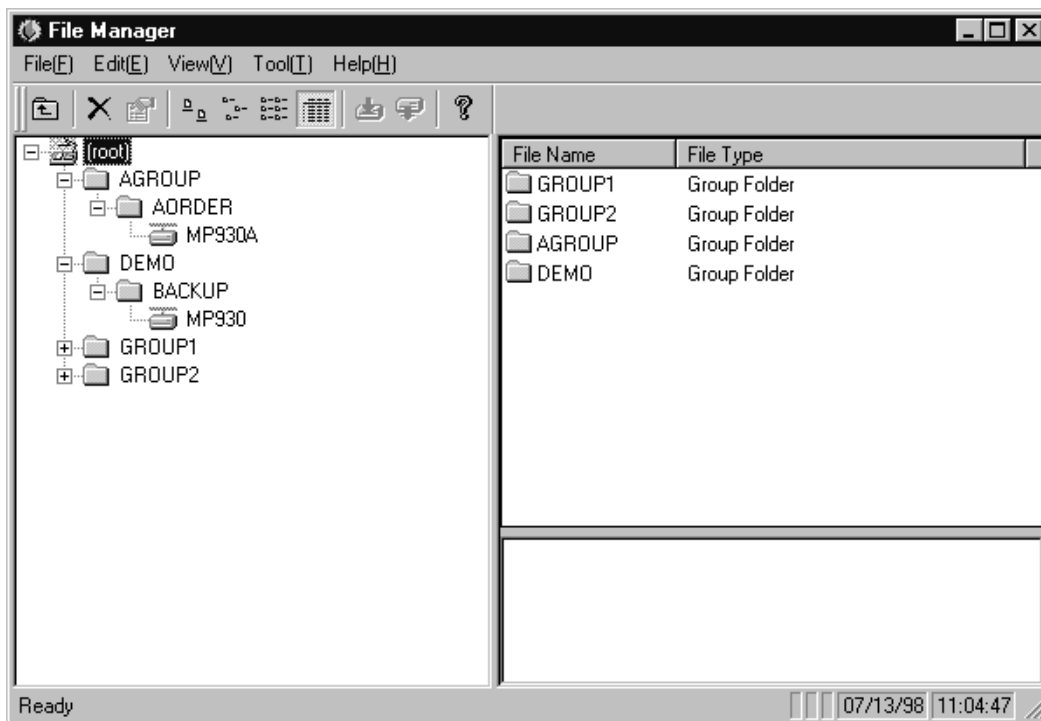


The File Manager Window and the **Communication Process** window start simultaneously, as shown in the task bar.



### 3.3.2 Selecting Controller

The File Manager screen is the starting point for all MotionWorks™ operations. The controller (in which programs are created and data is defined) must be selected first so that the MotionWorks™ functions can be performed. In this section, simple selection procedures are described; detailed operation methods are dealt with later.



As shown in the above window screen, double-click the root, the group folder, and the order folder to unfold the system structure. The system structure can also be unfolded by clicking the “+” symbol at the left side of the folder.

When the order folder is opened, the controller name is shown as follows:

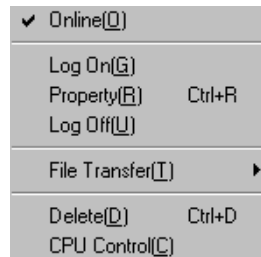


The icon at the front of the name differs from others so that it is easily distinguishable.

## ■ Log-in

The MotionSuite™ series machine controller must be logged in so that it can be controlled by MotionWorks™.

Before log in, right-click the controller folder to open a pop-up menu. In the pop-up menu, on-line/off-line mode can be switched by clicking.



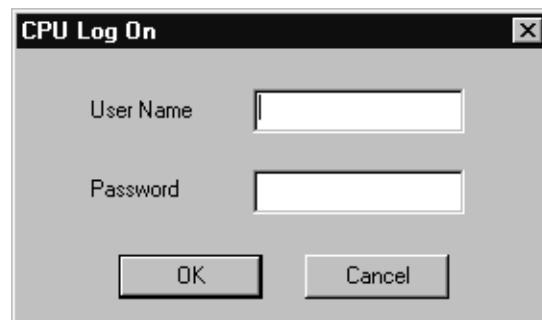
When a check mark appears before the on-line menu, the on-line mode is active. When no check mark appears, the controller is in off-line mode.

When the log-in is complete, the “+” symbol appears at the left side of the icon, as shown below.



## ■ System Protection through New User Registration

When the controller is logged in, a security dialog box appears as follows:



It is necessary to limit the users who can log in to the controller in order to protect the system when a program is running. MotionWorks™ protects the system by inputting the user name and a password.

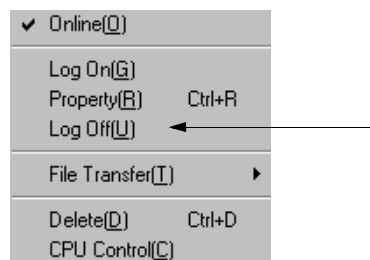
User Management provides the User Privilege Level in addition to the New User Registration and Existing User Deletion. Details are explained later.

- a. Inputting User Name  
Input the user name with 8 characters or less.
- b. Inputting Password  
The password is input with 16 characters or less. The input characters are displayed as a symbol string of “\*” for security purposes. The system allows input of the password up to three times; if the number of attempts exceeds three times, the log-in operation is cancelled.  
When first logging in, use the default user name and password determined by the system (see User Management).

### ■ Log-off

It is advisable to log off when a series of operations are complete, to avoid control of the MotionSuite™ series machine controller by unauthorized personnel. Log in again when needed. Log-in and log-off must be used as a pair.

Right-click the controller folder to open a pop-up menu, then click log-off as indicated below.



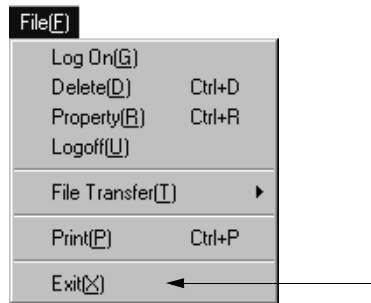
When the log-off is complete, all items unfolded in the folder close. The log-in symbol (“+”) at the left side of the icon is also gone.

### 3.3.3 Closing MotionWorks™

Close MotionWorks™ after logging off the MotionSuite™ series machine controller. The windows other than the File Manager screen also must be closed because it is not possible to close MotionWorks™ while these windows are open.



- a. Closing the File Manager Window  
Click **Exit (X)** from **File (F)** in the File Manager menu.



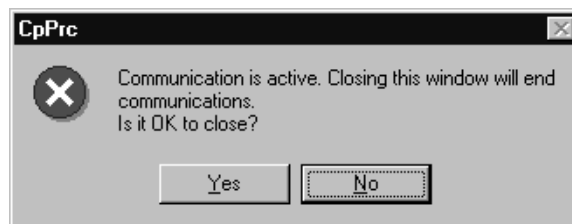
Or, click the X mark at the upper right corner in the File Manager window.



- b. Closing the Communication Process Window  
Right-click the Communication Process button on the task bar to open a pop-up menu, then click the **Close** item.



When **Close** is clicked, a message box appears. Ensure that you really want to terminate communication, then choose the **Yes** button.



### 3.3.4 System Shut-off

It is necessary to close Windows95 before shutting off the power supply. Click the **Start** button on the task bar to open a pop-up menu, then select the **Shut Down** item. When Windows95 is properly closed, the following message appears: **It is now safe to turn off your computer**. The power supply can be shut off in this condition. In some PCs the power supply shuts off automatically, depending on the configuration.

## 3.4 Global Menus

This section explains the menus and menu items that apply to every window.

### 3.4.1 Global Menu Items

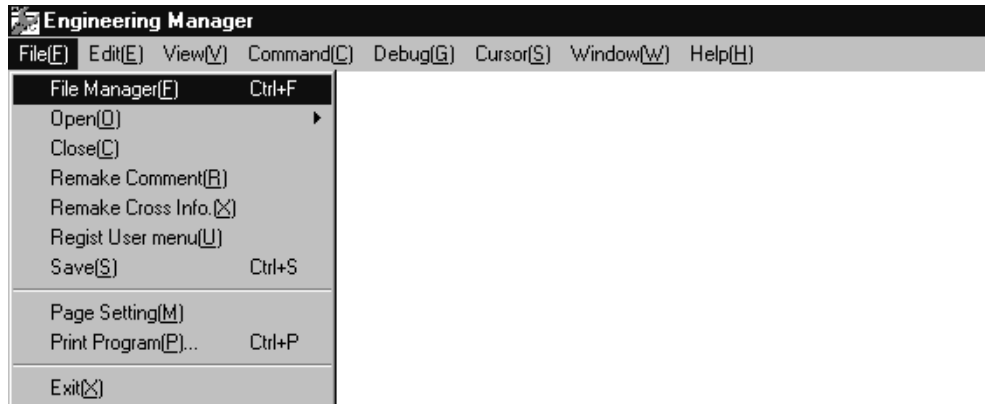
The pull-down menu items in the **File (F)**, **View (V)**, **Window (W)**, and **Help (H)** menus apply to every MotionWorks™ window. They are shown as follows.

Menu	Global Function
File (F)	
File Manager (F)	Displays the File Manager Window
Open (O)	(See menu explanation of each screen)
Close (C)	
Save (S)	
Delete (D)	
Print (P)	Prints documents
Exit (X)	Close window
(See menu explanation of each screen)	
View (V)	
Tool Bar (T)	Displays tool bar
Status bar (S)	Displays status bar
Window (W)	
Cascade (C)	Cascades window displays
Tile (T)	Tiles window displays
Arrange Icons (A)	Lines up all icons
Help (H)	
Help Topics (H)	Search Help topic
About Application (A)	Displays version information

### 3.4.2 File (F) Menu

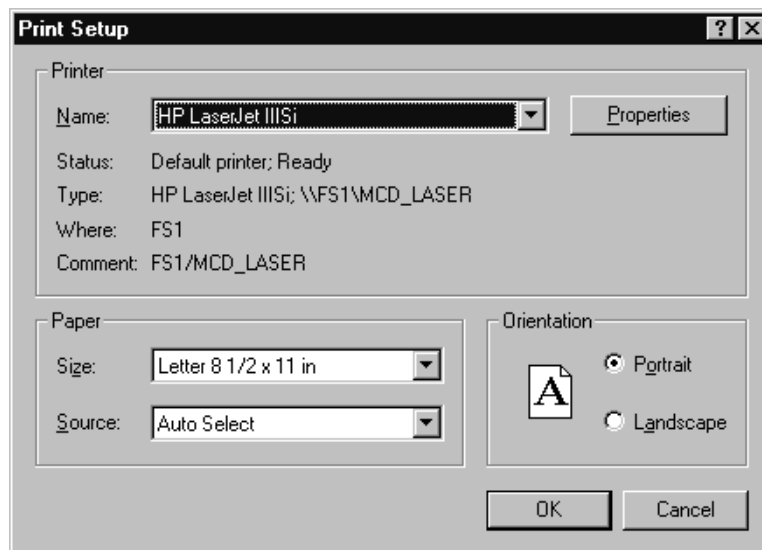
#### ■ File Manager (F)

The **File Manager (F)** is displayed in the forefront screen when it is selected from the **File (F)** menu.



#### ■ Print (P)

A Print Set-up Window is displayed when **Print Program (P)** is selected from the **File (F)** menu. Set up the print data and format to print. (Refer to Chapter 12: Print.)



## ■ Exit (X)

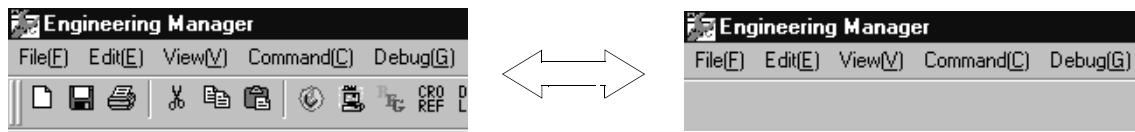
The Engineering Manager window (key window opened from the File Manager) and other windows can be closed when **Exit (X)** is selected from the **File (F)** menu.

If this operation is performed in the File Manager Window, the File Manager Window is also closed.




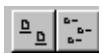






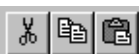
### 3.4.3 View (V) Menu

#### ■ Switching Tool Bar Display

The Display/Hide function of the tool bar can be switched by selecting **Tool Bar (T)** from the **View (V)** menu.



#### ■ Tool Bar Function

Tool Icon	Function
	Moves one level up from the current existing folder
	Deletes selected folder
	Displays property of a selected folder or file
	Displays file names with large or small icons respectively
	Displays file data with list or detail displays
	Displays version information
	Displays Help information
	Opens a newly created program file
	Opens an already existing program file
	Displays Print Set-up window
	Editing tools (Cut, Copy, and Paste)

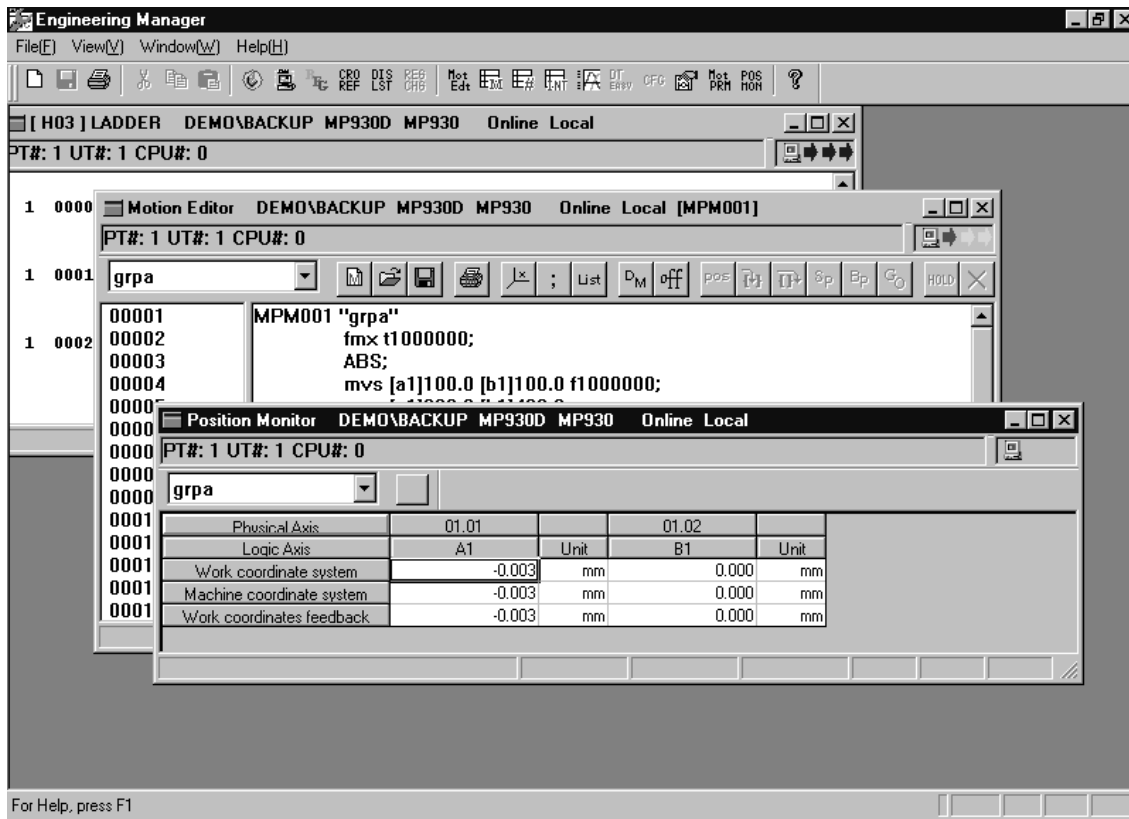
### ■ Switching Status Bar Display

The Display/Hide function of the Status Bar located on the bottom line of the window can be toggled.

### 3.4.4 Window (W) Menu

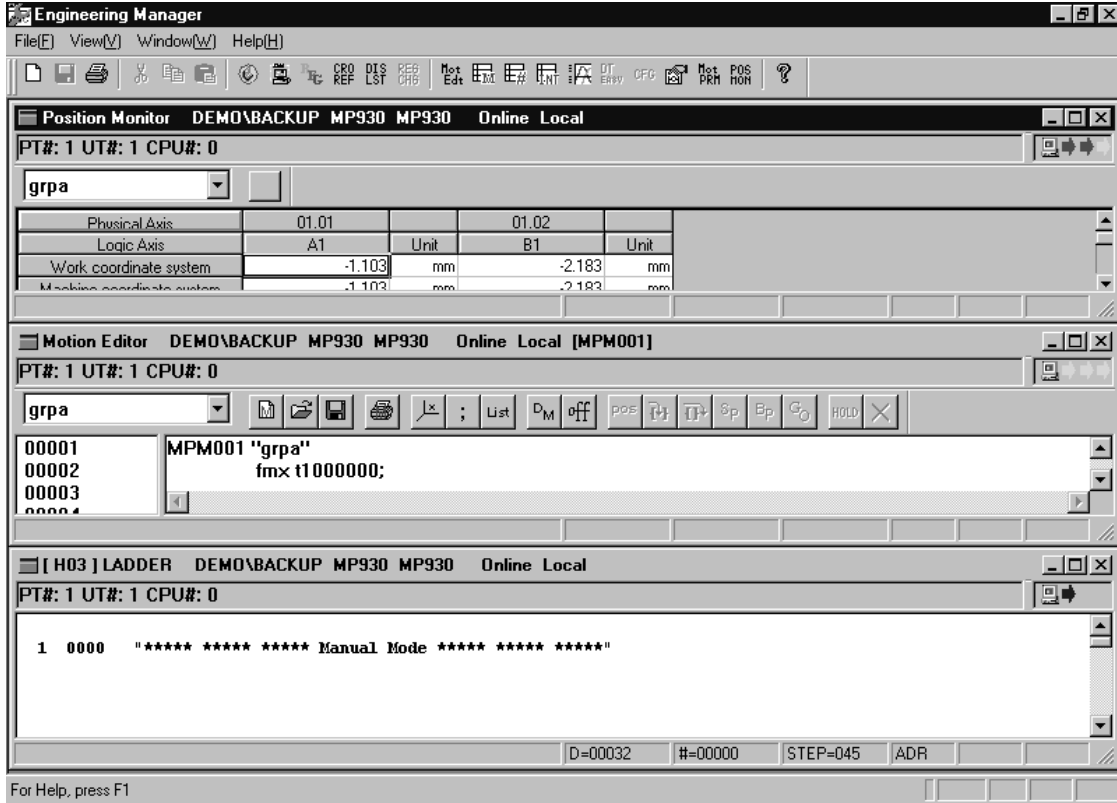
#### ■ Cascade Display

When **Cascade (C)** is selected from the **Window (W)** menu, window screens lie one upon another tidily from the upper left corner.



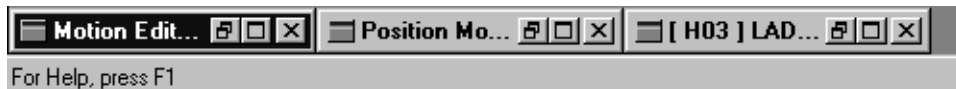
### ■ Tile (T) Display

When **Tile (T)** is selected from the **Window (W)** menu, window screens line up tidily from the top.



### ■ Arrange Icons

When **Arrange Icons (A)** is selected from the **Window (W)** menu, properly miniaturized icons are tidily displayed on the task bar.



### 3.4.5 Help (H) Menu

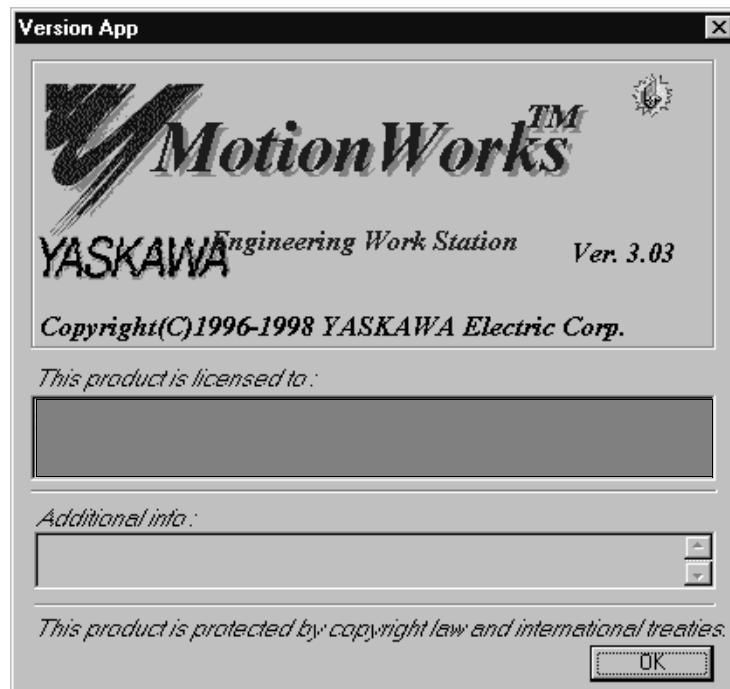
#### ■ Help Topics

Displays Help topics

#### ■ About Application

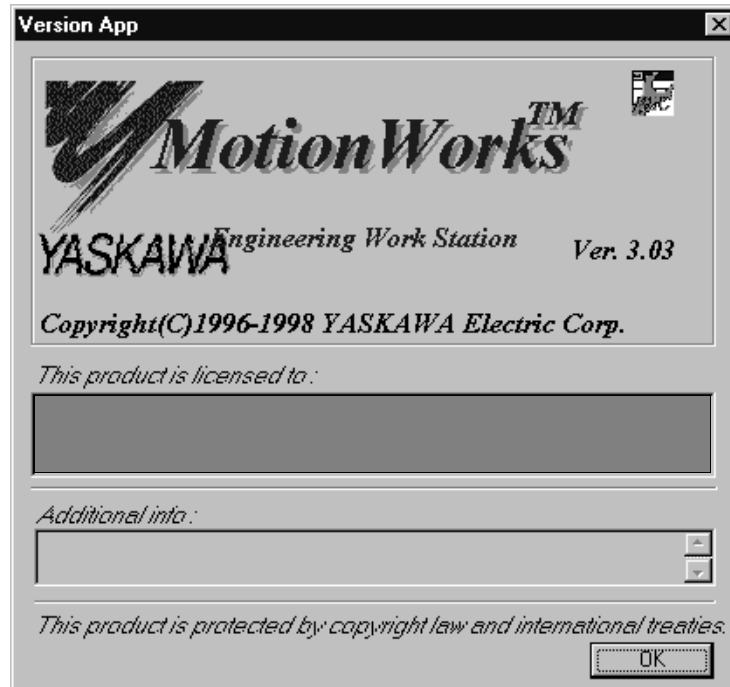
The MotionWorks™ system version information can be displayed from the File Manager menu and the Engineering Manager menu.

- a. The version information is displayed from the File Manager menu as shown below. The screen appears when **About Application (A)** is selected from the **Help (H)** menu. It can be closed by choosing the **OK** button.





- b. The version information is displayed from the Engineering Manager menu as shown below. This screen appears when the **About Application (A)** is selected from the **Help (H)** menu. It can be closed by choosing the **OK** button.



## 4 File Manager

**File Manager** provides the file management function which is the starting point of the MotionWorks™ system.

This chapter explains how to manage the **program file, definition file**, etc. used in the MotionWorks™ system.

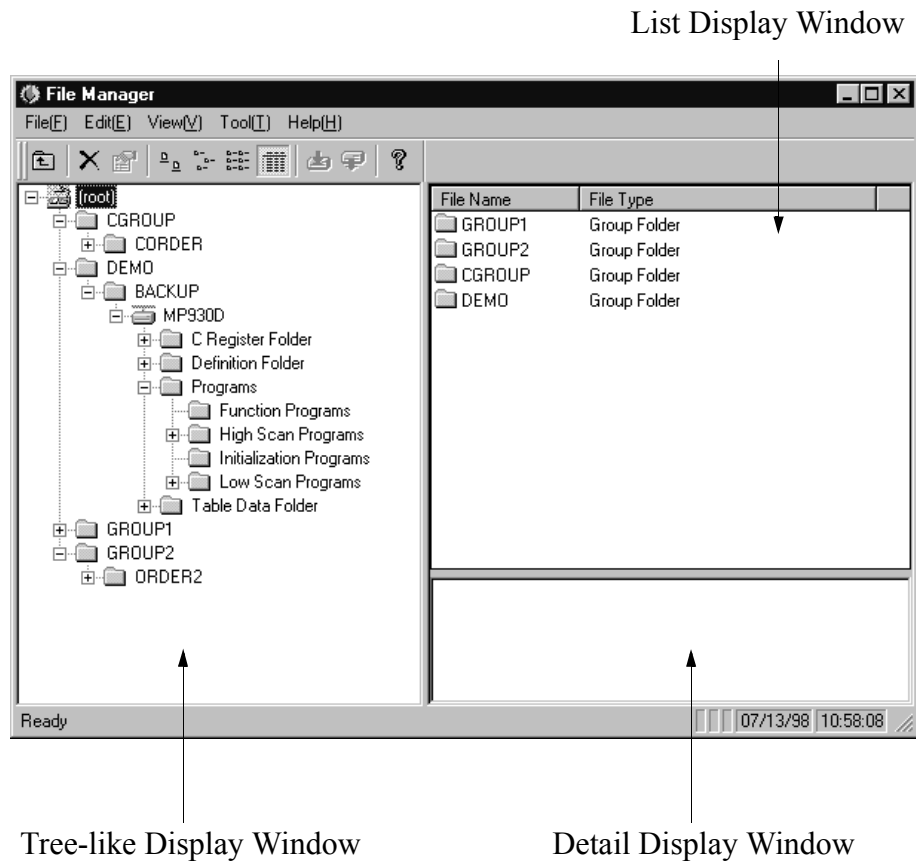
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## 4.1 Window Configuration

Upon starting the MotionWorks™ system (see Item 3.3.1 “Starting MotionWorks™”), the first window that appears is the File Manager Window. All MotionWorks™ operations start from this window. The File Manager Window is composed of **Tree-like Display Window**, **List Display Window**, and **Detail Display Window**. This configuration helps users to easily and quickly understand the system structure.

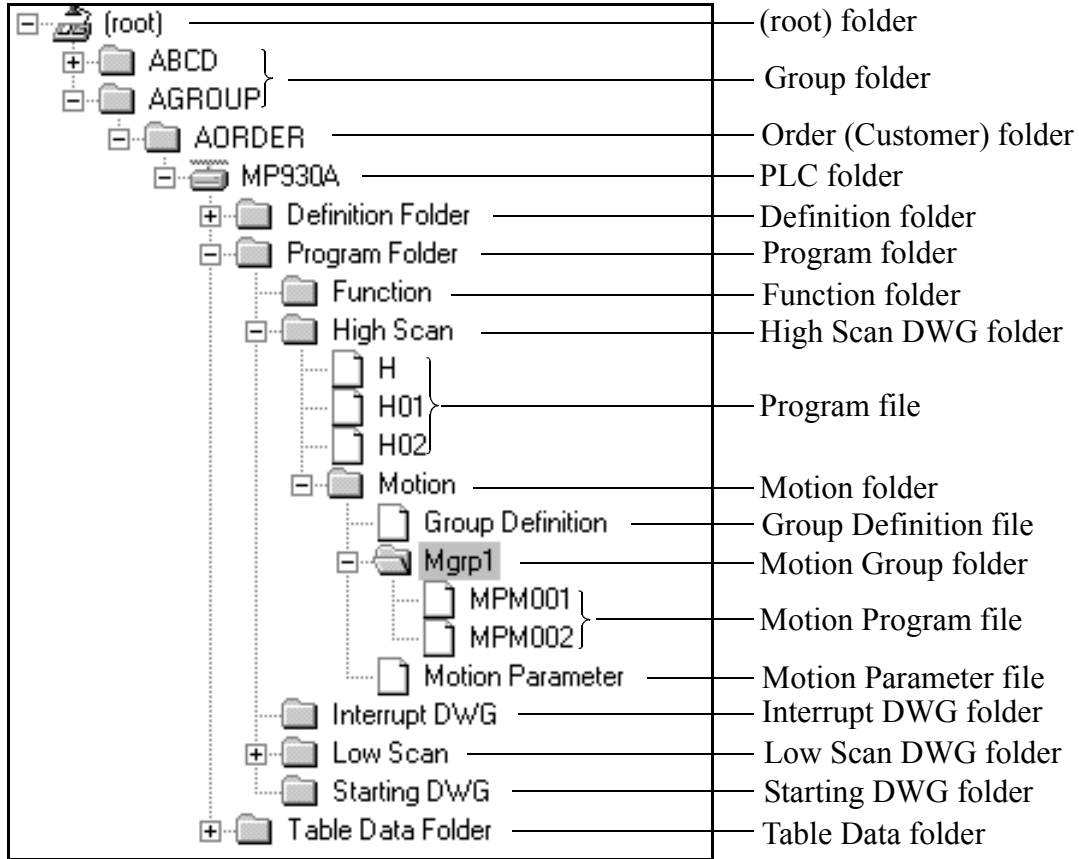


### File Manager Window

In the Tree-like Display Window, all folders and files that construct the system are shown. The List Display Window displays all files included in the selected folder of the Tree-like Display Window. This selected folder is also detailed in the Detail Display Window.

### 4.1.1 Folder and File Names

The folders and files that comprise the MotionWorks™ system are shown with icons in the Tree-like Display Window. They are named as follows.



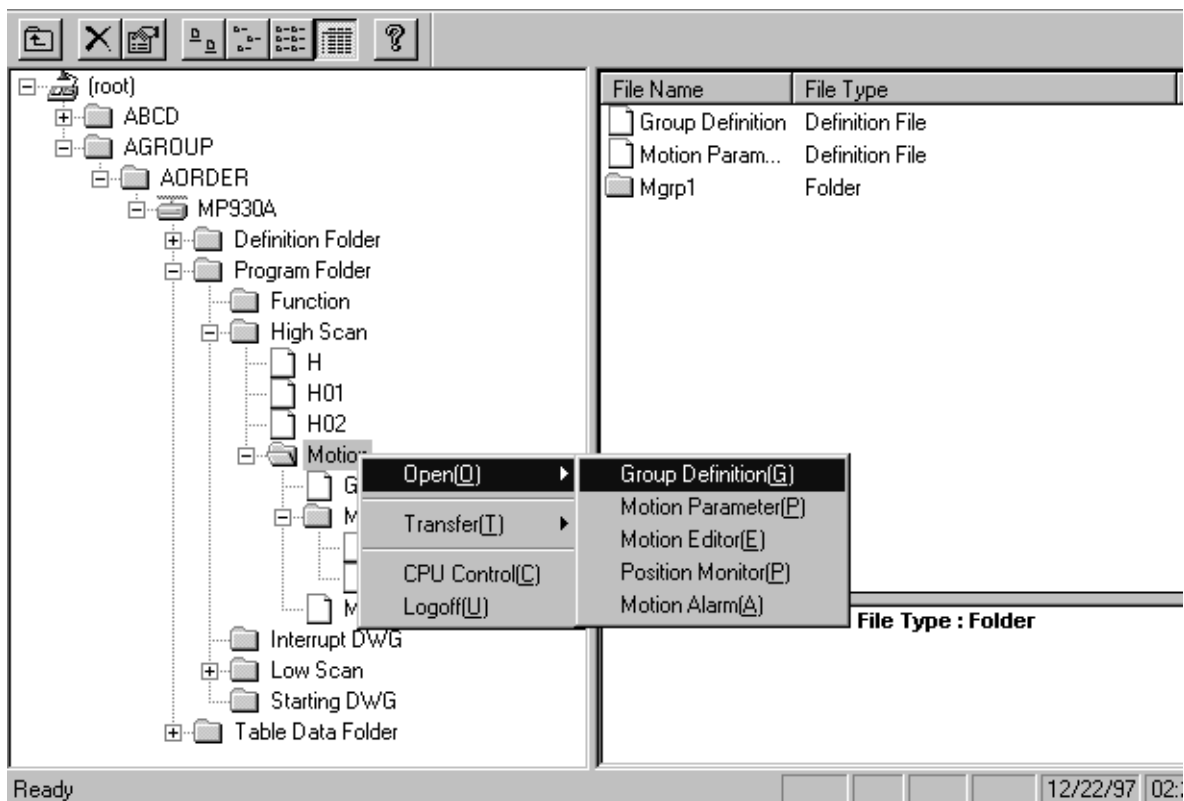
**Tree-like Display Window**

## 4.1.2 File Manager Menu

There are **pull-down menus** and **pop-up menus** in the File Manager menu. The menu contents vary according to the folder or file selected in the Tree-like Display Window or the List Display Window.

### ■ Pop-up Menu

The pop-up menu appears after a right-click on a menu. Each menu item in the pop-up menu can be selected. The following example shows that the pop-up menu is opened when a Motion folder is selected.

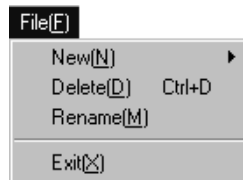


Pop-up Menu

## ■ Pull-down Menu



The Menu bar of the File Manager Window is shown above. From **File (F)** to **Help (H)**, the name of each menu does not change, but the contents of the pull-down menus unfolded from each menu vary according to the folder or file selected in the Tree-like Display Window or the List Display Window. For example, when a Group folder or a controller is selected, the **File (F)** menu shows the following different contents.



**When a Group folder is selected**



**When a controller is selected**

The Items 4.1.4 ~ 4.1.13 show how the pull-down menus and pop-up menus change according to the different folders or files.

### 4.1.3 Global Menus

No matter which folder or file is selected in the Tree-like Display Window, some menus such as **File (F)**→**Transfer (T)**, **View (V)**, **Tool (T)**, and **Help (H)** always show the same items. These menus are called global menus.

**File (F)**→**Transfer (T)**, **View (V)**, **Tool (T)**, and **Help (H)** are unfolded to the following global sub-menus. However, some exceptions exist and they are explained in detail.

Menu	Function	Reference
Transfer (T)		
All Transfer (A)	Transfers files one after the other	—
Individual Transfer (I)	Transfers file individually	—
Continuous Transfer (C)	Transfers file to multiple controllers	—

Menu	Function	Reference
View (V)		
Tool Bar (T)	Displays tool bar	—
Status Bar (S)	Displays status bar	—
Detail Window (W)	Displays or hides the Detail Display Window	—
Large Icon (G)	Displays file with large icon	—
Small Icon (M)	Displays file with small icon	—
List (L)	Lists file with small icon	—
Detail (D)	Lists detailed data	—
Refresh (R)	Displays updated information	—

Menu	Function	Reference
Tool (T)		
Register List (R)	Displays register list	—

Menu	Function	Reference
Help (H)		
About App. (A)	Displays version information	—



### 4.1.4 Menus for the Root and Group Folders

When the (root) or the Group folder is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.1: Pull-down Menu**

Menu	Functions	Reference
File (F)		
New (N)		
Group folder (G)	Creates new group folder	—
Order folder (O)	Creates new order folder	—
Delete (D)	Deletes folder or file	—
Rename (M)	Changes folder or file name	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
View (V)		
Tool (T)		
Help (H)		

**Table 4.2: Pop-up Menu**

Menu	Functions	Reference
New (N)		
Group folder (G)	Creates new group folder	—
Order folder (O)	Creates new order folder	—
Rename (M)	Changes folder or file name	—
Delete (D)	Deletes folder or file	—

### 4.1.5 Menus for the Order Folder

When the Order folder is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.3: Pull-down Menu**

Menu	Functions	Reference
File (F)		
New (N)		
Controller folder (C)	Creates new PLC folder	—
Delete (D)	Deletes folder or file	—
Rename (M)	Changes folder or file name	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
View (V)		
Tool (T)		
Help (H)		

**Table 4.4: Pop-up Menu**

Menu	Functions	Reference
New Make (N)		
Controller folder (C)	Creates new controller folder	—
Rename (M)	Changes folder or file name	—
Delete (D)	Deletes folder or file	—

## 4.1.6 Menus for the Controller

When the controller is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.5: Pull-down Menu**

Menu	Functions	Reference
File (F)		
Log-on (G)	Logs on CPU	—
Delete (D)	Deletes folder or file	—
Property (R)	Changes controller configuration	—
Log-off (U)	Logs off from CPU	—
File transfer (T)	Transfers file	—
Print (P)	Prints document	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
User Manager (U)	Manages user	—
CPU Control (C)	Switches CPU status	—
View (V)		
Tool (T)		
Register List (R)	Displays register list	—
Help (H)		

**Table 4.6: Pop-up Menu**

Menu	Function	Reference
On-line (O)	Switches on-line or off-line mode	—
Log-on (G)	Logs on CPU	—
Property (R)	Changes PLC configuration	—
File transfer (T)	Transfers file	—
Delete (D)	Deletes folder or file	—
CPU control (C)	Changes CPU status	—
Log-off (U)	Logs off from CPU	—

### 4.1.7 Menus for Program, Definition, and Table Data Folder

When the Program, the Definition, or the Table Data folder is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.7: Pull-down Menu**

Menu	Function	Reference
File (F)		
Log-off (U)	Logs off from CPU	—
Transfer (T)	Transfers file	—
Print (P)	Prints document	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
User Manager (U)	Manages user	—
CPU Control (C)	Changes CPU status	—
View (V)		
Tool (T)		
Help (H)		

**Table 4.8: Pop-up Menu**

Menu	Function	Reference
Transfer (T)	Transfers file	—
CPU Control (C)	Changes CPU status	—
Log-off (U)	Logs off from CPU	—

### 4.1.8 Menus for Interrupt DWG, Function, High Scan, Starting DWG, and Low Scan Folder

When the Interrupt DWG, Function, High Scan, Starting DWG, or the Low Scan Folder is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.9: Pull-down Menu**

Menu	Function	Reference
File (F)		
New Make Folder (N)	Opens new drawing	—
Property (R)	Changes PLC configuration	—
Log-off (U)	Logs off from CPU	—
Print (P)	Prints document	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
User Manager (U)	Manages user	—
View (V)		
List display (V)		
Display All DWG (A)	Displays a sub-program	—
SFC Flowchart (S)		—
Constant Table (#Register) (#)		—
Constant Table (M register) (M)		—
Input/Output Convert Table (O)		—
Interlock Table (I)		—
Part Assembly Table (A)		—
Tuning Panel (P)		—
Function Block Diagram (F)		—
Tool Bar (T)	Displays tool bar	—
Status Bar (S)	Displays status bar	—
Detail Window (W)	Displays or hides the detail display window	—
Large Icon (G)	Displays file with large icon	—
Small Icon (M)	Displays file with small icon	—
List (L)	Lists file with small icon	—
Detail (D)	Lists detailed data	—
Refresh (R)	Displays updated information	—
Tool (T)		
Help (H)		

**Table 4.10: Pop-up Menu**

Menu	Function	Reference
Make New DWG (N)	Opens new drawing	—
List Display (V)		
Display All DWG (A)	Displays a sub-program	—
Sequential Function Chart (S)		
Constant Table (#Register) (#)		
Constant Table (M register) (M)		
Input/Output Convert Table (O)		
Interlock Table (I)		
Part Assembly Table (A)		
Tuning Panel (P)		
Function Block Diagram (F)		

### 4.1.9 Menus for Program File

When the Program file is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.11: Pull-down Menu**

Menu	Function	Reference
File (F)		
Make New Folder (N)	Opens new drawing	—
Open (O)		
DWG Property (R)	Opens property window	—
Main Program (N)	Opens main program window	—
Sequential Function Chart (S)	Opens sequential function chart window	—
Constant Table (#Register) (#)	Opens constant table (#Register) window	—
Constant Table (M Register) (M)	Opens constant table (M register) window	—
Input/Output Convert Table (O)	Opens input/output convert table window	—
Interlock Table (I)	Opens interlock table window	—
Part Assembly Table (A)	Opens part assembly table window	—
Tuning Panel (T)	Opens tuning panel window	—
Function Block Diagram (F)	Opens function block diagram window	—
Delete (D)	Deletes new program	—
Property (P)	Not used	—
Log-off (U)	Logs off from CPU	—
Print (P)	Prints document	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set-up (D)	Sets up default user	—
User Manager (U)	Manages user	—
Enable/Disable (E)	Sets up new program disable	—
View (D)		
List Display (V)		
Display All (A)	Displays sub-program unit	—
SFC Flowchart (S)		
Constant Table (#Register) (#)		
Constant Table (M Register) (M)		
Input/Output Convert Table (O)		
Interlock Table (I)		
Part Assembly Table (A)		
Tuning Panel (P)		
Function Block Diagram (F)		
Tool Bar (T)	Displays tool bar	—
Status Bar (S)	Displays status bar	—
Detail Window (W)	Displays or hides the Detail Display Window	—
Large Icon (G)	Displays file with large icon	—
Small Icon (M)	Displays file with small icon	—
List (L)	Lists file with small icon	—
Detail (D)	Lists detailed data	—
Refresh (R)	Displays updated information	—
Tool (T)		
Help (H)		

**Table 4.12: Pop-up Menu**

Menu	Function	Reference
File (F)		
Make New DWG (N)	Opens new program	—
Open (O)		
DWG Property (R)	Opens property window	—
Main Program (N)	Opens main program window	—
Sequential Function Chart (S)	Opens sequential function chart window	—
Constant Table (#Register) (#)	Opens constant table (#Register) window	—
Constant Table (M register) (M)	Opens constant table (M register) window	—
Input/Output Convert Table (O)	Opens input/output convert table window	—
Interlock Table (I)	Opens interlock table window	—
Part Assembly Table (A)	Opens part assembly table window	—
Tuning Panel (P)	Opens tuning panel window	—
Function Block Diagram (F)	Opens function block diagram window	—
List Display (V)		
Display All DWG (A)	Displays sub-program unit	—
Sequential Function Chart (S)		
Constant Table (#Register) (#)		
Constant Table (M register) (M)		
Input/Output Convert Table (O)		
Interlock Table (I)		
Part Assembly Table (A)		
Tuning Panel (P)		
Function Block Diagram (F)		
Delete DWG (D)	Deletes program	—
Enable/Disable (E)	Sets up new program disable	—
Copy DWG (C)	Copies program	—



### 4.1.10 Menus for Motion Folder

When the Motion Folder is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.13: Pull-down Menu**

Menu	Function	Reference
File (F)		
Open (O)		
Group Definition (G)	Defines Group information	—
Motion Parameter (P)	Defines and displays Motion parameter	—
Motion Editor (E)	Edits Motion program	—
Position Monitor (P)	Displays current position	—
Motion Alarm (A)	Displays alarm information	—
Log-off (U)	Logs off from CPU	—
Transfer (T)		
Print (P)	Prints document	—
Exit	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
User Manager (U)	Manages user	—
CPU Control (C)	Changes CPU status	—
View (V)		
Tool (T)		
Help (H)		

**Table 4.14: Pop-up Menu**

Menu	Function	Reference
Open (O)		
Group Definition (G)	Defines Group information	—
Motion Parameter (P)	Defines and displays Motion parameter	—
Motion Editor (E)	Edits Motion program	—
Position Monitor (P)	Displays current position	—
Motion Alarm (A)	Displays alarm information	—
Transfer (T)		
CPU control (C)	Changes CPU status	—
Log-off (U)	Logs off from CPU	—

### 4.1.11 Menus for Motion Group Folder

When the Motion Group folder is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.15: Pull-down Menu**

Menu	Function	Reference
File (F)		
Make New Program (N)		
Open (O)		
Motion Editor (E)	Edits Motion program	—
Position Monitor (P)	Displays current position	—
Motion Alarm (A)	Displays alarm information	—
Log-off (U)	Logs off from CPU	—
Print (P)	Prints document	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
User Manager (U)	Manages user	—
View (V)		
Tool (T)		
Help (H)		

**Table 4.16: Pop-up Menu**

Menu	Function	Reference
Make New Program (N)		
Open (O)		
Motion Editor (E)	Edits Motion program	—
Position Monitor (O)	Displays current position	—
Motion Alarm (A)	Displays alarm information	—

### 4.1.12 Menus for Motion Program File

When the Motion Program file is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.17: Pull-down Menu**

Menu	Function	Reference
File (F)		
Make New Program (N)		
Open (O)		
Motion Editor (E)	Edits Motion program	—
Position Monitor (O)	Displays current position	—
Motion Alarm (A)	Displays alarm information	—
Delete (D)	Deletes Motion program file	—
Property (P)	Not used	—
Log-off (U)	Logs off from CPU	—
Print (P)	Prints document	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default User Set (D)	Sets up default user	—
User Manager (U)	Manages user	—
View (V)		
Tool (T)		
Help (H)		

**Table 4.18: Pop-up Menu**

Menu	Function	Reference
Make New Program (N)		
Open (O)		
Motion Editor (E)	Edits Motion program	—
Position Monitor (P)	Displays current position	—
Motion Alarm (A)	Displays alarm information	—
Delete DWG (D)	Deletes Motion program file	—
Copy DWG (C)	Copies Motion program file	—

### 4.1.13 Menus for Group Definition and Motion Parameter File

When the Group Definition or the Motion Parameter file is selected, the pull-down menu and the pop-up menu are shown as follows.

**Table 4.19: Pull-down Menu**

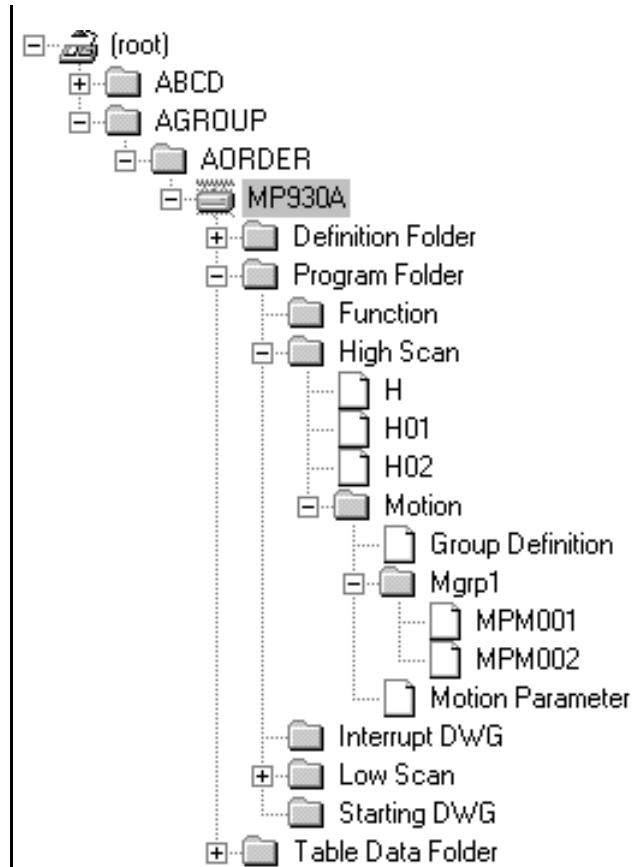
Menu	Function	Reference
File (F)		
Log off (U)	Logs off from CPU	—
Transfer (T)	Transfers file	—
Print (P)	Prints document	—
Exit (X)	Exits from application creation	—
Edit (E)		
Default user set (D)	Sets up default user	—
User manager (U)	Manages user	—
CPU control (C)	Changes CPU status	—
View (V)		
Tool (T)		
Help (H)		

**Table 4.20: Pop-up Menu**

Menu	Function	Reference
Transfer (T)	Transfers file	—
CPU control (C)	Changes CPU status	—
Log-off (U)	Logs off from CPU	—

### 4.1.14 Tree-like Display Window

The system structure is unfolded. The programs and definition data saved in the system are shown with the Group names and the Order names like a tree structure.



These programs and definition data are saved on the hard disk in off-line mode and saved in the controller in on-line mode.






## ■ Folder Display

A small symbol at the left side of an icon indicates that more menus can be unfolded.

+	This symbol indicates that the folder is closed. It changes to “-” by clicking, and the folder contents are displayed. This operation also can be done by double-clicking the folder name.
-	This symbol indicates that the folder is open. It changes to “+” by clicking, and the folder contents are closed. This operation also can be done by double-clicking the folder name.

## ■ Folder Icon

The folder type can be distinguished by the following icons.

	:	Root folder (installed with the system) represents the starting point of the Tree-like Display Window
	:	Group folder (Group name) Order folder (Customer name) Tag folder Program folder Interrupt DWG folder Function folder Starting DWG folder High Scan folder Low Scan folder Definition folder Table Data folder Motion folder Motion Group folder
	:	Controller
	:	CPU folder
	:	File (program, definition data etc.)

### 4.1.15 List Display Window

The folders or files included in the folder selected in the Tree-like Display Window are shown in the List Display Window. The contents shown in this window vary according to the folder selected in the Tree-like Display Window.

#### ■ When the Root or Group Folder is Selected

File Name	File Type
AGROUP	Group Folder
ABCD	Group Folder

**Titles of the List Display Window**

1. File Name  
Group or Order folder name is displayed.
2. File Type  
Folder type is displayed.

#### ■ When the Order (Customer) Folder is Selected

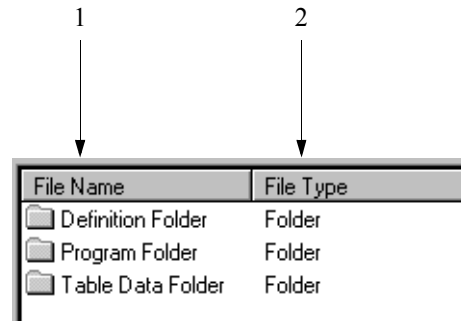
File Name	File Type	PLC Type	O.	D.	PT#	NT#	ST#	CPU#	Renewal Date	Comment
MP930A	PLC Folder	MP930	*		1	0	1	0	1997.12.19	

**Titles of the List Display Window**

1. File Name  
Folder name is displayed.
2. File Type  
Folder type is displayed.
3. PLC Type  
PLC or CPU type is displayed.
4. On-line Mode  
Zero (0) is displayed in on-line mode.
5. Database  
This data is invalid in the current version.

6. Connection Information  
Port (connects the PLC and MotionWorks™) number (PT#), PLC network number (NT#), station number (ST#), and CPU number (CPU#) are displayed.
7. Renewal Date  
The date when the PLC or CPU folder is created is displayed.
8. Comment  
Comments of the PLC or CPU folder are displayed.

**■ When the PLC Folder or CPU Folder is Selected**



**Titles of the List Display Window**

1. File Name  
The folder used to create the program, definition data, or the table data is displayed (see the following table for folder list).
2. File Type  
Folder or file type is displayed.

Folder	File	
Program folder	Interrupt DWG	DWG.I program file
	Function	User Function program file
	Start DWG	DWG.A program file
	High Scan	DWG.H program file
		Motion \Mgrp\MPMxxx program file
		Motion \Mgrp\MPSxxx program file
		Motion\Group Definition
	Low Scan	Motion\Motion Parameter
Definition folder	DWG.L program file	
	System Definition	
	Scan Time Definition	
	Application Information	
	Fault Monitor	
	Data Trace	
Table Data Folder	Module Configuration	
	Table Data List	



## ■ When the Function or High Scan Folder is Selected

File Name	D	Comment	St...	SFC	#C	MC	ID	ILK	ASM	TUN	FBD	Privil...	Date	Time	C
H			044									R1W0	1997...	09:25...	
H01			035									R1W0	1997...	09:25...	
H02			042									R1W0	1997...	09:25...	
Motion Folder															

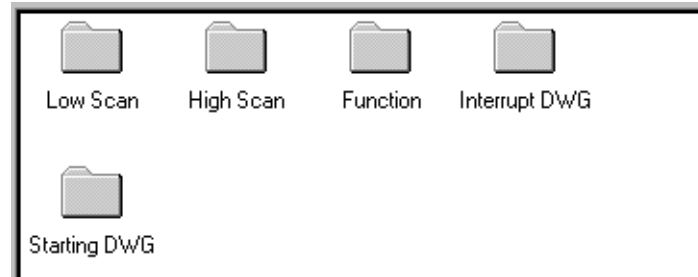
**Titles of the List Display Window**

1. File Name  
The DWG number/Function code is displayed.
2. D  
The letter D is displayed when the program is specified as disabled.
3. Comment  
The title of the DWG/Function program is displayed.
4. Step number  
The step number of the DWG/Function program is displayed.
5. Sub-program  
Creation information of the SFC (Sequential Function Chart) program or the table format program is displayed. Zero (0) is shown when the program is created.
  - SFC: Sequential Function Chart
  - #C: Constant Table (#Register)
  - MC: Constant Table (M register)
  - IO: Input/Output Convert Table
  - ILK: Interlock Table
  - ASM: Part Assembly Table
  - TUN: Tuning Panel
  - FBD: Function Block Diagram
6. Privilege  
The privilege of the DWG/Function program is displayed.
7. Date and Time  
The final date and time when the DWG/Function program is saved is displayed.
8. C  
This is invalid in the current version.

The List Display Window provides the following display modes.

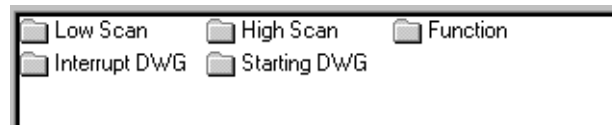
### ■ Large Icon Display

Folders or files can be displayed with large icons if selecting **Large icon (G)** from **View (V)** in the File Manager menu.



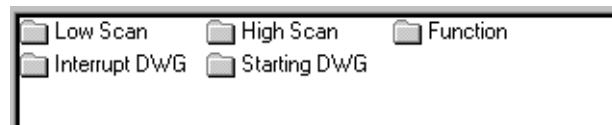
### ■ Small Icon Display

Folders or files can be displayed with small icons if selecting **Small icon (M)** from **View (V)** in the File Manager menu.



### ■ List Display

Folders or files can be listed with small icons if selecting **List (L)** from **View (V)** in the File Manager menu.



### ■ Detail Display

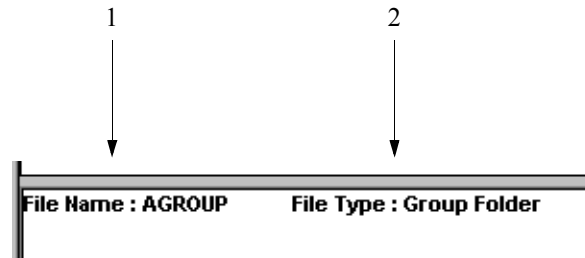
Detail data of folders or files can be listed if selecting **Detail (D)** from **View (V)** in the File Manager menu.

File Name	File Type
Low Scan	Folder
High Scan	Folder
Function	Folder
Interrupt D'WG	Folder
Starting D'WG	Folder

### 4.1.16 Detail Display Window

The folder or file selected in the Tree-like Display Window is detailed in the Detail Display Window. The contents shown in this window vary according to the folder or file selected in the Tree-like Display Window. However, nothing is displayed if the root folder is selected.

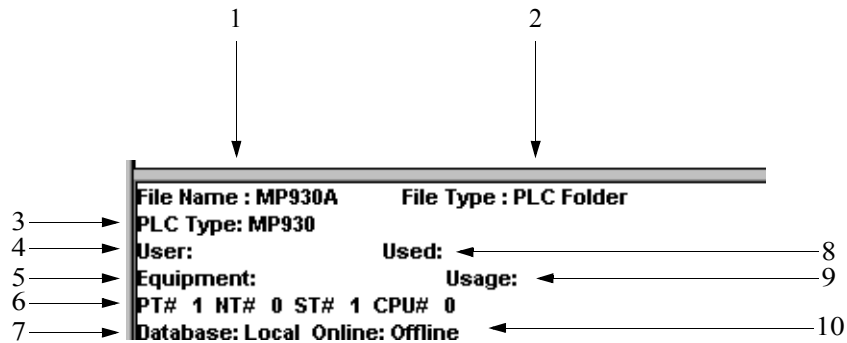
#### ■ When the Group or Order (Customer) Folder is Selected



**Titles of the Detail Display Window**

1. File Name  
Group or Order (Customer) folder name is displayed.
2. File Type  
Folder or file type is displayed.

#### ■ When the PLC or CPU Folder is Selected

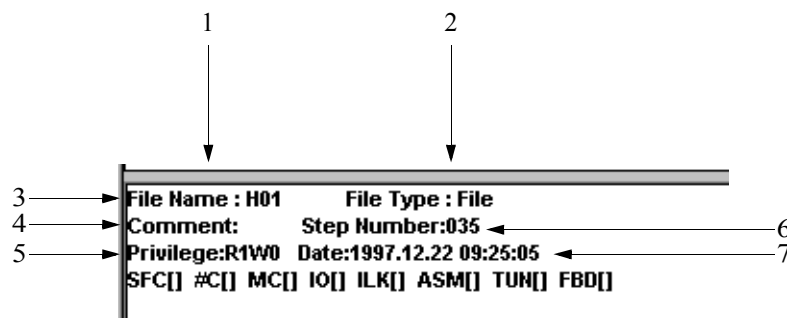


**Titles of the Detail Display Window**

1. File Name  
PLC or CPU folder name is displayed.
2. File Type  
Folder type is displayed.
3. PLC Type  
PLC type is displayed.

4. Customer  
Customer name is displayed, as set up in the **PLC Configuration Window**→**Application Tab**.
5. Equipment  
Equipment name is displayed, as set up in the **PLC Configuration Window**→**Application Tab**.
6. Connection Information  
Port (connects the PLC and MotionWorks™) number (PT#), PLC network number (NT#), station number (ST#), and CPU number (CPU#) are displayed.
7. Database  
This is invalid in the current version.
8. User  
User name is displayed, as set up in the **PLC Configuration Window**→**Application Tab**.
9. Usage  
Usage information is displayed, as set up in the **PLC Configuration Window**→**Application Tab**.
10. On-line  
“**Connected**” appears in the on-line mode and “**Unconnected**” appears in the off-line mode.

### ■ When the Program File is Selected



**Titles of the Detail Display Window**

1. File Name  
DWG/Function program name is displayed.
2. File Type  
Folder or file type is displayed.
3. Comment  
Title of the DWG/Function program is displayed.

4. Privilege  
Privilege of the DWG/Function program is displayed.
5. Sub-program  
Creation information of the Sequential Function Chart program or table format program is displayed. Zero (0) is shown when the program is created.
  - SFC: Sequential Function Chart
  - #C: Constant Table (#Register)
  - MC: Constant Table (M register)
  - IO: Input/Output Convert Table
  - ILK: Interlock Table
  - ASM: Part Assembly Table
  - TUN: Tuning Panel
  - FBD: Function Block Diagram
6. Step number  
Step number of the DWG/Function program is displayed.
7. Date  
Final date and time when the DWG/Function program is saved is displayed.

The Detail Display Window can be switched to Display mode or Hide mode by selecting **Detail Display Window (W)** from **View (D)** in the File Manager menu.

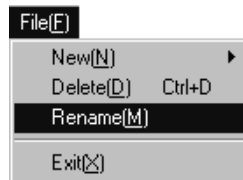
## 4.2 Rename

Follow the procedure below to change folder or file name.

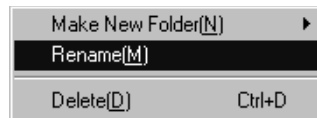
- a. Click the folder or the file name to be changed (here, a folder is selected).



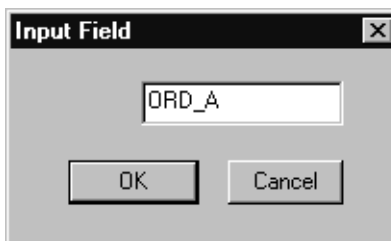
- b. Select **Rename (M)** from **File (F)** in the File Manager menu.



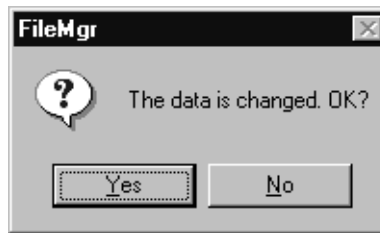
Or, right-click the folder name.



- c. Input the new name in the dialog box with 8 characters or less, then choose the **OK** button.



- d. Choose the **Yes** button in the message box.



- e. The name of the selected folder has been changed.



**Note:**

1. **Rename** cannot be executed when logged on to the CPU.
2. **Rename** applies to folders or files created by the user.

## 4.3 New Controller Registration

Follow the procedures below to register a new controller.

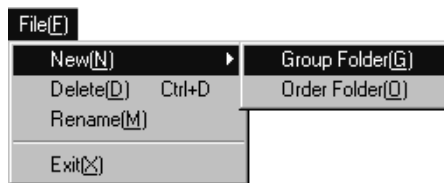
### 4.3.1 Creating New Group Folder

A new Group folder is created in the Root folder or the Group folder.

- a. Click the position where the new Group folder is to be created.



- b. Select **File (F)**→**New (N)**→**Group Folder (G)** from the File Manager menu.

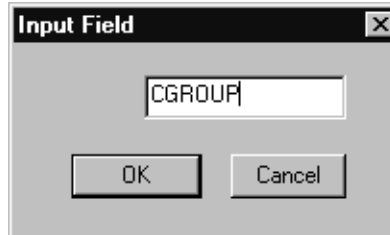




Or, right-click the position where the new Group folder is to be created.



- c. Input the new folder name in the dialog box, using 8 characters or less, then choose the **OK** button.



- d. The new Group folder has been created.



### Note:

A new Group folder can be created in an existing Group folder. The path name of the new Group folder can be created with 64 characters or less.  
 For example, when GROUP2 is created in GROUP1, the path name is shown as follows: C:\GROUP1\GROUP2... (17 characters).

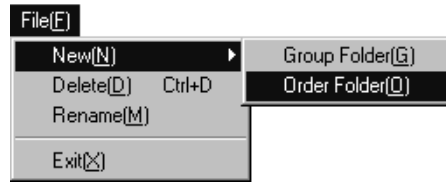
### 4.3.2 Creating New Order Folder

A new Order folder is created in the Group folder.

- a. Click the position where the new Order folder is to be created.



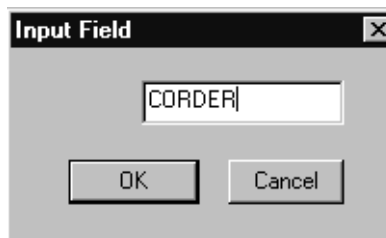
- b. Select **File (F)→New (N)→Order folder (O)** from the File Manager menu.



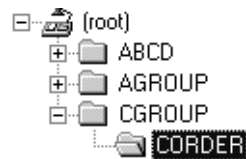
Or, right-click the position where the new Order folder is to be created.



- c. Input the new folder name in the dialog box with 8 characters or less, then choose the **OK** button.



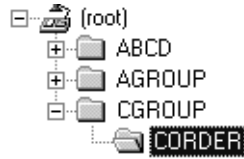
- d. The new Order folder has been created.



### 4.3.3 Creating A New Controller Folder

A new controller folder is created in the Order folder.

- a. Click the position where the new controller folder is to be created.



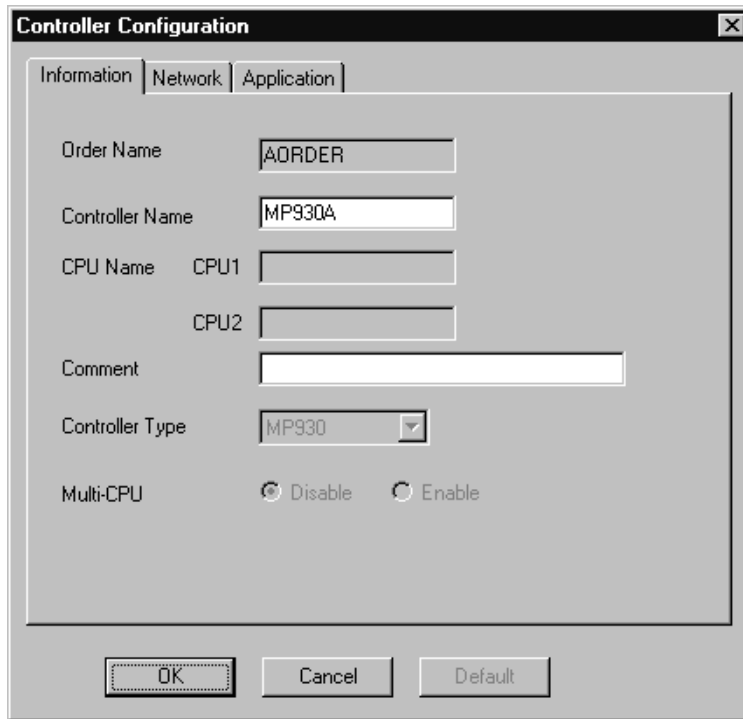
- b. Select **File (F)**→**New (N)**→**Controller folder (C)** from the File Manager menu.



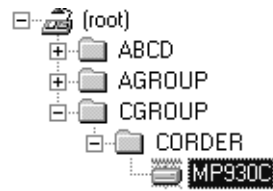
Or, right-click the position where the new controller folder is to be created.



- c. Set up the controller configuration in the **Controller Configuration Window**, then choose the **OK** button.



d. The new controller folder has been created.



## Controller Configuration Window

In the Controller Configuration Window, the information is set up by **Information Tab**, **Network Tab** and **Application Tab**.

### ■ Information Tab

The screenshot shows the 'Controller Configuration' dialog box with the 'Information' tab selected. The fields and their values are as follows:

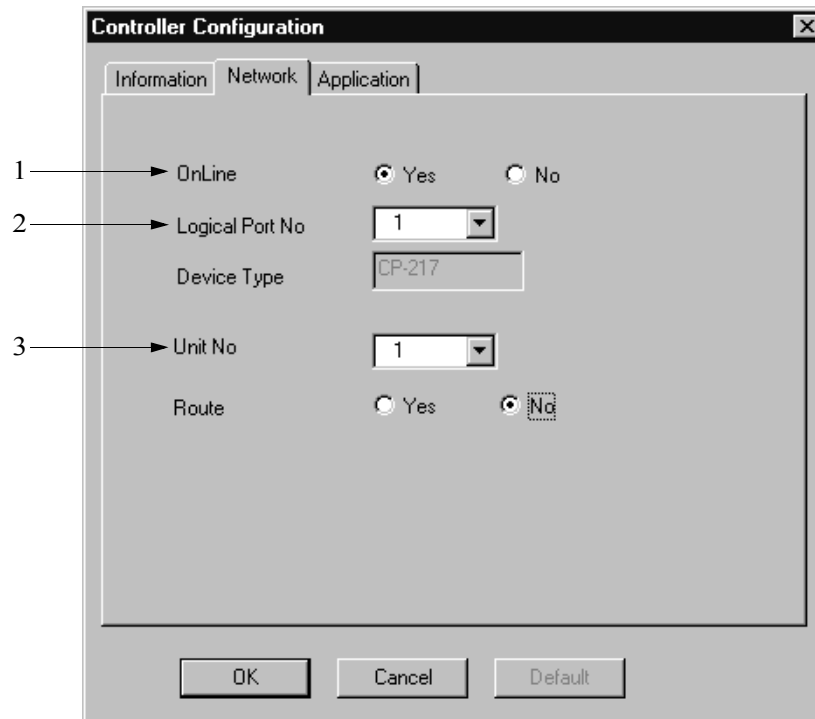
- 1. Order Name: AORDER
- 2. Controller Name: MP930A
- 3. CPU Name: CPU1 (and CPU2)
- 4. Comment: (empty)
- 5. Controller Type: MP930
- 6. Multi-CPU: Disable (selected)

Buttons at the bottom: OK, Cancel, Default.

1. Order (Customer) Name  
Order (Customer) name is displayed. It cannot be changed.
2. Controller Name  
Controller name is input with 8 characters or less.
3. CPU Name  
When the CP-9200SH is set up as the controller name, input the CPU name with 8 characters or less.  
When the CP-9200SH is set up as the PLC name and the Multi-CPU is designated, input both CPU1 and CPU2 names.
4. Comment  
Comments of the PLC or CPU are input with 32 characters or less.
5. Controller Type  
Controller type is shown.

6. Multiple CPU  
When the CP-9200SH is set up as the PLC name, select either with or without Multi-CPU designation.

## ■ Network Tab



1. On-line Designation  
Select either Yes or No.
2. Logical Port Number  
Select the logical port number. The logical port number must also be configured in the **Communication Process Window**.
3. Unit Number  
Set up the unit number in a range of 1~64.

## ■ Application Tab

The screenshot shows the 'Controller Configuration' dialog box with the 'Application' tab selected. The fields are as follows:

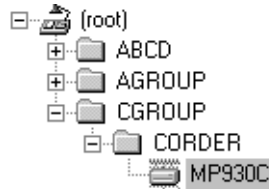
Field	Value
Customer	Yaskawa Electric America
User	Engineering
Equip	MP930
Usage	DEMO
Date	1998 02 09
Revision history	01 : 02 : 03 : 04 : 05 : ...

1. Customer  
Customer name is input with 32 characters or less.
2. User  
User name is input with 32 characters or less.
3. Equipment  
Equipment name is input with 32 characters or less.
4. Usage  
Usage information is input with 32 characters or less.
5. Date  
Date when PLC folder is created is input. The current date is displayed as default.
6. Revision History  
Revision history cannot be input when creating a new PLC folder.

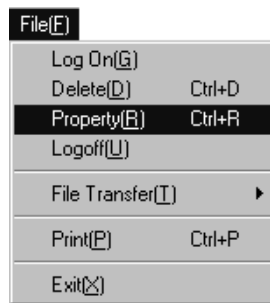
## 4.4 Changing Controller Configuration

Follow the steps below to modify the controller configuration data.

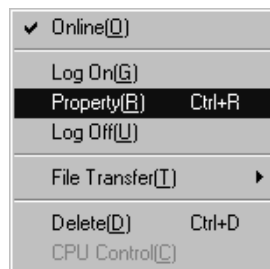
- a. Click the controller folder in which the information is to be modified.



- b. Select **Property (R)** from **File (F)** in the File Manager menu.



Or, select it from the pop-up menu.





- c. Set up new information in each field within the Controller Configuration Window, then choose the **OK** button.

The screenshot shows the 'Controller Configuration' dialog box with the 'Information' tab selected. The fields are as follows:

Field	Value
Order Name	AORDER
Controller Name	MP930A
CPU Name	CPU1
CPU2	
Comment	
Controller Type	MP930
Multi-CPU	<input checked="" type="radio"/> Disable <input type="radio"/> Enable

Buttons at the bottom: OK, Cancel, Default.

**Note:**

Controller configuration cannot be modified when logged on to the controller.

**Controller Configuration Window**

In the Controller Configuration Window, the information is modified by the **Information Tab**, **Network Tab** and **Application Tab**.

**■ Information Tab**

In this tab window, Controller Name and Comment can be modified. See Item 4.3.3 “Creating A New Controller Folder” for change contents.

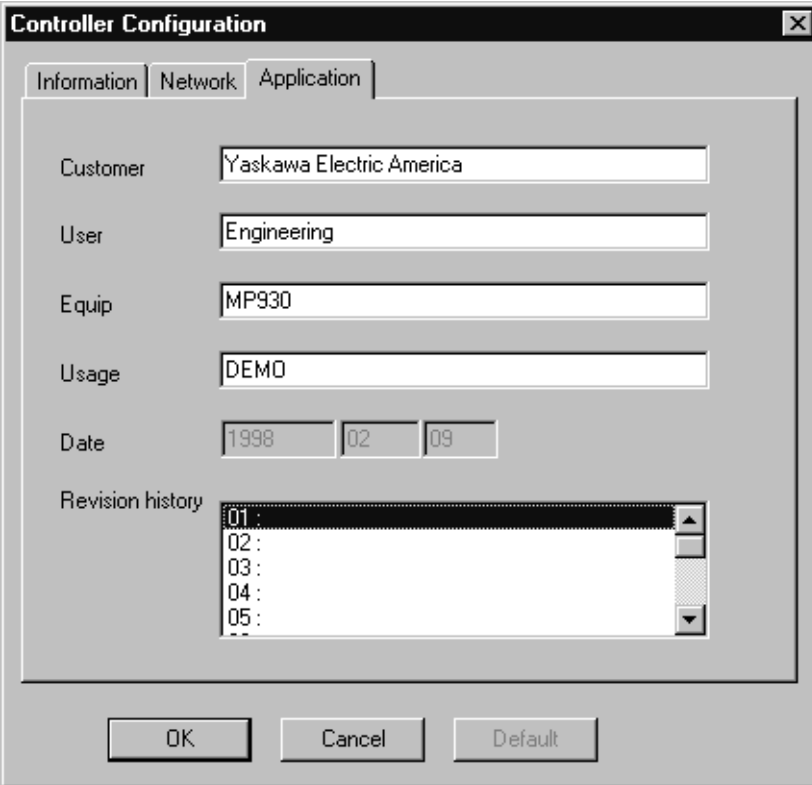
**■ Network Tab**

In this tab window, all information can be modified. See Item 4.3.3 “Creating A New Controller Folder - Controller Configuration Window.”

**■ Application Tab**

In this tab window, all information can be modified. See Section 4.3.3 “Creating A New Controller Folder - Controller Configuration Window.”

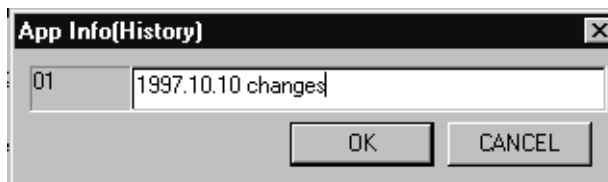
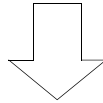
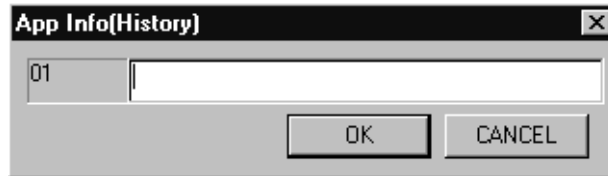
- a. In the Controller Configuration Window, select **Application Tab**, then double-click the number row where the **Revision History** is to be input.



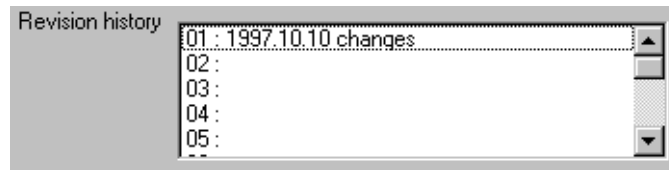
The screenshot shows the "Controller Configuration" dialog box with the "Application" tab selected. The dialog contains several input fields and a list box. The fields are: Customer (Yaskawa Electric America), User (Engineering), Equip (MP930), Usage (DEMO), and Date (1998, 02, 09). The Revision history list box contains the following entries: 01, 02, 03, 04, 05, and --. The list box has a scroll bar on the right side. At the bottom of the dialog are three buttons: OK, Cancel, and Default.

Field	Value
Customer	Yaskawa Electric America
User	Engineering
Equip	MP930
Usage	DEMO
Date	1998 02 09
Revision history	01 02 03 04 05 --

- b. Input contents of the **Revision History** with 50 characters or less, then choose the **OK** button.



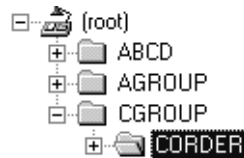
- c. The revised information in the **Application Tab** has been set up.



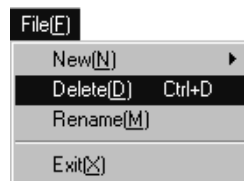
## 4.5 Deleting A Folder or File

When deleting a folder or file in on-line mode, the data saved in both the PLC and hard disk is deleted. When deleting a folder or file in off-line mode, only the data saved in the hard disk is deleted.

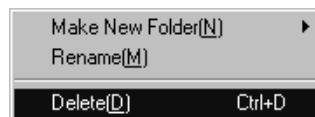
- a. Click the folder or the file to be deleted (here, a folder is selected).



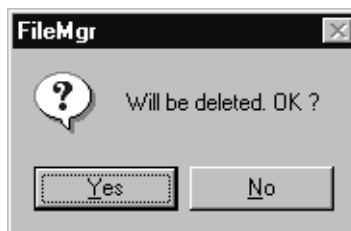
- b. Select **Delete (D)** from the **File (F)** in the File Manager menu.



Or, select it from the pop-up menu.



- c. Choose the **Yes** button in the message box.



- d. The selected folder has been deleted.



**Note:**

1. Use caution when deleting folders/files while the machine is running. There is a risk that the machine may go out of control due to deletion of the folder/file.
2. A program cannot be deleted by a user if the program write privilege level is higher than the user's write privilege level.
3. Sub-programs such as the SFC (Sequential Function Chart) program, the table format program, etc. are also deleted simultaneously if the main program is deleted.
4. This function only applies to a folder or file created by the user. Therefore, a folder or file such as a program folder or definition folder that comes with the MotionWorks™ system cannot be deleted.

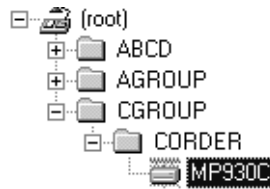
## 4.6 CPU Log-on/Log-off

The PLC or CPU must be logged on when you create a PLC or a CPU program or definition data.

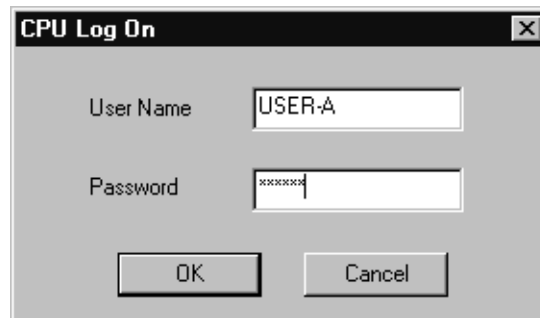
### 4.6.1 Logging on to the CPU

The MP9xx should be logged on to the PLC folder and other PLCs should be logged on to the CPU folder.

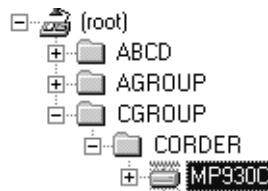
- a. Double-click the PLC or CPU folder to be logged on (here, a PLC folder is selected).



- b. Input the user name and password, then choose the **OK** button.



- c. The “+” symbol appears at the left side of the folder when the log-on is complete.



From this point, the user can edit the program or definition data in the logged on PLC or CPU folder.

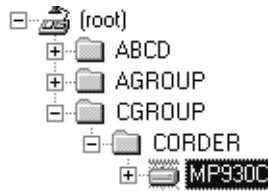
**Note:**

It is not necessary to input a user name and password when setting a default user.

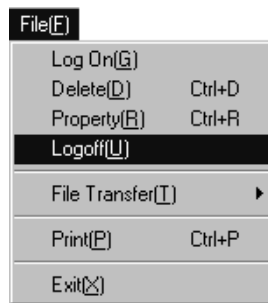
## 4.6.2 Logging off from the CPU

The MP9xx should be logged off from the PLC folder and other PLCs should be logged off from the CPU folder.

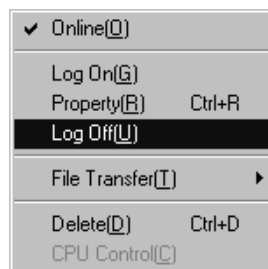
- a. Click the PLC or CPU folder to be logged off (here, a PLC folder is selected).



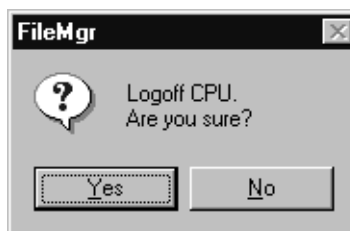
- b. Select **Log off (U)** from **File (F)** in the File Manager menu.



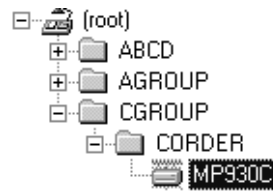
Or, select it from the pop-up menu.



- c. Choose the **Yes** button in the message box.



- d. The “+” symbol at the left side of the folder (“-” symbol is displayed when the folder is opened) disappears when the log-off is complete.

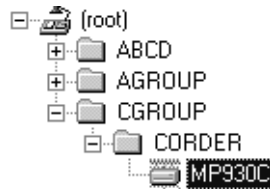




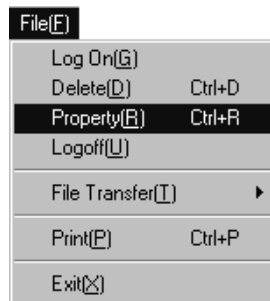
## 4.7 Switching On-line/Off-line Mode

When on-line mode is designated, program or definition data is linked to the PLC. When off-line mode is designated, program or definition data is linked to the hard disk.

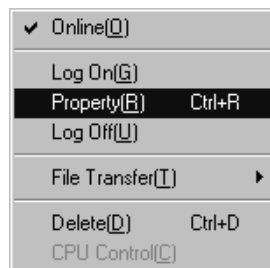
- a. Click the PLC or the CPU folder in which the on-line/off-line mode is to be switched (here, a PLC folder is selected).



- b. Select **Property (R)** from **File (F)** in the File Manager menu.



Or, select it from the pop-up menu.

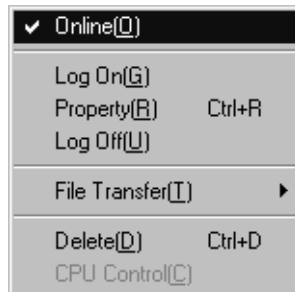


- c. Set up **On-line Designation** in the **Network Tab**.



**Note:**

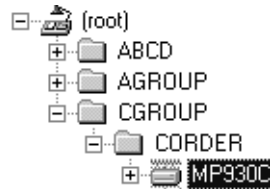
1. On-line/Off-line mode cannot be switched while logged on to the CPU.
2. On-line/Off-line mode can be switched by selecting **On-line (O)** from the pop-up menu.



## 4.8 Switching CPU Status

Follow the procedures below to switch the PLC or CPU to **Run** or **Stop**.

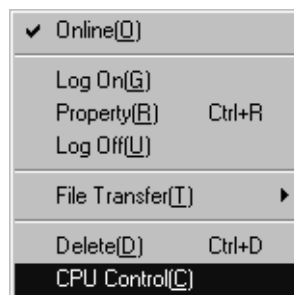
- a. Click the PLC or the CPU folder in which the CPU status is to be switched (here, a PLC folder is selected).



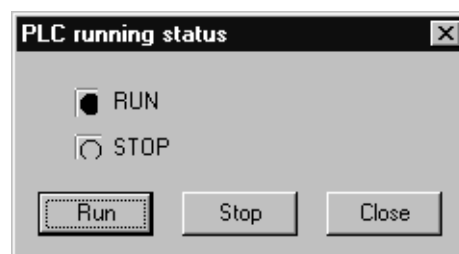
- b. Select **CPU Control (C)** from **Edit (E)** in the File Manager menu.



Or, select it from the pop-up menu.



- c. Choose the **Run** button when you want to switch the CPU to operation status. Otherwise, choose the **Stop** button.



The CPU status has been switched.

**Note:**

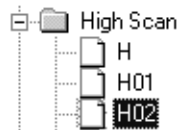
The current CPU status is displayed as  .  
The CPU status cannot be switched in off-line mode or without logging on to the CPU.

## 4.9 Editing DWG/Function Program

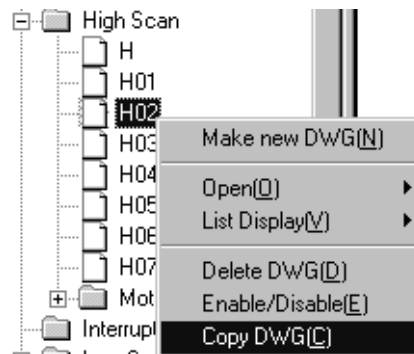
### 4.9.1 Copying Program

A program is copied to both the PLC and hard disk in on-line mode and copied to the hard disk in off-line mode.

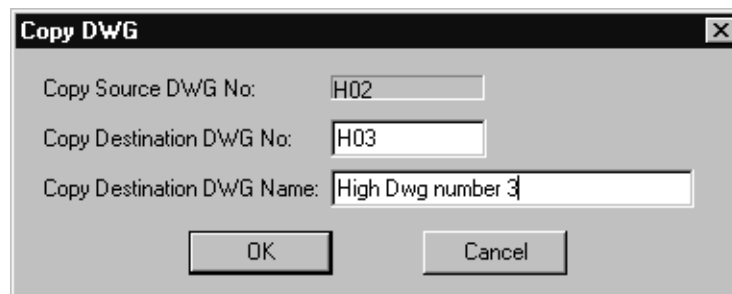
- a. Click the program to be copied.



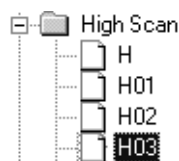
- b. Select **Copy (C)** from the pop-up menu.



- c. Input the copy DWG number/Function code and DWG/Function comments in the dialog box, then choose the **OK** button.



- d. The copy designated by the new DWG number has been created as a new program.



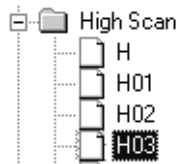
**Note:**

1. When a main program is copied, the sub-program, such as the table format program, is also copied simultaneously.
2. It is not possible to copy a program to an existing DWG/Function program.

**4.9.2 Setting Disable**

Follow the procedures below to set up the program disable function.

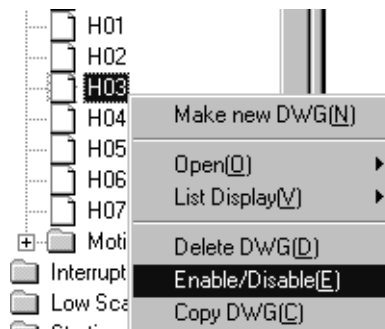
- a. Click the program in which the disable is to be set up.



- b. Select **Enable/Disable (E)** from **Edit (E)** in the File Manager menu.



Or, select it from the pop-up menu.



If the selected program is being set up for disable, the disable is released now. If it is not being set up for disable, the disable is set up now.

**Note:**

Enable/Disable can be set up only for the DWG/Function program.

### 4.9.3 Switching Sub-program Unit Display

**List Display (V)** can be switched by a unit of the sub-program that goes with the main program.

Select **View (V)**→**List Display (V)** from the File Manager menu, then select the sub-program type from the sub-menu of the **List Display (V)**. For example, if **SFC (Sequential Function Chart) Flowchart (S)** is selected, the main programs that create the SFC Flowchart are listed.

## 4.10 Updating Information

When DWG/Function programs are newly created or deleted, the MotionWorks™ File Manager changes the display information.

- a. Select **Refresh (R)** from **View (V)** in the File Manager menu.
- b. The updated information is displayed in the MotionWorks™ File Manager.

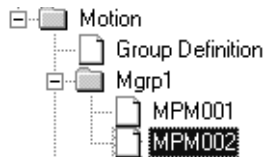


## 4.11 File Operation of the Motion Program

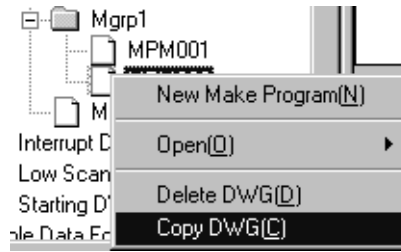
### 4.11.1 Copying A Program

Follow the procedures below to copy a motion program. The program is copied to both the PLC and hard disk in the on-line mode and copied to the hard disk in the off-line mode.

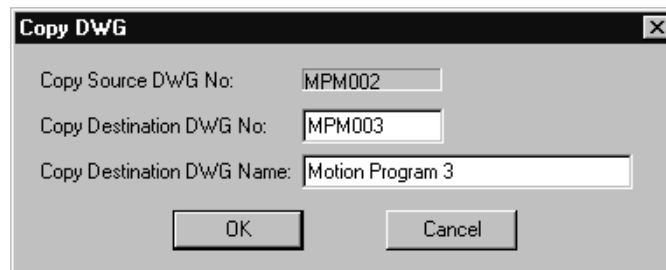
- a. Click the program to be copied.



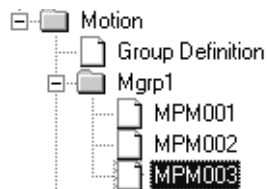
- b. Select **Copy (C)** from the pop-up menu.



- c. In the dialog box, input the copy DWG number/Function code and DWG/Function program comments, then choose the **OK** button.



- d. The copy designated by the new program name has been created as a new program.



**Note:**

It is not possible to copy a program to an existing motion program.

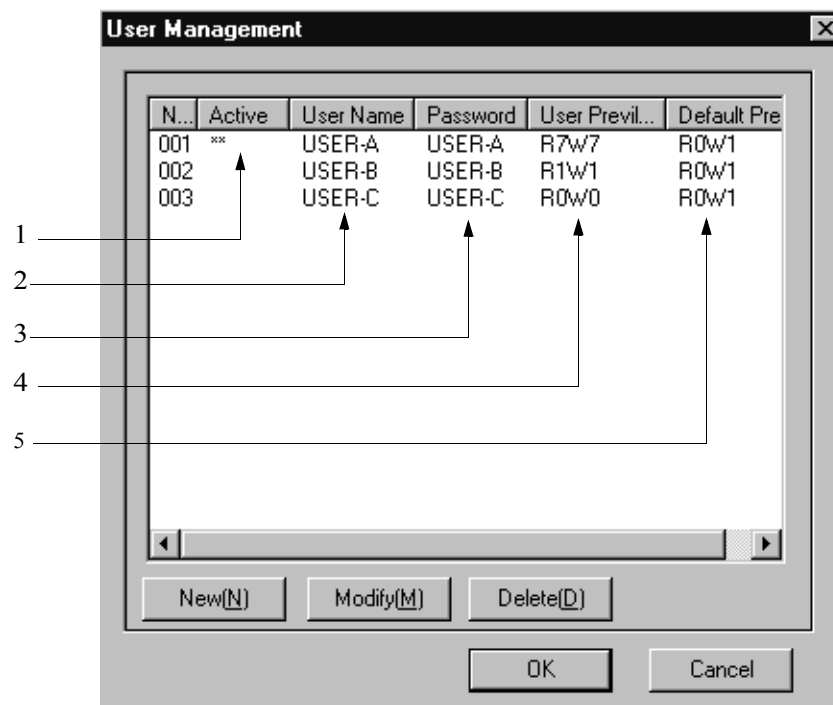
## 4.12 User Management

**User management** is executed in the File Manager Window. User data saved in the PLC in on-line mode and saved in the hard disk in off-line mode can be called up.

- a. Click a PLC folder, then select **User Manager (U)** from the **Edit (E)** in the File Manager menu.



- b. User Manager dialog box is displayed.



**User Manager Dialog Box**

**Note:**

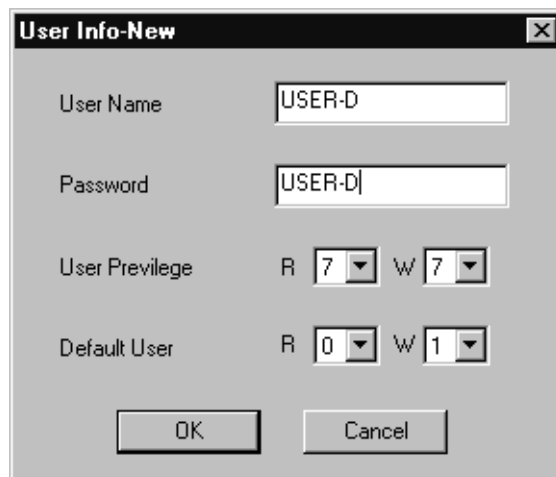
Open the User Manager Window while the PLC folder is highlighted. However, without logging in to the PLC, the User Management cannot be executed. Now, let's execute New User Registration in the User Manager dialog box.

1. Active  
“\*\*” is displayed in the current user row.
2. User Name  
User with lower privilege level than the current user is displayed.
3. Password  
Password that corresponds with each user name is displayed.
4. User Privilege  
User privilege is the privilege for the user to read and write the program already created. If user read privilege (R) is greater than the created program read privilege (R), it is possible for the user to read the program. If the user write privilege (W) is greater than the created program write privilege (W), it is possible for the user to save (update) the program.
5. Default Privilege  
Default privilege is the privilege set up in a new program when the user is creating it. In order to have this default privilege automatically set up in the new program, set up the most frequently used privilege as a default privilege to avoid changing the program privilege later.

#### 4.12.1 Registering A New User

Follow the procedures below to register a new user in the User Manager dialog box. Up to 18 users can be registered.

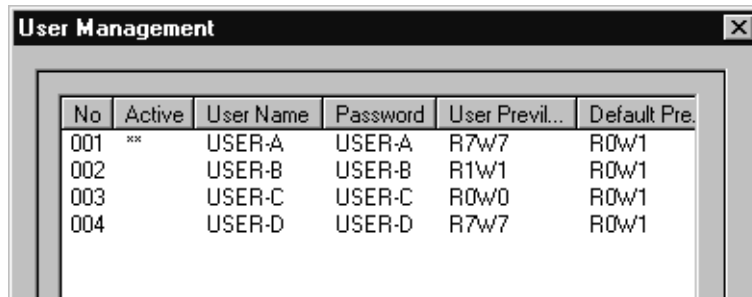
- a. Choose the **New (N)** button. Set up the user information in the dialog box, then choose the **OK** button.



The screenshot shows a dialog box titled "User Info-New" with a close button in the top right corner. The dialog box contains the following fields and controls:

- User Name:** A text input field containing "USER-D".
- Password:** A text input field containing "USER-D".
- User Privilege:** Two dropdown menus. The first is labeled "R" and the second is labeled "W". Both are set to the value "7".
- Default User:** Two dropdown menus. The first is labeled "R" and the second is labeled "W". The first is set to "0" and the second is set to "1".
- Buttons:** "OK" and "Cancel" buttons are located at the bottom of the dialog box.

- b. The user has been registered.



No	Active	User Name	Password	User Privil...	Default Pre.
001	**	USER-A	USER-A	R7W7	R0W1
002		USER-B	USER-B	R1W1	R0W1
003		USER-C	USER-C	R0W0	R0W1
004		USER-D	USER-D	R7W7	R0W1

### ■ User Name

Input the user name, using 16 characters or less, but do not use a space or comma. Duplicate user names cannot be input. Also, since **User-A**, **User-B**, and **User-C** are already registered as users in the MotionWorks™ system, they cannot be used again.

### ■ Password

Input a password that corresponds to the user name, using 16 characters or less. As soon as the user name is different, the password can be duplicated. Moreover, password input can be omitted.

### ■ User Privilege

Input the read privilege of the program already created to the **R** (read) row, and the write privilege of the program already created to the **W** (write) row in a value range of 0~7. The larger the value, the greater the privilege.

### ■ Default User

Input the read privilege of the newly created program to the **R** (read) row, and the write privilege of the newly created program to the **W** (write) row in a value range of 0~7. The larger the value, the greater the privilege.

## Standard Registered User

In the MotionWorks™ system, a standard registered user has been set up for each PLC. Moreover, standard user privileges and default privileges are also registered. They are shown as follows.

**Table 4.21: Standard Registered User**

User Name	Password	User Privilege	Default Privilege	Reference
USER-A	USER-A	R7W7	R0W1	For user manager
USER-B	USER-B	R1W1	R0W1	For user maintenance personnel
USER-C	USER-C	R1W0	R0W1	For user operator

### 4.12.2 Changing User Information

Follow the procedures below to change registered user information in the User Manager dialog box.

- a. Click the number of the user to be modified, then choose the **Modify (M)** button.

No	Active	User Name	Password	User Previl...	Default Pre.
001	***	USER-A	USER-A	R7w7	R0w1
002		USER-B	USER-B	R1w1	R0w1
003		USER-C	USER-C	R0w0	R0w1
004		USER-D	USER-D	R7w7	R0w1

- b. Set up user information in the dialog box, then choose the **OK** button.

The dialog box titled "User Info-Change[No:006]" contains the following fields and values:

- User Name: USER-D
- Password: USER-D
- User Privilege: R 2, W 3
- Default User: R 0, W 1

Buttons: OK, Cancel

- c. The selected user information has been modified.

No	Active	User Name	Password	User Previl...	Default Pre.
001	***	USER-A	USER-A	R7w7	R0w1
002		USER-B	USER-B	R1w1	R0w1
003		USER-C	USER-C	R0w0	R0w1
004		USER-D	USER-D	R2w3	R0w1

See Item 4.12.1 "Registering A New User" for complete user information.

### 4.12.3 Deleting User

Follow the procedures below to delete a registered user in the User Manager dialog box.

- a. Click the number of the user to be deleted, then choose the **Delete (D)** button.

No	Active	User Name	Password	User Previl...	Default Pre.
001	**	USER-A	USER-A	R7W7	R0W1
002		USER-B	USER-B	R1W1	R0W1
003		USER-C	USER-C	R0W0	R0W1
004		USER-D	USER-D	R2W3	R0W1

- b. Choose the **Yes** button in the message box.



- c. The selected user has been deleted.

No	Active	User Name	Password	User Previl...	Default Pre.
001	**	USER-A	USER-A	R7W7	R0W1
002		USER-B	USER-B	R1W1	R0W1
003		USER-C	USER-C	R0W0	R0W1

**Note:**

The current user cannot be deleted when the “\*\*” symbol is displayed in the **Active** column.

#### 4.12.4 Saving User Manager Data

User Manager data is saved by choosing the **OK** button in the User Manager dialog box. It is saved in both the PLC and hard disk in the on-line mode and saved in hard disk in the off-line mode.

The User Manager dialog box is closed after the data is saved.

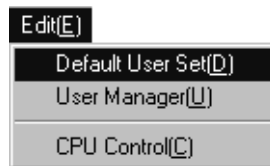
**Note:**

An error message box appears if the data save fails.

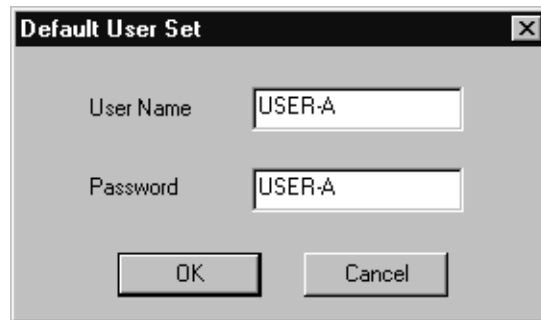
#### 4.12.5 Setting Default User

Instead of inputting the user name and password every time when logging to each PLC in the File Manager Window, set up a default user so that it can be used for subsequent log-on operations.

- a. Select **Default User Set (D)** from **Edit (E)** in the File Manager menu.

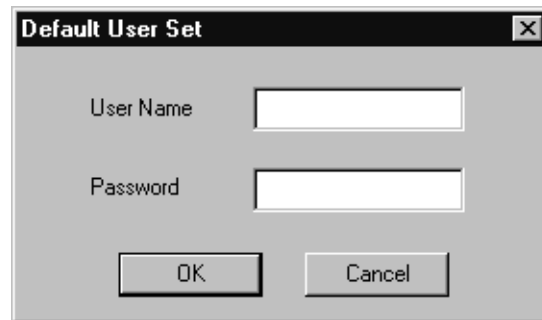


- b. Input the user name and password in the dialog box, then choose the **OK** button.



## **Clearing Default User**

Clear the user name and password in the dialog box, then choose the **OK** button.



### **Note:**

Although the default user is set up, it is not saved in the PLC or hard disk. Therefore, when the system is restarted after closing, the default user set up previously is invalid.



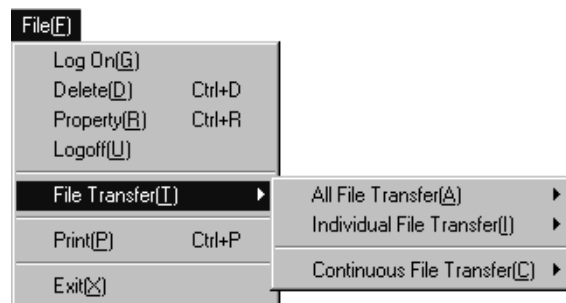
## 4.13 File Transfer

Created programs or definition data are compared and transferred among the PLC, hard disk, and floppy disk.

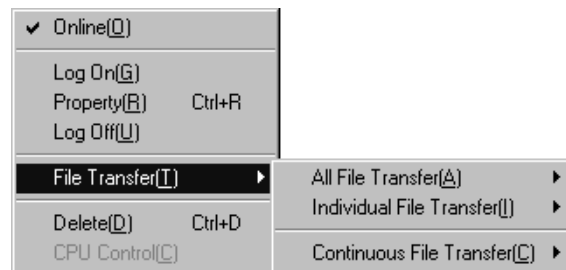
### 4.13.1 Opening File Transfer Window

Follow the procedures below to open the File Transfer Window from the File Manager Window.

- a. Select **File (F)**→**Transfer (T)** from the File Manager menu, then select the file transfer function from the **Transfer (T)** sub-menu.



Or, select it from the pop-up menu.



- b. Select the proper transfer process from the Transfer menu, then each file transfer window is opened.

#### Note:

1. File Transfer cannot be executed without logging on to the PLC.
2. When using a floppy disk (FD), the disk must be inserted in the floppy disk drive. Moreover, transfer to the PLC cannot be executed in off-line mode.

## **File Transfer Function**

As shown in Table 4.22, there are three (3) types of File Transfer. The file transfer function can be selected from each type.

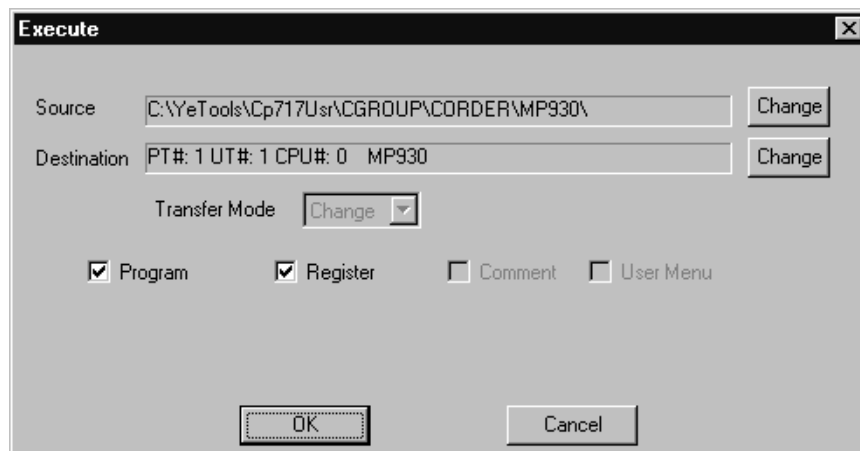
**Table 4.22: File Transfer Type**

Transfer Type	Transfer Process	Function	Reference
All Transfer	All Load (HD→CPU)	Transfers programs or definition data one after another	—
	All Dump (CPU→HD)		
	All Compare (CPU<->HD)		
	All File Transfer (HD→FD)		
	All File Transfer (FD→HD)		
	All File Transfer (HD→Other Media)		
	All File Transfer (Other Media →HD)		
Individual Transfer	Individual Load (HD→CPU)	Transfers specified program or definition data individually	—
	Individual Dump (CPU→HD)		
	Individual Compare (CPU<->HD)		
	Individual File Transfer (HD→FD)		
	Individual File Transfer (FD→HD)		
	Individual File Transfer (HD→Other Media)		
	Individual File Transfer (Other Media→HD)		
Continuous Transfer	Continuous Load (HD→CPU)	Transfers programs or definition data of multiple PLCs	—
	Continuous Dump (CPU→HD)		
	Continuous File Transfer (HD→Other Media)		
	Continuous File Transfer (Other Media→HD)		

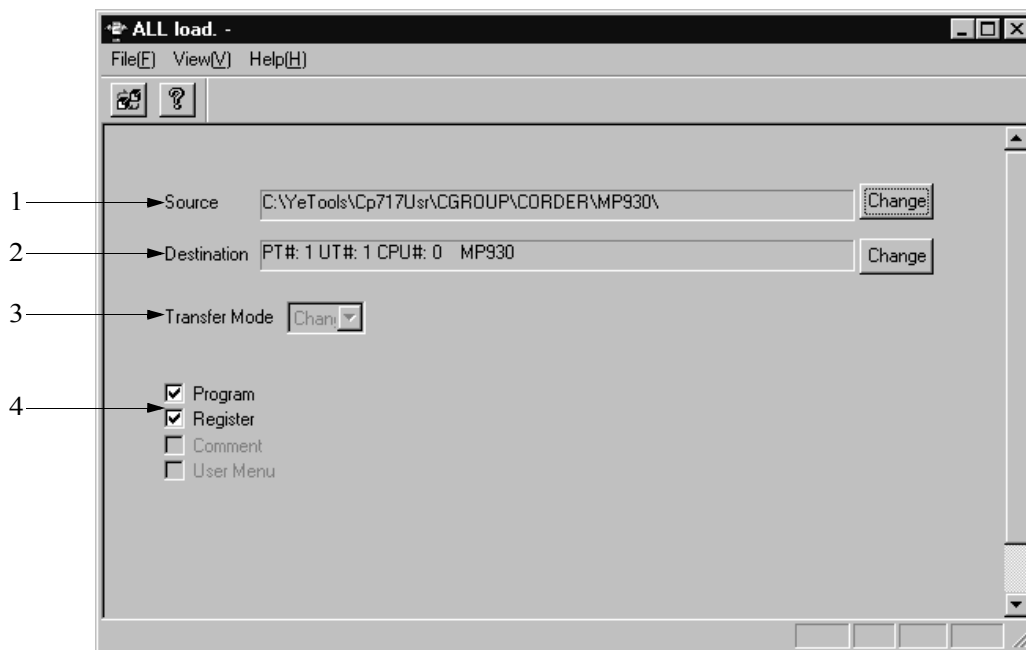
### **4.13.2 All Transfer**

Follow the procedures below to transfer programs or definition data one after another.

- a. The following message box appears when opening the All Transfer window.



- b. All Transfer is started when choosing the **OK** button. When choosing the **Cancel** button the next All Transfer window is opened.



1. Source  
If program or definition data is to be transferred from HD (hard disk), or FD (floppy disk), the original directory name is displayed.  
If program or definition data is to be transferred from the PLC, original PLC connection information and PLC model are displayed.
2. Destination  
If program or definition data is transferred to HD or FD, the destination directory name is displayed.  
If program or definition data is transferred to the PLC, the destination PLC connection information and PLC model are displayed.
3. Transfer Mode  
Transfer mode can be selected.
  - Addition Mode: Transfer file to the directory which has the same name as the original file name.
  - New Mode: Delete the directory which has the same name as the original file name, as well as its contents. Then make a new directory and transfer the file to the new directory.
 If the transfer object is in the PLC, only the Addition Mode is possible.

#### 4. Transfer Object

File transfer objects can be selected. The object varies according to the menu of the File Transfer. The transfer object and its contents are shown in Table 4.23 and Table 4.24.

**Table 4.23: Transfer Object and Contents (when executing in off-line mode)**

Transfer Object	Transfer Contents
Program	DWG program      Function program SFC program      Table Format program Tuning Panel      C Register table FBD                  Motion Configuration Definition Input/Output definition      Transfer Definition Application Information      Fault Definition Data Trace Definition      Table Data
Register	The contents of S, I, O, M, D Register
Comment	Comment
User Menu	This is an invalid data in the current version

**Table 4.24: Transfer Object and Contents (when executing in on-line mode)**

Transfer Item	Transfer Contents
Program	DWG program      Function program SFC program      Table Format program Tuning Panel      C Register table FBD                  Motion Configuration Definition Input/Output Definition      Transfer Definition Fault Definition      Data Trace Definition Table Data
Register	The contents of S, I, O, M, D Register

The transfer object settings can be cleared by selecting **Clear (W)** from **File (F)** in the File Transfer menu.

## **File Transfer Window Menu**

Menus displayed in the All Transfer window are shown in Table 4.25.

**Table 4.25: File Transfer Window Menu**

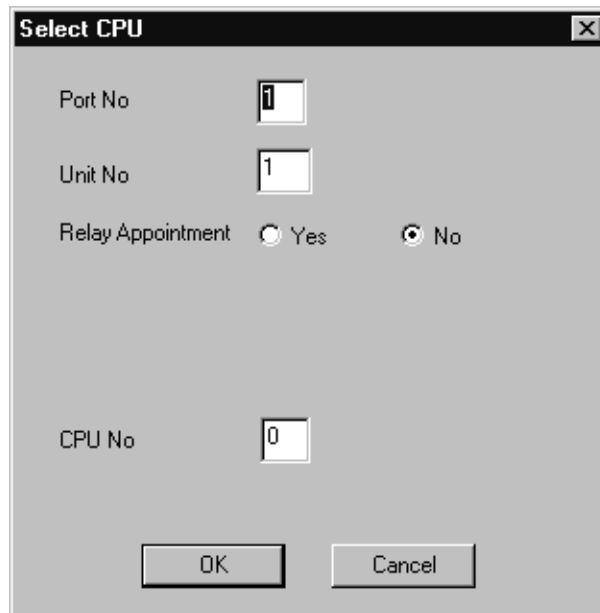
Menu	Function	Reference
File (F)		
Execute (S)	Starts individual file transfer	—
Clear (W)	Clears transfer object settings	—
Exit (E)	Closes File Transfer window	—
View (V)		
Tool Bar (T)	Displays tool bar	—
Status Bar (S)	Displays status bar	—
Error List (I)	Displays error window again	—
PLC Running Status	Changes PLC status	—
Change Source (O)	Changes file transfer source	—
Change Destination (R)	Changes file transfer destination	—
Help (H)		
About App. (A)	Displays version information	—

### ■ Changing Transfer Source and Destination

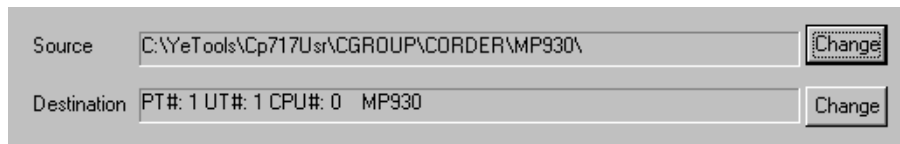
#### 1. Changing Transfer Object CPU

When File Transfer Source or Destination is in the PLC, the CPU of the transfer object can be changed by changing the connection information.

- a. Select the **Change Source (O)** or **Change Destination (R)** from **View (V)** in the File Transfer menu.
- b. Input the connection information in the dialog box, then choose the **OK** button.

**Note:**

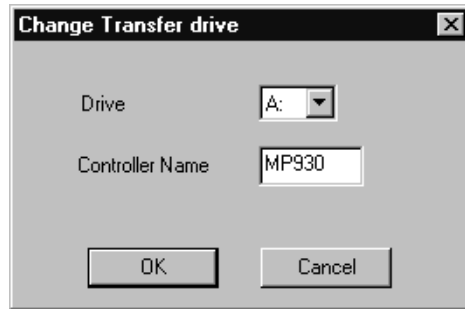
Transfer Origin or Destination can also be modified by selecting the **Change (M)** button shown in the following window.

**2. Changing Transfer Object Directory (FD)**

When File Transfer Source or Destination is a floppy disk (FD), the directory of the floppy disk and PLC name can be changed.

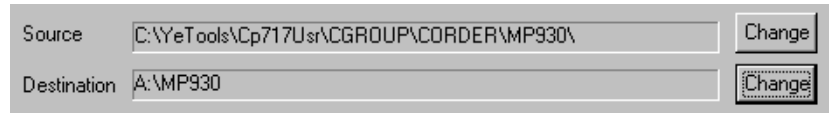
- a. Select **Change Source (O)** or **Change Destination (R)** from **View (V)** in the File Transfer menu.
- b. Set up drive number and PLC name in the dialog box, then choose the **OK**

button.



**Note:**

1. The transfer object directory also can be changed by selecting the **Change** button shown in the following window.



2. The PLC name and the directory name in the floppy disk must be input with 8 characters or less.

### 3. Changing Transfer Object Directory (HD)

When the File Transfer Source or Destination is on the hard disk (HD), the PLC configuration on the hard disk can be changed.

- a. Select **Change Source (O)** or **Change Destination (R)** from **View (V)** in the File Transfer menu.
- b. Select the PLC configuration to be changed in the dialog box, then choose the **OK** button.

Select					
Controller Name	CPU Name	Order Name	Group Name	Server	Equipment
DEMO		ORDER1	GROUP1		
FILES		BACKUP	DEMO		DEMO
MP930		ORDER2	GROUP2		4
MP930		CORDER	CGROUP		Demo

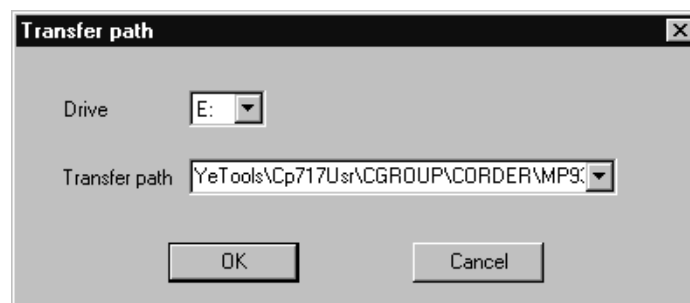
**Note:**

The transfer object directory can also be changed by selecting the **Change** button shown in the following window.

**3. Changing Transfer Object Drive (other media)**

When File Transfer Source or Destination is in another media such as magneto-optical disk (MO), the drive number and path name can be changed.

- a. Select the **Change Source (O)** or **Change Destination (R)** from **View (V)** in the File Transfer menu.
- b. Set up a new drive number and path name in the dialog box, then choose the **OK** button.

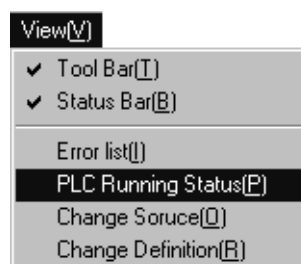
**Note:**

The transfer object directory can also be changed by selecting the **Change** button shown in the following window.

**■ Changing PLC Status**

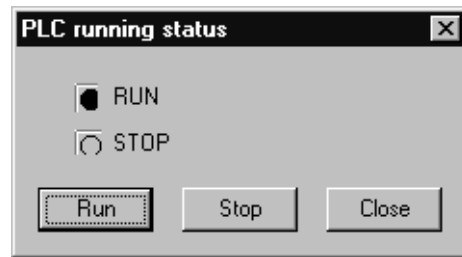
PLC or CPU status can be switched.

- a. Select **PLC Running Status (P)** from **View (V)** in the File Transfer menu.





- b. Choose the **Run** button if you want to switch the PLC to run status, otherwise, choose the **Stop** button.



The PLC status has been switched.

**Note:**

The current PLC status is displayed as . The PLC status cannot be switched in off-line mode or when not logged on to the PLC.

### ■ Starting Transfer

Follow the steps below to execute the All File Transfer.

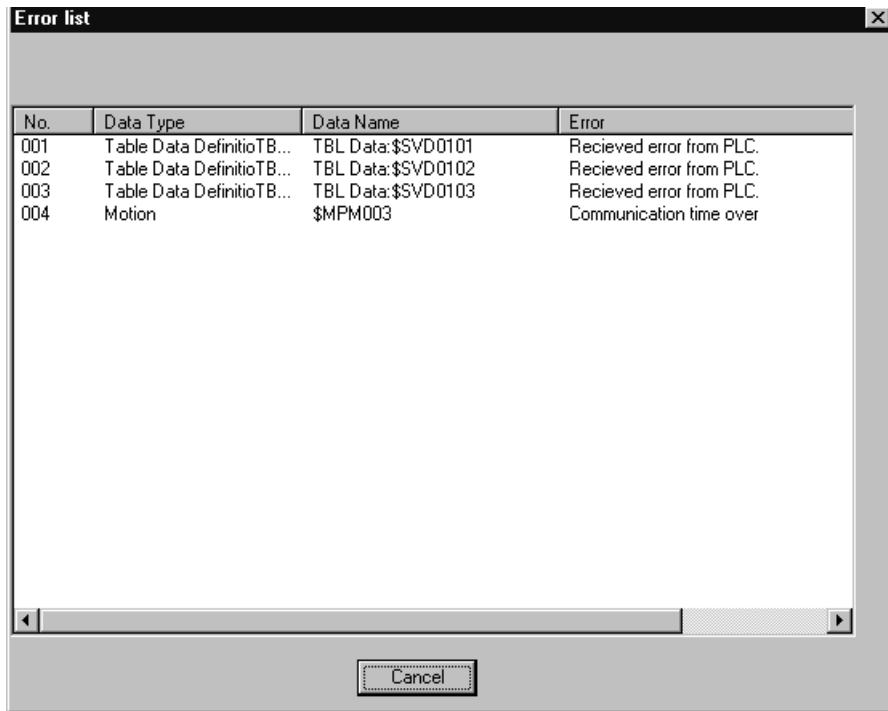
- a. Select **Execute (S)** from **File (F)** in the File Transfer menu.
- b. Choose the **Yes** button in the message box.
- c. Choose the **OK** button in the message box when the transfer is complete.

**Note:**

1. If a file is transferred to the PLC, execute the transfer when the PLC is in **Stop** status. See Item 4.13.2 “All Transfer ■ Changing PLC Status” for PLC running and stopping methods.
2. The All File Transfer window is opened when the file transfer is complete.

### Error During Transfer

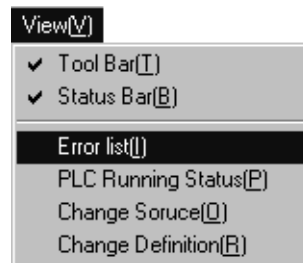
- a. When an error occurs during the transfer, an error window appears after the transfer is complete.



The screenshot shows a window titled "Error list" with a table of error information. The table has four columns: No., Data Type, Data Name, and Error. There are four rows of data. Below the table is a horizontal scrollbar and a "Cancel" button.

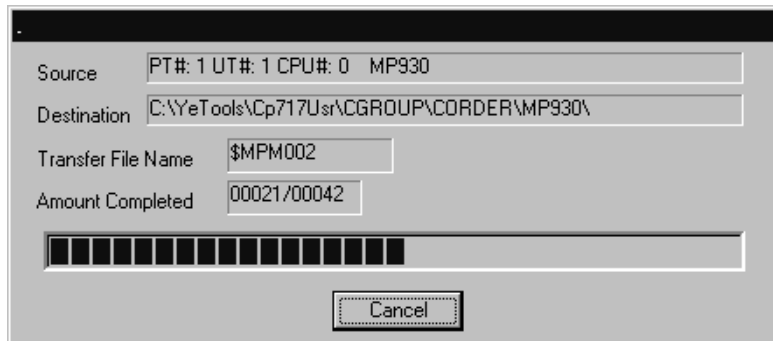
No.	Data Type	Data Name	Error
001	Table Data DefinitioTB...	TBL Data:\$SVD0101	Reieved error from PLC.
002	Table Data DefinitioTB...	TBL Data:\$SVD0102	Reieved error from PLC.
003	Table Data DefinitioTB...	TBL Data:\$SVD0103	Reieved error from PLC.
004	Motion	\$MPM003	Communication time over

- b. The error window can be opened again by selecting the **Error List (I)** from **View (V)** in the File Transfer menu.



## **Transfer File Display**

The following dialog box appears during file transfer. The transfer file is displayed in this dialog box. The transfer can be terminated by choosing the **Cancel** button.



In the Transfer File field, the following data is displayed (shown in Table 4.26).

**Table 4.26: Transfer File**

Item	Transfer File Name	Transfer Contents	Reference
Program	x	Source DWG Program	x (x=A, I, L) is DWG type
	xnn	Sub-DWG Program	nn is Sub-DWG number
	xnn.nn	Sub-sub-DWG Program	nn.nn is Sub-sub-DWG name
	xxxx	Function Program	xxxx is Function code
	xxxx	C Register Table	xxxx is C Register Table name
	\$USERMNG	User Manager File	*
	\$PCDEF	PLC Model Definition	nn (nn=01~08) is group number
	\$MODDEF	Module Model Definition	nn (nn=00, 01) is wire number
	\$SYSDEF	System Definition	nn (nn=01~55) is slot number
	\$SCAN-TB	Scan Time	
	\$APINFO	Application Information	
	\$TRACEnn	Data Trace Definition	
	\$FAULTDE	Fault Definition	
\$SLOTCFG	Module Configuration Definition		
\$BIODEF	Basic Input/Output Definition		
\$INVIO	Inverter Input/Output Definition		
\$215A00	CP-215 Transfer Definition		
\$216Ann	CP-216 Transfer Definition		
\$SERIA00	General Serial A Transfer Definition		
\$SERIB00	General Serial B Transfer Definition		
\$ESLOT01	Expanded Slot Transfer Definition		
\$ESLOTnn	Slot Transfer Definition		
\$EUN!T01	Expanded Unit Transfer Definition		
xxxx	Table Data	xxxx is the name of the table data	

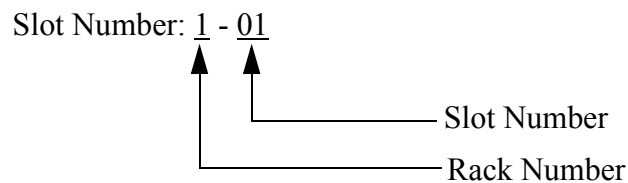
**Table 4.26: Transfer File (Continued)**

Program	\$PROMAPT	Motion Program	nn=1~11
	\$GRPDEF	Group Definition	nn=01~16
	\$M_PRMnn \$PRM_Gnn	Motion Parameter Group nn Parameter	
	\$MPMnnn	Motion Program	Main, nnn=1~256
	\$MPSnnn	Motion Program	Sub-routine, nnn=1~256
Register	\$SREG	S Register Data	—
	\$IREG	I Register Data	
	\$OREG	O Register Data	
	\$MREG	M Register Data	
	\$DREG	D Register Data	
Comment	xxxx.CMT	Comment File	Xxxx is the DWG number/Function code
User Menu	This data is invalid in current version		

\*The User Manager file is transferred simultaneously when the DWG/Function program is transferred. However, if an individual load is executed, it is not transferred.

### **Slot Transfer Definition File Name**

The transfer Definition File name is \$ESLOTnn (nn=00~55). **nn** is extracted from each slot number in Module Definition rack1~ rack4. The slot number is composed of a rack number and slot number as shown below:



**Example 1:** When the slot number is 1-04

- Add slot numbers which are up to the rack of (rack number-1) (see Table 4.27).  
1-1=0, then total slot number is 0.
- Add (slot number +1) to the (a) result.  
0+ (4+1)=5
- Since nn=05 according to (b), the Transfer Definition File name is \$ESLOT05.

**Example 2:** When the slot number is 3-04

- a. Add slot numbers which are up to the rack of (rack number-1) (see Table 4.27).  
 $3-1=2$ , then total slot number of rack 1 and rack 2 is:  
 $\text{Lock 1 (=14)+Rack 2 (=14)=28}$
- b. Add (slot number+1) to the (a) result,  
 $28+(4+1)=33$
- c. Since  $nn=33$  according to (b), then the Transfer Definition File name is  
 $\$ESLOT33$ .

**Table 4.27: Slot Number**

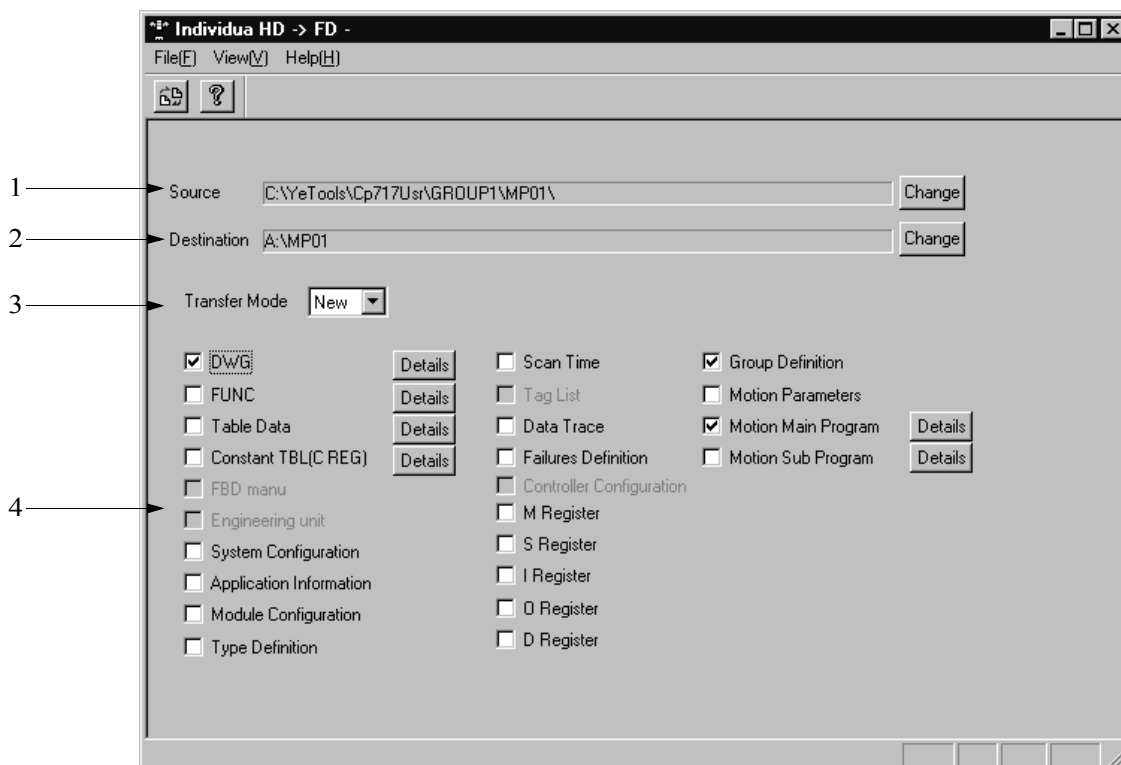
	Rack	Slot Number
Rack1~4	Long (single)	14
	Long (dual)	12
	Short (single)	8

**Note:**

In the MP9xx, only rack 1 is short-fixed.

**4.13.3 Individual Transfer**

Individually designated programs or definition data can be transferred.



1. **Transfer Source**  
 If program or definition data is to be transferred from HD (hard disk) or FD (floppy disk), the original directory name is displayed.  
 If program or definition data is to be transferred from the PLC, the original PLC connection information and PLC name are displayed.
2. **Transfer Destination**  
 If program or definition data is transferred to HD or FD, the destination directory name is displayed.  
 If program or definition data is transferred to the PLC, the destination PLC connection information and PLC name are displayed.
3. **Transfer Mode**  
 Transfer mode can be selected.
  - Addition Mode: Transfer file to the directory which has the same name as the original file directory name.
  - New Mode: Delete the directory which has the same name as the original directory name, as well as its contents. Then make a new directory and transfer the file to the new directory.
 If the transfer object is in the PLC, only the Addition Mode is possible.
4. **Transfer Object**  
 File transfer object can be selected.  
 The transfer object settings can be cleared by selecting the **Clear (W)** from the **File (F)** in the File Transfer menu.

### **File Transfer Window Menu**

Menus displayed in the Individual Transfer Window are shown in Table 4.28.

**Table 4.28: File Transfer Window Menu**

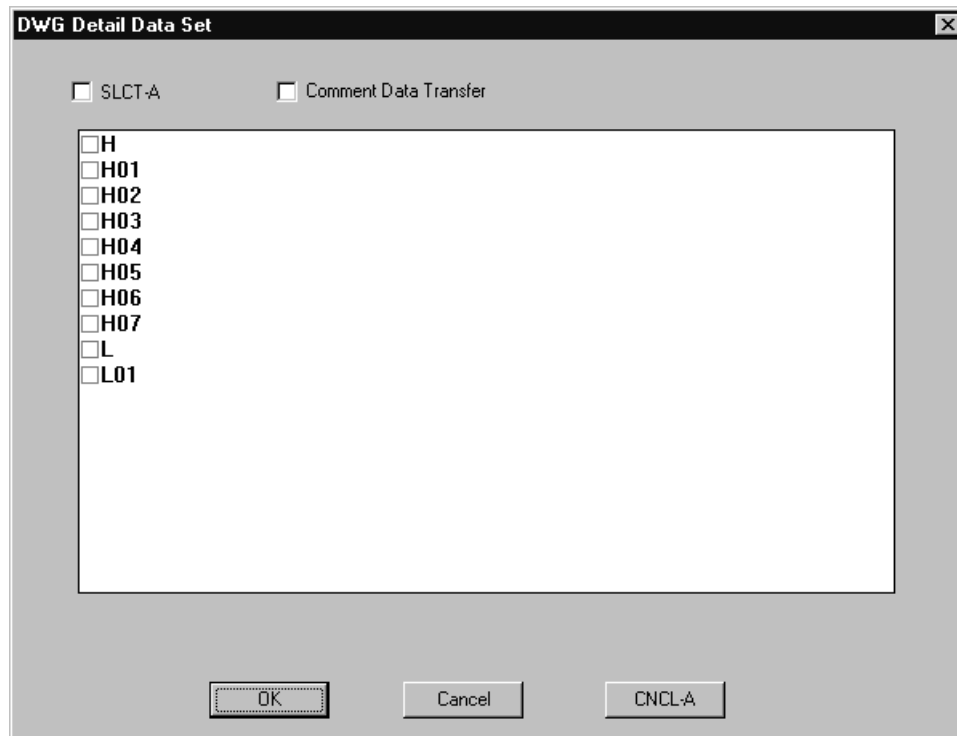
Menu	Function	Reference
<b>File (F)</b>		
Execute (S)	Starts Individual File Transfer	—
Clear (W)	Clears transfer object settings	—
Exit (E)	Closes File Transfer window	—
<b>View (V)</b>		
Tool Bar (T)	Displays tool bar	—
Status Bar (S)	Displays status bar	—
Error List (I)	Displays error window again	—
Change Source (O)	Changes file transfer source	—
Change Destination (R)	Changes file transfer destination	—
<b>Help (H)</b>		
About App. (A)	Displays version information	—

### 4.13.4 Changing Transfer Source and Transfer Destination

The transfer object PLC, floppy disk, etc. can be modified. Refer to Item 4.13.2 “All Transfer ■ Changing Transfer Source and Destination” for changing methods.

### 4.13.5 Setting Detailed Data

When the **Detail** button appears at the right side of the transfer object, detailed data must be set up. To set up the detailed data, first click the **Detail** button, then set up the data in the dialog box, choose the **OK** button. The following screen is displayed after the **Detail** button in the DWG window is selected.



All detailed data setting windows are described as follows.

- a. DWG  
Select the DWG program to be transferred. The selection can be cleared by choosing **CNCL-A** button. As soon as the **SLCT-A** button is chosen, all DWG programs are transferred.
- b. FUNC  
Select the Function program to be transferred. The selection can be cleared by choosing the **CNCL-A** button. As soon as the **SLCT-A** button is chosen, all Function programs are transferred.

- c. **Table Data**  
Select the Table Data to be transferred. The selection can be cleared by choosing the **CNCL-A** button.  
If **Table Data Transfer** is selected, both **Attribution Definition** and **Table Data** are transferred. Otherwise, only **Attribution Definition** is transferred. As soon as the **SLCT-A** button is chosen, all of the Table data is transferred.
- d. **Constant Table (C Register)**  
Select the C Register Table to be transferred. The selection can be cleared by choosing the **CNCL-A** button. As soon as the **SLCT-A** button is chosen, all C Register Tables are transferred.
- e. **Motion Main Program**  
Select the Motion Main Program to be transferred. The selection can be cleared by choosing the **CNCL-A** button. As soon as the **SLCT-A** button is chosen, all Motion Main programs are transferred.
- f. **Motion Sub-program**  
Select the Motion sub-program to be transferred. The selection can be cleared by choosing the **CNCL-A** button. As soon as the **SLCT-A** button is chosen, all Motion sub-programs are transferred.

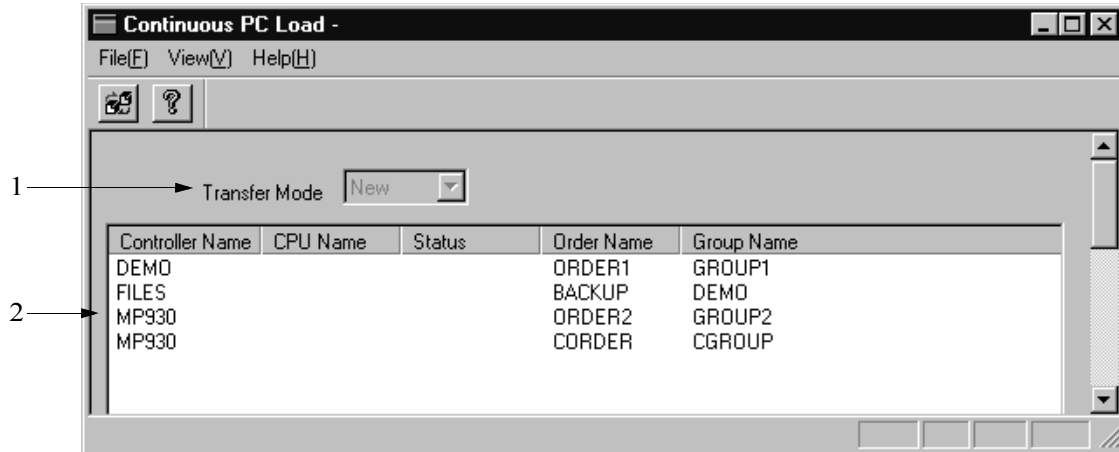
#### 4.13.6 Starting Transfer

To start the Individual Transfer refer to Item 4.13.2 “All Transfer ■ Starting Transfer” for starting methods.



### 4.13.7 Continuous Transfer

Programs or definition data in multiple PLCs can be transferred.



#### 1. Transfer Mode

Transfer mode can be selected.

**Addition Mode:** Transfer file to the directory which has the same name as the original file directory name.

**New Mode:** Delete the directory which has the same name as the original file directory name, as well as its contents. Then make a new directory and transfer the file to the new directory.

If the transfer object is in the PLC, only the Addition Mode is possible.

#### 2. Transfer Object

The file transfer object can be selected. Transfer contents include all files saved in the selected PLC.

## **File Transfer Window Menu**

Menus displayed in the Individual Transfer window are shown in Table 4.29.

**Table 4.29: File Transfer Window Menu**

Menu	Function	Reference
<b>File (F)</b>		
Execute (S)	Starts Continuous File Transfer	—
Exit (E)	Closes File Transfer window	—
<b>View (V)</b>		
Tool Bar (T)	Displays tool bar	—
Status Bar (S)	Displays status bar	—
Error List (I)	Displays error window again	—
Change Transfer Drive	Changes file transfer drive	—
<b>Help (H)</b>		
About App. (A)	Displays version information	—

### **■ Starting Transfer**

To start Continuous Transfer, refer to Item 4.13.2 “All Transfer ■ Starting Transfer” for starting methods.

#### **4.13.8 Closing File Transfer Window**

Follow the steps below to close the File Transfer Window.

- a. Select **Exit (E)** from **File (F)** in the File Transfer menu.
- b. The File Transfer window has been closed.

#### **Note:**

When executing a file transfer that changes the User Manager file, log on to the CPU again after the transfer is complete.

## 5 Engineering Manager

This chapter explains the Engineering Manager, which is the source screen of the programing tool.

5.1	Automatic Starting of the Engineering Manager .....	5-2
5.1.1	Automatic Starting .....	5-2
5.1.2	Basic Function .....	5-3
5.1.3	Menus Displayed When the Function Windows are not Open .....	5-3
5.1.4	Menus Displayed When the Function Windows are Open .....	5-5
5.2	Closing the Engineering Manager .....	5-6

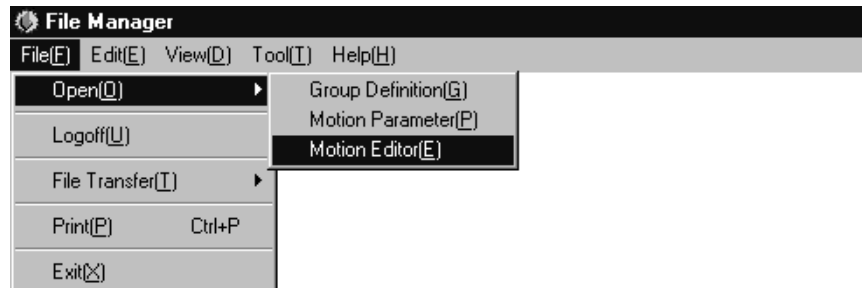
## 5.1 Automatic Starting of the Engineering Manager

This section describes how to start the Engineering Manager and its menus.

### 5.1.1 Automatic Starting

The Engineering Manager is automatically started by the File Manager operation; it cannot be started outside of the File Manager function. Once a programming tool is needed, the File Manager first calls up the Engineering Manager, then opens the requested function window in it. Any of the function windows can be operated under the Engineering Manager.

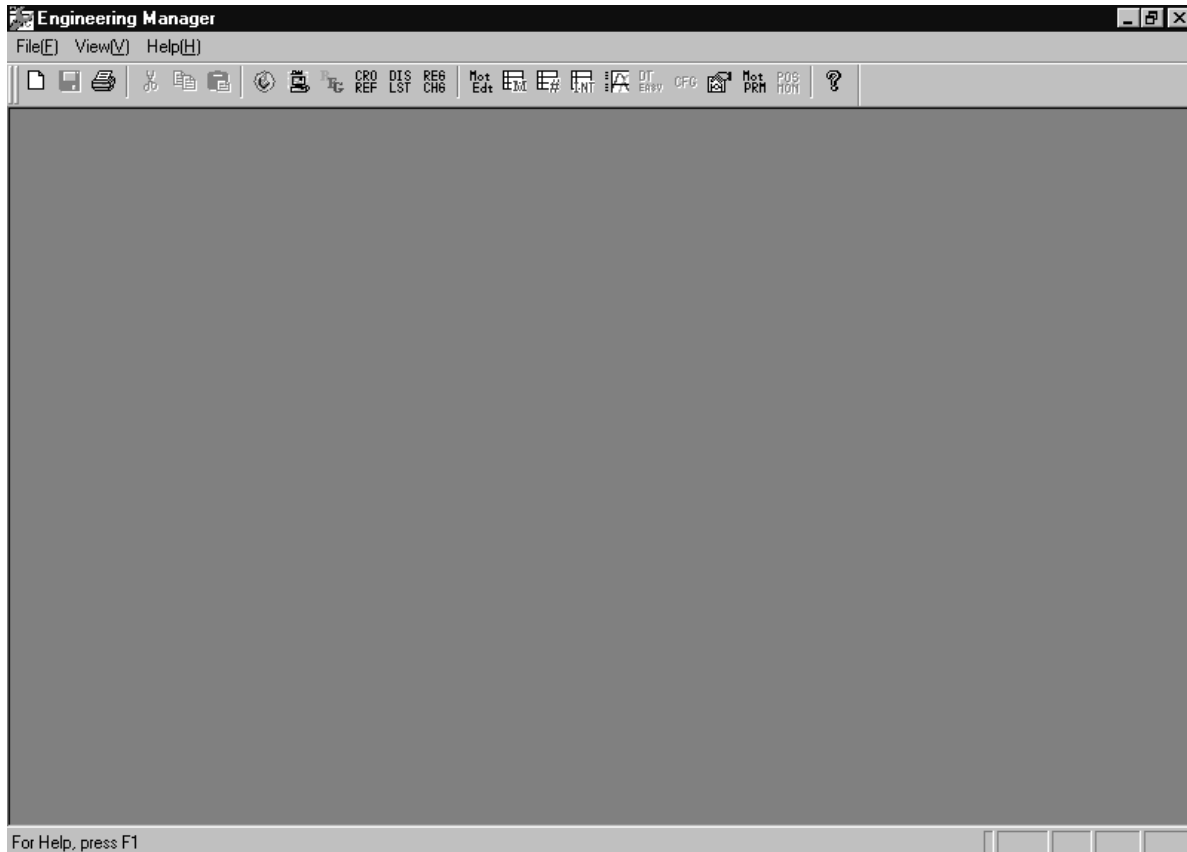
All sorts of function windows operated in the Engineering Manager are shown in Item 1.3.3, “Function Tree.” For example, when the Motion Program folder is selected in the File Manager, the following windows are displayed:



The Motion Editor window is started in the Engineering Manager window.



If the Motion Editor window is closed, the window that still remains is the Engineering Manager. Below is an example of how the Engineering Manager works in the MotionWorks™ system.



### 5.1.2 Basic Function

Function windows cannot be called up from the menus without the intervention of the File Manager.

Multiple windows can be open simultaneously and any of the open windows can be activated as an operation object.

### 5.1.3 Menus Displayed When the Function Windows are not Open

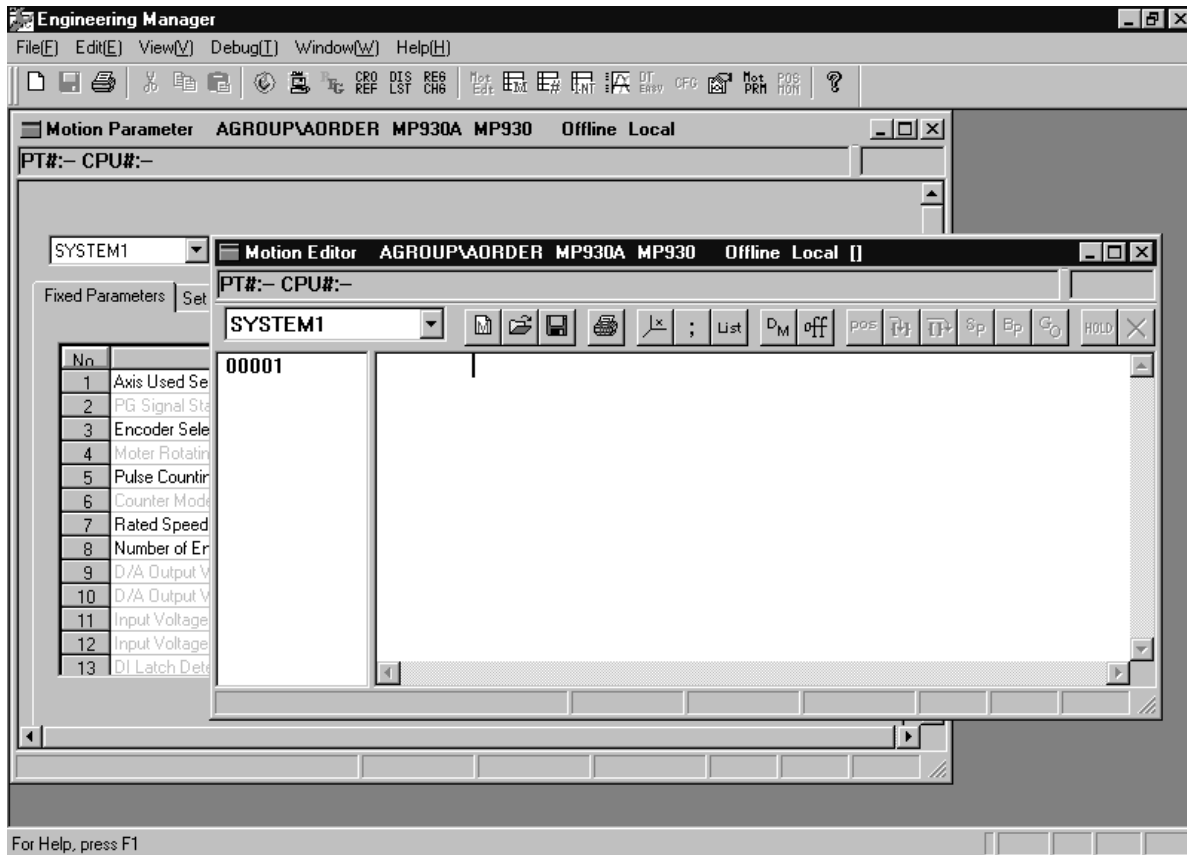
In the Engineering Manager window, a blank screen is displayed if none of the function windows are open. At this time, the menu contents are shown as follows:

Menu	Function
File (F)	
File Manager (F)	Calls up the File Manager
Open (O)	
Definition (D)	
Module Configuration (M)	Opens the defined modules
System Configuration (S)	
Scan Time Settings (T)	
Application Information (I)	
Data Trace (D)	
Fault Monitor (F)	
Group Definition (G)	
Motion Parameter (P)	
Program (P)	
Open New Drawing (O)	Opens the ladder programming tools
Property (R)	
Main Program (L)	
SFC Flowchart (S)	
SFC Time Chart (T)	
SFC Action Box (B)	
Constant Table (#Register) (H)	
Constant Table (M register) (M)	
Input/Output Convert Table (C)	
Interlock Table (I)	
Part Assembly List (A)	
Tuning Panel (P)	
Tool (T)	
Register List (C)	Opens the supplementary programming tools
Cross Reference (X)	
Disable Coil List (D)	
Comment List (C)	
C Register (C)	
C Register List (M)	Displays C register
Table Data Definition (G)	
Table Data List (L)	Displays the table data
Tag (N)	
Tag List (N)	Displays tag list
Motion Program (M)	
Motion Editor (E)	Opens the motion programming tools
Position Monitor (P)	
Task Monitor (T)	
Motion Alarm (A)	
Print (P)	Prints data
Exit (X)	Closes the Engineering Manager
View (V)	
Tool Bar (T)	Displays/Hides the tool bar
Status Bar (S)	Displays/Hides the status bar
Help (H)	
About App. (A)	Displays the version information

### 5.1.4 Menus Displayed When the Function Windows are Open

Multiple function windows can be open simultaneously in the Engineering Manager window. The menu contents vary according to the currently active window. For those menu contents, refer to the menu explanations of each function window.

In the following window display, the function windows of the Motion Editor and the Motion Parameter are open, but only the menu of the Motion Editor shows because it is currently active. If the Motion Parameter window is activated, the menu content changes correspondingly.



## 5.2 Closing the Engineering Manager

The Engineering Manager can be closed by selecting **File (F) → Exit (X)**. Since the confirmation message box does not display, be sure that all function windows have been closed (if there are any open) before closing the Engineering Manager window. Moreover, the File Manager window cannot be closed without first closing the Engineering Manager window.



## 6 Module Configuration

This chapter explains the settings of the modules installed in the PLC.

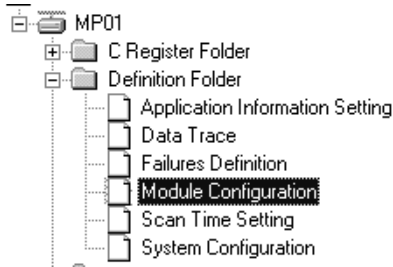
6.1	Opening the Module Configuration Window .....	6-2
6.1.1	Calling up from the File Manager Window .....	6-2
6.1.2	Calling up from the Engineering Manager Window .....	6-2
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6.5.3	Saving the Local I/O Configuration .....	6-17
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6.6	Network Configuration .....	6-20
6.6.1	Network Configuration Menus .....	6-21
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6.6.3	Saving the Network Configuration .....	6-28
6.6.4	Deleting the Network Configuration .....	6-28
6.6.5	Closing the Network Configuration .....	6-29

## 6.1 Opening the Module Configuration Window

This section describes how to call up the window that defines the Module Configuration Information.

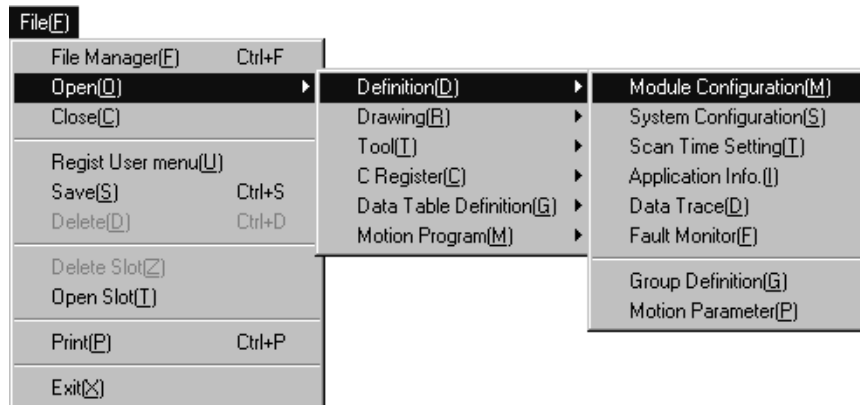
### 6.1.1 Calling up from the File Manager Window

In the Definition folder displayed in the Tree-like Display Window, double-click the Module Configuration file.



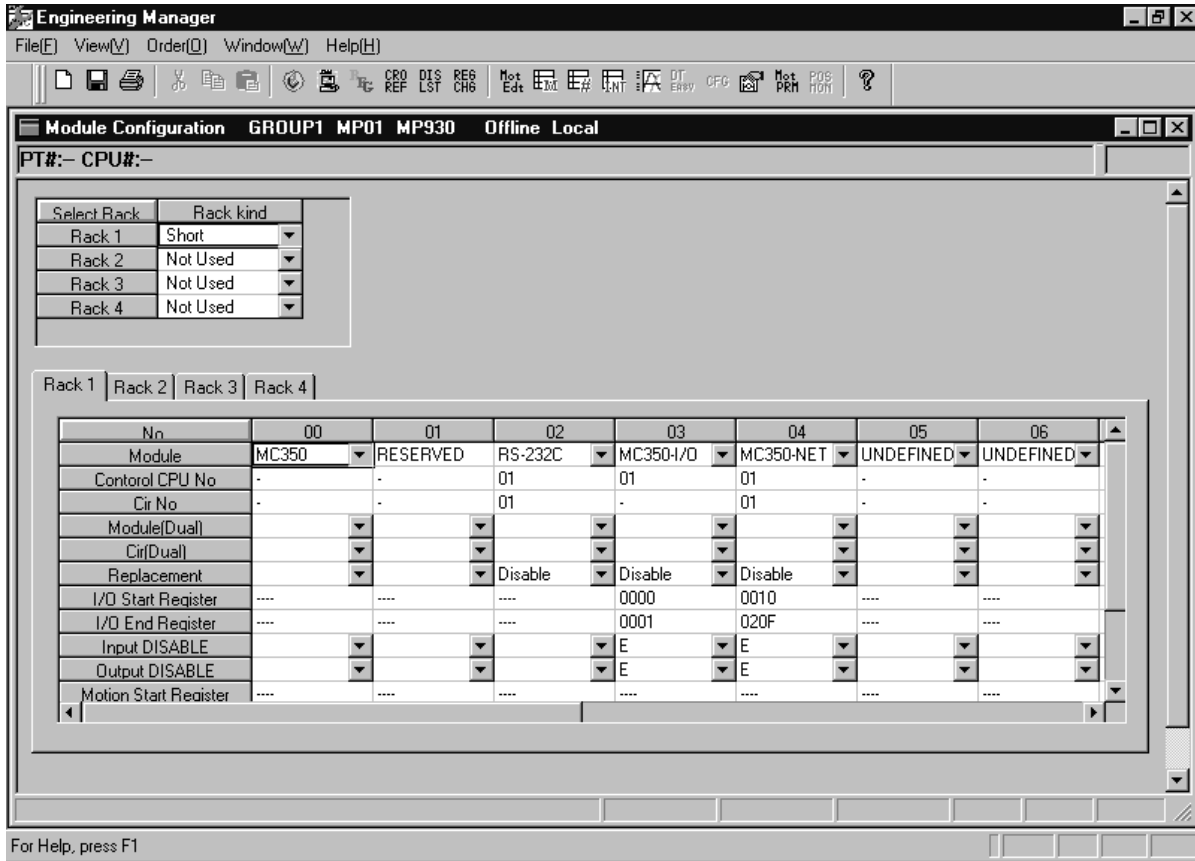
### 6.1.2 Calling up from the Engineering Manager Window

Select **File (F) → Open (O) → Definition (D) → Module Configuration (M)**.



### 6.1.3 Main Module Configuration Window

The module configuration window is opened as a sub-window of the Engineering Manager window by the operations mentioned above. It is shown as follows:



## 6.2 Module Configuration

This section describes how to define the **module group** that structures the controller, and the **individual modules**, such as the input/output definition, transfer parameters, etc.

### 6.2.1 Module Configuration Menus

The menus displayed in the Module Configuration window are shown as follows:

Menu	Function
File (F)	
File Manager (F)	Calls up the File Manager window
Open (O)	Selects and executes other functions
Close (C)	Closes the module definition window
Save (S)	Saves the module definition data
Delete (D)	Deletes the module definition data
Delete Slot (Z)	Deletes one (1) slot of definition data
Open slot (T)	Displays the slot definition window
Print (P)	Prints the module definition data
Exit (X)	Closes the Engineering Manager window
View (V)	
Tool Bar (T)	Displays tool bar
Status Bar (B)	Displays status bar
Order (O)	
Reset Module (R)	Resets module
Window (W)	
Cascade (C)	Cascades windows
Tile (T)	Tiles windows
Arrange Icon (A)	Arranges icons
Help (H)	
About Application (A)	Displays version information

## 6.2.2 Setting the Module Configuration

When the Module Configuration is selected, the following definition window is displayed.

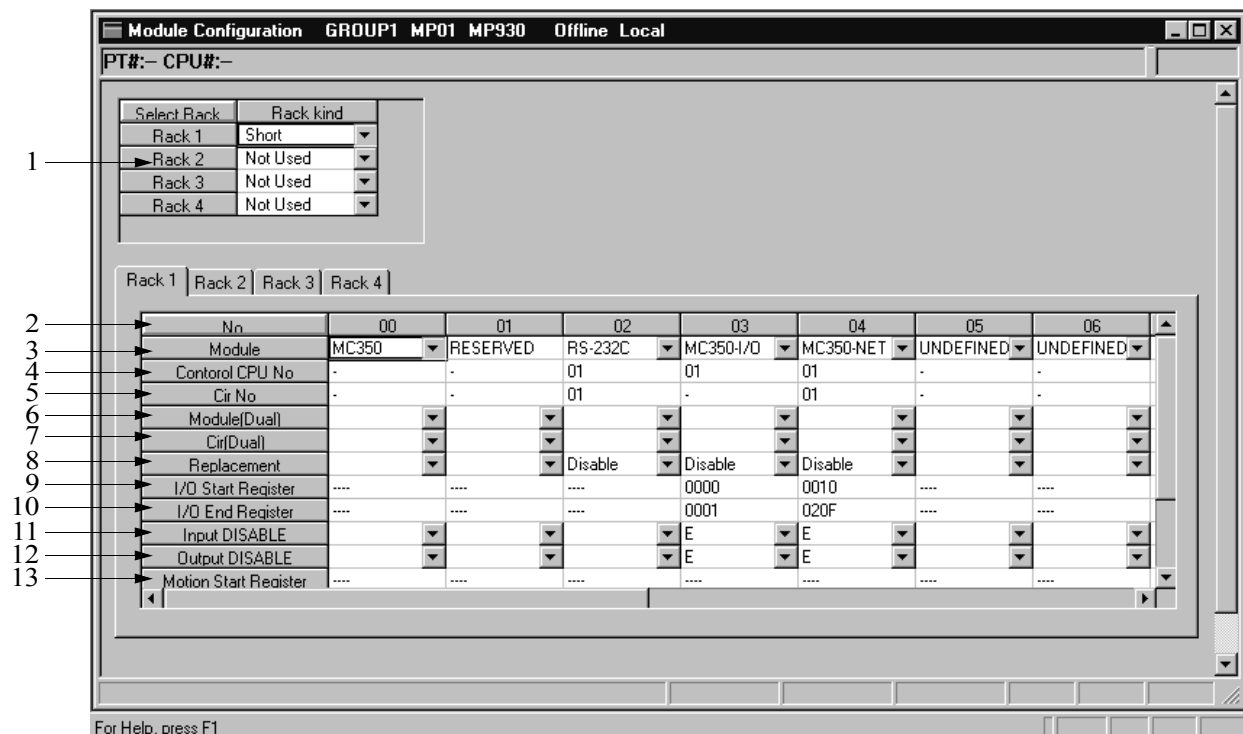
### ■ Configuration Rack Data

1. Rack  
Set up the rack type (rack1 to rack4).

### ■ Setting the Rack Data

Set up the configuration of the modules installed in each slot from rack1 to rack4. Select the tab from rack1 to rack4.

2. Number  
Displays the number of the slot that installs the module. The slot number is fixed; it cannot be changed or added.
3. Module  
Select the name of the module to be installed. The module is fixed; it cannot be changed or added.



4. Control CPU Number  
Set up the number of the CPU that controls the module. There is only one CPU which is fixed as “01.” It cannot be changed.
5. Circuit Number  
Set up the module circuit number. The RS-232C and MC350-NET are fixed as “01.” They cannot be changed or added.
6. Module Dualization  
Not currently available.
7. Circuit Dualization  
Not currently available.
8. Replacement  
Not currently available.
9. Start Register  
Input the module input/output starting register number. Refer to Section 6.5, “Local I/O Definition” and 6.6, “Network Definition” for details.  
  
The starting/ending register number range can be set between 0000 ~ 07FFh (total: 2048 words)  
  
In the machine controller, set up:
 

Local I/O:	0000 ~ 0001
Remote I/O:	0010 ~ 020F
10. End Register  
Input the module input/output ending register number. Refer to Section 6.5, “Local I/O Definition” and 6.6, “Network Definition” for details.
11. Input Disable  
Set up the input disable function of each module.

Setting Value	Status
Empty	Enable
D	Disable
E	Disable cannot be designated

## 12. Output Disable

Setting Value	Status
Empty	Enable
D	Disable
E	Disable cannot be designated

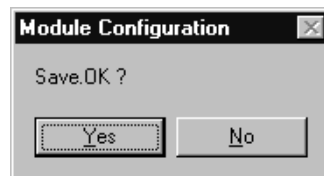
## 13. Motion Start Register

Status	Meaning
Empty	The module is not being installed. The slot is empty.
Not installed	The module is defined, but not installed yet.
Running	The module is operating normally.
Standing by	The module is on standby.
Error	The error in the module is detected.
X Module Name	The different module from the definition is installed.
Waiting for Initialization	The module is installed, but not defined yet.
Stopped	The module stopped.
Stop (Replacement is not allowed)	—
Replacement Ready	Replacement switch is ON; the LED is lit.
While Dual Operating (Control System)	Possesses control privilege while dual operating
While Dual Operating (Standby System)	Possesses no control privilege while dual operating

### 6.2.3 Saving the Module Configuration

Follow the steps below to save the Module Configuration file.

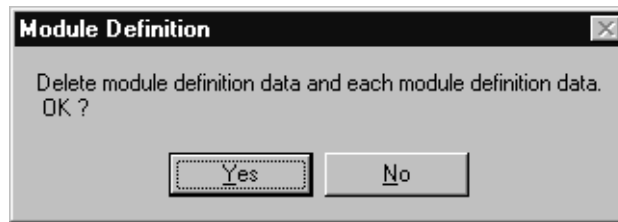
- Select **File (F)** → **Save (S)** from the menus.
- Choose the **Yes** button in the message box when confirming the message contents.



## 6.2.4 Deleting the Module Configuration

Follow the steps below to delete the Module Configuration file.

- a. Select **File (F) → Delete (D)** from the menus.
- b. Choose the **Yes** button in the message box when confirming the message contents.



## 6.2.5 Closing the Module Configuration

Close the Module Definition window; return to the Engineering Manager Window.

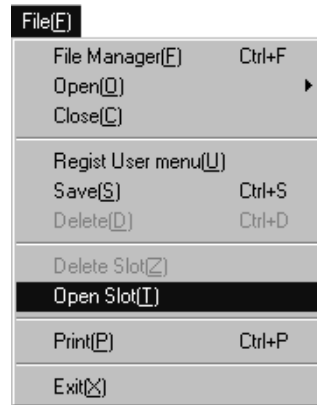
- a. Select **File (F) → Close (C)** from the menus.



### 6.3 Opening the Definition Window of the Module in the Slot

This section describes how to open the **Definition window of each module** installed in the slot. There are two (2) ways, shown as follows:

- a. Opening from the **File (F) Menu**  
 Open the Module Definition window of the selected slot number.  
 In this case, the General Serial Definition window is opened, because the RS-232C is selected.



- b. Opening by the Slot Number  
 Double-click the number of the slot in which the module is installed.  
 In this case, the General Serial Definition window is opened, because the RS-232C is selected.

Rack 1   Rack 2   Rack 3   Rack 4					
No	00	01	02	03	04
Module	MC350 ▼	RESERVED	RS-232C ▼	MC350-I/O ▼	MC350-NET ▼
Control CPU No	-	-	01	01	01

## 6.4 Serial Definition

This section describes how to set up the **General Serial Definition**.

### 6.4.1 Serial Definition Menus

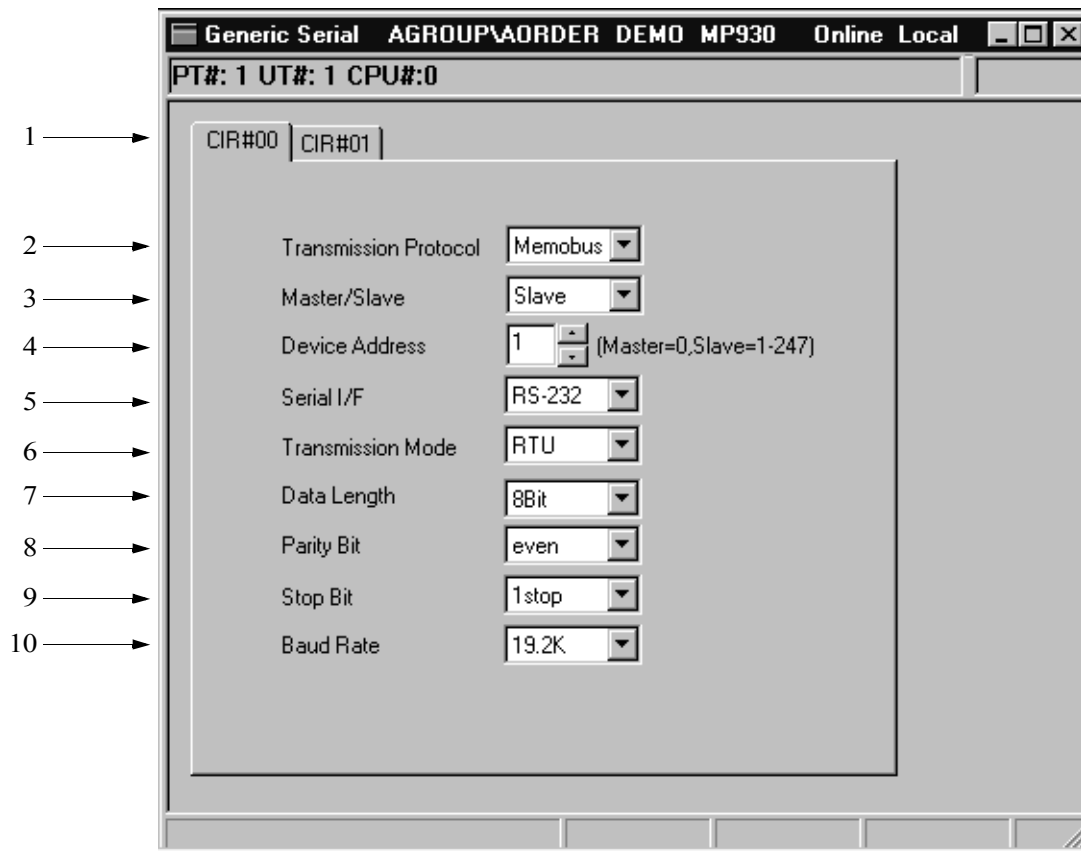
Menus other than the ones shown below are the same as the Module Configuration Definition menus.

Menu	Function
File (F)	
File Manager (F)	Calls up the File Manager window
Open (O)	Selects and executes other functions
Close (C)	Closes the serial definition window
Regist User Menu (U)	Registers user menu
Save (S)	Saves the serial definition data
Delete (D)	Deletes the serial definition data
Print (P)	Prints the serial definition data
Exit (X)	Closes the Engineering Manager window

### 6.4.2 Setting the Serial Definition

In the Serial Definition window displayed, there are separate tabs for each port number.

Tab Name	Port Number Selected in the Controller
CIR#00	Port1
CIR#01	Port2



Each setting value is previously determined by the system. Therefore, it is not necessary to set them up again, unless there is an exception.

1. Tab Name  
Select the tab to be set up.
2. Transmission Protocol  
Select the transmission protocol.

Memobus	Yaskawa Standard Memobus Process
No process	According to the user application program, transfer any data in any timing

3. Master/Slave  
Select the PLC for master or slave.
4. Device Address  
Select the device address. Set up “0” when the master is selected, select a device address between 1 ~ 247 when the slave is selected.
5. Serial I/F  
Select the RS-232C.

## 6. Transmission Mode

Select the transmission mode.

RTU	Designates the RTU mode in the MEMOBUS process
ASCII	Designates the ASCII mode in the MEMOBUS process
None	Free-process

## 7. Data Length

Select the size of one (1) character.

8bit	8 bits
------	--------

## 8. Parity Bit

Select to either use or not use the parity bit.

Even	Even parity
Odd	Odd parity
None	No parity

## 9. Stop Bit

Select stop bit number.

1stop	1 stop bit
2stop	2 stop bits

## 10. Baud Rate

Select the transfer speed (unit: bps).

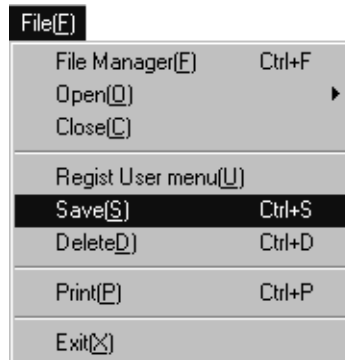
9.6K	9.6K bps
14.4K	14.4K bps
19.2K	19.2K bps
28.8K	28.8K bps
38.4K	38.4K bps
57.6K	57.6K bps

**Note:**

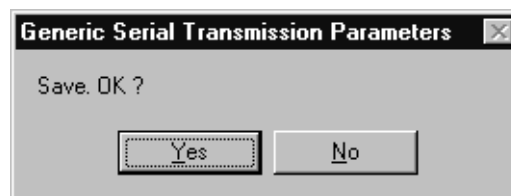
- (1) Use the MEMOBUS specifications for the MotionWorks™ connection ports.
- (2) Use the MEMOBUS specifications as the initialization value while creating a new program.
- (3) The maximum baud rate is 28.8k when connecting to the MotionWorks™ system.

### 6.4.3 Saving the Serial Definition

- a. Select **File (F)** → **Save (S)** from the menus.

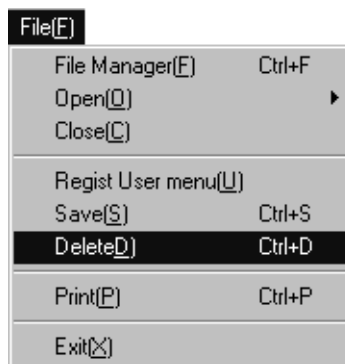


- b. Choose the **Yes** button in the message box when confirming the message contents.

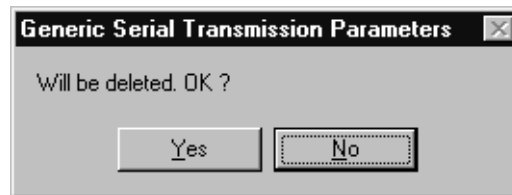


### 6.4.4 Deleting the Serial Definition

- a. Select **File (F)** → **Delete (D)** from the menus.



- b. Choose the **Yes** button in the message box when confirming the message contents.

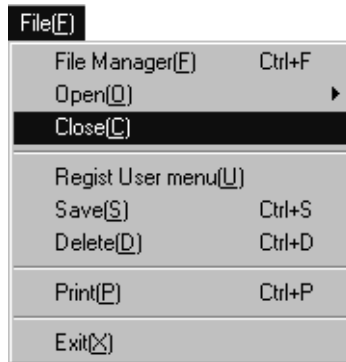


- c. The deletion is completed. Click the **OK** button.



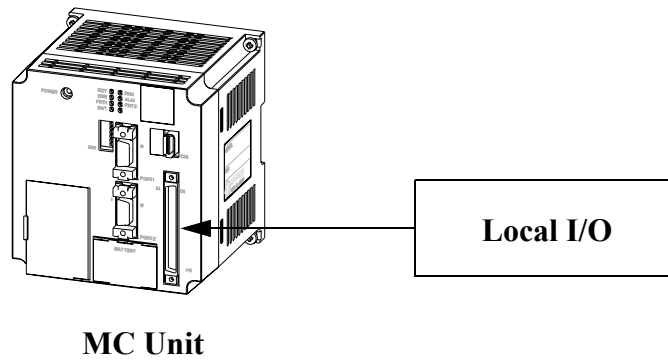
### 6.4.5 Closing the Serial Definition

- a. Select **File (F)** → **Close (C)** from the menus, to close the General Serial Definition window.



## 6.5 Local I/O Configuration

This section describes the settings of the local input/output which is connected to the I/O connector of the MC module.

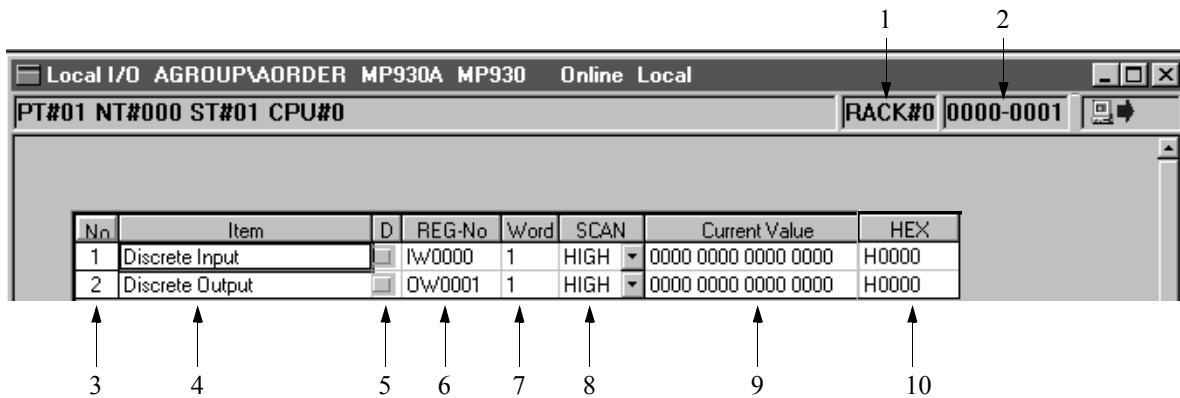


### 6.5.1 Local I/O Definition Menus

The menus shown below are used for the local I/O definition.

Menu	Function
<b>File (F)</b>	
File Manager (F)	Calls up the File Manager window
Open (O)	Selects, and executes other functions
Close (C)	Closes the local I/O definition window
Regist User Menu (U)	Registers user menu
Save (S)	Saves the local I/O definition data
Delete (D)	Deletes the local I/O definition data
Print (P)	Prints the local I/O definition data
Exit (X)	Closes the Engineering Manager window
<b>View (V)</b>	
Tool Bar (T)	Displays tool bar
Status Bar (S)	Displays status bar
<b>Window (W)</b>	
Cascade (C)	Cascades windows
Tile (T)	Tiles windows
Arrange icon (A)	Arranges icons
<b>Help (H)</b>	
About Application (A)	Displays version information

## 6.5.2 Setting the Local I/O Configuration



### ■ Configuration Information

The local I/O configuration information is set up in the Module Definition window.

1. Rack Number  
The rack (in which the local I/O is defined) number is displayed. The rack number is fixed as “#01”.
2. Register Range  
The range of the I/O register number is displayed. The range is fixed from 000 to 001.

### ■ Setting Items

3. Number  
The setting item number is displayed.
4. Item  
The setting item (input/output signal item) is displayed.
5. Disable  
Set up the register disable.

<input type="checkbox"/>	Enable status
<input checked="" type="checkbox"/>	Disable status

6. Register Number  
Input/Output register number is displayed. In the machine controller, as the Input and Output are respectively 16 points, the register number becomes a fixed assignment.



## 7. Word

The serial word numbers of the register are displayed. The machine controller is fixed at “1”.

## 8. SCAN

Set up the transfer process scan.

High	High-speed process scan
Low	Low-speed process scan
(NA)	No scan designation

## 9. Current Value

In on-line mode, the current value of the distributed PLC register is displayed with binary digits. The current value of the “discrete output” can be changed, and is saved in the PLC register immediately following confirmation of the input. Nothing is displayed in off-line mode.

No	Item	D	REG-No	Word	SCAN	Current Value	HEX
1	Discrete Input	<input type="checkbox"/>	IW0000	1	HIGH	0000 0000 0000 0000	H0000
2	Discrete Output	<input type="checkbox"/>	QW0001	1	HIGH	0000 0000 0000 0000	H0000

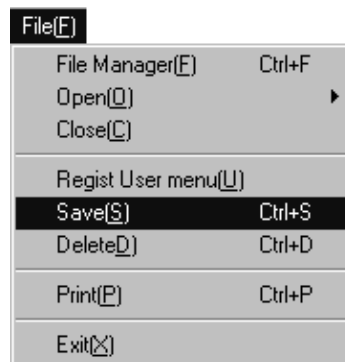
## 10. Hexadecimal

The contents in the current value row are displayed in hexadecimal. Nothing is displayed in the off-line mode.

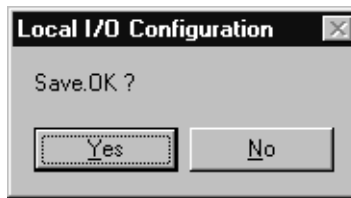
### 6.5.3 Saving the Local I/O Configuration

Follow the steps below to save the local I/O configuration data.

- Select **File (F)** → **Save (S)** from the menu.



- Choose the **Yes** button in the message box when confirming the message contents.



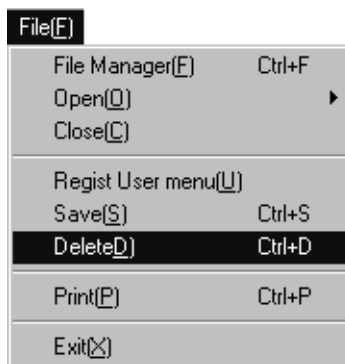
- c. Ensure the message “Saving has been completed” is shown on the status bar of the Local I/O Configuration window.

Saving has been completed.

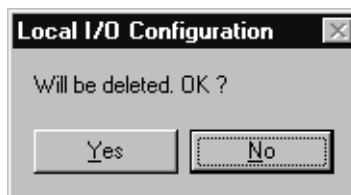
### 6.5.4 Deleting the Local I/O Configuration

Follow the steps below to delete the local I/O configuration data.

- a. Select **File (F)** → **Delete (D)** from the menu.



- b. Choose the **Yes** button in the message box when confirming the message contents.

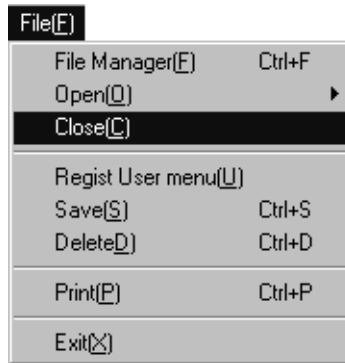


- c. Ensure the message “Deleting has been completed” is shown on the status bar of the Local I/O Configuration window.

Deleting has been completed.

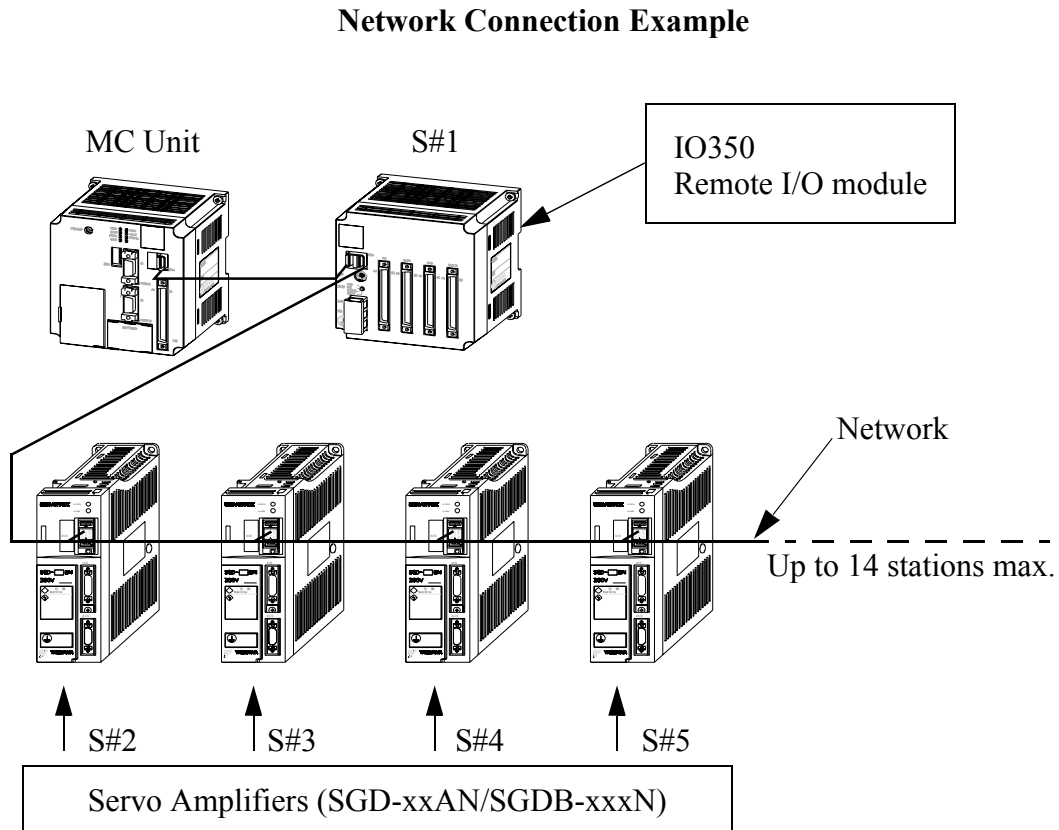
## 6.5.5 Closing the Local I/O Configuration

- a. Select **File (F)** → **Close (C)** from the menu.



## 6.6 Network Configuration

This section describes how to set up the network-type servos and I/O module which are connected to the MC module by the network.



This diagram shows the connection of the MC module, Station 1 (Remote I/O), and Station 2 ~ Station 5 (servo amplifiers). The servo motor is connected to each servo amplifier.

## 6.6.1 Network Configuration Menus

Menu	Function
File (F)	
File Manager (F)	Calls up the File Manager window
Open (O)	Selects and executes other functions
Close (C)	Closes the network definition window
Save (S)	Saves the network definition data
Regist User Menu	Registers user menu
Delete (D)	Deletes the network definition data
Print (P)	Prints the network definition data
Exit (X)	Closes the Engineering Manager window
Edit (E)	
Parameter Settings (D)	Returns the assignment data to default value
Assignment Delete (A)	Deletes assignment data
View (V)	
Tool Bar (T)	Displays tool bar
Status Bar (S)	Displays status bar
Window (W)	
Cascade (C)	Cascades windows
Tile (T)	Tiles windows
Arrange icon (A)	Arranges icons
Help (H)	
About Application (A)	Displays version information

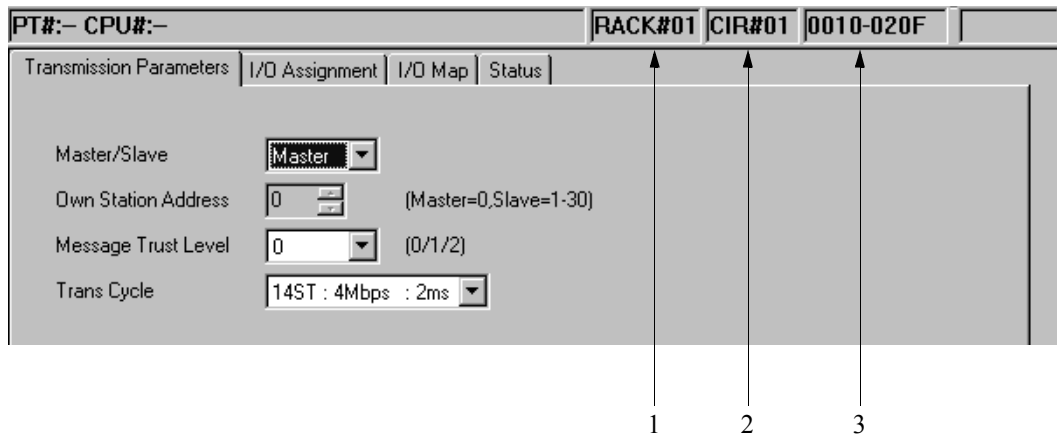
## 6.6.2 Setting the Network Configuration

Set up each device connected to the network. The setting window is composed of four (4) tabs. The contents are shown as follows:

Transmission Parameters	Sets up the transmission parameters of the network
Input/Output Assignment	Assigns the input/output of the network
Input/Output Map	Assigns input/output map
Status	Displays transmission status

## ■ Configuration Information

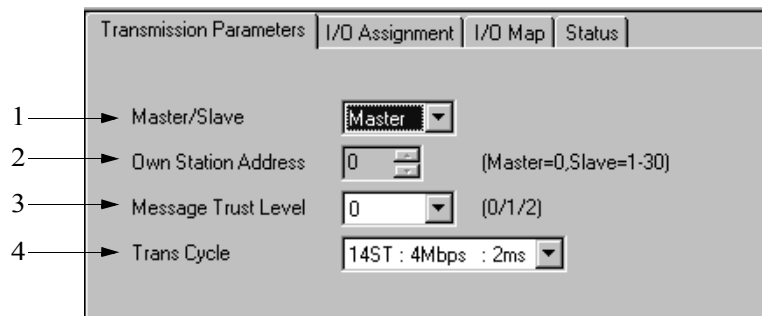
The configuration information is indicated by items (1) ~ (3) displayed under the title bar.



1. Rack Number  
The rack number defined by the network is displayed.
2. Circuit Number  
The circuit number is displayed. The machine controller is fixed as “01”.
3. Register Range  
The range of the input/output register number (which is input by Module Definition) is displayed.

## ■ Setting the Parameters

Set up the necessary parameters when using the network transfer system.



1. Master/Slave

Select either using the PLC as the master station, or as the slave station. When the master station is selected, fix own station address as “0”. When the slave station is selected, set it up within a range of 1~30.

In the machine controller, the master station setting is fixed.

2. Own Station Address

Refer to (1) above. As the master setting is fixed, the own station address is always “0”. It cannot be changed.

3. Message Trust Level

The trust level (error recovery method) when sending the MEMOBUS commands. The trust level is fixed at “0”.

0	Sends command out only once, and waits for response infinitely
1	Sends command out only once, and sends it again if no response is received within eight (8) seconds.
2	Sends data out (per word) twice consecutively, and waits for response infinitely. The transfer quality is good, but the transfer productivity reduces to half.

4. Transmission Cycle

Set up the transmission cycle.

## ■ Input/Output Assignment

### (1) Setting the Assignment Data

In the Input/Output Assignment tab window, set up the data of input/output devices to be connected to the network, or the transmission definition data.

Transmission Parameters   I/O Assignment   I/O Map   Status											
ST#	TYPE	D	INPUT	SIZE	D	OUTPUT	SIZE	SCAN	Station Name (Comment)		
01	SGD-xxN	<input type="checkbox"/>			<input type="checkbox"/>			High	Station01		
02	SGD-xxN	<input type="checkbox"/>			<input type="checkbox"/>			High	Station02		
03	JEPMC-IO350	<input type="checkbox"/>	Iw0010	004	<input type="checkbox"/>	0w0020	004	High	Station03		
04		<input type="checkbox"/>			<input type="checkbox"/>						
05		<input type="checkbox"/>			<input type="checkbox"/>						
06		<input type="checkbox"/>			<input type="checkbox"/>						
07		<input type="checkbox"/>			<input type="checkbox"/>						
08		<input type="checkbox"/>			<input type="checkbox"/>						
09		<input type="checkbox"/>			<input type="checkbox"/>						
10		<input type="checkbox"/>			<input type="checkbox"/>						
11		<input type="checkbox"/>			<input type="checkbox"/>						
12		<input type="checkbox"/>			<input type="checkbox"/>						

↑ 1    ↑ 2    ↑ 3    ↑ 4    ↑ 5    ↑ 6    ↑ 7    ↑ 8

#### 1. Station Number

The station number is displayed. Up to 14 station can be set up.

#### 2. Type

Set up the input/output devices to be connected to the stations. Select from the combo-box menus.

SGD-xxN	Servo amplifier
SGD-xxAN	Servo amplifier
JEPMC-IO350	IO350 remote I/O module

#### 3. Disable

Set up the input register disable status.

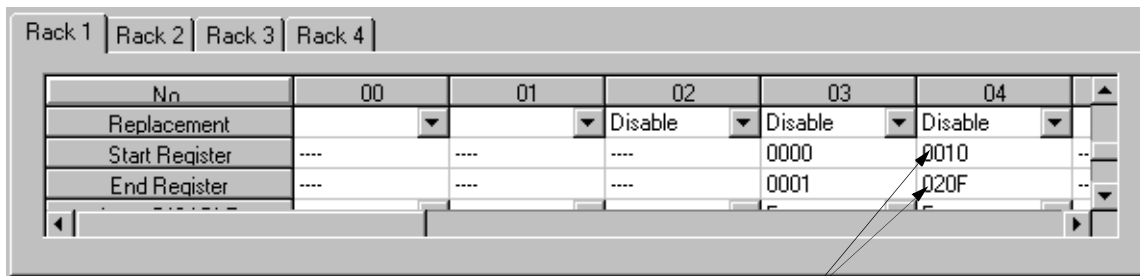
<input type="checkbox"/>	Enable status
<input checked="" type="checkbox"/>	Disable status



#### 4. Input and Size

Set up the heading input register number and register size. The register size is set up automatically. Do not duplicate the register number range between the stations. The register numbers which can be set are in the heading register number and ending register number ranges which are designated by the Module Definition.

If the station type is the servo amplifier, this setting does not exist.



#### 5. Disable

Set up the output register disable status.

<input type="checkbox"/>	Enable status
<input checked="" type="checkbox"/>	Disable status

#### 6. Output and Size

Set up the heading output register number and register size. The register size is set up automatically. Do not duplicate the register number range between the stations. The register numbers that can be set are in the heading register number and ending register number ranges which are designated by the Module Definition.

If the station type is the servo amplifier, this setting does not exist.

#### 7. Scan

Set up the scan time that supports the input/output. If the station type is servo amplifier, it is fixed as “high.”

High	High-speed process scan
Low	Low-speed process scan

#### 8. Station Name Comment

Input each station comment with 32 characters or less.

**(2) Deleting the Assignment Data**

Follow the steps below to delete the assignment data of one (1) station.

- a. Put the cursor in the station row to be deleted, then select **Edit (E)** → **Assignment Delete (A)**.

Transmission Parameters   I/O Assignment   I/O Map   Status									
ST#	TYPE	D	INPUT	SIZE	D	OUTPUT	SIZE	SCAN	Station Name (Comment)
01	SGD-***N							High	Station01
02	SGD-***N							High	Station02
03	JEPMC-IO350		Iw0010	004		0w0020	004	High	Station03
04									
05									

- b. The data assigned in the station has been deleted.

Transmission Parameters   I/O Assignment   I/O Map   Status									
ST#	TYPE	D	INPUT	SIZE	D	OUTPUT	SIZE	SCAN	Station Name (Comment)
01	SGD-***N							High	Station01
02	SGD-***N							High	Station02
03									
04									
05									

**■ Input/Output Map**

The Input/Output Map tab window displays the status of the PLC input/output assignment. The input/output register map (which is defined by the input/output assignment) is displayed. It cannot be changed.

Transmission Parameters   I/O Assignment   I/O Map   Status																		
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	ST#	TYPE
0010	HI	HI	HI	HI													03	JEPMC-IO350
0020	HO	HO	HO	HO														
0030																		
0040																		
0050																		
0060																		
0070																		
0080																		
0090																		
00A0																		
00B0																		
00C0																		
00D0																		
00E0																		
00F0																		
0100																		

HI
HO
LI
LO
DEL

HI	Assignment for the high scan input
HO	Assignment for the high scan output
LI	Assignment for the low scan input
LO	Assignment for the low scan output
DEL	Assignment deletion

■ **Status**

The Status tab window displays the data that the network is currently transferring. In the tab window shown below, the setting values are only for status display purposes. Therefore, they cannot be changed.

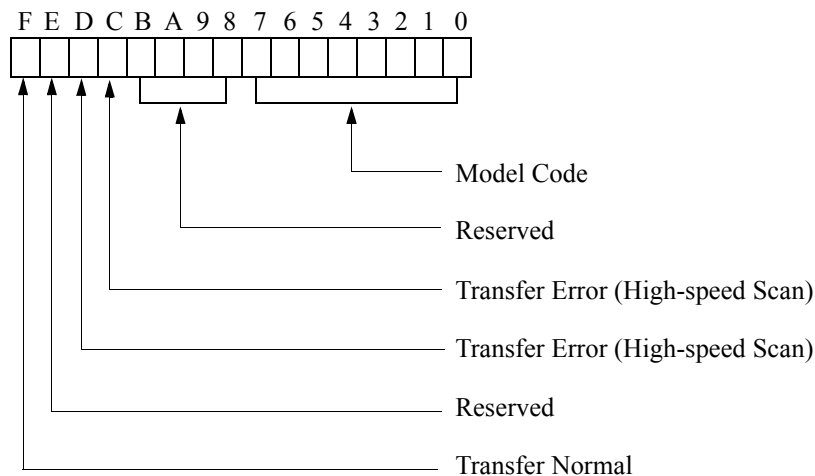
Transmission Parameters   I/O Assignment   I/O Map   Status									
ST#	TYPE	D	INPUT	I-SIZE	D	OUTPUT	O-SIZE	STS	Station Name (Comment)
01	SGD.**N	<input type="checkbox"/>			<input type="checkbox"/>				Station01
02	SGD.**N	<input type="checkbox"/>			<input type="checkbox"/>				Station02
03	JEPMC-I0350	<input type="checkbox"/>	Iw0010	004	<input type="checkbox"/>	Qw0020	004		Station03
04		<input type="checkbox"/>			<input type="checkbox"/>				
05		<input type="checkbox"/>			<input type="checkbox"/>				

↑  
1

The meaning of each item is similar to that in the Input/Output Assignment tab, except the “STS” column is added.

1. Status

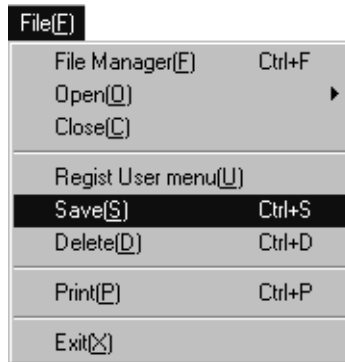
The contents of the network transfer status are displayed in hexadecimal in on-line mode. The meaning of each bit is shown as follows. Nothing is displayed in the off-line mode.



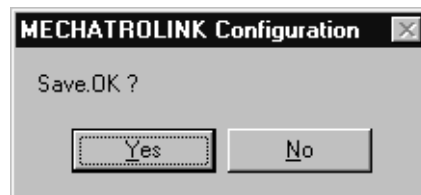
### 6.6.3 Saving the Network Configuration

Follow the steps below to save the network configuration data.

- a. Select **File (F)** → **Save (S)** from the menus.



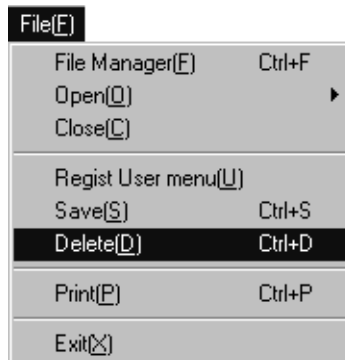
- b. Choose the **Yes** button. The configuration data has been saved.



### 6.6.4 Deleting the Network Configuration

Follow the steps below to delete the network configuration data.

- a. Select **File (F)** → **Delete (D)** from the menus.



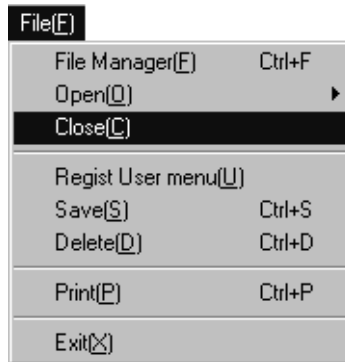
- b. Choose the **Yes** button. The configuration data has been deleted.



### 6.6.5 Closing the Network Configuration

Follow the steps below to close the network configuration.

- a. Select **File (F)** → **Close (C)** from the menus, then choose the **Yes** button.



## 7 System Data Definition

This chapter discusses the system data which must be set prior to using the MotionSuite™ series machine controller.

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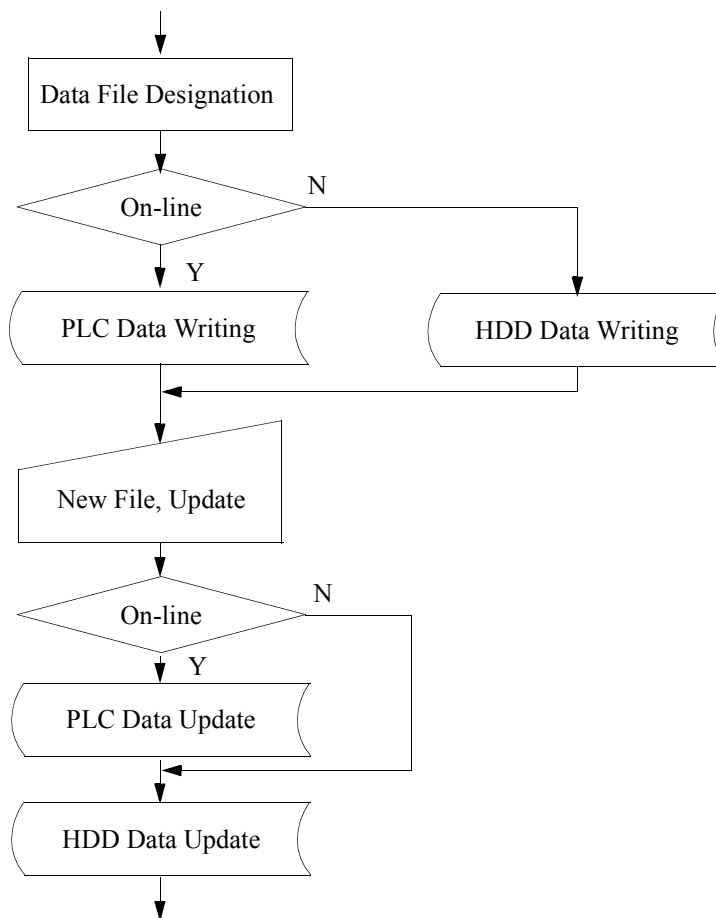
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## 7.1 Global System Data Setting Operations

This section deals with basic operations that prepare definition screens for system setting data, and discusses which definition screens are to be called out in the MotionSuite™ series machine controllers.

### 7.1.1 On-line Mode and Off-line Mode

The types of data files to be created and updated differ according to whether the unit is in the on-line mode or off-line mode. In the on-line mode, the data is registered in the PLC. This data is stored both in the PLC and on the hard drive during new file creation and update. In the off-line mode, the data is registered on the hard disk. This data is stored only on the hard drive during new file creation and update. Data created in the off-line mode must later be transferred to the PLC in the on-line mode. The PLC data is not updated if transmission is not performed.





## 7.1.2 Types of Definition Screens

The following table lists the system data definition screens provided in the MotionSuite™ series machine controllers, and describes them. A © in the Need box means that this definition data must be set. Others are defined according to the system configuration.

**Table 1: Definition Screen Types**

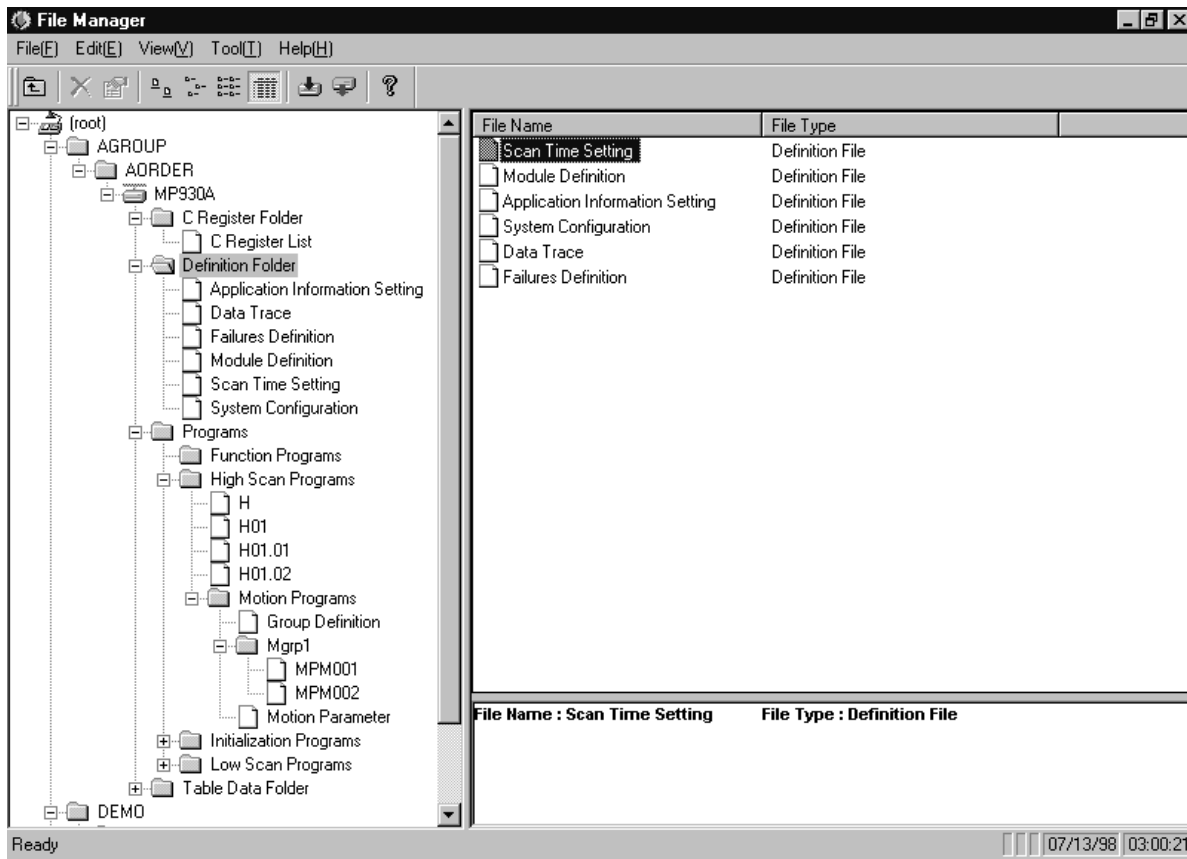
Definition	Description	Need
Scan Time Setting	High Speed/Low Speed scan time setting	©
Group Definition	Sets groups of axes for linked control	©
Motion Parameter Setting	Adjusts servo parameters	
System Configuration	Verifies/Changes PLC set-up	
Application Information	System data history	
Data Trace	Defines data to be traced (oscilloscope)	
Fault Monitor	Defines data for fault monitoring	

## 7.1.3 Definition Screen Call-out

There are two ways of starting: from the File Manager, and from the Engineering Manager.

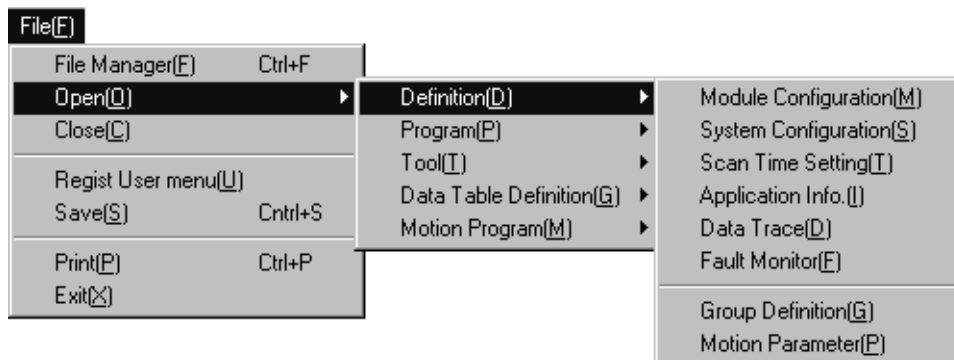
### ■ Starting from the File Manager

Open the desired PLC file as shown below in the tree diagram displayed in the left window of the File Manager. The definitions file is opened upon opening a motion folder and a definitions folder. Place the cursor on the definitions file to be operated and double-click; the files existing in the folder are displayed in the right window of the File Manager. Double-clicking here opens the file.



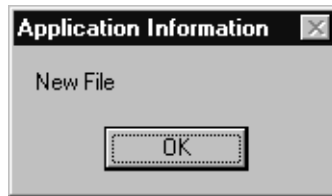
### ■ Starting from the Engineering Manager

In the Engineering Manager, the definitions list menu is displayed upon opening the general menu in the order of **Open (O)**⇒**Definition (D)** from **File (F)**.



### 7.1.4 New Definitions Files

At first, no definitions files exist in the PLC and hard drive at all. Therefore, a Create New File verification dialogue box is displayed upon opening a definitions file. Continue the definition operation by selecting the **OK** button. For example, the following dialogue box is displayed upon first setting the application data.



## 7.2 Group Definition

This section deals with the groups needed to execute motion programs, and the definition thereof.

### 7.2.1 Structure of Group Definition Window

This item deals with the group definition window menus.

#### ■ Structure of Group Definition Window Menus

See Item 7.1.3 “Definition Screen Call-out” to open the Group Definition Window. The menus displayed in the Group Definition Window are shown in Table 2.

**Table 2: Group Definition Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens file manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Cannot be used in this window	—
Regist User Menu (U)	Registers user menu	—
Save (S)	Saves group definitions	7.2.3
Delete (D)	Deletes group definitions	7.2.4
Print (P)	Prints document	Ch. 12
Exit (X)	Exits engineering manager	3.4.2
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

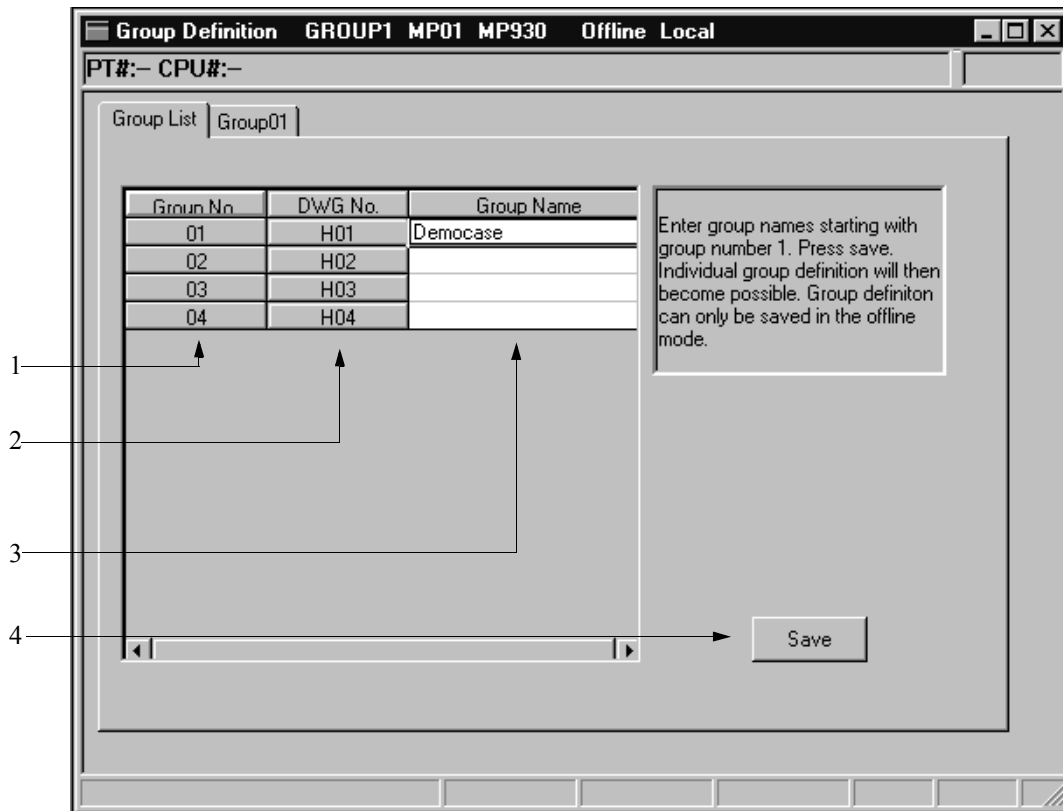
### 7.2.2 Group Definition Setting

In group definition, each group operation is defined after first setting the name of each group.

#### ■ Group Name Setting

In group definition, motion programs can be managed; they can be separated into a maximum of four groups. Each group has its own group number, drawing number, and group name. The group numbers and drawing numbers are defined beforehand.

However, the group names are set by the user in the Group List tab. Below is a description of each item in the Group List tab.



1. **Group Number**  
Shows the group number.
2. **Drawing Number**  
Displays the drawing numbers associated with the group number. Drawing numbers cannot be changed. These drawing numbers are displayed in the MM ladder creation area during automatic PGM generation, which are discussed in Chapter 8. Therefore, they are irrelevant if automatic generation is not done.
3. **Group Name**  
Displays and sets the group name. Input a group name of 16 16-bit characters (8 32-bit characters) or less.
4. **Save Button**  
Registers group name into the group list. Set group names by the following procedure:

- a. Move the cursor to the position at which the group name is to be input.

Group No.	DWG No.	Group Name
01	H01	
02	H02	
03	H03	
04	H04	

- b. Input the group name.

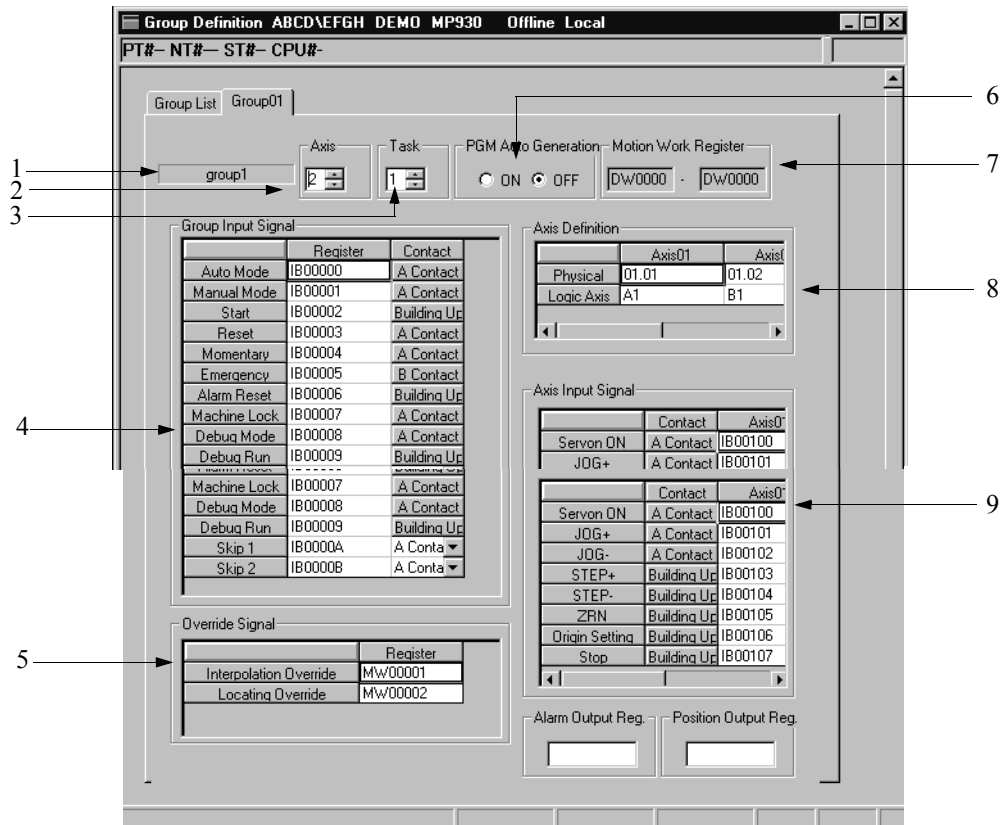
Group No.	DWG No.	Group Name
01	H01	group1
02	H02	
03	H03	
04	H04	

- c. Repeat (a) and (b) if group name input is not completed.
- d. Click the **Save** button. A window corresponding to the group name set is added to the Group Number tab.

Group No.	DWG No.	Group Name
01	H01	group1
02	H02	
03	H03	
04	H04	

## ■ Group Operation Definition

The following screen is displayed upon clicking the Group Number tab of the Group Definitions window. Data particular to groups is defined in this screen. Group operation definition must be executed for each group.



1. **Group Name**  
Displays the name of the group currently being defined.
2. **Number of Control Axes**  
Input the number of axes controlled in the group. The axis number input range is 0 ~ 15. Axis control is not executed if 0 is input.
3. **Number of Tasks**  
Input the number of motion programs to be simultaneously operated. The input range for number of tasks is 1 ~ 4.
4. **Group Input Signal**  
Allocates each group input signal to a binary form I register and M register.
5. **Override Signal**  
Defines the register setting the override signal.

6. **Automatic PGM Generation**  
Sets automatic MM (Motion Manager) ladder<sup>1</sup> generation.
7. **Motion Work Register**  
Although the MSEE command is used to start motion programs from the Motion Manager, use this command to define the register for the operation. Work registers need 2 words for each task. M registers and D registers can be designated.
8. **Axis Definition**  
Assigns logical axis names to the physical axis numbers<sup>2</sup> of the control axes. Input a logical axis name of 8 characters or less. Axes cannot be defined if 0 control axes are set.
9. **Axis Input Signal**  
Allocates the input signal of each axis in binary form into the I register and M register.

### 7.2.3 Saving Group Definitions

This function saves all group definitions data. Data is saved to both the PLC and hard drive in the on-line mode, and to the hard drive only in off-line mode. Save group definition data by the following procedure.

- a. Select **Save (S)** from **File (F)** in the Group Definition menu.
- b. Select the **Yes (Y)** button in the Group Definition message box.

### 7.2.4 Group Definition Deletion

This function deletes group definition data. Follow the procedure below to delete groups.

- a. Select **Delete (D)** from **File (F)** in the Group Definition menu.
- b. Select the **Yes (Y)** button in the Group Definition message box.


**Note:**

All group definition data is deleted upon executing delete.

- 
1. **MM Ladder:** An MM ladder is a standard ladder for realizing the various functions of group input, override, and axis input. Save the group definitions with automatic generation at “No” when this standard ladder is not needed
  2. **Physical Axis Number:** A physical axis number is structured from integer and fraction parts. The integer part is the servo module number, and is fixed at 01. The fraction part is the axis number. It shows a value of 0 ~ 15.



### 7.2.5 Closing Group Definition

Close group definition by closing the group definition window. To close the window, select the  button in the Group Definition window.

## 7.3 Motion Parameter Definition

This section deals with the setting of motion parameters. In motion parameter setting, it is necessary to set (reference) the necessary data using the four tabs: Fixed Parameters, Set-up Parameters, Servo Amplifier, and Parameter Monitor.

### 7.3.1 Structure of Motion Parameter Window

A description of the Motion Parameter window menus and tabs appears below.

#### ■ Structure of Motion Parameter Window Menus

See Item 7.1.3 “Definition Screen Call-out” before opening the Motion Parameter window.

#### Note:

The Motion Parameter window cannot be opened when the servo module (network, SVA, etc.) has not been defined in the module Configuration Definition Window. Moreover, the Motion Parameter window cannot be opened in the on-line mode if the current CPU number is 2.

The menus displayed in the Motion Parameter window are listed in Table 3. Reference the item numbers in Table 3 for each menu function.

**Table 3: Motion Parameter Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes the motion parameter window	7.3.8
Regist User Menu (U)	Register User Menu	—
Save (S)	Saves motion parameters	7.3.6
Delete (D)	Deletes motion parameters	7.3.7
Print (P)	Prints document	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
Edit (E)		
Default Setting (R)	Sets default values	7.3.2
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

## ■ Motion Parameter Window Tabs

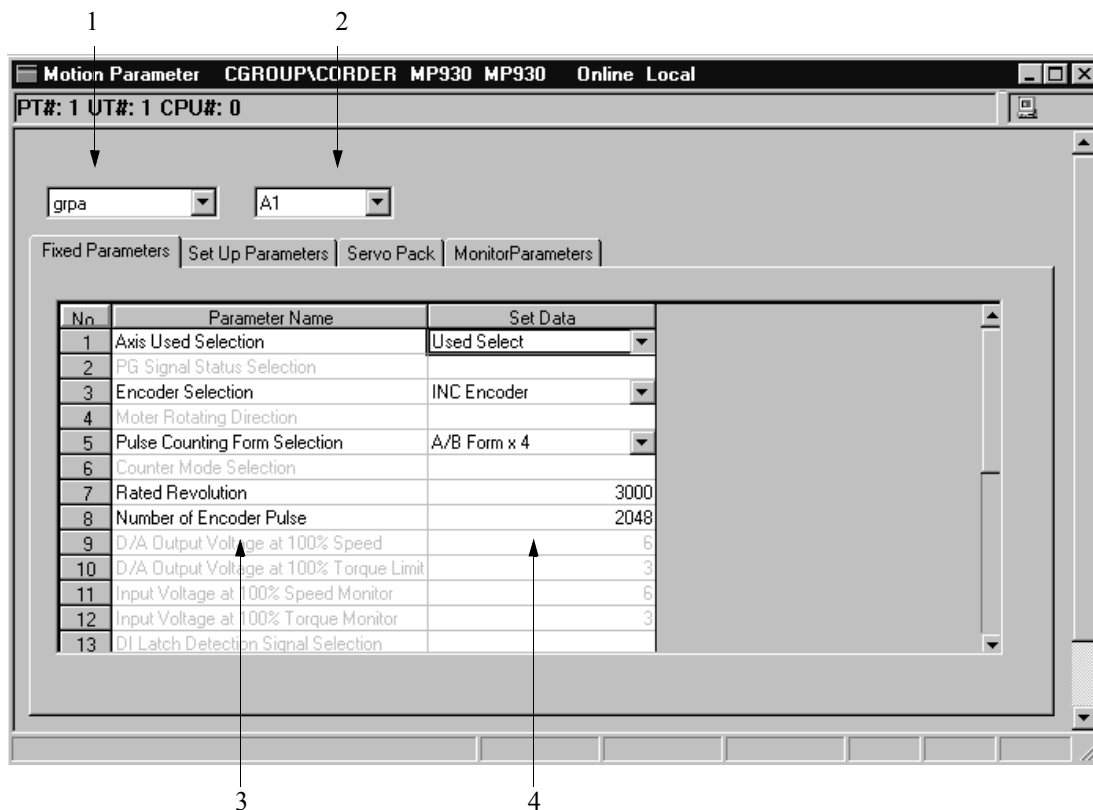
The Motion Parameter window consists of four tabs: Fixed Parameters, Set-up Parameter, Servo Amplifier, and Parameter Monitor. Reference the item numbers in Table 4 for each menu function.

**Table 4: Motion Parameter Window Tabs**

Tab Name	Function	Reference Item Number
Fixed Parameters	Sets fixed motion parameters.	7.3.2
Set-up Parameters	Sets set-up parameters.	7.3.3
Servo Pack	Sets servo parameters.	7.3.4
Parameter Monitor	Displays motion parameter monitor.	7.3.5

### 7.3.2 Fixed Parameter Setting

The following screen is displayed upon clicking the Fixed Parameter tab in the motion parameter window. Set fixed parameters in this screen. These parameter settings are usually determined by the physical properties of the machine system. Once they are set they usually do not need adjustment.



1. Group Name  
Selects the group name set in the group definition.
2. Logical Axis Name  
The logical axis name is displayed. Fixed parameters are set in axis units.
3. Parameter Name  
The parameter name is displayed.
4. Setting Data  
Input (select) the parameter values. The content of the settings of each parameter are shown in Table 5 below. The setting values of the shaded items cannot be changed.

**Table 5: Setting Data of Fixed Parameters**

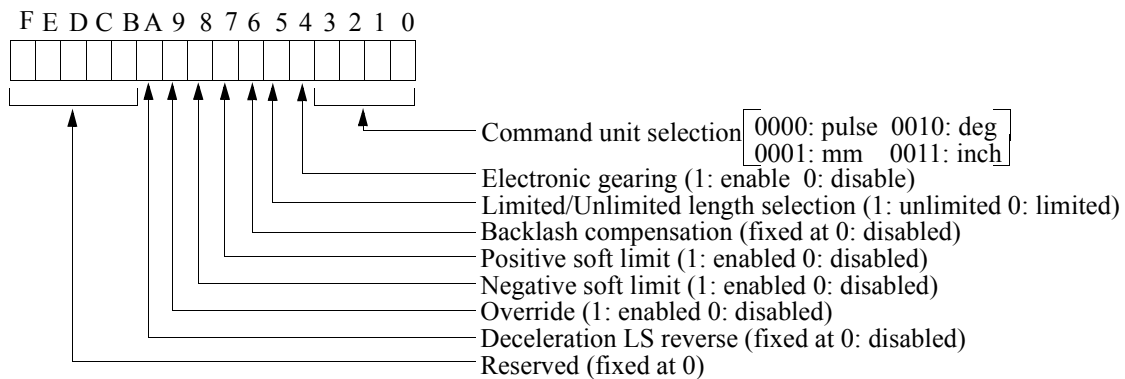
No.	Fixed Parameter	Setting Data	
1	Axis Used Selection	Unused selection	Used Selection
2	PG Signal Status Selection	+5V differential input	+12V collector input
3	Encoder Selection	Incremental Encoder	Absolute Encoder
4	Motor Rotating Direction (with absolute enc.)	Forward	Backward
5	Pulse Counting Form Selection	+/- format ×1	+/- format ×2
		Up/Down ×1	Up/Down ×2
		A/B format ×1	A/B format ×2
		A/B format ×4	
6	Counter Mode Selection	Reversible counter	Interval counter
		Frequency estimation	Basic counter
7	Rated Speed	1~32000 (1=1rpm)	
8	Number of Encoder Pulses	Multiples of four in 4~65532 (1=1P/R)	
9	D/A Output Voltage at 100% Speed	1~10 (1=1V)	
10	D/A Output Voltage at 100% Torque Limit	1~10 (1=1V)	
11	D/A Input Voltage at 100% Speed Monitor (D/A)	1~10 (1=1V)	
12	D/A Input Voltage at 100% Torque Monitor (A/D)	1~10 (1=1V)	
13	DI Latch Detection Signal Selection	DI INT input signal	
14	Coincidence Detection Used Selection	Not used	Used
15	Frequency Coefficient Selection	×10 (0.1Hz)	×100 (0.01Hz)
		×1000 (0.001Hz)	×1 (1Hz)
16	Simulation Mode Selection	Normal run mode	Simulation mode
17	Servo Module Function Select Flag	See Figure 1	
18	Number of Decimal Places	0~5	
19	1 Machine Rotation/Command Unit	1~2147483647 (command unit)	
20	Gear Ratio ( motor side)	1~65535	
21	Gear Ratio ( load side)	1~65535	

**Table 5: Setting Data of Fixed Parameters (Continued)**

No.	Fixed Parameter	Setting Data
22	Maximum Value of Unlimited Length Counter (posmax)	1~2147483647 (command unit)
23	Maximum Number of Absolute Encoder Rotations	1~2147483647 (1=1 rotation)
24	Positive Soft Limit	-2147483647 ~2147483647 (command unit)
25	Negative Soft Limit	-2147483647 ~2147483647 (command unit)
26	Zero Point Return Format	DEC signal + C-phase
		DEC signal + ZERO signal
		ZERO signal
		C-phase
27	Backlash Compensation	0~32767 (command unit)

**Note:**

Some parameters have a bit structure. Place the cursor over the current value location. Double-click to show the pop-up window containing detailed information.



Bits A and 6 cannot be set or changed.

**Figure 1: Bit Structure of Parameter No. 17, Servo Module Function Select Flag**

**Supplement:**

It is possible to omit the input of the fixed parameters, and yet set the default values. The fixed parameters of the currently displayed axes are set to their default values. The default values of the various fixed parameters are shown in Table 6 below.

**Table 6: Fixed Parameter Default Values**

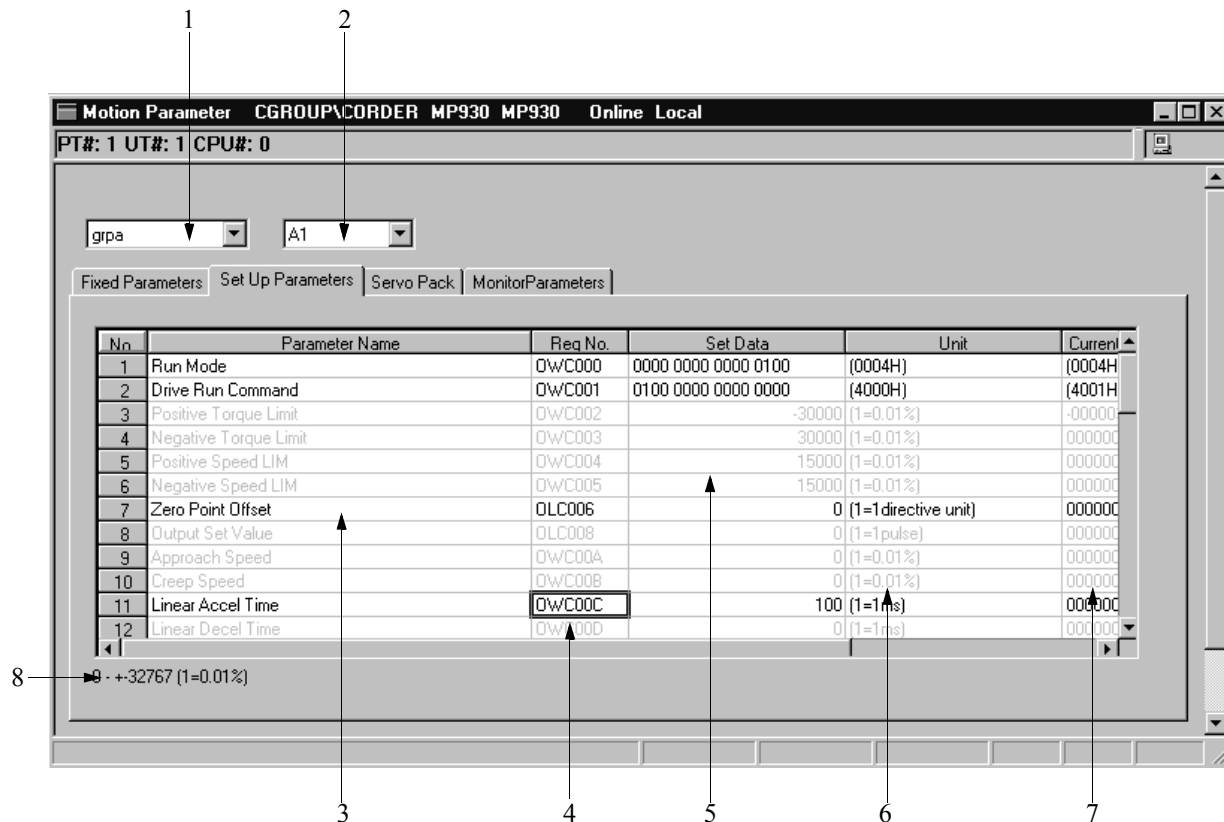
No.	Fixed Parameter	Default Value
1	Axis Used Selection	Unused selection
2	PG Signal Status Selection	+5V differential input
3	Encoder Selection	Incremental encoder
4	Motor Rotating Direction (with absolute enc.)	Forward rotation
5	Pulse Counting Form Selection	A/B format ×4
6	Counter Mode Selection	Basic counter
7	Rated Speed	3000r/min
8	Number of Encoder Pulses	2048P/R
9	D/A Output Voltage at 100% Speed	6V
10	D/A Output Voltage at 100% Torque Limit	3V
11	D/A Input Voltage at 100% Speed Monitor (D/A)	6V
12	D/A Input Voltage at 100% Torque Monitor (A/D)	3V
13	DI Latch Detection Signal Selection	DI INT input signal
14	Coincidence Detection Used Selection	Unused
15	Frequency Coefficient Selection	×100 (0.01Hz)
16	Simulation Mode Selection	Normal run mode
17	Servo Module Function Selection Flag	0000 0000 0000 0001
18	Number of Decimal Places	3
19	1 Machine Rotation/Command Unit	10000
20	Gear Ratio ( motor side)	1
21	Gear Ratio ( load side)	1
22	Maximum Value of Unlimited Length Counter (posmax)	3600000
23	Maximum Number of Absolute Encoder Rotations	99999
24	Positive Soft Limit	2147483647
25	Negative Soft Limit	-2147483647
26	Zero Point Return Format	DEC signal + C-phase
27	Backlash Compensation	0

Set the default values as follows:

- a. Select **Default Setting (R)** from **Edit (E)** in the motion parameter menu.
- b. Select the **Yes (Y)** button in the Motion Parameter message box.
- c. The default parameters for the various fixed parameters are set.

### 7.3.3 Set-up Parameters

The following screen is displayed upon clicking the Set-up Parameters tab in the motion parameter window. The parameters necessary for machine system set-up are set in this screen.



1. Group Name  
Select the group name set in the group definition.
2. Logical Axis Name  
Select the logical axis name.
3. Parameter Names  
This shows the parameter names.
4. Register Number  
Displays the register number corresponding to the parameter name.

## 5. Set Data

Input the parameter value. The set data of the various parameters is shown in Table 7. The set data of the shaded items cannot be changed.

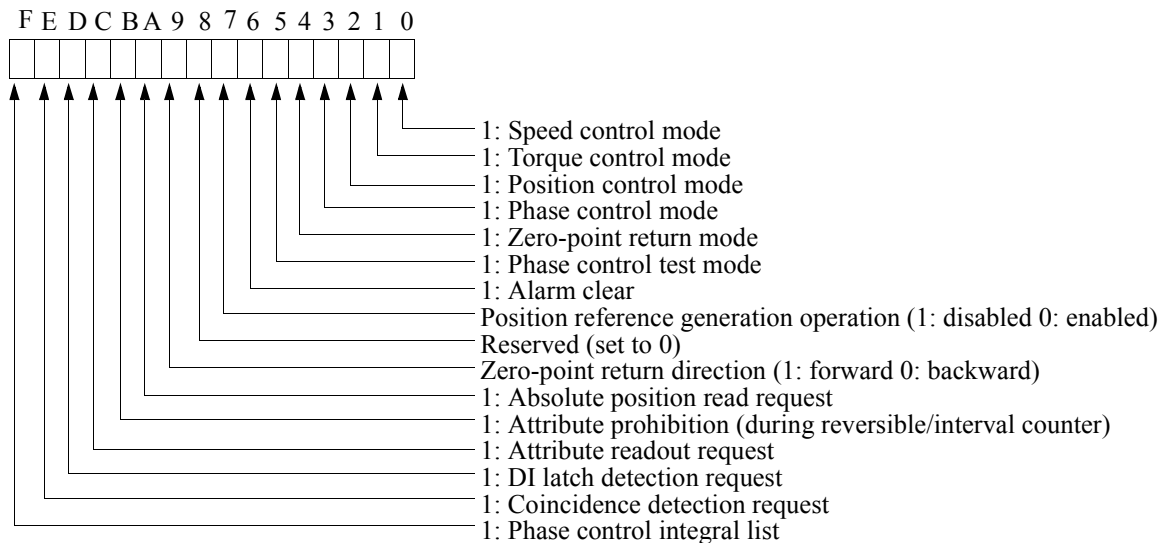
**Table 7: Set-up Parameter Data**

No.	Parameter	Range	Default Value	Notes
1	Run Mode	bit setting	0004H	See Figure 2
2	Drive RUN Command	bit setting	4000H	See Figure 3
3	Positive Torque Limit	0~±32767	-30000	1=0.01%
4	Negative Torque Limit	0~±32767	30000	1=0.01%
5	Positive Speed Limiter	0~32767	15000	1=0.01%
6	Negative Speed Limiter	0~32767	15000	1=0.01%
7	Zero Point Offset	0~±2 <sup>31</sup> -1	0	1=1 command unit
8	Output Set Value	0~±2 <sup>31</sup> -1	0	1=1 pulse
9	Approach Speed	0~32767	0	1=0.01%
10	Creep Speed	0~32767	0	1=0.01%
11	Linear Acceleration Time	0~32767	0	1=1ms
12	Linear Deceleration Time	0~32767	0	1=1ms
13	Positioning Range	0~65535	10	1=1 pulse
14	Deviation Error Detection	0~65535	65535	1=1 pulse
15	Position Loop Gain	0~32767	400	1=0.1
16	Feed Forward Gain	0~200	0	1=0.01
17	Position Reference	0~±2 <sup>31</sup> -1	0	1=1 command unit
18	Average Times	0~65535	0	1=1ms
19	Speed Reference	0~±32767	0	1=0.01%
20	Phase Compensation	0~±2 <sup>31</sup> -1	0	1=1 pulse
21	Speed Compensation	0~±32767	0	1=0.01%
22	Proportional Gain	0~32767	300	1=0.1
23	Integration Time	0~32767	300	1=1ms
24	Torque Reference	0~±32767	0	1=0.01%
25	Speed Limit	0~±32767	15000	1=0.01%
26	Speed Loop Gain	0~32767	400	1=0.1 Hz
27	Supplement Pulse	0~±2 <sup>31</sup> -1	0	1=1 pulse
28	Servo Interface Command Type	Command Selection	No command	See Table 8
29	Servo Command Flag	Bit setting	0000H	See Figure 4
30	Fast Feed Speed	0~±2 <sup>31</sup> -1	0	1=10 command units/min
31	External Positioning Range	0~±2 <sup>31</sup> -1	0	1=1 command unit
32	Stopping Distance	0~±2 <sup>31</sup> -1	0	1=1 command unit



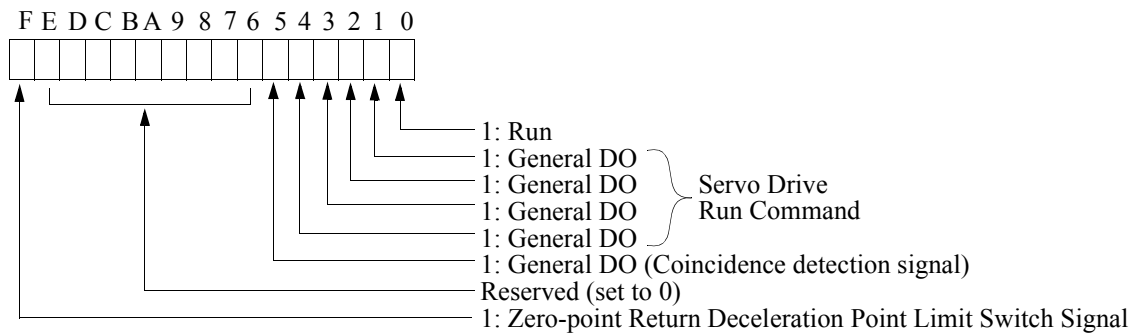
**Table 7: Set-up Parameter Data (Continued)**

No.	Parameter	Range	Default Value	Notes
33	Step Movement Quantity	$0 \sim 2^{31} - 1$	1000	1=1 command unit
34	Zero Point Return Range		0	1=1 command unit
35	Override	0~32767	10000	1=0.01%
36	Position Management Control Flag	Bit setting	0000H	See Figure 5
37	Work Coordinate Offset	$0 \sim \pm 2^{31} - 1$	0	1=1 command unit
38	Number of POSMAX Turns Preset Data	$0 \sim \pm 2^{31} - 1$	0	1=1 command unit
39	2nd In-Position Width	0~65535	0	1=1 command unit
40	Zero Point Position Output Width	0~65535	10	1=1 command unit
41	Positioning Completion Check Time	0~65535	0	1=1msec
42	Network Servo User Parameter Number	Bit setting	0000H	See Figure 6
43	Network Servo User Parameter Setting	$0 \sim \pm 2^{31} - 1$	0	—
44	Encoder Position at Power Cutoff (low)	$0 \sim \pm 2^{31} - 1$	0	1=1 pulse
45	Encoder Position at Power Cutoff (high)	$0 \sim \pm 2^{31} - 1$	0	1=1 pulse
46	PULSE Absolute Position at Power Cutoff (low)	$0 \sim \pm 2^{31} - 1$	0	1=1 pulse
47	PULSE Absolute Position at Power Cutoff (high)	$0 \sim \pm 2^{31} - 1$	0	1=1 pulse



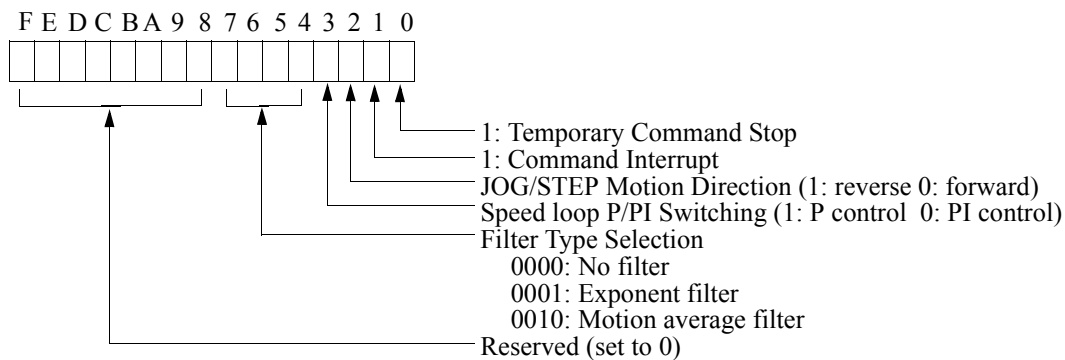
Bits 0, 1, 3~5, and 7~F cannot be set or changed.

**Figure 2: Bit Structure of Parameter No. 1, Run Mode**

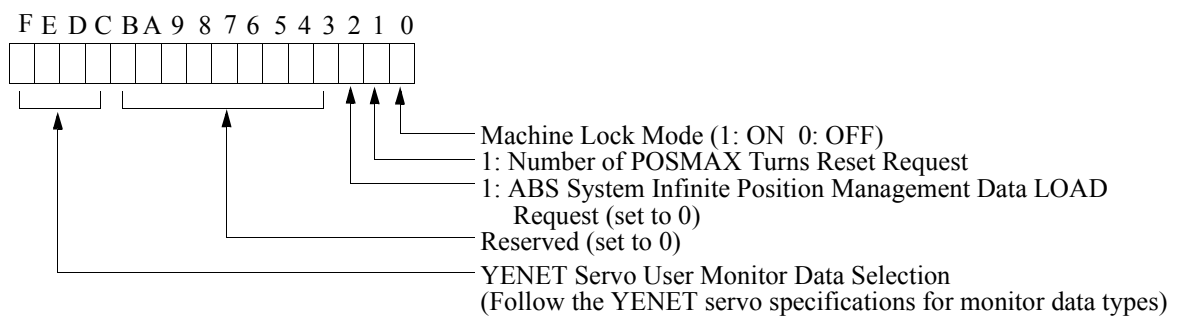


Bits 1~5 and F cannot be set or changed.

**Figure 3: Bit Structure of Parameter No. 2, Drive Run Command**

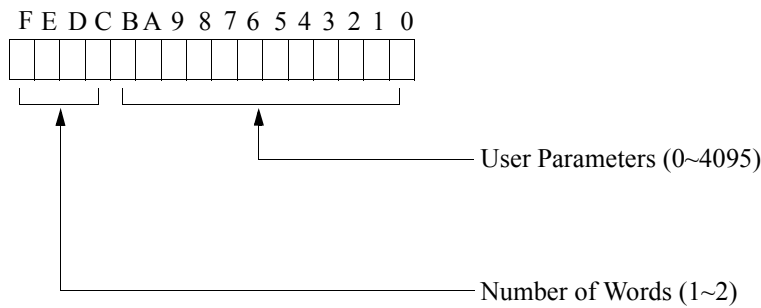


**Figure 4: Bit Structure of Parameter No. 29, Servo Command Flag**



Bit 2 can be neither set nor changed.

**Figure 5: Bit Structure of Parameter No. 36, Position Management Control Flag**



**Figure 6: Bit Structure of Parameter No. 42, Network Servo User Parameter Number**

**Table 8: Servo Interface Command Types**

Command Types	
Positioning	External Positioning
Zero-point Return	Interpolation
Final Interpolation Segment	Interpolation with Position Detection Function
Set Speed Feed	Set Inch Feed
Zero-Point Setting	Acceleration Time Change
Deceleration Time Change	Filter Parameter Change
Filter Type Change	Speed Loop Gain Change
Position Loop Gain Change	Feed Forward Change
User Parameter Read	User Parameter Write
Current Generated Alarm Monitor	Alarm History Monitor
Clear Alarm History	

6. Unit  
This displays the parameter units.
7. Current Value  
This displays the current value of a parameter in the on-line mode. Nothing is displayed in the off-line mode.
8. Minimum / Maximum Values  
This displays the minimum/maximum values allowed for the parameters.

**Note:**

An input setting is immediately stored in the PLC register when the **Enter** key is pressed in the on-line mode. The current value is then displayed accordingly.

**Supplement:****Default Value Setting**

It is possible to omit the input of each parameter, and to yet set the default values. See the Default Value column in Table 7 for the default value of each parameter. The setting method of the default parameters is the same as that for the fixed parameters. See Item, 7.3.2 “Fixed Parameter Setting.”

**Note:**

The parameters of the axis for the currently displayed servo number is the subject of the default setting. The settings are immediately stored in the PLC register at the same time as execution of default register setting. Therefore, the current values are re-displayed according to these values.

**7.3.4 Servo Amplifier (ServoPack) Parameter Setting**

The following screen is displayed upon clicking the ServoPack tab of the motion parameter window. Set servo amplifier parameters in this screen.

No.	Parameter Name	Set Data	Current Value
1	Memory Switch 1	0000 0011 1000 1100 (038CH)	0000 0000 0000 0000
2	Memory Switch 2	0000 0000 0000 0000 (0000H)	0000 0000 0000 0000
3	Load Inertia	100 (1=1%)	000000000000
4	Speed Loop Gain	400 (1=0.1Hz/s)	000000000000
5	Speed Loop Integration Time Constant	2000 (1=0.01ms)	000000000000
6	Emergency Stop Torque	200 (1=1%)	000000000000
7	Positioning Near Detection Width	10 (directive unit)	000000000000
8	Positive Torque Limit	200 (1=1%)	000000000000
9	Negative Torque Limit	200 (1=1%)	000000000000
10	Mode SW(Torque Reference)	200 (1=1%)	000000000000
11	Mode SW(Accel)	0 (1=0.167r/s)	000000000000
12	Mode SW(Deviation Pulse)	0 (1=1pulse)	000000000000
13	Encoder Pulse Multi	2048 (1=1P)	000000000000

1. Group Name  
Select the group name set in the group definition.
2. Logical Axis Name  
Select the logical axis name. Servo parameters are set in axis units.
3. ServoPack Name  
This displays the servo amplifier model.

## 4. Parameter Name

This displays the parameter name.

## 5. Set Data

Input the parameter value. Table 9 shows the set data of each parameter.

**Table 9: ServoPack Parameter Set Data**

No.	Parameter	Range	Default Value	Note
1	Memory Switch 1	Bit setting	0380H	See Table 10
2	Memory Switch 2	Bit setting	0000H	See Table 10
3	Load Inertia	0~65535	0	1=1%
4	Speed Loop Gain	1~20000	400	1=0.1Hz/s
5	Speed Loop Integral Time Constant	100~65535	2000	1=0.01ms
6	Emergency Stop Torque	0~32767	300	1=1%
7	Positioning Near Detection Width	0~10000	10	Command Unit
8	Positive Torque Limit	0~300	300	1=1%
9	Negative Torque Limit	0~300	300	1=1%
10	Mode SW (torque reference)	0~32767	200	1=1%
11	Mode SW (speed reference)	0~32767	0	1=1r/min
12	Mode SW (acceleration)	0~3000	0	1=0.167r/s
13	Mode SW (deviation pulse)	0~10000	0	1=1 pulse
14	Number of Encoder Pulses	513~32767	2048	1=1P/R
15	Brake Timing at Motor Stop	0~50	0	1=10ms
16	Memory Switch 3	Bit setting	0000H	See Table 10
17	Memory Switch 4	Bit setting	0000H	See Table 10
18	Brake Timing During Motor Rotation (Speed)	0~32767	100	1=1r/min
19	Brake Timing During Motor Rotation (Wait Time)	10~100	50	1=10ms
20	Torque Filter Time Constant	0~25000	400	1=1μs
21	Torque Filter Time Constant (2-dimensions)	0~25000	0	1=1μs
22	Position Loop Gain	0~50000	4000	1=0.01/s
23	Positioning Completion Width	0~250	7	Command Unit
24	Bias	0~65535	0	1=100 Command Unit/s
25	Feed Forward Compensation	0~100	0	1=1%
26	Excessive Position Deviation Range	1~65535	65535	Command Unit
27	1st Stage Speed Time Constant	0~65535	0	1=10000 Command Unit/s
28	2nd Stage Speed Time Constant	0~65535	100	1=10000 Command Unit/s
29	Speed Parameter Switching Speed	0~65535	0	1=100 Command Unit/s
30	Zero-point Return Approach Speed 1	0~65535	50	1=100 Command Unit/s
31	Zero-point Return Approach Speed 2	0~65535	5	1=100 Command Unit/s

**Table 9: ServoPack Parameter Set Data (Continued)**

No.	Parameter	Range	Default Value	Note
32	Electronic Gear B (numerator)	1~65535	4	
33	Electronic Gear A (denominator)	1~65535	1	
34	Operation Norm Time	0~5100	0	1=100μs
35	Feed Forward Reference Filter	0~64000	0	1=1μs
36	Zero-point Return Range	0~±2 <sup>31</sup> -1	100	Command Unit
37	Zero-point Position Range	0~65535	10	Command Unit
38	External Positioning Range	0~±2 <sup>31</sup> -1	100	Command Unit
39	Index Function Speed Bias	0~65535	0	1=1 Command Unit/s
40	Index Function Speed Time Constant	0~5100	0	1=100μs
41	Positive Soft Limit	0~±2 <sup>31</sup> -1	819191808	Command Unit
42	Negative Soft Limit	0~±2 <sup>31</sup> -1	819191808	Command Unit
43	Absolute Encoder Zero-point Position Offset	0~±2 <sup>31</sup> -1	0	Command Unit

**Table 10: Memory Switch Bit Structure for Parameters No. 1 and No. 2**

Memory Switch Number	Bit No.	Content
1	1~0	Reserved
	2	1=P-OT delete
	3	1=N-OT delete
	4~5	Reserved
	6	1= Coast to Stop, 0= DB Stop
	7	1= DB ON after DB stop, 0= DB OFF
	8	1= Emergency stop at OT, 0= Continue bit 6
	9	1= Clamp after stop in OT operation, 0=Base block
	A	Reserved
	B	1= Mode SW enabled, 0= Mode SW disabled
	C~D	Mode SW selection
	E	1= Absolute encoder, 0= Incremental encoder
	F	Reserved
2	0	1= Reverse mode, 0=Forward mode
	1	1= Delete, 0= Zero-point error detection
	2~F	Reserved
3	0~F	Reserved
4	0	Reserved
	1	Zero-point return direction: 1= Forward, 0= Reverse
	2~4	Reserved

**Table 10: Memory Switch Bit Structure for Parameters No. 1 and No. 2**

Memory Switch Number	Bit No.	Content
	5	1= DEC signal delete, 0= DEC signal enabled
	6	1= EXT signal delete, 0= EXT signal enabled
	7~9	Reserved
	A	P-OT signal direction: 1=Positive logic, 0= Negative logic
	B	N-OT signal direction: 1=Positive logic, 0= Negative logic
	C~F	Reserved

6. Unit

This displays the parameter units.

7. Current Value

This column displays the current value of a servo amplifier parameter.

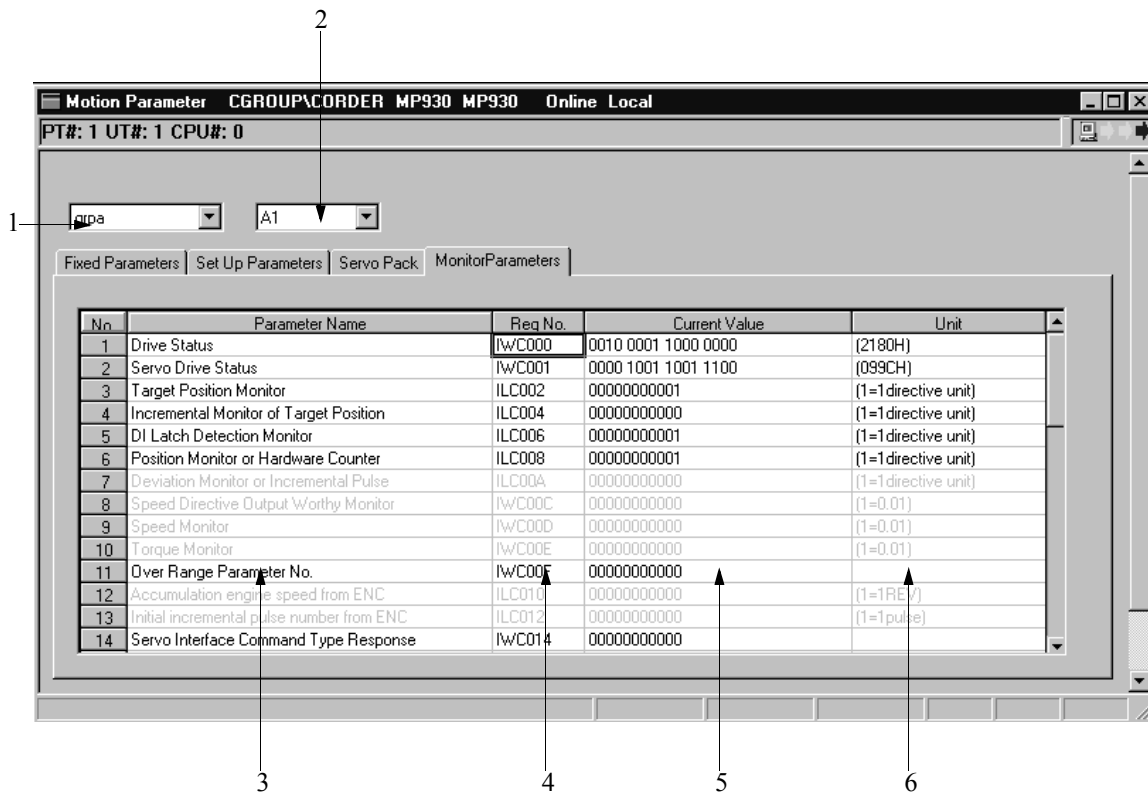
**Supplement:**

Default Value Setting

It is possible to omit the input of each parameter, and yet set the default values. The servo parameters of the axis currently displayed are set into the default. See the Default Value column in Table 9 for the default value of each parameter. The setting method of the default parameters is the same as that for the fixed parameters. See Item, 7.3.2 “Fixed Parameter Setting.”

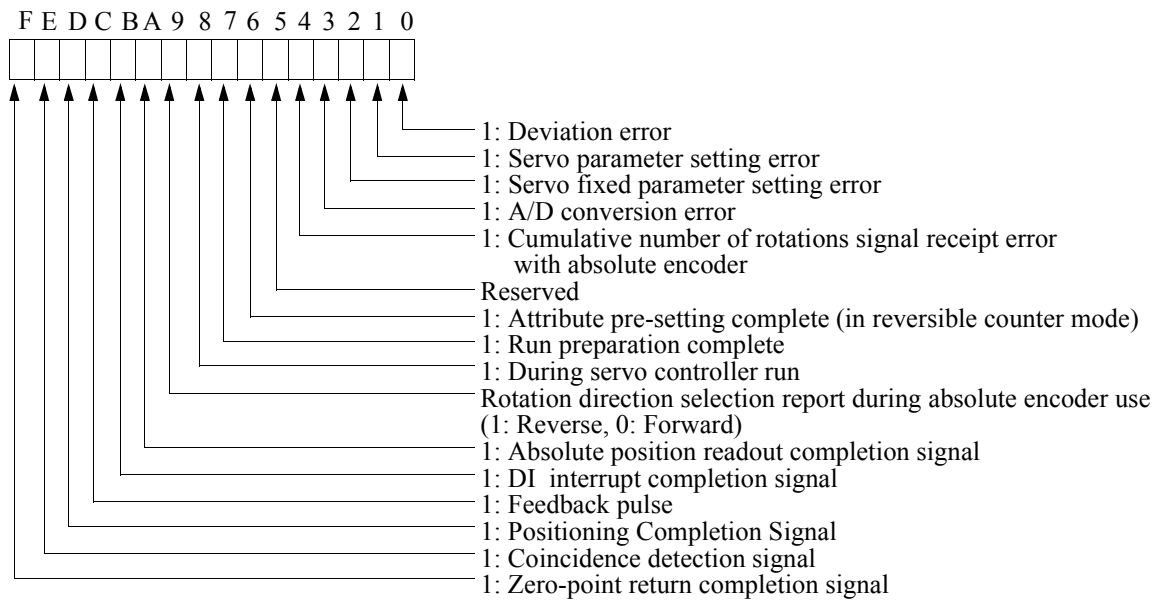
### 7.3.5 Monitor Parameters

The following screen is displayed upon clicking the Monitor Parameters tab in the motion parameter window. The current values of the motion parameters are displayed in this screen. This screen is for display only, and the individual settings cannot be changed.

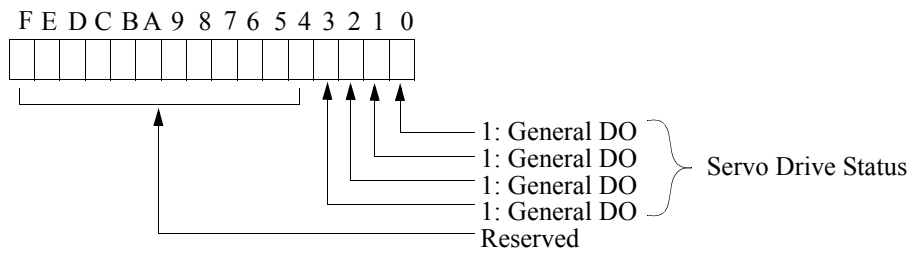


1. Group Name  
Select the group name set in the group definition.
2. Logical Axis Name  
Select the logical axis name. The parameter monitor is displayed in axis units.
3. Parameter Name  
The parameter name is displayed.
4. Register Number  
Displays the register number corresponding to the parameter name. This register number has a fixed allocation according to the servo number.
5. Current Value  
The current value of a parameter is displayed in the on-line mode. Nothing is displayed in the off-line mode.
6. Unit  
Displays the parameter units.





**Figure 7: Bit Structure of Parameter No. 1, Drive Status**



**Figure 8: Bit Structure of Parameter No. 2, Servo Drive Status**

### 7.3.6 Saving Motion Parameter Definitions

This function saves the various motion parameters. The data is saved into both the PLC and hard drive in the on-line mode, and into the hard drive in the off-line mode. Save motion parameters as follows.

- a. Select **Save (S)** from **File (F)** in the motion parameter menu.
- b. Select the **Yes (Y)** button in the Motion Parameter message box.

**Note:**

The save operation is necessary for each page of the Fixed Parameters, Set-up Parameter, and ServoPack tabs. Modified fixed parameters cannot be saved in the on-line mode if the first bit of the current value (during servo drive run) is ON in parameter number 2 “Drive Run Command” in the Set-up Parameter tab. Saving is possible after the first bit goes OFF. The error detection message box is displayed when a save fails. Remove the cause of the error, and repeat the save operation.

### 7.3.7 Deleting Motion Parameter Definitions

This function deletes motion parameter setting data. Follow the procedure below to delete motion parameters.

- a. Select **Delete (D)** from **File (F)** in the Motion Parameter menu.
- b. Select the **Yes (Y)** button in the Motion Parameter message box.

**Note:**

Fixed parameters and parameter settings for all axes are deleted upon executing the delete function. Initial values are then set.

### 7.3.8 Closing Motion Parameter Definition

Close motion parameter setting/display processing by closing the motion parameter window. To close the window, select **Close (C)** from **File (F)** in the Motion Parameter menu.

## 7.4 System Configuration

The current status of the PLC can be displayed and modified in the System Configuration window. This section describes the operation of the System Configuration window.

### 7.4.1 Structure of the System Configuration Window

This item deals with the menus and tabs of the System Configuration window.

#### ■ Menu Structure of the System Configuration Window

See Item 7.1.3, “Definition Screen Call-out” before opening the System Configuration window. The menus displayed in the System Configuration window are shown in Table 11. See the item numbers shown in Table 11 when referring to the various functions from the menu.

**Table 11: System Configuration Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes the System Configuration window	7.4.6
Regist User Menu (U)	Registers user menu	—
Save (S)	Saves System Configuration data	7.4.5
Print (P)	Prints document	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
Edit (E)		
Delete Assgin (D)	Deletes data allocated to the global memory	7.4.3
Control (C)		
Calendar (C)	Modifies calendar values	7.4.4
CPU Run (R)	Sets PLC to on-line running mode	7.4.4
CPU Stop (S)	Sets PLC to on-line stopping mode	7.4.4
Err Reset (E)	Resets detected error display	7.4.4
Mem Clear (M)	PLC memory clear	7.4.4
Mem Compact (L)	Compacts the user program for the PLC memory	7.4.4
CPU Reset (T)	Resets CPU	7.4.4
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Next Page (N)	Displays next tab page	7.4.1
Back Page (N)	Displays previous tab page	7.4.1
Window (W)		

**Table 11: System Configuration Window Menu (Continued)**

Menu	Function	Item No.
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

## ■ System Configuration Window Tabs

The System Configuration window consists of two tabs: System Configuration and Common Memory Assignment. See the item numbers shown in Table 12 when referring to any of the tab functions.

**Table 12: System Configuration Window Tabs**

Tab Names	Function	Item No.
System Configuration	Sets PLC status and counter values	7.4.2
Common Memory Assignment	Assigns global memory	7.4.3

### Helpful Hint

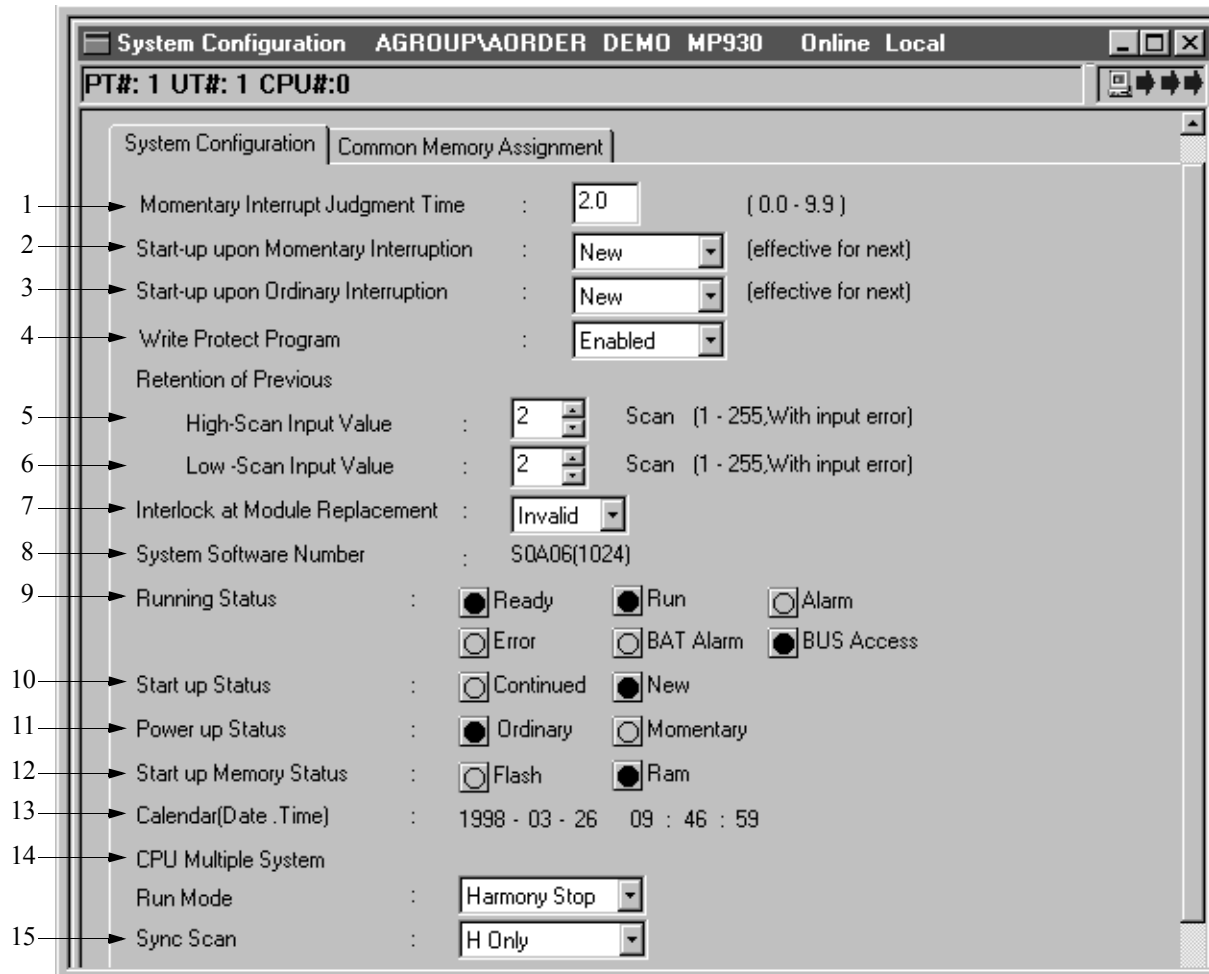
It is possible to move the tab pages in the following order upon selecting **Next Page (N)** from **View (V)** in the System Configuration menu.

System Configuration→Common Memory Assignment→System Configuration

To move the pages in reverse order, select **Back Page (P)** from **View (V)** in the System Configuration menu.

## 7.4.2 System Configuration Data Setting

The following screen is displayed upon opening the System Configuration window and clicking the System Configuration tab.



1. Momentary Interrupt Judgement Time  
Input a momentary stop determination time between 0.0 ~ 9.9. Momentary interrupt is not detected and a regular power loss results if 0.0 is input.
2. Start-up on Momentary Interruption  
Select the run format at PLC start following a momentary power loss. For details, see the user's manual for the individual PLC.
3. Start-up Upon Ordinary Interruption  
Select the run format at PLC start following a normal power shut down and recovery. For details, see the user's manual for the individual PLC.
4. Write Protect Program  
Select which programs and definition data may be overwritten.  
Disabled: Programs and definition data may be changed.  
Enabled: Although programs and definition data may be displayed, overwriting is not possible. However, register values can be changed.

5. Retention of Previous High-Scan Input Value  
Input the number of times the previous value of the high-speed scan input is held upon occurrence of an I/O error. For example, if “3” is input, the high-speed scan input is reset after four continuous I/O error occurrences. Input a value within the range of 1 ~ 255 for the Previous Value Hold Designation High-Speed Input.
6. Retention of Previous Low-Scan Input Value  
Input the number of times the previous value of the low-speed scan input is held upon occurrence of an I/O error. For example, if “3” is input, the low-speed scan input is reset after four continuous I/O error occurrences. Input a value within the range of 1 ~ 255 for the Previous Value Hold Designation Low-Speed Input.
7. Interlock at Module Replacement  
Set whether the interlock at module is valid or invalid according to the application program.
8. System Software Number  
Displays the PLC system software number.
9. Running Status  
This displays the running status of the current PLC in the on-line mode. The meaning of the various displays is shown in Table 13. Care must be taken as the number of LEDs on the front of the PLC differ. For details on the various running statuses, see the appropriate user’s manual for the machine controller used.

**Table 13: Running Statuses**

Status	Meaning	
READY	ON: Normal OFF: Self-diagnosis error	ON when the module is normal, OFF during self-diagnosis errors.
RUN	ON: Running OFF: Run Stop	ON when on-line (scan processing execution). OFF on occurrence of fatal error/PLC run stop operation in System Configuration window.
ALARM	ON: Alarm OFF: Normal	ON during alarm, OFF when normal
ERROR	ON: Error OFF: Normal	ON during error, OFF when normal
BAT ALM	ON: Battery voltage drop OFF: Battery voltage normal	ON when battery voltage drops, OFF when normal
BUS ACCESS	ON: Bus Access OFF: Bus access stop	ON during bus module access, OFF during bus access stop.

10. Start-up Status  
This shows the status when the PLC starts.
11. Power Up Status  
This displays the status when power returns.

#### 12. Start-up Memory Status

This displays the memory status upon start-up in the on-line mode.

#### 13. Calendar (Date/Time)

This shows the calendar values of the PLC internal clock. Calendar values can be changed in the on-line mode. Calendar values cannot be displayed in the off-line mode.

#### 14. CPU Multi-System Operation Mode

Sets the operation mode in the CPU multi-system.

Harmony Stop : Stopping of one CPU in conjunction with the stopping of another CPU

Stand Alone : No effect from the stopping of a given CPU

Set “Harmony Stop” in the MotionSuite™ series machine controller.

#### 15 Sync Scan

This sets the synchronous scanning of the CPU multi-system.

H/L : Synchronizes both high-speed scan and low-speed scan

H only : Synchronizes high-speed scan only

L only : Synchronizes low-speed scan only

No sync : Both CPUs operate asynchronously

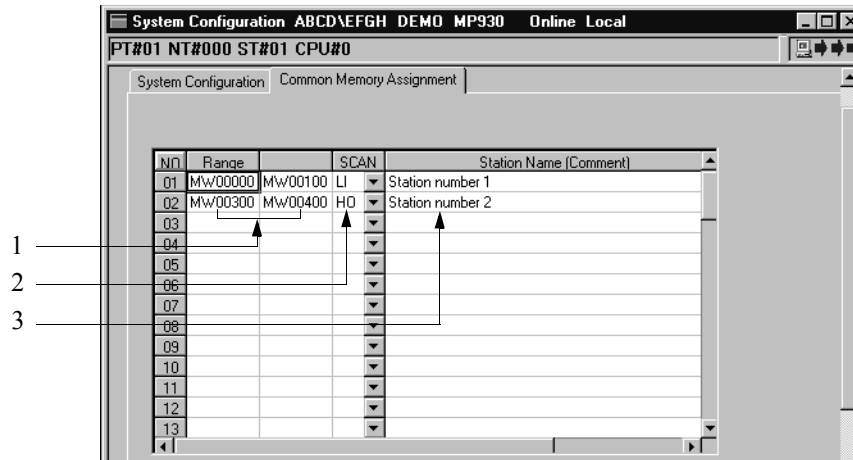
Set H only in the MotionSuite™ series machine controller.

### 7.4.3 Setting of Common Memory Assignment Data

This item deals with the setting and deletion of common memory assignment data.

#### ■ Setting of Common Memory Assignment Data

In multi-CPU configuration, it is possible to input/output M register data between various CPUs at a designated scan. In the Common Memory Assignment tab, use the M register as the global memory, and set whether to input/output a given range at a given scan. The following screen is displayed by opening the System Configuration window and clicking the Common Memory Assignment tab.



1. Range  
Input the M register range (0 ~ 32767) to be used as a common memory. Input a non-duplicated M register range. Be sure that the Start Number ≤ End Number.
2. Scan  
Input the scan at which to input/output the M register between the CPUs.
  - HI: High-speed scan input
  - HO: High-speed scan output
  - LI: Low-speed scan input
  - LO: Low-speed scan output
3. I/O Name  
Input the name of the M register range in 32 16-bit characters (16 32-bit characters) or less.

**Note:**

A maximum of 64 rows may be allocated to the common memory.

### ■ Deletion of Common Memory Assignment Data

Common memory assignment data is deleted in row units. Delete data as follows:

- a. Move the cursor to the data to be deleted.

NN	Range	SCAN	Station Name (Comment)
01	Mw00000 Mw00100	LI	Station number 1
02	Mw00300 Mw00400	HO	Station number 2
03			
04			

- b. Select **Delete Paste (D)** from **Edit (E)** in the System Configuration menu.



- c. The assignment data in (a) is deleted.

№	Range	SCAN	Station Name (Comment)
01			
02	MW00300 MW00400	HO	Station number 2
03			
04			

#### 7.4.4 PLC Status Change

This function changes the PLC status. The content of these changes is reflected in the operation of the PLC immediately following the change operation.

**Note:**

The PLC status cannot be changed in the off-line mode.

- a. PLC Run Operation  
This function executes PLC run.
  - a.1 Select **CPU Run (R)** from **Control (C)** in the System Configuration menu.
  - a.2 Select the **Yes (Y)** button in the message box.
- b. PLC Run Stop  
This function stops the PLC run. Running user programs stop upon run stop.
  - b.1 Select **CPU Stop (S)** from **Control (C)** in the System Configuration menu.
  - b.2 Select the **Yes (Y)** button in the message box.

**Note:**

In a multi-CPU configuration, both CPU modules stop running if the CPU multi-system mode is set to Coordinated Stop.

- c. Reset PLC Error Display  
This function resets the display of errors detected in the PLC. Check the content of the error with the Register List function (located in item 10.1, “Register List”) prior to resetting.
  - c.1 Select **Err Reset (E)** from **Control (C)** in the System Configuration menu.
  - c.2 Select the **Yes (Y)** button in the message box.

Subject of error content and display list

The subject of an error content and display list are shown in Table 14.

**Table 14: Subject of Error Content and Display List**

Register Number	Error Content
SB000410	User Operation Error

d. Clear PLC Memory

This function clears the PLC user program memory. By this operation, the content of both the program created by the user, and the definitions data, are deleted. The content of the flash memory, however, is not subject to this.

d.1 Select **Mem Clear (M)** from **Control (C)** in the System Configuration menu.

d.2 Select the **Yes (Y)** button in the message box.

**Note:**

Execute this operation in the PLC run stop status. See “PLC Run Stop” above regarding the stopping of PLC run.

e. Memory Compression

This function compresses the PLC user program memory. If the amount of user programs is unusually large, and the user memory free space becomes small, the free space of the user program memory becomes disconnected if there are repeated program changes. For this reason, it is sometimes impossible to change or add programs even if the necessary free space exists. At such times, it is possible to reduce the amount of user program memory space used, and to reconfigure disconnected free space into connected free space.

e.1 Select **Memory Compact (L)** from **Control (C)** in the System Configuration menu.

e.2 Select the **Yes (Y)** button in the message box.

**Note:**

Using the memory compression function, it is possible to create programs to the limit of the user program memory. However, care must be exercised as it becomes impossible to make changes to existing programs as the user program memory is used to its limit.

f. CPU Reset

This function rests the CPU. User programs within the CPU and configuration data are not deleted in this operation.

f.1 Select **CPU Reset (T)** from **Control (C)** in the System Configuration menu.

f.2 Select the **Yes (Y)** button in the message box.

**Note:**

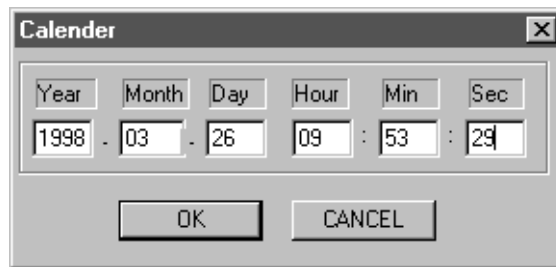
Execute this operation with the PLC run stopped. See “PLC Run Stop” regarding the stopping of PLC running.

g. Calendar Setting

This function sets the calendar values.

g.1 Select **Calendar (D)** from **Control (C)** in the System Configuration menu.

g.2 Input the calendar values in the dialogue box, and select the **Set** button.



**Note:**

This function can only be operated in the on-line mode. The calendar values are stored immediately in the PLC upon selecting the **Set** button.

### 7.4.5 Saving System Configuration

This function saves the System Configuration data. The data is saved into both the PLC and hard drive in the on-line mode, and into the hard drive only in the off-line mode. Save the system configuration data as follows:

- a. Select **Save (S)** from **File (F)** in the system configuration menu.
- b. Select the **Yes (Y)** button from the message box.

**Note:**

An error message box is displayed in the event of a failed save. Remove the cause of the error, and repeat the save operation.

### 7.4.6 Closing System Configuration

Close system configuration by closing the system configuration window. To close the window, select **Close (C)** from **File (F)** in the system configuration menu.

## 7.5 Scan Time Setting

Scan time refers to the periodic repeat execution of a user program (high-speed scan processing drawings, low-speed scan processing drawings) by the PLC. In this section, we deal with the scan time setting method.

### 7.5.1 Structure of the Scan Time Window

In this item we deal with the structure of the scan time window menus.

#### ■ Structure of the Scan Time Window Menus

See Item 7.1.3, “Definition Screen Call-out” before opening the scan time window. The menus displayed in the scan time window are shown in Table 15 below. See the item numbers shown in Table 15 to refer to any of the functions from the menu.

**Table 15: Scan Time Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens file manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes the scan time window	7.5.5
Save (S)	Saves scan time setting data	7.5.4
Print (P)	Prints document	Ch. 12
Exit (X)	Exits engineering manager	3.4.2
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
PC Add (A)	Adds the PLC displaying the scan time	7.5.2
PC Delete (D)	Deletes the PLC displaying the scan time	7.5.2
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

## 7.5.2 Scan Time Setting

The following screen is displayed upon opening the scan time window.

PT#: 1 UT#: 1 CPU#: 0		
Own Network No		NT#000
Own Station Number		ST#00
CPU Number		CP#00
PLC Type		MP930
High Speed Scan	Set Time [ ms ]	4.0
	Maximum Time [ ms ]	0.7
	Current Time [ ms ]	0.6
Low Speed Scan	Steps [ step ]	347
	Set Time [ ms ]	30.0
	Maximum Time [ ms ]	1.0
	Current Time [ ms ]	0.2
	Steps [ step ]	29
Start-up D'WG	Steps [Step]	0
Interrupt D'WG	Steps [Step]	0
User Function	Steps [Step]	0
Total Step	Steps [Step]	376
Program Memory Total	[Byte]	1093608
Available	[Byte]	908388

### 1. PLC Data

These rows display the PLC data. The names of the individual PLCs only are displayed in the off-line mode.

### 2. High-Speed Scan Time

The high-speed scan time of the PLC is displayed in the on-line mode. The scan time data stored in the hard disk is displayed in the off-line mode. The range of high-speed time scan settings differ according to PLC type. They are between 2.0 ~ 30.0ms (set at intervals of 2.0ms).

Setting: Input the setting value for each scan.

Maximum Value: This box displays the maximum value of each scan. To clear the maximum scan time, set this box to 0. 0 is displayed in the off-line mode.

Current Value: This box displays the current value of each scan. 0 is displayed in the off-line mode.

### 3. Low-Speed Scan Time

The low-speed scan time of the PLC is displayed in the on-line mode. The range of low-speed time scan settings differs according to PLC type. They are between 2.0 ~ 300.0ms (set at intervals of 0.1ms). See the “High-Speed Scan Time” box for the setting value, maximum value, and current value.

#### 4. Number of Steps

The total number of drawing/function program steps for each PLC is displayed.

Start-up Drawings:

The total number of start-up drawing steps is displayed for each PLC.

Interrupt Drawings:

The total number of interrupt drawing steps is displayed for each PLC.

User Functions:

The total number of user function steps is displayed for each PLC.

#### 5. Total Number of Steps

The total number of steps for all drawings in each PLC is displayed.

#### 6. Program Memory

The amount of program memory used in each PLC is displayed.

Total: The total amount of program memory is displayed here. 0 is displayed in the off-line mode.

Available: The amount of program memory available is displayed. 0 is displayed in the off-line mode.

### Supplement

In the on-line mode, the maximum value can be cleared to 0 by inputting 0 in the “Maximum Value” box for scan time, and executing the save operation. Adoption of a new maximum value begins after clearing.

### 7.5.3 Saving Scan Time Settings

This function saves scan time setting data. The data is saved to both the PLC and hard drive in the on-line mode, and to the hard drive only in the off-line mode. Save scan time setting data by the following procedure:

- a. Select **Save (S)** from **File (F)** in the scan time menu.
- b. Select the **Yes (Y)** button from the scan time message box.

### 7.5.4 Closing Scan Time Settings

Close scan time setting by closing the scan time window. To close the window, select **Close (C)** from **File (F)** in the scan time menu.

## 7.6 Application Information

This is the setting of current application information (such as installation names, revision history, etc.) using the PLC. Although some of the data set here is reflected in document printouts, it has no effect on current PLC run operations. This section contains information on the setting of application information.

### 7.6.1 Structure of Application Information Window

The application information window menus are explained in this section.

#### ■ Structure of Application Information Window Menu

See Item 7.1.3, “Definition Screen Call-out” before opening the application information window. The menus displayed in the application information window are shown in Table 16 below. See the item numbers shown in Table 16 when referring to any of the functions from the menu.

**Table 16: Application Information Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes the application data window	7.6.4
Regist User Menu (U)	Registers user menu	—
Save (S)	Saves application data	7.6.3
Print (P)	Prints document	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

## 7.6.2 Application Information Setting

The following screen is displayed upon opening the application information window. Set data according to the description of each piece of application information.

The screenshot shows a window titled 'Application Information' with the following fields and values:

- Order No.: AORDER
- Controller Name.: DEMO
- Controller Type.: MP930
- User.: YEA
- Used.: ENGINEERING
- Equip.: MP930
- Usage.: DEMO
- Date: 1998.03.26

Below the fields is a 'Revision history' table with 9 rows:

1	
2	
3	
4	
5	
6	
7	
8	
9	

1. Order Number  
Input a name of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.
2. Controller  
Input a name of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.
3. Controller Type  
Input a name of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.
4. User  
Input a name of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.



5. Used  
Input a name of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.
6. Equipment  
Input a name of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.
7. Usage  
Input a name of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.
8. Date Prepared  
Input a name of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name.
9. Revision History  
Input a name of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the same name. Up to 15 data rows may be input into the revision data history.

### 7.6.3 Saving Application Information

This function saves the application information data. The data is saved into both the PLC and hard drive in the on-line mode, and into the hard drive only in the off-line mode. Save the application information data as follows:

- a. Select **Save (S)** from **File (F)** in the application data menu.
- b. Select the **Yes (Y)** button from the message box.

**Note:**

An error message box is displayed in the event of a failed save. Remove the cause of the error, and repeat save.

### 7.6.4 Closing Application Information

Close application information setting by closing the application information window. To close the window, select **Close (C)** from **File (F)** in the application information menu.

## 7.7 Data Trace

Data trace is executed in group units. This section covers the definition of the data to be traced, and the display of the traced data.

### 7.7.1 Structure of Data Trace Window

This item deals with the data trace window menus and tabs.

#### ■ Structure of Data Trace Window Menu

See Item 7.1.3, “Definition Screen Call-out” before opening the data trace window. The menus displayed in the data trace window are shown in Table 17 below. See the item numbers shown in Table 17 when referring to any of the functions from the menu.

**Table 17: Data Trace Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes the data trace window	7.7.10
Regist User Menu (U)	Registers user menu	—
Save (S)	Saves trace definition data	7.7.3
Delete (D)	Deletes trace definition data	7.7.4
Trace Data (T)		
Read (R)	Reads trace data from the floppy disk	7.7.6
Write (W)	Writes trace data from the floppy disk	7.7.5
Print (P)	Prints document	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
Edit (E)		
Trigger Initiate Condition (T)		
Delete (D)	Deletes trigger conditions	7.7.2
Trace Setting (S)		
Delete (D)	Deletes trace designation	7.7.2
Add (A)	Adds trace designation	7.7.2
Default Setting (D)	Sets default values	7.7.2
Control (C)		
Trace Start (S)	Starts trace	7.7.8
Trace Stop (P)	Stops trace	7.7.8

**Table 17: Data Trace Window Menu (Continued)**

Menu	Function	Item No.
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Mode (M)		
RE-DSP (R)	Updates display data	7.7.8
AUTO (A)	Automatic update of display data	7.7.8
Sampling (S)		
Number of Read Data (R)	Modifies the number of data rows read	7.7.8
Trace Time Axis (T)	Modifies trace time axis	7.7.8
Jump to ApPOINT Data (O)	Displays trace data from a desired sample number	7.7.8
Data (D)		
Decimal (D)	Displays trace data in decimal form	7.7.8
Hexadecimal (H)	Displays trace data in hexadecimal form	7.7.8
m/s (M)	Switches the time axis units	7.7.8
Next Page (N)	Displays next tab page	7.7.1
Back Page (N)	Displays previous tab page	7.7.1
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

### ■ Data Trace Window Tabs

The data trace window is composed of three tabs: Data Trace Definition, List, and Trend Graph.

**Table 18: Data Trace Window Tabs**

Tab Name	Function	Item No.
Data Trace Definition	Defines trace data.	7.7.2
List	Displays trace data lists	7.7.8
Trend Graph	Displays trace data graph	7.7.9

### Helpful Hint

The tabs can be moved in the following order by selecting **Next Page (N)** from **View (V)** in the data trace menu: Data Trace Definition→List→Trend Graph→Data Trace Definition. To move the pages in reverse order, select **Back Page (P)** from **View (V)** in the data trace menu.

## 7.7.2 Data Trace Definition

This item offers information on the definition of trace data (register content, relay ON/OFF).

### ■ Data Trace Definition Data Setting

The following screen is displayed upon opening the data trace window and clicking the Data Trace Definition tab.

PT#: 1 UT#: 1 CPU#:0

Group Number: GROUP-1 Status: RUN

Data Trace Definition | List | Trend Graph

Data Name: TRACE DEFINITION-01

Trace Timing: H-SCAN Trace Interval: 00000 Trace No. of Times: 000000

Trigger Condition

Initiate	MB000340	=	ON	RELAY START TRIGGER
Terminate1	MB000340	=	OFF	RELAY STOP TRIGGER
	Delay =		00000	
Terminate2	ML01234	>=	001100000	RELAY STOP TRIGGER
	Delay =		00000	

Trace Data Definition

Nn	REG	D/w/G	SCALE	Comment
01	DW00001	H02	000000	
02	MB000320			
03	ML00060		0000000000	
04				
05				
06				
07				
08				
09				

Set the definition data after referencing the following items.

1. Group Number  
Select the group number of the trace to be defined.
2. Data Name  
Input a name for the trace definition data of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters can be combined in a single name. The data input here has no effect on data trace execution.

### 3. Trace Timing

Select the data trace execution timing.

Program: Data trace is executed when a system function trace has been executed within a drawing/function program.

H-SCAN :Executes data trace for each high-speed scan.

L-SCAN :Executes data trace for each low-speed scan.

### 4. Trace Interval

Input the data trace scan period (0 ~ 32767) when H-SCAN or L-SCAN has been set in the Execution Timing box. For example, if 3 is input, data trace is executed for each scan at an interval of one trace per four scans. If 0 is input, data trace is executed at each scan input into the Execution Timing box. Inputting 0 is the same as inputting 1. Input is not possible if Program is selected in the Execution Timing box.

### 5. Number of Traces

Input the maximum number of traces (0 ~ 999999). Continuous data trace results if 0 is input. Data trace is executed until the conditions set in the Stop Trigger Conditions box are established or the trace is manually stopped. If 1000 is input, data trace continues for 1000 data rows. Input is not possible if Program is selected in the Execution Timing box.

### 6. Initiate Trigger Conditions

Input the data trace initiate conditions when H-SCAN or L-SCAN has been set in the Execution Timing box. Manual trace start operation is necessary if these conditions are not input. Input is not possible if Program is selected in the Execution Timing box.

### 7. Terminate Trigger Conditions

Input the conditions under which the data trace is to stop and the number of traces until data trace is stopped following establishment of the stop conditions when H-SCAN or L-SCAN has been set in the Execution Timing box. Up to two conditions can be set. When 0 is input in the Delay box, data trace stops simultaneously with the establishment of the stop conditions. If stop trigger conditions are not input, data trace is executed until the number of traces reaches the number in the Number of Traces box or the trace is manually stopped. If two stop trigger conditions are set, data trace stops if either of these conditions is established. Input is not possible if Program is selected in the Execution Timing box.

### 8. Trace Data Definition

Input the register numbers, drawing numbers, scale conversions, and comments to be subject to the trace. Up to 16 trace data components can be set.

REG: Input the register number to be traced. Register types that can be input are S, O, M, and D registers. 16-bit integer data, 32-bit integer data, and bit data can be traced according to the register type.

DWG: Input the D register drawing number when the register number to

be traced is a D register (when D is input in the REG box). No input is needed in this box if a register number other than D register is input. A plurality of D registers of different scans cannot be simultaneously designated in the drawing number designation. Data trace cannot be executed if the scan level designated in the Execution Timing box is checked and the scan levels do not match.

**SCALE:** Input the scale conversion value for the traced data. This value becomes the amplitude in trend graph display of the trace data.

**Comment:** Input comments on the register to be traced of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters can be combined in these comments.

The trace definition data of the currently displayed group number is deleted if saving is done without any data in Trace Data Definition. This is the same as executing **Delete (D)** from **File (F)** in the data trace menu.

#### 9. Status

This displays the data trace execution status of the CPU for the group number currently displayed.

RUN:Data trace execution underway

STOP:Data trace stopped

#### **Important Point on Trigger Conditions**

There are three trigger conditions: Start Trigger, Stop Trigger 1, and Stop Trigger 2. When a register number which is in bit form is input on the left, only the “=” operand can be selected. Input ON or OFF on the right side.

When a register number which is other than bit form is input on the left, select from operands “<”, “≤”, “=”, “≠”, “≥”, and “>”, and input a numerical value on the right. Input a number from 0 ~ 65534 for the stop trigger ON delay. Input comments of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters can be combined in these comments.

#### **Important Point on Default Setting**

It is possible to set default settings by selecting **Default Setting (D)** from **Edit (E)** in the data trace menu. All other data is cleared if Program is set in the Execution Timing box, and 0 in the Number of Traces box.

### ■ Trace Definition Data Editing

Editing trace definition data is described below.

#### a. Deleting Trigger Conditions

This function deletes data set in Trigger Conditions.

- a.1 Move the cursor to the trigger condition to be deleted.

Trigger Condition

Initiate	MB001230	=	ON	RELAY WITH START TRIGGER
Terminate1	MB012341	=	OFF	RELAY WITH STOP TRIGGER
Delay =	00080			
Terminate2	ML01234	>=	001100000	RELAY WITH STOP TRIGGER
Delay =	00000			

- a.2 Select **Trigger Initiate Conditions (T)⇒Delete (D)** from **Edit (E)** in the data trace menu.
- a.3 The trigger conditions designated in (a.1) are deleted.

Trigger Condition

Initiate	MB001230	=	ON	RELAY WITH START TRIGGER
Terminate1				
Delay =				
Terminate2	ML01234	>=	001100000	RELAY WITH STOP TRIGGER
Delay =	00000			

**Note:**

Trigger conditions are deleted in trigger condition units. For example, if deletion is executed in the Stop Trigger Condition 1 box, then the Condition Format, Comment, and Delay data of Stop Trigger Condition 1 is deleted.

- b. Row Data Deletion
  - Deletes one row of data set in Trace Data Definition.
  - b.1 Move the cursor to the trace data to be deleted.

Trace Data Definition

No.	REG	Dw/G	SCALE	Comment
01	Dw00010	L01.01	000000	
02	Mw05110		000000	
03	Mw05111		000000	
04	Mw05112		000000	

- b.2 Select **Trace Setting (S)⇒Delete (D)** from **Edit (E)** in the data trace menu.
- b.3 The trigger conditions designated in (b.1) are deleted.

Trace Data Definition

No.	REG	Dw/G	SCALE	Comment
01	Mw05110		000000	
02	Mw05111		000000	
03	Mw05112		000000	
04				

- c. Row Data Insertion
  - This function inserts blank rows in Trace Data Designation.

- c.1 Move the cursor to the trace data designation position for insertion.

Nn	REG	DWG	SCALE	Comment
01	DW00010	L01.01	000000	
02	MW05110		000000	
03	MW05111		000000	
04	MW05112		000000	

- c.2 Select **Trace Setting (S)⇒Add (A)** from **Edit (E)** in the data trace menu.  
 c.3 A blank row is inserted at the position designated in (c.1).

Nn	REG	DWG	SCALE	Comment
01				
02	DW00010	L01.01	000000	
03	MW05110		000000	
04	MW05111		000000	

### 7.7.3 Saving Data Trace Definitions

This function saves data trace definition data. Data is saved into both the PLC and hard drive in the on-line mode, and into the hard drive only in the off-line mode. Save data trace definition data as follows.

- Select **Save (S)** from **File (F)** in the data trace menu.
- Select the **Yes (Y)** button in the Data Trace message box.

**Note:**

The save operation is the same when there is no data trace as when the delete function is executed. An error detection message box is displayed when a save fails. Remove the cause of the error, and save again.

### 7.7.4 Deleting Data Trace Definitions

This function deletes all data trace definition data. Data trace definition data is deleted in both the PLC and hard drive in the on-line mode, and in the hard drive only in the off-line mode. Delete trace definition data as follows:

- Select **Delete (D)** from **File (F)** in the data trace menu.
- Select the **Yes (Y)** button in the Data Trace message box.

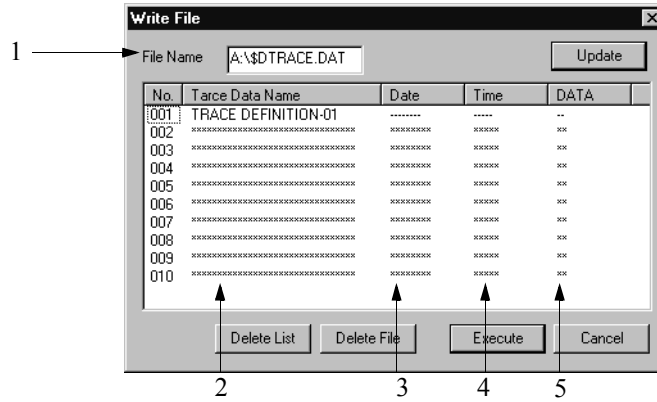
### 7.7.5 Data Trace Data Writing and Deletion

This item deals with the writing of data trace data onto floppy disks. Only data trace definition data can be written when executing the Data Trace Definition tab. Both trace definition data and traced data can be written when either the List tab or Trend Graph tab is used.



## ■ Structure of Writing Dialogue Box

The Writing dialogue box is displayed upon selecting **Trace Data (T)⇒Write (W)** from **File (F)** in the data trace menu. Each of the items in the writing dialogue box is described below.



### 1. File Name

Input the drive number and the file name of the floppy disk onto which trace data is to be stored. The default file name is \$DTRACE.DAT. Upon inputting the file name and pressing the **Update** button, a list of the trace data stored in the input file is displayed in 1 ~ 10 of the No. box.

### 2. Trace Data Name

This displays the name of the trace data. This stores the data in the Trace Name box of the Trace Definition tab. “\*” means that there is no saved trace data.

### 3. Date

The date at which a given data was traced is shown. “-” means that the saved data is trace definition data only. “\*” means that there is no saved trace data.

### 4. Time

The time at which a given data was traced is shown. “-” means that the saved data is trace definition data only. “\*” means that there is no saved trace data.

### 5. DATA

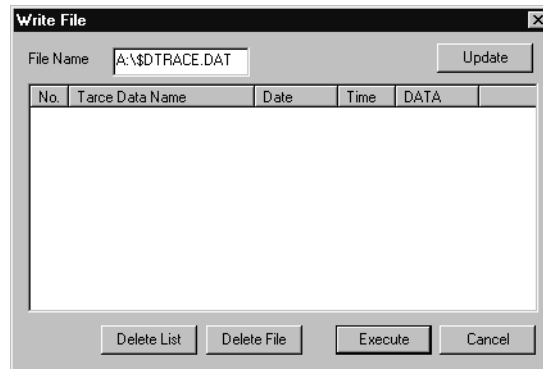
This shows the type of trace data saved:

- : This shows that the saved data is trace definition data only.
- O: This shows that the saved data is both trace definition data and traced data.
- \*\* : This shows that there is no saved data.

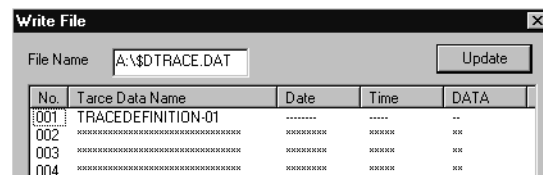
## ■ Trace Data Writing

This function writes the trace data to a floppy disk.

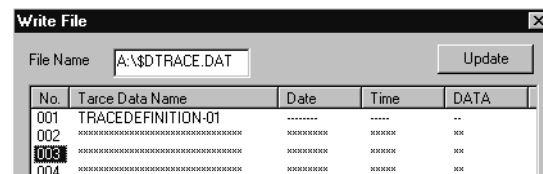
- a. The Writing dialogue box is displayed upon selecting **Trace Data (T)⇒Write (W)** from **File (F)** in the data trace menu.



- b. Input the file name to be written into the File Name text box, and select the **Update** button.



- c. The No. box of the trace number in which trace data is to be written is highlighted.



- d. Select the **Execute** button.

## ■ Trace Data Deletion

This function deletes trace data stored in the floppy disk.

- a. Trace Data File Deletion  
This function deletes trace data files displayed in the File Name text box.
  - a.1 The Writing dialogue box is displayed upon selecting **Trace Data (T)⇒Write (W)** from **File (F)** in the data trace menu

- a.2 Input the file name to be deleted into the File Name text box, and select the **Update** button.
- a.3 Select the **Delete File** button.

Trace Data Definition

No.	REG	DWG	SCALE	Comment
01				
02	DW00010	L01.01	000000	
03	MW05110		000000	
04	MW05111		000000	

- a.4 Select the **Yes (Y)** button in the message box.
- a.5 The trace data file designated in (a.2) is deleted.
- a.6 Select the **Cancel** button to end the trace data file deletion.

Write File

File Name: A:\\$DTRACE.DAT [Update]

No.	Trace Data Name	Date	Time	D
001	*****	*****	*****	**
002	*****	*****	*****	**
003	*****	*****	*****	**
004	*****	*****	*****	**

b. Deletion of Individual Trace Data

This function deletes individual trace data.

- b.1 The Writing dialogue box is displayed upon selecting **Trace Data (T)⇒Write (W)** from **File (F)** in the data trace menu.
- b.2 Input the file name including the trace data to be deleted into the File Name text box, and select the **Update** button.
- b.3 The No. box of the trace number to be deleted is highlighted

Write File

File Name: A:\\$DTRACE.DAT [Update]

No.	Trace Data Name	Date	Time	D
001	TRACEDEFINITION-01	*****	*****	**
002	TRACEDEFINITION-01	*****	*****	**
003	*****	*****	*****	**
004	*****	*****	*****	**

- b.4 Select the **Delete List** button.
- b.5 Select the **Yes (Y)** button in the message box. The trace data selected in (b.3) is deleted.

Write File

File Name: A:\\$DTRACE.DAT [Update]

No.	Trace Data Name	Date	Time	D
001	*****	*****	*****	**
002	TRACEDEFINITION-01	*****	*****	**
003	*****	*****	*****	**
004	*****	*****	*****	**

- b.6 Select the **Cancel** button to end trace data deletion.

## 7.7.6 Trace Data Reading

This section discusses reading of trace data stored on a floppy disk.

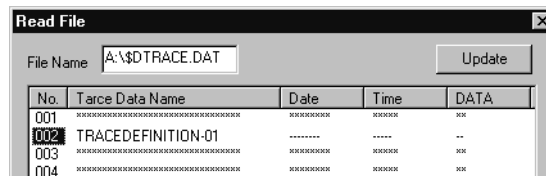
### ■ Structure of Reading Dialogue Box

The reading dialogue box is displayed by selecting **Trace Data (T)⇒Read (R)** from **File (F)** in the data trace menu. See the subsection, “Structure of the Writing Dialogue Box” of item 7.7.5 for details on the individual items in the Reading dialogue box.

### ■ Trace Data Reading

This function reads trace data from a floppy disk.

- a. The Reading dialogue box is displayed upon selecting **Trace Data (T)⇒Read (R)** from **File (F)** in the data trace menu.
- b. Input the file name into the File Name text box, and select the **Update** button. The trace data list is displayed.
- c. The No. box of the trace number of the trace data to be read is highlighted.



- d. Select the **Execute** button.
- e. Select the **Cancel** button to end trace data reading.

#### Note:

A maximum of 10 rows of trace data can be read per file. Trace data reading is executed in group units. Even if reading is executed in Group-1, the trace data of other groups is not read.

## 7.7.7 Data Trace Start

The PLC starts data trace simultaneously with saving trace definition data into the PLC. If the save operation is done after changing trace definitions, all trace data up to that point is lost, and data trace must begin again from the beginning. The current data trace execution state is displayed in the Current Execution Status box.



**Note:**

The PLC may refuse to execute data trace for the following reasons:

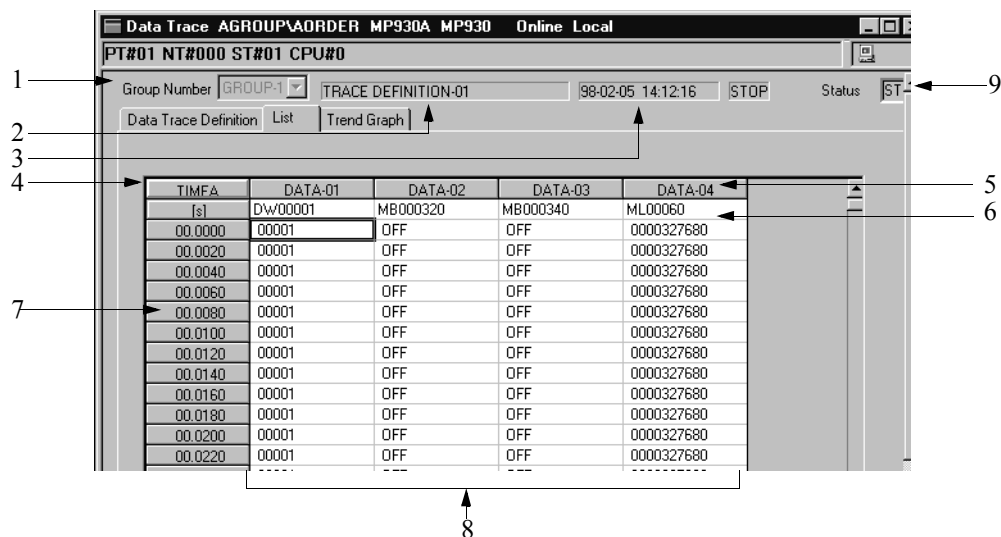
- The current PLC is in the off-line stop mode.
- MotionWorks™ is in the off-line mode.
- If Program is set into the Execution Timing box of the Trace Definition tab, system function trace does not operate within the main program.
- If Program is set into the Execution Timing box of the Trace Definition tab, the trace reset command (RESET) of the system function trace within the main program is ON.
- The number of traces has reached the number set in the Number of Traces box in the Trace Definitions tab.
- The conditions set in the Stop Trigger Conditions box in the Trace Definitions tab are established.
- Data trace has been manually stopped.

### 7.7.8 Trace Data List Display

This function displays the traced data in numerical list form.

#### ■ Structure of the List Tab

The following screen is displayed upon opening the data trace window and clicking the List tab.



1. Group Number  
This displays the group number of the data trace currently displayed.
2. Group Name  
This box displays the group number and group name of the currently displayed data trace. The group name is set in the Trace Name box in the Trace Definition tab.

3. Status  
This displays the date and time of the latest data trace, and the execution status of the data trace at that time.  
RUN: Trace under execution  
STOP: Trace stopped
4. Trace Time Axis  
Displays trace data by axis type (for details, see Item 7.7.8 “Trace Time Axis Change”).  
SNOA: Displays trace data in sample number units with the trace start time at 0.  
SNOB: Displays trace data in sample number units with the trace stop time at 0.  
TIMEA: Displays trace data in time units with the trace start time at 0.  
TIMEB: Displays trace data in time units with the trace stop time at 0.
5. Data Name  
The data names DATA-01, DATA-02, and DATA-03 are automatically attached to the data to be traced.
6. Register Number  
This column displays the register numbers to be traced.
7. Sample Number  
This column displays the sample numbers. The display status differs according to the Trace Time Axis box.
8. Trace Data  
This column displays traced data in accordance with the register type (16-bit integer, 32-bit integer, real number, bit)
9. Status  
This displays the data trace execution status of the CPU in the currently displayed group.

### ■ Display Data Update

This function displays the newest trace data. Update the trace data display as follows:

- a. Select **Mode (M)⇒RE-DSP(R)** from **View (V)** in the data trace menu.
- b. The newest trace data is displayed.

## Important Point-Automatic Updating of New Trace Data

Trace data is automatically scrolled, and the newest trace data displayed, upon selecting **Mode (M)⇒Auto (A)** from **View (V)** in the data trace menu. Other tabs cannot be switched to in the automatic update mode. Automatic update is released upon selecting **Mode (M)⇒Auto (A)** from **View (V)** in the data trace menu again.

### ■ Display Monitor Base Change

The display data can be switched between decimals and hexadecimals by changing the base. The base of bit data cannot be changed.

#### a. Decimal Display

This function displays the data presently under the cursor in decimal form.

a.1 Move the cursor to the item to be displayed in decimal form.

TIMFA	DATA-01	DATA-02	DATA-03	DATA-04
[s]	DW00001	MB000320	MB000340	ML00060
00.0000	00001	OFF	OFF	H00050000
00.0020	00001	OFF	OFF	H00050000

a.2 Select **Data (D)⇒Decimal (D)** from **View (V)** in the data trace menu.

a.3 The data is displayed in decimal form.

TIMFA	DATA-01	DATA-02	DATA-03	DATA-04
[s]	DW00001	MB000320	MB000340	ML00060
00.0000	00001	OFF	OFF	0000327680
00.0020	00001	OFF	OFF	0000327680

#### b. Hexadecimal Display

This function displays the data presently under the cursor in decimal form.

b.1 Move the cursor to the item to be displayed in hexadecimal form.

TIMFA	DATA-01	DATA-02	DATA-03	DATA-04
[s]	DW00001	MB000320	MB000340	ML00060
00.0000	00001	OFF	OFF	0000327680
00.0020	00001	OFF	OFF	0000327680

b.2 Select **Data (D)⇒Hexadecimal (D)** from **View (V)** in the data trace menu.

b.3 The data is displayed in hexadecimal form.

TIMFA	DATA-01	DATA-02	DATA-03	DATA-04
[s]	DW00001	MB000320	MB000340	ML00060
00.0000	00001	OFF	OFF	H00050000
00.0020	00001	OFF	OFF	H00050000

### ■ Manual Trace Start/Stop

This function manually stops and starts data trace.

#### a. Manual Start

This function manually starts data trace.

a.1 Select **Trace Start (S)** from **Control (C)** in the data trace menu.

#### b. Manual Stop

This function manually stops data trace.

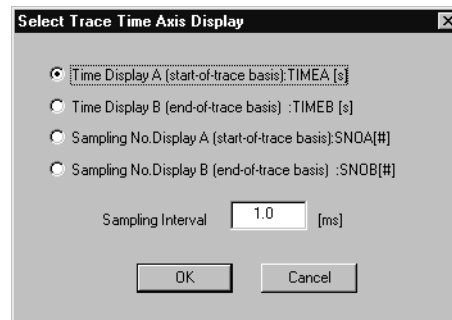
b.1 Select **Trace Stop(P)** from **Control (C)** in the data trace menu.

## ■ Trace Time Axis Change

This function changes the time axis displayed in the data trace. The data trace time axis is displayed below.

TIMFA	DATA-01	DATA-02	DATA-03
[s]	DW00001	MB000320	MB000340

- Select **Sampling (S)⇒Trace Time Axis (T)** from **View (V)** in the data trace menu.
- Set the time axis and sampling interval in the dialogue box and push the **OK** button.



- The trace time axis display is switched, and numerical data is displayed.

### Note:

It is necessary to input the sampling interval into the dialogue box in (b) when setting Program into the Execution Timing box in the Trace Definitions tab, and changing the time axis to Time Display A or Time Display B.

### Important Points - Trace Time Axis

There are four types of trace time axes: TIMEA, TIMEB, SNOA, and SNOB. The meaning of each time axis is as follows:

#### ■ TIMEA

This displays trace data in time units assuming the time at which tracing starts to be 0. Therefore, 0 is the newest trace data. The data is traced for each scan set in the Scan Time Setting screen. The display units are 1s and 0.01s. The units can be alternately displayed by selecting **Data (D)⇒m/s (M)** from **View (V)** in the Data Trace menu. 01.000 equals one second in 1s units. 0.01s equals 0.01 seconds in 0.01s units. However, the decimal point position changes depending on the trace time width. 01.000 and 1.000 are the same.

#### ■ TIMEB

This displays trace data in time units assuming the time at which tracing stops to be 0. Therefore, 0 is the oldest trace data. The data is traced for each scan set in the Scan Time Setting screen. The display units are 1s and 0.01s. The units can be alternately displayed by selecting **Data (D)⇒m/s (M)** from **View (V)** in the Data Trace menu. 01.000 equals one second in 1s units. 0.01s equals 0.01 seconds in 0.01s units. However, the decimal point position may change depending on the trace time width. 01.000 and 1.000 are the



same.

### ■ SNOA

This displays trace data in sample number units assuming the time at which tracing starts to be 0. Data is traced at the interval set in the Execution Timing box in the Data Trace Definition Screen. The traced data numbers are displayed as 0→1→2→3..., where 0 is assumed to be the oldest trace data.

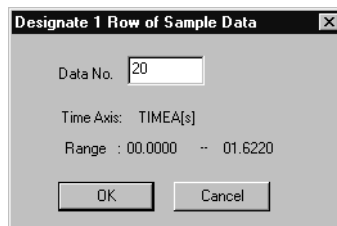
### ■ SNOB

This displays trace data in sample number units assuming the time at which tracing stops to be 0. Data is traced at the interval set in the Execution Timing box in the Data Trace Definition Screen. The traced data numbers are displayed as 3→2→1→0..., where 0 is assumed to be the newest trace data.

## ■ Changing the Display Start Sample Number

This function displays trace data from a desired sample number.

- Select **Sampling (S)⇒1Row Data Designation (O)** from **View (V)** in the data trace menu.
- Input the sample number to start display into the dialogue box, and select the **OK** button.

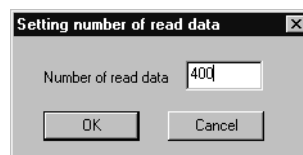


- The trace data is displayed starting from the number input in (b).

## ■ Setting Read Data Numbers

This function changes data numbers reading trace data. The number of trace data set in this operation is read from the PLC upon subsequent operation of the RE-DSP function.

- Select **Sampling (S)⇒Read Data Number (R)** from **View (V)** in the data trace menu.
- Input the read data number to start display in the dialogue box, and select the **OK** button.



**Note:**

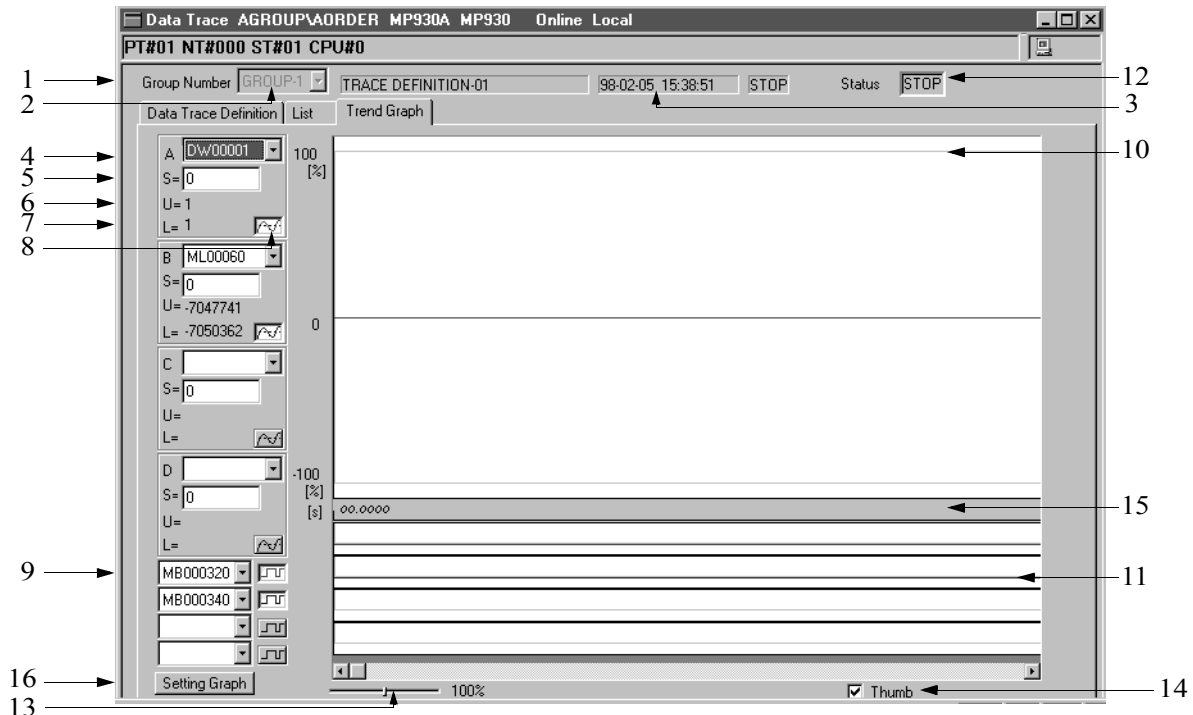
The read data numbers are in frame units. One frame unit = 1 traced data row × number of items.

## 7.7.9 Trace Data Trend Graph Display

This function displays trace data in trend graph form.

### ■ Structure of the Trend Graph Tab

The following screen is displayed upon opening the data trace window and clicking the trend graph tab.



1. Group Number  
This displays the group number of the data trace currently displayed.
2. Group Name  
This displays the group name of the group number of the data trace currently displayed. The group name displays the data input into the Trace Name box in the Trace Definition tab.
3. Status  
This displays the date and time of the last data trace, as well as execution status of the data trace at that time.
  - RUN: Data trace execution underway
  - STOP: Data trace stop

4. Register Number  
Select the 16-bit integer, 32-bit integer, or real number register number to be traced. It is possible to select the register number set in the Trace Data Designation box of the Trace Definition tab. However, it is not possible to select register numbers in the automatic update mode.
5. Scale Conversion  
Input the scale conversion of the trace data. It is possible to adjust the vertical amplitude of the graph by this value. When automatic update (see the subsection, “Display Data Update” in Item 7.7.8) is used, continuous display is done using this value as the amplitude. The data set into the Trace Designation: Scale box in the Trace Definition tab is set as the default. The amplitude is the same when 0 is input as when 32767 is input.
6. Maximum Value  
This displays the maximum value of trace data.
7. Minimum Value  
This displays the minimum value of trace data.
8. Display ON/OFF Switching  
Display may be switched alternately ON or OFF by selecting this button.
9. Relay Number  
This displays the bit register number to be traced.
10. 16-bit Integer/32-bit Integer/Real Number Data Display  
This displays 16-bit integer/32-bit integer/real number data in graph form. A maximum of four data units can be displayed at once.
11. Bit Data Display  
This displays bit data in graph form. A maximum of four data units can be displayed at once.
12. Current Execution Status  
This displays the data trace execution status of the CPU in the group number currently displayed.  
    RUN:     Data trace execution underway  
    STOP:    Data trace stop
13. Scale Adjustment Slider  
This adjusts the horizontal amplitude of the trace data displayed in the data display area by dragging the slider. This can also be adjusted by pushing the left and right arrow keys.
14. Scroll Mode Switching  
A check mark here indicates that this function is ON. When the scroll box in the scroll bar of the data display area is dragged, the graph also scrolls according to

the movement of the scroll box. When OFF, the graph does not scroll while the scroll box is dragged, and the graph is re-displayed at completion of dragging.

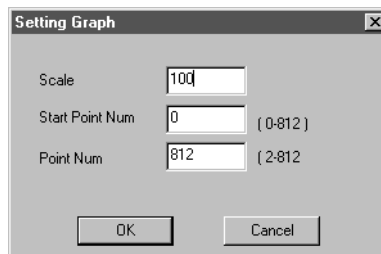
#### 15. Sample Number

This displays the sample number. The display format changes according to the trace time axis. It is possible to display vertical lines in the graph display by selecting the sample number position.

#### 16. Setting Graph Pointer

It is possible to modify the scale and displayed decimals of the currently displayed graph. These changes are made as follows:

- a. Select the **Setting Graph** button.
- b. Input the graph setting data into the dialogue box, and select the **OK** button.



- c. The graph is re-displayed with the contents set in (b).

### ■ Display Data Update

This function displays the newest trace data. See the subsection, “Display Data Update” in item 7.7.8 for instructions to display the newest trace data.

### ■ Manual Stop/Start of Trace

This function manually stops/starts the trace data. See the subsection “Manual Stop/Start of Trace” in item 7.7.8 for instructions to manually stop/start trace.

### ■ Trace Time Axis Change

This function changes the time axis displaying the trace data. See the subsection “Trace Time Change” in item 7.7.8, for instructions to change the trace time box.

### ■ Display Start Sample Number Change

This function displays trace data from a desired sample number. See the subsection “Changing Display Start Sample Number” in item 7.7.8, for instructions to change sample numbers.

## ■ Read Data Number Change

This function changes the data number reading the trace data. See the subsection “Changing Read Data Number” in item 7.7.8, for instructions to change read data numbers.

### 7.7.10 Closing Data Trace Definition

End data trace processing by closing the data trace window. To close the data trace window, select **Close (C)** from **File (F)** in the data trace menu.

## 7.8 Fault Monitor Data

The MotionSuite™ series machine controllers are equipped with a fault tracing function. Fault relays, fault levels, and failure names are defined in the fault monitor definition window. The fault relays defined here display faults when the unit is in the ON state.

### 7.8.1 Structure of the Fault Monitor Window

Information on the fault monitor window menus and tabs appears below.

#### ■ Structure of the Fault Monitor Window Menu

See Item 7.1.3, “Definition Screen Call-out” before opening the fault monitor window. Table 19 shows the menus displayed in the fault monitor definition window. See the item numbers shown in Table 19 when referring to any of the functions in the menu.

**Table 19: Fault Monitor Definition Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes the fault monitor definition window	7.8.9
Regist User Menu (U)	Registers user menu	—
Save (S)	Saves fault monitor definition data	7.8.7
Delete (D)	Deletes fault monitor definition data	7.8.8
Print (P)	Prints document	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
Edit (E)		
Insert (I)	Inserts blank row	7.8.2
Delete (D)	Deletes a number of connected rows	7.8.2
Cut (T)	Cuts row data	7.8.2
Copy (C)	Copies row data to cut buffer	7.8.2
Paste (P)	Copies contents of cut buffer	7.8.2
Comment (K)	Sets comments into failure names	7.8.2
Status (S)		
Confirm (C)	Confirm status	—
Reset (R)	Reset status	—
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Next Page (N)	Displays next tab page	7.8.1
Back Page (N)	Displays previous tab page	7.8.1
Window (W)		

**Table 19: Fault Monitor Definition Window Menu (Continued)**

Menu	Function	Item No.
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

## ■ Fault Monitor Window Tabs

The fault monitor definition window consists of the following five tabs: Failures, Annunciator, Status, Current, and Trace.

**Table 20: Fault Monitor Definition Window Tabs**

Tab Name	Function	Ref. Item
Failures	Defined data used in fault monitoring	7.8.2
Annunciator	Defines annunciator signals	7.8.3
Status	Displays fault occurrence status	7.8.4
Current	Displays fault presently occurring	7.8.5
Trace	Displays current and past fault occurrence status	7.8.6

### Helpful Hint

It is possible to move the tab pages in the following order upon selecting **Next Page (N)** from **View (V)** in the Failures menu.

Failures→Annunciator→Status→Current→Trace→Failures.

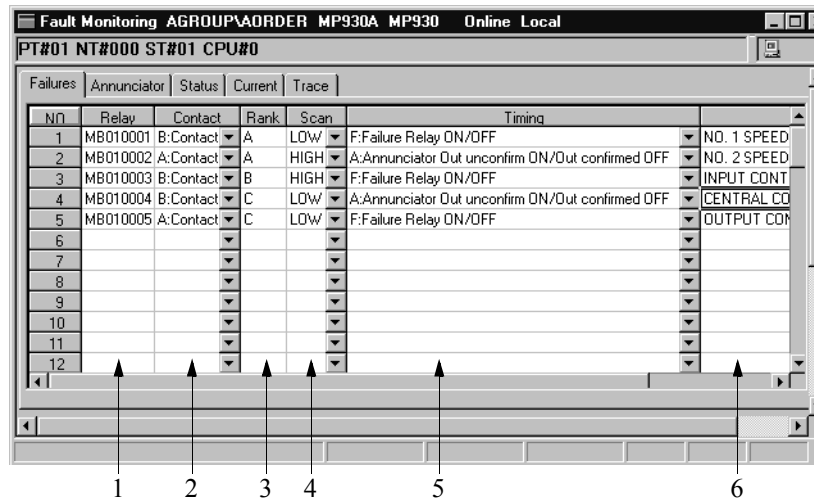
To move the pages in reverse order, select **Back Page (P)** from **View (V)** in the Failures menu.

## 7.8.2 Failures

This item discusses the input and editing of Failures data.

### ■ Setting of Fault Configuration Data

The following screen is displayed upon opening the fault monitor window and clicking the Failures tab.



Input the configuration data. The number of fault points of the Failures data that can be defined differs according to the type of PLC.

1. Relay  
Input the relay number (bit register number). The types of registers that can be input are S, I, O, and M.
2. Contact  
Select A Contact when a fault detected with the Fault relay input into the Relay box is in the ON state, and B Contact when a fault is detected with the Fault relay input into the Relay box is in the OFF state.
3. Rank  
Input a single character for the fault rank. As the rank is a comment, it has no effect on Relay processing. The rank can be freely determined by the user.
4. Scan  
Select the type of Relay scan.
  - HIGH: High-speed processing scan
  - LOW: Low-speed processing scan
5. Timing  
Select the fault trace timing.
  - F: Switches the fault relay ON/OFF  
This designates a normal fault trace. Fault occurrence/Recovery processing is executed at the point in time when the Fault relay goes ON/OFF.
  - A: Annunciator Unconfirmed Output ON/Confirmed Output OFF  
This designates a fault in which the annunciator was used. Fault occurrence/Recovery processing is executed when the unconfirmed output goes ON/OFF.



## 6. Failure Name

Input a failure name of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.

### ■ Editing of Fault Configuration Data

Input fault configuration data can be edited in row units.

## a. Insert Row

This function inputs a desired number of blank rows into the table.

- a.1 Drag the cursor from the point where rows are to be inserted for the amount of rows to be inserted.

NΠ	Relay	Contact	Rank	Scan	Timing	
1	MB010001	B:Contact	A	LOW	F:Failure Relay ON/OFF	NO. 1 SPEED
2	MB010002	A:Contact	A	HIGH	A:Annunciator Out unconfirm ON/Out confirmed OFF	NO. 2 SPEED
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
4	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
5	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
6						

- a.2 Select **Insert (I)** from **Edit (E)** in the Failures menu.

- a.3 Select the **Yes** button in message box.

- a.4 Blank rows are inserted in front of the position selected in (a.1).

NΠ	Relay	Contact	Rank	Scan	Timing	
1						
2						
3	MB010001	B:Contact	A	LOW	F:Failure Relay ON/OFF	NO. 1 SPEED
4	MB010002	A:Contact	A	HIGH	A:Annunciator Out unconfirm ON/Out confirmed OFF	NO. 2 SPEED
5	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
6	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
7	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
8						

## b. Delete Rows

This function deletes a number of connected rows in the table.

- b.1 Drag the cursor from the point where rows are to be deleted up to the end line of the deletion.

NΠ	Relay	Contact	Rank	Scan	Timing	
1	MB010001	B:Contact	A	LOW	F:Failure Relay ON/OFF	NO. 1 SPEED
2	MB010002	A:Contact	A	HIGH	A:Annunciator Out unconfirm ON/Out confirmed OFF	NO. 2 SPEED
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
4	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
5	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
6						

- b.2 Select **Delete (D)** from **Edit (E)** in the Failures menu.

- b.3 Select the **Yes** button in the message box.

- b.4 The rows selected in (b.1) are deleted.

NΠ	Relay	Contact	Rank	Scan	Timing	
1	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
2	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
3	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
4						

## c. Cutting of Row Data

This function cuts a number of connected rows in the table. The cut data is copied into the cut buffer. The contents of the cut buffer can be repeatedly copied using the Paste function.

- c.1 Drag the cursor across the rows to be cut.

NO	Relay	Contact	Rank	Scan	Timing	
1	MB010001	B:Contact	A	LOW	F:Failure Relay ON/OFF	NO. 1 SPEED
2	MB010002	A:Contact	A	HIGH	A:Annunciator Out unconfirm ON/Out confirmed OFF	NO. 2 SPEED
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
4	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
5	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
6						

- c.2 Select **Cut (T)** from **Edit (E)** in the Failures menu.  
 c.3 Select the **Yes** button in the message box.  
 c.4 The rows selected in (c.1) are cut.

NO	Relay	Contact	Rank	Scan	Timing	
1						
2						
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
4	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
5	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
6						

- d. Copying Row Data

This function copies a number of connected rows into the cut buffer. The contents of the cut buffer can be repeatedly copied using the Paste function.

- d.1 Drag the cursor across the row to be copied.

NO	Relay	Contact	Rank	Scan	Timing	
1	MB010001	B:Contact	A	LOW	F:Failure Relay ON/OFF	NO. 1 SPEED
2	MB010002	A:Contact	A	HIGH	A:Annunciator Out unconfirm ON/Out confirmed OFF	NO. 2 SPEED
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
4	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
5	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
6						

- d.2 Select **Copy (C)** from **Edit (E)** in the Failures menu.  
 d.3 The rows selected in (d.1) are copied.

- e. Pasting of Row Data

This function pastes (overwrites) the contents of the cut buffer in the table. Row data to be copied is put into the cut buffer by either the Cut function or Paste function. The contents of the cut buffer are held in memory and can therefore be copied repeatedly into the table until the next Cut or Copy operation.

- e.1 Move the cursor to the position where the row data is to be pasted.

NO	Relay	Contact	Rank	Scan	Timing	
1						
2						
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
4	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
5	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
6						

- e.2 Select **Paste (P)** from **Edit (E)** in the Failures menu.  
 e.3 Select the **Yes** button in message box.  
 e.4 The contents of the cut buffer are copied into the position designated in (e.1).

NO	Relay	Contact	Rank	Scan	Timing	
1	MB010001	B:Contact	A	LOW	F:Failure Relay ON/OFF	NO. 1 SPEED
2	MB010002	A:Contact	A	HIGH	A:Annunciator Out unconfirm ON/Out confirmed OFF	NO. 2 SPEED
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT
4	MB010004	B:Contact	C	LOW	A:Annunciator Out unconfirm ON/Out confirmed OFF	CENTRAL CO
5	MB010005	A:Contact	C	LOW	F:Failure Relay ON/OFF	OUTPUT CO
6						

f. Comment Input

This function reads register comment data edited during main program creation, and sets it into the Failure Name box.

f.1 Move the cursor to the Failure Name box of the relay for which comment data is to be read out.

№	Relay	Contact	Rank	Scan	Timing	
1	MB010001	B:Contact	A	LOW	F:Failure Relay ON/OFF	NO. 1 SPEED
2	MB010002	A:Contact	A	HIGH	A:Annunciator Out unconfirm ON/Out confirmed OFF	NO. 2 SPEED
3	MB010003	B:Contact	B	HIGH	F:Failure Relay ON/OFF	INPUT CONT

f.2 Select **Comment (K)** from **Edit (E)** in the Failures menu.

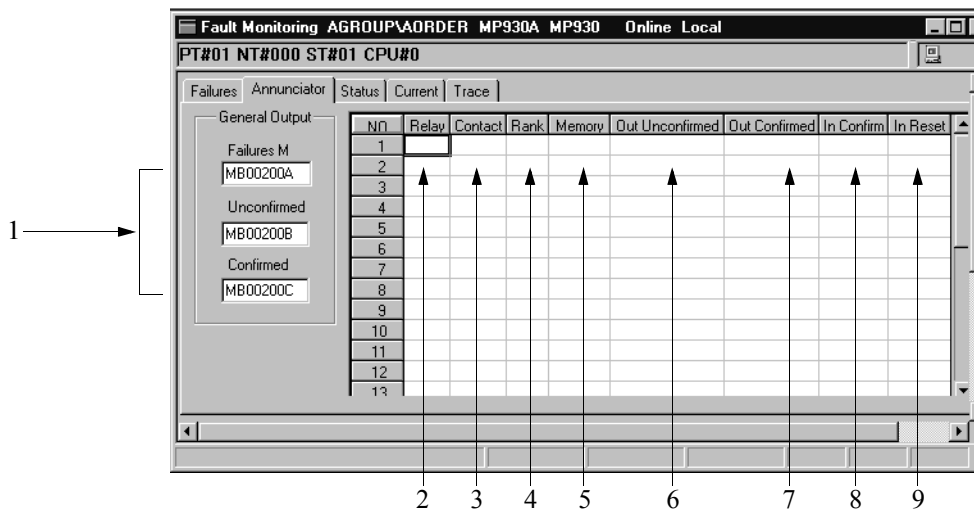
f.3 The register comment data is read out and displayed.

**Note:**

This function cannot be executed if a relay number has not been input into the Relay box, or if no register comments have been created during main program creation. See Item 8.2.9, “Comment Creation” for more details on creating comments.

### 7.8.3 Annunciator Signal Configuration

Input register numbers to create annunciator circuits in the Annunciator tab. The following screen is displayed upon opening the fault monitor window and clicking the Annunciator tab.



1. General Output

Input the general output coil number (fault M output, unconfirmed output, verified output). Input a bit register number for each output coil number. The inputtable register types are O and M registers.

2. Relay

This column displays the fault relay. Fault relays are set in the Failures tab.

3. Contact  
Displays the contact designation. Contact designation is set in the Failures tab.
4. Rank  
This column displays the fault rank. Fault ranks are set in the Failures tab.
5. Memory  
Input the fault memory output coil number. Input a bit register number for each output coil number. The inputtable register types are O and M registers.
6. Unconfirmed Output  
Input the unconfirmed fault output coil number. Input a bit register number for each output coil number. The inputtable register types are O and M registers.
7. Confirmed Output  
Input the confirmed fault output coil number. Input a bit register number for each output coil number. The inputtable register types are O and M registers.
8. Confirmed Input  
Input the confirmed fault input relay number. Input a bit register number for each input relay number. The inputtable register types are S, I, O and M registers.
9. Reset Input  
Input the fault reset input relay number. Input a bit register number for the input relay number. The inputtable register types are the S, I, O, and M registers.

#### 7.8.4 Fault Status

This item deals with the meaning of items in the Status tab.

##### ■ Status

The Status tab shows the current fault occurrence state, and whether said faults are confirmed or unconfirmed. The following screen is displayed upon opening the Fault Monitor window and clicking the Status tab

NO	Relay	Contact	Rank	Scan	Timing	Status	Failure Name
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

1. Relay  
This column displays the fault relay. The fault relay is set in the Failures tab.
2. Contact  
This column displays the contact designation. The contact designation is set in the Failures tab.
3. Rank  
This column displays the fault rank. Rank is set in the Failures tab.
4. Scan  
This column displays the Relay scan. Relay scan is set in the Failures tab.
5. Timing  
This column displays the fault status timing. Timing is set in the Failures tab.
6. Status  
This column displays the status of currently occurring faults.
  - Blank: Shows that no faults have occurred.
  - Unconfirmed: Shows that an unconfirmed error has occurred.
  - Confirmed: Shows that a confirmed error has occurred.
7. Failure Name  
This column displays the failure name. Failure names are set in the Failures tab.

## ■ Fault Confirm and Reset

This function confirms and resets faults.

**Note:**

The results of a fault confirmation and reset are reflected immediately in the PLC.

- a. Fault Confirmation
 

This function confirms unconfirmed faults.

  - a.1 Move the cursor to the fault to be confirmed.
  - a.2 Select **Confirm (E)** from **Status (S)** in the Failures Menu.
  - a.3 Select the **Yes (Y)** button in the message box.
  - a.4 Select the **OK** button in the message box. The Status box changes from “unconfirmed” to “confirmed.”
  
- b. Fault Reset
 

This function resets confirmed faults.

  - b.1 Move the cursor to the fault to be reset.
  - b.2 Select **Reset (R)** from **Status (S)** in the Failures Menu.
  - b.3 Select the **Yes (Y)** button in the message box.
  - b.4 Select the **OK** button in the message box.
  - b.5 The Status box changes from “confirmed” to blank.

**Note:**

Reset is not possible when F (Fault Relay ON/OFF) is defined in the Timing box of the Failures tab.

## 7.8.5 Display of Current Faults

Fault data can be displayed in the Current tab if a fault occurs due to data set in the Failures tab. If a change occurs during application in the fault monitor data, the PLC resets all heretofore fault trace data, and the fault data reflected in the content of the newly defined Failures data is displayed. The items in the Current tab are as follows:

N#	Relay	Contact	Rank	Occurrence	Failure Name
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

1. Relay

This column displays the Fault relay. The fault relay is set in the Failures tab.

2. Contact

This column displays the contact designation. The contact designation is set in the Failures tab.

3. Rank

This column displays the fault rank. Fault ranks are set in the Failures tab.

4. Occurrence

This column displays the time at which a fault occurred.

5. Failure Name

This column displays the failure name. Failure names are set in the Failures tab.

## 7.8.6 Fault Trace

This function displays current fault occurrence states and recovery status for previously occurred faults in the Trace tab. The items in the Trace tab are as follows:

NO	Relay	Contact	Rank	Occurrence	Restoration	Failure Name
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

1. Relay

This column displays the Fault relay. The fault relay is set in the Failures tab.

2. Contact

This column displays the contact designation. The contact designation is set in the Failures tab.

3. Rank

This column displays the fault ranks. Fault ranks are set in the Failures tab.

4. Occurrence

This column displays the time at which a fault occurred.

5. Restoration

This column displays the time at which a fault recovered. Faults not displaying a date and time indicate that they are currently not recovered.

6. Failure Name

This column displays the failure name. Failure names are set in the Failures tab.

### 7.8.7 Saving Fault Monitor Data

This function saves fault monitor data. In the on-line mode data is saved into both the PLC and hard drive, and into the hard drive only in the off-line mode. Save fault monitor data as follows:

- a. Select **Save (S)** from **File (F)** in the fault monitor definition menu.
- b. Select the **Yes (Y)** button in the Failures message box.

**Note:**

The error detection message box is displayed when a save fails. Remove the cause of the error, and save again.

### 7.8.8 Deletion Fault Monitor Data

This function deletes fault monitor data. In the on-line mode, fault monitor data is deleted from both the PLC and hard drive, and from the hard drive only in the off-line mode. Delete fault monitor data as follows:

- a. Select **Delete (D)** from **File (F)** in the fault monitor definition menu.
- b. Select the **Yes (Y)** button in the Failures message box.
- c. All the fault monitor data is deleted.

### 7.8.9 Closing Fault Monitor Data

Setting/display processing of the fault monitor data is closed by closing the fault monitor window. To close the fault monitor window, select **Close (C)** from **File (F)** in the fault monitor menu.



## 8 Ladder Programming

This chapter explains the methods for creating ladder programs.

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## 8.1 Property Settings

This section deals with the setting methods for ladder program comments, # register numbers, history updates, etc.

### 8.1.1 Configuration of the Property Window

Menus and page tabs in the property window are discussed below.

#### ■ Opening the Property Window

Open the property window as described below. This calls up the property data stored in the PLC if in the on-line mode, and on the hard disk if in the off-line mode.

- a. First, as the properties are set into the programs, see which programs are applicable to this setting by referring to item 8.2.1.
- b. Select **Open (O)**, **Drawings (R)**, and **Property (R)** from the **File (F)** menu.
- c. The property window for the programs opened in (a.) are displayed.

#### Supplement:

Properties are set into the main program of open source drawing or function . Therefore, when properties for another drawing or function are set, it is necessary to open the main program for it.

#### ■ Configuration of Property Window Menus

The program menu displayed in the property window is the same as that for the ladder program window. See Item 8.2.1 “Configuration of Ladder Program Window”.

#### ■ Property Window Page Tabs

The tab controls for the property window differ for drawing programs and function programs. The item numbers in the right-hand columns of tables 1 and 2 refer to sections of the MotionSuite™ Series Machine Controller Software Manual.

**Table 1: Drawing Property Window Tab Control**

Tab Name	Function	Item Number
DWG Configuration	Defines ladder program structure data	8.1.2
Symbol Definition	Defies drawing program symbols	8.1.4
# Register List	Sets ladder program registers	8.1.5
Update History	Displays ladder update history	8.1.6

**Table 2: Function Property Window Tab Control**

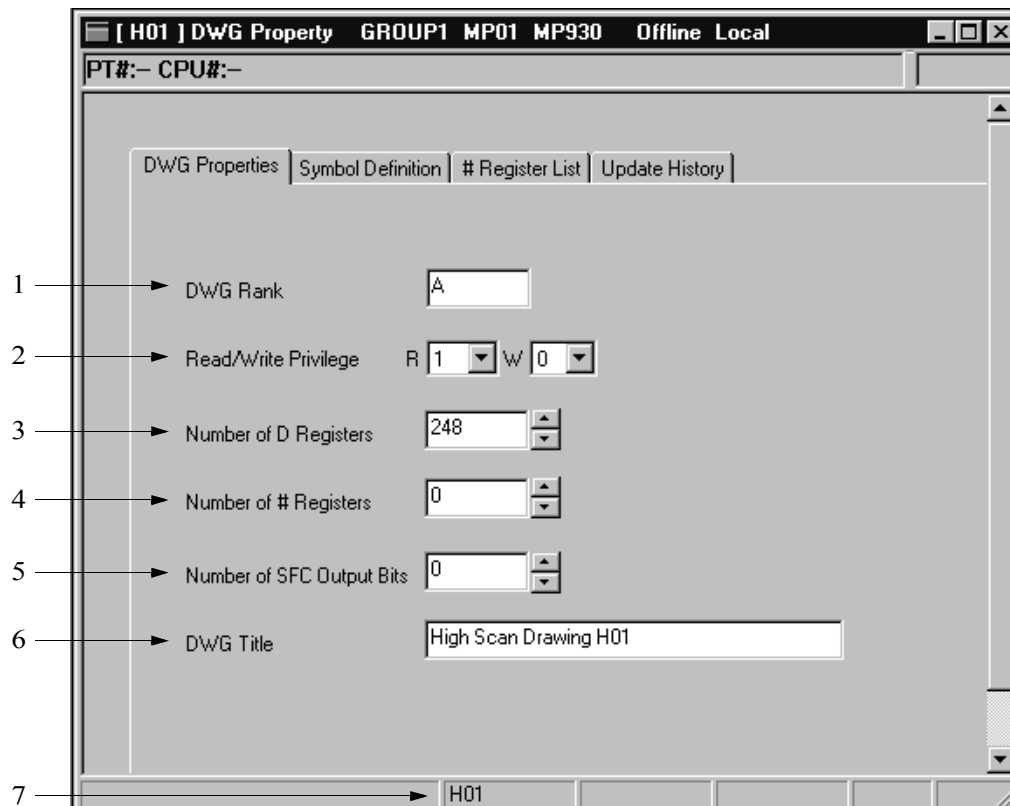
Tab Name	Function	Item Number
Func Configuration	Defines function program structure data	8.1.2
I/O Definition	Defines function I/O	8.1.3
Symbol Definition	Defies drawing program symbols	8.1.4
# Register List	Sets ladder program registers	8.1.5
Update History	Displays ladder update history	8.1.6

**Helpful Hint**

By selecting **Next Page (N)** from the **View (V)** menu, it is possible to shift the tab control pages from “DWG Configuration” on the far left to those on the right. To shift the pages from right to left, select **Back Page (P)** from the **View (V)** menu.

**8.1.2 Definition of Structural Data**

The following screen is displayed upon clicking the “DWG Configuration” tab in the property window. Ladder and function program configuration data is defined in this screen.



1. DWG rank  
Input the rank of the ladder or function program as one character. The rank can be freely determined by the user.
2. Privilege Parameter  
Input the read/write privileges for the ladder or function program. The privilege data cannot be set to a value higher than that of the current user. See Section 4.11 “User Management” for details on file privileges.
3. Number of D Registers  
Input the number of D register words when using D registers within a ladder or function program. D register cannot be used within the program if 0 is input. For example, when 10 is input, the D register numbers usable within the program are as follows:

Integers	:	DW00000~DW00009
32-bit Integers	:	DL00000~DL00008
Real Numbers	:	DF00000~DF00008
Bit form	:	DB000000~DB000009F
4. Number of # Registers<sup>1</sup>  
Input the number of # register words when # registers are used within a ladder or function program. If 0 is input, # registers cannot be referred to within a program.
5. Number of SFC Output Bits  
Input the output bits for each SFC step in units of 16 bits (to a maximum of 128 bits) when using an SFC program within a ladder or function program. If 0 is input, this only results in the SFC output bit time chart not being displayed, and has no effect on the operation of the SFC program.
6. DWG Title  
Input a ladder or function program title of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the title. The number of D registers and # register varies depending on the PLC type. Moreover, SFC programs cannot be used by some PLC types. See “MP9XX User Manual, Edition XXX”.
7. Ladder Number/Function Symbol  
Displays the ladder number/function symbol of the program subject to property setting.

**Note:**

The D registers and # registers are merely for storing areas. It follows then, that if a register of a given prefix is used in program creation, it is necessary to create the pro-

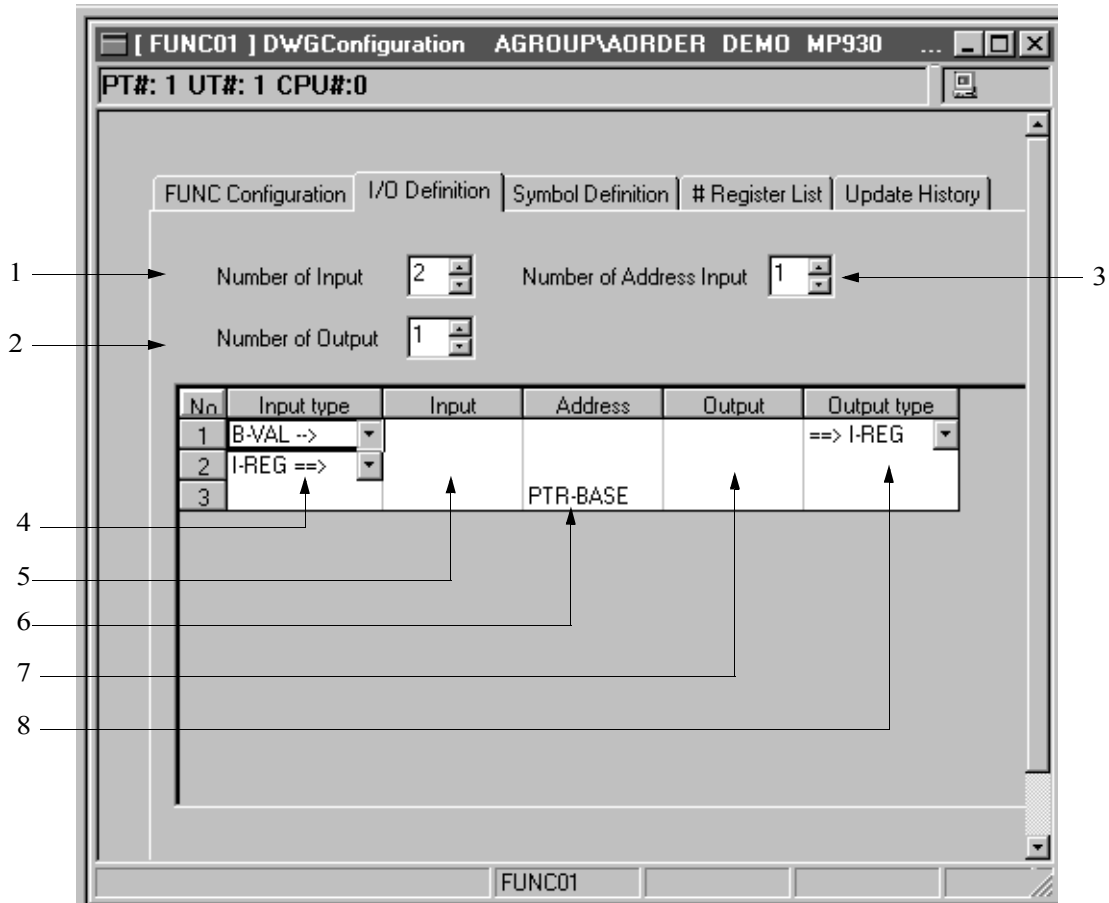
---

1. # registers are called “sharp” registers.

gram so as not to exceed the regions set into the program. An **Operation Error** results if an area is exceeded and a D register or # register is read or written.

### 8.1.3 I/O Definition

When the I/O Definition tab is clicked in the Property window, the following screen is displayed. Define function program I/O in this screen.



1. Number of Function Inputs  
Input the number of function inputs from 1~16.
2. Number of Function Outputs  
Input the number of function outputs from 1~16.
3. Number of Address Inputs  
1 if addresses are to be input, 0 if not.

4. Input Type  
Select one of the following function input data types.

Item	Data Type
B-VAL	Bit
I-VAL	Integer
I-REG	
L-VAL	32-bit Integer
LREG	
F-VAL	Real Number
F-REG	

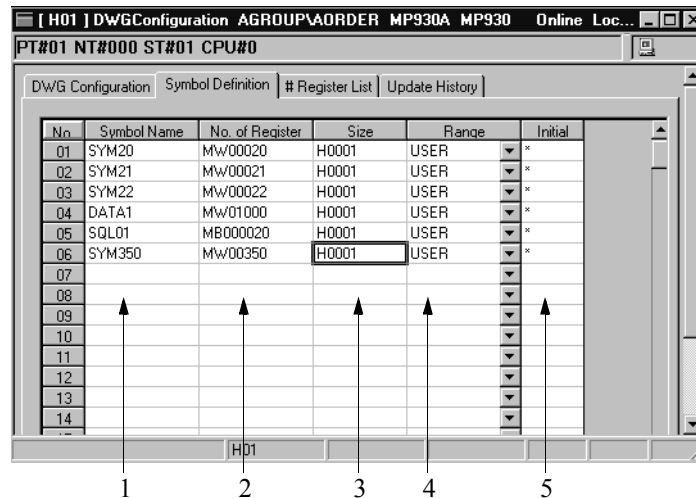
5. Input Comment  
Input 8 16-bit characters or less of function input data comments.
6. Address Comment  
Input 8 16-bit characters or less of function address data comments.
7. Output Comment  
Input 8 16-bit characters or less of function output data comments.
8. Output Type  
Select the function output data type.

### 8.1.4 Symbol Definition

This item includes information on symbol definition and symbol editing methods.

#### ■ Setting of Symbol Definition Data

The following screen is displayed upon clicking the “Symbol Definition” tab in the Property Window. In this screen, define data necessary during symbol input into the operands in the program window.



1. Symbol Name

Input a symbol name of 8 16-bit characters or less. This symbol is displayed during operand input in the program window. The first character in a symbol name cannot be a number, -, or \_. Symbols beginning with the character \$ are either symbols defined in MotionWorks™, or are called automatic symbols as they are automatically allocated by MotionWorks™. Automatic Symbols are displayed as follows:

\$AUTOxxx (xxx is a number starting from 001)

Ladder and function programs cannot be saved when there are automatic symbols remaining. Change automatic symbols to another symbol name.

2. Register Number

Input the register number defining the symbol. Input a symbol without inputting a register number during operand input in the program window to display the corresponding register number.

3. Size

Input the amount of data to be obtained by the symbol. The default setting is 1. The data input here is displayed in hexadecimal form. Attach an “H” to the start of a number when inputting hexadecimals. This data is enabled during autonumbering of a register defined to a symbol. For example, when autonumbering is executed at size 1 for MW00001, the next symbol becomes MW00002, and a one word size is allocated from MW00001 on. If autonumbering is executed at size 2 for MW00001, the next symbol becomes MW00003, and a two word size is allocated from MW00001 on. See “Symbol Autonumbering” in this item for how to autonumber.

4. Range

Input the symbol range.

- |       |  |
|-------|--|
| Auto: | Shows the symbols to be autonumbered (when allocated by MotionWorks™)  |
| MTBL: | Shows the symbols subject to upper level linkage. It is possible to execute upper level linkage using the upper level linkage function, and set the same symbol definition data for each type of scan. |
| User: | Shows user-defined symbols (if the register numbers have been allocated by the user).  |

5. Initial

This data is disabled in the current version.

**Note:**

The maximum number of symbol definitions varies by PLC type.



## ■ Symbol Editing

Input symbols can be edited in row units.

### 1. Symbol Deletion

When a symbol name has been changed in the program window, the symbol name prior to the change remains and is not deleted. Such unnecessary symbols should be deleted. Symbol deletion cannot be done in the program window. It must be done using the menu bar

- a. Move the cursor to the symbol to be deleted.

No.	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1	MB000001	H0001	USER	*
02	DATA2	MB000002	H0001	USER	*
03	DATA3	MB000003	H0001	USER	*
04					

- b. Select **DEL (D)** from **Edit (E)** in the program menu.
- c. The row selected in (a.) is deleted.

No.	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1	MB000001	H0001	USER	*
02	DATA3	MB000003	H0001	USER	*
03					
04					

### 2. Symbol Order Change

Symbols can be switched to display in alphabetical order.

- a. Select **Sort (S)** from the **View (V)** menu.
- b. The symbol display is changed to alphabetical order.

## ■ Symbol Aut numbering

All symbols in the “AUTO” symbol range are automatically allocated to a desired register number. The symbol definitions are displayed as shown below when the Symbol Definition tab is called up if a symbol name to which no register number has been allocated (undefined symbol) is input.

No.	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1		H0001	AUTO	*
02	DATA2		H0001	AUTO	*
03	DATA3		H0001	AUTO	*
04					

Normally, the autonumbering function operates with the symbol range in the “AUTO” state. However, if a register number is already set in the Register Number box (if autonumbering has been executed once, the register number was manually input, etc.), it is not be subject to autonumbering even if “AUTO” is displayed in the Range box for that symbol.

## 1. D Register and M Register Autonumbering

This procedure automatically allocates a symbol from a desired D or M register number.

- a. Input the symbol definition data to be autonumbered in the manner shown below.

No.	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1	Dw	H0001	AUTO	*
02	DATA2	MF	H0001	AUTO	*
03	DATA3	Mw	H0001	AUTO	*
04					

- b. Select **Auto Number (A)** and **D, M (I)** from the **Data (D)** menu.
- c. Input the starting register number into the dialog box, and select the **Set** button.

- d. The Register is Autonumbered and Displayed  
 The data size of DATA1, which is in the D register in integer form, is 1. The data size of DATA 2, which is in the M register in real number form, is 1. The data size of DATA 3, which is in the M register in integer form, is 1. Therefore, DW00000, MF00002, and MW00001 result when autonumbering is executed with the first number of the D register being 0, and the first number of the M register being 1.

No.	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1	Dw00000	H0001	AUTO	*
02	DATA2	MF00002	H0001	AUTO	*
03	DATA3	Mw00001	H0001	AUTO	*
04					

### Note:

In (a), input up to register type in the Register Number box. The Register Number box input can be omitted if symbol input mode operands have been input into the program window. In the Size box, input a numerical value in decimal form (word units if word data, bit units if bit data) corresponding to the register type. Input AUTO into the Range box. If execution is done without inputting anything, the result is the same as if DW were input. The autonumbering procedure is bit→integer→double length integer→real number.

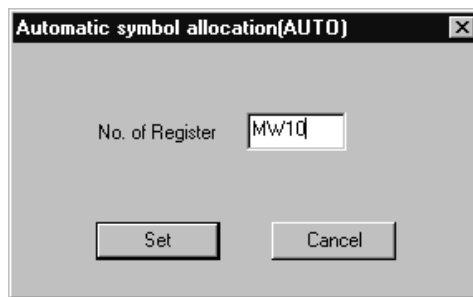
## 2. Autonumbering All Registers

This procedure automatically allocates a symbol from a desired S, I, O, M, D, C or # register number.

- a. Input the symbol definition data to be autonumbered in the manner shown below.

Nn	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1	MW	H0002	AUTO	*
02	DATA2	MF	H0001	AUTO	*
03	DATA3	MW	H0001	AUTO	*
04	DATA4	MW	H0001	AUTO	*
05					

- b. Select **Auto Number (A)** and **AUTO** from the **Data (D)** menu.
- c. Input the starting register number into the dialog box, and select the **Set** button.



- d. The Register is Autonumbered and Displayed  
The size of DATA1 is set to 2 words. The size of DATA 3 is set to 1 word. The size of DATA 4 is set to 1 word. Therefore if autonumbering is executed from MW00010, a 2 word size is assumed for DATA 1, and numbered as in MW00010, MW00012, and MW00013.

Nn	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1	Mw00010	H0002	AUTO	*
02	DATA2	MF	H0001	AUTO	*
03	DATA3	Mw00012	H0001	AUTO	*
04	DATA4	Mw00013	H0001	AUTO	*
05					

### Note:

In (a), input up to register type in the Register Number box. The Register Number box input can be omitted if symbol input mode operands have been input into the program window. In the Size box, input a numerical value in decimal form (word units if word data, bit units if bit data) corresponding to the register type. Input AUTO into the Range box.

### ■ Upper Level Symbol Link

Symbol data is only enabled within the ladder or function program in which the symbol is defined. Therefore, it is possible to define the same symbol in a different ladder/function program at a different register number. The upper level symbol link is a function which defines symbols in such a way that identical symbol names are correlated

with identical register numbers within a single scanned ladder drawing. If the ladder program for which this function is executed is a sub-ladder, then the symbols of the parent ladder are scanned, and the register numbers determined. At this time it is necessary to define the symbols subject to upper level link in the source drawing beforehand.

- a. Input the symbol definition data to be upper level linked in the following manner.

No	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1			MTBL	*
02	DATA2			MTBL	*
03	DATA3			MTBL	*
04					

- b. Select **Symbol Link (L)** from the **Data (D)** menu.
- c. Definition data within different drawings of the same type which are in the upper level are scanned, and their contents displayed.

No	Symbol Name	No. of Register	Size	Range	Initial
01	DATA1	Mw00001	H0001	USER	*
02	DATA2	Mw00002	H0001	USER	*
03	DATA3	Mw00003	H0001	USER	*
04					

**Note:**

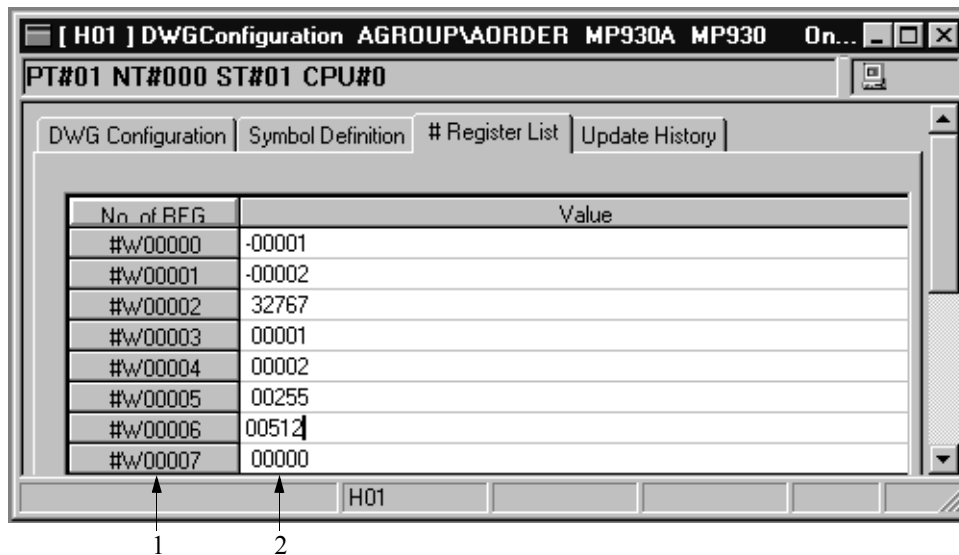
In (a) do not input any data into the Register Number and Size boxes. Input MTBL into the Range box.

### 8.1.5 # Register Lists

This section deals with the methods for setting and modifying # register values.

#### ■ Setting of # Register Values

The following screen is displayed upon clicking the # Register List tab on the **Property** window. The content of the # register is set in this screen. This function cannot be operated if the # register size in the Configuration Definition tab is set to 0.



1. Register Number  
Displays the # register number.
2. Setting Value  
Input the # register value.

### ■ Modification of # Register Base Values

Modifies the # register display mode (base).

#### 1. Decimal Integer Display

The register values are displayed in decimal form when **Format (C)⇒DEC (D)**.

No. of REG	Value
#w00000	18816
#w00001	18478
#w00002	32767
#w00003	00032
#w00004	04097

#### 2. Hexadecimal Integer Display

In the decimal integer display mode, the register numbers are displayed in hexadecimal if **Format (C)⇒HEX (H)** is selected from the **Data (D)** menu.

No. of REG	Value
#w00000	4980
#w00001	482E
#w00002	7FFF
#w00003	0020
#w00004	1001

### 3. Real Number Display

Registers are displayed in real numbers if **Format (C)⇒FLOAT (F)** is selected from the **Data (D)** program menu.

No. of RFG	Value
#F00000	1.784700E+005
#F00002	0.000000E+000
#F00004	2.342379E-038
#F00006	0.000000E+000

### 4. Decimal 32-bit Integer Display

Registers are displayed as 32-bit integers if **Display Format (C)⇒LONG (B)** is selected from the **Data (D)** program menu.

No. of RFG	Value
#L00000	1210993024
#L00002	0002129919
#L00004	0016715777
#L00006	0000000512

### 5. Binary Integer Display

Registers are displayed in binary values if **Display Format (C)⇒BIN (B)** is selected from the **Data (D)** program menu.

No. of RFG	Value
#W00000	0100 1001 1000 0000
#W00001	0100 1000 0010 1110
#W00002	0111 1111 1111 1111
#W00003	0000 0000 0010 0000
#W00004	0001 0000 0000 0001

### 6. ASCII Display

Registers are converted to ASCII characters and displayed if **Display Format (C)⇒ASCII (A)** is selected from the **Data (D)** program menu.

No. of RFG	Value
#W00000	AB CD EF GH IJ

#### Note:

Indeterminate data is displayed if registers that cannot be displayed in ASCII format are displayed in ASCII format.

#### ■ # Register Value Modification

This function changes the # register value. The register value is displayed as 0 ~ 9 in the case of decimals, 0 ~ 9 and A ~ F in the case of hexadecimals, 0 and 1 in the case of binary, and alphanumeric in the case of ASCII. Negative numbers can be displayed if the register value is in decimals.

- a. Move the cursor to the register value to be changed.

No. of RFG	Value
#w00000	16961
#w00001	17475
#w00002	17989
#w00003	18845
#w00004	19017

- b. Input the value.

### ■ Clearing a # Register

This function clears a desired number of connected areas.

- a. Select **Set (S)** from the **Data (D)** menu.
- b. Input the first register number, number to be cleared, and the cleared data, then press the **Set** button.

**Register Data Fill**

First Register Number: #w1

Number of Register: 3

Data to fill: 555

Buttons: Set, Cancel

- c. The parameters are cleared by the data set in (b).

No. of RFG	Value
#w00000	16961
#w00001	00555
#w00002	00555
#w00003	00555
#w00004	19017

## 8.1.6 Update History

This item describes the display and deletion of update history data.

### ■ Update History Display

The following screen is displayed upon clicking the Update History tab. This screen displays the update history data. Ladder and function programs can have a maximum of 10 update history entries per drawing. The update history is displayed starting from the oldest date.

Nn	Date	Time	User Name
01	1997-10-17	15:12:28	USER-A
02	1997-10-17	15:25:36	USER-A
03	1997-10-17	15:26:04	USER-A
04	1997-10-17	15:58:18	USER-A
05	1997-10-17	16:01:34	USER-A
06	1997-10-17	16:06:02	USER-A
07	1997-10-17	16:07:06	USER-A
08	1997-10-17	18:28:42	USER-A

1. Date  
Shows the date at which a ladder or function program was stored.
2. Time  
Shows the time at which a ladder or function program was stored.
3. User Name  
Shows the name of the user who stored a ladder or function program.

### ■ Deleting the Update History

This function deletes update history data. Ladder and function programs can either be deleted as a group or one by one.

1. Group History Deletion  
Deletes all update history data currently displayed.
  - a. Select **ALLDEL (Z)** from the **Edit (E)** menu.
  - b. All the update history data is deleted.



## 2. Partial History Deletion

Deletes a specific item of update history data.

- a. Move the cursor to the update history data to be deleted.

Nn	Date	Time	User Name
01	1997-10-17	15:12:28	USER-A
02	1997-10-17	15:25:36	USER-A
03	1997-10-17	15:26:04	USER-A
04	1997-10-17	15:58:18	USER-A
05	1997-10-17	16:01:34	USER-A
06	1997-10-17	16:06:02	USER-A
07	1997-10-17	16:07:06	USER-A
08	1997-10-17	18:28:42	USER-A
09	1997-10-24	19:46:48	USER-A

- b. Select **DEL (D)** from the **Edit (E)** menu.
- c. The update history data selected in (a) is deleted.

Nn	Date	Time	User Name
01	1997-10-17	15:12:28	USER-A
02	1997-10-17	15:25:36	USER-A
03	1997-10-17	15:26:04	USER-A
04	1997-10-17	15:58:18	USER-A
05	1997-10-17	16:01:34	USER-A
06	1997-10-17	16:06:02	USER-A
07	1997-10-17	16:07:06	USER-A
08	1997-10-17	18:28:42	USER-A
09			

### 8.1.7 Property Data Storage

Property data must be saved at the same time as a ladder or function program. For this reason, execute the **Save (S)** command from the program window of the Drawing Number/Function Symbol in which the properties are set. The data is stored both into the PLC and hard drive in the on-line mode, and into the hard drive in the off-line mode. Store the property data by the following procedure.

- a. Select the **Window (W)** menu, and select the program window for which properties have been set.



- b. Select **Save (S)** from the **File (F)** menu.

- c. Select the **Yes** button in the message box.
- d. Select the **OK** button in the message box.

**Note:**

An error detection message box is displayed if the save fails. Remove the cause of the error, and save again.

## 8.2 Ladder Program Editing

This section includes the creation of drawings and function ladder program (main program) creation.

### 8.2.1 Ladder Program Window Structure

This item describes the configuration of the Ladder Program window.

#### ■ Open Ladder Program Window

The Ladder Program window can be opened from the File Manager or Engineering Manager. Programs may be called up from the PLC in on-line mode, and from the hard drive in off-line mode.

##### Opening New Drawings from the File Manager

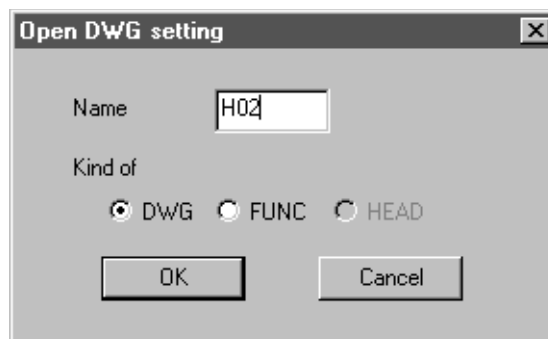
- Place cursor on either Function Programs folder, High Scan Programs folder, Initialization Programs folder, Interrupt Programs folder, or Low Scan Programs folder. Select **Make New DWG (N)** from the **File (F)** menu.
- Enter the drawing name and drawing type, either DWG or FUNC, into the dialog box, then select the **OK** button.
- The program window of the drawing number/function symbol set in (b) opens.

##### Opening Existing Drawings from File Manager

- Point to the drawing number in the tree display.
- Select **Open (O)** and **Main Program (N)** from **File (F)**.
- The program window opens and the selected DWG is displayed.

##### Opening New/Existing Drawing from Engineering Manager

- Select **Open (O)**, **Drawing (R)**, and **Open New DWG (O)** from the **File (F)** program menu.
- Enter the drawing name and type into the dialog box, then select the **OK** button.

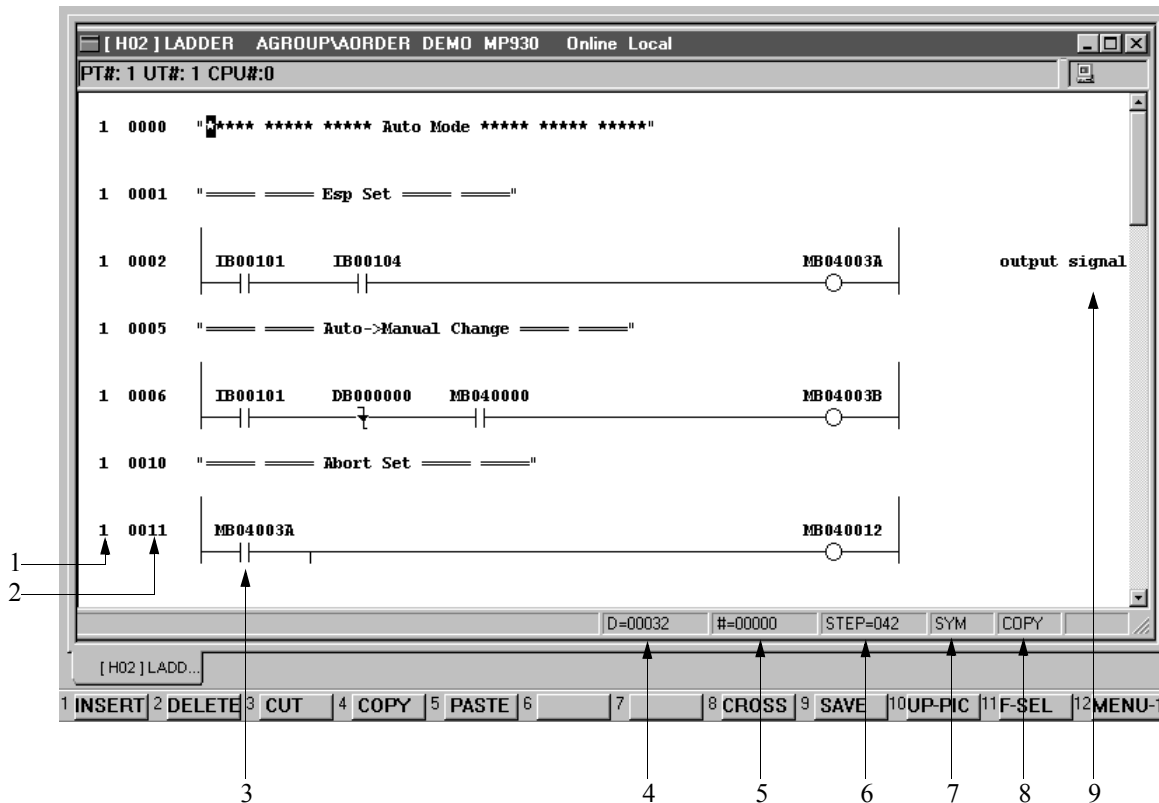


- The program window of the drawing number/function symbol set in (b) opens.

**Note:**

When opening a drawing as a main program, set **DWG** for the drawing type in the dialog box. When opening a function as a main program, set **FUNC** for the drawing type in the dialog box.

The following screen is displayed upon opening the Ladder Program window.



1. Syntax Depth  
Shows the number of levels to which the program syntax extends.
2. Step Number  
Shows the step number of the far left command.
3. Program  
Displays the program executed by the PLC in the case of a drawing, and the user function internal program in the case of a user function. The current value of each operand is concurrently displayed during program execution.
4. Drawing Number  
Shows the drawing number creating the main program.
5. Function Symbol  
Shows the function symbol creating the main program.
6. Step  
Shows the total number of steps for the main program displayed.

## 7. Operand Input Mode

Shows the operand input mode.

ADR : Register Input Mode

SYM : Symbol Input Mode

S-A : Symbol/Register Input Mode

## 8. Edit Mode

Displays the current edit mode during command input or deletion.

CUT : Cut Mode

COPY : Copy Mode

INS : Insertion Mode

DEL : Deletion Mode

## 9. Comments

Shows comments attached to the execution program. See **8.2.9 “Comment Creation”** for the comment creation method.

### ■ Ladder Program Window Menu Configuration

The menus displayed in the program window are shown in Table 3. When referencing any function from the menu, refer to the item number in the right-hand column.

**Table 3: Ladder Program Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens file manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes program windows	8.2.12
Update (U)	Cannot be used in MP9XX	—
Remake Comments (R)	Inserts comments	—
Remake Cross Info (X)	Updates cross data	X.X.X
Save (S)	Saves program.	8.1.4
		8.2.10
Page Setting (M)		
Print (P)	Prints main program	8.2.11
Exit (X)	Exits Engineering Manager	3.4.2

**Table 3: Ladder Program Window Menu (continued)**

Menu	Function	Item No.
Edit (E)		
UNDO (U)	Cannot be used in this version	—
REDO (R)	Cannot be used in this version	—
CUT (X)	Cuts a command and copies it to the cut buffer	8.2.4
COPY (C)	Copies to cut buffer	8.2.4
PASTE (V)	Pastes contents of cut buffer into program	8.2.4
INS (I)	Inserts command	8.2.4
DEL (D)	Deletes commands	8.1.4
		8.2.4
Search (S)		
Search (S)	Cannot be used in this version	—
Next (N)	Cannot be used in this version	—
Replace (Q)		
Individual (I)	Cannot be used in this version	—
All (A)	Cannot be used in this version	—
column Edit (L)		
CUT (X)	Cannot be used in this version	—
COPY (C)	Cannot be used in this version	—
PASTE (V)	Cannot be used in this version	—
INS (I)	Cannot be used in this version	—
DEL (D)	Cannot be used in this version	—
Column Edit (O)		
CUT (X)	Cannot be used in this version	—
COPY (C)	Cannot be used in this version	—
PASTE (V)	Cannot be used in this version	—
INS (I)	Cannot be used in this version	—
DEL (D)	Cannot be used in this version	—
ALLDEL (Z)	Deletes entire update history	8.1.6

**Table 3: Ladder Program Window Menu (continued)**

Menu	Function	Item No.
View (V)		
Input Mode (M)		
Operand (O)	Sets operand input mode	8.2.3
Symbol (S)	Sets symbol input mode	8.2.3
Operand + Symbol	Sets operand + symbol input mode	8.2.3
Normal (R)	Switches to normal display mode	
Large (L)	Switches to enlarged display mode	8.2.2
Sort (O)		
Sort (S)	Cannot be used in this version	—
Return Sort (R)	Cannot be used in this version	—
Comment (C)		
Main Program (L)	Cannot be used in this version	—
SFC Flowchart (S)	Cannot be used in this version	—
SFC Time Chart (T)	Cannot be used in this version	—
SFC Action Box (B)	Cannot be used in this version	—
Symbol (Y)		
Program (P)	Switches to program symbol display mode	8.2.2
Comment (C)	Switches to comment symbol display mode	8.2.2
Tool Bar (T)	Displays tool bars that are available	3.4.3
Status Bar (S)	Displays status bar	3.4.3
Comment Bar (B)	Displays comment bar	8.2.9
Function Bar (F)	Displays function bar	8.2.2
Next Page (N)	Displays next tab control page	8.1.1
Back Page (P)	Displays previous tab control page	8.1.1

**Table 3: Ladder Program Window Menu (continued)**

Menu	Function	Item No.
<b>Data (D)</b>		
Set (S)	Clears a register value at a set numerical value	8.1.5
ON (N)	Cannot be used in this version	—
OFF (F)	Cannot be used in this version	—
<b>Format (C)</b>		
DEC (D)	Displays a register in decimals	8.1.5
HEX (H)	Displays a register in hexadecimals	8.1.5
FLOAT (F)	Displays a register in real numbers	8.1.5
LONG (L)	Displays a register in 32-bit integers	8.1.5
BIN (B)	Displays a register in binary form	8.1.5
ASCII (A)	Displays a register in ASCII characters	8.1.5
<b>Autonumbering (A)</b>		
AUTO (A)	Executes automatic numbering of all registers	8.1.4
D, M (I)	Executes automatic numbering of D and M registers	8.1.4
Symbol Link (L)	Executes upper level symbol link	8.1.4
Set Top Register (R)	Cannot be used in this version	—
<b>Command (C)</b>		
RELAY (R)	Displays list of available commands	8.2.3
ART (A)		8.2.5
LOGIC (L)		
CONTROL (C)	Displays list of available commands	8.2.3
FUNCTION (F)		8.2.5
MOVE (M)		
DDC (D)		
TABLE (T)		
MOTION (M)		
SFC (S)		
<b>Debug (G)</b>		
SYNC (S)	Synchronous adoption of present value	8.2.8
HOLD (H)	Temporarily stops the currently adopted value	8.2.8
DIS-ON (N)	Designates coil command disable ON	8.2.6
DIS-OFF (F)	Designates coil command disable OFF	8.2.6
ENABLE (E)	Releases coil command disable designation	8.2.6
REFER (R)	Opens reference program window	8.2.7
BACK (B)	Displays programs opened by REFER	8.2.7



**Table 3: Ladder Program Window Menu (continued)**

Menu	Function	Item No.
Cursor (S)		
Jump to Head (T)	Cannot be used in this version	—
Jump to End (B)	Cannot be used in this version	—
Jump to Line (L)	Moves cursor to desired step number	8.2.7
Step Jump (S)	Cannot be used in this version	—
Move to Left and Right (C)	Cannot be used in this version	—
Move to Up and Down (R)	Cannot be used in this version	—
No Move (N)	Cannot be used in this version	—
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons.	3.4.4
Help (H)		
About App. (A)	Displays version data.	3.4.5

## 8.2.2 Display Mode Switching

The methods for switching the various display modes necessary in program creation and editing are described below.

### ■ Program Display Mode Switching

The Normal Display Mode displays standard size characters, and the Large Display Mode displays larger characters. The Normal Display Mode appears when the program window is first opened. Switch to the large display mode by selecting **Large (L)** from the **View (V)** menu.

### ■ Symbol Display Mode Switching

There are two modes for displaying symbols (comments) in the program window: the Comment Mode in which symbols created by the comment creation function are displayed, and the Program Display Mode, in which symbols created by symbol definition are displayed. The Comment Mode appears when the program window is first opened. For the Program Mode, select **Symbol (Y)** and **Program (P)** from the **View (V)** menu. Switch to the Comment Mode by selecting **Symbol (Y)** and **Comment (C)** from the **View (V)** menu.

### ■ Function Bar Display Mode Switching

Displaying the function bar and pressing the function keys therein is the same as selecting the commands within the program menu. Switch the function bar ON and OFF by selecting **Function Bar (F)** from the **View (V)** menu. The function keys do not function if the function bar is not displayed.

### 8.2.3 Command Input

Command input and edit methods are described in this item.

#### ■ Command Selection

Commands may be input using the following three methods. Furthermore, some commands can be used by PLC devices and some cannot. For details on each command, see the MotionSuite™ Series Machine Controller Ladder Programming Manual.

##### 1. Command Selection from Shortcut Commands

Easy command selection is possible by inputting keywords (shortcut commands) for command input from the keyboard, and pressing the Enter key, thus eliminating the need to search for a command within the pull-down menus or function bar.

For example, below is a description of the selection method for the normally open (NO) contact command (-| |-).

- a. Input **J|**, which is the shortcut command for the normally open (NO) contact command, and press the Enter key.

J|

- b. The normally open (NO) contact command is displayed

1 0000 | | |

##### 2. Command Selection from Program Menu.

Pull down the **Command** menu and select commands. For example, below is a description of the selection method for the normally open (NO) contact command (-| |-).

- a. Select **RELAY (R)** ⇒ **A Relay (A)** (for normally open contact) from the **Command (C)** menu.

Command[C]	
RELAY[R]	A Relay[A]
ART[A]	B Relay[B]
LOGIC[L]	Branch[I]
CONTROL[C]	Join[J]

- b. The normally open (NO) contact command is displayed.

### 3. Command Selection from Function Bar

Select the commands displayed on the function bar using the function keys. For example, below is a description of the selection method for the normally open (NO) contact command (-| |-).

- a. Press the **F12** (menu-1) key until the **F1** (relay) function key is displayed, and press **F11** (f-sel) on the function bar.
- b. Press the **F1** key and select -| |- on the function bar.
- c. The normally open (NO) contact command is displayed.

#### Note:

This function is enabled when the function bar is displayed. See item 8.2.2 “Display Mode Switching” for function bar display instructions.

### ■ Operand Input

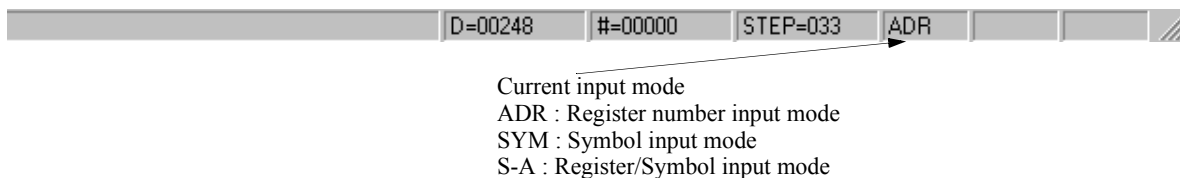
There are four operand input methods: Input by register number, by symbol, by register/symbol, and by parameter.

#### Terminology

An operand is data (symbols, register numbers, parameters) necessary to a command.

#### 1. Input Mode Switching

This function switches the operand input from “Operand Input Mode,” “Symbol Input Mode,” to “Operand+symbol Input Mode,” in that order. The current input mode appears in the lower part of the window as shown in the figure below.




The register number input mode is active when the program window is first displayed. Switch the input mode by selecting any of **Input Mode (M) ⇒ Operand (O)**, **Input Mode (M) ⇒ Symbol (S)**, or **Input Mode (M) ⇒ Operand+Symbol (D)** from the **View (V)** menu.

#### 2. Input by Register Number

When inputting the register number only, the cursor does not move to the symbol input position.

- a. Set operand input mode.

- b. Select command. The cursor is displayed at the register number input position.



- c. Input register number.

**Note:**

When the register number input in (c) is symbol defined by a property window (symbol definition) tab, symbols corresponding to the register number simultaneously appear.

## 3. Input by Symbol

When inputting the symbol only, the cursor does not move to the register number input position.

- a. Set symbol input mode.
- b. Select commands. The cursor is displayed at the symbol input position.



- c. Input the symbol.

**Note:**

If the symbols input in (c) are defined by the “Symbol Definition” tab in the property window, register numbers corresponding to the symbol simultaneously appear. See item 8.1.4 “Symbol Definition” for inputtable symbols.

## 4. Symbol/Register Input

This function inputs both symbols and register numbers. In this case, symbol definition can be automatically executed without defining the symbols with the Symbol Definition tab in the property window.

- a. Set Operand + Symbol input mode.
- b. Select commands. The cursor is displayed at the symbol input position.



- c. Input the symbol. The cursor then appears at the register number input position.

- d. Input the register number.



**Note:**

See item 8.1.4 “Symbol Definition” for inputtable symbols.

5. Input by parameters

- a. Input a parameter. Parameters are either in decimal (integer, 32-bit integer, real number) or hexadecimal (integer, 32-bit integer) form. Set the input mode to Operand input.
- b. Select the command. The cursor appears at the parameter input position.
- c. Input the parameter.

**Supplement:**

Parameter input format

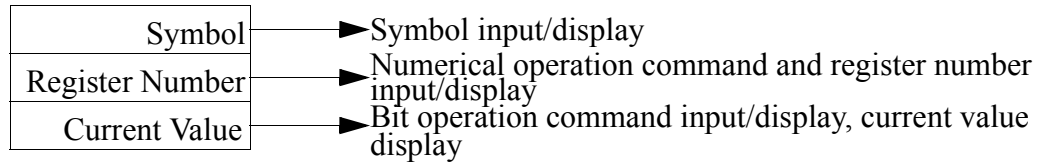
The formats during parameter input are displayed in the following chart.

	Input Value	Screen Display	Input Example	Description
Decimals	Integer	00100	100	Uses '0'~'9'. Input '-' to the head of the load amount.
	32-bit Integers	0000010000	10000L	Uses '0'~'9'. Input 'L' to the end of the value. Input '-' to the head of the load amount. 32-bit integers are automatic if 'L' is not input when “Input value > 32767” or “Input value < -32768”.
	Real Numbers	100.1E	100.1E	Uses '0'~'9'. Input 'E' to the end of the value. Input '-' to the head of the load amount. Real numbers are automatic if '.' is included in the input value, even if 'E' is input.
Hex	Integers	H32FF	H32FF	Input 'H' to the head of the value. Uses '0'~'9' and 'A'~'F'.
	32-bit Integers	H000032FF	H32FFL	Input 'H' to the head of the value. Uses '0'~'9' and 'A'~'F'. Input 'L' to the end of the value. 32-bit integers are automatic even if 'L' is not input if the input value is 4 places or higher.

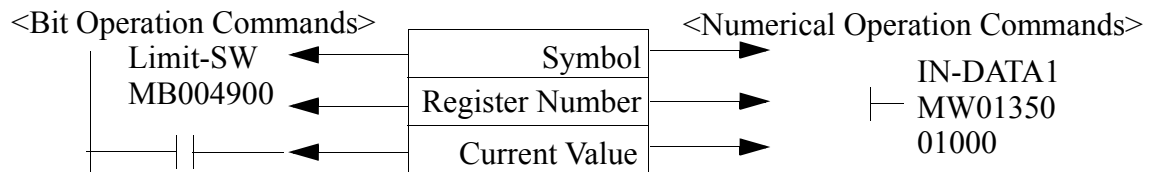
## ■ Command Input

### 1. Command Structure

Commands are configured as shown in the figure below.



The current value of the bit operation command is displayed in boldface if the bit operation conditions have been established as shown in the figure below, and normal type if not so established. Register values are displayed for numerical operation commands. Current values are displayed only in the on-line operation mode.



### 2. Input of Numerical Operations, Logical Operations, and Comparative Commands

Upon pushing the Enter key after inputting numerical operations, logical operations, and comparative commands, the cursor should, in principle, move to the right.

When, following a storage command, it is no longer possible to enter commands due to the limits of window size, the cursor moves to the far left of the next column. The following program input example is given.



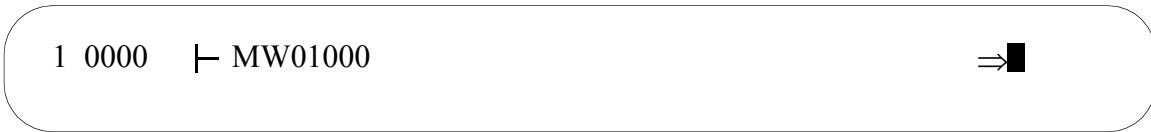
a. Select the Integer Values command



b. Input the register number



c. Select the storage command



d. Input the register number



### 3. Conditional Command Input

Dedicated commands have not been provided for the purpose of conditional commands. When creating conditional commands, show that a command is conditional by simultaneously selecting the [] command which shows the existence of conditions. If the following program has a bit register IB00010 condition established, it is manifested by executing the command within the []. However, conditions refer to bit status only. The following program example is given.



a. Input the normally open (NO) contact command. This is a condition.



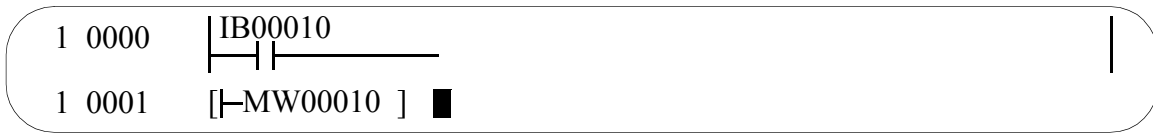
b. Select the Integer Values command



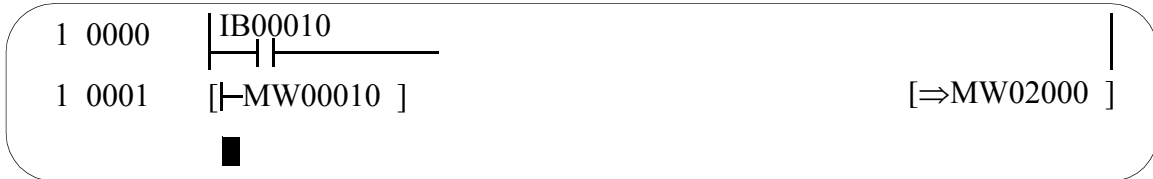
c. Select the condition command



d. Input the register number

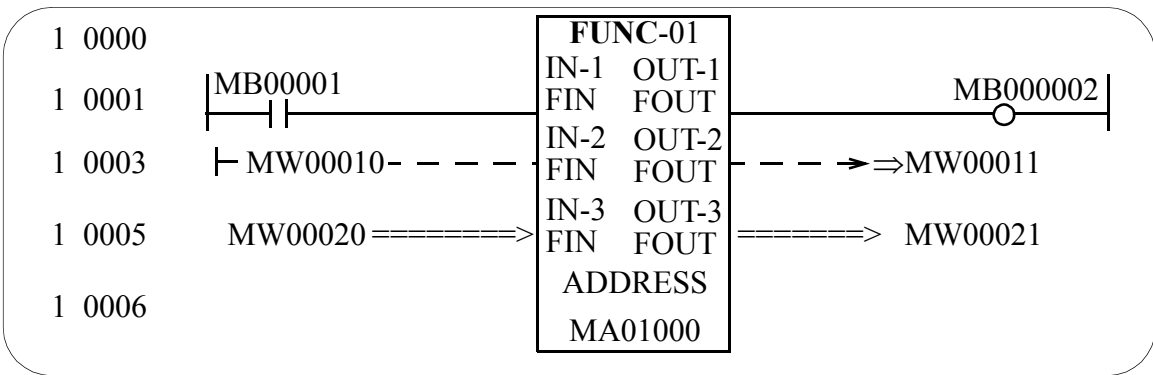


e. Input the storage command in the same manner as b ~ d.



4. Function Input

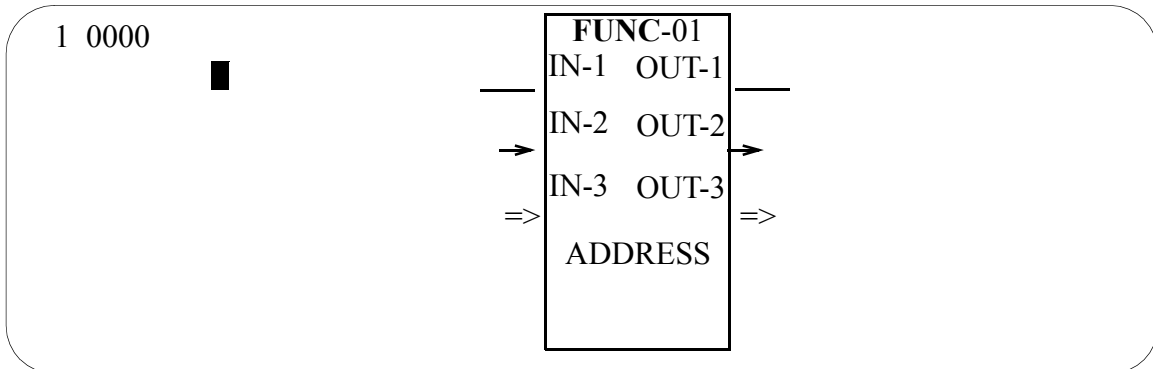
There are two types of functions: system functions (functions prepared by the system), and user functions (functions created by the user). The input method is the same for both. Define user functions prior to input. A program example is given below.



a. Select the **FSTART** command.



b. Input the function symbol. The function expression is displayed.



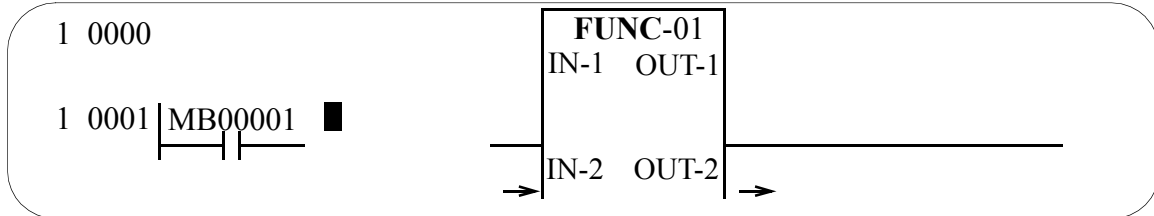


Next, let us examine programming the function input, address input, and output.

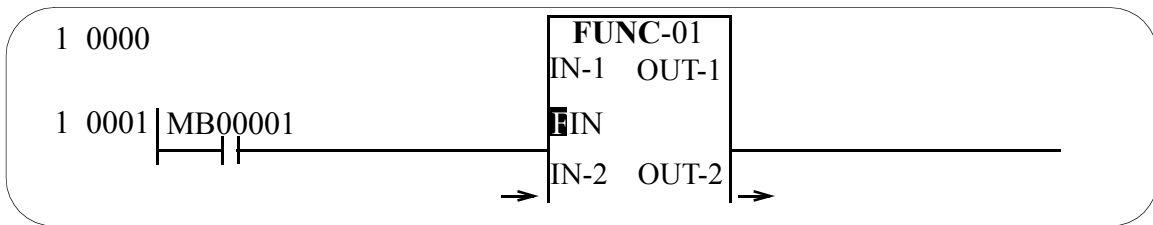
■ **Input**

Program the bit form (defined by B-VAL) input as follows:

c. Input the normally open (NO) contact command

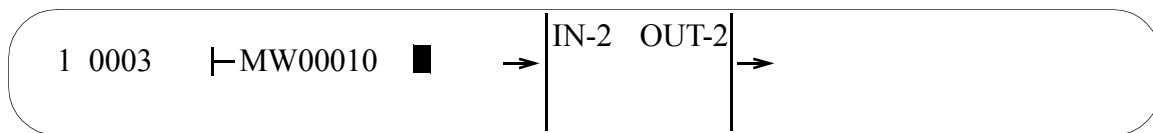


d. Select the **FIN** command. The function input parameters and normally open (NO) contact command are connected.

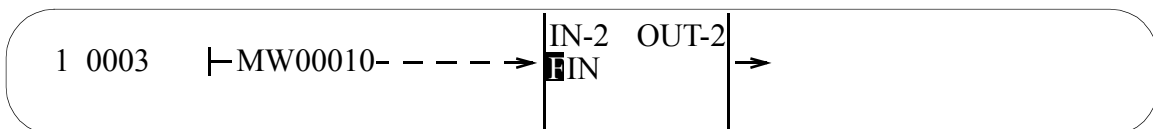


Program the inputs of the integer form (defined by I-VAL), 32-bit integer form (defined by L-VAL), and real number form (defined by F-VAL) as follows:

e. Input the numeric command.

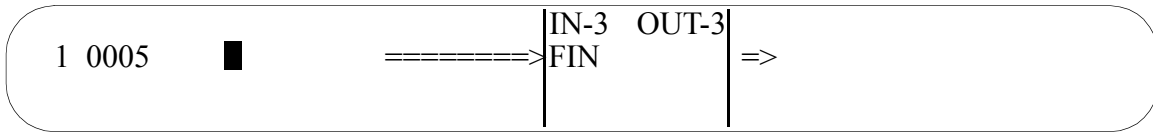


f. Select the **FIN** command. The function input parameters and **A** numeric command are connected.

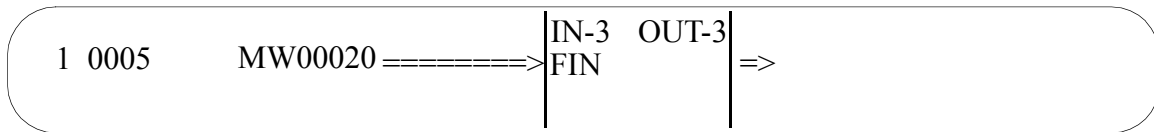


Program the inputs of the integer form (defined by I-REG), 32-bit integer form (defined by L-REG), and real number form (defined by F-REG) as follows:

- g. Select the **FIN** command. The function input parameters and **A** numeric command are connected.



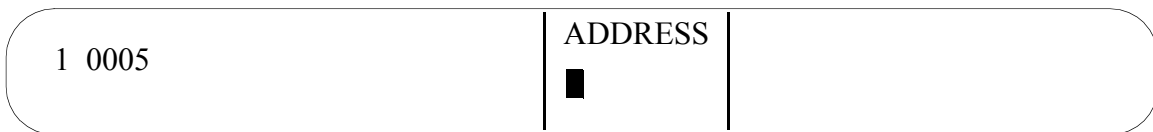
- h. Input the register number (or parameter).



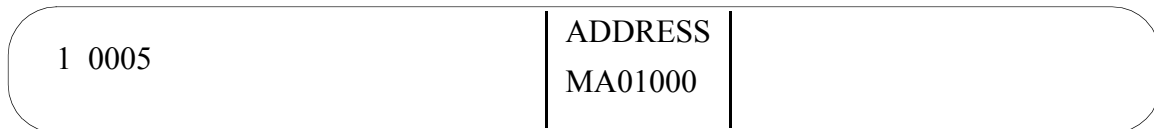
**■ Address Input**

Program the address inputs as follows.

- i. Select the **FIN** command.



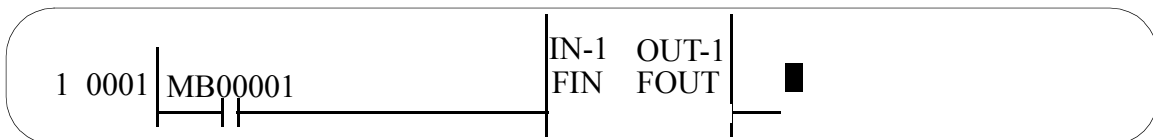
- j. Input the register number.



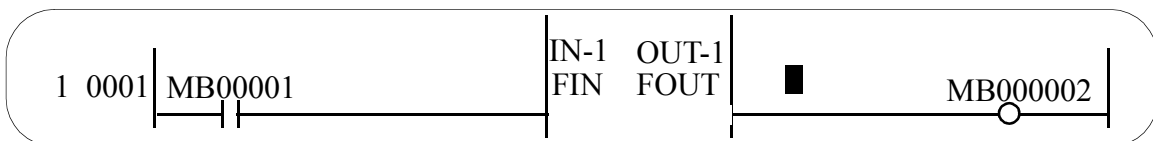
**■ Output**

Program the bit form (defined by B-VAL) output as follows.

- k. Select the **FOUT** command. The function output parameters and **coil** command are connected.

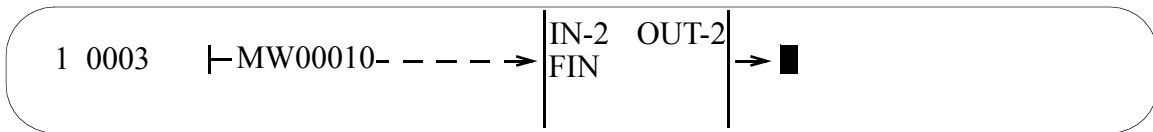


- l. Input the coil command.

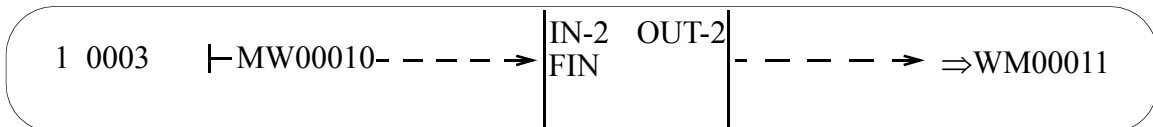


Program the inputs of the integer form (defined by I-VAL), 32-bit integer form (defined by L-VAL), and real number form (defined by F-VAL) as follows:

- m. Select the **FOUT** command.

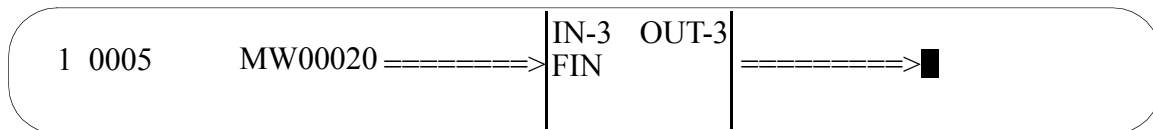


- n. Input the register number.

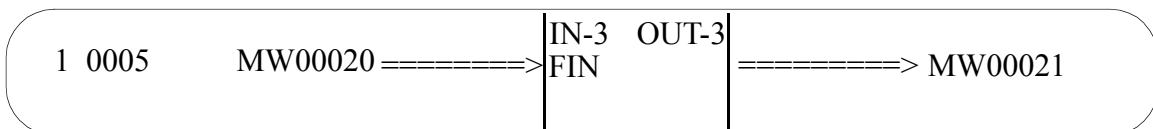


Program the inputs of the integer form (defined by I-REG), 32-bit integer form (defined by L-REG), and real number form (defined by F-REG) as follows:

- o. Select the **FOUT** command.

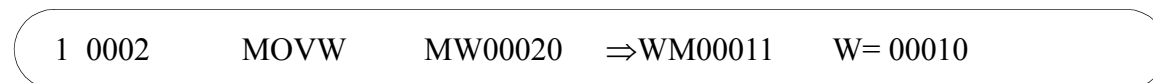


- p. Input the register number.

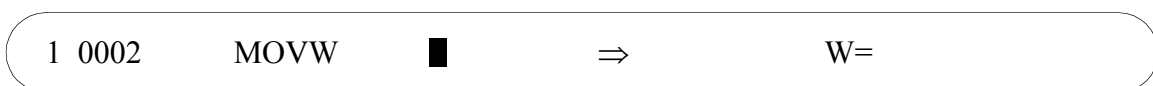


##### 5. **MOVW, XCHG** Command Input

Commands such as **MOVW** and **XCHG** require two or more operands. At command input the cursor moves to the first operand input position. Command input is completed by inputting the necessary operands in sequence. The following program example is given:



- a. Select the **MOVW** command. The cursor moves to the first operand input position. The **MOVW** command changes rows and is displayed on the far left.



- b. Input the first operand.

1 0002      MOVW      MW00020    ⇒■                  W=

- c. Input the second and third operands in the same manner as in (b).

1 0002      MOVW      MW00020    ⇒WM00011      W= 00010    ■

#### 6. **SEE** Command Input

Input the **SEE** number. A program input example is given below:

1 0002      SEE            H01.01

- a. Select the **SEE** command. The cursor moves to the drawing code input position.

1 0002      SEE            ■

- b. Input the drawing number.

1 0002      SEE            H01.01      ■

#### 7. **END** Command Input

Closing of IF statements, WHILE statements, and FOR statements, as well as ending drawing/function programs is accomplished by the END command. In closing various statements, the END command expressions that follow these statements upon END command input are IEND, WEND, and FEND, as well as DEND when inputting an END command for closing a drawing/function program. A programming example follows.

```

1 0000      ┆00000          =>  |
1 0002                                =>MW02000
1 0003      WHILE
2 0004      ┆ |      <00100
2 0006      ON
2 0007      ┆MW00200+MW00100i          =>MW00200
2 0010      ┆ |      +00001          =>  |
1 0013      WEND

```

- a. Input the Number of Integers Command, and Storage command.

```

1 0000      ┆00000          =>  |
1 0002                                =>MW02000

```

- b. Select the **WHILE** command

```

1 0000      ┆00000          =>  |
1 0002                                =>MW02000
1 0003      WHILE      █

```

- c. Input the **WHILE** statement content as follows:

```

1 0003      WHILE
2 0004      ┆ |      <00100
2 0006      ON
2 0007      ┆MW00200+MW00100i          =>MW00200
2 0010      ┆ |      +00001          =>  |

```

- d. Input the **END** command. The type of **END** command is automatically determined, and the proper **END** command displayed.

```

2 0010      ┌─ |      +00001      ⇒      |
1 0013      WEND  █

```

#### 8. In-column Comment Input

Comments may be input to a desired position in the main program and user function program. In-column comments have no effect on the operation of the program.

- a. Select the Comment command

```

2 0000  “” █

```

- b. Input the comment.

```

2 0000  “MW01000 is Motor Speed” █

```

- c. Input “”(double quotation) at the end of the comment.

```

2 0000  “MW01000 is Motor Speed”

```

#### Note:

Input comments in 16-bit characters. The maximum size of an in-column comment is 70 characters per column. A maximum of 180 characters is possible if the column is changed. However, due to the number of column changes, only character strings of less than 180 characters can be input.

### 8.2.4 Program Editing

When starting program editing in the on-line mode, adoption of current values temporarily stops. Current value adoption starts again after the edited program has been saved.

#### Note:

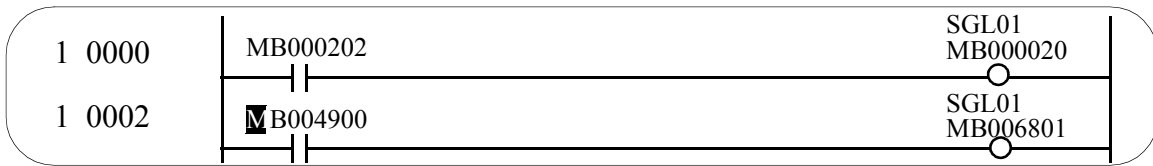
Program editing is not possible if:

- The cursor is at an empty position other than a command or operand.
- Another edit function is in operation.

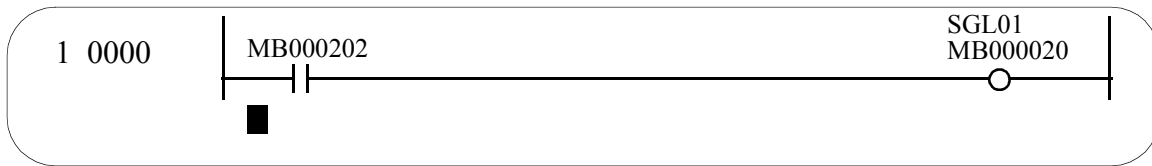
1. Insert

Inserts a command within a string of commands.

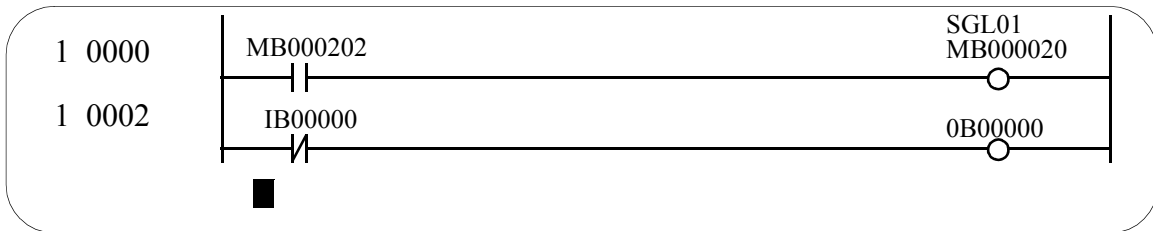
- a. Move the cursor to the command input location.



- b. Select **INS(I)** from the **EDIT(E)** program menu. “INS,” which signifies the insert mode, is displayed at the bottom of the window.

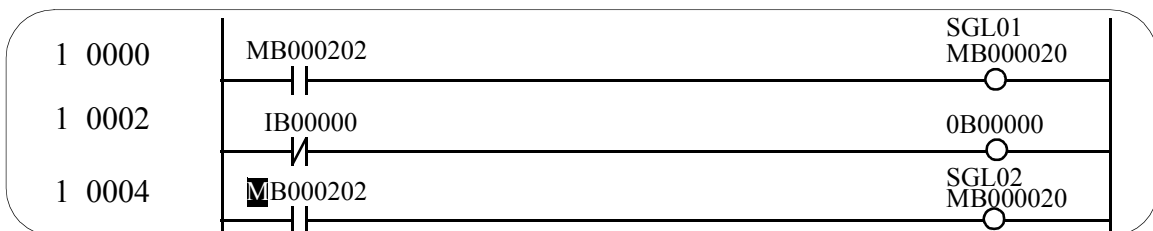


- c. Input the command. Commands can continue to be input until executing (d).



- d. Select **INS (I)** from the **Edit (E)** program menu.

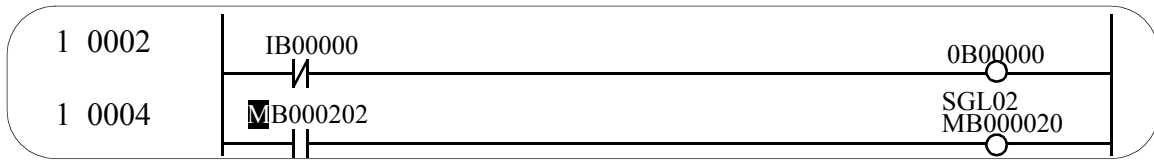
- e. The command input in (c) is inserted.



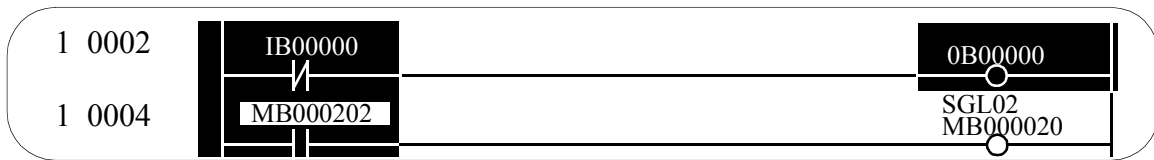
2. Delete

Deletes commands. It is possible to delete commands at once within an area.

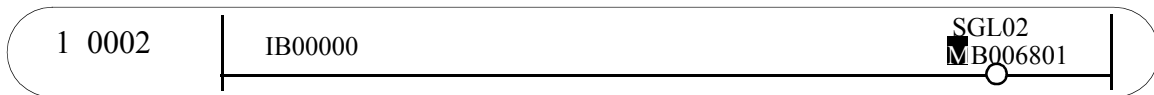
- a. Move the cursor to the delete start position.



- b. Select **DEL (D)** from the **Edit (E)** menu. “DEL,” which signifies the delete mode, is displayed at the bottom of the window.
- c. Move the cursor to the delete finish position. The deleted area is highlighted.



- d. Select **DEL (D)** from the **Edit (E)** menu.
- e. The commands within the area designated in (a.) and (c.) are deleted.



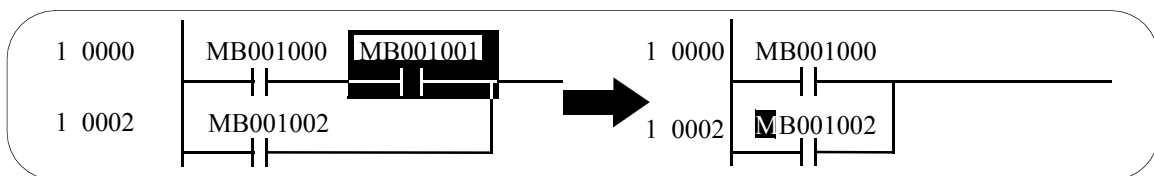
**Note:**

It is possible to exit delete mode without deleting commands by pressing the ESC key while in the delete mode.

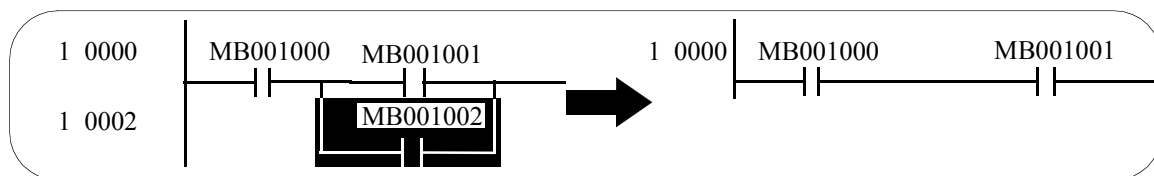
**Supplement:**

Deletion of one relay circuit command.

When one relay circuit command has been deleted, the power column is compensated in the following manner according to the connection status of the circuit at the deletion position.



If there are any circuits directly connected to a deleted element, they are shorted following deletion of that command.





If a circuit is connected in parallel with a deleted element, it remains open following deletion of the command.

### Supplement:

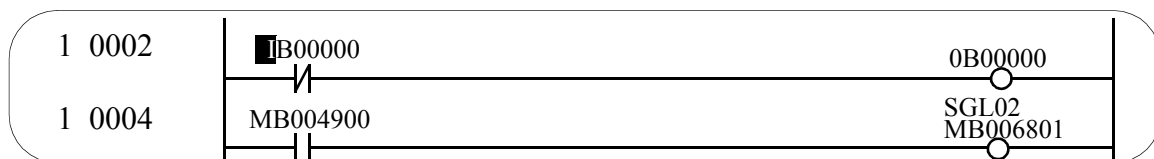
Deletion of a number of commands containing a relay circuit.

If a number of commands containing a relay circuit are deleted, select the delete area start position at the power connection command, and the delete area end position at the coil command.

#### 3. Cut

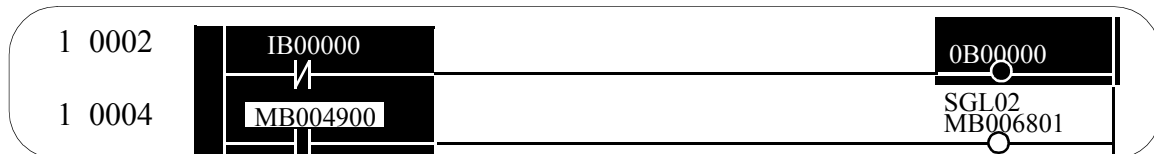
This function cuts a command. Data cut in this way is copied to the cut buffer. The contents of the cut buffer can in turn be recopied using the **Paste** command.

- a. Move the cursor to the cut start position.



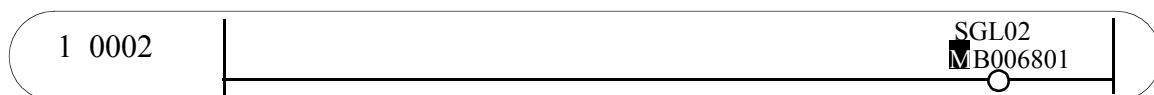
- b. Select **CUT (X)** from the **Edit (E)** menu. “CUT,” which signifies the cut mode, is shown at the bottom of the window.

- c. Move the cursor to the cut end position. The area to be cut is highlighted.



- d. Select **CUT (X)** from the **Edit (E)** menu.

- e. The area designated in steps (a) and (b) is cut.



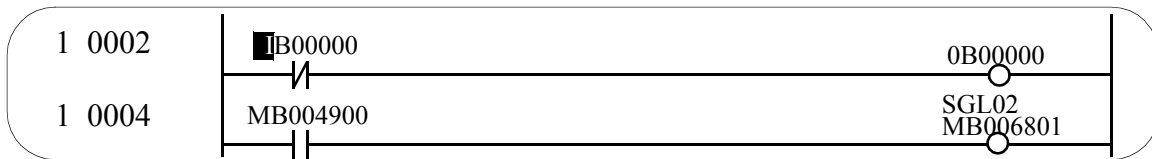
### Note:

The cut mode can be released without cutting any commands by pressing the ESC key when in the cut mode. When a command is cut using the cut function, there is no power column compensation similar to that in the delete mode.

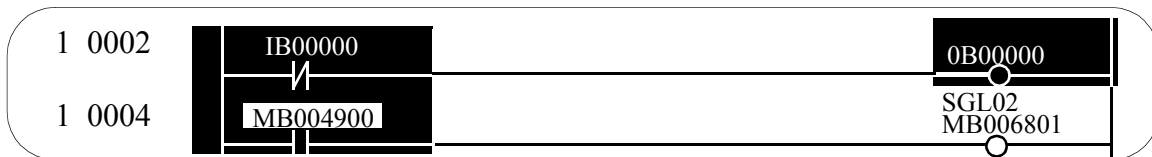
#### 4. Copy

This function copies a command to the cut buffer. The contents of the cut buffer can in turn be recopied using the **Paste** command.

- a. Move the cursor to the copy start position.

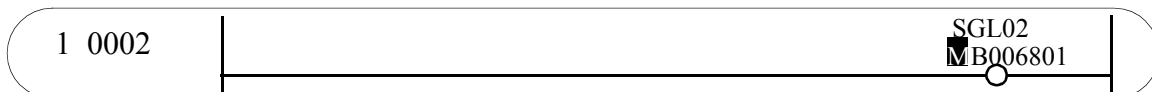


- b. Select **COPY (X)** from the **Edit (E)** menu. “COPY,” which signifies the copy mode, is shown at the bottom of the window.
- c. Move the cursor to the copy end position. The area to be copied is highlighted.

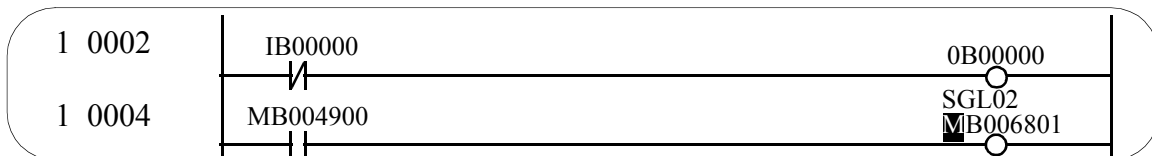


- d. Select **COPY (X)** from the **Edit (E)** menu.
- e. The area designated in steps (a) and (b) is copied to the cut buffer.
5. Paste  
This function copies the contents of the cut buffer. The data to be copied or cut is sent to the cut buffer by the **Cut** or **Copy** functions. The contents of the cut buffer are held until execution of the next **Cut** or **Copy** function. Multiple copies are therefore possible.

- a. Move the cursor to the position where the command is to be pasted.



- b. Select **PASTE (V)** from the **Edit (E)** menu.
- c. The contents of the cut buffer are copied to the position specified in (a).



## 6. Command/Operand Modification

Already existing commands and operands can be modified in the following manner.

- a. Relay Number Modification
- a.1 Move the cursor (using the arrow keys) to the relay number to be modified.
  - a.2 Input the new relay number.

- b. Contact Modification
  - b.1 Move the cursor to the contact command to be modified.
  - b.2 Input the new contact command.
- c. Relay/Contact Modification
  - c.1 Move the cursor to the relay to be modified.
  - c.2 Input the new relay number.
  - c.3 Input the new contact number.
- d. Operand Modification
  - d.1 Move the cursor to the operand to be modified.
  - d.2 Input the new operand. Modifiable operands are listed below. Operands not usable by a command cannot be modified.
    - Decimal/Hexadecimal integer parameters, decimal/hexadecimal 32-bit integer parameters, decimal real number parameters
    - S, I, O, M, D registers or those with same prefix
    - C register, # register, or those with same prefix
    - X, Y, Z, A function number registers, or those with same prefix
    - Prefix registers (I, J)
- e. Comment Modification
  - e.1 Move the cursor to the comment to be modified.
  - e.2 Select the Comment command
  - e.3 Input the new comment
  - e.4 Input ""(Double Quotation) at the end of the comments.

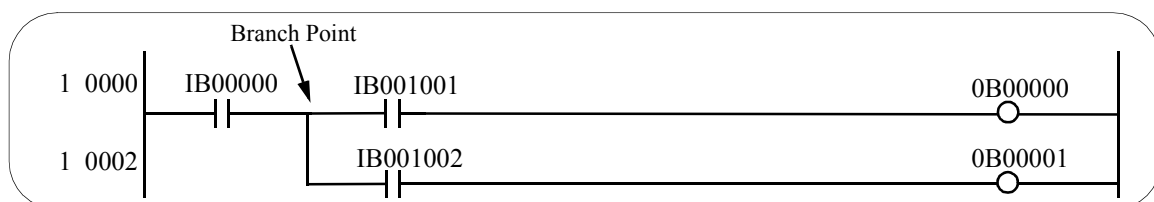
### 8.2.5 Creation of Branch Circuits

Commands are input at the current cursor position. When branched and parallel circuits are made in relay circuits, move the cursor according to the branching, join, and convergence connections. The cursor position at which the next command is input, is reserved by designating a convergence from a branch. Reservation and release alternately switch with each selection of a designated branch or convergence. Branch/join designation is in the command selection menu. Furthermore, branching and parallel circuits can be designated using shortcut commands.

#### 1. Setting of Branch Points

Display the branch points on the left side of the coil commands, and thereafter reserve the parallel circuit input position from that point as shown in the diagram below.

However, when connecting the contact to the power column, the branch is automatically displayed even if the branch point is not set.



- a. Select the normally open (NO) contact command



- b. Select **RELAY (R)** then **Branch (T)** from the **Command (O)** menu. The branch point is displayed.

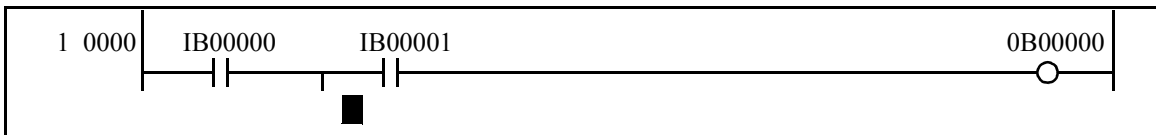


- c. Input the relay number.



**Note:**

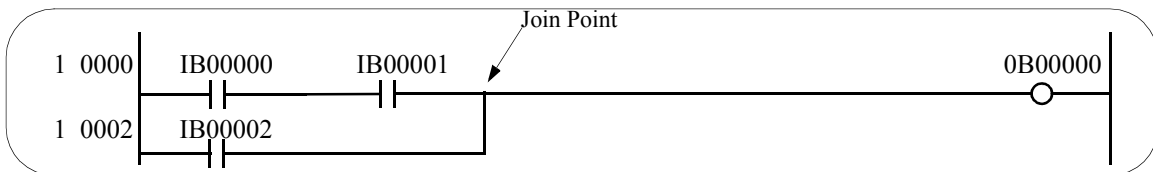
In (b) it is possible to display branch designation points even if the branch point shortcut command “;” is used. Upon inputting a coil command following the operation in (c), the cursor is displayed at the branch position indicated in (b) as shown below, and not the power column. It is therefore possible to input the next command from that position.



If a number of branch points are set, the cursor moves to the position of the last branch point.

2. Setting of Join Points

If there is a branch point, display the join points on the left side of the contact commands, and thereafter reserve the parallel circuit input position between that branch point and the join point as shown in the diagram below. If there is no branch point, reserve it between the power column and the join point.



- a. Select the normally open (NO) contact command.



- b. Select **RELAY (R)** then **Join (J)** from the **Command (O)** menu. The join point is displayed.



- c. Input the relay number.

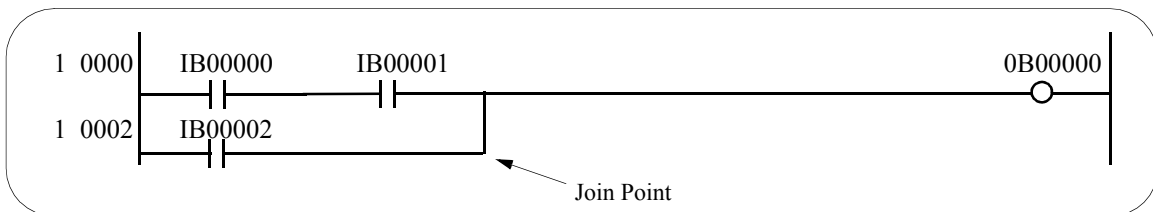


**Note:**

In (b) a join point can also be displayed by inputting the join shortcut command “.?”. After the operation in (c), the next command input position is a position column changed from the join point. The next command is input from the branch point if a branch point was previously indicated, and from the power column if no branch point was previously indicated.

3. Join Connection Setting

Connect the join point position previously indicated to the current command input position. Join connection is not possible if no join point was indicated.



- a. Indicate a join point as shown below.



- b. Select the normally open (NO) contact command.



- c. Select **Connect (C)** from the **Command (O)** menu. The join point is then connected.

- d. Input the relay number.

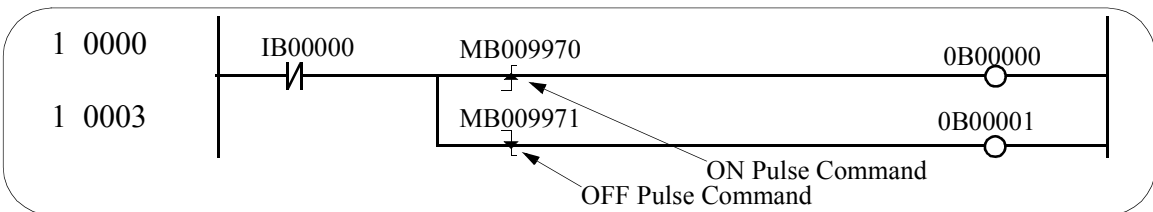


**Note:**

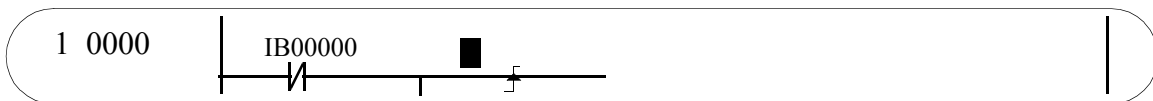
In (c), it is possible to connect a join point by inputting the join shortcut command “;”. After the operation in (d), the next command input position is the left side of the join connected point.

4. Creation of One-Shot Circuits

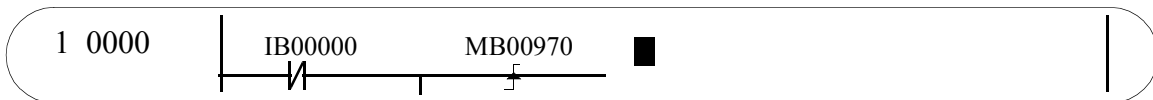
Create one-shot circuit programs in a manner similar to the branching method described in (1) Branch Point Setting ~ (3) Join Connection.



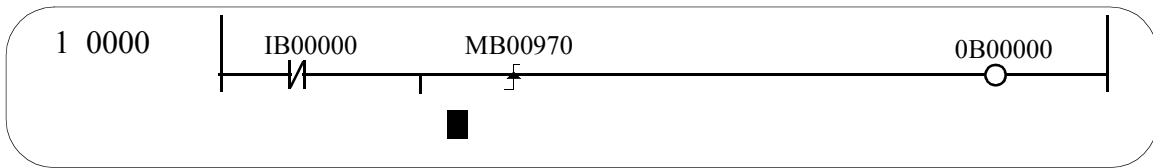
- a. Input the **normally closed (NC) contact** command.
- b. After selecting the **ON pulse** command, set the branch point.



- c. Input the register number which is the operand of the ON pulse.

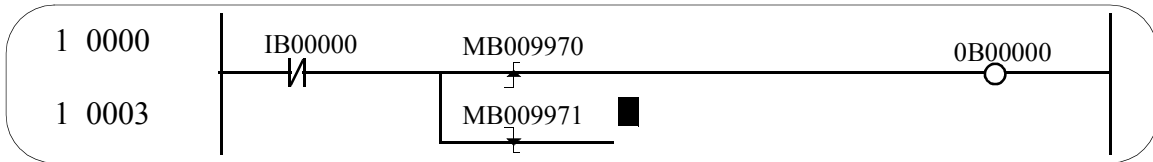


d. Input the coil command.

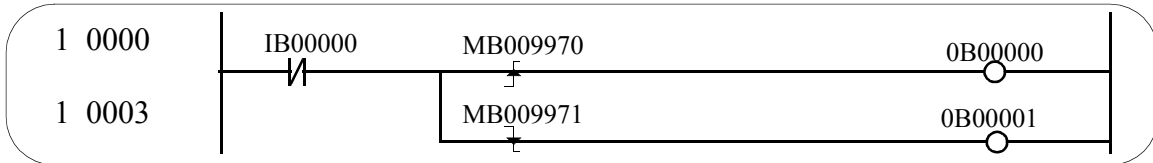


e. Select the **OFF pulse** command.

f. Input the register number, which is the operand of the **OFF pulse** command.



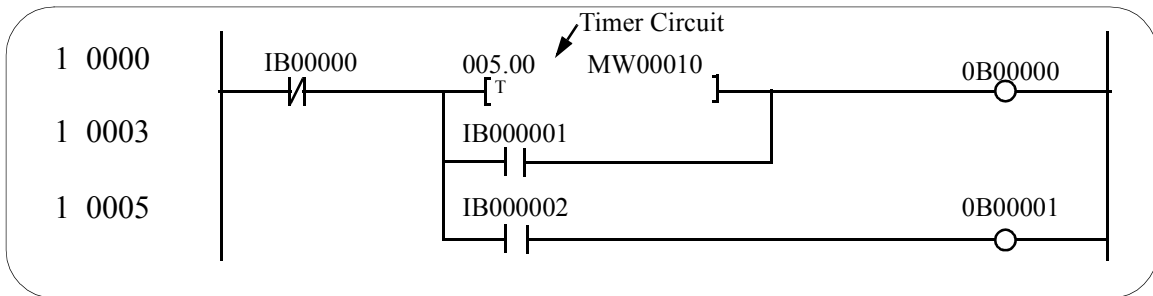
g. Input the coil command



### 5. Timer Circuit Creation

Create the timer circuit programs by designating the following three points.

- Signs for branch points, join points, and join connections.
- Time limit setting parameters or register numbers for time limit setting.
- Register numbers for calculations.

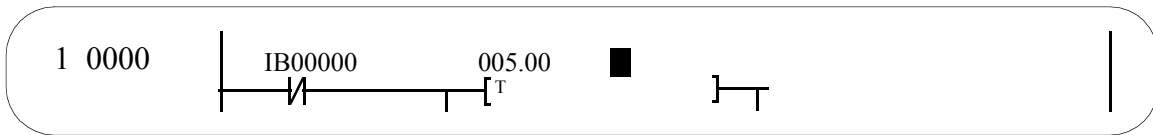


a. Input the **normally closed (NC) contact** command.

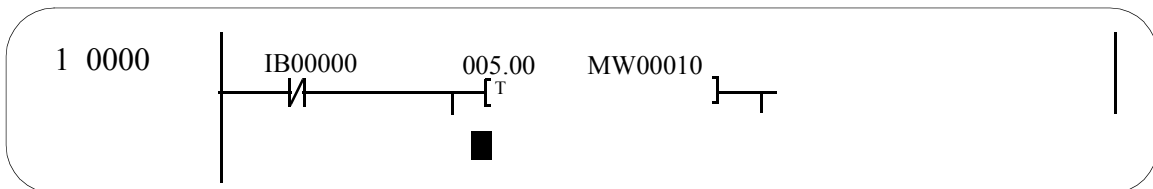
b. After selecting the **ON delay** command, set the branching and join points.



- c. Input the time limit setting values (parameters or register numbers) which are ON delay command operands.



- d. Input calculation register numbers which are ON delay command operands.

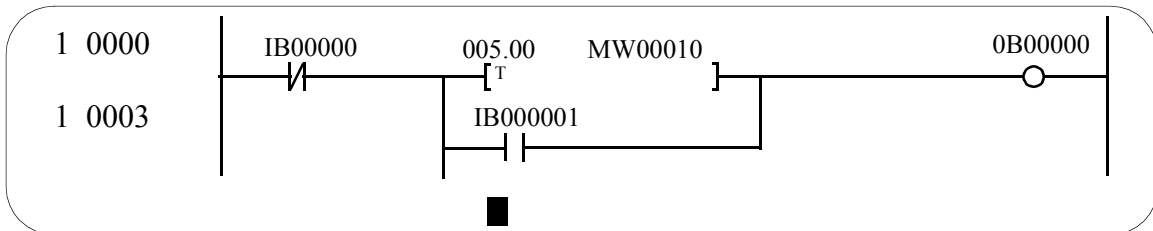


- e. After selecting the normally open (NO) contact command, set the branch and join points.

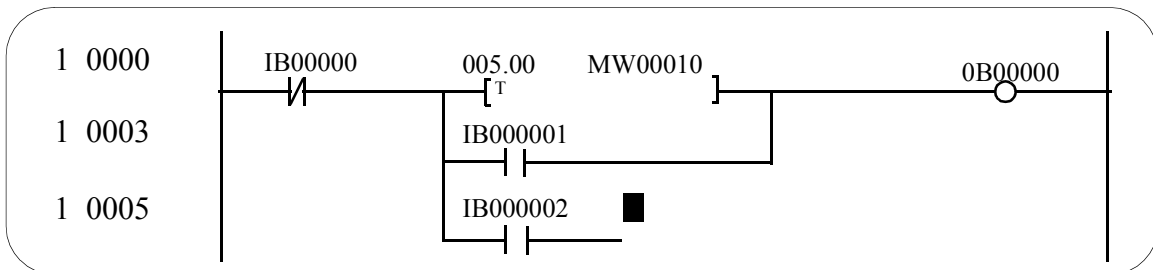


- f. Input the register numbers which are operands of the normally open (NO) contact command.

- g. Input the coil command.

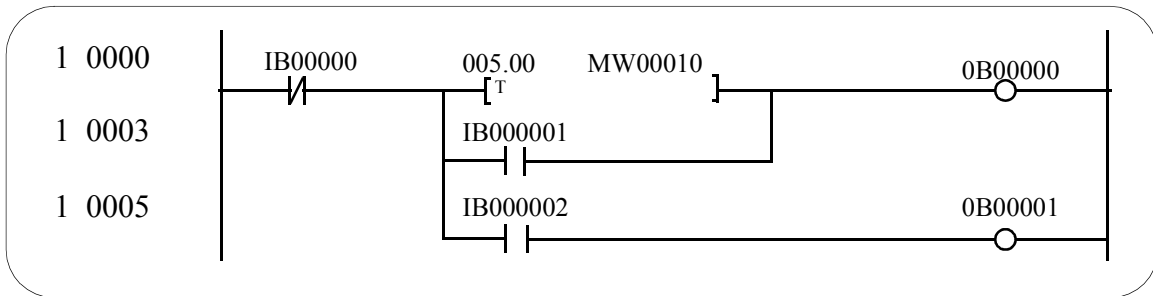


- h. Input the normally open (NO) contact command.





i. Input the coil command.

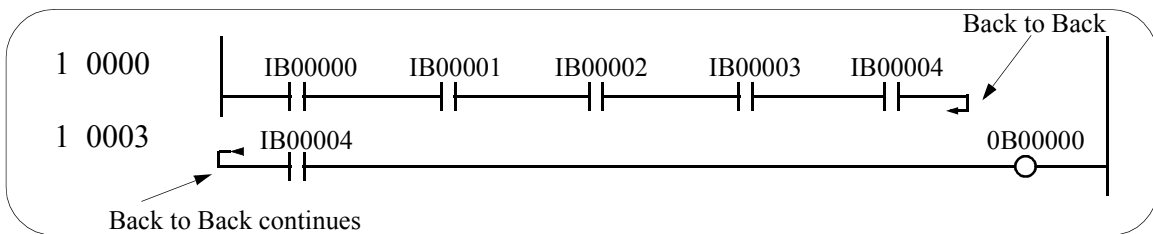


**Note:**

Setting of branch points, join points, and join connections can be done either when the cursor is on the time limit setting value or on the calculation register.

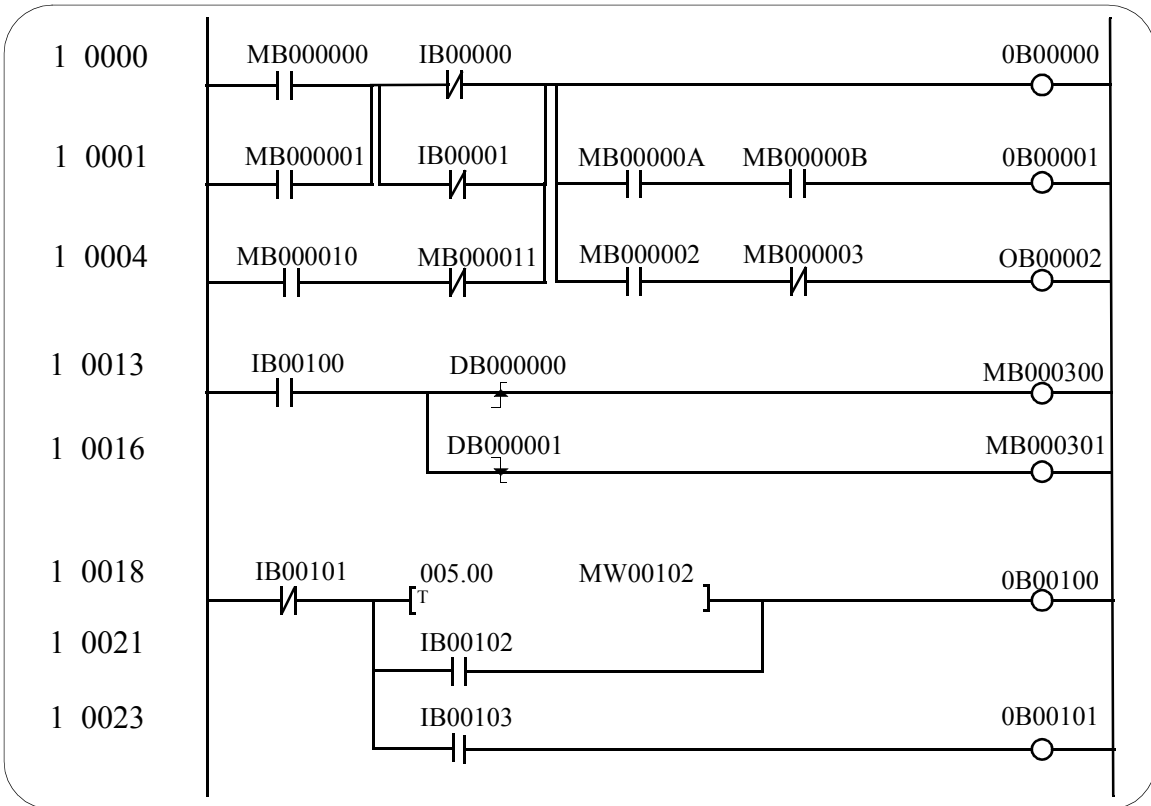
6. Serial Connection

If no join points or join connections are designated, the next contact is connected in series, and the cursor moves to the right of the current command position. Serial connections are operated regardless of whether a branch is made within them, and there is no limit to the number of contacts. If the number of serial connections exceeds one, as shown in the following figure, the column position of the next command input is changed and displayed.



7. Creation of Complex Circuits

Complex circuits such as the one below can be created by setting branch points, join points, and join connections.



The procedure used to create the above sequence circuit is shown in the table below.

Order	Command Selection	Branch/Join Selection		
1	Normally open (NO) contact	Join point	MB000000	
2	Normally open (NO) contact	Join connection	MB000001	
3	Normally closed (NC) contact	Branch point, join point	IB00000	
4	Normally closed (NC) contact	Join point, join connection	IB00001	
5	Normally open (NO) contact		MB000010	
6	Normally closed (NC) contact	Join connection	MB000011	
7	Coil	Branch point	OB00000	
8	Normally open (NO) contact	Branch point	MB00000A	
9	Normally open (NO) contact		MB00000B	
10	Coil		OB00001	
11	Normally open (NO) contact		MB000002	
12	Normally closed (NC) contact		MB000003	
13	Coil		OB00002	
14	Normally open (NO) contact		IB00100	
15	ON pulse	Branch point	DB000000	
16	Coil		MB000300	
17	OFF pulse		DB000001	
18	Coil		MB000301	
19	Normally closed (NC) contact		IB00101	
20	ON delay	Branch point, join point	005.00	MW00102
21	Normally open (NO) contact	Branch point, join connection	IB00102	
22	Coil		OB00100	
23	Normally open (NO) contact		IB00103	
24	Coil		OB00101	

Taking procedure order number 3 in the table, the actual operation method is shown.  
<Operation Sequence for Procedure Order Number 3>

- a. Select the normally closed (NC) contact command.
- b. Select the Branch command
- c. Select the Join point.
- d. Input “IB00000” and press the Enter key.

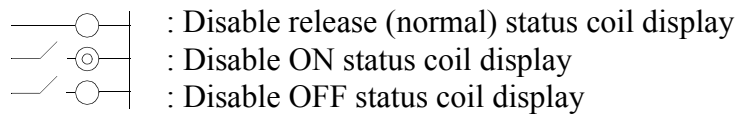
**Note:**

In (d), entering “IB00000” is the same as entering the register type and number only as the system determines the type of register held in the operand of the open code. However, if multiple operands are used, set the operand input by pressing the Enter key each time one of the operands is input.

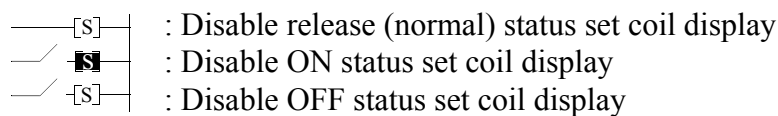
**8.2.6 Disable Coil Setting**

This function sets the energized state in which the coil command is forcibly turned ON (Disable ON), and the de-energized state (Disable OFF) in which OFF is set, and releases the set coil disable. However, it is also possible to display the coil chart in the disabled state.

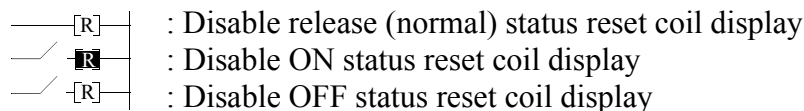
## • Coil Command



## • Set Coil Command



## • Reset Coil Command

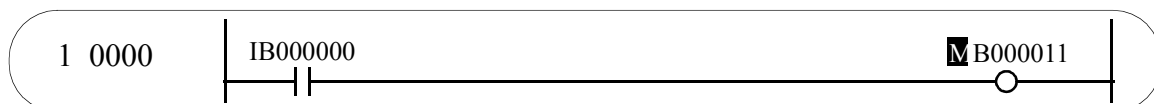
**Note:**

When operating during installation, there may be cases in which devices cannot be operated during this activity. Operate this function based on full verification of this. In the on-line mode, the data of the disable coil setting/release is written into the PLC at the same time as the setting/release operation. The disable setting switches the disable coil ON or OFF, and does not affect other coils even if the other coils are the same coil. However, commands other than the coil command using the same relay (normally open contact command, etc.) are affected.

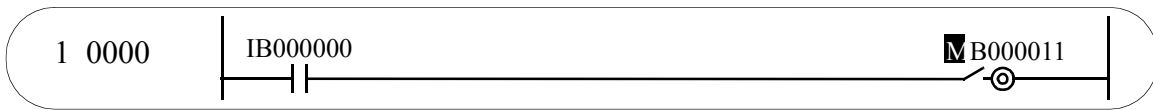
## 1. Disable ON setting

This function forcibly sets the coil command so that it is fixed in the ON state.

- a. Move the cursor to the coil command to be set to Disable ON.



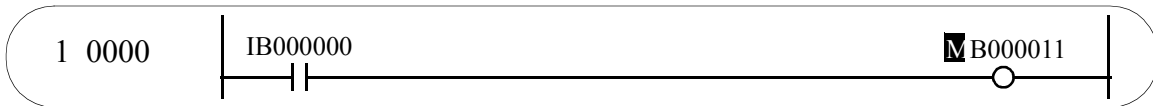
- b. Select **DIS-ON (N)** from the **Debug (G)** menu. The coil display is in the disable ON state.



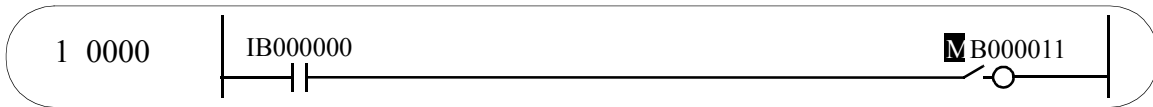
## 2. Disable OFF Setting

This function forcibly sets the coil command so that it is fixed in the OFF state.

- a. Move the cursor to the coil command to be set to Disable OFF.



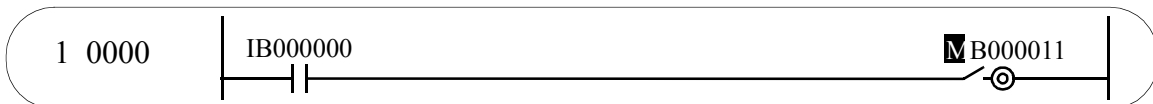
- b. Select **DIS-OFF (F)** from the **Debug (G)** menu. The coil display is in the disable OFF state.



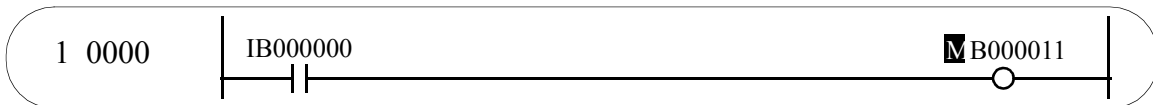
## 3. Disable Setting Release

This function releases the coil command disable setting.

- a. Move the cursor to the coil command for which disable is to be released.



- b. Select **ENABLE (E)** from the **Debug (G)** menu. The coil display returns to normal.

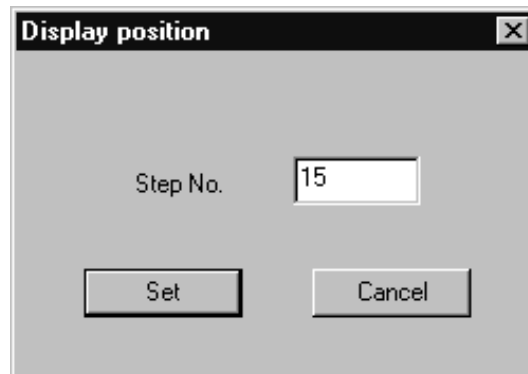


## 4. Disable List Display

This function displays a list of disabled coils.

## 8.2.7 Jump

1. Jump to desired step number.  
The cursor moves to a command at a desired step number.
  - a. Select **Jump to Line (L)** from the **Cursor (S)** menu.
  - b. Input the step numbers to the dialog box, and select the Set button.



- c. The cursor moves to the command at the step number input in (b).
2. Open the program window using the SEE, FSTART commands.  
When using the SEE or FSTART commands in a drawing/function program being displayed, the drawing/function program window referenced by these commands is open.
  - a. Move the cursor to the drawing number/function symbol to be referenced by the SEE or FSTART command.

1 0000      SEE      **I** 01.01

- b. Select **REFER (R)** from the **Debug (G)** menu.
  - c. Open the program window referenced in (a).

### Note:

The REFER function cannot be used in the off-line mode. When operating it in the on-line mode, the drawing/function programs opened by the REFER function display the current values of the status executed by the SEE and FSTART command which originate the reference.

3. Display Window BACK Display  
This function displays the open windows in reverse order according to the REFER function.
  - a. Select **BACK (B)** from the **Debug (G)** menu.

- b. Previously displayed windows can now be recalled in reverse order (up to a maximum of 4 layers).

### 8.2.8 Current Value Display

Using this function, it is possible to display current program values simultaneously with the program display. The current values of the various programs are displayed as follows:

- Contact: Displays the contact open/closed state on the wiring diagram. Open contacts are displayed in boldface.
- Coil: Displays the coil energized/de-energized state on the wiring diagram. Energized (ON) coils are displayed in boldface.
- Operand: The value of the operands used is displayed under the formula. Current values are constantly updated, and the latest data displayed.

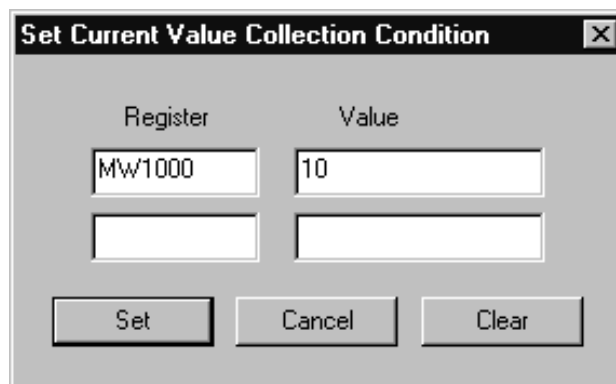
**Note:**

Current value display is not possible in the off-line mode.

#### 1. Synchronous Current Value Adoption

This function displays the current program values when the ON/OFF conditions of designated register numbers (S, I, O, M, D, C, #), prefix registers I and J, as well as of designated relay numbers are satisfied. When the conditions are satisfied, the present value is updated. The values are displayed as before if the conditions are not satisfied. Up to 2 synchronization conditions can be set. An AND condition results when two conditions are set.

- a. Select **SYNC (S)** from the **Debug (G)** menu.
- b. Enter the register number and value into the dialog box, and select the Set button.



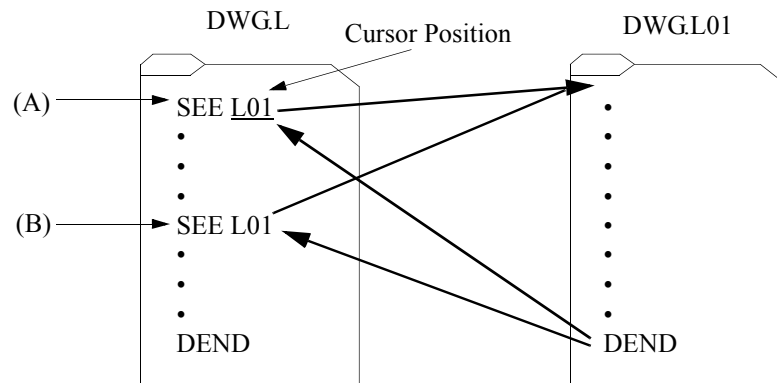
- c. When the setting conditions are established, the current value display is updated. The display remains as before if setting conditions are not established.

**Note:**

In (b), the current value adoption conditions set are cleared upon selecting the Clear button.

## 2. Current Value Display by the REFER Function

When executing the REFER function with the cursor in a SEE command or a user function symbol, the drawing program or user function program is displayed. Therefore, it is possible to display current values when the SEE command or user function reference command (FSTART) are executed. In the following diagram, the DWGL.L01 program window is displayed upon moving the cursor to position (A) of DWGL and executing the REFER function. The value at the time of referencing position (B) from the SEE function is displayed.



- a. Move the cursor to the Drawing number/function symbol position of the **SEE** command or **FSTART** command.
  - b. Select **REFER (R)** from the **Debug (G)** menu
  - c. The referenced program window is displayed.
3. Temporary Hold of Current Value Adoption
- The adoption of current values can be temporarily stopped upon selecting **HOLD (H)** from the **Debug (G)** menu. Adoption of current values resumes when the HOLD function is operated once again in the current value adoption temporary hold state.

### 8.2.9 Comment Creation

Create register comments according to the following procedure.

- a. Select **Comment Bar (B)** from the **View (V)** menu, and open the comment creation window.



- b. Input the register number.





- c. Input symbols. Input up to 8 16-bit characters (4 32-bit character). Symbols may be comprised of a combination of 16-bit and 32-bit characters.
- d. Input comments. Input up to 48 16-bit characters (24 32-bit characters). Symbols may be comprised of a combination of 16-bit and 32-bit characters.



- e. Press the Enter key. The comments are written into the comment file when the Enter key is pressed.
- f. When inputting the next comment, repeat steps (b) ~ (e). Upon completion, select **Comment Bar (B)** from the **View (V)** window.

### Helpful Hint

After moving the cursor to the register number when performing step (a), the register number displays a default value during step (b).

### Note:

The symbols input in step (c) differ from the symbols defined by the Symbol Definition tab in the Property Window.

## 8.2.10 Saving Ladder Programs

In this section, a method for saving the program and the structure of the error window are explained.

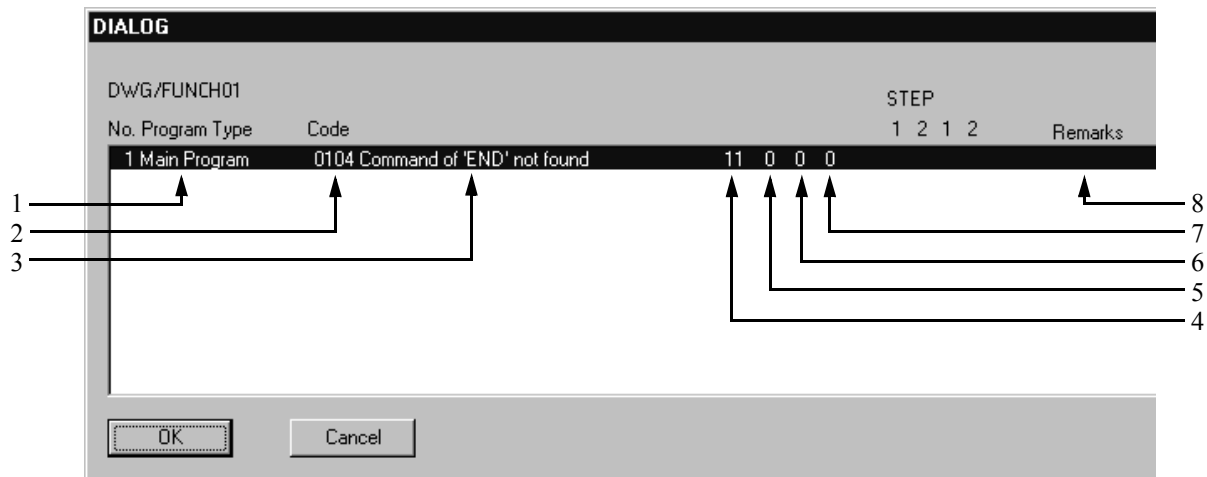
### • Saving A Program

The main program is saved in both the **PLC** and the hard disk in the on-line mode and saved in the hard disk in the off-line mode.

- a. Select **Save (S)** from **File (F)** in the Program menu.
- b. Select the **Yes** button in the **Message box**.
- c. Select the **OK** button in the “Saving has been completed” **Message box**.

### • Error Window Structure

Compilation processing is executed when a program is saved. An error window is displayed if a compilation error is detected.



1. Program type  
The type of program where an error is detected is displayed.
2. Code  
The code number of the error is displayed.
3. Error contents  
The contents of the error are displayed.
4. Step 1  
The number of the step where an error is detected is displayed in the case of a main program or SFC program, while the number of the row where an error is detected is displayed in the case of a list format program or Tuning Panel program.
5. Step 2  
The invalid data of the main program or SFC program is displayed. The number of the column where an error is detected is displayed in the case of list format program of Tuning Panel program.
6. Detail 1  
This data is invalid on a list program or Tuning Panel program other than a main program, SFC program, parameter list (#Register), or interlock list. A plural number is displayed when an error is detected in the parameter list (#Register), while a sub-number is displayed when an error is detected in the interlock list creation screen.
7. Detail 2  
This data is invalid on the current version.

## 8. Remarks

This data is currently invalid. Highlight the desired position in the error window, then select the **OK** button. The cursor moves to the position where an error is detected.

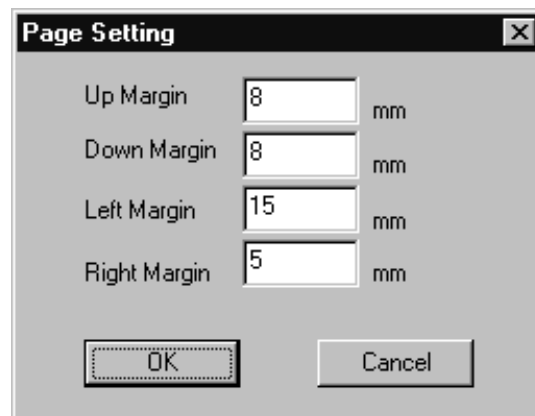
### 8.2.11 Ladder Program Printing

In the main program, **Print** can be executed from the program window instead of starting **Print manager**. However, the print object must be the open main program.

- Page Setting

Print margins are set up as follows:

- a. Select **Page Setting (M)** from **File (F)** in the program menus.
- b. In the **Page Setting** dialog box, set each margin, then select the **OK** button.

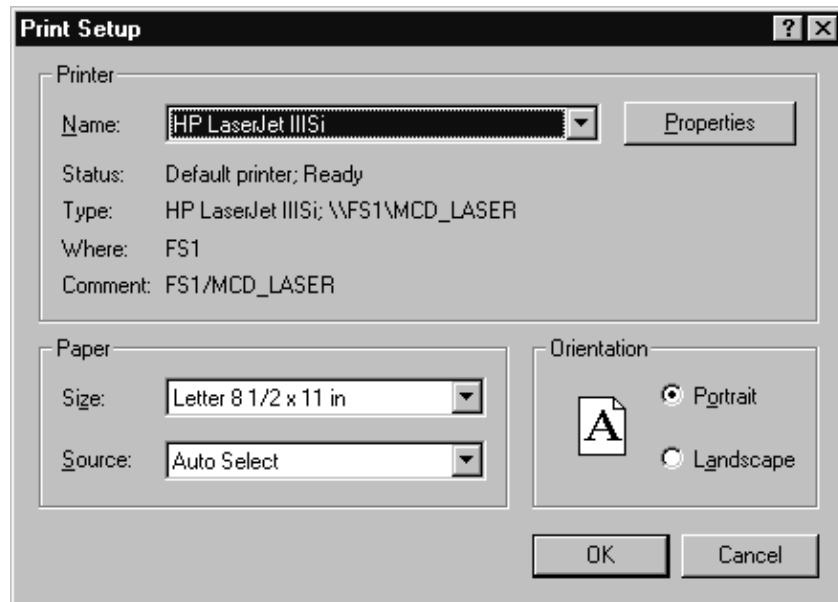


- Printing

Print currently displayed main programs as follows:

- a. Select **Print (P)** from **File (F)** in the program menu.

- b. In the **Print Setup** dialog box, select the printer then select the **OK** button.



**Note:**

Refer to the contents of the printer manual for your specific printer, in regards to the contents of the **Printer Setup** in (b).

### 8.2.12 Ladder Program Edit Completion

Complete editing of the ladder program by closing the ladder program window. Select **Close (C)** from **File (F)** in the program menu.

## 8.3 Tabular Format Program Creation

The following five types of tabular format programs exist.

- Constant table (# Register)
- Constant table (M register)
- I/O convert table
- Interlock table
- Parts assembling table

This section outlines the method for creating tabular format programs.

### 8.3.1 Tabular Format Program Window Configuration

Opening the tabular format program window and configuring the window menu are discussed below.

#### ■ Opening the Tabular Format Program Window

The following five tabular format program types exist:

Tabular Format Program	Function
Constant Table (# register)	Creates parameters such as torque control parameters, position control parameters, etc., fixed into the various ladder/function programs.
Constant Table (M register)	Creates parameters used globally across the various ladder/function programs for the mechanical and electrical installation properties.
I/O Convert Table	Creates numerical data scale conversions and bit signal conversions.
Interlock Table	Creates various interlocks such as device starting conditions and running conditions.
Parts Assembling Table	Simultaneously creates multiple set pattern circuits such as solenoid valve circuits, accessory sequence circuits, etc.

These tabular format program windows can be opened from either the File Manager or the Engineering Manager. Tabular format programs stored in the PLC in the on-line mode, or on the hard drive in the off-line mode are called out.

#### Opening from File Manager

- a. Point to a ladder number in the tree diagram.
- b. Select **Open (N)** from the **File (F)** menu.
- c. Select the table to be created from the sub-menu displaying the five types (listed above).
- d. The tabular format program window opens.

### Opening from the Engineering Manager

- a. Select **Open (O)**⇒**Program (P)** from the **File (F)** menu.
- b. Select the table to be created from the sub-menu displaying the five types (listed above).
- c. The tabular format program window opens.

#### Note:

When the tabular format program window is open with no ladder or function programs open, a display drawing setting dialog box is displayed. Input the drawing name and type, and select the **OK** button.

#### Supplement:

Tabular display programs are set with regard to open source ladder/function main programs. For this reason, when setting a tabular format program for a different ladder number or function symbol, it is necessary to open the main program of that ladder number or function symbol.

### ■ Tabular Format Program Window Menu Configuration

The menus displayed in the tabular format program window are described in Table 4. When referencing the various functions from the menu, see the item numbers shown in the right-hand column.

**Table 4: Tabular Format Program Window Menu**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes tabular format program window	8.2.12
Regist User Menu (U)	Registers user menu	—
Save (S)	Saves tabular format program window	8.3.9
Delete (D)	Cannot be used in this window	—
Page Setting (M)	Sets print margins	8.3.10
Print (P)	Prints tabular program	8.2.11
Exit (X)	Exits Engineering Manager	3.4.2

**Table 4: Tabular Format Program Window Menu (Continued)**

Menu	Function	Item No.
Edit (E)		
Cut (T)	Cuts table data	8.3.8
Copy (C)	Copies table data into the cut buffer	8.3.8
Paste (P)	Pastes contents of cut buffer into program	8.3.8
Delete Row (D)	Deletes a number of connected rows	8.3.8
Insert Row (I)	Inserts empty row	8.3.8
Delete Column (R) <sup>*1, *2</sup>	Deletes a number of connected columns	8.3.8
Insert Column (Q) <sup>*1, *2</sup>	Inserts a blank column	8.3.8
Entry Comment (T) <sup>*1</sup>	Registers comments	8.3.8
Input (I)		
Input Setting Data (S)	Switches to setting input mode	8.3.2
Table Definition (T)	Switches to table definition input mode	8.3.2
Register (R)	Switches to register input mode	8.3.2
Direction of Cursor Movement (C)	Sets the cursor scroll direction	8.3.2
View (V)		
Tool Bar (T)	Displays the tool bars that are available	3.4.3
Status Bar (S)	Displays status bar	3.4.3
Display Head Row (F)	Moves cursor to first column of table	8.3.8
Display Designated Row (R)	Moves cursor to a desired column in the table	8.3.8
Display Last Row (E)	Moves cursor to last column of table	8.3.8
Next Page (N) <sup>*3</sup>	Moves cursor to next page of table	8.3.8
Back Page (B) <sup>*3</sup>	Moves cursor to previous page of table	8.3.8
Block Division (W) <sup>*1</sup>	Divides/Merges blocks	8.3.6
Sub Table/Main Table (A) <sup>*1</sup>	Switches between main tables and sub-tables	8.3.6
Parts Unit Designation <sup>*2</sup>	Switches part units	8.3.7
Display Format Change (D) <sup>*2</sup>	Switches the display format	8.3.7
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
Help Topics (H)	Displays Help topics	—
About App. (A)	Displays version data	3.4.5

\*1: Displayed in interlock table

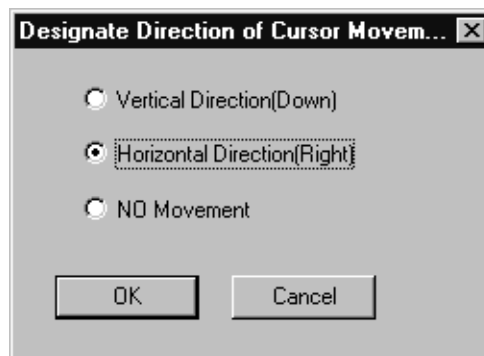
\*2: Displayed in parts assembly table

\*3: Displayed in constant table ( # register)

### 8.3.2 Input Mode Switching

There are three table data input modes: the Input Setting Data (input of settings only) mode, the Input Table Definition (input of all the cells within the table) mode, and the Input Register (input of register numbers only) mode. Moreover, the position of the cursor after pressing the Enter key can be set to either Vertical, Horizontal, or No Movement.

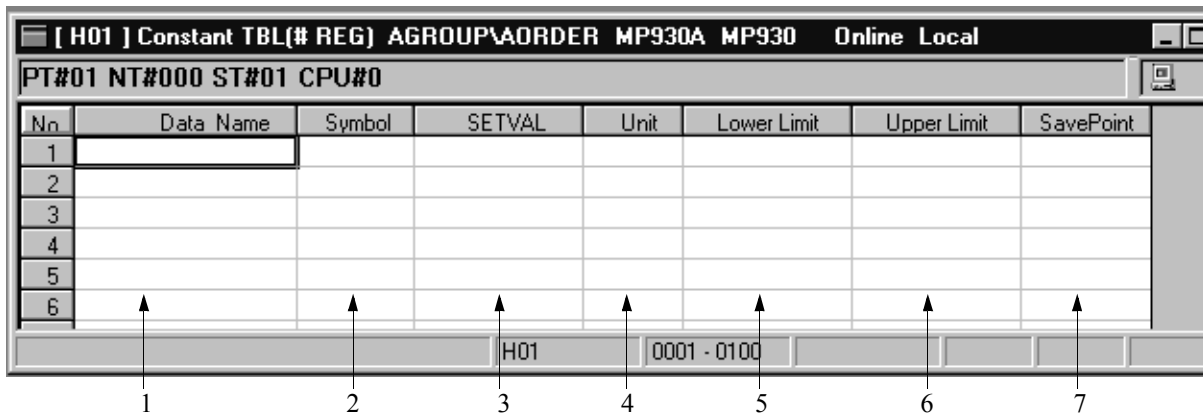
1. Input Setting Data Mode  
Inputs setting values only. Input to other cells is not possible.
  - a. Select **Input Setting Data (S)** from the **Input (I)** table menu.
2. Table Definition Input Mode  
Inputs data to all table cells.
  - a. Select **Input Table Definition (T)** from the **Input (I)** table menu.
3. Register Input Mode  
Inputs register numbers only. Input to other table cells is not possible.
  - a. Select **Input Register (R)** from the **Input (I)** table menu.
4. Cursor Scrolling Direction Switching  
This function switches the cursor scrolling direction following input of table data, and pressing of the **Enter** key.
  - a. Select **Direction of Cursor Movement (C)** from the **Input (I)** table menu.
  - b. Designate a scrolling direction in the dialog box, and select the **OK** button.





### 8.3.3 Constant Table (# register) Data Input

Constant tables (# register) are created by inputting parameters (integers, 32-bit integers, real numbers), symbols, and # register numbers. When storing a constant table (# register), the parameters are automatically converted to a # register following an upper/lower limit check. Table data can be created up to a number of number registers set in the DWG Configuration tab in the Property Window.



1. Data Name  
Input a name for each parameter of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.
2. Symbol  
Input a symbol pertaining to the # register to be stored of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.
3. Set Val  
Input the parameters to be stored in the # register. If the input is hexadecimal, attach an H to the beginning of the value such as in "H00FF." Input numerical values within the range as an upper/lower limit check; the data set in the Upper Limit and Lower Limit boxes executed upon setting input.
4. Unit  
Input parameter units of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.
5. Lower Limit  
Input the parameter lower limit.
6. Upper Limit  
Input the parameter upper limit. Input so that Lower Limit  $\leq$  Upper Limit.
7. Save Point  
Input the # register number to which the parameters are to be stored.

**Note:**

Setting, Lower Limit, Upper Limit, and Save Point must be set. An error occurs during storage if these are not set.

**Note:**

Constant tables (# register) cannot be created if the number of number registers set in the DWG Configuration tab in the Property Window is 0.

### 8.3.4 Constant Table (M register) Data Input

Constant tables (M register) are created by inputting parameters (integers, 32-bit integers, real numbers, hexadecimals), symbols, and M register numbers. When storing a constant table (M register), the parameters are automatically converted to a sub-program stored in the M register following an upper/lower limit check. The sub-programs are referred to according to the XCALL commands of the main program. Up to 200 rows of table data can be input.

Nn	Data Name	Symbol	SETVAL	Unit	Lower Limit	Upper Limit	SavePoint
1							
2							
3							
4							
5							
6							

1. Data Name  
Input a name for each parameter of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.
2. Symbol  
Input a symbol pertaining to the M register into which storage is to be executed of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.
3. Set Val  
Input the parameters to be stored in the M register. If the input is hexadecimal, attach an H to the beginning of the value such as in "H00FF". Input numerical values within range as an upper/lower limit; verify that the data set in the Upper Limit and Lower Limit boxes is executed upon setting input.

4. Unit  
Input parameter units of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.
5. Lower Limit  
Input the parameter lower limit.
6. Upper Limit  
Input the parameter upper limit. Input so that Lower Limit ≤ Upper Limit.
7. Save Point  
Input the M register to which the parameters are to be stored.

**Note:**

Setting, Lower Limit, Upper Limit, and Save Point must be set. An error occurs during storage if these are not set.

### 8.3.5 I/O Conversion Table Data Input

I/O conversion tables designate the input registers and conversion formats, and define the output registers that store the converted results. When storing an I/O convert table, the input register values are converted according to the conversion format and automatically converted to a sub-program stored in the output register following an upper/lower limit check. The sub-programs are referred to according to the XCALL commands of the main program. Up to 100 rows of table data can be input.

No	Data Name	Input			Setting		Scale Conversion/Bit Signal	Output		
		Symbol	Register	Unit	Lower Limit	Upper		Symbol	Register	Unit
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

1. Data Name  
Input a name for each parameter of 36 16-bit characters (18 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.
2. Input: Symbol  
Input a symbol pertaining to the register number input in 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.

3. **Input: Register**  
Input the register number to be input. The current values are displayed in the on-line mode.
4. **Input: Unit**  
Input units of registers to be input in 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.
5. **Setting Range: Lower Limit**  
Input the value to be used in the lower limit check following scale conversion.
6. **Setting Range: Upper Limit**  
Input the value to be used in the upper limit check following scale conversion.
7. **Scale Conversion Designation/Bit Signal Conversion Set**  
Input the conversion format for the register values input. Leave a 16-bit space between the value and the operations of the format which is input.
8. **Output: Symbol**  
Input a symbol pertaining to the register number output in 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.
9. **Output: Register**  
Input the output register number storing the converted value of the registers which were input.
10. **Output: Unit**  
Input units of registers to be output in 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.

**Note:**

Input registers and output registers must be set. An error occurs during storage if these are not set.

**Note:**

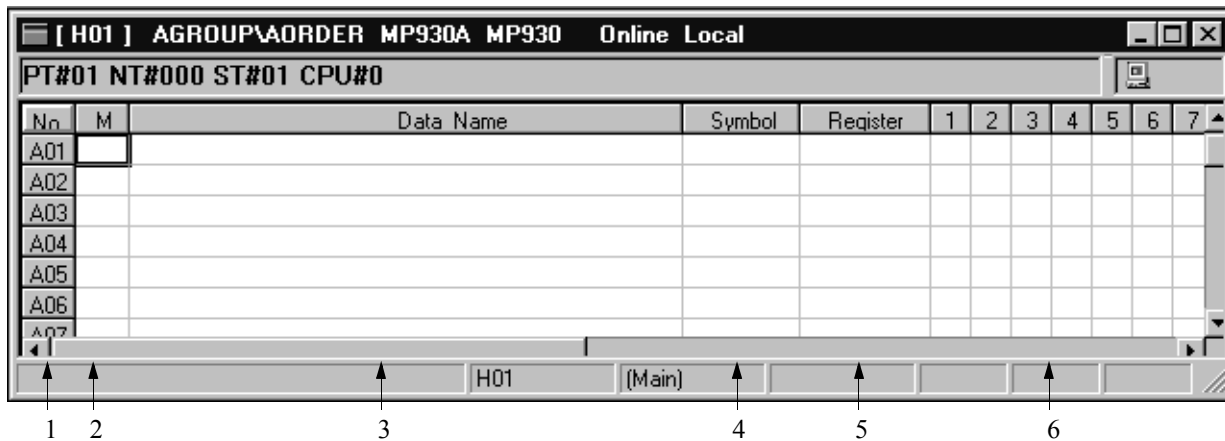
User function I/O conversion tables cannot be created.

### 8.3.6 Interlock Table Data Input

Various interlock conditions are defined in interlock tables. Interlock conditions are defined by inputting symbols, bit-form register numbers, and signal types (normally open contact, normally closed contact, coil). Upon storing this table, it becomes a sub-program configured from the normally open contact, normally closed contact, and coil. The sub-program is referred to from the main program XCALL command.

## ■ Table Data Input

Table data can be input up to 500 rows and 25 columns.



1. Number  
Shows the row number for each block. The block numbers are shown with the letters A ~ Z, the numbers following are the column numbers.
2. Mode  
Input the interlock conditions input mode with the letter I, S, O or X.
  - I: Input I when defining an input signal. The signal input to the line 1 ~ xx of the column which defined this mode sets normally open (NO) contacts to (□), and normally closed (NC) contacts to (⊗).
  - S: Input S when inputting table data into a sub-table. This mode is enabled only in a main table. The sub-table output and main table input symbols (or registers) must be identical.
  - O: Input O when defining the output signal. The signal input to column 1 ~ xx of the row which defined this mode sets coils to (●).
  - X: Input X when defining an output signal as an input signal. Input to the Input Register box is necessary when X is input. However, be sure that the same symbol outputs are defined in the main table in the case of a main table, and the sub-1 table in the case of a sub-1 table.
3. Data Name  
Input a name of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.
4. Symbol  
Input a symbol pertaining to the register number subject to interlock in 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined in this entry.

5. Register  
Input the bit-form register number to be interlocked.
6. Signal  
Input the interlock conditions. Normally open (NO) contacts are expressed with (□), normally closed (NC) contacts with (⊗), and coils with (●).

**Note:**

Mode, register, and signal must be set. An error occurs during storage if these are not set.

**Note:**

User function interlock tables cannot be created.

### ■ Sub-Table and Main Table Switching

The interlock table is configured according to a main interlock table (= main table), and sub-interlock tables (= sub-table) corresponding to each of the rows of the main interlock table. Sub-tables are created during the layering of interlock conditions. Sub-table numbers are determined according to column number in the main table: column A01 of the main table becomes sub-table A01, column B02 becomes sub-table B02, etc. Selecting **Main Table/Sub-Table (A)** from the **View (V)** menu switches currently displayed main tables to sub-tables, and sub-tables to main tables.

**Note:**

When switching from a main table to a sub-table, it is necessary in advance to move the cursor to the column of the main table displaying the sub-table. Sub-tables cannot be created for rows in which data other than S has been set into the M box.

### ■ Block Division/Merge

This function divides an interlock into a plurality of blocks. A maximum of 26 blocks can be divided, and each block is treated as an independent interlock.

- a. Move the cursor to the block divide/merge position.
- b. Select **Block Division (W)** from the table format program **View (V)** menu.
- c. The block is divided/merged.

**Note:**

Each time the divide/merge function is operated, a block is alternately divided or merged. Blocks cannot be divided in sub-tables. Interlocks cannot be created across blocks. Interlocks should be complete within each block.

## ■ Entry Comment

Indicate whether the data in the Name box is to be registered as a comment of the register of the same column.

- Select **Entry Comment (T)** from **Edit (E)** in the table format program menu.
- Indicate registration in the dialogue box, and select the **Set** button.



### 8.3.7 Parts Assembling Table Data Input

Parts assembling tables are created by inputting register numbers to execute input/output of user constants, as well as work register numbers. Upon saving a parts assembling table, the register numbers within the user function program are renumbered, and create a sub-program in the same function column based on this data using one column of the parts assembling table as a single function program data unit. The sub-program is referred to by the XCALL command of the main program.

## ■ Table Data Input

Table data can be input up to 100 rows. However, the input and output sections can only be up to 16 columns each.

No.	Data Name	PartName	Input	Output	HeadWork	REG No.
1					D/W	#W
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

1. **Data Name**  
Input a name of 28 16-bit characters (14 32-bit characters) or less. 16-bit and 32-bit characters can be combined in a name.
2. **Parts Name**  
Input the existing user function number. The I/O signal of the user function is automatically displayed following input.
3. **Input**  
Input the output register numbers or values so that the various inputs of a user function are allocated. Affix an H to the beginning of a value if it is input in hexadecimal form.
4. **Output**  
Input the input register number so that the various outputs of a user function are allocated.
5. **HeadWork**  
Input the D register number, or # register number so that the work register used in a user function is allocated.

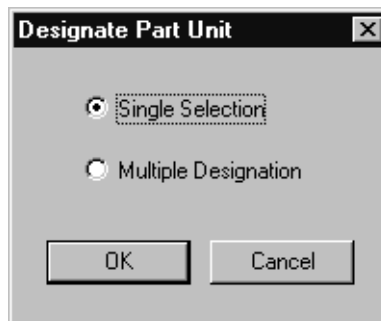
**Note:**

Parts assembling tables cannot be created for user functions. The default number of input and output columns for parts assembling tables is three. When a function with a number of inputs/outputs of four or greater is input in the Part Name box, it is necessary to increase the number of columns beforehand.

**■ Designate Part Unit**

This function switches between creation of parts assembling tables using a single part (singular designation), and multiple parts (plural designation).

- a. Select **Part Unit Designation (P)** from **View (V)** in the tabular format program menu.
- b. Designate the parts unit in the dialogue box, and select the **OK** button.



- c. The display format is switched and the parts assembling table displayed.



## ■ Display Selection

Parts assembling drawing display formats are of the following two types: register number only display (normal display), and register number and user function symbol display (symbol + setting display). Normal display and symbol + setting display can be switched in the following manner.

- a. Select **Display Selection (D)** from **View (V)** in the tabular format program menu.
- b. The display format is switched and the parts assembling table displayed.

### Note:

The display format cannot be switched if the parts unit is designated as singular.

## 8.3.8 Table Editing

This function edits tables in units of rows, columns, and blocks.

### ■ Cursor Movement

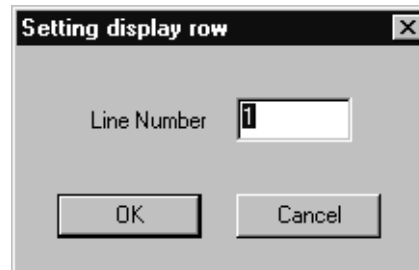
Although the cursor is normally moved by pressing the arrow keys, or clicking cells with the mouse, it is also possible to move the cursor to first column, last column, or next page as needed.

- a. Display Head Row  
This moves the cursor to the first row of a table.
  - a.1 Select **Display Head Row (F)** from **View (V)** in the tabular format program menu.
  - a.2 The cursor is displayed at the first row of the table.
- b. Display Last Row  
This moves the cursor to the last row of a table.
  - b.1 Select **Display Last Row (E)** from **View (V)** in the tabular format program menu.
  - b.2 The cursor is displayed at the last row of the table.

## c. Display Designated Row

This function moves the cursor to a desired column in the table.

- c.1 Select **Display Designated Row (R)** from **View (V)** in the tabular format program menu.
- c.2 In the dialogue box, input the column number to which the cursor is to move, and select the **OK** button.



- c.3 The cursor is displayed at the column input in (c.2).

## d. Next Page

This function moves the cursor in a parameter table (# register) to the first column of the next page of the table.

- d.1 Select **Next Page (N)** from **View (V)** in the tabular format program menu.
- d.2 The next page of the table format program is displayed.

## e. Back Page

This function moves the cursor in a parameter table (# register) to the first column of the previous page of the table.

- e.1 Select **Back Page (B)** from **View (V)** in the tabular format program menu.
- e.2 The next page of the table format program is displayed.

## ■ Selection of Editing Object

Select the part of the table to be edited.

- a. Point to the upper left cell of the area to be edited.

Nn	Data Name	PartName	Input		Output		HeadWork	REG No.
							DW	#W
1								
2								
3								
4								

- b. Drag the cursor to the lower right corner of the area to be edited.

Nn	Data Name	PartName	Input		Output		HeadWork	REG No.
							DW	#W
1								
2								
3								
4								

## ■ Table Data Editing

This is the cutting and pasting of table data.

### a. Cutting Table Data

This function cuts a designated area of table data. The cut table data is copied into the cut buffer. The contents of the cut buffer can be copied a number of times using the **Paste** function.

- a.1 Select the area to be cut.
- a.2 Select **Cut (T)** from **Edit (E)** in the tabular format program menu.
- a.3 The data designated in (a.1) is cut.

### b. Copying Table Data

This function copies a designated area of table data into the cut buffer. The contents of the cut buffer can be copied a number of times using the **Paste** function.

- b.1 Select the area to be copied.
- b.2 Select **Copy (C)** from **Edit (E)** in the tabular format program menu.
- b.3 The data designated in (b.1) is copied into the cut buffer.

### c. Pasting Table Data

Inserts cut buffer contents.

- c.1 Move the cursor to the position at which pasting is to be done. The contents copied into the cut buffer by the **Cut** or **Copy** functions are available for pasting. Multiple copies can be made because the cut buffer contents are held until the next execution of the **Cut** function or **Copy** function.
- c.2 Select **Paste (P)** from **Edit (E)** in the tabular format program menu.
- c.3 The cut buffer contents are copied into the position designated in (c.1).

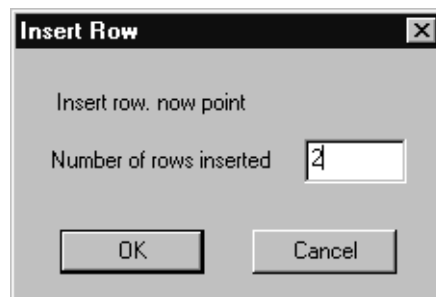
## ■ Row Editing

Insertion and deletion of rows are discussed below.

### a. Insert Row

This function inserts a blank row at a desired position.

- a.1 Move the cursor to the position at which a row is to be inserted.
- a.2 Select **Insert Row (I)** from **Edit (E)** in the tabular format program menu.
- a.3 In the dialogue box, input the number of rows to be inserted, and select the **OK** button.



- a.4 The number of blank rows input in (a.3) is inserted at the position designated in (a.1).

b. Delete Row

This function deletes a number of connected rows.

b.1 Select the rows to be deleted.

b.2 Select **Delete Row (D)** from **Edit (E)** in the tabular format program menu.

b.3 The rows designated in (b.1) are deleted.

**Note:**

Deletion of all rows currently displayed is not possible.

## ■ Column Editing

Insertion and deletion of columns in interlock tables and parts assembling tables are discussed below.

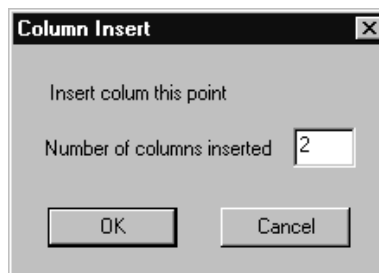
a. Insert Column

This function inserts blank columns at the desired position.

a.1 Move the cursor to the position at which columns are to be inserted.

a.2 Select **Insert Column (Q)** from **Edit (E)** in the tabular format program menu.

a.3 In the dialogue box, input the number of columns to be inserted, and select the **OK** button.



a.4 The number of columns input in (a.3) is inserted at the position designated in (a.1).

**Note:**

In interlock tables, columns cannot be inserted into the Number, ~, and Register columns.

b. Delete Column

This function deletes a number of connected columns.

b.1 Select part of the column to be deleted.

b.2 Select **Delete Column (R)** from **Edit (E)** in the tabular format program menu.

b.3 The columns designated in (b.1) are deleted.

**Note:**

In interlock tables, Number, ~, and Register columns cannot be deleted.

### 8.3.9 Saving Tabular Format Programs

Saving tabular format programs is discussed in this item. Saving is done into both the PLC and hard drive in the on-line mode, and into the hard drive in the off-line mode. A program (main program, etc.) is simultaneously saved whenever the same ladder/function program window is opened.

- a. Select **Save (S)** from **File (F)** in the tabular format program menu.
- b. Select the **Yes (Y)** button in the “**DWG/FUNC Save OK?**” message box.
- c. Select the **OK** button in the “**Saving Has Been Completed**” message box.

**Note:**

In interlock tables, it is possible to save without relay and coil settings. This is both to improve the operability of MotionWorks™, and to enable discontinuation of program creation. However, make sure that relays and coils are set prior to program operation.

**Note:**

Compiler processing is executed when saving tabular format programs. An error window is displayed if a compiler error is detected. For details on the error window, see Item 8.2.10 “Ladder Program Storage.”

### 8.3.10 Printing Tabular Format Programs

In tabular format programs, it is possible to print from the tabular format program window without opening the Print Manager. However, the program printed is the tabular format program currently open. For page setup and print execution method, see Item 8.2.11 “Ladder Program Printing.”

### 8.3.11 Ending Tabular Format Program Creation

Close the window to end tabular format program creation. To close the tabular format program window, select **Close (C)** from the **File (F)** menu.

## 8.4 Tuning Panel Creation

In the Tuning Panel, comments such as names, units, etc., are defined in the registers used in ladder programs and function programs. In the on-line mode, the current values of the defined registers can be displayed and their values changed.

### 8.4.1 Tuning Panel Window Structure

Opening the Tuning Panel window, and the structure of the window menu are presented in this item.

#### ■ Opening the Tuning Panel Window

The Tuning Panel window can be opened from either the File Manager or Engineering Manager. Stored adjustment parameters are called out from the PLC in the on-line mode, and from the hard drive in the off-line mode.

##### Opening From the File Manager

- a. Point and click a drawing number on the tree diagram.
- b. Select **Open (N)⇒Tuning Panel (P)** from the **File (F)** menu.
- c. The Tuning Panel window is open.

##### Opening From the Engineering Manager

- a. Select **Open (N)⇒Program (P)⇒Tuning Panel (P)** from the **File (F)** menu.
- b. The Tuning Panel window is open.

#### Note:

The Input DWG Name dialogue box is displayed when the Tuning Panel window is open and the ladder or function programs are closed. Input the drawing name, and ladder type, then select the **OK** button.

#### Supplement:

The Tuning Panel is set up to correspond with a main program for an open source ladder/function. Therefore, when another ladder number/function symbol Tuning Panel is set, the main program for that ladder number function symbol must be open.

#### ■ Tuning Panel Window Menu Structure

The menus displayed in the Tuning Panel window are shown in Table 5. See the item numbers listed in the right-hand column of Table 5 to refer to the various functions in the menus.

**Table 5: Tuning Panel Window Menus**

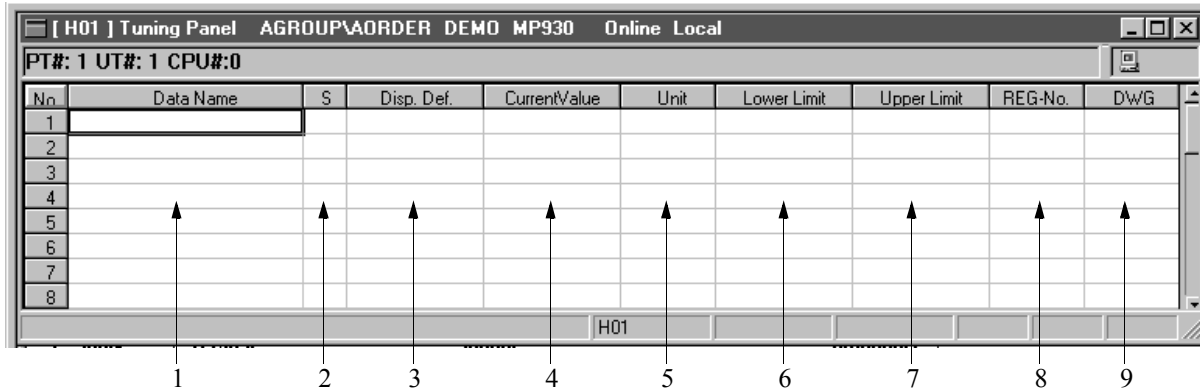
Menu	Function	Item No.
<b>File (F)</b>		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes Tuning Panel window	8.4.7
Regist User Menu (U)	Registers user menu	—
Save (S)	Saves Tuning Panel	8.4.5
Delete (D)	Cannot be used in this window	—
Page Setting (M)	Sets print margins	8.4.6
Print (P)	Prints Tuning Panel definition data	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
<b>Edit (E)</b>		
Cut (T)	Cuts table data	8.3.8
Copy (C)	Copies table data into the cut buffer	8.3.8
Paste (P)	Copies contents of cut buffer into program	8.3.8
Delete Row (D)	Deletes a number of connected rows	8.3.8
Insert Row (I)	Inserts empty row	8.3.8
<b>Input (I)</b>		
Input Setting Data (S)	Switches to setting input mode	8.3.2
Table Definition (T)	Switches to table definition input mode	8.3.2
Register (R)	Switches to register input mode	8.3.2
Direction of Cursor Movement (C)	Sets the cursor scroll direction	8.3.2
<b>View (V)</b>		
Tool Bar (T)	Displays the tool bars that are available	3.4.3
Status Bar (S)	Displays status bar	3.4.3
Display Head Row (F)	Moves cursor to first row of table	8.3.8
Display designated Row (R)	Moves cursor to a desired row in the table	8.3.8
Display Last Row (E)	Moves cursor to last row of table	8.3.8
<b>Window (W)</b>		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
<b>Help (H)</b>		
About App. (A)	Displays version data	3.4.5

## 8.4.2 Input Mode Switching

There are three Tuning Panel input modes as follows: Input Setting (input setting values only) mode, Input Table Definition (input to all cells in table) mode, and Input Register (register number only input) mode. It is also possible to set the cursor position following input and pressing of the **Enter** key to Horizontal, Vertical or No Movement. The method of switching the input mode is the same as that for tabular format programs. See Item 8.3.2 “Input Mode Switching.”

### 8.4.3 Tuning Panel Setting

Input the various definition data into the Tuning Panel. Up to 100 units of definition data can be created.



1. Data Name  
Input data names of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.
2. Setting Permission  
Input S to permit setting of the current value. The current value cannot be changed if this is an empty space.
3. Display Definition  
Input the current value display format in X for whole numbers and “.” for decimal points. Input examples for display definitions are given in Table 6 below.

**Table 6: Display Definition Input Formats**

Current Value	Display Format	Register Type
Positive numbers with +/-	Xx.xxx	Positive number, double length integer
Positive numbers without +/-	Uxx.xxx	Positive number, double length integer <sup>*1</sup>
Hexadecimals	Hxxxx	Positive number, double length integer <sup>*2</sup>
Real Numbers (with exponent)	x.xxxxxE.xx	Real number
Real Numbers (without exponent)	x.xxxxx	Real number
Bit Signals	ON/OFF or 0/1	Bit type <sup>*2</sup>

\*1: The fraction values shift according to the current value. If the display decimal places are exceeded, they are converted to real number format (with +/-) and the current values displayed.

\*2: Negative values cannot be input during current value input.



4. **Current Value**  
This column displays the current value of the register. The register data is displayed from the PLC in the on-line mode, and from the hard disk in the off-line mode. If x.xxx is input in the Display Definition box, 1.000 is displayed even if the actual register value is 1000. If S is input into the S box, it is possible to modify the current value. The input value is saved upon pressing the **Enter** key. If upper limits and lower limits are set in the Upper Limit box and Lower Limit box, only values within that range can be input.
5. **Unit**  
Input current value units of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined within units.
6. **Lower Limit**  
Input the lower limit in inputting current values. If the same value is input into both the upper limit and lower limit, no other current value can be input. Input so that Lower Limit  $\leq$  Upper Limit.
7. **Upper Limit**  
Input the upper limit in inputting current values. If the same value is input into both the upper limit and lower limit, no other current value can be input. Input so that Lower Limit  $\leq$  Upper Limit.
8. **REG\_Number**  
Input the register number so as to display its current value. Inputtable register types are I, O, M, and D.
9. **DWG**  
Input a D register ladder number if a D register number is input in the REG-Number box.

#### 8.4.4 Editing the Tuning Panel

Edit the panel by column units and block units. The Tuning Panel editing method is the same as that for tabular format programs. See Item 8.3.8 “Table Editing.”

#### 8.4.5 Saving the Tuning Panel

Save the Tuning Panel. The Tuning Panel is saved to both the PLC and hard drive in the on-line mode, and to the hard drive in the off-line mode. If the program window of the same drawing number is open, that program, the main program, etc., are saved at the same time.

- a. Select **Save (S)** from **File (F)** in the Tuning Panel menu.
- b. Select the **Yes (Y)** button in the “**DWG/FUNC Save OK?**” dialogue box.
- c. Select the **OK** button in the “**Saving Has Been Completed**” message box.

**Note:**

When saving the Tuning Panel, a check is performed as to whether the definition data was input correctly. An error window is displayed if an error is detected. See Item 8.2.10 “Ladder Program Storage” regarding this error window.

**8.4.6 Printing from the Tuning Panel**

It is possible to print from the Tuning Panel window without opening the Print Manager. However, only the Tuning Panel currently open can be printed. For page setup and print execution method, see Item 8.2.11 “Ladder Program Printing.”

**8.4.7 Ending Tuning Panel Creation**

Tuning Panel creation ends when the Tuning Panel window is closed. To close the Tuning Panel window, select **Close (C)** from the **File (F)** menu.

## 8.5 C Register Creation

The creation of the various global parameter data common to all ladders and functions in installations, products, etc. is presented below.

### 8.5.1 C Register List Window Configuration

C register tables are managed according to the list window. The method for opening the list window, and the structure of the menus are discussed in this item.

#### ■ Opening the C Register List Window

The list window can be opened from the Engineering Manager. The C register list stored in the PLC in the on-line mode, and in the hard drive in the off-line mode, is called out.

##### Opening from the Engineering Manager

- a. Select **Open (O)⇒C Register (C)⇒C Register List (M)** from the **File (F)** menu.
- b. The list window opens.

#### ■ Appearance of C Register List Window

This window displays a list of stored C registers. The list is displayed in C register number order. From this window, open the C register table window, and define the C register contents.

1. Table Name  
This column shows the C register name.
2. Register  
This column shows the first number of the C register.
3. Size  
This column shows the size from the first C register number in word units.
4. Comments  
This column shows comments in the C register table.

## ■ Menu Structure of C Register List Window

The menus displayed in the C register list window are shown in Table 7. See the item numbers shown in the right-hand column to reference a function from the menu.

**Table 7: C Register list Window Menus**

Menu	Function	Item No.
<b>File (F)</b>		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes the C register list window	8.5.8
Specification Table (C Register) (T)	Opens C register table	8.5.2
New (N)	Creates new C register table	8.5.2
Delete (D)	Deletes C register table	8.5.2
Correct (U)	Corrects C register table	8.5.2
Print (P)	Prints document	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
<b>View (V)</b>		
Tool Bar (T)	Displays the tool bar	3.4.3
Status Bar (S)	Displays status bar	3.4.3
<b>Window (W)</b>		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
<b>Help (H)</b>		
Help Topics (H)	Displays Help topics	—
About App. (A)	Displays version data	3.4.5

### 8.5.2 Table Operation with the List Window

Using the list window, it is possible to execute C register table creation, deletion, etc.

#### ■ Opening C Register Tables

Open C register table windows from the C register list window.

- a. Point and click on the Number box of a C register.
- b. Select **Parameter Table (C register) (T)** from **File (F)** in the C register list menu.
- c. The C register table window selected in (a) is opened.

#### Helpful Hint

The C register display window can also be opened by double-clicking in (a). See Item 8.5.5 “C Register Table Setting” for operation of C register table windows.

## ■ Creation of New C Register Tables

This item presents the creation of new C registers. After creating a C register, open its C register table window.

- a. Select **New (N)** from **File (F)** in the C register list menu.
- b. In the dialogue box, input the table name, starting register number, size, and comments, then select the **OK** button.
- c. Open the C register table window specified in (b).

### Note:

Input a table name of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters may be combined in the name. Input a starting register number between CW0 ~ CW16383, and 16284 or less in proportion to the size. Starting register numbers and sizes that duplicate other C register areas cannot be input.

### 8.5.3 Structure of C Register Table Window

Opening of the C register table window, and its menu structure are presented here.

#### ■ Opening of C Register Table Window

Open the C register table window. The C register tables stored in the PLC in the on-line mode, and in the hard drive in the off-line mode, are called out. See Item 8.5.2 “Table Operation with the List Window” for further information on opening the C register table window.

## ■ Menu Structure of C Register Table Window

Table 8 shows the menus displayed in the C register table window. Refer to the item numbers in the right-hand column for more information on each of the menu functions.

**Table 8: C Register Table Window Menus**

Menu	Function	Ref. No.
<b>File (F)</b>		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes C register table window	8.5.9
Save (S)	Saves C register table	8.5.7
Delete (D)	Cannot be used in this window	—
Page Setting (M)	Sets print margins	8.5.8
Print (P)	Prints C register table	8.5.8
Exit (X)	Exits Engineering Manager	3.4.2
<b>Edit (E)</b>		
CUT (T)	Cuts table data	8.5.6
COPY (C)	Copies table data into the cut buffer	8.5.6
PASTE (V)	Copies contents of cut buffer into program	8.5.6
Delete Row (D)	Deletes a number of connected rows	8.5.6
Insert Row (Z)	Inserts empty row	8.5.6
<b>Input (I)</b>		
Input Setting Data (S)	Switches to setting input mode	8.5.4
Table Definition (T)	Switches to table definition input mode	8.5.4
Register (R)	Switches to register input mode	8.5.4
Direction of Cursor Movement (C)	Sets the cursor scroll direction	8.5.4
<b>View (V)</b>		
Tool Bar (T)	Displays the tool bar	3.4.3
Status Bar (S)	Displays status bar	3.4.3
Display Head Row (F)	Moves cursor to first row of table	8.5.6
Designated Row (R)	Moves cursor to a desired row in the table	8.5.6
Display Last Row (E)	Moves cursor to last row of table	8.5.6
<b>Window (W)</b>		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
<b>Help (H)</b>		
Help Topics (H)	Displays Help topics	—
About App. (A)	Displays version data	3.4.5

## 8.5.4 Input Mode Switching

There are three table data input modes: the Setting Input mode (input of settings only), the Table Definition Input mode (input of all the cells within the table), and the Register Input mode (input of register numbers only). Moreover, the position of the cursor after pressing the **Enter** key can be set to either Vertical, Horizontal, or No Movement. The method of input mode switching is identical to that for tabular format programs. See Item 8.3.2 “Input Mode Switching.”

## 8.5.5 C Register Table Setting

C registers are created by inputting parameters (integers, double-length integers, real numbers, hexadecimals), symbols, and C register numbers. These parameters are automatically converted to a C register following an upper limit and lower limit check on each parameter upon C register table storage. Table data can be created up to the size of the currently open C register.

1. Name  
Input a name of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters can be combined within names.
2. Symbol  
Input a symbol of 8 16-bit characters (4 32-bit characters) or less pertaining to the C register to be stored into. 16-bit and 32-bit characters can be combined within symbols.
3. Setting Value  
Input parameters to be stored in the C register. In hexadecimal input, affix an H to the beginning of the value, as in H00FF. During setting input, input values within range as an upper/lower limit check is done by the data set into the Upper Limit and Lower Limit boxes.
4. Table Name  
The table name of the currently displayed C register table is displayed.
5. Unit  
Input parameter units of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined within units.
6. Starting Register Number  
The C register number of the currently displayed C register table is displayed.
7. Lower Limit  
Input the lower parameter limit.
8. Size  
The size of the C register of the currently displayed C register table is displayed in word units.

9. Upper Limit  
Input the parameter upper limit. At this time input values such that Lower Limit  $\leq$  Upper Limit.
10. Save Point  
Input the C register in which the parameters are stored.

**Note:**

The settings, lower limit, upper limit, and Save Point must be input. A save error results if these are not set.

### 8.5.6 Editing C Register Tables

Edit the C register tables. The method for editing C register tables is the same as that for tabular format programs. See Item 8.3.8 “Table Editing.”

### 8.5.7 Saving C Register Tables

Save the C register tables. Saving is done to both the PLC and hard drive in the on-line mode, and to the hard drive in the off-line mode.

- a. Select **Save (S)** from **File (F)** in the C register table menu.
- b. Select the **Yes (Y)** button in the **Parameter Table (C register)** message box.
- c. Select the **OK** button in the “**Saving Has Been Completed**” message box.

**Note:**

Compilation processing is executed during C register storage. An error window is displayed if a compiler error is detected. See Item 8.2.10 “Ladder Program Storage.”

### 8.5.8 Printing C Register Table

In C register tables, it is possible to execute printing from the C register table window without opening the Print Manager. However, only the C register table currently open can be printed. For page setup and print execution method, see Item 8.2.11 “Ladder Program Printing.”

### 8.5.9 Ending C Register Table Creation

Close the C register list window or C register table window to end C register panel creation. To close the C register table window, select **Close (C)** from **File (F)** in the table window menu. To close the C register list window, select **Close (C)** from **File (F)** in the list window menu.



## 8.6 Table Data Creation

The data used in the main program in table format is discussed below.

### 8.6.1 Summary of Table Data Creation Procedure

The procedure for creating table data is briefly presented here.

#### ■ Table Data Creation Procedure

Table data creation can be broadly divided into three procedures. First, define the table name, using “Table Definition Data Setting.” Next, set the names of the table column items using “Column Attribute Setting.” Finally, input data with column attributes for the number of rows using “Table Data Setting.”

##### a. Table Definition Data Setting

Open the table data list window, and select the **New (N)** command in the **File (F)** menu of the table data window. Set the table name, table type, number of columns, number of rows, and table comments into the table definition setting dialogue box which is displayed.

Setting Item	Content
Table Name	Name of table
Table Type	Two types: Array and Record
Number of Columns	Number of table columns
Number of Rows	Number of table rows
Table Comments	Table notes

##### b. Column Attribute Setting

Open the Column Attribute window, and set the column attributes. For column attributes, set column name, data type, size, display type, etc.

Setting Item	Content
Column Name	Name of column
Data Type	Integer, 32-bit integer, real number, and character
Size	Length of data type
Display Type	Display format of table data
Column Comments	Column notes

##### c. Table Data Settings

Open the table data window, and set the column data for each column.

In the following items, a more detailed explanation of the above procedures appears.

## 8.6.2 Structure of Table Data List Window

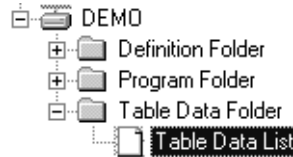
Opening of the list window, as well as the structure of the window and menus are presented in this item.

### ■ Opening Table Data List Window

The list window can be opened from the File Manager or the Engineering Manager. This function calls up a list of the table data stored in the PLC in the on-line mode, or in the hard drive in the off-line mode.

#### Opening from the File Manager

- a. Display the PLC folders in the tree diagram.
- b. Double-click the Table Display List folder in the Table Data folder.



- c. The list window opens.

#### Opening from the Engineering Manager

- a. Select **Open (O)⇒Data Table Definition (G)⇒Data Table Map (L)** from the **File (F)** menu.
- b. The list window opens.

### ■ Outline of Table Data List Window

This function displays a list of stored table data. The tables are arranged alphabetically in the list. From this window, open the column attribute and table data setting windows, and define the table data.

Table Data Definition List ABCD\EF GH DEMO MP930 Online Local

PT#01 NT#000 ST#01 CPU#0

No.	Table Name	Table Type	Column	Lines	Comment
00001	\$SVCFG01	Record Type	00058	00008	SGD-***N
00002	\$SVCFG02	Record Type	00058	00008	SGDB-***AN
00003	\$SVD0101	Record Type	00058	00002	
00004	\$SVD0102	Record Type	00058	00002	
00005	\$SVD0103	Record Type	00058	00002	

1. Table Name  
2. Table Type  
3. Column  
4. Lines  
5. Comments  
6. Column Attribute Button  
7. Table Data Button

1. Table Name  
This column shows the name of the table data.
2. Table Type  
This column shows the table type.
3. Column  
This column shows the number of table data columns.
4. Lines  
This column shows the number of table data rows.
5. Comments  
This column shows the table data comments.
6. Column Attribute Button  
This button opens the column attribute window.
7. Table Data Button  
This button opens the table data window.

## ■ Structure of Table Data List Window Menus

The menus displayed in the column attribute window are shown in Table 9. Refer to the item numbers shown in the right-hand column for further explanation of each of the menu functions.

**Table 9: Table Data List Window Menus**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
New (N)	Creates new table data	8.6.3
Delete (D)	Cannot be used in this window	8.6.3
Close (C)	Closes table data list window	8.6.12
Print (P)	Prints C register table	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
View (V)		
Tool Bar (T)	Displays the tool bars that are available	3.4.3
Status Bar (S)	Displays status bar	3.4.3
Column Definition (C)	Opens the column attribute window	8.6.3
Table Data (D)	Opens table data window	8.6.3
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

### 8.6.3 Table Operation in the List Window

It is possible to open the column attribute window and table data window from the list window. Furthermore, it is also possible to delete tables or change definition data.

#### ■ Opening the Column Attribute Window

Open the column attribute window from the table data list window.

- a. Select a table data number box.

No.	Table Name	Table Type	Column	Lines	Comment
00001	\$SVCFG01	Record Type	00058	00008	SGD-***N
00002	\$SVCFG02	Record Type	00058	00008	SGDB-***AN
00003	\$SVD0101	Record Type	00058	00002	
00004	\$SVD0102	Record Type	00058	00002	

- b. Select **Column Definition (C)** from **View (V)** in the table data list menu, or select the **Column Attribute** button.
- c. The table data column attribute window for the table data selected in (a) is displayed. See Item 8.6.5 “Setting Column Attribute” for further information on how to operate the column attribute window.

#### Helpful Hint

The column attribute window can also be opened by double-clicking in (a).

#### Supplement:

The column attribute window can also be opened from the table data window. Use the following procedure to open from the table data window.

- a. Select **Column Attribute (R)** from **File (F)** in the table data menu.
- b. The column attribute window opens.

#### ■ Opening the Table Data Window

Open the table data window from the table data list window.

- a. Point and click the Number box in the table data.
- b. Select **Table Data (D)** from **View (V)** in the table data list menu, or select the **Table Data** button.
- c. The table data window of the table data selected in (a) is opened.

**Supplement:**

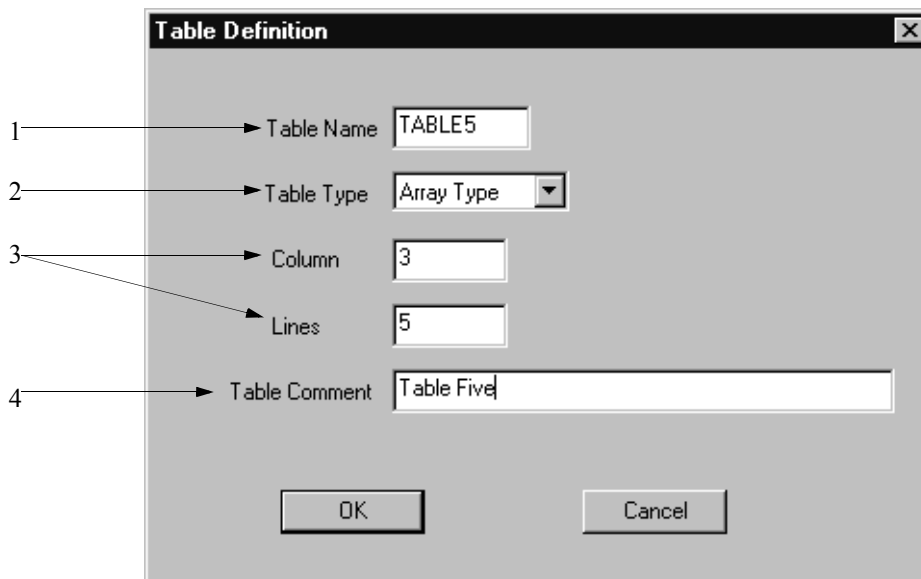
The table data window can also be opened from the column attribute window. Follow the steps below to open from the column attribute window.

- a. Select **Table Data (D)** from **File (F)** in the line attribute menu.
- b. The table data window opens.

**■ Creation of New Table Data**

Creates new table data. After the table data is created, the column attribute window for that data opens.

- a. Select **New (N)** from **File (F)** in the table data list menu.
- b. Input the table definition data into the table definition setting dialogue box, and select the **OK** button.



- c. The column attribute window for the table data set in (b) opens.

**Table Definition Setting Dialogue Box**

Input the following data into the table definition setting dialogue box to create table data.

1. Table Name  
Input a table name of 8 16-bit characters or less. However the characters “,”, “?”, “\*”, “”, and ‘ cannot be used.
2. Table Type  
Select the table type.  
Array : Table in which all columns have the same attributes.  
Record: Table in which attributes differ by column unit.

### 3. Number of Columns, Number of Rows

The number of columns and rows within a table is within a range of 1 ~ 10000. The table data size is a result of “Number of Columns × Number of Rows.” Creation of table data with a size exceeding 5Mbytes is not possible. If 5Mbytes is exceeded, an error detection message box is displayed. For this reason, keep the number of columns and number of rows as small as possible. Furthermore, a warning message box is displayed if table data exceeds 1Mbyte. Try to keep table data size under 1Mbyte.

### 4. Table Comments

Input table data comments of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters can be combined within comments.

## ■ Table Data Deletion

This function deletes table data stored in both the PLC and hard drive in the on-line mode, and in the hard drive in the off-line mode.

- a. Point to and click the number of the table data to be deleted.

No.	Table Name	Table Type	Column	Lines	Comment
00001	\$SVCFG01	Record Type	00058	00008	SGD-***N
00002	\$SVCFG02	Record Type	00058	00008	SGDB-***AN
00003	\$SVD0101	Record Type	00058	00002	
00004	\$SVD0102	Record Type	00058	00002	

- b. Select **Delete (D)** from the **File (F)** in the table data list menu.
- c. Select the **Yes (Y)** button in the message box.
- d. The table data selected in (a) is deleted.

No.	Table Name	Table Type	Column	Lines	Comment
00001	\$SVCFG01	Record Type	00058	00008	SGD-***N
00002	\$SVCFG02	Record Type	00058	00008	SGDB-***AN
00003	\$SVD0101	Record Type	00058	00002	

## 8.6.4 Structure of the Column Attribute Window

Opening the column attribute window, and the structure of the menus therein, is presented in this item.

### ■ Opening the Column Attribute Window

Open the column attribute window. This window calls out the column attribute data stored in the PLC in the on-line mode, and in the hard drive in the off-line mode. See Item 8.6.3 “Table Operation: Opening the Column Attribute Window” to open the column attribute window.

## ■ Structure of the Column Attribute Window Menus

The menus displayed in the column attribute window are shown in Table 10. Refer to the item numbers shown in the right-hand column for further information on the menu functions.

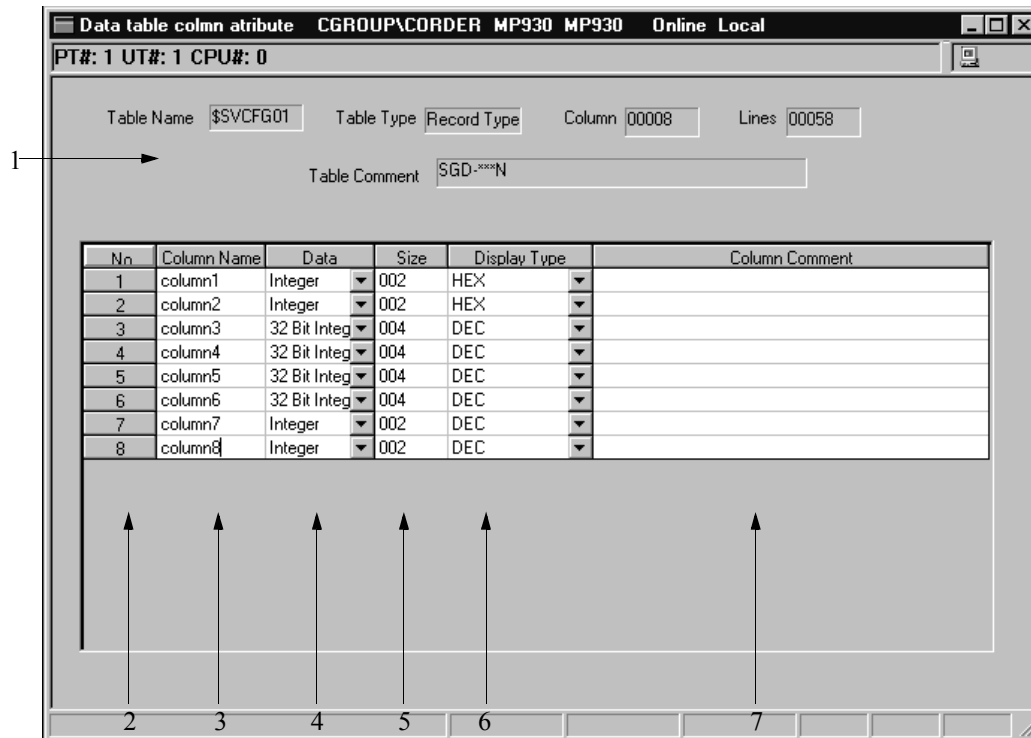
**Table 10: Column Attribute Window Menus**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes column attribute window	8.6.12
Save (S)	Saves column attribute table	8.6.7
Table Data (D)	Opens the table data window	8.6.3
Change (H)	Changes table definitions	8.6.6
Print (P)	Prints document	Ch. 12
Exit (X)	Exits Engineering Manager	3.4.2
Edit (E)		
Copy (C)	Copies column data into the cut buffer	8.6.6
Cut (T)	Cuts column data	8.6.6
Paste (P)	Copies contents of cut buffer into program	8.6.6
Insert (I)	Inserts empty row	8.6.6
Delete (D)	Deletes data	8.6.6
View (V)		
Tool Bar (T)	Displays the tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Go To (J)	Moves cursor to a desired row in the table	8.6.6
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile (T)	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

### 8.6.5 Setting Column Attributes

If the table is array type, set the attributes for just one column because the column attributes are the same for all columns. In the record type, set the column attributes for a number of columns, because the attributes differ for each column.





### 1. Table Definition Data

This column displays table data name, table type, number of columns, number of rows, and table comments.

### 2. Number

This column shows the column numbers. This is one in an array table, and a number of columns in record tables.

### 3. Column Name

Input a column name of 8 16-bit characters (4 32-bit characters) or less. 16-bit and 32-bit characters can be combined within column names.

### 4. Data

Select the column data type.

Integer:	Integer type
32-bit Integer:	32-bit integer type
Real :	Real number type
Character :	Character string type

### 5. Size

Input the number of table data bytes from 1 ~ 80. However, the value is 2 bytes when Integer is in the Data box, 4 bytes when 32-bit Integer, and 4 bytes when Real Number, and cannot be changed. A different value can be input only for Character String.

## 6. Display Type

Sets the data display type. However, this cannot be changed when Character String or Real Number are in the Data box.

BIN	: Binary display
DEC	: Decimal display
HEX	: Hexadecimal display
Real	: Real number display
Character	: Character string display

## 7. Column Comments

Input column comments of 32 16-bit characters (16 32-bit characters) or less. 16-bit and 32-bit characters can be combined within comments.

**Note:**

In the on-line mode, it is possible to change data only in the Display Type box and Column Comment box.

**8.6.6 Column Attribute Editing**

This function edits column attribute setting data.

## a. Data Row Insertion

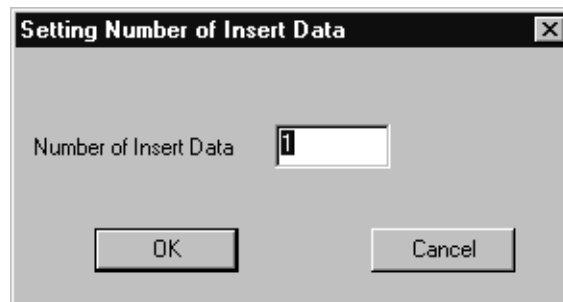
This function inserts blank rows at a desired position.

a.1 Move the cursor to the position at which the row is to be inserted.

N <sub>n</sub>	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2	column2	Integer	002	HEX	
3	column3	32 Bit Integ	004	DEC	
4	column4	32 Bit Integ	004	DEC	
5	column5	32 Bit Integ	004	DEC	

a.2 Select **Insert (I)** from **Edit (E)** in the Column Attribute menu.

a.3 In the dialogue box, input the number of rows to be inserted, and select the **OK** button.

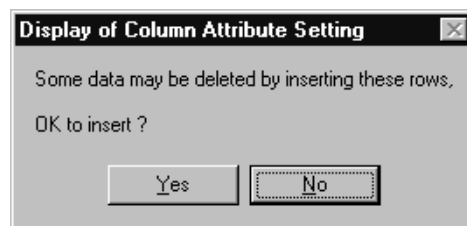


- a.4 The number of rows designated in (a.3) is inserted at the position designated in (a.1).

Nn	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2					
3	column2	Integer	002	HEX	
4	column3	32 Bit Integ	004	DEC	
5	column4	32 Bit Integ	004	DEC	

**Note:**

Here, the actual number of rows is not increased, but rather the setting data shifts down by the number of rows inserted. If rows are deleted due to the insertion, a verification message box appears. Select whether to insert rows or not.



The actual number of rows can be increased by changing the number of rows in the table definition. See Item 8.6.3 “Table Operation in the List Window: Correction of Table Definition Data.”

- b. Deletion of Data Rows

This function deletes a number of connected data rows.

- b.1 Select the row(s) to be deleted.

Nn	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2					
3	column2	Integer	002	HEX	
4	column3	32 Bit Integ	004	DEC	
5	column4	32 Bit Integ	004	DEC	

- b.2 Select **Delete (D)** from **Edit (E)** in the Row Attribute menu.

- b.3 Select the **Yes (Y)** button in the message box.

- b.4 The row(s) designated in (b.1) is deleted.

Nn	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2					
3	column2	Integer	002	HEX	
4	column4	32 Bit Integ	004	DEC	
5	column5	32 Bit Integ	004	DEC	

**Note:**

Here, the number of rows is not actually decreased; the setting data is shifted upward by the number of rows deleted. The actual number of rows can be decreased by changing the number of rows in the table definition. See Item 8.6.3 “Table Operation in the List Window: Correction of Table Definition Data”.

## c. Cutting Data

This function cuts a designated area of data. The cut data is copied into the cut buffer. The contents of the cut buffer can be repeatedly copied by using the **Paste** function.

c.1 Select the area to be cut.

Nn	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2					
3	column2	Integer	002	HEX	
4	column4	32 Bit Integ	004	DEC	
5	column5	32 Bit Integ	004	DEC	

c.2 Select **Cut (T)** from **Edit (E)** in the Column Attribute menu.

c.3 The data in the area selected in (c.1) is cut.

Nn	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2					
3	column4	32 Bit Integ	004	DEC	
4	column5	32 Bit Integ	004	DEC	
5	column6	32 Bit Integ	004	DEC	

## d. Copying Data

This function copies a designated area of data. The copied data is copied into the cut buffer.

d.1 Select the area to be copied.

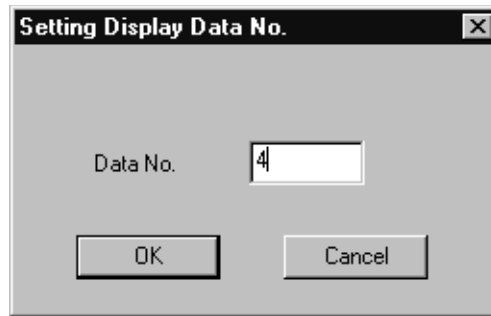
Nn	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2					
3	column4	32 Bit Integ	004	DEC	
4	column5	32 Bit Integ	004	DEC	
5	column6	32 Bit Integ	004	DEC	

d.2 Select **Copy (C)** from **Edit (E)** in the Column Attribute menu.

d.3 The data in the area selected in (c.1) is copied into the cut buffer.

Nn	Column Name	Data	Size	Display Type	Column Comment
1	column1	Integer	002	HEX	
2	column4	32 Bit Integ	004	DEC	
3					
4	column4	32 Bit Integ	004	DEC	
5	column5	32 Bit Integ	004	DEC	

- e. Go To  
This function moves the cursor to a desired row.
  - e.1 Select **Go To (T)** from **View (V)** in the Column Attribute menu.
  - e.2 In the dialogue box, input the row number to be jumped to, and select the **OK** button.



- e.3 The cursor moves to the row input in (e.2).
- f. Changing Table Definitions  
This function changes the table data table type.
  - f.1 Select **Change (H)** from **File (F)** in the Column Attribute menu.
  - f.2 In the Table Definition Setting dialogue box, input the change content, and select the **OK** button.

**Note:**

Table definitions cannot be changed when the table data window is open. Moreover, table names cannot be changed. It is not possible to change data other than table comments in the on-line mode. See Item 8.6.3 “Table Operation in the List Window: New Table Data Creation.”

### 8.6.7 Saving Row Attributes

This function saves row attribute data. The data is saved to both the PLC and hard drive in the on-line mode, and into the hard drive in the off-line mode.

- a. Select **Save (S)** from **File (F)** in the Column Attribute menu.
- b. Select the **Yes (Y)** button in the message box.
- c. Select the **OK** button in the message box.

**Note:**

When a save fails, an error detection message box is displayed.

## 8.6.8 Data Window Structure

Opening the table data window and the structure of the menus are discussed in this item.

### ■ Opening the Table Data Window

This function opens the table data window. This window calls out the table data stored in the PLC in the on-line mode, and in the hard drive in the off-line mode. See Item 8.6.3 “Table Operation in the List Window: Opening the Data Window” for further information on opening the table data window.

### ■ Structure of the Table Data Window Menus

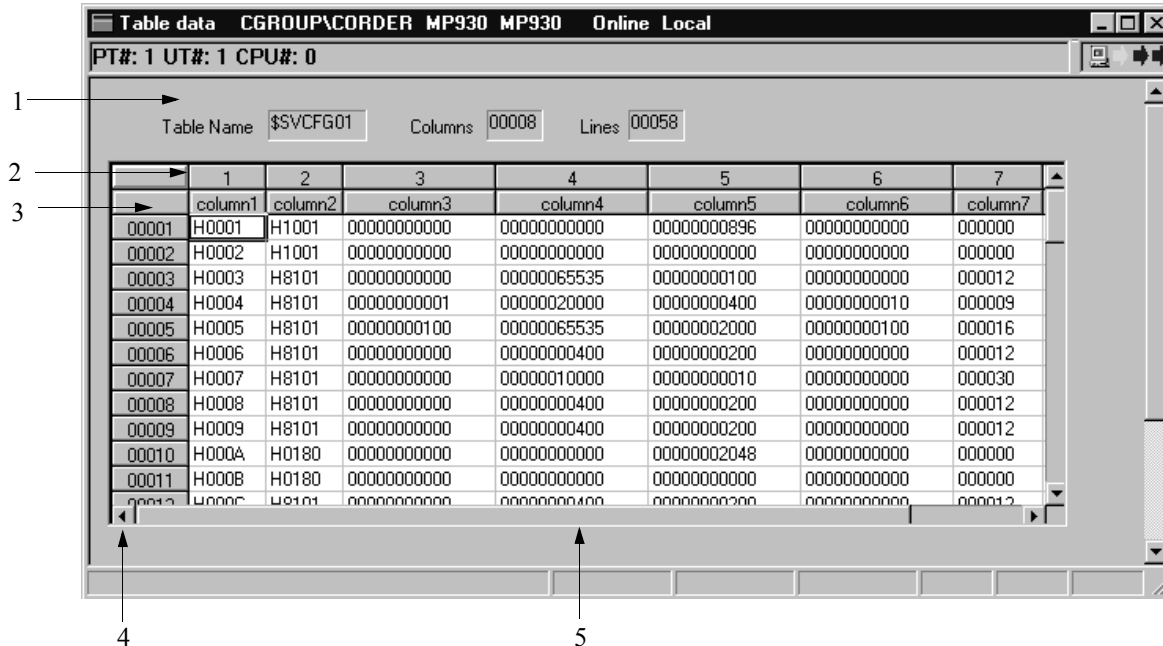
Table 11 shows the menus displayed in the table data window. Refer to the item numbers in the right-hand column for further information on each of the menu functions.

**Table 11: Table Data Window Menus**

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager	3.4.2
Open (O)	Opens various function windows	5.1
Close (C)	Closes table data window	8.6.12
Column Attribute (R)	Opens column attribute window	8.6.3
Print (P)	Prints C register table	8.5.8
Exit (X)	Exits Engineering Manager	3.4.2
View (V)		
Tool Bar (T)	Displays the tool bars that are available	3.4.4
Status Bar (S)	Displays status bar	3.4.4
Go To (J)	Move cursor to a designated row	8.6.10
Edit (E)		
Copy (C)	Not usable in this window	—
Row Insert (L)	Not usable in this window	—
Row Delete (D)	Not usable in this window	—
Column Insert (I)	Not usable in this window	—
Column Delete (G)	Not usable in this window	—
Window (W)		
Cascade (C)	Displays the windows in cascade form	3.4.4
Tile	Displays the windows in tile form	3.4.4
Arrange Icons (A)	Displays arranged icons	3.4.4
Help (H)		
About App. (A)	Displays version data	3.4.5

## 8.6.9 Table Data Setting

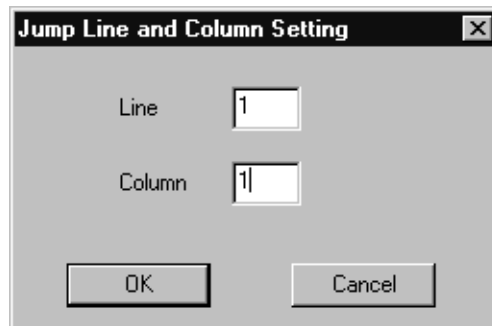
This function sets the table data. The data set here is used in the table data operation command (TBLBR, TBLBW, etc.) in the main program.



1. Table Definition Data  
This box displays the table data name, number of columns, and number of rows.
2. Column Number  
This displays the column number.
3. Column Name  
This displays the column name.
4. Row Number  
This displays the row number.
5. Table Data  
Input 0 ~ 9 if the table data is decimal, 0 ~ 9 and A ~ F if hexadecimal, and 1 or 0 if binary. For hexadecimals, input H at the beginning of the number.

## 8.6.10 Table Data Editing

- a. Go To  
This function moves the cursor to a designated row and column.
  - a.1 Select **Go To (J)** from **View (V)** in the table data menu.
  - a.2 In the dialogue box, input the row number and column number desired, and select the **OK** button.



a.3 The cursor moves to the row and column designated in (a.2).

### 8.6.11 Saving Table Data

The data input during table data setting is saved immediately upon pressing the **Enter** key. The data is saved to both the PLC and hard drive in the on-line mode, and to the hard drive in the off-line mode.

### 8.6.12 Ending Table Data Creation

Table data creation is ended by closing the table data list window, the column attribute window, and the table data window. First, close the table data window. Close the table data window by selecting **Close (C)** from **File (F)** in the window menu with the table data window active. Next, close the row attribute window. Close the row attribute window by selecting **Close (C)** from **File (F)** in the window menu with the row attribute window active. Finally, close the table data list window. Close the table data list window by selecting **Close (C)** from **File (F)** in the window menu with the table data list window active.



## 9 Motion Programming

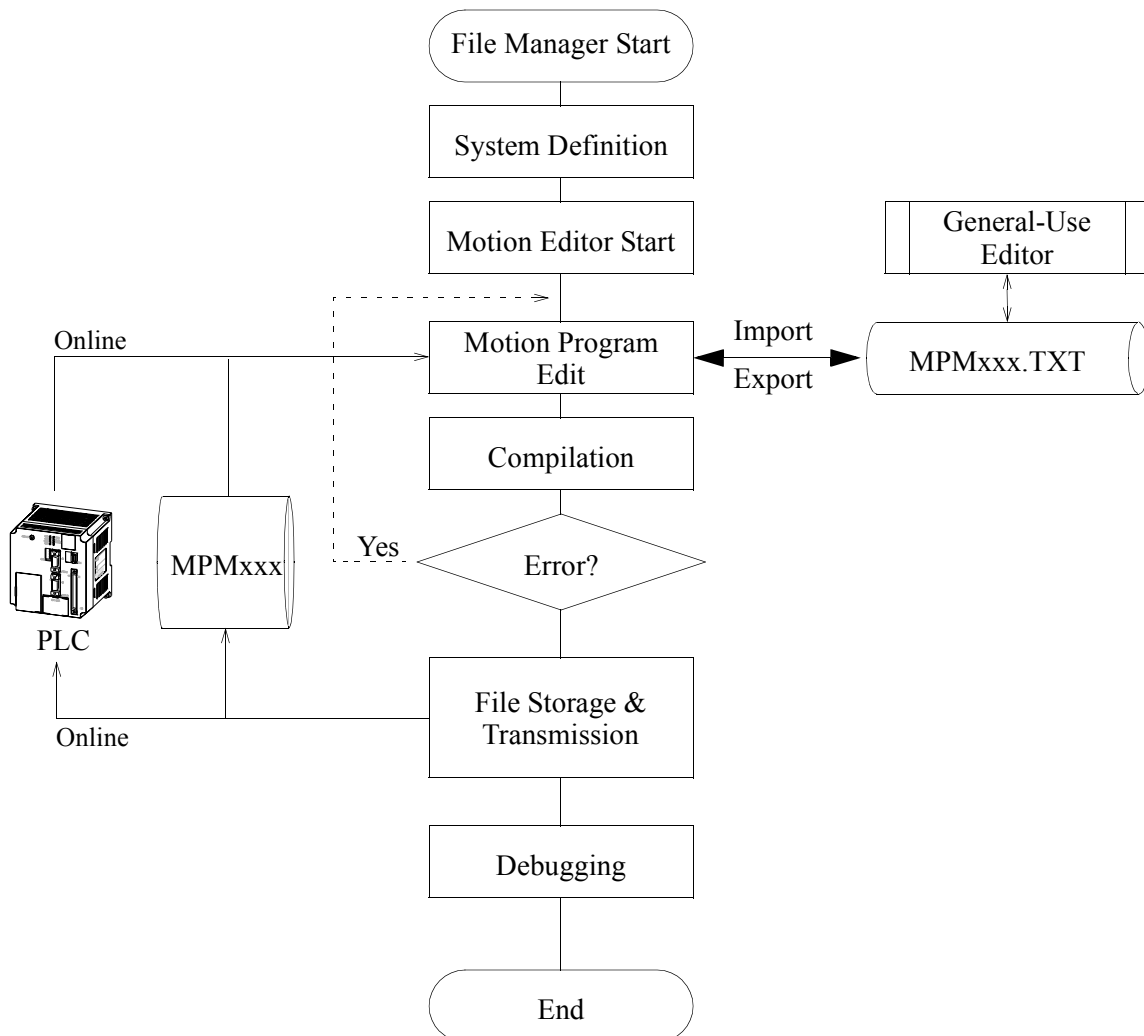
This chapter describes the programming tools used to create motion programs.

9.1	Outline of Motion Program Creation .....	9-2
9.2	Motion Properties .....	9-3
9.3	Motion Editor .....	9-5
9.3.1	Starting the Motion Editor .....	9-5
9.3.2	Motion Editor Window .....	9-6
9.3.3	Motion Editor Menu .....	9-7
9.3.4	Motion Editor Commands .....	9-9
9.3.5	Special Motion Editor Commands .....	9-16
9.3.6	Closing the Motion Editor .....	9-19
9.4	Compiler .....	9-20
9.4.1	Compiler Operation .....	9-20
9.4.2	Compiler Operation Steps .....	9-21
9.4.3	Normal Completion of Compilation .....	9-21
9.4.4	Abnormal Completion of Compilation .....	9-21

## 9.1 Outline of Motion Program Creation

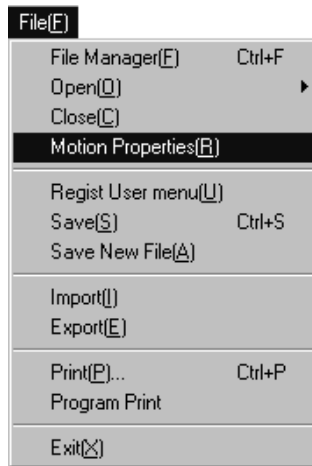
The flowchart below shows the development steps in a standard motion program. It is necessary to set the work from the start of the File Manager to the definition of the system prior to motion programming. See Chapter 6 “Module Definitions” and Chapter 7 “System Data Definitions.” The creation of motion programs, from the editing method to compilation and file storage are presented in this section.

The development flow of a motion program is as follows:

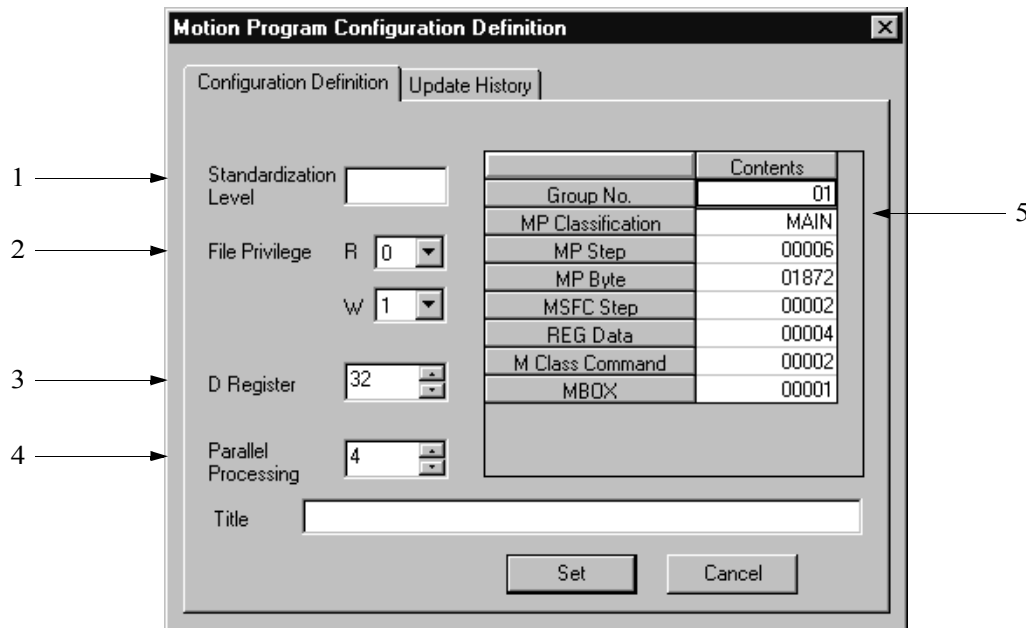


## 9.2 Motion Properties

The attribute data possessed by each motion program are the motion properties. Although there are some predetermined values in the system, it is still necessary to set attribute values according to the scale, specifications, etc., of the program. Motion properties can be updated at any time; however, the values are referenced while compilation work areas are allocated. At the start of programming, be sure to verify the motion properties; set if necessary.



With the motion editor open, select **Motion Properties (R)** from the **File (F)** menu. Motion programs have the program attributes shown in each of the following figures. The displayed contents are the standard, transferable attribute values, and for this reason should only be changed when necessary. The property screen is composed of the Configuration Definition tab and the Update History tab.



1. Standardization Level  
Input the DWG/Program rank using one character. The rank can be freely determined by the user.
2. File Privilege  
Input the DWG/Function program read/write privileges. The privilege data cannot be set to a value higher than that of the privilege of the present user.
3. D Register  
Input the number of D register words when using a D register within a DWG/Function program. If zero is input, D register reference within the program is impossible. For example, if 10 is input, the usable D register numbers within the program are as follows:  
Integers: DW00000~DW00009  
Double-length Integers: DL00000~DL00008  
Real Numbers: DF00000~DF00008  
Bits: DB000000~DB000009F
4. Parallel Processing  
Set the maximum number of parallel processes, 0 to 4, using the **PFORK** command.

Machine Type	Maximum Number of Parallel Processes
MP9xx	4

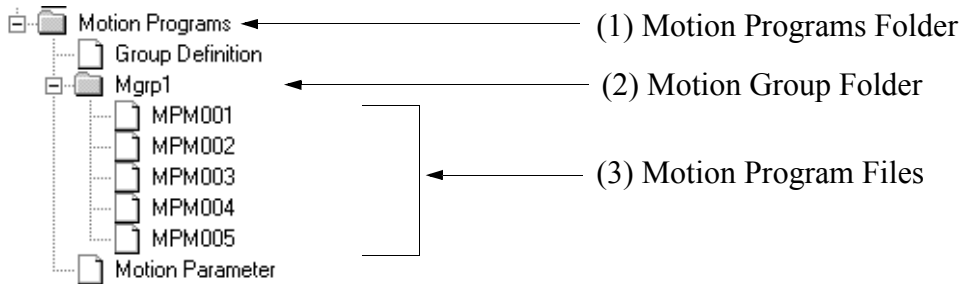
5. Program Data  
This displays data related to motion control. It is for reference only and no changes can be made.

## 9.3 Motion Editor

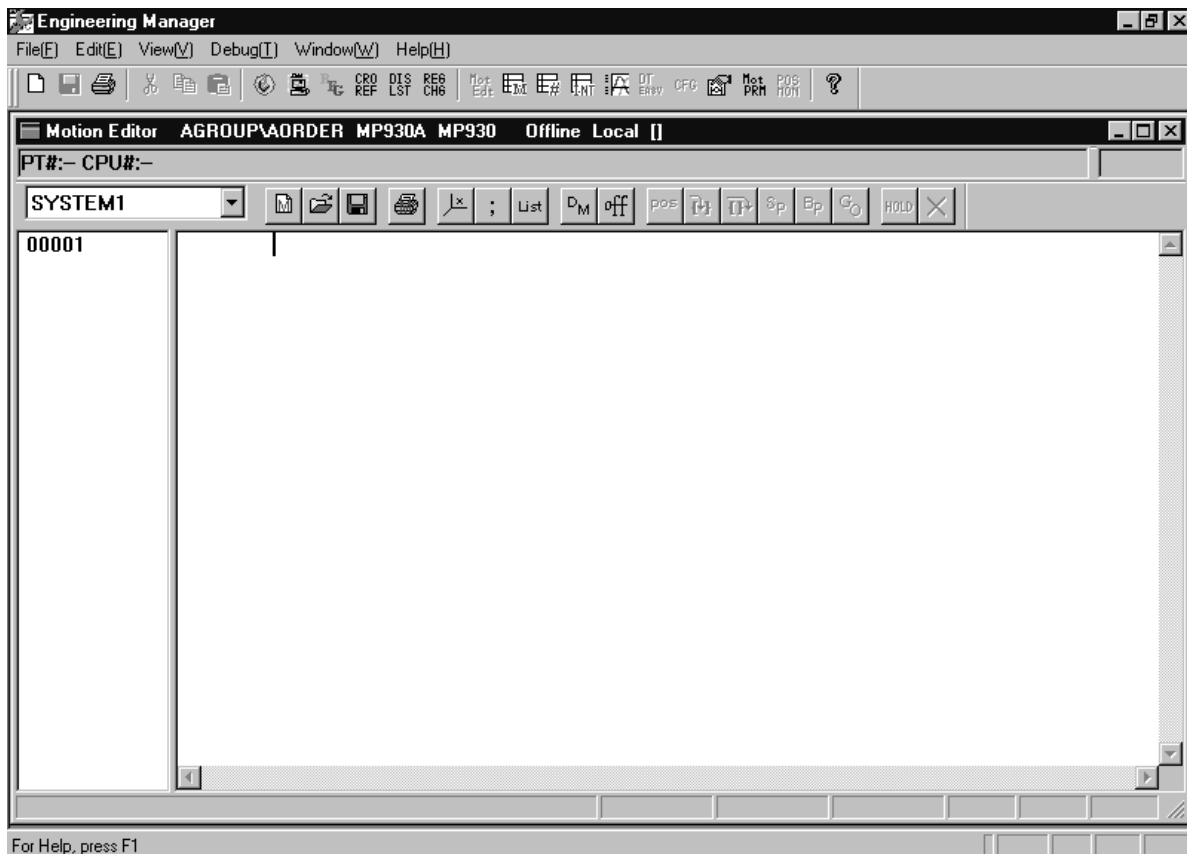
The motion program editor possesses programming tools and functions necessary in motion program development, such as program text editing, compiling, debugging and monitoring.

### 9.3.1 Starting the Motion Editor

Open the motion editor from the File Manager



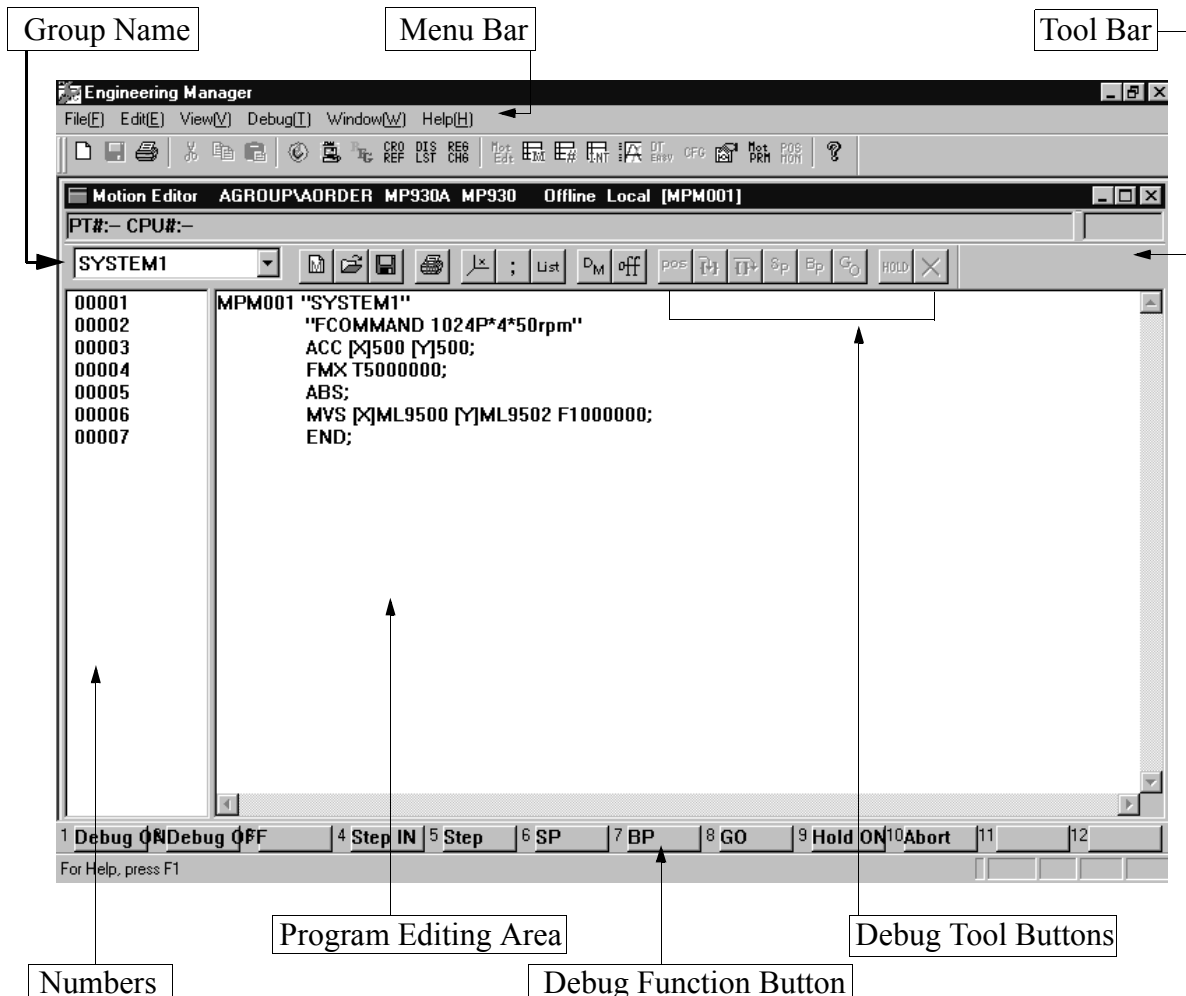
Select from among (1) Motion Programs Folders, (2) Motion Group Folders, and (3) Motion Program Files, by placing the mouse cursor on the desired selection and double-clicking.



*Screen Following Motion Editor Start*

### 9.3.2 Motion Editor Window

The structure of the Motion Editor Window is discussed in this item. The motion editor is displayed on the engineering manager screen, which is the parent screen. Although various screens other than the motion editor are displayed on the engineering manager screen, the content of the engineering manager menu bar is switched to the motion editor when the motion editor is active.



#### ***Motion Editor Screen Configuration***

Group Name	Shows names of groups in the motion program
Menu Bar	Menu bar enabled in motion editor
Tool Bar	Often-used commands are in icon form
Numbers	Numbers automatically allocated upon input to the program
Program Editing Area	Area in which program is actually input
Debugging Tool Buttons	Buttons allocating debugging functions
Debugging Function Buttons	Buttons allocating debugging functions

### 9.3.3 Motion Editor Menu

The menu items upon motion editor activation are as follows:

Menu	Function Outline
<b>File (F)</b>	
File Manager(F)	Calls out the File Manager
<b>Open (O)</b>	
<b>Definition (D)</b>	
Module Configuration (M)	Shows various definition screens
System Configuration (S)	
Scan Time Setting (T)	
Application Info. (I)	
Data Trace (D)	
Fault Monitor (F)	
Group Definition (G)	
Motion Parameter (P)	
<b>Program (P)</b>	
Open New DWG (O)	Sequence Programming Tools
Property (R)	
Main Program (L)	
SFC Flow Chart (S)	
SFC Time Chart (T)	
SFC Action Box (B)	
Constant Table (# register) (H)	
Constant Table (M register) (M)	
I/O Convert Table (C)	
Interlock Table (I)	
Parts Assembling Table (A)	
Tuning Panel (P)	
<b>Tool (T)</b>	
Register List (R)	Displays the PLC registers
Cross Reference (X)	
Disable Coil List (D)	
Comment List (C)	
<b>Data Table Definition (G)</b>	
Data Table Map (L)	

Menu		Function Outline
	Motion Program (M)	
	Open New File (N)	Opens new file
	Open (O)	Opens existing file
	Position Monitor (P)	Displays Position Monitor
	Task Monitor (T)	Displays Task Monitor
	Motion Alarm (A)	Displays alarm data
	Close (C)	Closes Motion Editor
	Motion Properties (R)	Defines motion properties
	Regist User Menu (U)	Registers user menu
	Save (S)	Saves program
	Save New File (A)	Saves a program under a given name
	Delete (D)	Deletes program
	Import (I)	Converts text files to motion program files
	Export (E)	Converts motion program files to text files
	Print (P)	Prints various data
	Exit (X)	Closes Engineering Manager
Edit (E)		
	Undo	Undoes the previous operation
	Cut (T)	Standard text editing commands
	Copy (C)	
	Paste (P)	
	Find (S)	
	Replace (R)	Replaces a character string with another character string
	Jump (J)	Jumps to a designated line number
	Head (U)	Jumps to the first program line
	Last (E)	Jumps to last program line
	Semicolon (I)	Adds semicolon to the final column of a program line
	Position Teaching (P)	Integrates the present position into the operand
View (V)		
	Font (F)	Switches the display font
	Tool Bar (T)	Shows tool bars that are available
	Status Bar (B)	Turns the status bar ON/OFF
	Error List (L)	Displays the error list again
	Monitor Parallel No. (M)	See “Debugging”
	Monitor Regeneration (V)	



Menu	Function Outline
Debug(T)	
Debug ON (D)	
Hold (H)	
Abort (C)	
Multi-Step Run (G)	
Start Point (P)	
Brake Point (B)	
Step Run (S)	
Step In (I)	
Code Generator (L)	
Current Value Update (N)	
Debug OFF (X)	
Window (W)	
Cascade (C)	
Tile (T)	
Arrange Icons (A)	
Help (H)	
About App. (A)	

### 9.3.4 Motion Editor Commands

In this section, those commands often used in the menu bar and tool icons are described.

#### ■ Find

This function scans for a character string in the program being edited. The scan window is displayed upon selection of **Edit (E)** and **Find (S)**. Select the character string, the search direction, etc., then press the Find Next button. When a group of character strings is found, the system displays the repeating portion on a black background and waits for the next operation. Press either the Find Next or Cancel Button. If the scanned character string is not found, an alarm sounds. Either change the scan conditions and scan again, or close the scan screen by pressing the Cancel button.

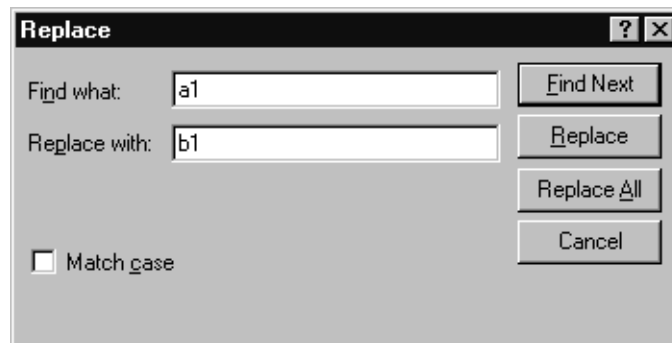


*Find Screen*

## ■ Replace

This function replaces the character string currently being edited. The replace window is displayed upon selection of **Edit (E)** and **Replace (R)**. Set the post-replacement character string, then press the **Replace** or **Replace All** button to replace the character string(s). Pressing the Find Next button causes a string to be skipped without the replacement processing being executed. Pressing the Cancel button closes the replacement screen. If the pre-substitution character string is not found, an alarm sounds. Either change the substitution conditions and scan again, or close the scan screen by pressing the Cancel button.

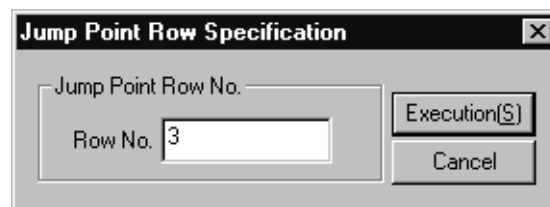
### *Replace Input Screen*



## ■ Jump

This function moves the cursor to a designated line within the program. Input the line number and press **Execution (S)**. Close the jump window by pressing Cancel.

### *Jump Designation Number Setting*



## ■ Jump to Head

This function moves the cursor to the head line of the program. Select **Edit (E)** and **Head (U)**.

00001	MPM003 "grpa"
00002	FMX T5000000;
00003	ABS;
00004	MVS [a1]0.0 [B1]0.0 F5000000;

Cursor

## ■ Last

This function jumps the cursor to, and displays the final line of, the program. Select **Edit (E)** and **Last (E)**.

```

00004
00005
00006
00007
00008
00009

```

**MVS [a1]0.0 [B1]0.0 F5000000;**  
**PLN [a1][B1];**  
**MCC [a1]0.0 [B1]0.0 U10.0 V0.0 T3 F5000000;**  
**END;**

← Cursor

## ■ Semicolon

Enable/Disable functions by selecting **Edit (E)** and then **Semicolon (I)**. Add a semicolon (;) to the final column of a program line by pressing the enter key during column input. A semicolon is necessary in the final column of a program line due to constraints arising from the motion language specifications. This function is meant to reduce the programming input load. As shown in the figure below, a check mark before **Semicolon (I)** indicates that the function is enabled. If disabled, select **Edit (E)** and then **Semicolon (I)** again.



When enabled,  
this button is  
depressed.

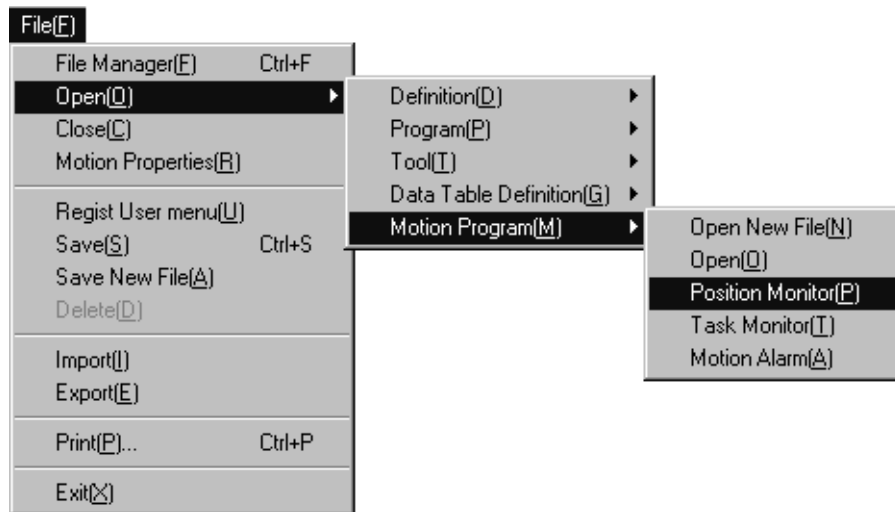
## ■ Position Teaching

The current coordinate value is inserted into the coordinate operand of the motion command for each of the axes controlled by the PLC.

### 1. Position Window Display

Open the position monitor screen to show the current coordinate position.

Select **File (F)**, **Open (O)**, **Motion Program (M)**, and **Position Monitor (P)** in that order.



The present coordinate values are displayed.

Position Monitor ABCD\EF GH DEMOSAVE MP930 Online Local				
PT#01 NT#000 ST#01 CPU#0				
grpa				
Physical Axis	01.01		01.02	
Logic Axis	A1	Unit	B1	Unit
Work coordinate system	0.002	mm	73	pulse
Machine coordinate system	0.002	mm	73	pulse
Work coordinates feedback	0.002	mm	73	pulse

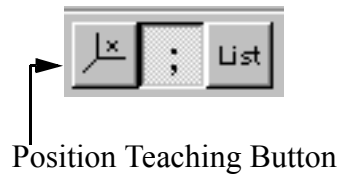
## 2. Setting Taught Axes

This function sets the axes to be taught.

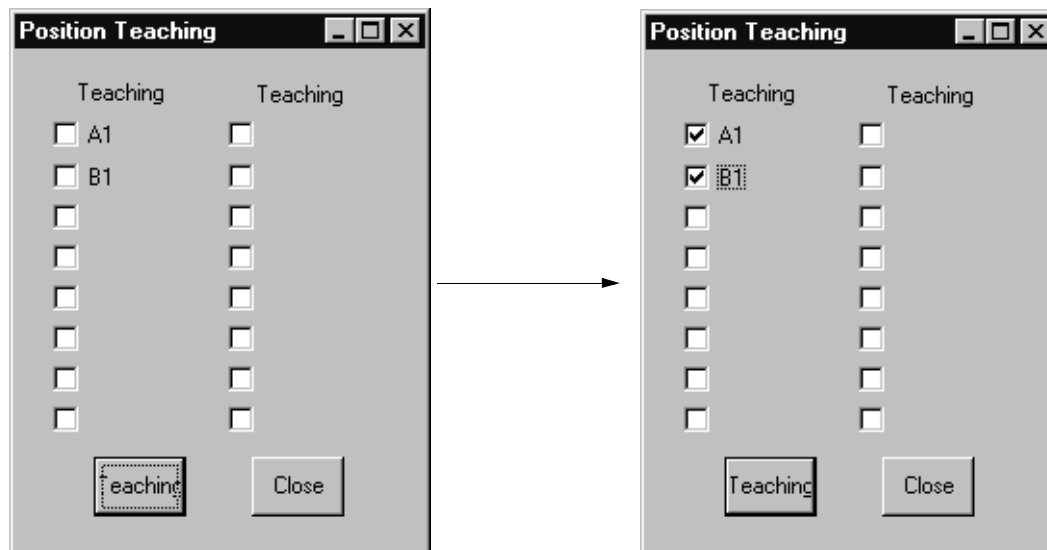
Select **Edit (E)**, and **Position Teaching (P)**, in that order



Or, push the Position Teaching button.



Now, with the position teaching window open, set the axes for which the teach function is to be executed. A1 and B1 are set as the teach axes in the example below.



### 3. Incorporating Coordinates

For example, let us assume that a cursor follows a MOV command in the motion editor screen as shown below.

```
abs;
mov
```

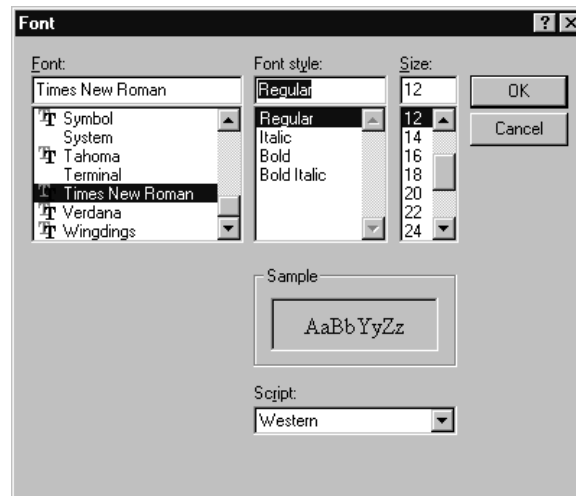
At this time, the coordinates shown in the position monitor window are displayed in the MOV command operand as the coordinate values for A1 and B1 upon pressing the Teach button in the Position Teaching window.

```
abs;
mov [A1]0.000 [B1]0.000
```

Coordinate constants may be incorporated in the same manner into commands other than MOV which contain spindle data operands. If the position monitor and position teaching windows are no longer needed, close them by clicking the X in the upper right-hand corner.

## ■ Font Designation

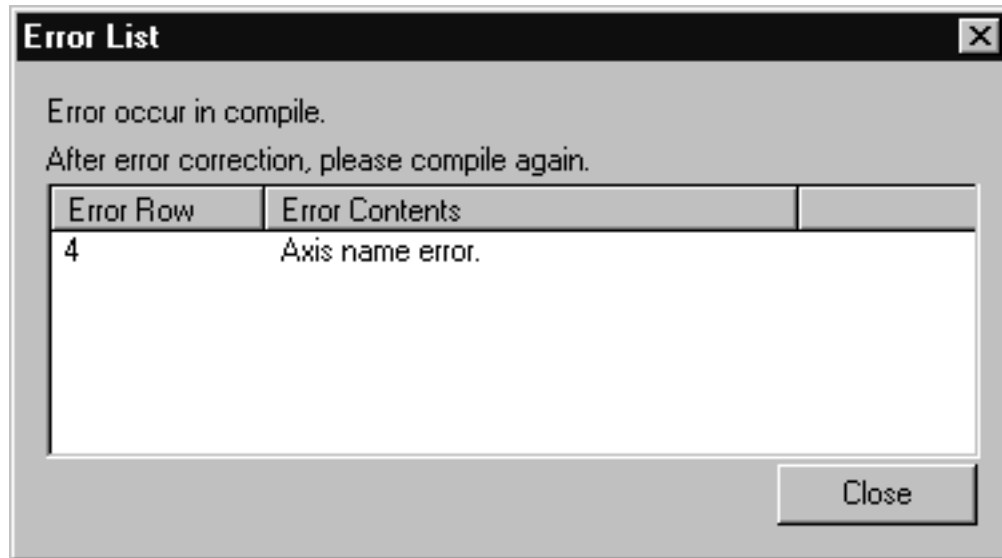
This function allows the user to designate which font is used inside the Motion Editor window. **Select View (V)**, then **Font (F)**, set the desired font, and push the **OK** button.



## ■ Error List

This function re-displays the compiled error list.

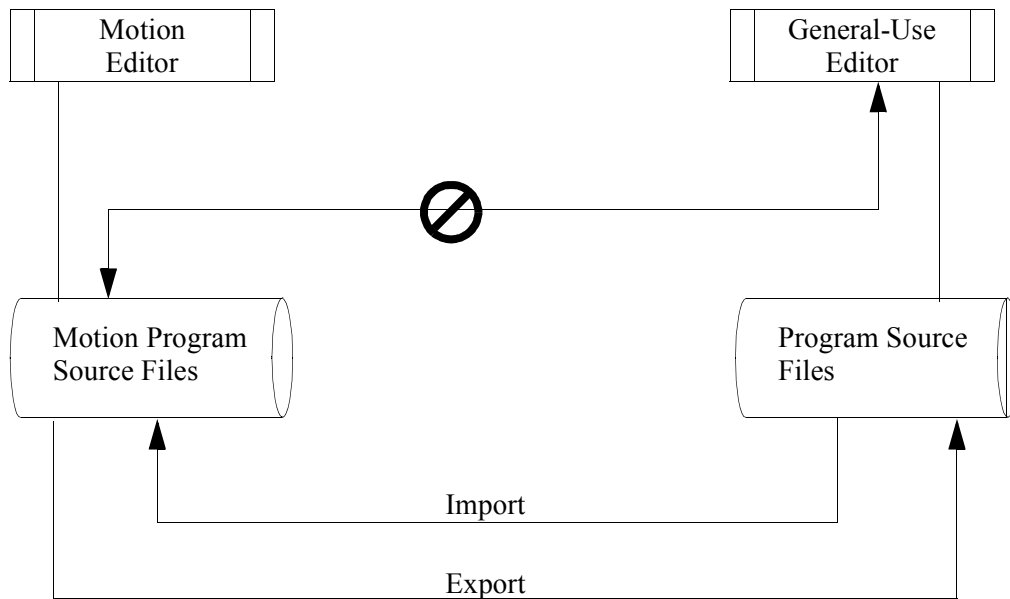
Select **View (V)** and **Error List (L)**. Close the Error List window with the Close button.



The List tool icon can also be used

### 9.3.5 Special Motion Editor Commands

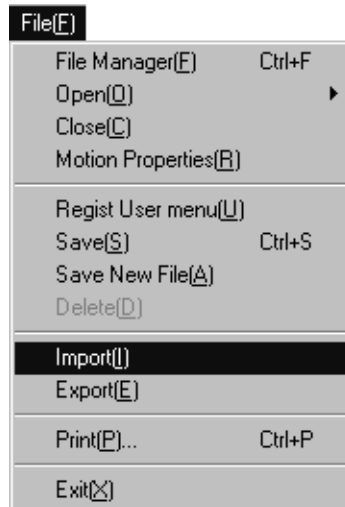
Program source files stored in the motion editor include text files, and combinations of various data including operating environment. Therefore, although the operating environment is not a problem in the motion editor itself, there are problems if a conventional general use text editor is used. This is because direct source files cannot be opened in a general-use text editor. For this reason, an Import/Export function has been provided in the Motion Editor, making possible the use of general-use text editors. In this section the Import/Export command, which is a function for collaboration with external program text files, is described.





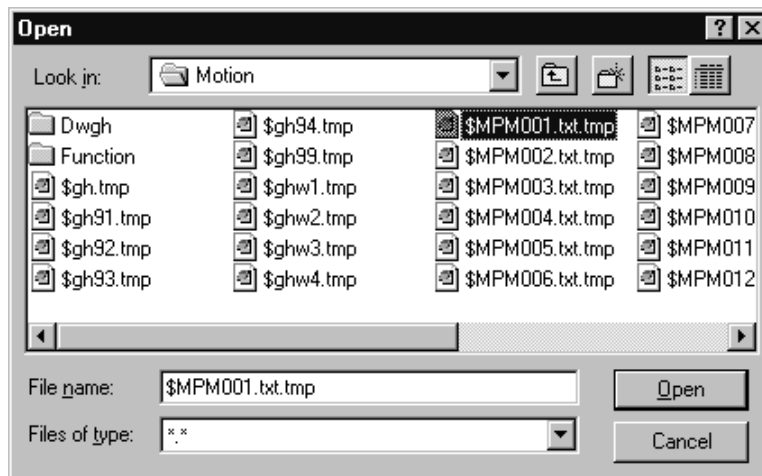
## ■ Import

This function converts text files created on general-use editors into motion program files integrated into the motion editor.

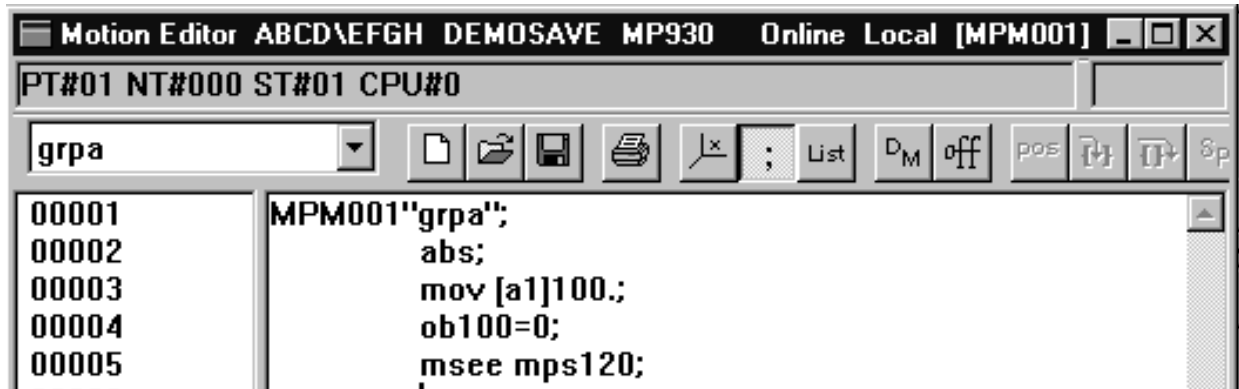


Select **File (F)** and **Import (I)**.

Upon selecting Import, display the file opening screen of the text file to be converted, select the folder containing the file, select the file, and push the Open button.



The selected text file is then read, and a new motion editor screen is displayed. Store the file after program editing is complete.



## ■ Export

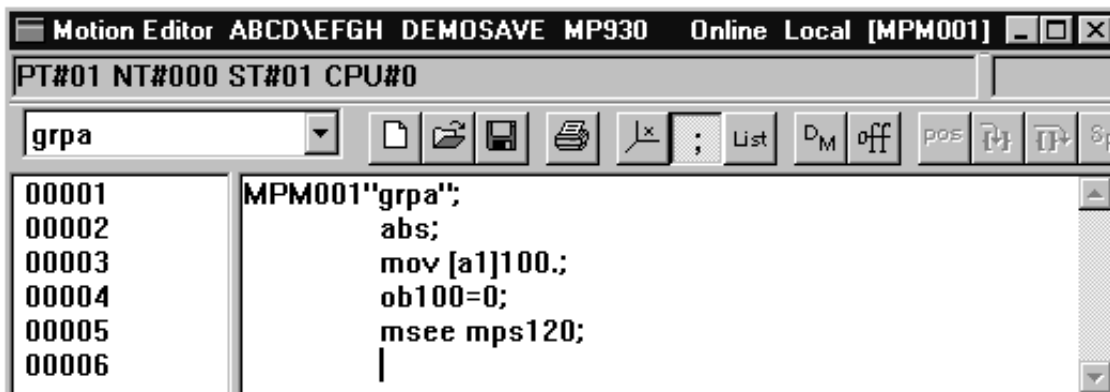
The export function is used for:

- (1) Temporary storage of files during editing in the motion editor.
- (2) Editing already existing files in a general-use editor.

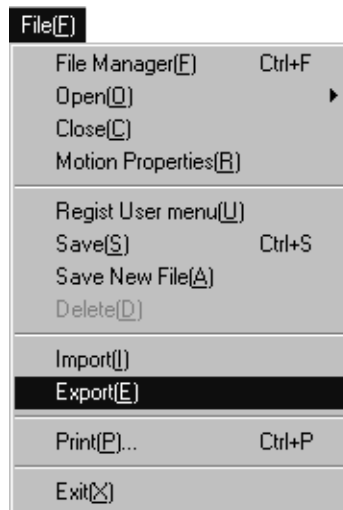
**In the motion editor in particular, motion programs that are incomplete or have grammatical errors cannot be stored as is in the motion editor. (1) must be used for storing all programs undergoing editing unless there are no errors.**

Convert the motion program files being edited in the motion editor, and store them on disk.

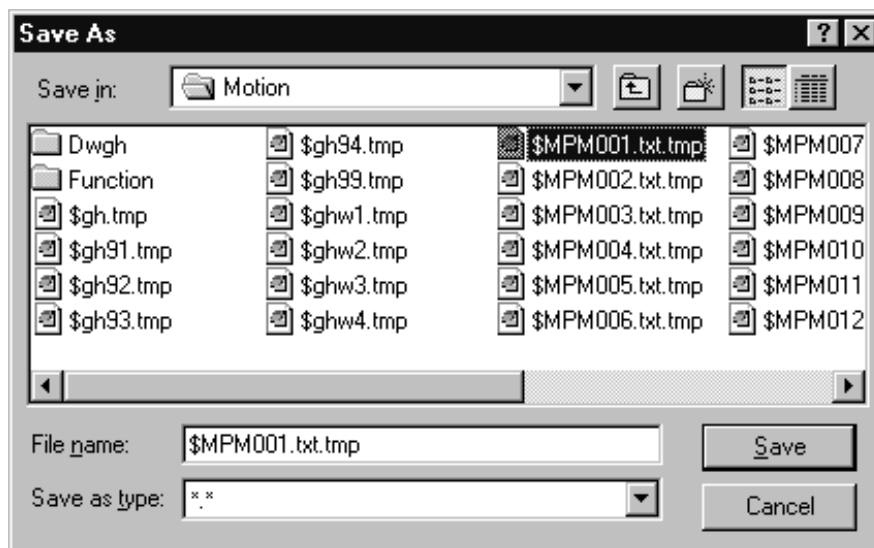
For example, when saving the following program as a text file during program editing:



With the program open , select **File (F)** and **Export (E)**.



Upon selecting Export, a screen appears to confirm the text file storage destination. Select or input the storage destination folder and file, and push the Save button. If an already existing file name is used, that file is overwritten.



Close the motion editor screen; when saving is complete, the system returns to the editing screen.

### 9.3.6 Closing the Motion Editor

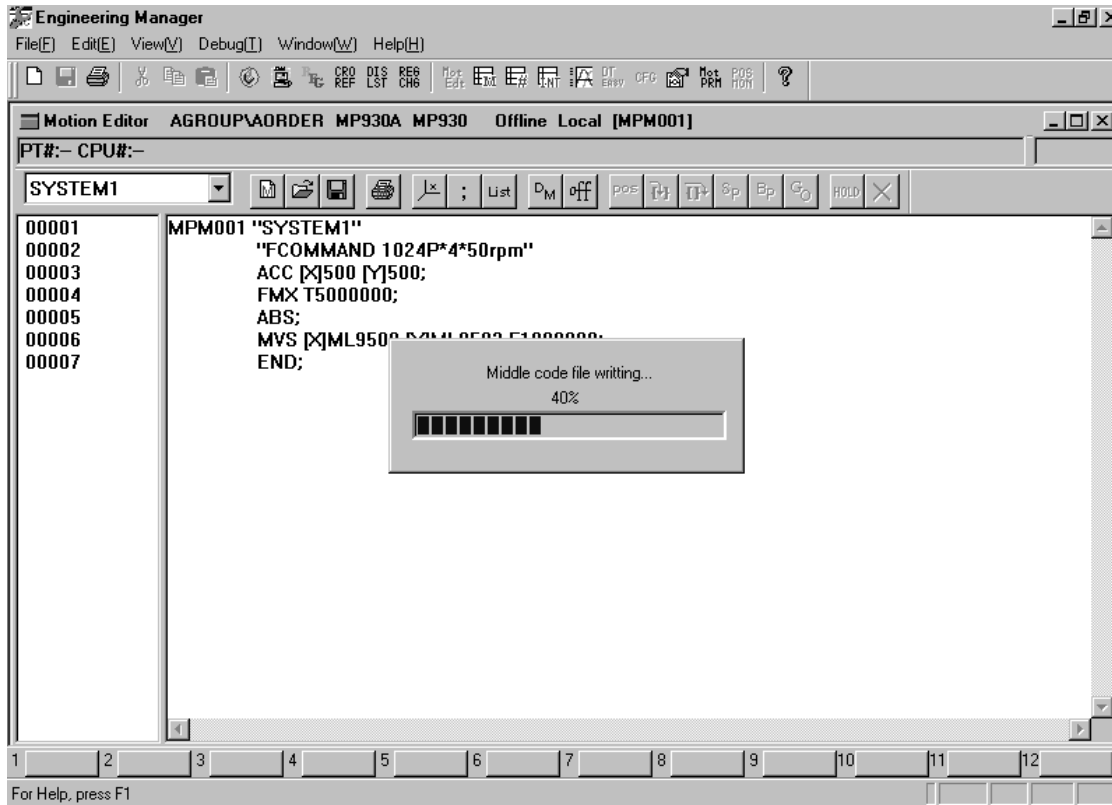
The motion editor can be closed by selecting **File (F)** and **Close (C)**. The Engineering Manager remains open; only the motion error window is closed.

## 9.4 Compiler

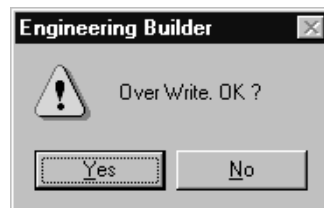
In this section, compiler processing of motion programs is explained.

### 9.4.1 Compiler Operation

The compiler operates automatically during file storage. Operate the compiler either by selecting **File (F)** then **Save (S)**, **File (F)**, then **Save As (A)**, or the Storage Tool icon. During compilation, a progress bar shows the status of the compilation

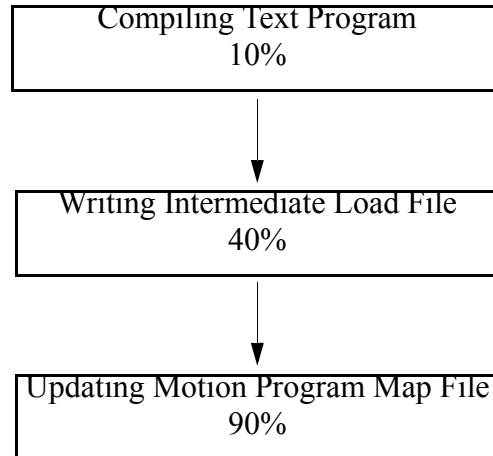


Furthermore, the window shown below is displayed during compilation when the object storing the file already exists. Select “Yes” if overwriting is desired. If overwriting is not desired, execute **File (F)** and **Save As (A)**.



## 9.4.2 Compiler Operation Steps

Upon starting the compiler, the operation status of the compiler is displayed in the following order:



The Compiler Operation window closes upon completion.

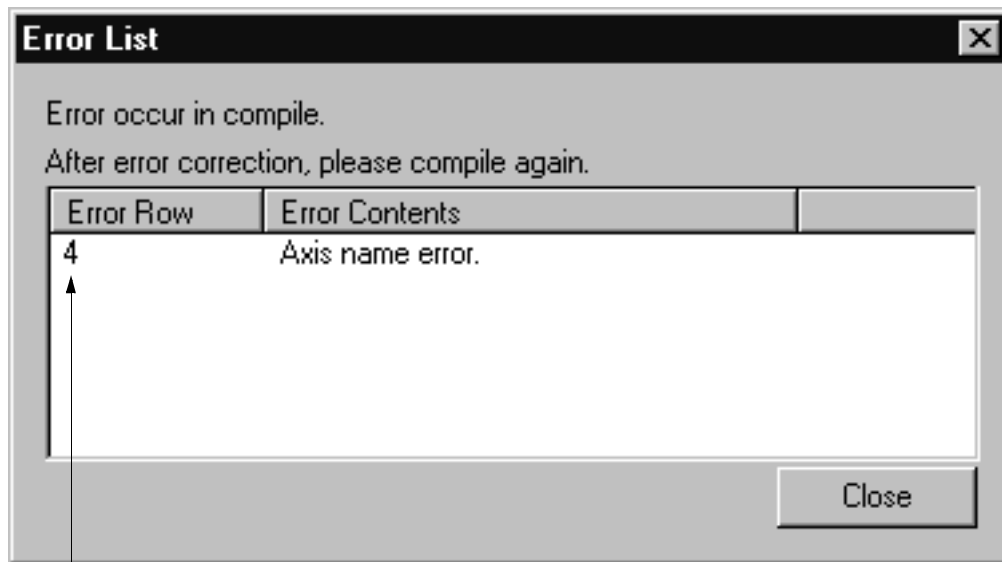
## 9.4.3 Normal Completion of Compilation

The file is stored on the disk if compilation is completed normally. Furthermore, if online, the compiled files are transmitted to the PLC.

At this stage the operation screen returns to the Motion Editor. Close the Motion Editor if no special editing is needed.

## 9.4.4 Abnormal Completion of Compilation

Upon occurrence of a compilation error, the compiler displays an error window. Check the error content and compile again after correcting the error. This error can be displayed using the list command even if the error display window is closed.



By double-clicking the line number displayed in the Error Occurrence Line, it is possible to move the cursor to said location in the Motion Editor.

Furthermore, **motion program files cannot be saved insofar as there is a compiler. Use the export command for temporary storage of program files.**

## 10 Monitor

This chapter explains the monitor function.

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10.1.2 Register Value Display .....	10-3
10.1.3 Display Format Change .....	10-5
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## 10.1 Register List

The register list displays the current values of the S register, I register, O register, M register, D register, and C register. The value of each register can be changed in the register list.

### 10.1.1 Structure of the Register/Register List Window

This item explains the menus in the register and register list windows.

The register window is open when starting the register list. By executing the “Open Register” command in the register window, the register values are displayed as a sub-window. This sub-window, in which the register values are displayed, is called the “Register List Window.”

#### ■ Opening the Register List Window

The register list window can be opened from the File Manager and the Engineering Manager.

- a. From the File Manager  
Select **Tool (T)** → **Register List (R)**.
- b. From the Engineering Manager Window  
Select **File (F)** → **Open (O)** → **Tool (T)** → **Register List (R)**.



## ■ Menus in the Register/Register List Window

The menus displayed in the Register/Register List window are shown in the following table. For further information on each menu, refer to the item number shown in the right-hand column

Menu	Function	Item No.
File (F)		
Open Register List (O)	Displays register list window	10.1.2
Close (C)	Closes register list window	10.1.5
Exit (X)	Exits from register list	10.1.5
View Mode (M)		
DEC (D) *1	Displays register list in decimal	10.1.3
HEX (H) *1	Displays register list in hexadecimal	10.1.3
FLOAT (F) *1	Displays register list in real number	10.1.3
BIN (B) *1	Displays register list in binary	10.1.3
LONG (L) *1	Displays register list in double-length integer	10.1.3
ASCII (A) *1	Displays register list in the ASCII format	10.1.3
Show (V)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Window (W)		
Cascade (C) *1	Displays windows in cascade format	3.4.4
Tile (T) *1	Displays windows in tile format	3.4.4
Help (H)		
About Version (A)	Displays version information	3.4.5

\*1: Only displayed in the register list window.

### 10.1.2 Register Value Display

The register values are displayed in the sub-window of the register list window. The register list can be displayed by integer, double-length integer, real number, and bit number. The register values are saved in the PLC in the on-line mode, and on the hard disk in the off-line mode.

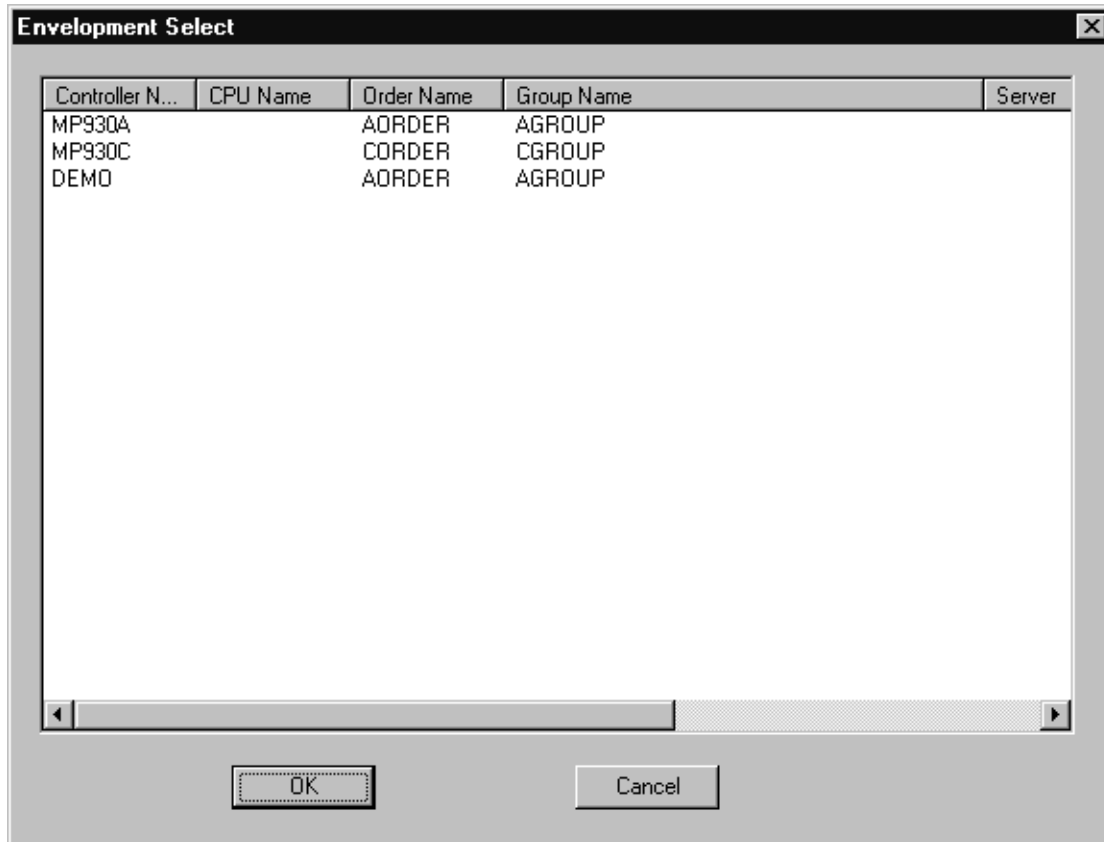
#### ■ Displaying the Register Values

Follow the steps below to display the register values.

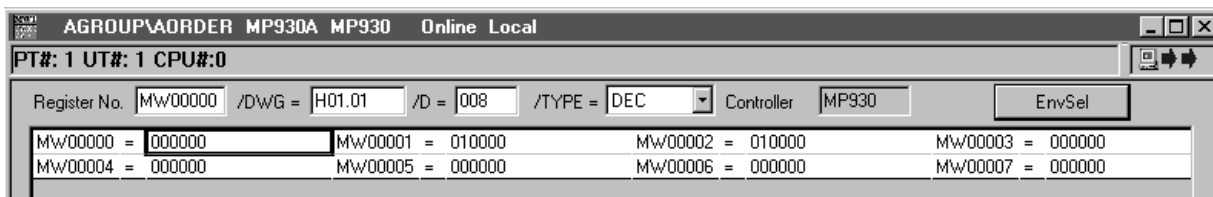
- a. Select **File (F)** → **Open Register (O)** in the register list menu.
- b. Input the register number, drawing (DWG) number, and word number in the dialog box, then choose the **OK** button.



- c. Click the environment selection button to select the PLC model, if necessary. The PLC that originally started the register list is the default. For example, if the register list is started from the Engineering Manager, the PLC that originally started the Engineering Manager is the default. When displaying the register value of default PLC, it is not necessary to choose the environment selection button.



- d. Choose the **OK** button in the register designation dialog box, to display the register list.



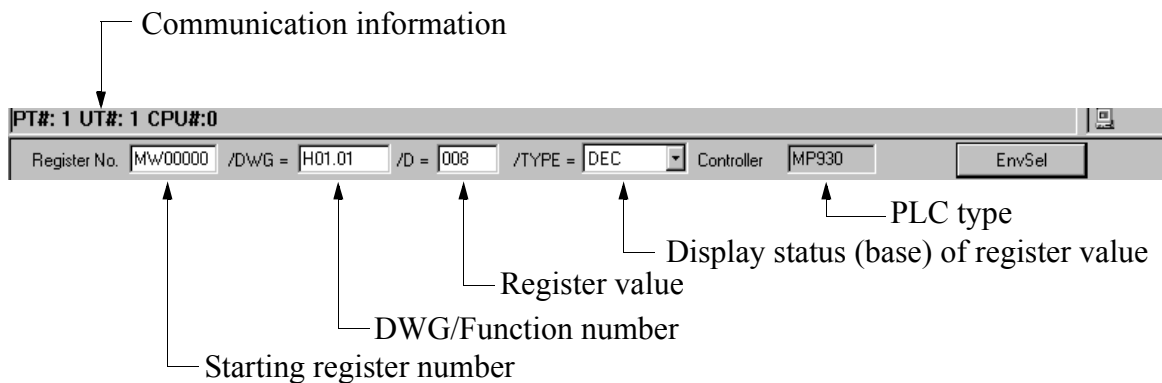
**Note:**

- (1) When inputting a register number other than the D register in step b (above), it is not necessary to input the DWG number of the D register.
- (2) The register list of the X register, Y register, A register, and # register cannot be displayed.
- (3) In the off-line mode, the register list (other than the M register) cannot be displayed. However, depending on the file transfer function, when the register values are saved on either a hard disk or floppy disk, their register lists can be displayed.

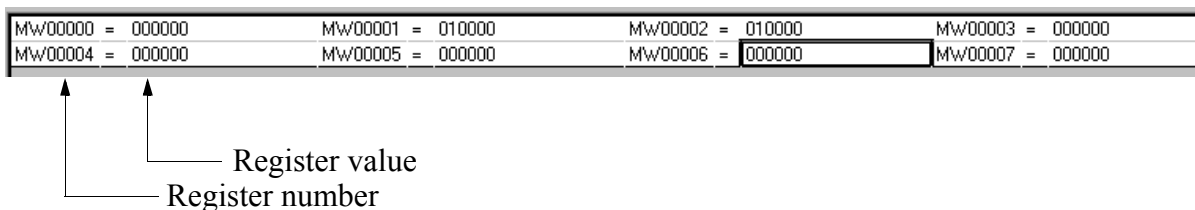
**■ Display Window Format**

The value of each register is shown as follows:

## a. Register Information



## b. Register list

**10.1.3 Display Format Change**

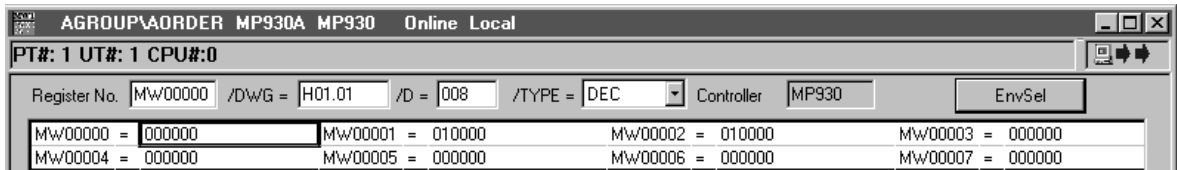
The base or the register type of the displayed register list can be changed.

**■ Base Change of the Display Value**

Decimal, hexadecimal, binary, and ASCII are changeable bases.

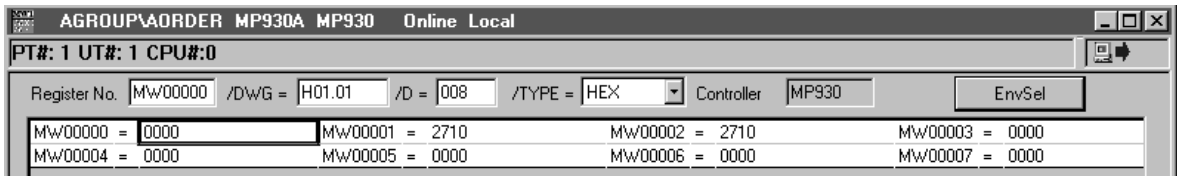
## a. Decimal

Select **View Mode (M)** → **DEC (C)** from the register list menu. The register value is displayed in decimal.



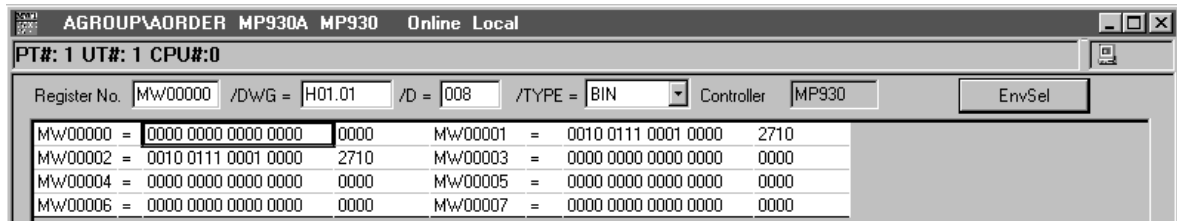
b. Hexadecimal

Select **View Mode (M) → HEX (H)** from the register list menu. The register value is displayed in hexadecimal.



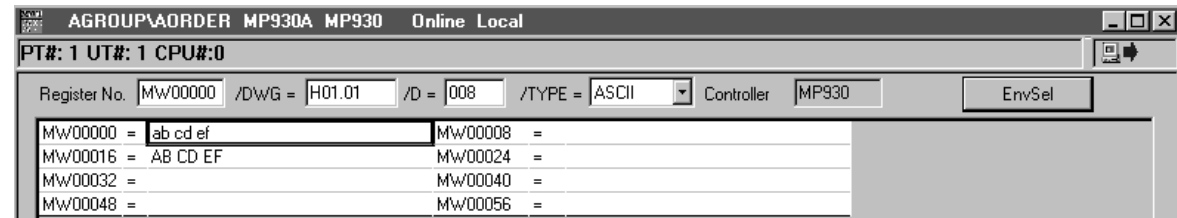
c. Binary

Select **View Mode (M) → BIN (B)** from the register list menu. The register value is displayed in binary.



d. ASCII

Select **View Mode (M) → ASCII (A)** from the register list menu. The register value is displayed in ASCII.



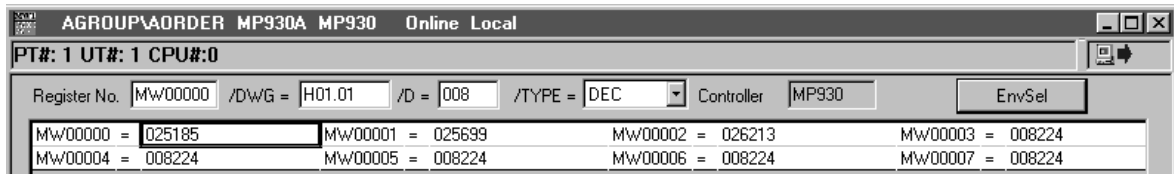
## ■ Register Type Change

The register type can be changed to integer, 32-bit integer, and real number.

### a. Integer

Select **View Mode (M)** → **DEC (C)** or **HEX (H)** from the register list menu.

The register number and value are displayed in integer.



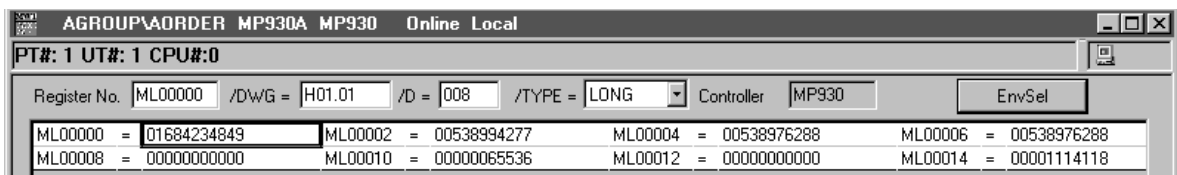
### Note:

When selecting the DEC function, the register list is displayed in decimal integer.

When selecting the HEX function, the register list is displayed in hexadecimal integer.

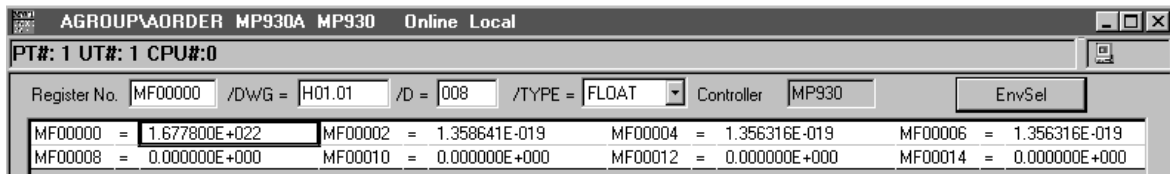
### b. 32-bit integer

Select **View Mode (M)** → **LONG (L)** from the register list menu. The register number and value are displayed in 32-bit integer.



### c. Real number

Select **View Mode (M)** → **FLOAT (F)** from the register list menu. The register number and value are displayed in real number.



### 10.1.4 Register Value Change

Follow the steps below to change the register value.

- a. Move the cursor to the register value to be changed.

MW00000 = 025185	MW00001 = 025699	MW00002 = 026213	MW00003 = 008224
MW00004 = 008224	MW00005 = 008224	MW00006 = 008224	MW00007 = 008224

- b. Input the value, then press the **Enter** key.

MW00000 = 025185	MW00001 = 123456	MW00002 = 026213	MW00003 = 008224
MW00004 = 008224	MW00005 = 008224	MW00006 = 008224	MW00007 = 008224

**Note:**

- (1) In the register lists of the integer, 32-bit integer, and real number, input 0 ~ 9 if it is decimal, input 0 ~ 9 and A ~ F if it is hexadecimal, and input 1 and 0 if it is binary. At this point, negative value can be input if the register value is displayed in decimal.
- (2) The input value is immediately saved in the PLC when pressing the **Enter** key.

### 10.1.5 Closing the Register/Register List Windows

- a. Select **File (F) → Close (C)** from the register list menu to close the register list window.
- b. Select **File (F) → Exit (X)** from the register list menu to exit from the register window.

## 10.2 Motion Program Monitor

The motion program monitor highlights the statement of the motion program which is running.

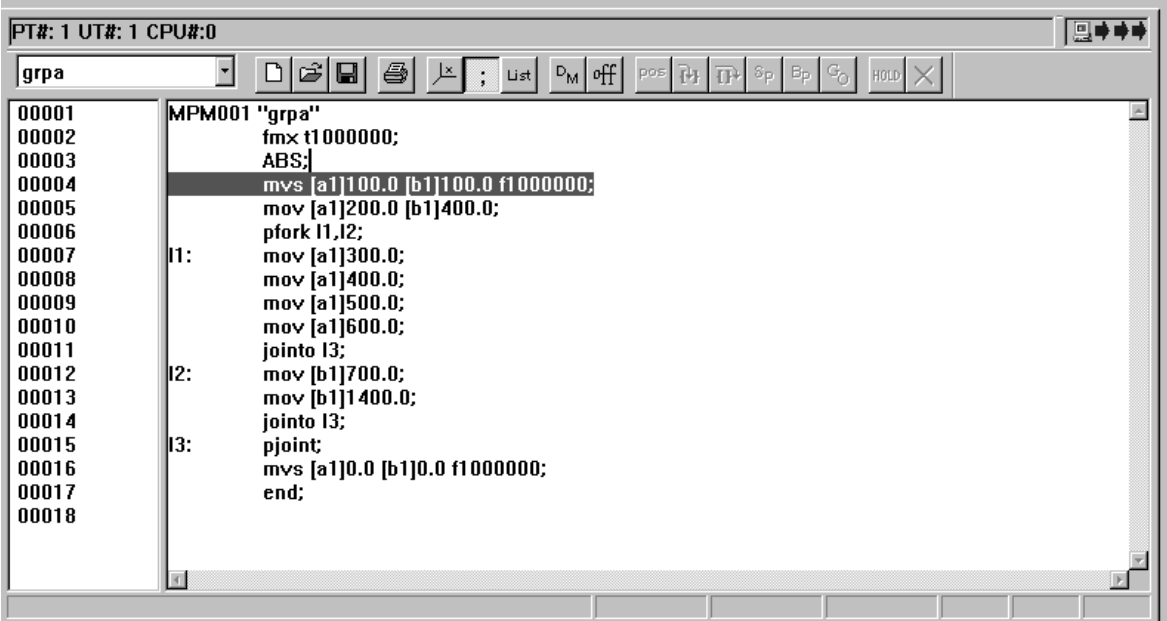
### 10.2.1 Structure of the Motion Program Monitor Window

The motion program monitor performs its function in the motion editor window. Therefore, refer to item 9.2, “Motion Editor,” for window opening method or menu contents.

### 10.2.2 Monitor Display of the Motion Program

When the motion program is opened from the motion editor during running, it is displayed in program monitor mode.

In the program monitor mode, the motion command which is currently executed is highlighted as shown below:

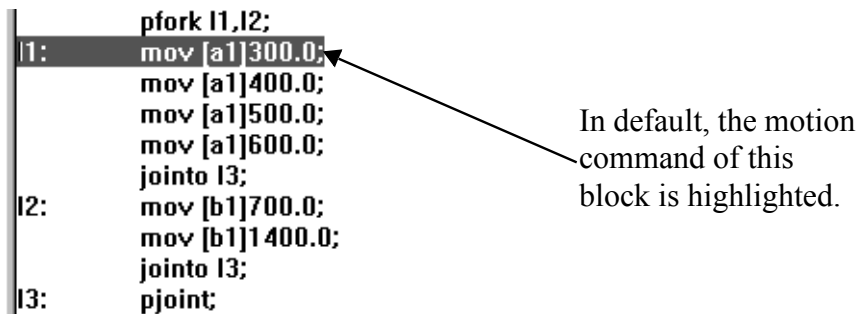


The screenshot shows a window titled "PT#: 1 UT#: 1 CPU#:0". The window contains a list of motion commands. The command "mvs [a1]100.0 [b1]100.0 f1000000;" is highlighted. The list of commands is as follows:

```
00001 MPM001 "grpa"
00002   fmx t1000000;
00003   ABS;
00004   mvs [a1]100.0 [b1]100.0 f1000000;
00005   mov [a1]200.0 [b1]400.0;
00006   pfork l1,l2;
00007 l1:   mov [a1]300.0;
00008       mov [a1]400.0;
00009       mov [a1]500.0;
00010       mov [a1]600.0;
00011       jointo l3;
00012 l2:   mov [b1]700.0;
00013       mov [b1]1400.0;
00014       jointo l3;
00015 l3:   pjoint;
00016       mvs [a1]0.0 [b1]0.0 f1000000;
00017       end;
00018
```

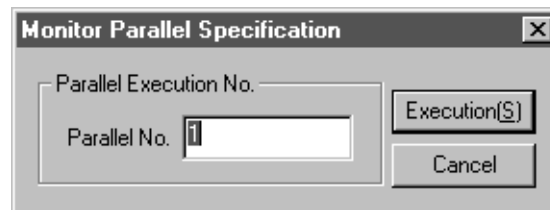
## ■ Monitor Display in the Parallel Execution Command [PFORK]

When the PFORK command is executed, as the default setting, the motion command within the block designated by label 1 is highlighted.



## ■ Switching the Block Which Displays the Monitor

- Select **View (V)** → **Monitor Parallel Number (M)** from the motion editor menu.
- In the dialog box, input parallel number (block number), then choose **Execution** button. The parallel number can be input in a range of 1 ~ 4.





**Note:**

The commands highlighted in the monitor mode are shown in the following table.

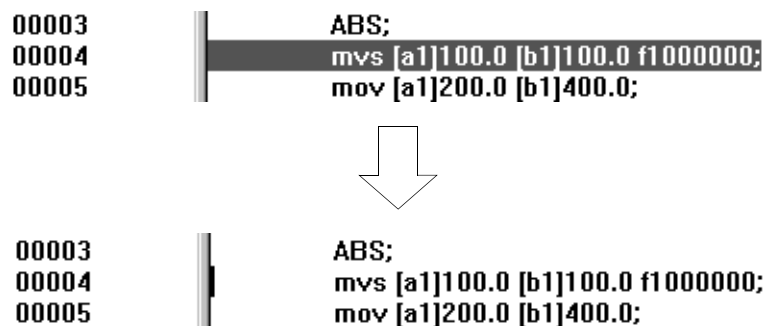
Command	Name
MOV	Positioning
MCW	Circular Interpolation
MCC	Helical Interpolation
SKP	Skip Command
PFN	In-position Check
ACC	Acceleration Time Change
SCC	S-curve Time Constant Change
IOW	I/O Variable Waiting
MVS	Linear Interpolation
ZRN	Zero-point Return
MVT	Time Designated Positioning
EXM	External Positioning
UFC	User Function Call-up
DCC	Deceleration Time Change
TIM	Time Waiting
MSEE	Sub-program Call-up

### 10.2.3 Releasing and Reviewing the Monitor Display

This item explains how to release and review the monitor display.

#### ■ Releasing the Monitor Display

To release the monitor display, press the space bar when the cursor is in the motion editor window. The cursor shape changes from highlighting to editing. The program can be edited when the monitor view is released.



**Note:**

If a program is edited and saved when the monitor view is released, it may not operate normally.

**■ Reviewing the Monitor Display**

To review the monitor display which was released, select **View (V) → Monitor Regenerator (V)** from the motion editor menu when the cursor is in the motion editor window.

**Supplement:**

When saving the motion program when the monitor view is released, the monitor display is reviewed.

## 10.3 Position Monitor

The position monitor displays current axial position.

### 10.3.1 Structure of the Position Monitor Window

This item explains how to open the position monitor window and menu contents.

#### ■ Opening the Position Monitor Window

Follow the steps below to open the position monitor window from the Engineering Manager.

- a. Select **File (F) → Open (O) → Motion Program (M) → Position Monitor (P)**.
- b. The position monitor window opens.

#### ■ Menus in the Position Monitor Window

The menus displayed in the position monitor window are shown in the following table. Refer to the item number in the right-hand column for information on each menu.

Menu	Function	Item No.
<b>File (F)</b>		
File Manager (F)	Opens File Manager window	3.4.2
Open (O)	Opens each function window	5.1
Close (C)	Closes position monitor window	10.3.3
Register User Menu (U)	Register user menu	—
Save (S)	Cannot be used in this window	—
Delete (D)	Cannot be used in this window	—
Print (P)	Prints document	12
Exit (X)	Exits from Engineering Manager	3.4.2
<b>View (V)</b>		
Tool Bar (T)	Displays tool bars that are available	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Display Item (S)	Selects display item	10.3.2
<b>Window (W)</b>		
Cascade (C)	Displays windows in cascade format	3.4.4
Tile (T)	Displays windows in tile format	3.4.4
Arrange Icon (A)	Arranges and displays icons	—
<b>Help (H)</b>		
About Version (A)	Displays version information	3.4.5

### 10.3.2 Position Monitor Display

The position monitor displays work coordinate, machine coordinate, and work coordinate feedback position of each axis defined by the group.

#### ■ Monitor Display

The monitor display screen is shown below.

PT#: 1 UT#: 1 CPU#:0				
1	grpa			
2	Physical Axis	01.01	01.02	
3	Logic Axis	A1	B1	Unit
4	Work coordinate system	-0.001	0.042	mm
5	Machine coordinate system	-0.001	0.042	mm
6	Work coordinates feedback	-0.001	0.042	mm

1. Group  
The group name is selected from this box. The current position of the axis defined by the selected group is displayed. When “Whole group” is selected, all axes of the group are displayed.
2. Physical axis  
The number of physical axes defined by the selected group is displayed.
3. Logical axis  
The name of the logical axis attached to the physical axis is displayed.
4. Work coordinate system  
The work coordinate of each axis is displayed. The work coordinate is the one that adds the work coordinate offset to the target position monitor (IL0002).
5. Machine coordinate system  
The machine coordinate of each axis is displayed. The machine coordinate uses the values of the target position monitor (IL0002).
6. Work coordinate feedback  
The position of each axis’s work coordinate feedback is displayed. This position is the one that adds the work coordinate offset to the position monitor (IL0008).
7. Unit  
The unit of the coordinate is defined by the servo module function selection flag.

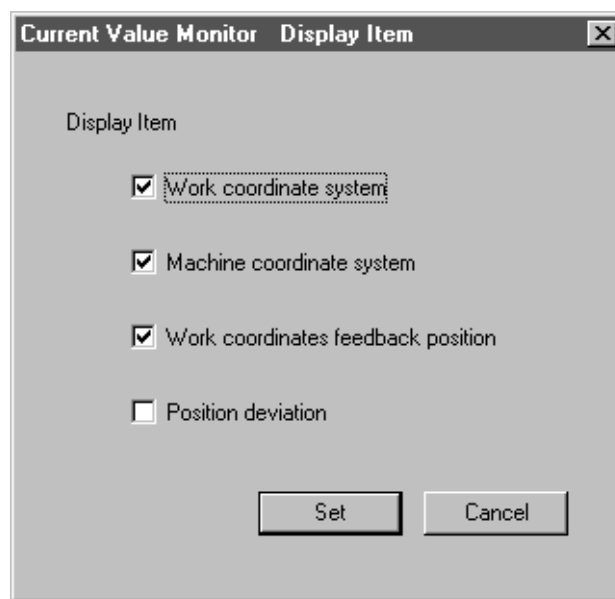
**Note:**

- (1) The servo module function selection flag is a fixed parameter.
- (2) The work coordinate offset is a setting parameter.
- (3) The target position monitor and the position monitor are the parameter monitors.

**■ Display Subject Selection**

When the position monitor window is open, the work coordinate, machine coordinate, and the work coordinate feedback position are displayed, these subjects can be selected.

- a. Select **View (V) → Display Item (S)** from the position monitor menu.
- b. The dialog box is displayed. Check a display subject, then choose the **Set** button.



- c. The subject checked in “b” is displayed.

Physical Axis	01.01		
Logic Axis	A1	Unit	
Work coordinate system	-0.001	mm	
Machine coordinate system	-0.001	mm	
Work coordinates feedback	-0.001	mm	

**Note:**

The position deviation can be selected as a display subject. However, in the network servo, this subject cannot be displayed.

### 10.3.3 Closing the Position Monitor

Close the position monitor window to exit from the program.

To close the position monitor window, select **File (F)** → **Close (C)** from the position monitor menu.

## 10.4 Task Monitor

Task monitor displays the execution status of the motion program.

### 10.4.1 Structure of the Task Monitor Window

This item explains how to open the task monitor window and its menu structure.

#### ■ Opening the Task Monitor Window

The task monitor window can be opened from the Engineering Manager window.

- a. Select **View (V) → Open (O) → Motion Program (M) → Task Monitor (T)** from the Engineering Manager menu.
- b. The task monitor window is displayed.

#### ■ Menu Structure of the Task Monitor Window

The menus displayed in the task monitor window are shown in the following table. For the function of each menu, refer to the item number shown in the item number column.

Menu	Function	Item No.
<b>File (F)</b>		
File Manager (F)	Opens File Manager window	3.4.2
Open (O)	Opens each function window	5.1
Close (C)	Closes task monitor window	10.4.3
Regist User Menu (U)	Registers user menu	—
Save (S)	Cannot be used in this window	—
Delete (D)	Cannot be used in this window	—
Print (P)	Prints document	12
Exit (X)	Exits from Engineering Manager window	3.4.2
<b>View (V)</b>		
Tool Bar (T)	Displays tool bars that are available	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Detailed Mode (M)	Displays in detailed mode	10.4.2
<b>Window (W)</b>		
Cascade (C)	Displays windows in cascade format	3.4.4
Tile (T)	Displays windows in tile format	3.4.4
Arrange Icon (A)	Arranges and displays icons	
<b>Help (H)</b>		
About Version (A)	Displays version information	3.4.5

## 10.4.2 Status View of the Motion Program

There are two view modes in the task monitor, standard view and detailed view. The standard view mode displays the execution status of the tasks to be operated simultaneously in the same group, or the execution status of the group to which the motion program belongs.

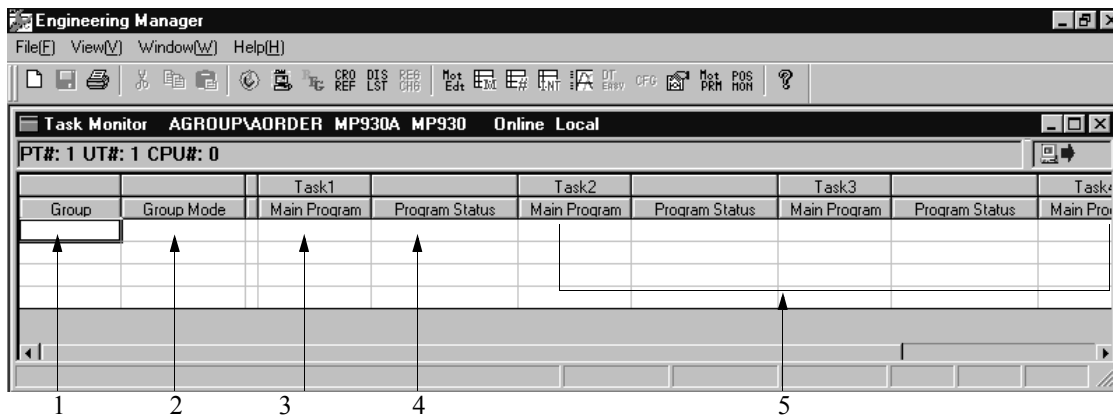
In addition to the information shown in the standard view mode, the detailed view mode also displays the operation status of the parallel execution command (PFORK), and the execution step number of the program.

### Note:

The task monitor only operates normally when the group is defined by the “With PGM automatic creation” in the group definition.

### ■ Standard View

When the task monitor window is open, the standard view mode is displayed as below:



1. Group  
The group name set by the group definition is displayed.
2. Group mode  
The group execution status is displayed. There are the following displays:
  - During group operation
  - Group operation stopped temporarily
  - Group debugging stopped
  - Group operation alarm occurred
  - Automatic mode
  - Manual mode
3. Main program of task 1  
The number of the motion program which is being operated in task 1 is displayed.



#### 4. Program status of task 1

The execution status of the program which is being operated in task 1 is displayed. There are the following displays:

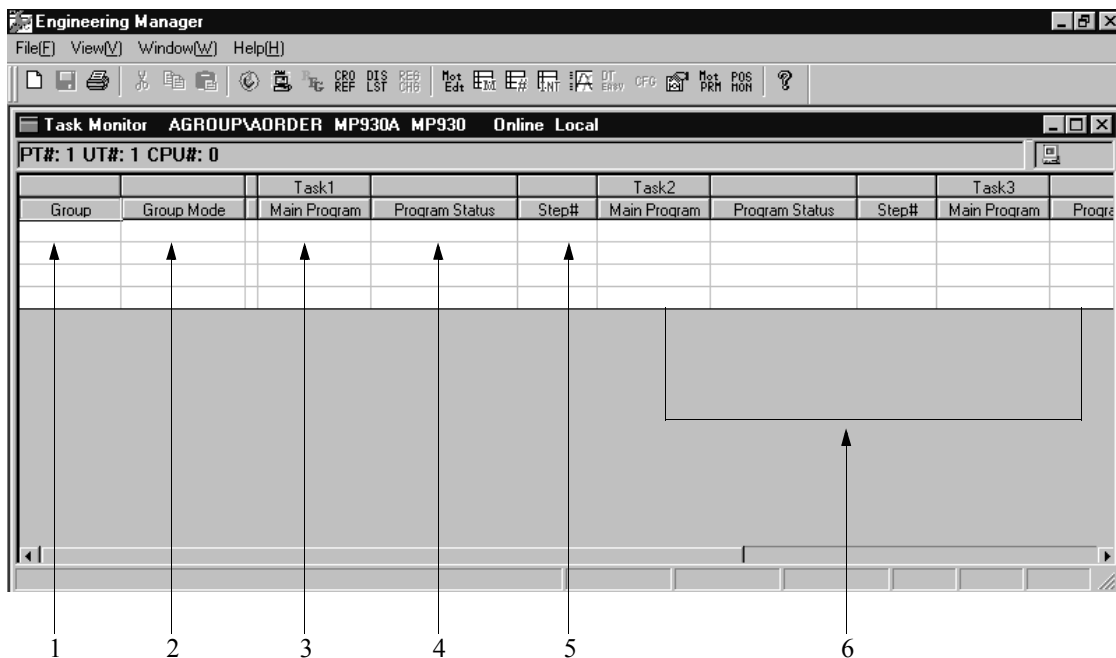
- During program operation
- Program operation stopped temporarily
- During program abort
- Program debugging stopped
- Program operation alarm occurred
- Program operation brake occurred
- During program debug
- Error of duplicated main program
- Over error of main program number

#### 5. Main program and program status of tasks 2 ~ 4

The main program and program status of tasks 2 ~ 4 are displayed. The display contents are the same as task 1.

### ■ Detailed View

The detailed view can be switched from the task monitor menu by selecting **View (V)** → **Detailed Mode (M)**. If it is selected again, the standard view mode is displayed.



#### 1. Group

The group name set by the group definition is displayed.

#### 2. Group mode

The execution status of the group is displayed. For view contents, refer to the “Standard view.”

3. Main program of task 1  
The number of the motion program which is being operated in task 1 and the number of each process of the parallel execution command are displayed.
4. Program status of task 1  
The execution status of each process of the parallel execution command, and the program which is being operated in task 1 are displayed. For the execution status of the program, refer to the “Standard view.”  
The process execution status is shown as follows:
  - During motion function operation
  - In hold
  - In abort
  - Debugging stopped
  - Alarm occurred
  - Brake occurred
  - During return process
  - In debug mode
  - Skip signal latch
5. Step number of task 1  
The execution step number of the program is displayed.
6. Status of tasks 2 ~ 4  
The main program, program status, and step number of tasks 2 ~ 4 are displayed.

### 10.4.3 Closing the Task Monitor

Close the task monitor window to exit from the program.

To close the task monitor window, select **File (F)** → **Close (C)** from the task monitor menu.

## 10.5 Motion Alarm

This section describes how to display alarm status.

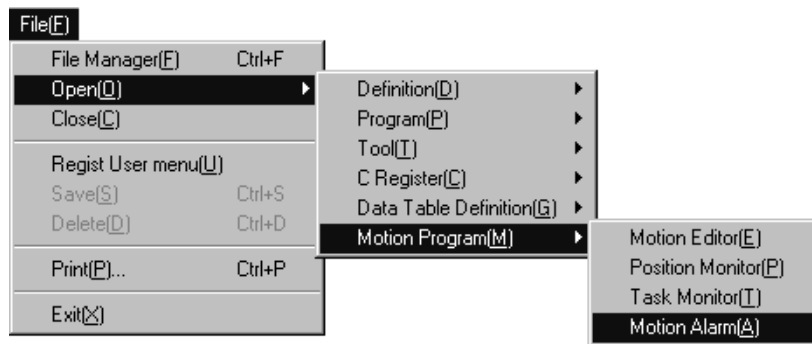
### 10.5.1 Structure of the Motion Alarm Window

This item explains how to open the motion alarm window and menu structure.

#### ■ Opening the Motion Alarm Window

The motion alarm window can be opened from the Engineering Manager.

- a. Select **File (F) → Open (O) → Motion Program (M) → Motion Alarm (A)** from the Engineering Manager menu.



- b. The motion alarm window opens.

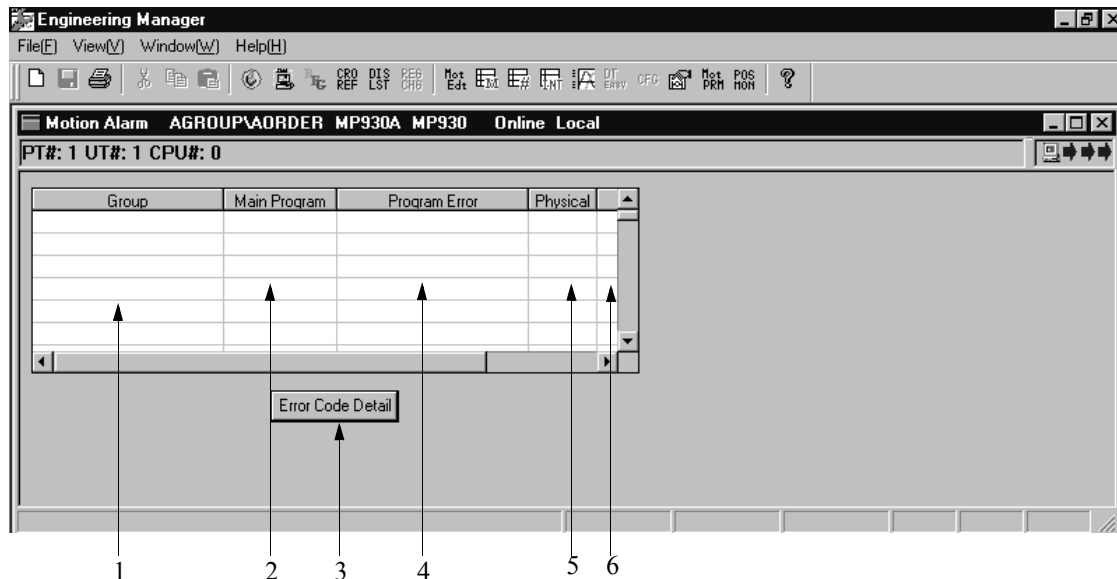
## ■ Menu Structure of the Motion Alarm Window

The menus displayed in the motion alarm window are shown in the following table. Refer to the item number in the right-hand column for further information on each menu.

Menu	Function	Item No.
File (F)		
File Manager (F)	Opens File Manager window	3.4.2
Open (O)	Opens each function window	5.1
Close (C)	Closes motion alarm window	10.5.3
Regist User Menu (U)	Registers user menu	—
Save (S)	Cannot be used in this window	—
Delete (D)	Cannot be used in this window	—
Print (P)	Prints document	12
Exit (X)	Exits from Engineering Manager window	3.4.2
View (V)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Window (W)		
Cascade (C)	Displays windows in cascade format	3.4.4
Tile (T)	Displays windows in tile format	3.4.4
Arrange Icon (A)	Arranges and displays icons	—
Help (H)		
About Version (A)	Displays version information	3.4.5

## 10.5.2 Motion Alarm View

When an alarm occurs, the group name, program name, program error message, physical axis number, and servo error code of the program that causes the alarm, are displayed.



1. Group  
The name of the group in which the alarm occurs is displayed.
2. Main program  
The name of the main program in which the alarm occurs is displayed.
3. Error code detail button  
When the error code detail button is clicked, the statement regarding the error in the row on which the cursor is locked, is displayed. However, the statement is not shown if it is a program error.
4. Program error  
When an alarm occurs in a program, the “Alarm occurs” message is displayed.
5. Physical axis  
The number of the physical axis in which the alarm occurs is displayed.
6. Servo error  
The error code of the servo is displayed.

**Note:**

The motion alarm only operates normally when the group is defined by the “With PGM automatic creation” in the group definition.

### 10.5.3 Closing the Motion Alarm

Close the motion alarm window to exit from the program.

To close the motion alarm window, select **File (F)** → **Close (C)** from the motion alarm menu.

## 11 Debug Operation

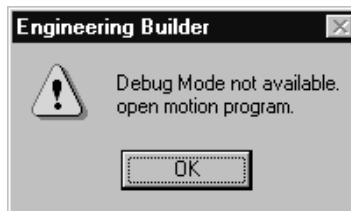
This chapter explains the debug function of the motion program.

11.1	Structure of the Debug Window .....	11-2
11.1.1	Opening the Debug Window .....	11-2
11.1.2	Debug Menus .....	11-3
11.1.3	Debug Tool Icons .....	11-4
11.1.4	Debug Function Keys .....	11-5
11.1.5	Debug Status Bar .....	11-5
11.2	Debug Operation .....	11-6
11.2.1	Debug Mode ON/OFF .....	11-6
11.2.2	Debug Operation Window .....	11-7
11.2.3	Step Execution .....	11-9
11.2.4	Multi-step Execution .....	11-11
11.2.5	Hold Enable/Disable .....	11-12
11.2.6	Abort .....	11-13
11.2.7	Current Value Update .....	11-15
11.2.8	Editing During the Debug Operation .....	11-16
11.2.9	Restrictions During the Debug Operation .....	11-20

## 11.1 Structure of the Debug Window

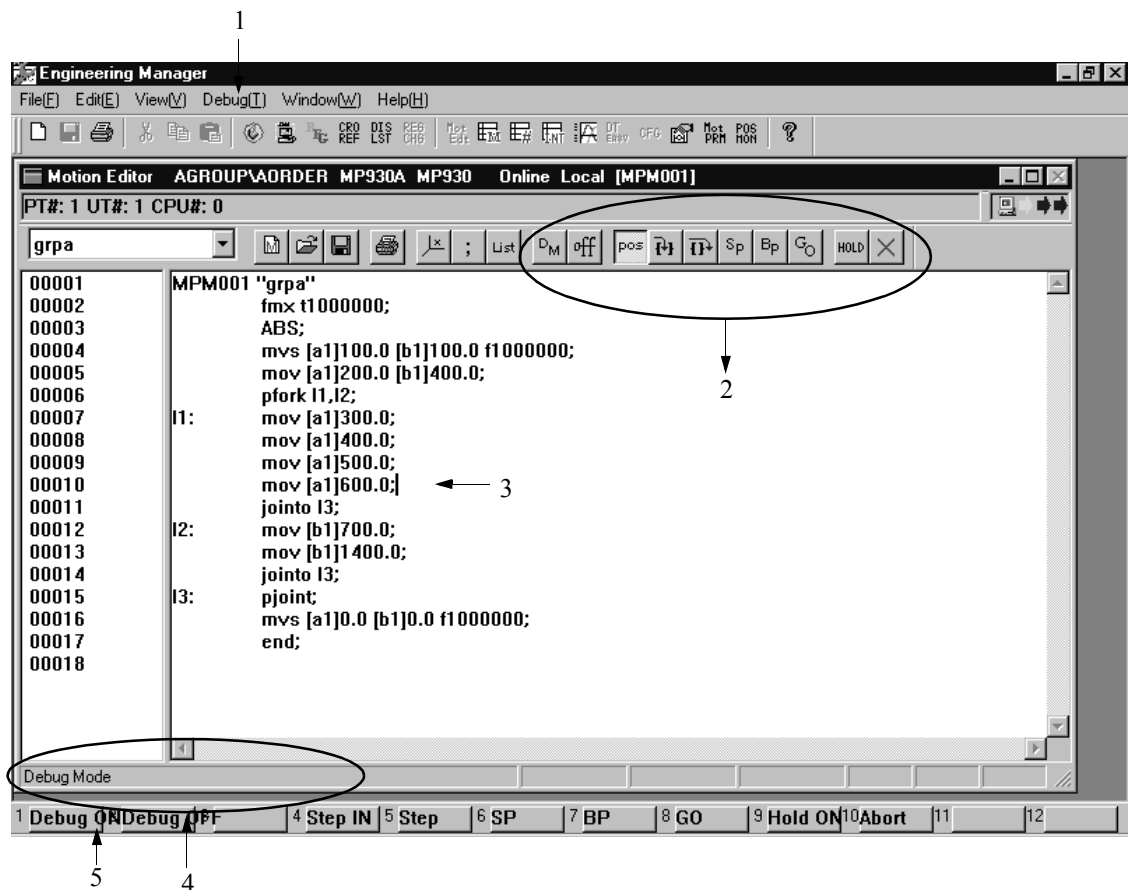
The debug operation environment is available when the motion editor window is open. This section explains the function of the debug operation which is prepared in the motion editor window.

The debug operation function is only enabled in on-line mode or while a program is open. If attempting to enter the debug mode while in off-line mode or when no motion programs are open, the following error message is displayed:



### 11.1.1 Opening the Debug Window

When the motion editor starts, the following window is displayed. When the debug is in OFF mode, functions other than debug ON are disabled.





1. Debug menu  
Unfolds the commands used in the debug operation.
2. Debug Tool Icons  
Icons which are made for frequently used debug commands.
3. Editing cursor  
Cursor used to edit the program.
4. Status bar  
Location of the debug information display.
5. Debug Function Key  
Function keys designated for debug commands.

### 11.1.2 Debug Menus



← Various debug commands can be selected in the debug pull-down menu.

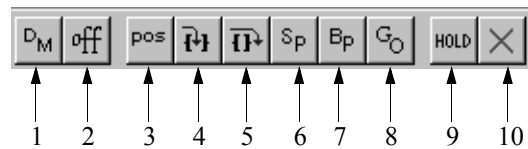
The outline of each function is shown in the following table:

Menu	Function
File (F)	Refer to Section 9.3: "Motion Editor."
Editor (E)	
View (V)	
Font (F)	Refer to Section 9.3: "Motion Editor."
Tool Bar (T)	
Status Bar (B)	
Error List (L)	
Monitor Parallel Number (M)	Refer to Section 10.2: "Motion Program Monitor."
Regeneration (V)	

Debug (T)	
Debug ON (D)	Enables debug operation mode
Hold (H)	Discontinues moving command during execution
Abort (C)	Terminates debug operation
Multi-step Run (G)	Runs 1 ~ n rows
Start Point (P)	Designates the starting row of the execution
Break Point (B)	Designates the stopping row of the execution
Step Run (S)	Executes by per step
Step In (I)	Transfers control to sub-routine
Code Generator (L)	Updates object after compiling
Current Value Update (N)	Updates
Debug OFF (X)	Disables debug operation mode
Window (W)	Refer to Section 9.3: “Motion Editor.”
Help (H)	

### 11.1.3 Debug Tool Icons

To execute the functions, left-click (one time) the icons in the debug operation.



1. Debug Mode ON
2. Debug Mode OFF
3. Update Position
4. In Sub-program
5. 1 Step Run
6. Start Point Setting
7. Break Point Setting
8. Multi-step Execution
9. Hold Enable/Disable
10. Abort

### 11.1.4 Debug Function Keys

The debug commands can also be executed by function keys. Refer to Item 11.1.3: “Debug Tool Icons” for each key’s function.

### 11.1.5 Debug Status Bar



The debug status bar is displayed at the bottom of the motion editor window to indicate the status during the debug operation. The following status information can be displayed simultaneously.

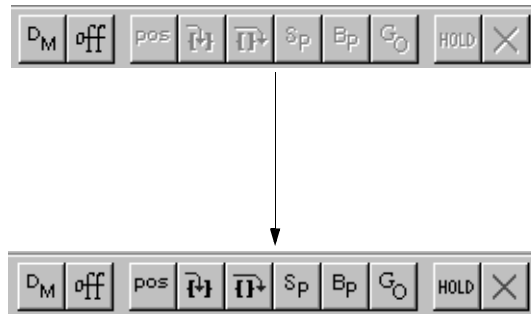
Debug mode:	Debug operation mode is enabled
Running:	Debug is being operated normally
Hold:	Moving command is discontinued
Abort:	Debug operation is being reset
Alarm:	Debug operation error occurs
Break:	Debug operation stopped at break point

## 11.2 Debug Operation

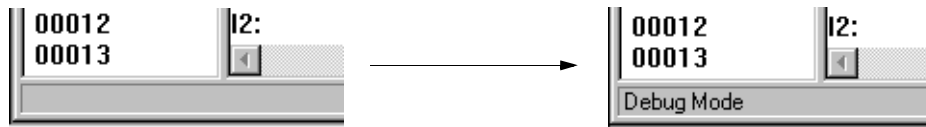
This section explains how to operate the debug. The debug operation executes on the condition that the program (debug object) opened in the motion editor window has no compiling error; otherwise, it cannot be executed.

### 11.2.1 Debug Mode ON/OFF

The debug operation must be started with the debug mode ON command. Various commands used for debug operation are enabled by executing this command, the message “During Debug Mode” is displayed at the same time on the status bar. All debug operation related tool icons are enabled by clicking the **DM** button.



On the status bar, the message “During Debug Mode” is displayed.



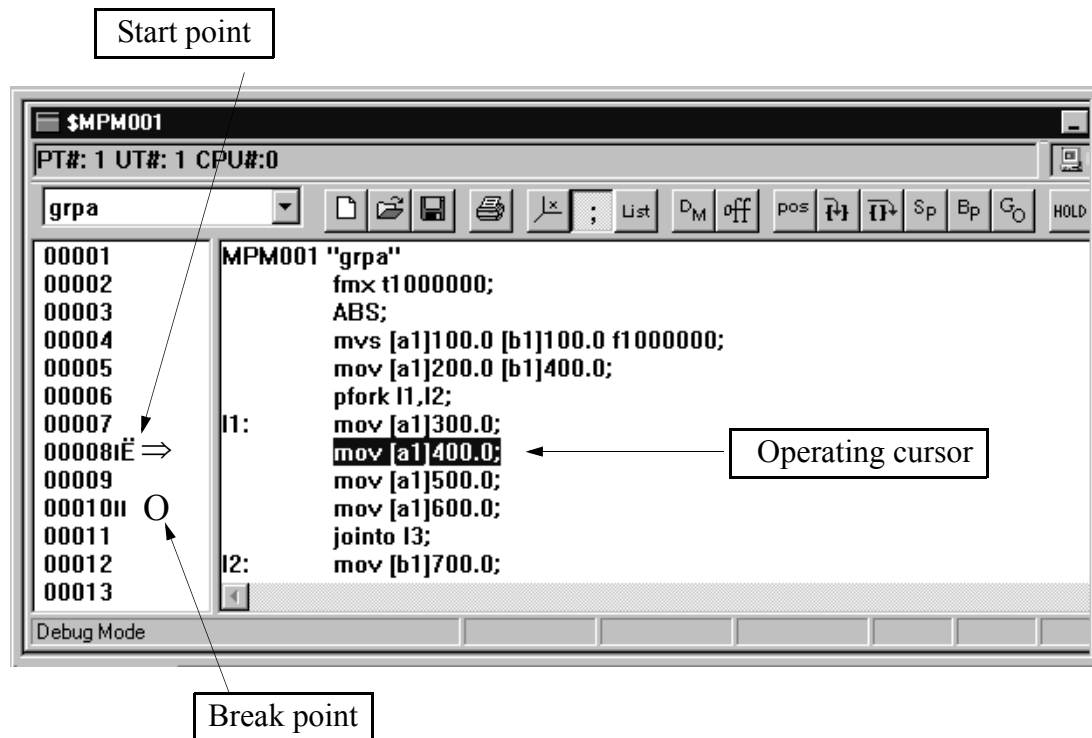
The debug operation is disabled by executing the debug mode OFF command; the original display then returns.

**Note:**

- (1) Use the Debug mode ON command during operation stop.
- (2) The debug mode ON command is only enabled to a single main program; it cannot be set up for multiple main programs simultaneously.
- (3) When closing the MotionWorks™ system without first ending the debug operation by the debug mode OFF command, an error occurs when attempting to operate the debug after restarting the system. Therefore, execute the debug mode ON command after the debug mode OFF command is executed.

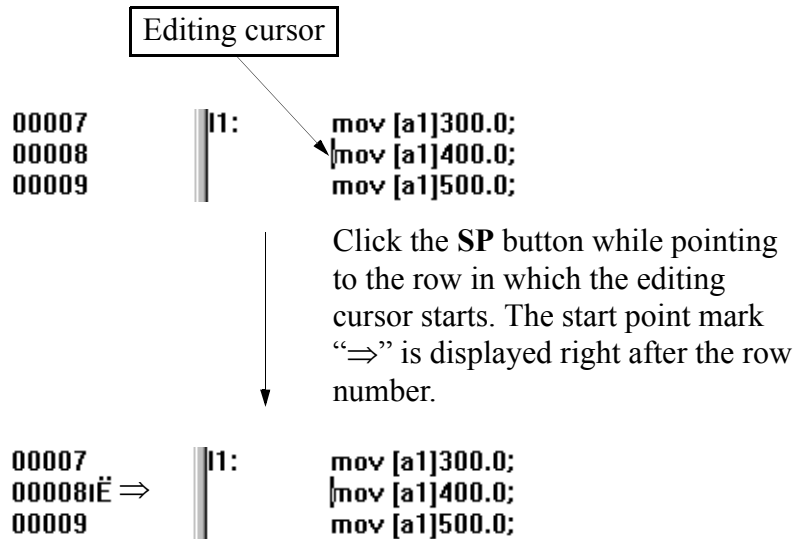
## 11.2.2 Debug Operation Window

During the debug operation, the following window is displayed. In the row number section, right after the row number, a start point and break point are displayed. The row in operation is highlighted from the head to the end as an operation cursor. The row currently being executed can be confirmed by tracing this operation cursor.



## ■ Start Point Setting

The start point “⇒” is displayed from the setting time during the operation; it disappears when the operation stops. To release it by manual operation, set it again in the same row.



However, in the step execution, because the setting and execution are in one operation, this mark may not be seen in the command for short execution time.

## ■ Break Point Setting

Once the break point “O” is set up, it remains in the same position until it is released. The setting method is the same as the start point: click the **BP** button while pointing to the row in which the editing cursor ends, then the break point mark “O” is displayed right after the row number.

The break point can be released by any of the following 4 methods:

- Set up a different break point from the current one.
- Click the **BP** button again in the row which is currently being set up.
- Use the abort command.
- Disable the debug operation

## ■ Operation Cursor

By highlighting a row in which the command is being executed, the row is considered as an operation cursor.

When the operation cursor departs from the row which is being displayed in the motion editor window, it automatically scrolls the program row to continue to display the command which is being operated.

The operation cursor changes to the editing cursor when the operation stops. The

operation cursor is also displayed during operation as soon as the program opened by the editor menu is executed.

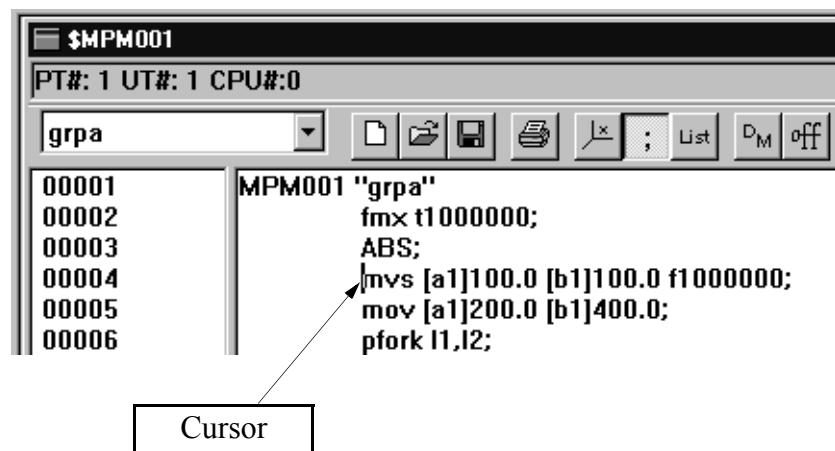
### 11.2.3 Step Execution

Step execution is a command that executes the debug operation while confirming the program row by row. Depending on how the sub-routine described by the MSEE command is executed, they are in sub-program and one-step run commands. The debug operation of the main program that includes the sub-routine is executed by both commands.

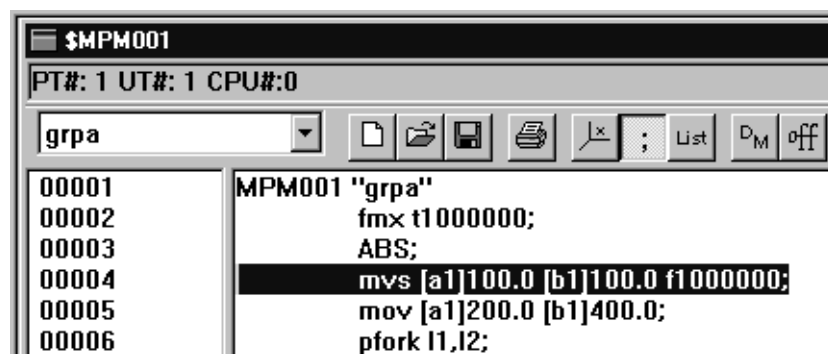
#### ■ In Program

In-program is one of the step execution commands which is executed row by row. The sub-routine described by the MSEE command is handled as one execution unit, and stops by the next MSEE command.

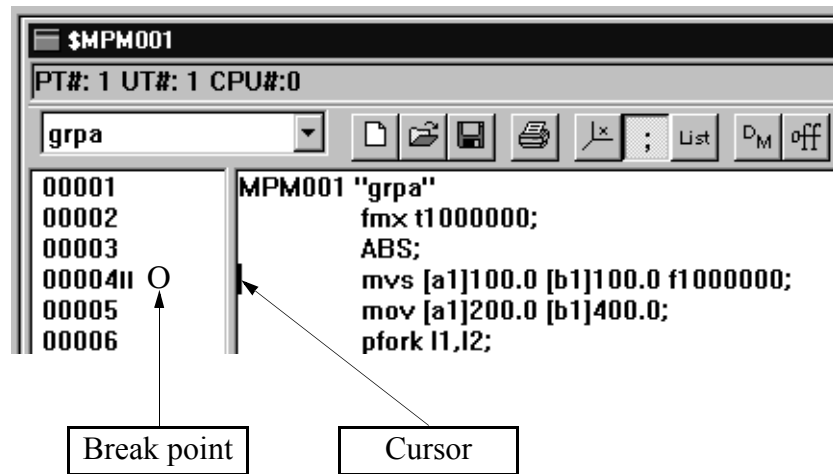
Set up the cursor on the row in which the step is executed



Execution can be confirmed by the operating cursor while executing the command. However, if the execution ended too early, it may not be seen.



When 1 row is executed, the break point and cursor are set up automatically.



■ Step In

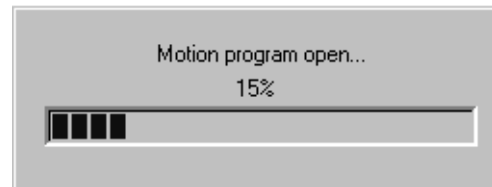
The step in command is used when the sub-routine described by the MSEE command is being debugged. The execution point is enabled when the MSEE command is executed; otherwise, it performs the same function as in the sub-program command. Once the step in command is executed, the motion editor window of the sub-routine called up by the MSEE command is opened; control is transferred. In the sub-routine, as in the main program, other debug commands can be used. In the sub-routine, once the RET command is executed, the editor window of the sub-routine is closed, and returns to the next command of the MSEE command which was called up. There are up to 8 nests between the sub-routines.

The right window shows that a starting row is set up by the MSEE command. The sub-routine [mps101] is executed.

```

00010
00011
00012
00013
00014
;
[msee mps101; "call mps 101
fmx +30000;
mvs [c1]100 [d1]200;
mvs[a1]0 [b1]0;
    
```

Once the step in is executed, the sub-routine is open, and the environment for debugging is available.



The editor window of the sub-routine is open, the cursor is set on the starting row. At this point, various step execution commands can be used.

```

00001
00002
00003
00004
00005
00006
MPS101 "grpa"
    dw14 = 14;
    dw15 = 15;
    fmx +10000;
    mvs [d1]200 f1000pfn;
    ret;
    
```



Once the RET command of the sub-routine is opened, the sub-routine window is closed, and returns to the main window.

```

00010
00011
00012 O
00013
00014
;
msee mps101; "call mps 101
fmx +30000;
mvs [c1]100 [d1]200;
mvs[a1]0 [b1]0;

```

### 11.2.4 Multi-step Execution

This function executes the commands for 1 ~ n rows which are set up by the start point and break point. Either the start point or the break point can be the first one to be set up. The start point can be released automatically when execution stops, but the break point remains there until it is set again.

This window shows an example in which the cursors are set up on the 2nd and 7th rows. The start point is set up on the second row; the break point is set up on the seventh row.

Once the multi-step is executed, row2 ~ row5 are executed, and the break point stops at the seventh row.

The operation cursor may not be seen depending on the type of command. Refer to Section 10.2 “Motion Program Monitor” for the commands displayed by the operation cursor. If the set break point did not pass, as soon as logic is normal, the following processes occur.

- a. Main program  
Executed until the END command, stops.
- b. Sub-program  
The RET command is executed, returns to the MSEE command, and stops by the next command.

In this window, it is executed until the END command in the sub-program stops, because the break point is set up. Open [mps120] by the one-step run command.

00001	MPM002 "grpa"
00002	abs;
00003	mov [a1] 100.;
00004	ob100=0;
00005	msee mps120;
00006	ob101=1;
00007	tim +500;
00008	mvs [b1]100.[c1]200;
00009	mov[c1]0;
00010	;
00011	end;

Enter the sub-routine. When executing the multi-step as shown in this window, the RET command is executed; the sub-routine returns to the main program.

00001	MPS120 "grpa"
00002	inc mov [a1]10;
00003	mov [d1]20;
00004	tim +100;
00005	ret;

The sub-routine returned to the main program, and stopped by the next command.

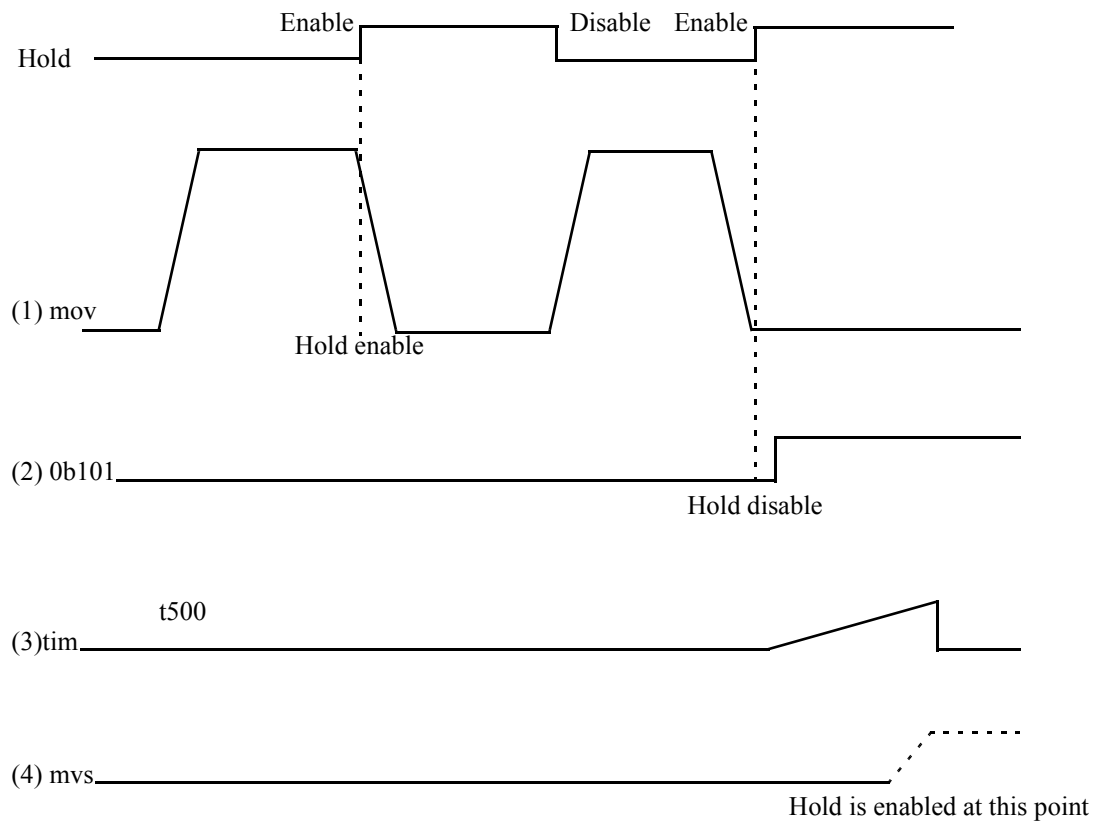
00001	MPM002 "grpa"
00002	abs;
00003	mov [a1] 100.;
00004	ob100=0;
00005	msee mps120;
00006	ob101=1;
00007	tim +500;

### 11.2.5 Hold Enable/Disable

The hold enable command temporarily stops the operating command. Once it is executed again, the stopped command is released, and is executed continuously. However, the hold operation is only possible for the moving command; it is ignored during other command execution.

The timing chart in the following commands are shown as follows:

0010	mov [a1]100;	←Hold enable
0011	ob1010 = 1	←Hold disable
0012	tim t500;	←Hold disable
0013	mvs [b1]100. [c1]200;	←Hold enable
0014	mov [c1]10;	←Hold enable

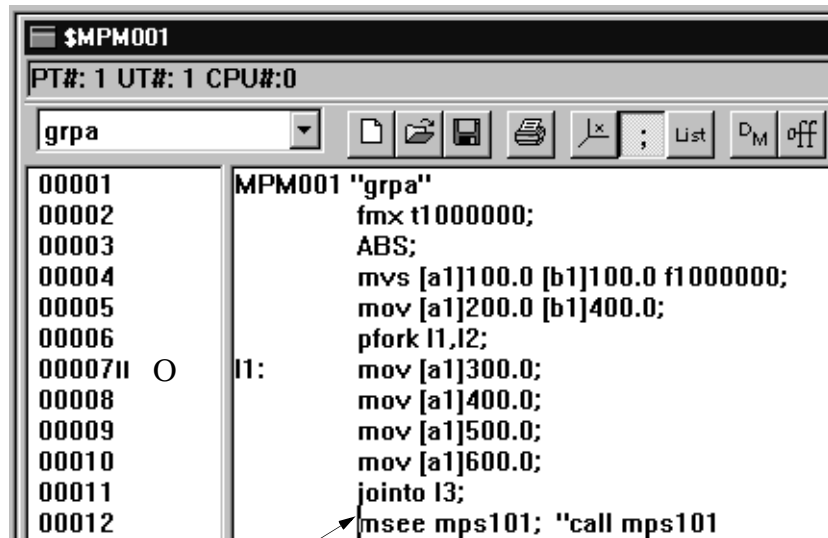


### 11.2.6 Abort

The abort command terminates execution based on the debug operation. The terminated execution cannot be executed continuously. After the abort is executed, the following occur:

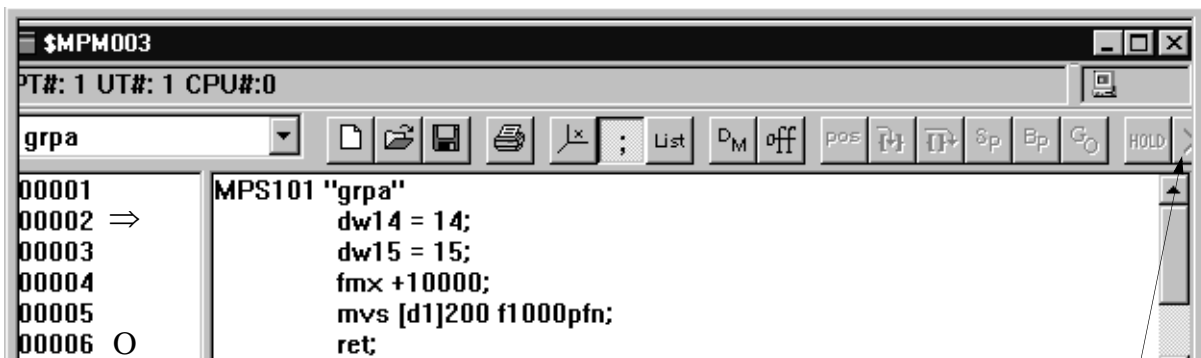
- The start point and break point are released, and disappear.
- The debug control returns to the main program even if it is in the sub-routine. The main program screen is activated, and the editing cursor points to the starting row. Therefore, the debug operation must be started again from the main program.
- The sub-routine screen does not close automatically even if it is open. This is not only because the debug operation process must be confirmed, but also it must be saved to the controller if there is any sub-routine which has been edited during the debug operation (Refer to Item 11.2.8: "Editing During the Debug Operation.")

For example, set up the cursor on the MSEE command, then execute the sub-routine [mps101] by the one-step run command.



Set up the cursor to the MSEE command

When entering the sub-routine, set up the start point and break point as follows:



Abort

Here, instead of doing the step execution, execute the abort command. Therefore, the start/break points are cleared, the debug commands are in OFF mode, and the debug operation is reset.

```

$MPM003
PT#: 1 UT#: 1 CPU#:0
grpa
00001 MPS101 "grpa"
00002     dw14 = 14;
00003     dw15 = 15;
00004     fmx +10000;
00005     mvs [d1]200 f1000pfn;
00006     ret;

```

Since the debug operation is reset, only the main program is possible for operating the debug; the start point is set up in the starting row.

```

$MPM001
PT#: 1 UT#: 1 CPU#:0
grpa
00001 MPM001 "grpa"
00002     fmx t1000000;
00003     ABS;
00004     mvs [a1]100.0 [b1]100.0 f1000000;
00005     mov [a1]200.0 [b1]400.0;
00006     pfork l1,l2;
00007ll O l1: mov [a1]300.0;
00008     mov [a1]400.0;
00009     mov [a1]500.0;
00010     mov [a1]600.0;
00011     jointo l3;
00012     msec mps101; "call mps101;

```

### 11.2.7 Current Value Update

During the debug operation, when an axis is moved by the ladder program (such as the JOG) before it is moved by the motion program, a difference occurs between the old values and the current values. The current value update is a command that compensates this difference.

#### Note:

During the debug operation, if the axis is moved by hand, this command must be executed.

## 11.2.8 Editing During the Debug Operation

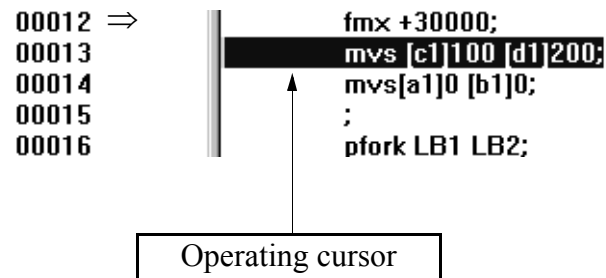
During the debug operation, when attempting to improve the program, or correct an error existing in the program, if the program is not highlighted by the operation cursor (the commands are not being executed), the program can be changed, and executed again.

### ■ Programs Which Can be Edited

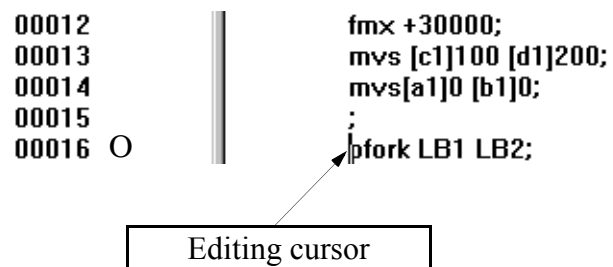
Programs which can be edited have the following restrictions:

- They must be displayed in an active window during the debug operation.
- The sub-routine window is not open during the debug operation (however, the sub-routine window can be switched or scrolled.)
- They may be programs which are not related to the debug operation (however, the programs cannot be saved).

A program cannot be edited when the operation cursor is displayed, thereby indicating the program is running.



In this window, the editing cursor is displayed in the beginning of the [PFORK] command during stop; at this point the program can be edited.



The following window shows that the sub-routine [MPS101] is activated from the main program [MPM001] by the one-step run command. Another program [MPM002] which is not related to the debug operation is also open.

At this point, the [MPM002] which is not related to the activated [MPS101] can be edited, but cannot be saved.

The [MPM001] which has been passed over during the debug operation cannot be edited.



	00004		dw12=12;
Input "dw14 = 14".	00005		dw13=13;
	00006		dw14=14;
	00007		!

Compile the text modified by either pressing **Shift + Enter** or selecting **Debug (T) → Code Generator (L)**. Execution is opened again if there are no errors.

The break point is set-up in the row number, but it does not mean that the break point is set-up in the command assigned in the row number. Therefore, when the row number deviates due to program editing, the break point is set up to a command different from the previous one.

Pay attention to the break point which is currently being set while editing.

Set up the break point to the ninth row.	00007		fmx +20000;
	00008		mvs [a1]0 [b1]0;
	00009 ○		[mvs [c1]0;
	00010		;

Edit the MVS command of the ninth row. At this point, since only the substitution is being modified, the break point still corresponds to the command.	00007		fmx +20000;
	00008		mvs [a1]0 [b1]0;
	00009 ○		mvs [c1]200!
	00010		;

Two rows of commands are being added to the ninth row. Since the row number deviated, the break point moves to the tim statement.	00007		fmx +20000;
	00008		mvs [a1]0 [b1]0;
	00009 ○		tim +100;
	00010		mw100 = 100;
	00011		[mvs [c1]200;
	00012		;

The tim statement has been deleted, so the break point is set up to the substitution statement.	00007		fmx +20000;
	00008		mvs [a1]0 [b1]0;
	00009 ○		mw100 = 100;
	00010		mvs [c1]200;
	00011		;

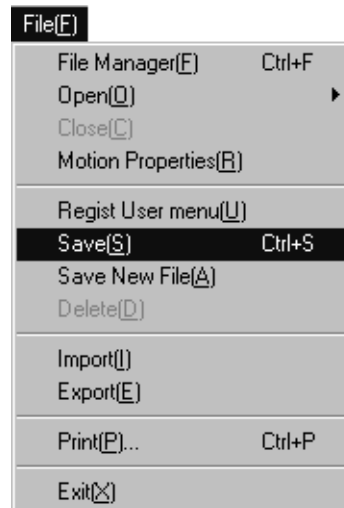


## ■ Renewing File

During the debug operation, temporary registration and real registration exist in file renew. Temporary registration is the command designed for test operation; it can only confirm the motion result based on the program modification. If the result is good, the modified contents should be reflected formally in the file.

- a. Temporary registration  
The modified program can be temporarily registered to the PLC by pressing **Shift+Enter** or by selecting **Debug (T) → Code Generator (L)**. As soon as the original program in the PLC is not really registered, it is not rewritten.
- b. Real registration  
The file registered in the hard disk and PLC is updated by the modified program. The editor cannot be closed without performing the real registration. Select **File (F) → Save (S)** to close the editor.

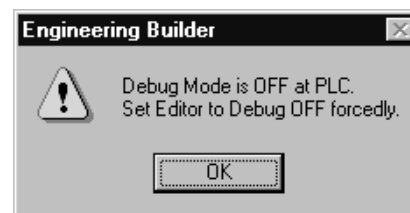
Execute the real registration in the active editor screen.



Or,



This message is displayed when attempting to turn off the debug operation without performing the real registration. Press the **OK** button to save the program.



### Note:

Temporary registration is executed in the sub-routine when the system automatically executes real registration, if the RET command is executed without actually performing the real registration. When attempting to keep the program which existed before the debug operation, either create and copy the PLC folder in the File Manager to save the program, or save the necessary program by using the export command.

## 11.2.9 Restrictions During the Debug Operation

There are some restrictions during the debug operation.

### ■ Commands Which are Enabled During the Debug Operation

There are commands which are enabled during program stop, and commands which are enabled during program operation.

Command	During Stop	During Operation
Debug Mode ON [DM]	O	×
Debug Mode OFF [Off]	O	×
Update Position [POS]	O	×
In Subprogram (step-over)	O	×
Step In	O	×
Start Point Setting [SP]	O	×
Break Point Setting [BP]	O	×
Multi-step Execution [GO]	O	×
Hold Enable/Disable [HOLD]	×	O
Abort [×]	×	O

×: Disabled      O: Enabled

### ■ Cursor and Break Point After Step Execution

The editing cursor and break point move to the next row after step execution, but if the comment or label row of the next row is on non-execution command, the row stops by the next execution command.

Set up a cursor in the 5th row.

```

00001 MPM001 "grpa"
00002     fmx t1000000;
00003     ABS;
00004     mvs [a1]100.0 [b1]100.0 f1000000;
00005     [mov [a1]200.0 [b1]400.0;
00006     pfork l1,l2;
00007     l1:   mov [a1]300.0;
00008     mov [a1]400.0;
00009     mov [a1]500.0;

```

Execute stepover.

```

00001 MPM001 "grpa"
00002     fmx t1000000;
00003     ABS;
00004     mvs [a1]100.0 [b1]100.0 f1000000;
00005     mov [a1]200.0 [b1]400.0;
00006     pfork l1,l2;
00007     l1:   mov [a1]300.0;
00008     mov [a1]400.0;
00009     mov [a1]500.0;

```

Passing the comment and label rows, the cursor and break point are set up to the [fmx] command of the 9th row.

00001		MPM001 "grpa"
00002		fm $\times$ t1000000;
00003		ABS;
00004		mvs [a1]100.0 [b1]100.0 f1000000;
00005		mov [a1]200.0 [b1]400.0;
00006		pfork l1,l2;
00007	l1:	mov [a1]300.0;
00008		mov [a1]400.0;
00009	O	mov [a1]500.0;

## ■ Commands Which Cannot Execute the Step

There are some commands which cannot execute the step. If the commands (listed below) are executed, error messages are displayed. Therefore, set up the start point to the next command which can execute the step.

Command	Coding Example	Note
IF	if ib01 == 1;	—
ELSE	else;	Start point cannot be set
IEND	iend;	—
WHILE	while ib01 == 1;	—
WEND	wend;	—
PFORK	pfork L1 L2;	—
JOINTO	jointo L3;	—
PJOINT	L3: pjoint L1 L2;	—
SFORK	sfork ib01 == 1? L1 ib01 == 0?L2;	—
SJOINT	L3: sjoint;	—
END	end;	Start point cannot be set

## ■ Commands Which Cannot Set the Start/Break Points

The following non-execution commands cannot set up the start/break point. Therefore, set them up to the possible commands.

Command	Coding Example	Start Point	Break Point	Note
ELSE	else;	×	O	Step cannot be executed
END	end;	×	O	Step cannot be executed
;row	;	×	×	—
Comment, ; row	"Interpolation speed setting"	×	×	—
Label row	Label;	×	×	—

×: Disabled

O: Enabled

## ■ Execution from Comment and Label Row

The step can be executed from either the row with ; only, or the comment row. However, at this point, execute the possible command appearing after it.

Set up a cursor to the comment row.	00006		;
	00007		comment
	00008		fmx +20000;
	00009		mvs [a1]0 [b1]0;
	00010		mw100 = 100;

When the step is executed, the possible command is executed after the sixth row. At this point, the fmx command is executed.	00006		;
	00007		; comment
	00008		<b>fmx +20000;</b>
	00009 ○		mvs [a1]0 [b1]0;
	00010		mw100 = 100;

## ■ SNG Motion

The SNG designation does not function during the debug operation.

The 30th and 31st rows are designated by SNG, but they are in the step execution.	00028		mov [a1]0;
	00029		ob101=1;
	00030 ○		<b>sng mov [a1]100;</b>
	00031		sng mov [b1]100;
	00032		ob101=1;
	00033		mov [a1]100;

## 12 Printing

This chapter presents the printing of program data, machine configuration data, etc., stored on the MotionWorks™ hard drive, according to the set print specifications.

12.1	Structure of Print Manager Window .....	12-2
12.2	Program Print Data Selection .....	12-5
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12.3	Selecting Register Print Data .....	12-10
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12.4	Selecting Definition Print Data .....	12-13
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12.5	Motion Print Data Selection .....	12-15
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12.8	Editing of Print Setting File .....	12-21
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12.9.6	M Register Map Print Sample .....	12-28
12.9.7	M Register List Sample .....	12-29

## 12.1 Structure of Print Manager Window

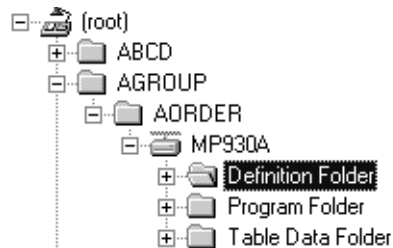
This section covers the opening of the print window, and the menu structure of that window.

### ■ Opening Print Window

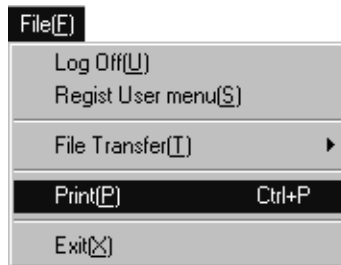
The print window can be opened from either the File Manager or the Engineering Manager.

#### Opening from the File Manager

- a. Select a PLC folder, CPU folder, drawing folder, etc., from the tree diagram.



- b. Select **Print (P)** from the **File (F)** menu.



- c. The print manager starts, and the print window opens.

#### Opening from the Engineering Manager

- a. Select **Print (P)** from **File (F)** in the menu.
- b. The print manager starts, and the print window opens.

#### Note:

The **Print (P)** command in the **File (F)** menu of the ladder program window prints the main program displayed in the window. Therefore, the print manager does not start.

## ■ Structure of Print Window Menu

Table 1 shows the menus displayed in the print window. See the item numbers shown in the table when referring to any of the menu functions.

**Table 1: Print Window Menu**

Menu	Function	Item No.
File (F)		
Read (R)	Reads print settings file	12.8.1
Close (C)	Cannot be used in this window	—
Save (S)	Saves print setting data	12.8.3
Delete (D)	Deletes print settings file	12.8.2
Exit (X)	Exits Engineering Manager	3.4.2
Edit (E)		
Date (D)	Sets current date	12.2.1
Copy History (N)	Copies revision history data	12.2.1
Print (P)		
Execute Print (E)	Executes printing	12.2.1
Printing Status (D)	Displays printing status	12.2.1
View (V)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Next Page (N)	Displays next tab page	7.4.1
Back Page (P)	Displays previous tab page	7.4.1
Help (H)		
About App. (A)	Displays version data	3.4.5

## ■ Print Window Tabs

The print window consists of the following four tabs: Program, Register, Definition, and Motion. See the item numbers in Table 2 when referring to any of these tabs.

**Table 2: Print Window Tabs**

Tab Name	Function	Item Number
Program	Sets print data for drawings/function programs	12.2
Register	Sets S, I, O, M, and D, register print data	12.3
Definition	Sets print data such as system definitions, transmission definition, etc.	12.4
Motion	Sets motion program print data	12.5

**Helpful Hint**

It is possible to move the tab pages in the following order upon selecting **Next Page (N)** from **View (V)** in the Print menu.

Program→Registers→Definitions→Motion→Program.

To move the pages in reverse order, select **Back Page (P)** from **View (V)** in the System Configuration menu.

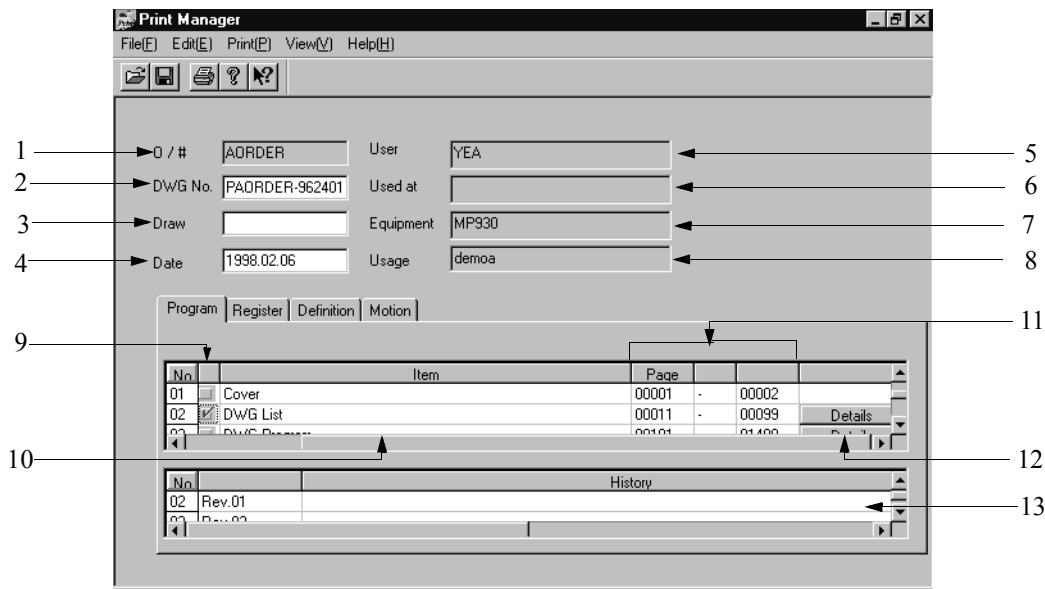


## 12.2 Program Print Data Selection

This is the process of selecting the drawing program or function program print data.

### 12.2.1 Program Print Set-up

The following screen is displayed upon clicking the Program tab in the print window. Print items relating to programs are selected in this screen.



1. O/#

This box displays the data in the Order Number box of the application data window. This data is printed on document paper as a footnote from the second page on.

2. DWG.No.

Input 16 16-bit characters (8 32-bit characters) or less. 16-bit and 32-bit characters can be combined. This data is printed in the headers and footers of the document.

3. Draw

Input 16 16-bit characters (8 32-bit characters) or less. 16-bit and 32-bit characters can be combined. This data is printed in the Draw box of the document footer.

4. Date

Input 16 16-bit characters (8 32-bit characters) or less. 16-bit and 32-bit characters can be combined. The current date can be set by selecting **Date (D)** from **Edit (E)** in the Print menu. This data is printed in the Date box of the document footer.

5. User  
The data in the User box of the application data window is displayed. It cannot be changed. This data is printed in the User box in the document sheet.
6. Used At  
The data in the Used At box of the application data window is displayed. It cannot be changed. This data is printed in the Used At box in the document sheet.
7. Equipment  
The data in the Equipment box of the application data window is displayed. It cannot be changed. This data is printed in the Equipment box in the document sheet.
8. Usage  
The data in the Usage box of the application data window is displayed. It cannot be changed. This data is printed in the Usage box in the document sheet.
9. Selection Status  
This column shows the selection status of the print object items.
  - Unselected Items
  - Selected Items
10. Print Items  
This column shows the print object items. The print items vary according to PLC type.
11. Page Number  
Input the starting and ending page numbers for printing. Input a starting page number smaller than the ending page number. If the number of document pages exceeds the range input into the starting page and ending page numbers, the document is printed from the page preceding the page number designated in the final page.
12. **Details** Button  
This button executes detailed selection of print items. See Item 12.2.2, “Detailed Program Setting” for details on the **Details** button.
13. Revision History Data  
Input the revision history of the print setting file in 64 16-bit characters (32 32-bit characters) or less. 16-bit and 32-bit characters can be combined in entries. Up to 20 rows of revision history data can be created. By selecting **Copy Revision History (D)** from **Edit (E)** in the print menu, it is possible to copy the revision history data in the currently displayed tab to the revision history data of another tab, thus making the revision history data of all the tabs identical.

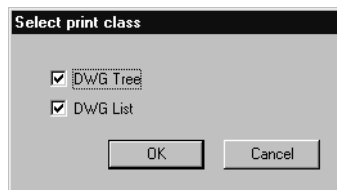
## 12.2.2 Detailed Program Setting

It is necessary to set detailed printing items for any print item with a **Details** button displayed on the right side. In general, detailed items are set as follows.

- a. Select the **Details** button.
- b. Set the print items in the detailed item dialogue box.
- c. Select the **OK** button.

### ■ Detailed Settings for Drawing Lists

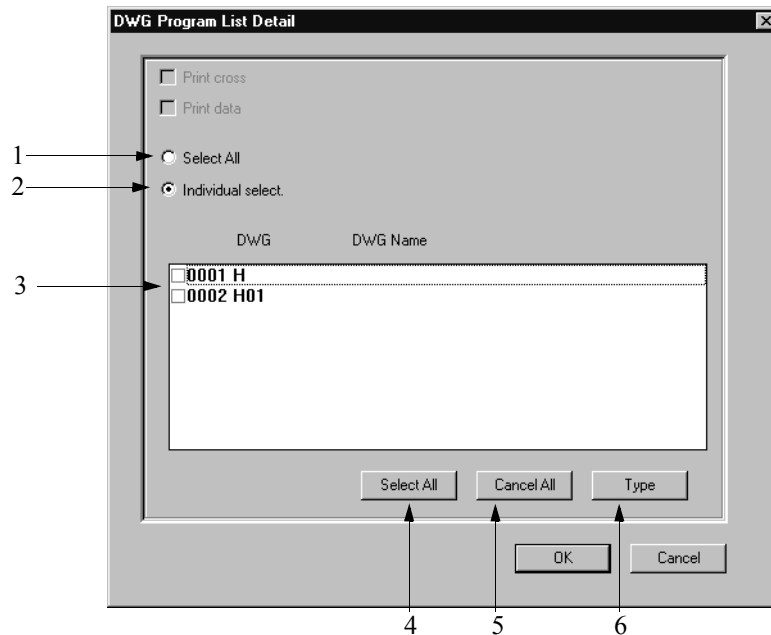
A print object type classification dialogue box is displayed upon selecting the **Details** button. In this box, designate the printing of a DWG Tree and DWG List.



1. DWG Tree  
This button prints system drawings (in which the layer status of drawings is displayed as a tree diagram).
2. DWG List  
This button prints DWG lists.

### ■ Detailed Setting of Drawing Programs

The Drawing Program List Details dialogue box is displayed upon selecting the **Details** button. The dialogue box is displayed below. Designate either Select All or Individual Selection in this box.



1. **Select All**  
This prints all drawing programs.
2. **Individual Selection**  
This prints drawing programs selected from the list box.
3. **Individual Drawing Program Designation List Box**  
Individual program print setting is executed by selecting drawing programs from this list box when Individual Selection has been designated.
4. **Select All Button**  
Selecting the **Select All** button prints all the drawings in the list box.
5. **Cancel All Button**  
Selecting the **Cancel All** button releases all drawing program print settings in the list box.

**Note:** Differences Between Select All and Select All in Individual Selection

**Select All** prints additional programs if the number of programs increases due to program addition. **Select All in Individual Selection** assumes the print objects to be the selected programs, and does not print additional programs if the number of programs later increases.

6. **Type Button**  
The program type of a drawing program can be selected by selecting the **Type** button. Types of data without check marks attached cannot be printed.



### ■ Detailed Function Program Setting

The Function Program List Details dialogue box is displayed upon selecting the **Details** button. Designate Select All or Individual Selection in this box. All function programs are printed if Select All is designated. Selected programs are printed if Individual Selection is designated. The methods for selecting function programs are the same as those for drawing programs. See “Detailed Drawing Program Setting” in this item.

### ■ Detailed Parameter Table (C Register) Setting

The Parameter Table (C Register) Details dialogue box is displayed upon selecting the **Details** button. Designate Select All or Individual Selection in this box. All parameter tables (C Registers) are printed if Select All is designated. Selected parameter tables (C Registers) are printed if Individual Selection is designated. Furthermore, if the Print Cross Reference option is checked, the cross reference data of the C register is printed. The methods for selecting parameter tables (C Registers) are the same as those for drawing programs. See “Detailed Drawing Program Setting” in this item.

### ■ Detailed Table Data Setting

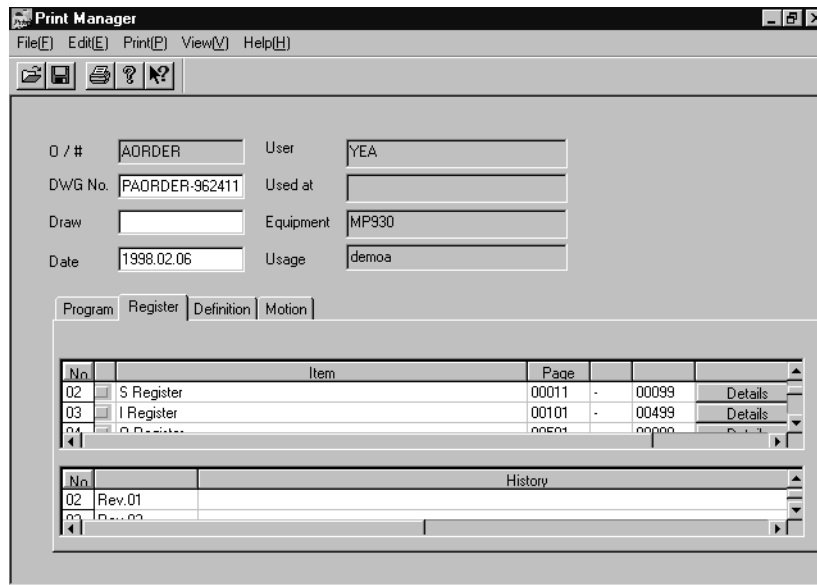
The Table Data Details dialogue box is displayed upon selecting the **Details** button. Designate Select All or Individual Selection in this box. All Table Data is printed if Select All is designated. Selected Table Data is printed if Individual Selection is designated. When 501 or more table data rows are to be printed, it is possible to switch the table data displayed in the list box in units of 500 rows by pressing the **Page Up** and **Page Down** keys. The methods for selecting parameter tables (C registers) are the same as those for drawing programs. See “Detailed Drawing Program Setting” in this item.

## 12.3 Selecting Register Print Data

This function selects S, I, O, M, D, and # register print data.

### 12.3.1 Register Print Settings

The following screen is displayed upon clicking the Register tab in the print window. Select register-related print items in this window.



The register print settings are the same as those for programs. See Item 12.2.1 “Program Print Set-up.”

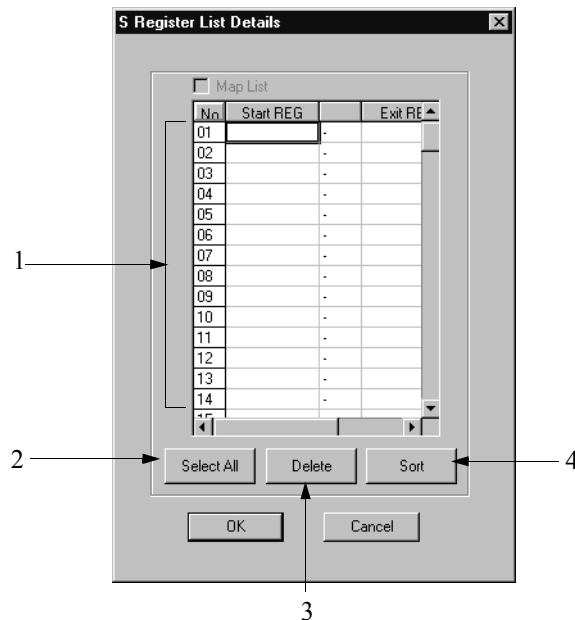
### 12.3.2 Detailed Register Settings

It is necessary to set detailed printing items for any print item with a **Details** button displayed on the right side. In general, detailed items are set as follows:

- Select the **Details** button.
- Set the print items in the detailed item dialogue box.
- Select the **OK** button.

#### ■ Detailed S Register Setting

The S register details dialogue box is displayed upon selecting the **Details** button. In this box, it is possible to select all register ranges at once, and to sort the registers.



1. **Individual S Register Print Range Designation**  
Designate individual S register print ranges in this area.
2. **Select All Button**  
Designate all S register ranges by selecting the **Select All** button.
3. **Delete Button**  
This function deletes a range of registers at the cursor position when the cursor is moved to the register range to be deleted, and the **Delete** button is selected.
4. **Sort Button**  
Selecting the **Sort** button displays the input register range in order of register numbers.

### ■ Detailed I Register Setting

The I Register Detail List dialogue box is displayed upon selecting the **Details** button. Input (in hexadecimal form) the start number and end number of the I register to be printed. The selection method of the register range is the same as that for S registers. See Detailed S Register Setting in this item.

### ■ Detailed O Register Setting

The O Register Detail List dialogue box is displayed upon selecting the **Details** button. Input (in hexadecimal form) the start number and end number of the O register to be printed. The selection method of the register range is the same as that for S registers. See Detailed S Register Setting in this item.

### ■ Detailed M Register Setting

The M Register Detail List dialogue box is displayed upon selecting the **Details** button. Input (in hexadecimal form) the start number and end number of the M register to be printed. The M register usage status list is printed before the M register if the Map List option is checked. The selection method of the register range is the same as that for S registers. See Detailed S Register Setting in this item.

### ■ Detailed D Register Setting

The D Register Detail List dialogue box is displayed upon selecting the **Details** button. Designate either Select All or Individual Selection in this box. All drawing/function program D registers are printed if Select All is designated. Selecting a drawing/function program prints the D register used in that program if Individual Selection is designated. The M register usage status list is printed before the M register if the Map List option is checked. The selection method for D registers is the same as that for drawing programs. See Item 12.2.2 “Detailed Program Setting: Detailed Setting of Drawing Programs.”

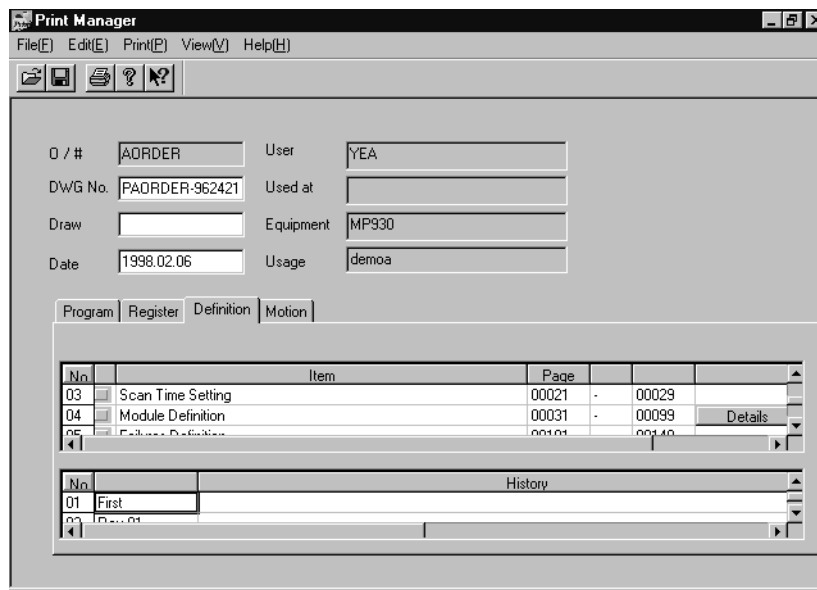


## 12.4 Selecting Definition Print Data

This function selects system configuration, scan time setting, module definition, failures definition, and data trace print data.

### 12.4.1 Definition Print Settings

The following screen is displayed upon clicking the Definitions tab in the print window. Select definition-related print items in this window.



The definition print settings are the same as those for programs. See Item 12.2.1 “Program Print Set-up.”

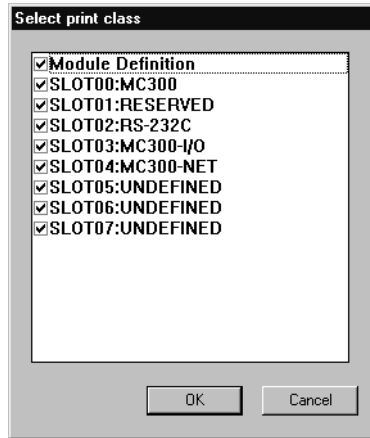
### 12.4.2 Detailed Definition Settings

It is necessary to set detailed printing items for any print item with a **Details** button displayed on the right side. In general, detailed items are set as follows:

- a. Select the **Details** button.
- b. Set the print items in the detailed item dialogue box.
- c. Select the **OK** button.

## ■ Detailed Setting of Module Definitions

The Print Object Class dialogue box is displayed upon selecting the **Details** button. Select the slot numbers to print the definition content in this box.



**Note:**

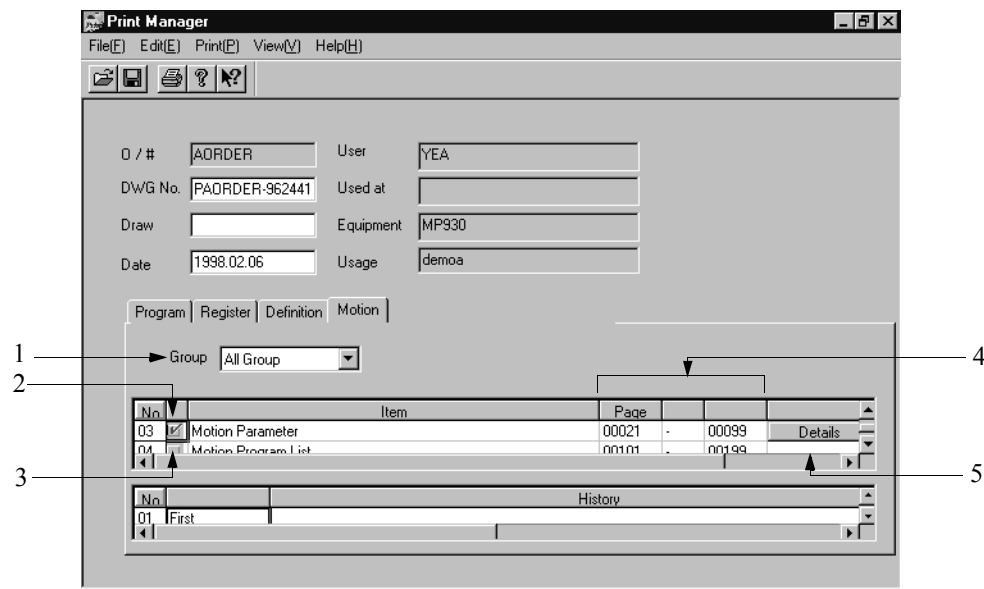
Data is disabled if a RESERVED or UNDEFINED slot number is selected.

## 12.5 Motion Print Data Selection

This is the process of selecting the motion program or motion parameter print data.

### 12.5.1 Motion Print Set-up

The following screen is displayed upon clicking the Program tab in the print window. Print items relating to programs are selected in this screen.



1. Group Name  
Select a group here. The motion programs of the selected group are subject to printing.
2. Selection Status  
This column shows the selection status of the print object items.
  - Unselected Items
  - Selected Items
3. Print Items  
This column shows the print object items.

4. **Page Number**  
Input the starting and ending page numbers for printing. Input a starting page number smaller than the ending page number. If the number of document pages exceeds the range input into the starting page and ending page numbers, the document prints from the page preceding the page number designated in the final page.
5. **Details Button**  
This button executes detailed selection of print items. See Item 12.2.2 “Detailed Program Setting” for information on the **Details** button.

### 12.5.2 Detailed Motion Setting

It is necessary to set detailed printing items for any print item with a **Details** button displayed on the right side. In general, detailed items are set as follows:

- a. Select the **Details** button.
- b. Set the print items in the detailed item dialogue box.
- c. Select the **OK** button.

#### ■ Detailed Motion Parameter Setting

The Motion Parameter List detail dialogue box is displayed upon selecting the **Details** button. Designate either Select All or Individual Selection in this box. Motion parameters for all axes are printed if Select All is designated. The motion parameters of a selected axis are printed if Individual Selection is designated. The selection method for motion parameters is the same as that for drawing programs. See Item 12.2.2, “Detailed Program Setting: Detailed Setting of Drawing Programs.”

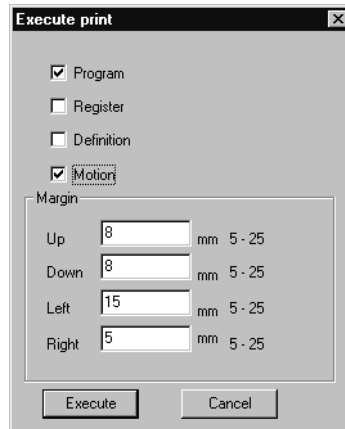
#### ■ Detailed Motion Program Setting

The Motion Program List dialogue box is displayed upon selecting the **Details** button. Designate either Select All or Individual Selection in this box. All motion programs are printed if Select All is designated. Selected motion programs are printed if Individual Selection is designated. Motion program cross-reference data is printed if the Print Cross-Reference option is checked. The selection method for motion programs is the same as that for drawing programs. See Item 12.2.2, “Detailed Program Setting: Detailed Setting of Drawing Programs.”

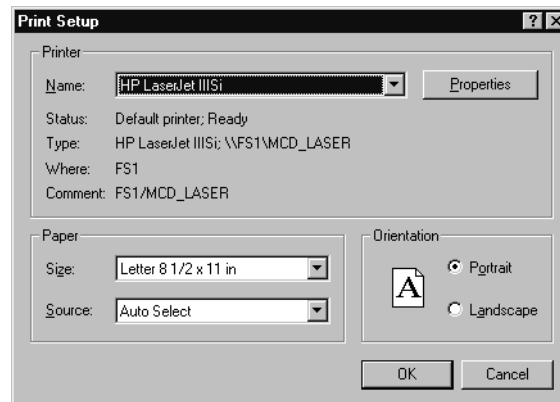
## 12.6 Print Execution

This function executes printing according to the Program, Register, Definition, and Motion print settings. It is also possible to display the current print status during printing.

- a. Select **Execute Print (E)** from **Print (P)** in the print menu.
- b. Set the printing object and margin into the dialogue box, and select the **Execute** button.



- c. Set the printer in the dialogue box, and select the **OK** button.



**Note:**

See the printer manual for the content of printer settings in (c).

## 12.7 Print Status Display from the List Manager

Print status display and print cancellation are executed using the List Manager.

### 12.7.1 Structure of List Manager Window

This item presents information on the opening of the List Manager, and the structure of the menus thereof.

#### ■ Opening List Manager

The List Manager can be opened from the Print Manager.

##### Opening from the Print Manager

- a. Select **Print Status (D)** from **Print (P)** in the Print Manager menu.
- b. The List Manager starts, and the Print Status window opens.

##### Note:

The List Manager starts when MotionWorks™ starts. Further printing is not possible if the List Manager is closed upon selecting **Exit (X)** from **File (F)** in the menu. It is necessary to restart MotionWorks™ at closing.

#### ■ Structure of List Manager Menu

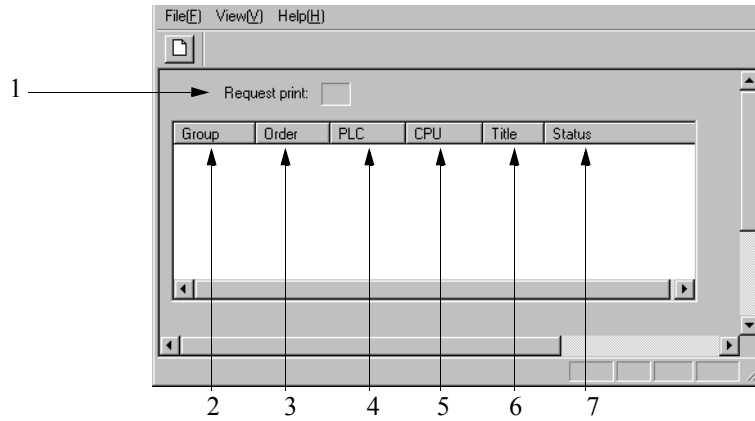
The menus displayed in the List Manager are shown in Table 3 below. Refer to the item numbers in the right-hand column for further information on each of the menus.

**Table 3: List Manager Menu**

Menu	Function	Item No.
File (F)		
Cancel Print	Cancels printing	12.7.3
Exit (X)	Exits MotionWorks™ document printing	12.7.1
View (F)		
Tool Bar (T)	Displays tool bar	3.4.3
Status Bar (B)	Displays status bar	3.4.3
Help (H)		
About App. (A)	Displays version data	3.4.5

## 12.7.2 Print Status Display

The following screen is displayed upon starting the List Manager. The current print status is displayed on this screen.



1. Request Print  
This box displays the number of print jobs waiting for execution.
2. Group  
This column displays the group names of the print jobs.
3. Order  
This column displays the order numbers of the print jobs.
4. PLC  
This column displays the PLCs of the print jobs.
5. CPU  
This column displays the CPUs of the print jobs.
6. Title  
This column displays the titles of the print setting files.
7. Status  
The following messages are displayed in the Status box.

Message	Meaning
Preparing to Print	Print data is being converted to a print image.
Printing Cancelled	Printing is being cancelled.

### 12.7.3 Print Cancellation

This function cancels print jobs.

- a. Select the print job for which printing is to be cancelled.
- b. Select **Cancel (C)** from **File (F)** in the List Manager Menu.
- c. Select the **Yes (Y)** button in the message box.
- d. The printing of the print job selected in (a) is cancelled.



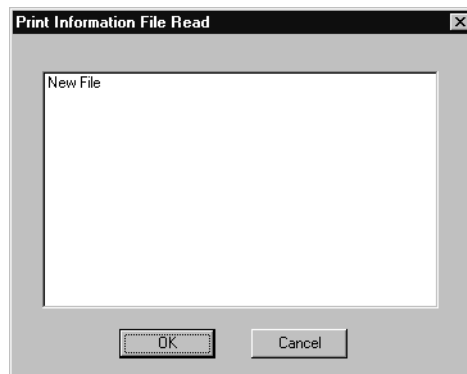
## 12.8 Editing of Print Setting File

Print settings selected in the Program, Register, Definition, and Motion tabs can be saved as files. The files are called print setting files.

### 12.8.1 Reading Print Setting Files

This function reads print setting files stored on the MotionWorks™ hard drive.

- a. Select **Read (R)** from **File (F)** in the print menu.
- b. Select the print setting file to be read in the dialogue box. Select the **OK** button.



- c. The print specifications in the print setting file selected in (b) are read.

### 12.8.2 Deletion of Print Setting Files

This function deletes print setting files stored on the MotionWorks™ hard drive.

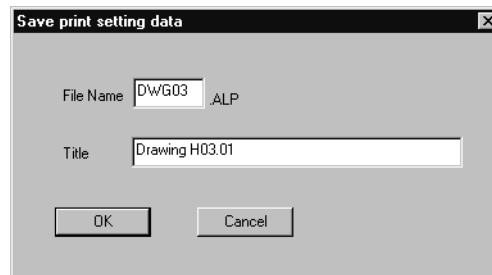
- a. Select **Delete (D)** from **File (F)** in the print menu.
- b. Select the print setting file to be deleted in the dialogue box, then select the **OK** button.
- c. The print setting file selected in (b) is deleted.

### 12.8.3 Saving Print Setting Files

This function stores currently displayed print settings onto the MotionWorks™ hard drive.

- a. Select **Save (S)** from **File (F)** in the print menu.

- b. Input the file name and title into the dialogue box, then select the **OK** button.

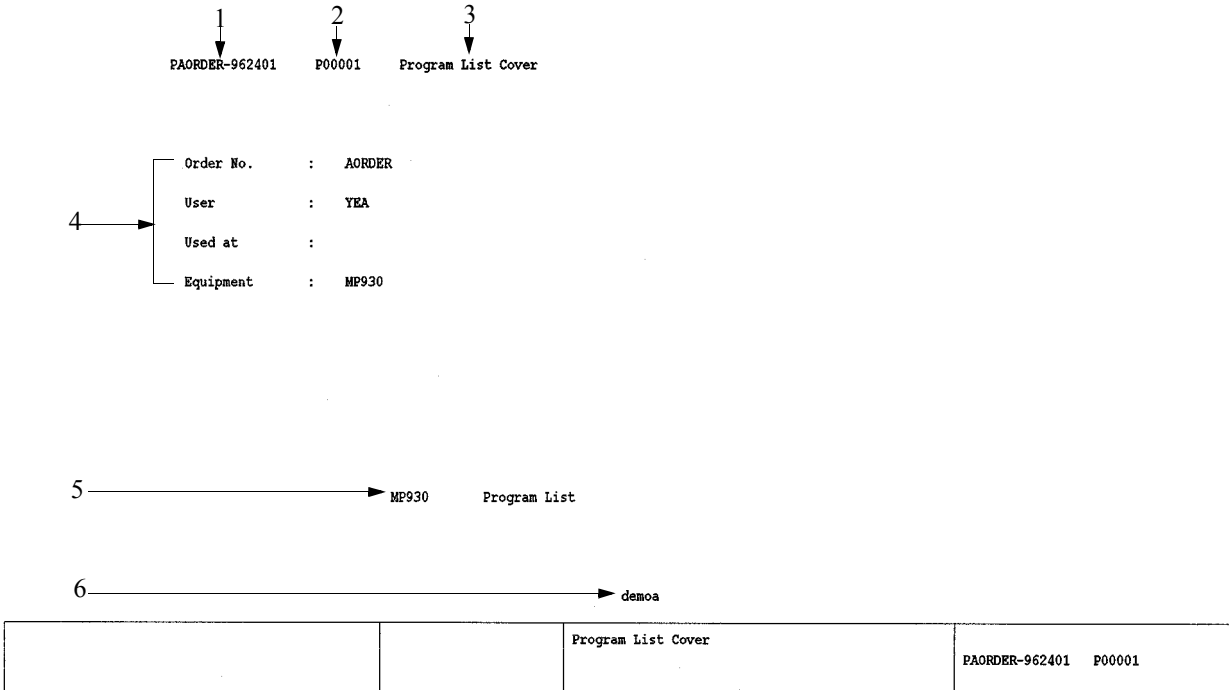


**Note:**

In (b), input a file name of 8 16-bit characters (4 32-bit characters) or less, and a title of 48 16-bit characters (24 32-bit characters) or less. 16-bit and 32-bit characters can be combined in these entries.

## 12.9 Sample of Print Results

### 12.9.1 Cover Sheet Sample



1. Drawing Number  
The data in the Drawing Number box in the print window is printed here.
2. Page Number  
The page number is printed. The initial value is the data in the Page Number box of each tab in the print window.
3. List Type  
Each printout type is printed.
4. Application Data  
The data of the application data window is printed.
5. Title  
The PLC type and printout type are printed.
6. Sub-Title  
The data in the Application box of the application data window is printed.

## 12.9.2 Contents Sample

PAORDER-962401 P00002 Program List Contents

	Item	Page
	Contents	0001 - 0002
	DWG List	0011 - 0099
	DWG Program List	0101 - 1499
	Function List	1501 - 1509
1 →	Function Program List	1511 - 1999
	Constant TBL(C REG) List	2001 - 2009
	Constant TBL(C REG)	2011 - 2499
	Table Data Definition List	2501 - 2509
	Table Data Definition	2511 - 2999
2 →	Total	2984
3 →	Lacked Pages	0003 - 0010 - 0100 - 1500 - 1510 - 2000 - 2010 - 2500 - 2510

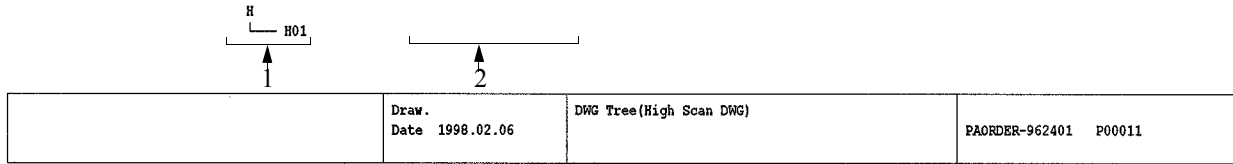
4 → History

	Draw. Date 1998.02.06	Program List Contents PAORDER-962401 P00002
--	--------------------------	--

1. Contents  
The contents are printed here.
2. Total  
The total number of printed pages is printed here.
3. Missing Pages  
Unprinted page numbers are printed here.
4. Revision History  
The revision history is printed here.

### 12.9.3 Drawing Tree Sample

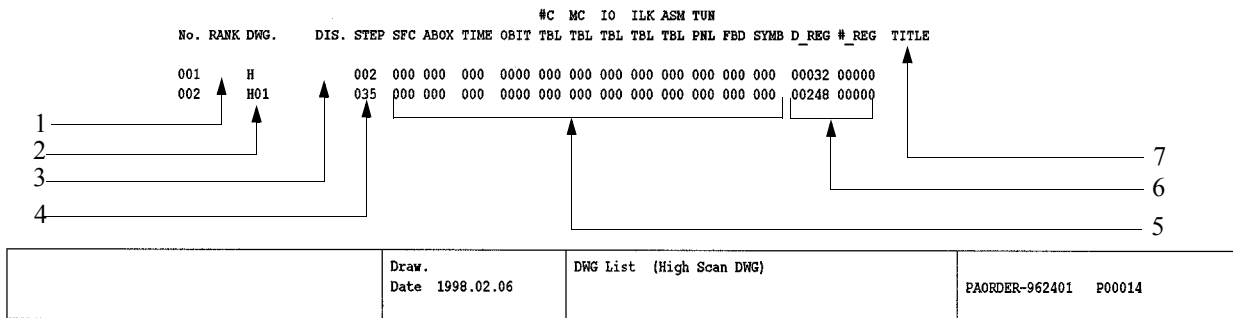
PAORDER-962401 P00011 DWG Tree(High Scan DWG)



1. Tree  
The tree structure of the programs is printed here.
2. Title  
The program title is printed here.

### 12.9.4 Drawing List Sample

PAORDER-962401 P00014 DWG List (High Scan DWG)



1. Program Rank  
The program rank is printed here.
2. Drawing Number  
The drawing number is printed here.
3. Disable Data  
The drawing program disable data is printed here.
4. Number of Steps  
The number of steps in the main program is printed here.

5. Number of Steps

The number of steps in the sub-program is printed here.

- |       |                                |        |                        |
|-------|--------------------------------|--------|------------------------|
| SFC   | : SFC Flowchart                | IOTBL  | : I/O conversion table |
| ABOX  | : SFC action box               | ILKTBL | : Interlock table      |
| TIME  | : No. of SFC step boxes        | ASMTBL | : Parts assembly table |
| OBIT  | : No. of SFC output bits       | TUNPNL | : Tuning panel         |
| #CTBL | : Parameter table (# register) | FBD    | : FBD                  |
| MCTBL | : Parameter table (M register) | SYMB   | : Symbol definition    |

6. Number of Registers

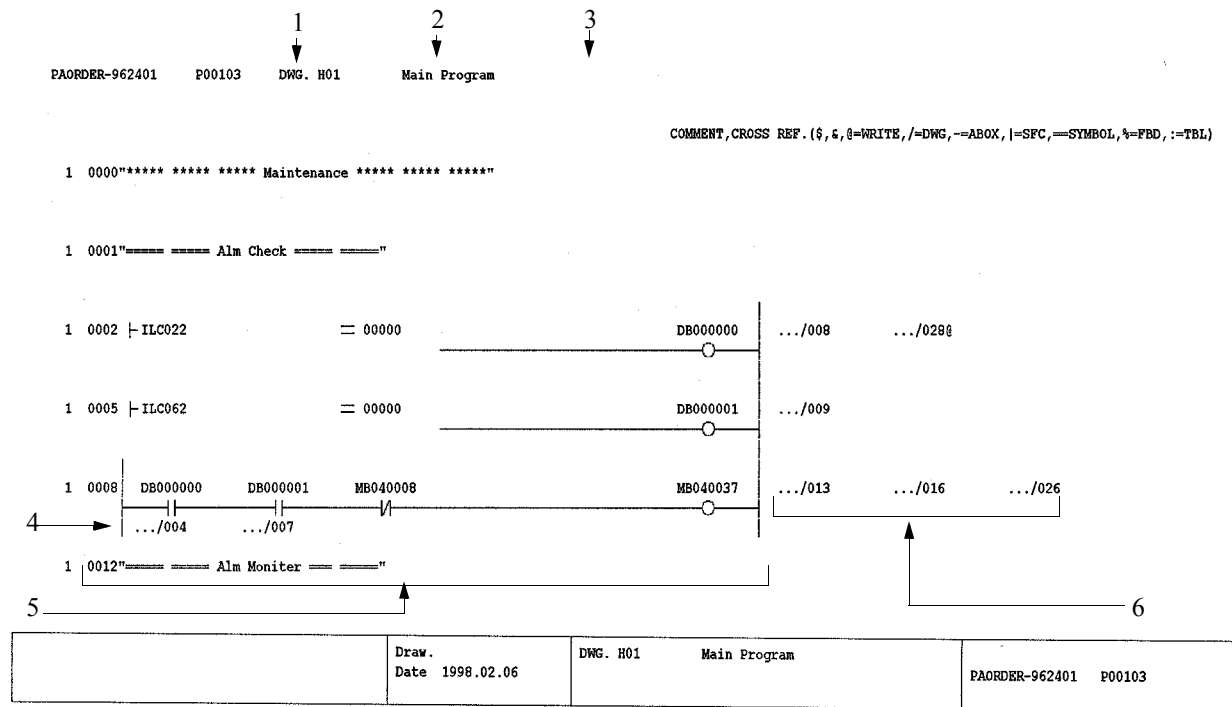
The number of registers is printed here.

- |       |                         |       |                      |
|-------|-------------------------|-------|----------------------|
| D_REG | : Number of D registers | #_REG | : No. of # registers |
|-------|-------------------------|-------|----------------------|

7. Title

The program title is printed here.

### 12.9.5 Drawing Program Print Sample



1. Drawing Number

The drawing number is printed here.

2. Program Type

The program type is printed here.

3. Title

Each program title is printed here.

4. Cross-reference Data  
The cross-reference data written out from the register is printed here.
5. Program  
The main program content is printed here.
6. Cross-Reference Data  
Cross-reference data is printed for coil commands and storage commands. However, program titles are printed for SEE commands and FSTART commands. A “...” printed at the drawing position of the cross-reference data indicates a metadrawing. Furthermore, types of writing in which \$, &, or @ are printed at the end of the cross-reference data are as follows:
  - \$ : Coil commands (—○—) and storage commands (⇒).
  - & : Transmission commands such as MOVW, XCHNG< ROTL, ROTR, etc.
  - @ : Pulse, total registers.
7. Creation Date  
The data printed in the Draw box is the data in the Creator box in the print window, and the data printed in the Data box is the data in the Creation Date box.
8. Program Data  
The drawing number and program type are printed here.
9. Title  
The program title is printed here.
10. Drawing Number  
The data in the Drawing Number box in the print window is printed here.
11. Page Numbers  
The page numbers are printed here. The initial value is the data in the Page Number box of each of the tabs in the print window.





## 12.9.7 M Register List Sample

PAORDER-962411 P01002 M Register List

REG No.	Cross Reference	REG No.	Symbol	COMMENT
MB040008	H01/010	MB040008		
MB040009		MB040009		
MB04000A		MB04000A		
MB04000B		MB04000B		
MB04000C		MB04000C		
MB04000D		MB04000D		
MB04000E		MB04000E		
MB04000F		MB04000F		
MB040010		MB040010		
MB040011		MB040011		
MB040012		MB040012		
MB040013		MB040013		
MB040014		MB040014		
MB040015	H01/025\$	MB040015		
MB040016		MB040016		
MB040017		MB040017		
MB040018		MB040018		
MB040019		MB040019		
MB04001A		MB04001A		
MB04001B		MB04001B		

(\$, &, @=WRITE, /=DWG, -=ABOX, |=SFC, ==SYMBOL, ^=FBD, :=TBL, !=TPNL)

MB040008 - MB04005E

- 1. Register Number**  
 The register number is printed here.
- 2. Cross-Reference Data**  
 Cross-reference data is printed for register numbers. Cross-reference data in which \$, &, or @ is printed at the end indicates writing of the register within the program. The meanings of the writing types are as follows:
  - \$ : Coil commands (—○—) and storage commands (⇒).
  - & : Transmission commands such as MOVW, XCHNG< ROTL, ROTR, etc.
  - @ : Pulse, total registers.
- 3. Symbol**  
 Symbols defined in the register are printed here.
- 4. Comment**  
 Comments defined in the register are printed here.
- 5. Register Range**  
 The range of the register on the currently printed page is printed here.

## 13 Compilation Error Message List

This chapter presents the compilation error message list.

13.1 Compilation Error Message List .....	13-2
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### 13.1 Compilation Error Message List

The error messages and the individual causes of their issuance are explained in this item. Correct motion programs in accordance with the contents of the table below.

Error Messages	Causes for Occurrence
Syntax Error	<ul style="list-style-type: none"> <li>• Improper command expression, no command</li> <li>• Improper = (equals operand)</li> <li>• Unsuitable operand designated</li> <li>• Improper comparison operand, unsuitable position</li> <li>• Numbers in parentheses ( , ) do not coincide</li> <li>• Meaningless word</li> <li>• Too many items for the formula</li> <li>• No WHILE~WEND object</li> <li>• No IF~END object</li> <li>• Other expression-related errors</li> </ul>
Incorrect address designation	<ul style="list-style-type: none"> <li>• Designation of an improper address in an expression; no address</li> </ul>
Variable range exceeded	<ul style="list-style-type: none"> <li>• Range of register (variable) exceeded</li> </ul>
An unusable variable type exists within the operation	<ul style="list-style-type: none"> <li>• Improper register type</li> <li>• Improper register classification</li> </ul>
The operation cannot be enacted	<ul style="list-style-type: none"> <li>• When enacting an operation, a maximum of 10W of local variables (D variables) can be executed as work areas during parallel operation. A left noted error is issued if this maximum number is exceeded. Furthermore, these local variables used as work areas are used as shown below, released if 1 block of processing is finished, and reused.</li> </ul> <p>Cases in which local variables are necessary for work:</p> <ol style="list-style-type: none"> <li>1. Used in temporarily saving the results of operations prior to the enacting of formulas based on an order of priority. (Use a number of words according to the complexity of the formula.)</li> <li>2. Used in temporarily saving the results of functions when a function is used in an operation formula. (Number of functions × 2W)</li> <li>3. Used in temporarily saving the results of operations when an operation function is used in a coordinate command within a motion command. (Number of coordinate commands designating operation formulae × 2W)</li> </ol>
Fraction size exceeded	<ul style="list-style-type: none"> <li>• Improper decimal point position</li> <li>• Number of decimal places in designated value exceeded</li> <li>• Designated numerical range exceeded</li> </ul>
Excessive integer size	<ul style="list-style-type: none"> <li>• Designated value exceeded</li> <li>• Designated numerical range exceeded</li> </ul>
Axis name error	<ul style="list-style-type: none"> <li>• The physical and logical axis name are not registered in the group definition.</li> <li>• The same axis name is used repeatedly in a single motion command expression.</li> </ul>
Designated number of axes exceeded	<ul style="list-style-type: none"> <li>• The designated maximum number of simultaneous axes in the axis designation has been exceeded</li> </ul>
Zero division error	<ul style="list-style-type: none"> <li>• 0 is written in the operation function</li> </ul>

Error Messages	Causes for Occurrence
Excessive number of one block characters	<ul style="list-style-type: none"> <li>• An excessive number of one block characters is written</li> </ul>
Command duplication error	<ul style="list-style-type: none"> <li>• A non-duplicatable command is written</li> </ul>
Unusable command	<ul style="list-style-type: none"> <li>• END is used in a sub-program</li> <li>• RET is used in a main program</li> <li>• RET position mistaken</li> <li>• GOTO position mistaken</li> <li>• Position of command using the axis as an argument in a command is mistaken</li> </ul>
Close command	<ul style="list-style-type: none"> <li>• No END, RET command</li> </ul>
Excessive nest depth	<ul style="list-style-type: none"> <li>• Excessive nest depth for IF statement</li> <li>• Excessive nest depth for WHILE statement</li> <li>• Excessive nest depth for SFORK statement</li> </ul>
Number of branches has exceeded range	<ul style="list-style-type: none"> <li>• The number of labels designated by PFORK has exceeded the range</li> <li>• The number of labels designated by SFORK has exceeded the range</li> </ul>
Duplicate labels are used	<ul style="list-style-type: none"> <li>• The label designated in PFORK is duplicated in SJOINT</li> <li>• The label designated in SFORK is duplicated in PJOINT</li> </ul>
No label	<ul style="list-style-type: none"> <li>• No label is designated in PFORK</li> <li>• No label in PFORK-related JOINTO</li> <li>• No label is designated in SFORK</li> <li>• No label in SFORK-related JOINTO</li> <li>• No label is designated in GOTO</li> </ul>
Excessive number of parallel operations	<ul style="list-style-type: none"> <li>• The number of parallel operations has exceeded the maximum</li> </ul>
Label order is mistaken	<ul style="list-style-type: none"> <li>• PFORK statement label order is mistaken</li> <li>• SFORK statement label order is mistaken</li> </ul>
Program name is mistaken	<ul style="list-style-type: none"> <li>• Name is not MPMxxx, MPSxxx format</li> </ul>
Label is defined twice	<ul style="list-style-type: none"> <li>• The label is defined again at another position</li> </ul>
Jump destination is mistaken	<ul style="list-style-type: none"> <li>• The destination of a GOTO jump is a mistaken position such as within a parallel operation, etc.</li> </ul>
An improper character string is designated	<ul style="list-style-type: none"> <li>• Characters other than alphanumeric are in the label</li> <li>• Excessive number of label characters</li> </ul>

## 14 Command List

This chapter provides information on the command list for drawing/function creation.

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## 14.1 Command List for Drawing/Function Creation

The following are lists of the commands used in the creation of drawings and functions. The commands are grouped by function.

### 14.1.1 Program Control Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
SEE	SEE	SEE	[CONTROL (C)]-[SEE]	1[SEE]
FOR	FOR	FOR	[CONTROL (C)]-[FOR]	4[FOR]
WHILE	WHILE	WHILE	[CONTROL (C)]-[WHILE]	1[WHILE]
ON	ON	ON	[CONTROL (C)]-[ON]	2[ON]
OFF	OFF	OFF	[CONTROL (C)]-[OFF]	3[OFF]
IFON	IFON	IFON	[CONTROL (C)]-[IFON]	5[IFON]
IFOFF	IFOFF	IFOFF	[CONTROL (C)]-[IFOFF]	6[IFOFF]
ELSE	ELSE	ELSE	[CONTROL (C)]-[ELSE]	7[ELSE]
END	DEND FEND WEND IEND	END	[CONTROL (C)]-[END]	8[END]
Condition	[ ]	[ ]	[FUNCTION (F)]-[ [ ] ]	9[ [ ] ]
Function reference FSTART		FSTART	[CONTROL (C)]-[FSTART]	4[FSTART]
Function Input FIN		FIN	[CONTROL (C)]-[FIN]	5[FIN]
Function Output FOUT		FOUT	[CONTROL (C)]-[FOUT]	6[FOUT]
In-line comment	“ “	“	[CONTROL (C)]-[Comment]	10[CMT]
Expansion Program Execution	XCALL	XCALL	[CONTROL (C)]-[XCALL]	2[XCALL]
SFC Program Execution	SFC	SFC	[SFC (S)]-[SFC]	8[SFC]
Number of SFC Steps	SFCSTEP	SFCSTEP	[SFC (S)]-[SFCSTEP]	8[SFCSTEP]
Action Box	ABOX	ABOX	[SFC (S)]-[ABOX]	9[ABOX]
Action Box	SBOX	SBOX	[SFC (S)]-[SBOX]	10[SBOX]

### 14.1.2 Direct Input Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Direct Input	IN	IN	[CONTROL (C)]-[IN]	1[IN]
Direct Output	OUT	OUT	[CONTROL (C)]-[OUT]	2[OUT]
Direct Input R	INR	INR	[CONTROL (C)]-[INR]	3[INR]
Direct Output R	OUTR	OUTR	[CONTROL (C)]-[OUTR]	4[OUTR]
Continuous Execution Direct Input	INS	INS	[CONTROL (C)]-[INS]	7[INS]
Continuous Execution Direct Output	OUTS	OUTS	[CONTROL (C)]-[OUTS]	8[OUTS]

### 14.1.3 Ladder Circuit Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Normally open contact	•••	[	[RELAY (R)]-[Normally open contact (A)]	1[•••]
Normally closed contact	•••	]/	[RELAY (R)]-[Normally closed contact (B)]	2[•••]
Coil	•••	@	[RELAY (R)]-[Coil (O)/Coil (C)]	10[•••]
Set Coil	•••	@S	[RELAY (R)]-[Coil (O)/Set Coil (S)]	9[•••]
Reset Coil	•••	@R	[RELAY (R)]-[Coil (O)/Reset Coil (R)]	10[•••]
ON Pulse	• – •	JP	[RELAY (R)]-[ON Pulse (P)]	8[• – •]
OFF Pulse	• ■ •	JN	[RELAY (R)]-[OFF Pulse (Q)]	8[• ■ •]
ON Delay (0.01s)	••••	[ON	[RELAY (R)]-[ON Delay [10ms] (N)]	6[ONDLY]
OFF Delay (0.01s)	••••	[OFF	[RELAY (R)]-[OFF Delay [10ms] (F)]	7[OFFDLY]
ON Delay (1s)	••••	[SON	[RELAY (R)]-[ON Delay [1s] (S)]	6[ONSDL]
OFF Delay (1s)	••••	[SOFF	[RELAY (R)]-[ON Delay [1s] (R)]	7[ONSDL]
Branch	•	, (comma)	[RELAY (R)]-[Branch ] (T)]	3[•]
Converge	•	. (period)	[RELAY (R)]-[Converge (J)]	4[•]
Convergence Continuation	•	,. (comma+period)	[RELAY (R)]-[Convergence Continuation (C)]	5[•]

### 14.1.4 Logical Operation Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Logical AND (AND)	∧	&	[LOGIC (L) -[AND]	1[∧]
Logical OR (OR)	∨		[LOGIC (L) -[OR]	2[∨]
Logical Exclusive OR (OR)	•	^	[LOGIC (L) -[XOR]	10[•]

### 14.1.5 Numerical Operation Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Integers	•	;	[ART (A)]-[Number (I)/Integer (I)]	1[•]
Real Numbers	•	::	[ART (A)]-[Number (I)/Real Number (F)]	1[•]
Store	•	:	[ART (A)]-[Store (S)]	10[•]
Addition	+	+	[ART (A)]-[+]	2[+]
Subtraction	-	-	[ART (A)]-[-]	3[-]
Expanded Addition	++	++	[ART (A)]-[++]	2[++]
Expanded Subtraction	--	--	[ART (A)]-[--]	3[--]
Multiplication	×	*	[ART (A)]-[-×]	4[×]
Division	÷	/	[ART (A)]-[-÷]	5[÷]
Integer Remainder	MOD	MOD	[ART (A)]-[MOD]	6[MOD]
Real Number Remainder	REM	REM	[ART (A)]-[REM]	6[REM]
Increment	INC	INC	[ART (A)]-[INC]	4[INC]
Decrement	DEC	DEC	[ART (A)]-[DEC]	5[DEC]
Time Addition	TMADD	TMADD	[ART (A)]-[TMADD]	6[TMADD]
Time Subtraction	TMSUB	TMSUB	[ART (A)]-[TMSUB]	7[TMSUB]
Time Spent	SPEND	SPEND	[ART (A)]-[SPEND]	8[SPEND]



### 14.1.6 Numerical Conversion Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
+/- Inversion	INV	INV	[ART (A)]-[INV]	7[INV]
1 Complement	COM	COM	[ART (A)]-[COM]	8[COM]
Absolute Value	ABS	ABS	[ART (A)]-[ABS]	1[ABS]
BIN Conversion (BCD→BIN)	BIN	BIN	[ART (A)]-[BIN]	8[BIN]
BCD Conversion (BIN→BCD)	BCD	BCD	[ART (A)]-[BCD]	9[BCD]
Parity Conversion	PARITY	PARITY	[ART (A)]-[PARITY]	7[PARITY]
ASCII Conversion 1	ASCII	ASCII	[ART (A)]-[ASCII]	1[ASCII]
ASCII Conversion 2	BINASC	BINASC	[ART (A)]-[BINASC]	2[BINASC]
ASCII Conversion 3	ASCBIN	ASCBIN	[ART (A)]-[ASCBIN]	3[ASCBIN]

### 14.1.7 Numerical Comparison Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Comparison (<)	<	<	[LOGIC (L)]-<[<]	5[<]
Comparison (≤)	≤	≤	[LOGIC (L)]-<[≤]	6[≤]
Comparison (=)	=	=	[LOGIC (L)]-<[=]	7[=]
Comparison (≠)	≠	≠	[LOGIC (L)]-<[≠]	8[≠]
Comparison (≥)	≥	≥	[LOGIC (L)]-<[≥]	9[≥]
Comparison (>)	>	>	[LOGIC (L)]->[>]	10[>]
Range Check	RCHK	RCHK	[LOGIC (L)]-[RCHK]	5[RCHK]

### 14.1.8 Data Operation Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Bit Rotation (left)	ROTL	ROTL	[MOVE (M)]-[ROTL]	6[ROTL]
Bit Rotation (right)	ROTR	ROTR	[MOVE (M)]-[ROTR]	7[ROTR]
Bit Transfer	MOVB	MOVB	[MOVE (M)]-[MOVB]	2[MOVB]
Word Transfer	MOVW	MOVW	[MOVE (M)]-[MOVW]	1[MOVW]
Exchange Transfer	XCHNG	XCHNG	[MOVE (M)]-[XCHNG]	3[XCHNG]
Word Setting	SETW	SETW	[MOVE (M)]-[SETW]	4[SETW]
Byte→Word Extraction	BEXTD	BEXTD	[MOVE (M)]-[BEXTD]	5[BEXTD]
Word→Byte Compression	BPRESS	BRESS	[MOVE (M)]-[BPRESS]	6[BPRESS]
Data Search	BSRCH	BSRCH	[MOVE (M)]-[BSRCH]	7[BSRCH]
Sort	SORT	SORT	[MOVE (M)]-[SORT]	8[SORT]
Shift Bits Left	SHFTL	SHFTL	[MOVE (M)]-[SHFTL]	8[SHFTL]
Shift Bits Right	SHFTR	SHFTR	[MOVE (M)]-[SHFTR]	9[SHFTR]
Copy Word	COPY	COPY	[MOVE (M)]-[COPY]	5[COPY]
Bit Swap	BSWAP	BSWAP	[MOVE (M)]-[BSWAP]	4[BSWAP]

### 14.1.9 Basic Function Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Square Root	SQRT	SQRT	[FUNCTION (F)]-[SQRT]	2[SQRT]
Sine	SIN	SIN	[FUNCTION (F)]-[SIN]	3[SIN]
Cosine	COS	COS	[FUNCTION (F)]-[COS]	4[COS]
Tangent	TAN	TAN	[FUNCTION (F)]-[TAN]	5[TAN]
Inverse Sine	ASIN	ASIN	[FUNCTION (F)]-[ASIN]	6[ASIN]
Inverse Cosine	ACOS	ACOS	[FUNCTION (F)]-[ACOS]	7[ACOS]
Inverse Tangent	ATAN	ATAN	[FUNCTION (F)]-[ATAN]	8[ATAN]
Exponent	EXP	EXP	[FUNCTION (F)]-[EXP]	4[EXP]
Natural Logarithm	LN	LN	[FUNCTION (F)]-[LN]	2[LN]
Common Logarithm	LOG	LOG	[FUNCTION (F)]-[LOG]	3[LOG]

### 14.1.10 DDC Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Dead Zone A	DX_A	DZA	[DDC (D)]-[DZA]	2[DZA]
Dead Zone B	DX_B	DZB	[DDC (D)]-[DZB]	3[DZB]
Upper/Lower Limit	LIMIT	LIMIT	[DDC (D)]-[LIMIT]	4[LIM]
PI Control	PI	PI	[DDC (D)]-[PI]	2[PI]
PD Control	PD	PD	[DDC (D)]-[PD]	3[PD]
PID Control	PID	PID	[DDC (D)]-[PID]	4[PID]
Lag	LAG	LAG	[DDC (D)]-[LAG]	5[LAG]
Phase Lag	LLAG	LLAG	[DDC (D)]-[LLAG]	6[LLAG]
Function Generator	FGN	FGN	[DDC (D)]-[FGN]	6[FGN]
Inverse Function Generator	IFGN	IFGN	[DDC (D)]-[IFGN]	7[IFGN]
Linear Accelerator-1	LAU	LAU	[DDC (D)]-[LAU]	7[LAU]
Linear Accelerator-2	SLAU	SLAU	[DDC (D)]-[SLAU]	8[SLAU]
Pulse Width Modulation	PWM	PWM	[DDC (D)]-[PWM]	9[PWM]

### 14.1.11 Table Data Operation Commands

Command	Display	Function Bar		
		Pull-down Window		
		Short Command		
Block Read	TBLBR	TBLBR	[TABLE (T)]-[TBLBR]	1[TBLBR]
Block Write	TBLBW	TBLBW	[TABLE (T)]-[TBLBW]	2[TBLBW]
Row Search	TBSRL	TBSRL	[TABLE (T)]-[TBSRL]	3[TBSRL]
Column Search	TBSRC	TBSRC	[TABLE (T)]-[TBSRC]	4[TBSRC]
Clear Block	TBLCL	TBLCL	[TABLE (T)]-[TBLCL]	5[TBLCL]
Move Table Blocks	TBLMV	TBLMV	[TABLE (T)]-[TBLMV]	6[TBLMV]
Queue Table Read	QTBLR	QTBLR	[TABLE (T)]-[QTBLR]	1[QTBLR]
Queue Table Read	QTBLRI	QTBLRI	[TABLE (T)]-[QTBLRI]	2[QTBLRI]
Queue Table Write	QTBLW	QTBLW	[TABLE (T)]-[QTBLW]	3[QTBLW]
Queue Table Write	QTBLWI	QTBLWI	[TABLE (T)]-[QTBLWI]	4[QTBLWI]
Queue Pointer Clear	QTBLCL	QTBLCL	[TABLE (T)]-[QTBLCL]	5[QTBLCL]

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