Machine Controller MP900/MP2000 Series

MPE720 Software for Programming Device

USER'S MANUAL

TYPE: CPMC-MPE720

YASKAWA

MANUAL NO. SIEP C880700 05B

Using this Manual

■ About this Manual

This manual describes the installation and operation of the MPE720, a programming software package that aids in the design and maintenance of MP900-series and MP2000-series Machine Controllers.

This manual is written for readers with a working knowledge of Microsoft Windows 95, 98, 2000, NT, or XP. Refer to Windows documentation provided with your computer for information on basic operations, such as opening and closing windows and mouse operations.

Read this manual carefully to ensure the proper use of the MPE720. Also, keep this manual in a safe place so that it can be referred to whenever necessary.

■ Description of Technical Terms, Abbreviations, and Symbols

In this manual, the following terms are defined as follows:

- **PLC** = Machine Controller
- **MPE720** = MPE720 software
- **Proramming Device** = Personal computer where the MPE720 is installed

■ Intended Audience

This manual is intended for the following users.

- Those responsible for designing the MP900/MP2000 System
- Those responsible for writing MP900/MP2000 motion programs
- Those responsible for writing MP900/MP2000 ladder programs

■ Visual Aids

The following aids are used to indicate certain types of information for easier reference.

IMPORTANT — Indicates important information that should be memorized.

Indicates supplemental information.

◀ EXAMPLE ▶ — Indicates application examples.

Describes technical terms that are difficult to understand, or appear in the text without an explanation being given.

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- Ethernet is a registered trademark of the Xerox Corporation.
- Other product names and company names are the trademarks or registered trademarks of the respective company. “TM” and the ® mark do not appear with product or company names in this manual.

■ About the Software

- This software is to be installed on only one specified computer. You must purchase another copy of the software to install it on another computer.
- This software is not to be copied for any reason other than when installing it on the computer.
- Store the CD-ROM containing the software in a safe place.
- This software is not to be decompiled, disassembled, or reverse engineered.
- This software is not to be given to, rent to, exchanged with, or otherwise released to a third party without the prior permission of Yaskawa Electric Corporation.

■ Related Manuals

The MP900-series Machine Controllers consist of four models, the MP910, MP920, MP930, and MP940. The MP2000-series Machine Controllers consist of two models, the MP2100 and MP2300. Manuals have been produced based on this product line.

Refer to the following related manuals as required.

Manual Name	Manual Number	Contents
Machine Controller MP900 Series User's Manual Ladder Programming	SIEZ-C887-1.2	Describes the instructions used in MP900/ MP2000 ladder programming.
Machine Controller MP900 Series User's Manual Motion Programming	SIEZ-C887-1.3	Describes the instructions used in MP900/ MP2000 motion programming.
Machine Controller MP900 Series User's Manual MECHATROLINK System	SIEZ-C887-5.1	Describes the communication functions, specifications, and application methods of the MECHATROLINK Modules for MP900 Machine Controllers.
Machine Controller MP920 User's Manual Motion Module	SIEZ-C887-2.5	Describes the functions, specifications, and application methods of the MP920 Motion Modules (SVA-01, SVB-01, and PO-01).
Machine Controller MP920 User's Manual Communications Module	SIEZ-C887-2.6	Describes the functions, specifications, and application methods of the MP920 Communications Modules (217IF, 215IF, and 218IF).
Machine Controller MP900 Series 260IF DeviceNet System User's Manual	SIEZ-C887-5.2	Describes the functions, specifications, and application methods of the MP920 DeviceNet Module (260IF).
Machine Controller MP910 User's Manual Design and Maintenance	SIEZ-C887-3.1	Describes the design and maintenance of the MP910 Machine Controller.
Machine Controller MP920 User's Manual Design and Maintenance	SIEZ-C887-2.1	Describes the design and maintenance of the MP920 Machine Controller.
Machine Controller MP930 User's Manual Design and Maintenance	SIEZ-C887-1.1	Describes the design and maintenance of the MP930 Machine Controller.
Machine Controller MP940 User's Manual Design and Maintenance	SIEZ-C887-4.1	Describes the design and maintenance of the MP940 Machine Controller.
Machine Controller MP2300 Basic Module User's Manual	SIEPC88070003	Describes the design and maintenance of the MP2300 Basic Module.
Machine Controller MP2300 Communication Module User's Manual	SIEPC88070004	Describes the functions, specifications, and application methods of the MP2300 Communication Modules (217IF-01, 218IF-01, 260IF-01, and 261IF-01).
Machine Controller MP2100 User's Manual Design and Maintenance	SIEPC88070001	Describes the design and maintenance of the MP2100 Machine Controller.

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Outline of the MPE720

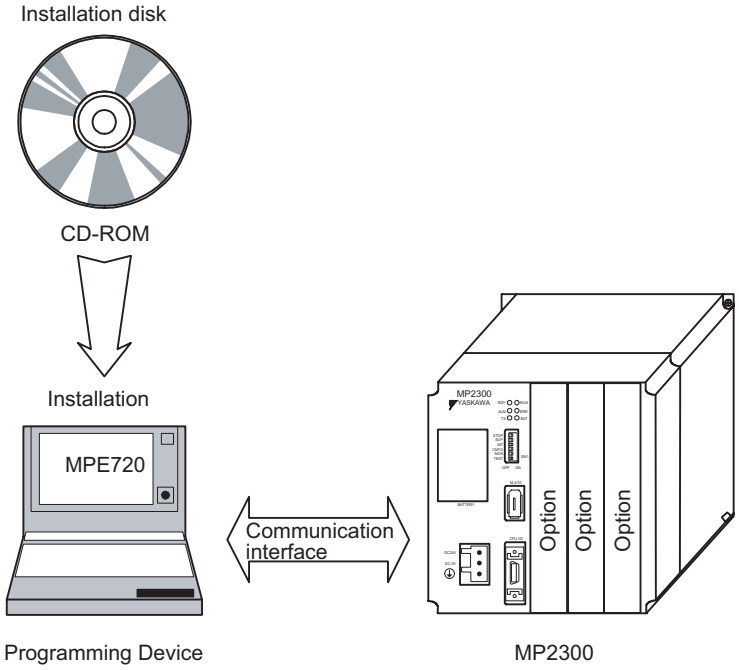
This chapter introduces the MPE720 for the Machine Controllers.

1.1 MPE720

The MPE720 is a programming device software used to control and monitor Machine Controllers. (Model: CPMC-MPE720)

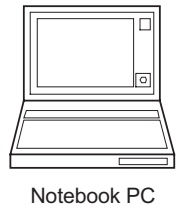
The MPE720 runs on Windows 95, 98, 2000, NT 4.0, or XP. In general, a personal computer (PC) where the MPE720 is installed is called a Programming Device.

A Programming Device and a Machine Controller are normally connected by an RS-232C communication interface. A CP-215 high-speed communication interface and CP-218 Ethernet interface are also available depending on the MP-series model.

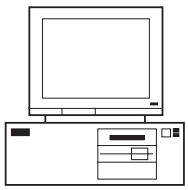


1.1.1 Recommended PC

The Programming Device performs high-speed data communication with the Machine Controller and must provide control, monitoring, and many other functions. The system requirements for the PC to ensure easy MPE720 operation are given below. Check the PC system before installing the MPE720.


Notebook PC

or


Desktop PC

Operating System

Windows 95, 98, 2000, NT4.0, or XP*4

PC Architecture	DOS
CPU	Pentium 200 MHz or more *1
Memory	64 MB or more (128 MB recommended)*2
Resolution	800 × 600 dots or more
Hardware Disk Capacity	200 MB *3
Communication Port	RS-232C (19.2 Kbps)

* 1. Any equivalent product from Intel Corporation may be used.
* 2. More memory is required to operate other applications simultaneously. Otherwise, memory swapping will be performed frequently, decreasing performance.
* 3. Standard working space after installation is also included.
* 4. Service pack 5 or later is required for Windows NT, service pack 1 or later, for Windows 2000.

1.1.2 Version Applicability

The Machine Controllers and OS types applicable to each MPE720 version are shown below.

	Applicable Machine Controllers		Applicable OS					
	MP900 Series	MP2000 Series	95	98	Me	NT	2000	XP
MPE720 Version	Ver. 4.30A (first edition) or later	Ver. 4.41 or later	Ver. 4.30A (first edition) or later		N/A	Ver. 4.30A (first edition) or later		Ver. 4.50 or later

INFO

■ Restrictions on Simultaneous Installation of the CP-717 and MPE720

Both programs can be installed together on one PC if the following software versions are used.

- CP717: version 4.20 or later
- MPE720: version 4.30 or later

Operation may not be stable if any other versions are installed simultaneously.

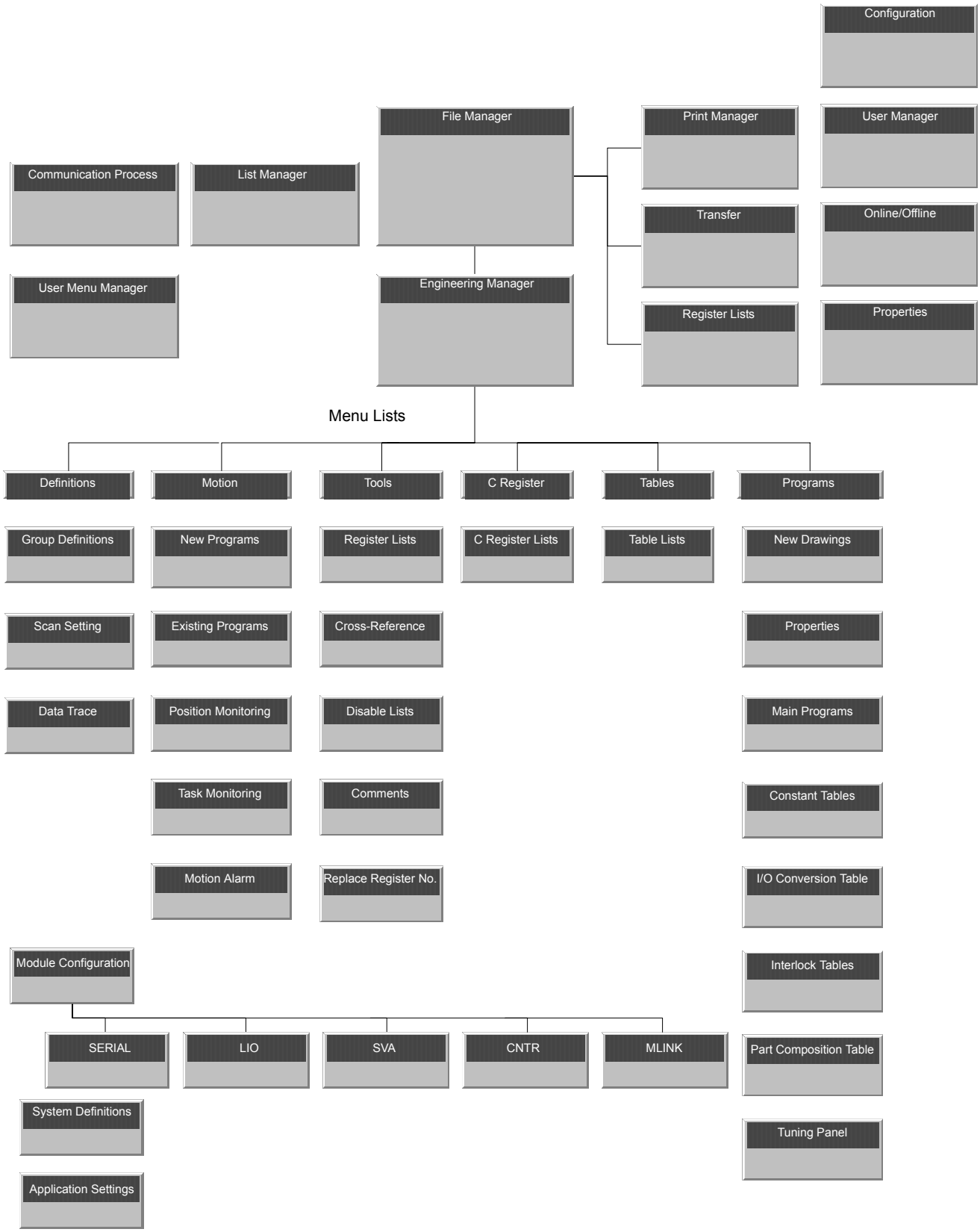
1.1.3 Main Functions

The MPE720 is configured from five management programs called the Managers. The Managers are used to manage and control MP-series systems. The main functions provided by these Managers are listed below.

Manager	Function	Outline
File Manager	Displays the MPE720 system and file configuration as a tree diagram, and provides file management functions. The File Manager can be used both online and offline.	
	File operations	Provides folders and files necessary for system configuration structured in a tree hierarchy.
	User management	Provides user security functions, mainly for logon and logoff.
	File transfers	Provides functions for data transmission between the Programming Device and Machine Controllers.
	Commands	Starts the tools.
Engineering Manager	Accesses the engineering tools. When online with a Machine Controller, monitoring is also possible.	
	Commands	Provides all of the programming functions. The File Manager can also be accessed.
	Definitions	Provides functions for defining Module configurations, systems, scan times, application information, data traces, groups, and motion parameters.
	Ladder programming	Provides functions for new programs, properties, constant tables, I/O conversion tables, interlock tables, part composition tables, and tuning panels as the programming environment.
	Utilities	Provides register lists, cross-references, disable coil lists, comment lists, and register number replacement tools.
	Motion programs	Accesses the motion programming environment using the Motion Editor.
List and Print Manager	Print processing	Displays the status of jobs that are printing and jobs that are queued. Can also be used to cancel print commands.
User Menu Manager	Shortcut registration	Creates a shortcut icon on the desktop.
Communication Process Manager	Communication processing	Sets the communication ports and their parameters and manages communication with Machine Controllers.

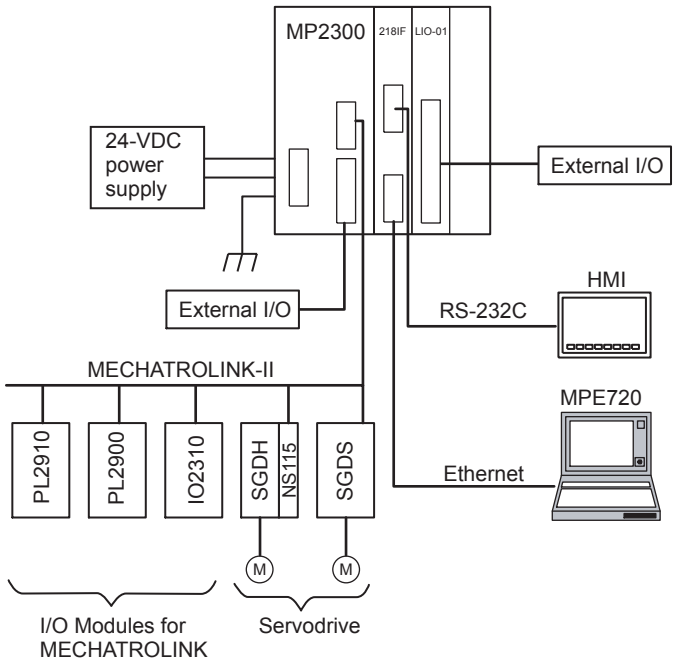
1.1.4 Function Tree

The following schematic diagram shows the commands activated by each Manager. The first window displayed by the MPE720 is the File Manager Window.



1.1.5 System Configuration Example

The following figure shows the system configuration.



Note: 1. Up to 21 devices can be connected to MECHATROLINK-II (The SERVOPACKs can be connected up to 16 axes).
2. Up to 32 I/O points (16 inputs and 16 outputs) can be used with the LIO-01 Module and up to 12 I/O points (8 inputs and 4 outputs) can be used with the CPU I/O Module.
3. Communication Modules can be used to connect to Ethernet, DeviceNet, PROFIBUS, RS-232C, and RS-422/485 open networks.
4. In the above example, a 218IF-01 Module is used. The Programming Device is connected to Ethernet and a Human-Machine Interface (HMI) is connected to RS-232C.

1.2 Outline of the Application Program Development Procedure

This section explains the standard procedure and points for developing an application program.

1.2.1 Simple Development Flowchart

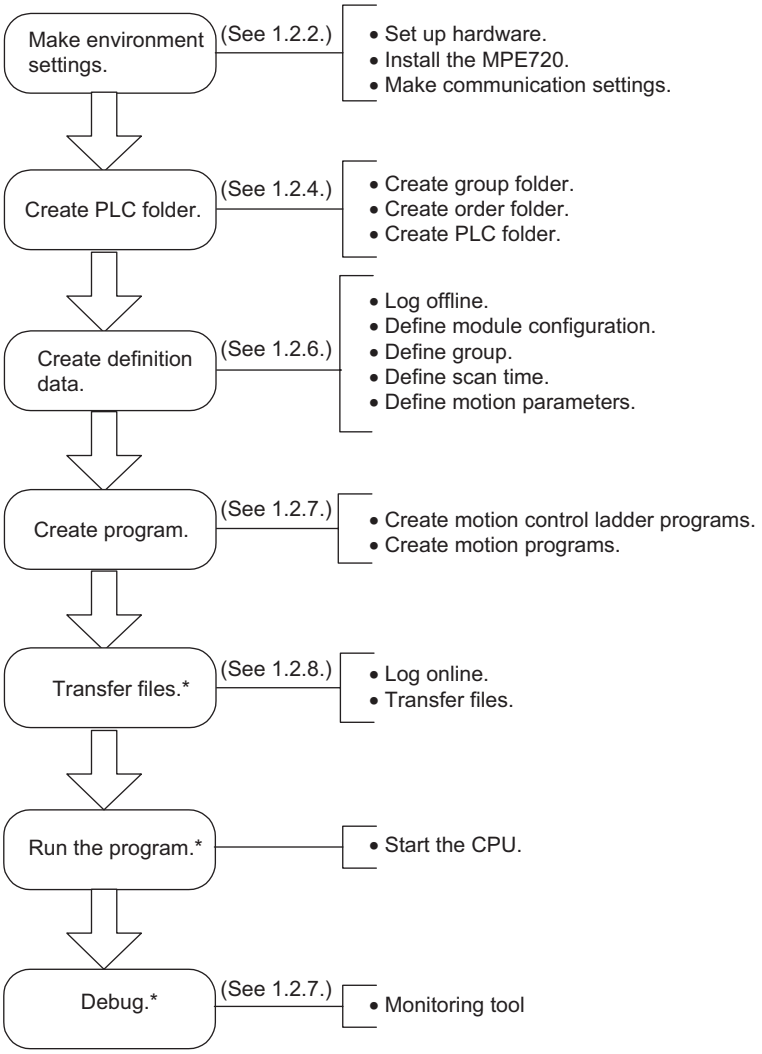
The basic procedure is as follows: After installing the MPE720, create a PLC folder, and then define the Machine Controller and servos before starting programming.

When using an MP2000-series Machine Controller with all peripheral devices, refer to *(2) Procedure with All MP2000-series Machine Controller Peripheral Devices Connected*.

To convert application programs developed for the MP900-series Machine Controllers into programs for MP2000-series Machine Controllers, refer to *(3) Procedure when Converting MP900-series Machine Controller Application Program for Use with the MP2000-series Machine Controllers*.

(1) Basic Procedure

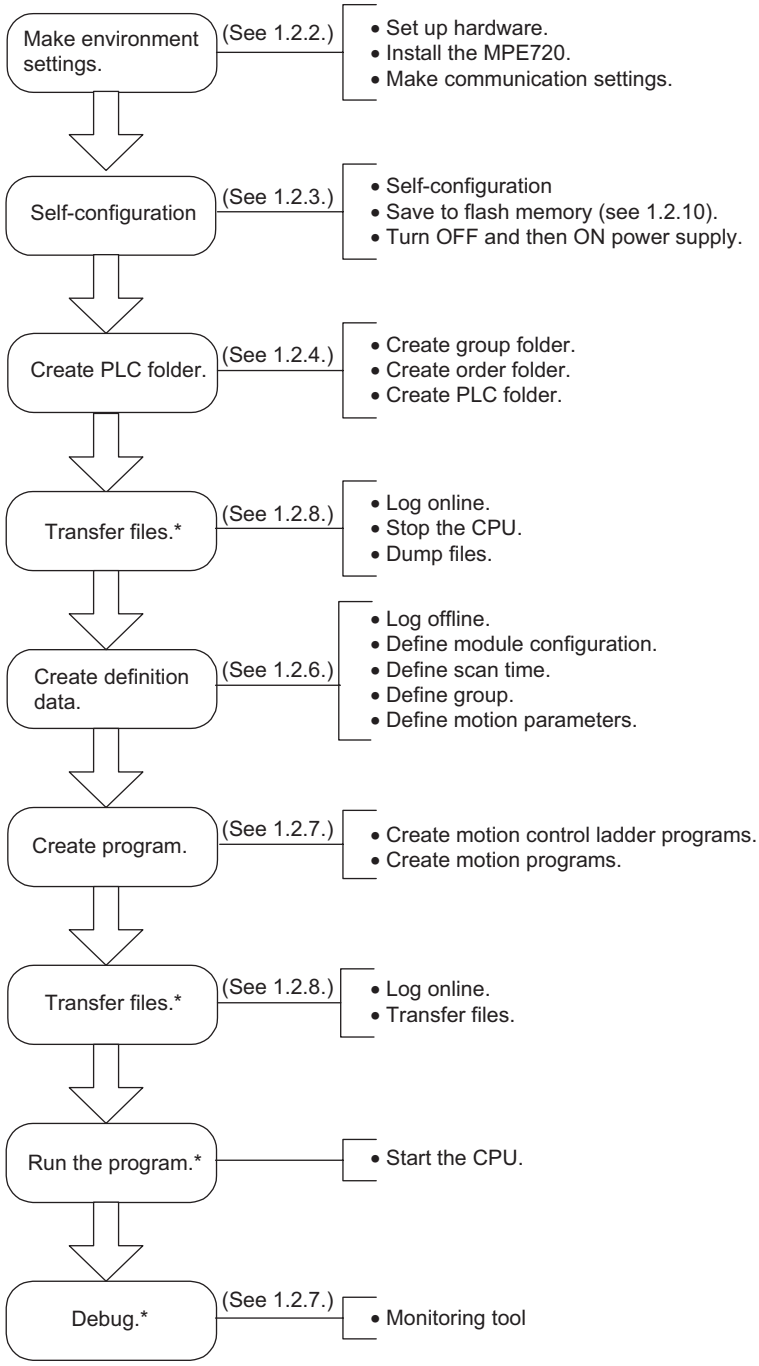
The procedure for developing a new application program is shown in the following flow chart.



* These are online operations.

(2) Procedure with All MP2000-series Machine Controller Peripheral Devices Connected

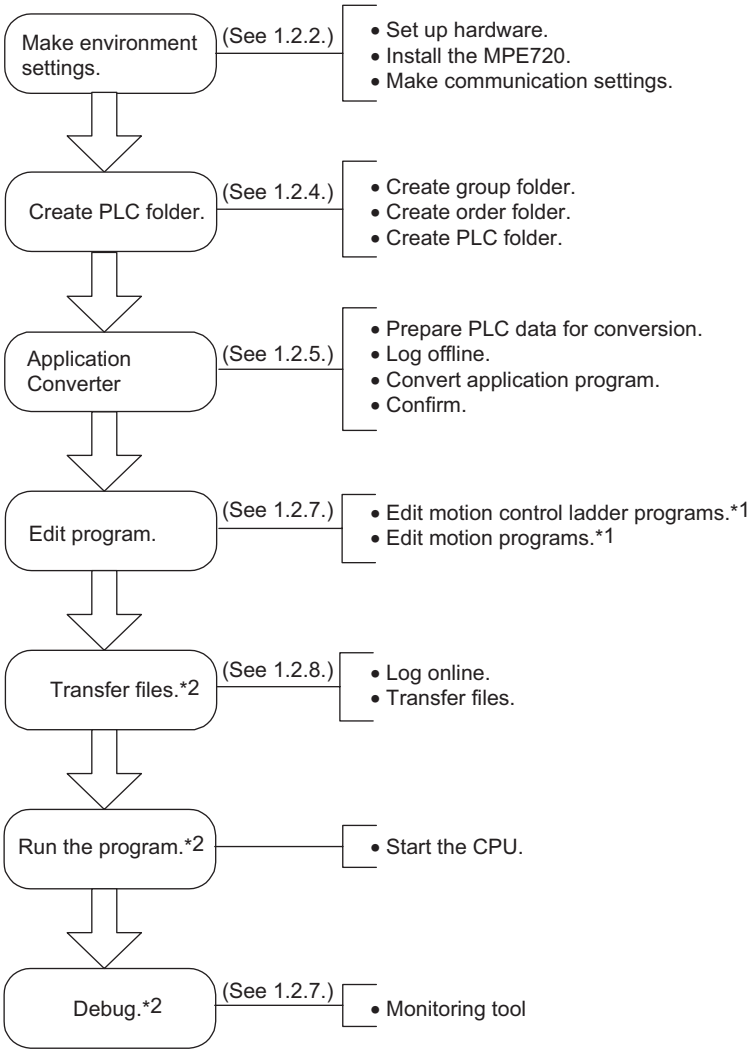
When an MP2000-series Machine Controller application program is being created, the creation of definition data can be simplified if peripheral devices, such as SERVOPACKs, have been prepared in advance.



* These are online operations.

(3) Procedure when Converting MP900-series Machine Controller Application Program for Use with the MP2000-series Machine Controllers

Existing MP900-series Machine Controller application program can be converted to MP2000-series Machine Controller application program.



* 1. If the system configuration has not been changed, it may be possible to skip the program editing step.
* 2. These are online operations.

1.2.2 Environment Settings

The environment settings regulate the hardware, software, and communication environments.

(1) Hardware Installation

This section assumes that hardware installation has been completed. If the hardware has not yet been installed, refer to the user's manual for the Machine Controller that you are using, and install the required hardware.

Defining systems and creating programs offline, however, can be performed before the hardware has been installed.

(2) MPE720 Installation

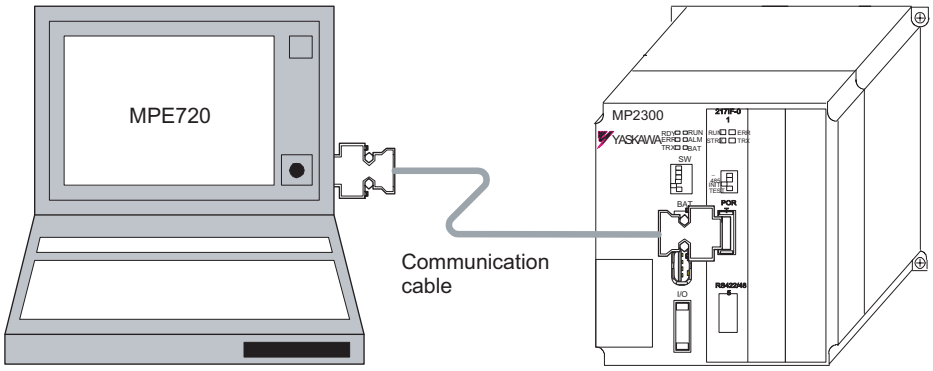
Install the MPE720 on the personal computer to be used as a Programming Device.

For details, refer to *1.3 Installing the MPE720*.

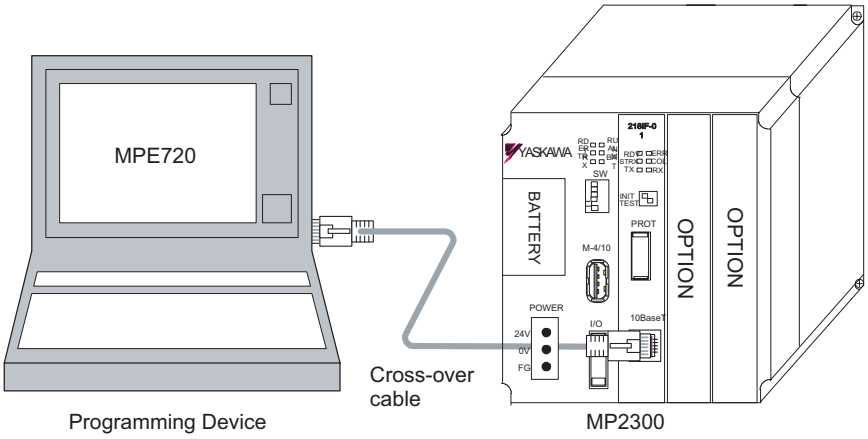
(3) Communication Settings

Set the communication conditions for communication between the Programming Device and the Machine Controller.

The following example shows the connection between a Programming Device and an MP2300 using the 217IF Module and an RS-232C communication cable.



The following example shows the connection using the 218IF Module and an Ethernet cross-over cable.



For details, refer to *2.1 Communication Manager*.

1.2.3 Self-configuration

When an MP2000-series Machine Controller is being used, the definition data can be created automatically. This feature can simplify system startup operations and reduce the time required. Self-configuration can be executed when the MP2000-series Machine Controller's power supply is turned ON or it can be executed from the MPE720. The peripheral devices must be readied and connected before performing self-configuration.

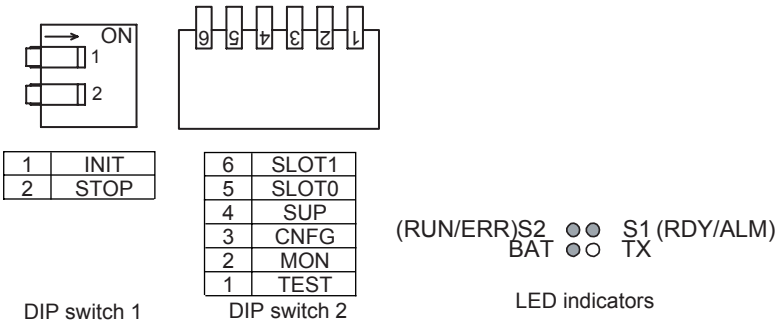
When self-configuration has been completed, save the data in flash memory and turn ON the MP2000-series Machine Controller.

(1) Self-configuration with Power ON

Complete connection of the peripheral devices and turn ON the power supplies to the peripheral devices. After setting the CNFG switch to ON on the front of the MP2000-series Machine Controller and turning ON the MP2000-series Machine Controller, self-configuration will start and the RUN indicator will blink. When self-configuration has been completed, the RDY indicator will light.

The following figure shows the layout of the DIP switches and LED indicators on the MP2000-series Machine Controllers.

- MP2100



- MP2300

After self-configuration has been completed, the status of the RUN indicator depends on the setting of the STOP switch when power was turned ON.

CNFG Switch	STOP Switch	Status after Self-configuration Has Been Completed
ON	ON	RDY indicator: Lit RUN indicator: Not lit After self-configuration has been completed, the MP2000-series Machine Controller will be in stopped status.
	OFF	RDY indicator: Lit RUN indicator: Lit After self-configuration has been completed, the MP2000-series Machine Controller will be in operating status.
OFF	ON	RDY indicator: Lit RUN indicator: Not lit Self-configuration will not be executed and the MP2000-series Machine Controller will be in stopped status.
	OFF	RDY indicator: Lit RUN indicator: Lit Self-configuration will not be executed and the MP2000-series Machine Controller will be in operating status.

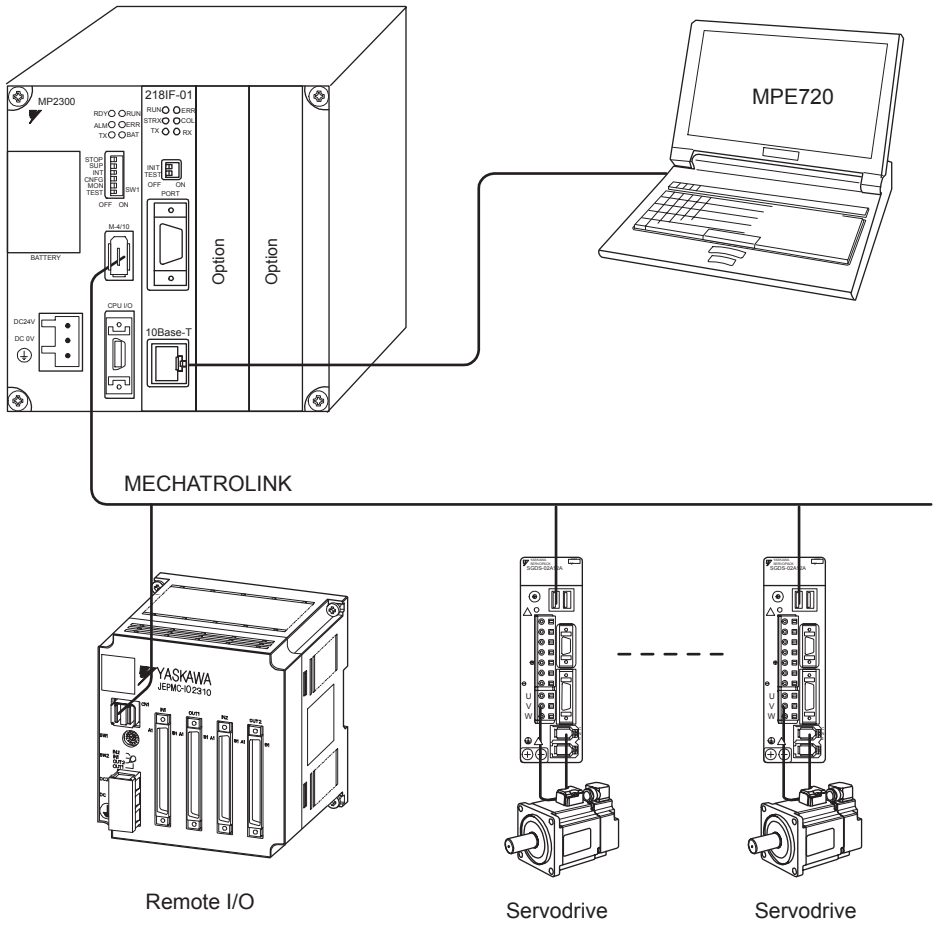
If an error occurs during self-configuration, the ERR indicator will light.

When operation is started without executing self-configuration, the definition data stored in flash memory is used.

(2) Self-configuration from the MPE720

Complete connection of the peripheral devices and turn ON the power supplies to the peripheral devices. After the MPE720 has been installed, it is possible to execute self-configuration by logging online to the MP2000-series Machine Controller's PLC folder.

In the following example, the MPE720 is connected to an MP2300 and the required peripheral devices are connected.



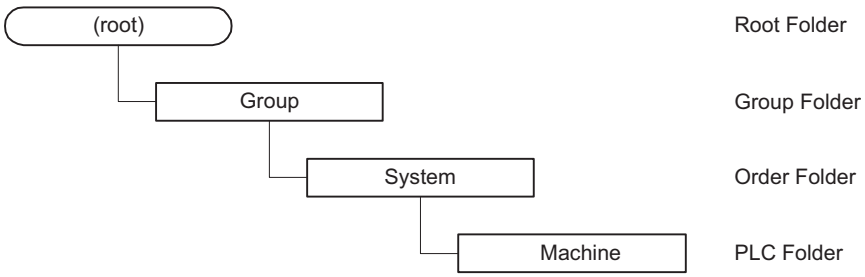
If self-configuration is executed from the Order Menu in the Module Configuration Window, self-configuration will start after a confirmation message is displayed. The RUN indicator will blink while self-configuration is being executed. If the self-configuration has been completed normally, the LED indicators will return to their previous status. If an error occurs during self-configuration, the ERR indicator will be lit.

For details, refer to *Chapter 8 Definition Folder 5: Module Configuration Definitions*.

1.2.4 Registering a Machine Controller

Create folders in the following order to register a new Machine Controller. The newly registered Machine Controller will be registered as a PLC folder, and the relevant data folders will be created automatically. At this time, the programming environment will be set up. The group folder and order folder are provided to organize the PLC folder.

Refer to *2.2.1 File Manager Window* to *2.2.4 Creating PLC Folders* for details.



The root folder is displayed in the Directory Tree when the File Manager Window is open.

(1) Creating a Group Folder

The group folder is used to freely divide the order folder into groups. For example, if each factory were to be organized into a group, all of the systems installed in the factory would be registered below the group folder.

Group folders can be created only under the root folder, or under another group folder.

(2) Creating an Order Folder

The order folder is used to organize the PLC folder. For example, when organizing in units of systems, all of the Machine Controllers used in each system are registered under a single order folder.

Order folders can be created only under the root folder, or under a group folder.

(3) Creating a PLC Folder

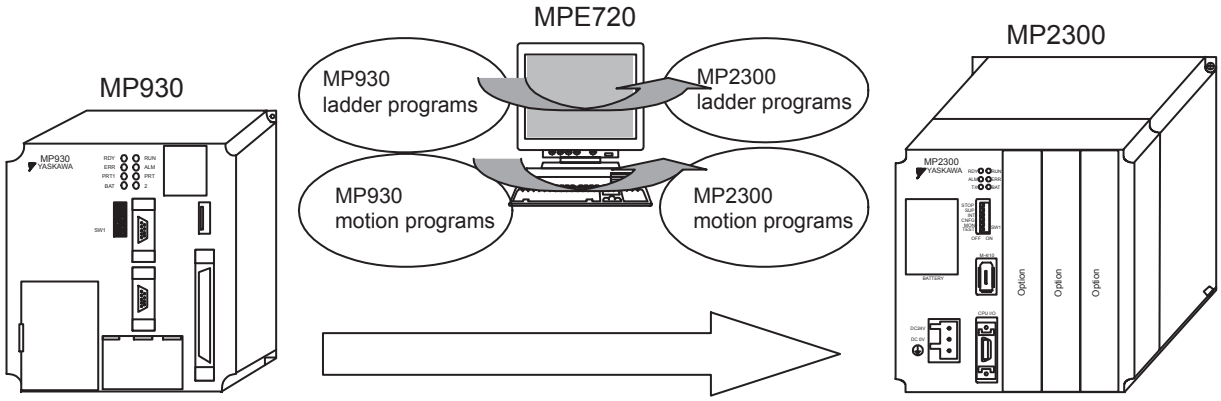
Each Machine Controller is represented by a PLC folder. Information concerning the Machine Controller is automatically generated below the PLC folder. By logging on to the PLC folder, you can proceed with the subsequent development procedure.

PLC folders can be created only under an order folder.

Group folders, order folders, and PLC folders are called user folders.

1.2.5 Application Converter

The Application Converter is a software tool that converts application data created for an MP900-series Machine Controller to the equivalent data for use in an MP2000-series Machine Controller.



1.2.6 Setting Machine Controller's Definitions

This section describes the following Machine Controller's definitions.

- Module Configuration Definitions
- Scan Time Definitions
- Group Definitions
- Motion Parameters

Each of these is described below.

(1) Offline Logon

Because the group definition that will be subsequently be set is an important definition file for the operating environment of the motion program, it cannot be done online. When setting the first definition, log on and execute the setting offline.

TERMS

Logon

Logging on is necessary from the viewpoint of safety and confidentiality using functions that identify the user operating the Machine Controller. Unless logged on, Machine Controller operations cannot be performed.

(2) Module Configuration Definitions

Set the Machine Controller Module configurations. These settings are essential. Set the Machine Controller Module configurations, the communication port, network, and I/O for each Module. Refer to *Chapter 8 Definition Folder 5: Module Configuration Definitions* for details.

(3) Scan Time Definitions

Set the scan times for both high and low speed for the system. Refer to the user's manual for the Machine Controller that you are using for details on scan processing.

The low-speed scan process is executed in the unused time of the high-speed scan process. Therefore, as a guideline, set a time that is twice the execution time of all the DWG.H drawings as the high-speed scan time.

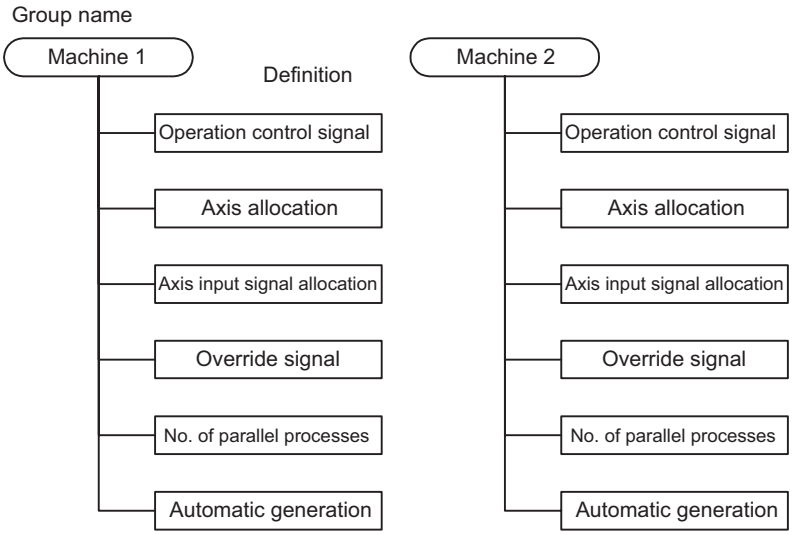
Refer to *Chapter 6 Definition Folder 3: Scan Time Definitions* for information on acquiring and setting the scan time current value.

(4) Group Definitions

Set the group definitions while offline. These definitions cannot be set online.

Use group definitions to set the signals for controlling the machine, number of axes, number of parallel processes, etc. The MPE720 provides standard control signals that enable automatic generation. When PGM Auto Generation is enabled, the motion control ladder program, which is required for program operation, will be generated automatically. PGM Auto Generation functions only on the MP900 Series.

For example, if operating multiple machines using a single Machine Controller, it is easier to consider allocating one group to each machine. Assuming that currently there are two machines operating independently, set the definitions for each by allocating group names Machine 1 and Machine 2.



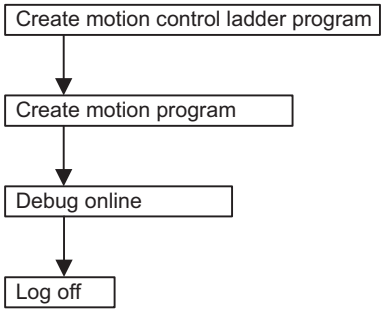
One machine is usually operated by one group.

(5) Motion Parameters

Motion parameter settings are required to adjust the initial setting parameters for the servo amplifier and motor. Refer to the user's manual for the Machine Controller that you are using, and set the parameters depending on the type of servo and its application.

1.2.7 Creating Programs

The procedure performed up to this point completes the settings required for programming. This section explains the procedure for actual programming.



(1) Creating Motion Control Ladder Programs

A motion program is controlled by the motion control ladder program. The motion control ladder program is generated automatically if automatic generation is enabled in the group definitions.

If using a unique control signal system, however, disable automatic generation and create a new motion control ladder program. Be sure to read and understand ladder programs and motion programs in the relevant Machine Controller User's Manual: Design and Maintenance before creating new motion control ladder programs.

Refer to the *Machine Controller MP900 Series User's Manual: Ladder Programming* (SIE-C887-1.2) for details on ladder programs.

If automatically generated motion control ladder programs require considerable revision, use the ladder editor for easy revision. Refer to *Chapter 9 Program Folder 1: Ladder Programming* for details.

(2) Creating Motion Programs

Create motion programs using the motion editor. Refer to *Chapter 10 Program Folder 2: Motion Programming* for details of editor operations, and refer to the *Machine Controller MP900 Series User's Manual: Motion Programming* (SIEZ-C887-1.3) for individual move commands.

(3) Debugging Tool

The Debugging Tool is a testing tool for motion programs. It cannot be used offline.

The Debugging Tool monitors program execution in addition to step commands that execute the program one step at a time, and brake point setting commands that specify steps to stop execution.

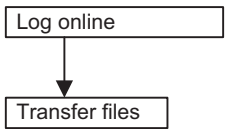
(4) Logoff

Check that the program is operating normally before logging off. All data (including program data) created while online is also written to the hard disk.

To quit operations, including debugging programs, be sure to log off. Debugging can be continued by logging on again.

1.2.8 Transferring Files

Transfer the data that has been defined to the Machine Controller.



(1) Logging Online

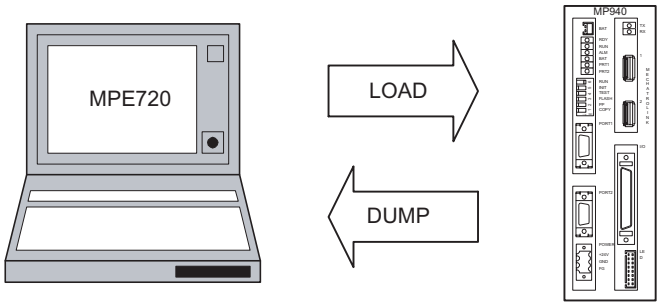
Communication is required between the MPE720 and the Machine Controller, so log on in online mode.

If you are logged on in offline mode, log off first, and then log on again in online mode.

(2) Transferring Data

Normally, set the definition data and create programs in offline mode, and then log online and transfer the definition data and programs that have been generated to the Machine Controller.

Refer to *2.2.10 Transferring Files* for the operations required.



The Machine Controller is now ready to operate machines.

1.2.9 Saving to Flash Memory

Save to Flash Memory is a function for writing the user application data for the Machine Controller into flash memory. User applications written to flash memory are saved even without battery back-up.

IMPORTANT

Since the MP2000-series Machine Controller starts up from flash memory, when changing a user application online, be sure to save it to flash memory. If the power supply to the Machine Controller is turned ON or OFF without saving this data to flash memory, all changes to the user application will be lost.

1.3 Installing the MPE720

This section explains the procedure for installing the MPE720.
The MPE720 installation disk is provided on a CD-ROM.

1.3.1 Starting the Installer

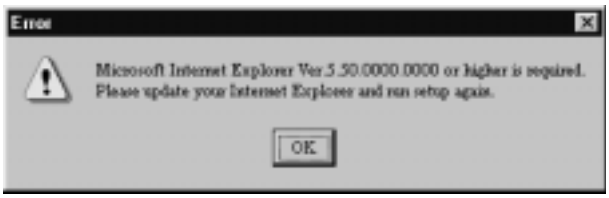
1. Insert the CD-ROM into the CD-ROM drive. The following window will appear.

2. Click the **Install** Button. The following window will appear.

3. Click the **MPE720** Button to start the Installer.

INFO

- Double-clicking ***Launch.exe*** in the CD-ROM drive on Explorer can also start the Installer.
- Unless Microsoft Internet Explorer 5.5 or higher is installed on the PC, the following error message will appear when Installer starts.

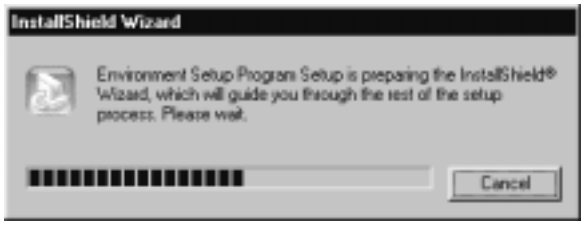


Click the **OK** Button and install Microsoft Internet Explorer 5.5 or higher, then install MPE720 again.

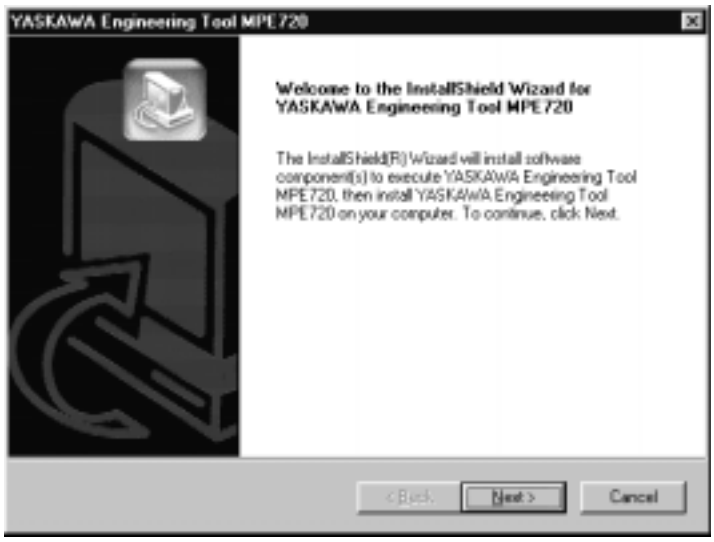
- Microsoft Internet Explorer 5.5 can be installed from the CD-ROM for the MPE720.

1.3.2 Preparing Setup

The window for setup preparation will appear as shown below. While this window is shown, installation is being prepared.

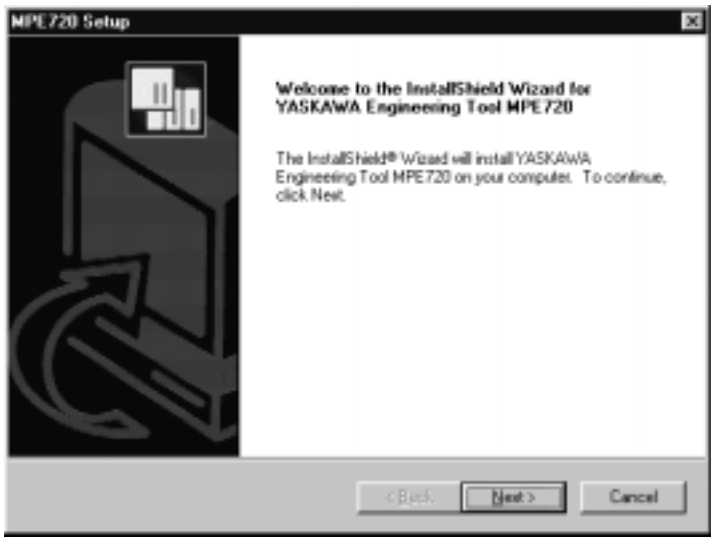


When installation preparations have been completed, the following window will appear. Click the **Next** Button after verifying the message.

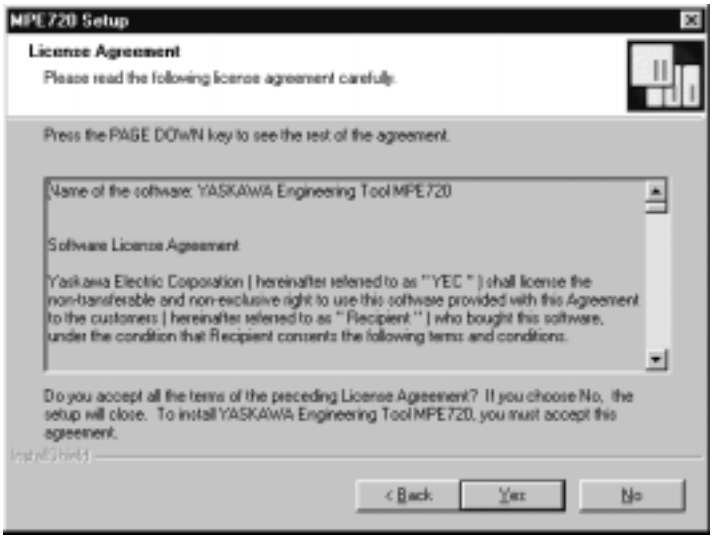


1.3.3 Starting Setup

The following window will appear when preparation for setup has been completed, and installation can be started.



1. Click the **Next** Button after verifying the message. The following window will appear.



2. Click the **Yes** Button after verifying the message. Setup will start and the Customer Information Window will appear.

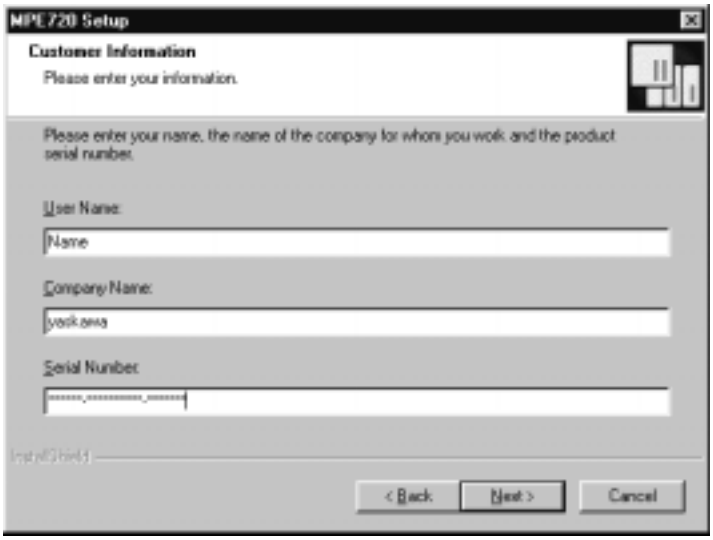
INFO

■ The following buttons can be used in all of the following operations.

- Clicking the **Next** Button executes the process and moves to the next window.
  Clicking the **Back** Button returns to the previous window.
- Clicking the **Cancel** Button terminates processing.

1.3.4 Entering Customer Information

1. In the Customer Information Window, enter the user name (customer name), company name, and serial number as the customer information.

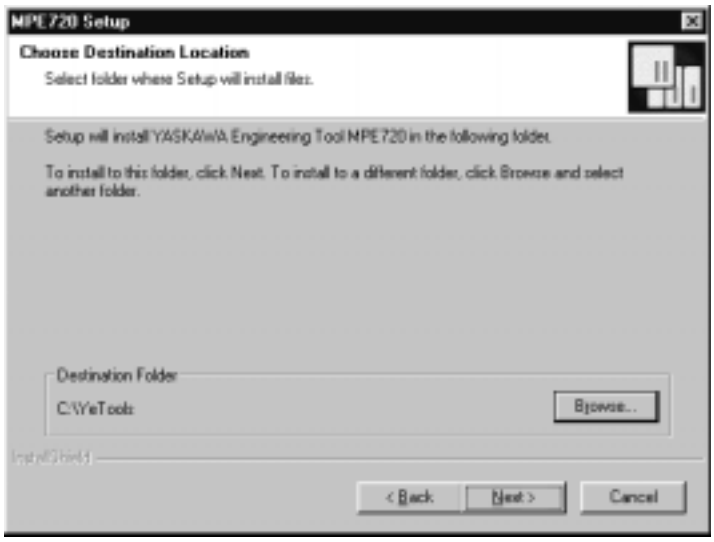


2. After entering the data, click the **Next** Button. The Choose Destination Location Window will appear.

1.3.5 Selecting Installation Destination

Select the installation destination directory. C:\YeTools is the MPE720 default directory.

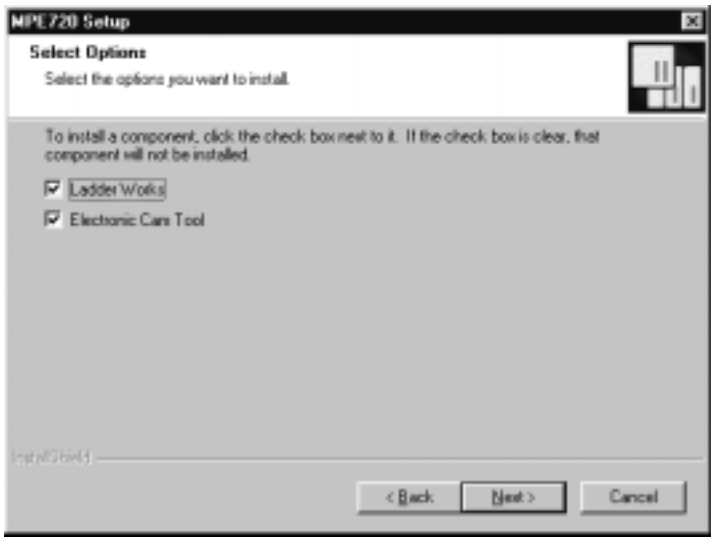
Click the **Browse** Button to change the installation destination directory. It is recommended, however, that C:\YeTools be used.



1.3.6 Selecting Options

In this window, select the options to install.

It is recommended to select both the *Ladder Works* and *Electronic Cam Tool* Options to install the Ladder Works and the Electric Cam Tool as MPE720 standard options.



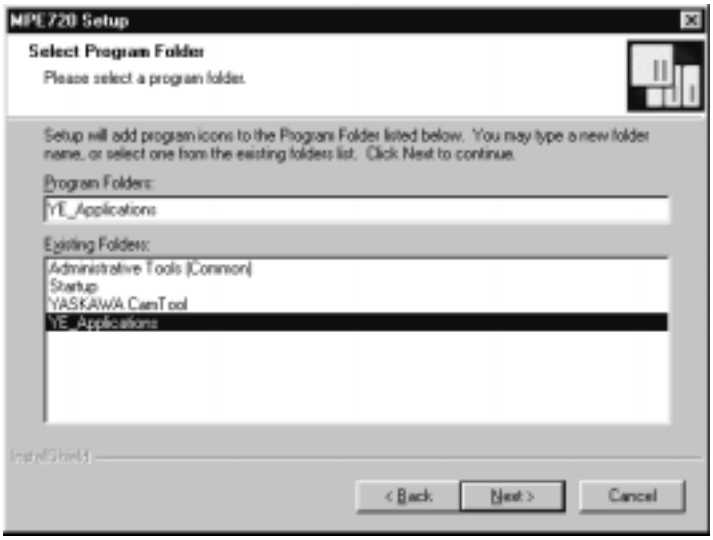
After selecting the options, click the **Next** Button. The Select Program Folder Window will appear.

INFO

- Ladder Works: Ladder Works for Windows with the MPE720 installed
- Electric Cam Tool: Electronic cam data preparation tool

1.3.7 Selecting Program Folder

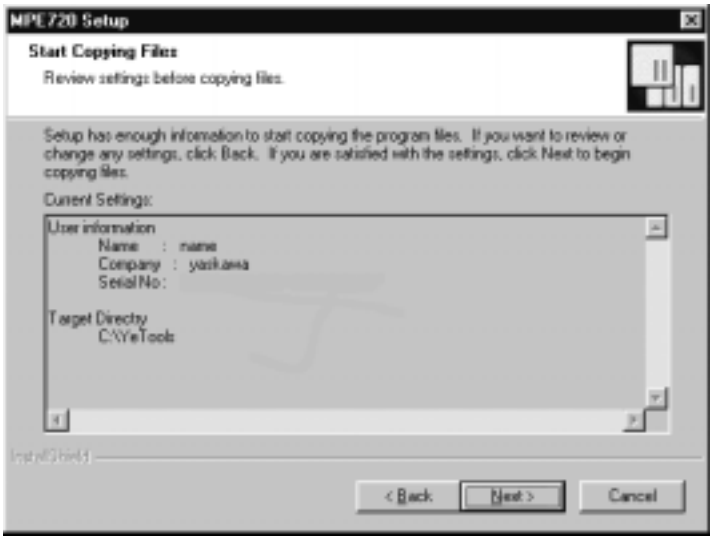
In this window, specify and register the program folder to register the application group. The default is YE_Applications. Any existing folder other than the default can be selected. It is recommended, however, that YE_Applications be used.



When selecting the program folder, click the **Next** Button. The Start Copying Files Window will appear.

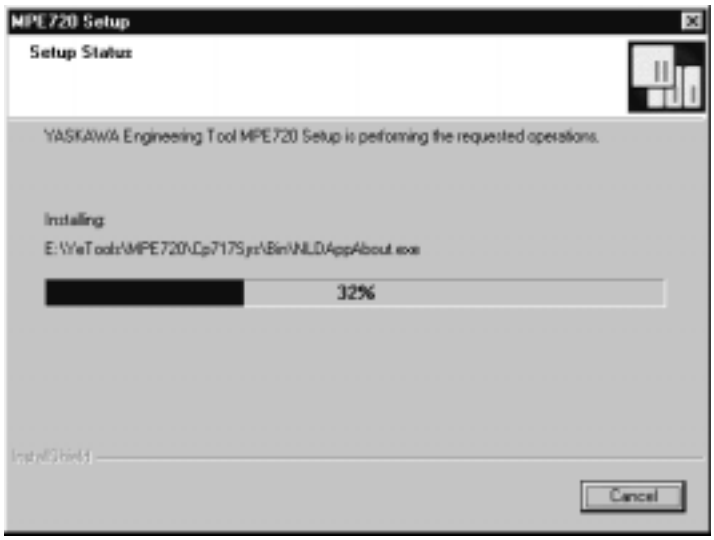
1.3.8 Copying Files

1. In this window, the information that has been input is displayed. To correct something, click the **Back** Button to return to the previous window and correct the relevant part.



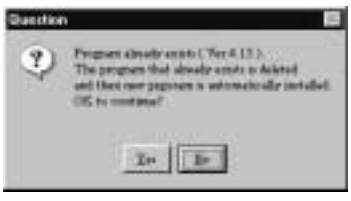
2. After setting has been completed, click the **Next** Button to start copying a file.

3. File copying will start. The following windows will appear in order.
   The copy progress status can be checked in the progress bar dialog box.
   Wait until copying has been completed.



INFO

The following messages may appear when installing the MPE720.

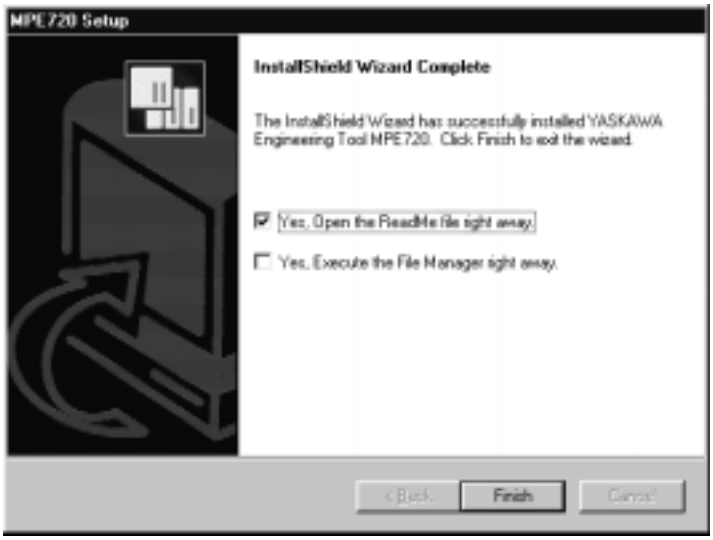
  	These messages appear when the optional software with the older version has not been uninstalled successfully. Verify the message and click the **OK** Button to continue the installation and update the version.Clicking the **Cancel** Button stops installing the optional software. It is recommended to update the optional software version when updating the MPE720 version.

1.3.9 Completing Setup

When setup has been completed, the MPE720 Setup Window will appear.

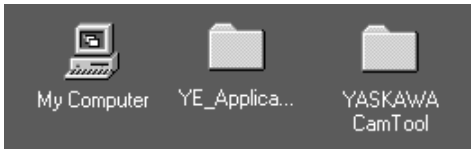
There are two options in this window. Select the desired option, and click the **Finish** Button.

- If you select *Yes, Open the ReadMe file right away*, the ReadMe file that describes the Software License Agreement will be displayed. If display is not necessary, clear the check mark.
- If you select *Yes, Execute the File Manager right away,* the application will start after completion of the setup.



1.3.10 Verifying Setup Contents

When setup has been completed, the common program folder (default name: YE_Applications, YASKAWA CamTool), which forms the platform for the application groups, will have been created on the desktop.



Perform the following steps to verify that installation and setup were completed successfully.

1. Double-click the **YE_Applications** program folder. The program folder will be opened and the contents will be displayed as shown below.

2. Double-click the **MPE720** Icon and verify that the application starts correctly.

INFO

The application can also be started up by selecting this application from the Program Menu under the Windows **Start** Button.

1.3.11 Folders Created at Installation

The Installer creates folders for file components, and the relevant files are copied to the folders.

	File Component	Folder That Is Created
1	ReadMe (latest information) file, etc.	\...\YeTools
2	MPE720 program file	\...\YeTools\MPE720\Cp717sys
3	MPE720 data file	\...\YeTools\MPE720\Cp717Usr
4	Windows communication driver	\...\WINDIR\System
5	Common DLL	\...\WINDIR\system
6	MPE720 communication program file	\...\YeTools\CpComSys

Note: 1. \...\YeTools
Indicates the basic folder of the MPE720 system. Most files are installed in this folder. The folder name can be changed. It is recommended, however, that the standard folder name YeTools be used.
2. \...\WINDIR
Indicates the folder where the Windows system has been installed. C:\Windows is used for the standard installation of Windows. Files depending on the Windows system are installed, such as communication driver module or common DLLs, for the MPE720 data communication with the Machine Controller.

TERMS

File component

Files classified into groups in the units of functions

2

Manager Functions

This chapter explains each manager window in the MPE720.

2.1 Communication Manager

The Communication Manager function provides communication services between the Programming Device and the Machine Controller. The Communication Manager is called the Communication Process in the MPE720.

The Communication Manager itself supports various physical lines, but the Machine Controller supports only serial and Ethernet communications.

2.1.1 Starting the Communication Manager

Start the Communication Manager by double-clicking the **Communication Manager** Icon in the applications folder set during installation.

Normally, however, there is no need to start the Communication Manager manually, as it starts automatically when the MPE720 is started.

2.1.2 Communication Manager Operations

Click the **Communication Process** Icon on the task bar to display the Communication Process Window.

Use the Communication Manager to update and check the communication parameters and to check the communication status.

INFO

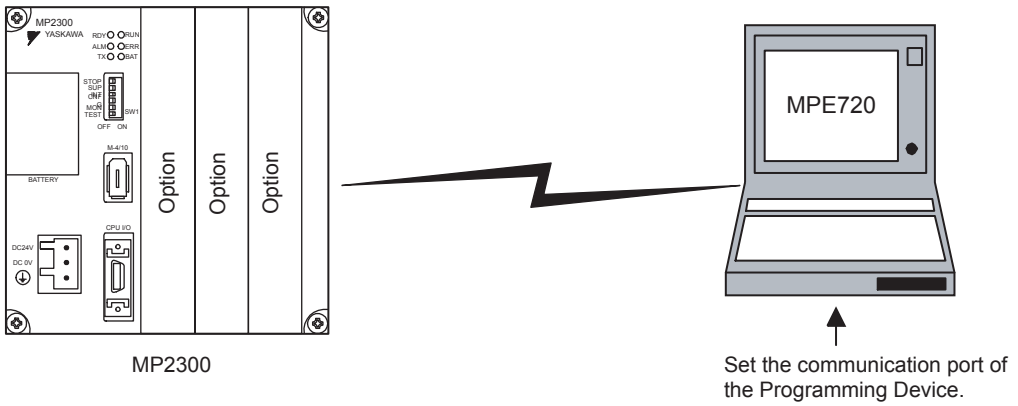
Do not close the Communication Manager by selecting ***File*** − ***Exit*** during online communication, because a communication error will occur.

(1) Outline of Communication Settings

When installation has been completed, be sure to make settings for communication of the MPE720. Select the right communication interface from the following three interfaces for communication medium and set the communication conditions.

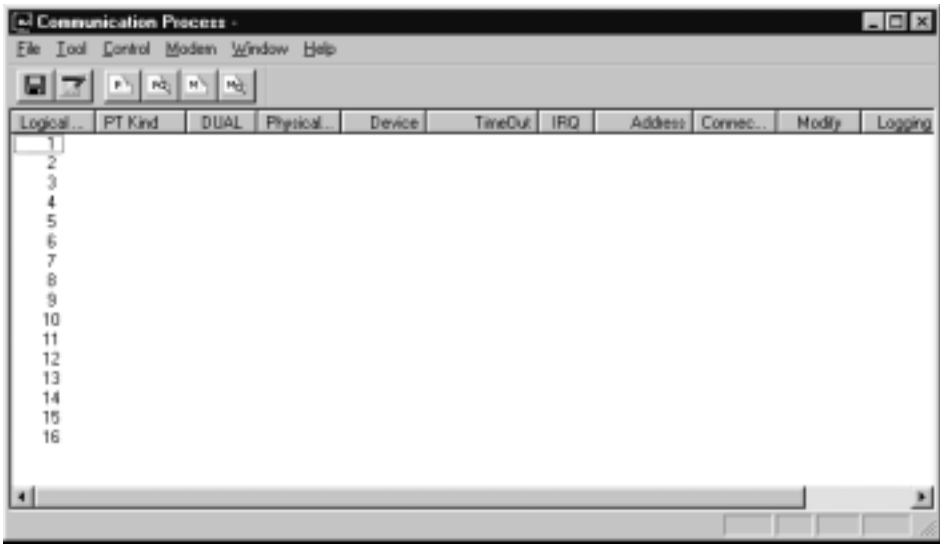
- Serial interface
- CP-215 (215IF) high-speed communication interface
- Ethernet interface

Once the settings have been made, they are stored as MPE720 system information. No settings need to be made from the next operation, unless the settings need to be changed.

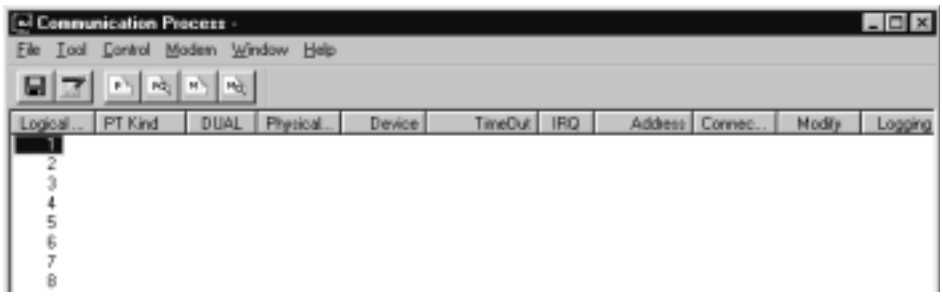


(2) Calling the Communication Process

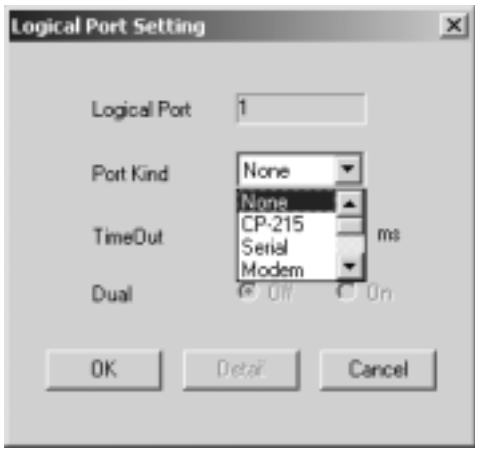
1. Double-click the **Communication Manager** Icon of the communication process in the YE_Applications program folder.
2. The Communication Process Window will appear. For the communication processes, logical ports for up to 16 channels can be operated. Select and set an unused logical port in order from the top.



3. Double-click the relevant logical port number, or select relevant logical port number and then select ***File*** – ***Setting***. When logical port number 1 has been selected, the window will be as follows:



The Logical Port Setting Window will appear.



4. Select the relevant communication interface for the *Port Kind* and click the **OK** Button.
   When ***Serial***, ***CP215***, or ***CP218*** is selected, proceed to *(3)*, *(4)*, or *(5)* respectively.

IMPORTANT

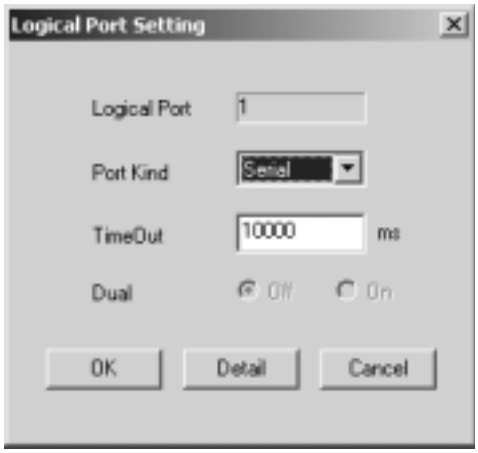
Do not set the logical port to any communication device (e.g., CP-215) that is not connected to the Programming Device. Failure to observe this precaution may make hardware operations unstable.

(3) Setting the Serial Communication Port

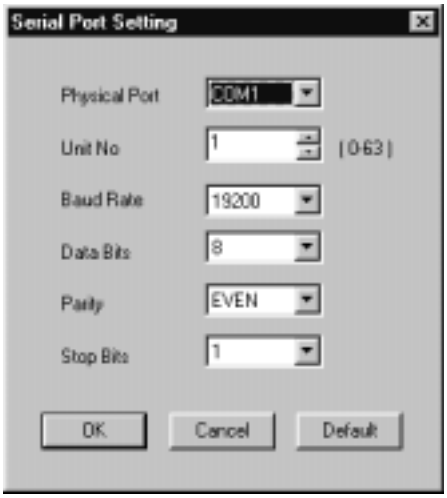
(a) Setting Procedure

Set the serial communication port using the following procedure.

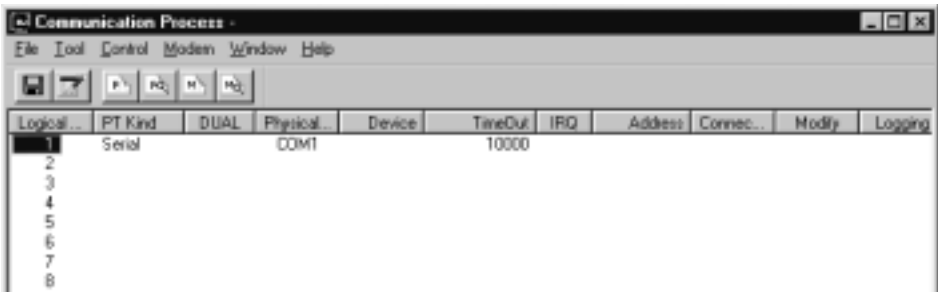
1. Select ***Serial*** as the *Port Kind* in the Logical Port Setting Window.



2. Clicking the **Detail** Button to display the Serial Port Setting Window showing the setting information.
   Click the **OK** Button after setting the serial port parameters. Normally, the following defaults are entered.



3. The Logical Port Setting Window will appear again. Click the **OK** Button again. The Communication Process Window will appear again, so that you can verify that *Serial* has been assigned to logical port 1.



This completes setting the Serial communication port. The setting contents must be saved in a file.

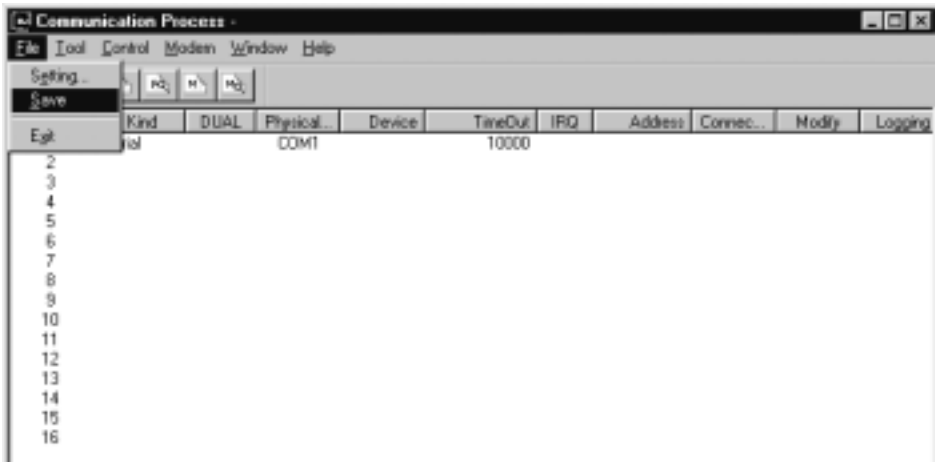
2

(b) Saving Communication Port Settings

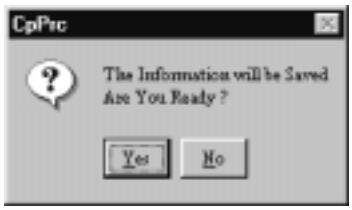
Save the set values of the communication port in a file. After that, this data is supplied as the communication port information when the communication process starts up.

Save the communication port set values in a file using the following procedure.

1. Select ***File - Save***.

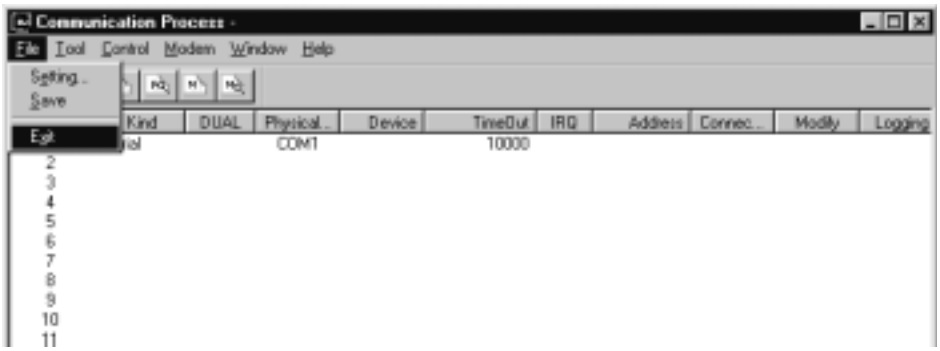


2. A confirmation message will appear to verify whether the information is to be saved. Click the **Yes** Button to save the information.



(c) Completing Communication Process

Select ***File - Exit*** to close the Communication Process Window.



IMPORTANT

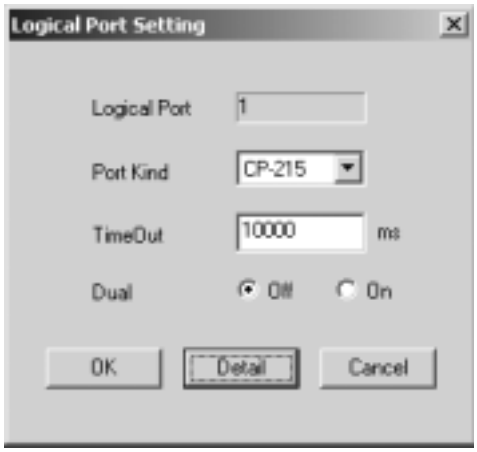
The communication port settings will be valid when the communication process is restarted after the setting have been saved in a file.

(4) Setting the CP-215 (215IF) Communication Port

(a) Setting Procedure

Set the CP-215 communication port using the follow procedure.

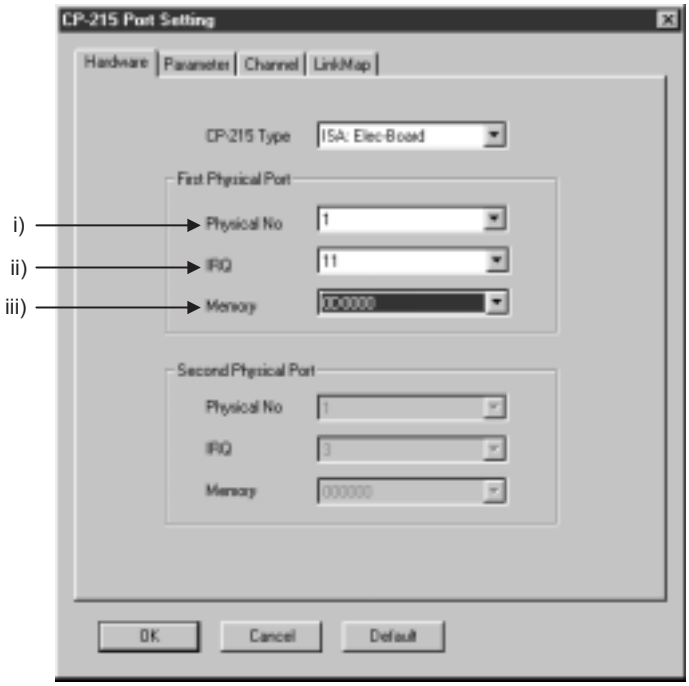
1. Select ***CP-215*** as the *Port Kind* in the Logical Port Setting Window.



2. Click the **Detail** Button to display the CP-215 Port Setting Window. Set the CP-215 parameters in order on the four tab pages, Hardware, Parameter, and Channel. No settings are required on the LinkMap Tab Page.

a) Hardware Tab Page

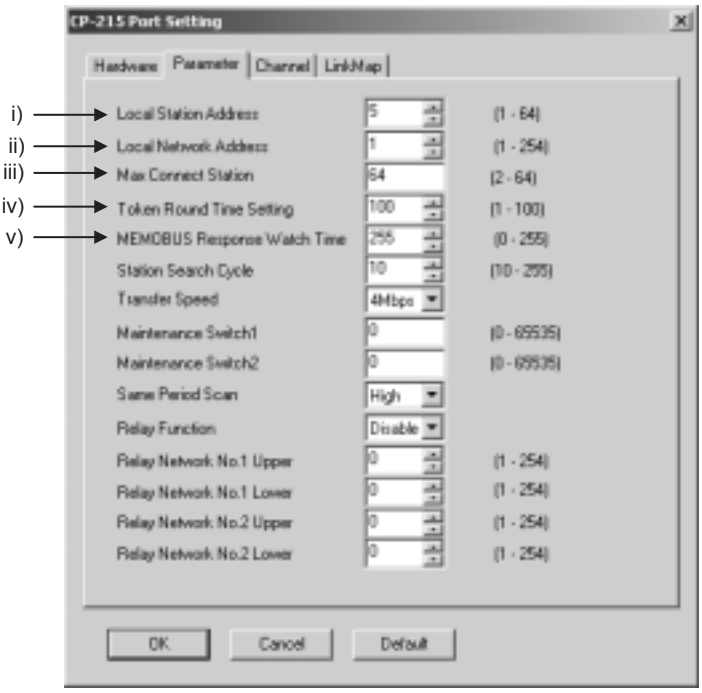
Set the operating conditions of the CP-215 PC/AT Card mounted in the PC.



Setting	Details
i) Physical No. (physical port)	Set the I/O port number. If there is only one CP-215 PC/AT Card, set ***1***. When more than one CP-215 PC/AT Card is used, assign ***2, 3, 4*** , etc., in order.
ii) IRQ (interrupt request)	Select a hardware interruption number that is currently not used in the PC.
iii) Memory	Set the communication buffer address. Normally, set a memory address that is not used in the UMB.

b) Parameter Tab Page

Set the CP-215 transfer parameters. Set from the *Local Station Address* to the *MEMOBUS Response Watch Time* i) to v). Use the default values for the other parameters.

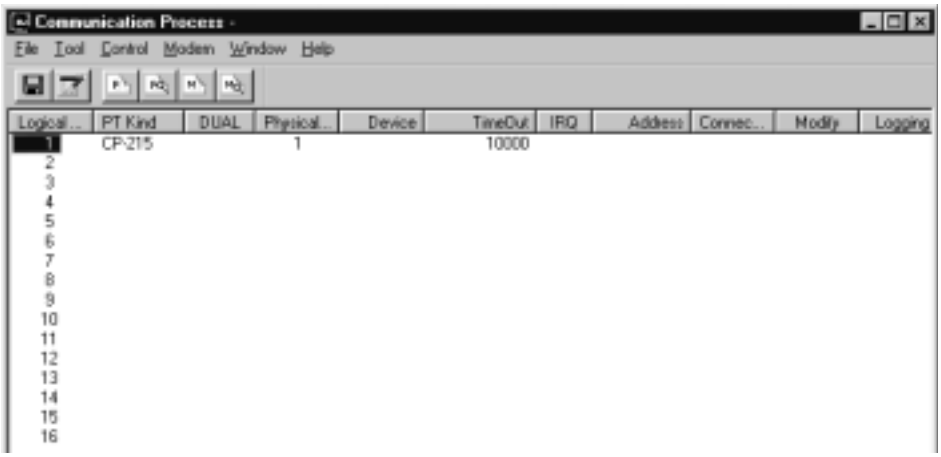


Setting	Details
i) Local Station Address	Set the Programming Device station number.
ii) Local Network Address	Set the network number where the Programming Device is connected. Set ***1*** when there is only one network segment.
iii) Max. Connect Station	Set the number of the CP-215 network stations. The number of stations indicates the number of CP-215 Interface Modules in the Machine Controllers, and the number of CP-215 PC/AT Cards in the PCs.
iv) Token Round Time Setting	Set the target time from when each station receives a token to when it receives the token again. Set ***100***.
v) MEMOBUS Response Watch Time	Sets the time until a response is received after sending a message. Set ***255***.

c) Channel Tab Page

Set the number of panel command channels. Set the *Panel Command Channel* to ***2***. Other parameters are not used with the MPE720; use the default values. After completing the settings, click the **OK** Button.

3. The Logical Port Setting Window will appear again. Click the **OK** Button. The Communication Process Window will appear again so that you can verify that the CP-215 has been assigned to logical port number 1.



This completes setting the CP-215 communication port. The setting contents must be saved in a file.

(b) Saving Communication Port Settings and Completing Communication Process

Refer to *(b)* and *(c)* in *(3) Setting the Serial Communication Port*.

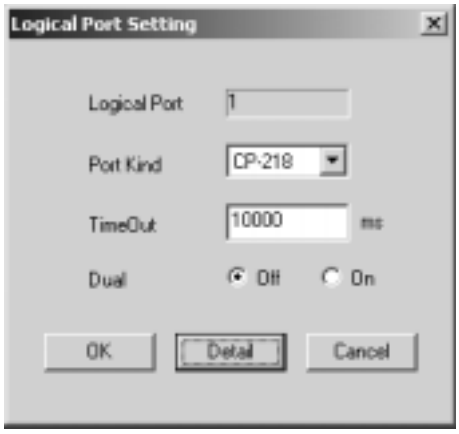
(5) Setting the CP-218 (218IF) Communication Port

Ethernet is used for communication via the 218IF-01 Module mounted in the Machine Controller. For this configuration, the Programming Device must be equipped with a general-purpose Ethernet board and PCMCIA card.

(a) Setting Procedure

Set the CP-218 communication port using the following procedure.

1. Select ***CP-218*** as the *Port Kind* in the Logical Port Setting Window.

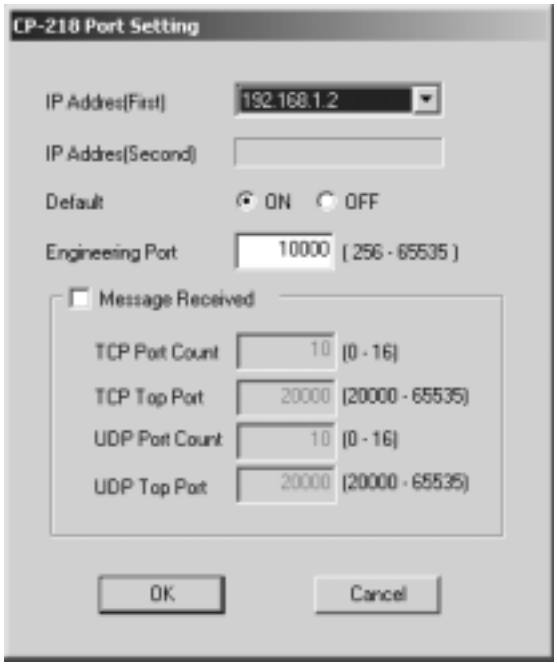


2. Click the **Detail** Button to display the CP-218 Port Setting Window. Set only the *IP Address (First)*. Use the default values for other parameters.

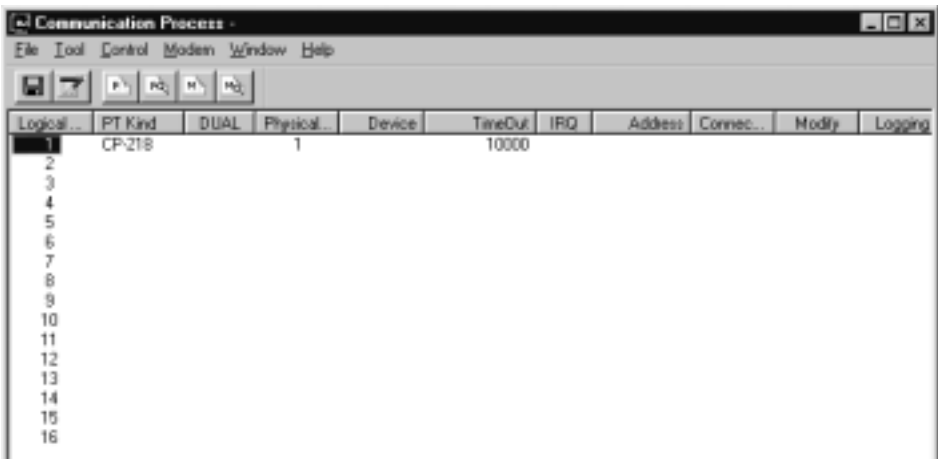
   Select the IP address from the following:

   - IP address assigned to the Ethernet board or the PCMCIA card mounted on the PC that works as a Programming Device
   - The automatically set IP address i.e., either one of private addresses 192.168.1.1 to 192.168.1.254 of class C

   Select the IP address following the instructions of the network administrator. IP addresses, including that of the Machine Controller, must be managed.



3. The Logical Port Setting Window will appear again. Click the **OK** Button. The Communication Process Window will appear again so that you can verify that the CP-218 has been assigned to logical port number 1.



This completes setting the CP-218 communication port. The setting contents must be saved in a file.

(b) Saving Communication Port Set Value and Completing Communication Process

Refer to *(b)* and *(c)* in *(3) Setting the Serial Communication Port*.

2.2 File Manager

The File Manager Window is the first window that opens when the MPE720 is started. All MPE720 operations are started from this window, which provides a user interface mainly for files.

This section explains the File Manager Window configuration and menus.

2.2.1 File Manager Window

The File Manager Window is made up of three sections to enable easy comprehension of the Machine Controller's system configuration. The three sections are the Directory Tree, List, and Details.

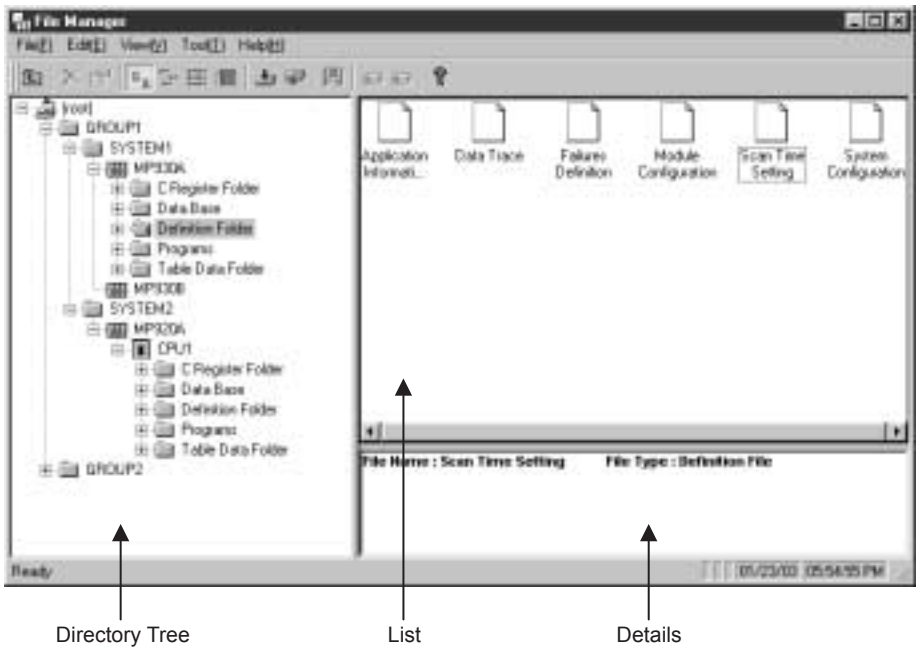


Fig 2.1 File Manager Window

The following table gives an outline of each section of the File Manager Window.

Section	Outline
Directory Tree	This section shows the system configuration using folders in a hierarchical structure.
List	This section shows the files contained in each folder.
Details	This section shows the attributes of each file.

(1) Directory Tree Section

The Directory Tree shows the system configuration using folders in a hierarchical structure. The program and definition data lists saved in the system are displayed in the Directory Tree by group or order name.

Hard disk folders are displayed when in offline mode, and the files saved in the Machine Controller are displayed when in online mode.

(a) Opening Folders

A small symbol in front of the folder icon means that the folder contains other folders.

Symbol	Meaning
	• This symbol indicates that the folder is closed. Click the + symbol and it will change to a – symbol, and the folders inside will be displayed. • The same operation can be performed by double-clicking the folder name.
	• This symbol indicates that the folder is open. Click the – symbol and it will change to the + symbol, and the folders inside will no longer be displayed. • The same operation can be performed by double-clicking the folder name.

(b) Folder Icons and File Icons

Different types of folders can be distinguished by the folder icons shown in the following table. These icons appear in the Directory Tree.

Icon	Meaning
	Root folder. This is a fixed folder, and is the first icon in the Directory Tree.
	Group folders (group names), order folders (order names), program folders, interrupt programs folders, function programs folders, initialization programs folders, high scan programs folders, low scan programs folders, definition folders, table data folders, motion program folders, and motion group folders
	PLC folders (Machine Controller names)
	CPU folders
	Files (programs, definitions, etc.)

(2) List Section

The List shows the folders and files contained within the folder selected with the cursor in the Directory Tree. The detailed information displayed will differ depending on the type of folder or file selected.

- Changing the List Display Mode

  The list display mode can be changed. Select between list and detailed display, and change the icon size, using the View (V) Menu in the File Manager.

(3) Details Section

The Details shows detailed data for each folder and file selected with the cursor in the Directory Tree. The details displayed will differ depending on the type of folder or file selected. If ***(root)*** (root folder) is selected with the cursor, nothing will be displayed.

- Displaying/Hiding Details

  Select ***View*** – ***Detail Window*** from the File Manager Menu to display/hide the Details.

2.2.2 Basic Tree Concepts

This section explains the configuration of folders displayed in the Directory Tree. The Directory Tree has a root folder under which multiple systems can be created by job.

(1) Folder Configuration

The root folder is displayed as the top branch of the tree, and contains group folders, order folders, PLC folders, and the data folders.

The MPE720 is designed to handle multiple systems and Machine Controllers, so logically, a group folder and order folder are above the PLC folder, which defines the MP Series.

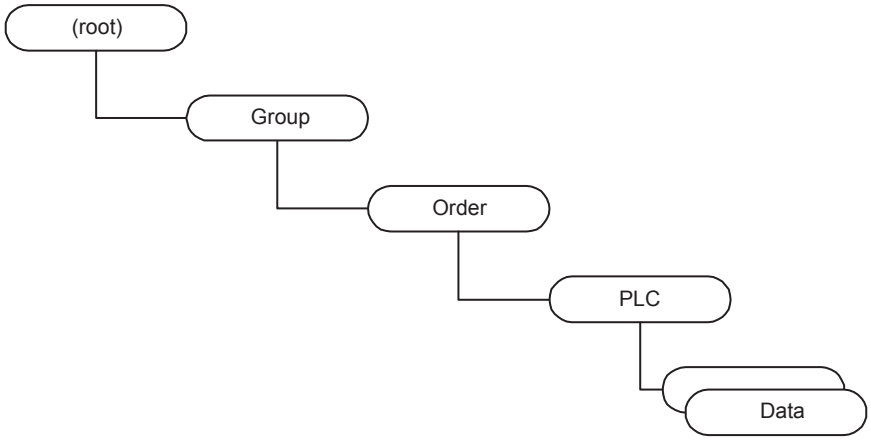


Fig 2.2 Folder Tree Branches

(a) Root Folder

User-defined folders are managed under the root folder, which is the only folder provided by default by the MPE720. The MPE720 can manage multiple group folders and order folders.

(b) Group Folders

Group folders indicate large job units such as projects.

Order folders, in which one job can be broken down into multiple tasks, can be created under the group folder. The group folder can be omitted, however, if the entire job can fit into one order folder.

A maximum of 20 group folders can be defined for large-scale projects, but their management is complicated.

INFO

The group folder names are not connected to the group definitions in the PLC folder. Allocate group names in control units related to the relevant Machine Controller in the group definitions.

(c) Order Folders

Order folders indicate task units such as systems included in a project, and can contain PLC folders, each of which defines multiple Machine Controllers.

Order folders cannot be branched on their own, but at least one order folder must be created.

(d) PLC Folders

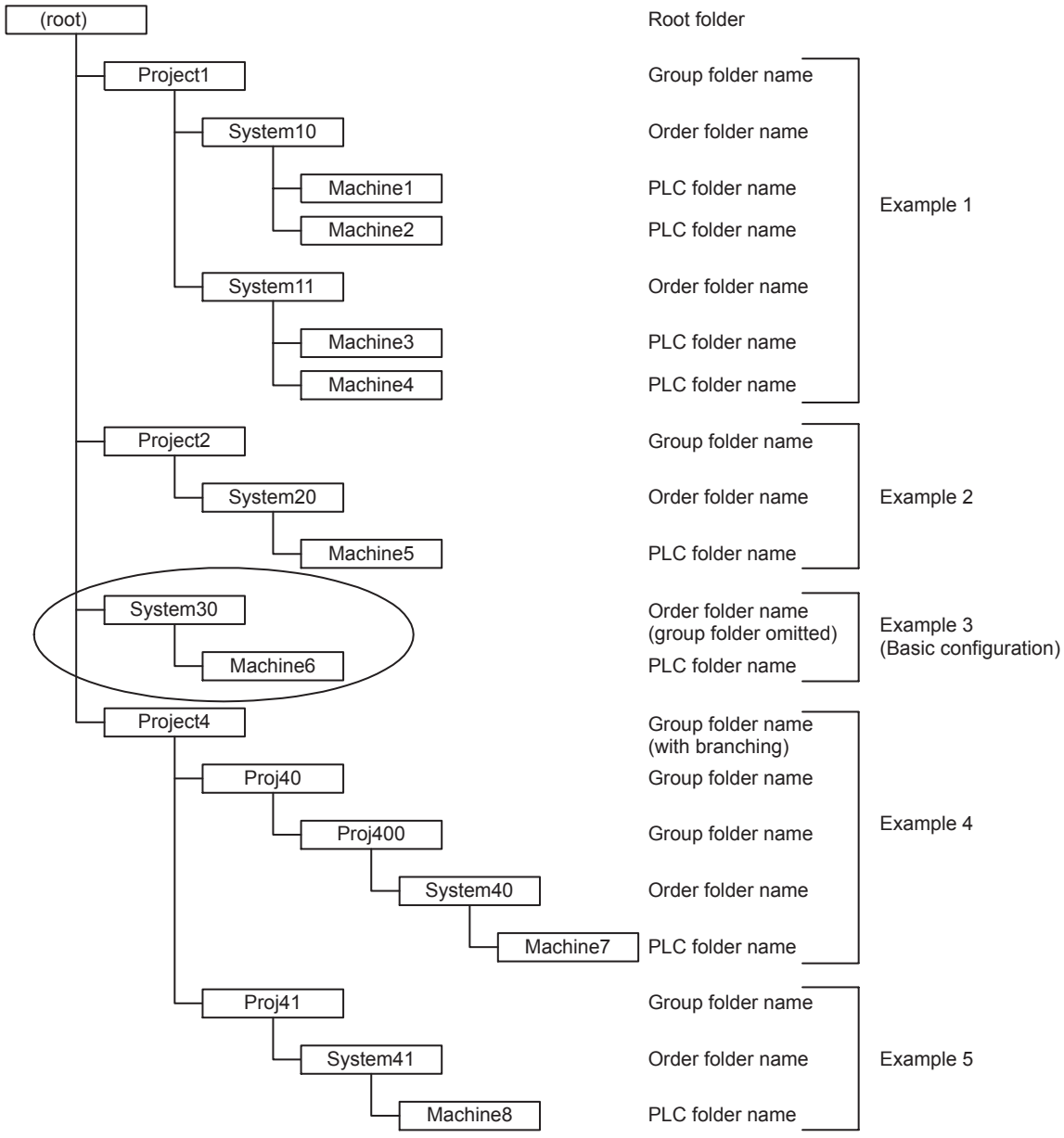
A PLC folder defines a Machine Controller. Multiple data folders are created automatically under the PLC folder.

PLC folders cannot be branched on their own, but at least one PLC folder must be created.

Specifically, connect online to the MP Series from the PLC folder. Multiple PLC folders can be defined, but only one Machine Controller can be connected online at a time, so do not try to connect online to multiple Machine Controllers.

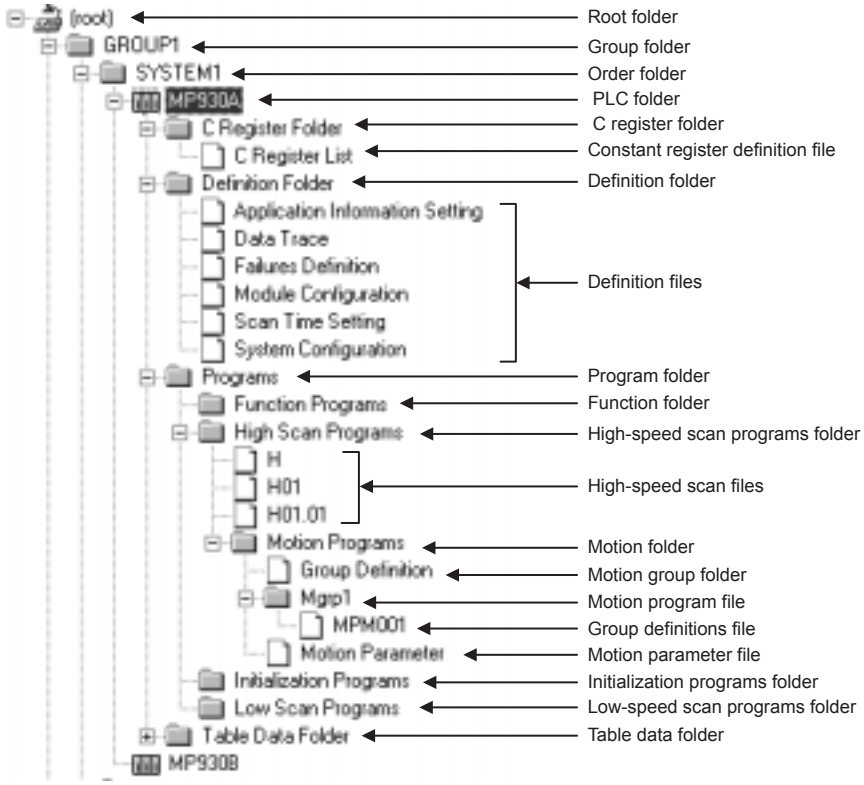
(e) Folder Configuration Example

An example of a folder configuration is shown below. Refer to the example that resembles the system to be created.



(2) Expanded PLC Folder Diagram

When creating a new PLC folder, the data folder groups under the PLC folder are generated automatically as shown below. The following figure shows the standard tree diagram when logged on to the MP Series.



2.2.3 Command Menus

Select commands from the pull-down menus or pop-up menus.

The contents of the menu depends on the type of folder or file selected with the cursor in both Directory Tree and List.

Refer to *Appendix B File Manager Menus* for File Manager menus.

(1) Selecting from the Pull-down Menu

Click the File Manager Menu bar to display the pull-down menu.

The following example shows the differences in the File Menu when the group folder and the PLC folder are selected with the cursor.

Group Folder

PLC Folder

(2) Selecting from the Pop-up Menus

Right-click a folder or file to display the pop-up menu.

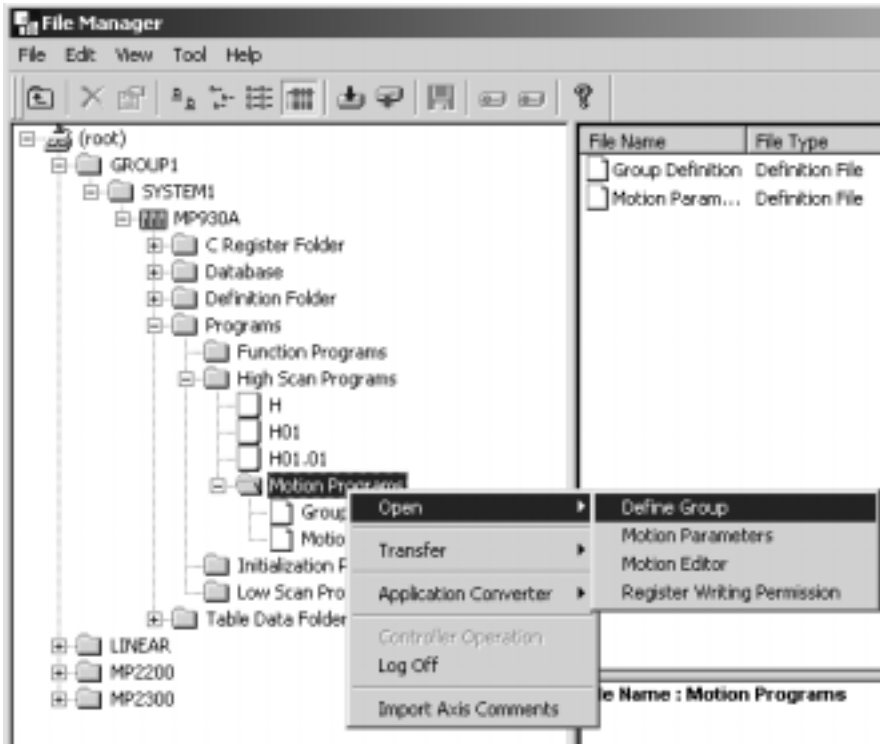


Fig 2.3 Pop-up Menus

2.2.4 Creating PLC Folders

This section explains the operating procedure to create new PLC folders, which are necessary to create the program.

(1) Group Folders

(a) Creating New Folders

Create new group folders using the following procedure.

1. Select the root folder with the cursor.
2. Select ***File*** – ***New*** – ***Group Folder*** from the File Manager Menu.
   Alternatively, right-click the root folder and make the selection from the pop-up menu.
3. Enter the group folder name in the input field dialog box that will be displayed, and then click the **OK** Button.
4. A new group folder will be created.

INFO

Group folder names must be 8 characters maximum. Path names for group folders must be 64 characters maximum.

Example: When Group 2 is created under Group 1, the path name will be 17 characters.

C:\GROUP1\GROUP2\

(b) Changing Folder Names

Change group folder names using the following procedure.

1. Select the group folder whose name you want to change with the cursor.
2. Select ***File*** – ***Rename*** from the File Manager Menu.
   Alternatively, right-click the group folder and make the selection from the pop-up menu.

3. Enter the new file name in the input field dialog box that will be displayed, and then click the **OK** Button. Group folder names must be 8 characters maximum.

4. A confirmation message will be displayed. Click the **Yes** Button. The file name will be changed.

INFO

Names cannot be changed while logged on to the CPU. Names can be changed for folders and files created by the user.

(c) Deleting Folders

Delete group folders using the following procedure.

1. Select the group folder to be deleted with the cursor.
2. Select ***File*** – ***Delete*** from the File Manager Menu.
   Alternatively, right-click the group folder and make the selection from the pop-up menu.
3. A confirmation dialog box will be displayed. Click the **Yes** Button to delete the group folder. The folder and its files will be deleted.

IMPORTANT

- Deleting files and folders while the system is operating may cause the currently operating device to malfunction. Be sure to check before deleting.
- The delete function deletes files and folders created by the user. Consequently, folders (including program folders and definition folders) created by the MPE720 cannot be deleted.

(2) Order Folders

(a) Creating New Folders

Create new order folders using the following procedure.

1. Select the group folder in which to create the root folder or order folder with the cursor.
2. Select ***File*** – ***New*** – ***Order Folder*** from the File Manager Menu.
   Alternatively, right-click the group folder and make the selection from the pop-up menu.
3. Enter the new order folder name in the input field dialog box that will be displayed, and then click the **OK** Button.
4. The new order folder will be created.

INFO

Order folder names must be 8 characters maximum.

(b) Changing and Deleting Folders

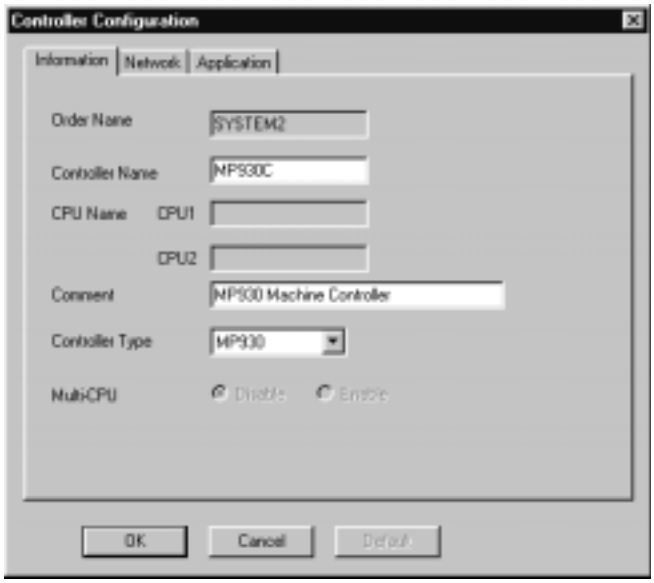
Refer to *(b)* and *(c)* in *(1) Group Folders*.

(3) PLC Folders

(a) Creating New Folders

Create new PLC folders using the following procedure.

1. Select the order folder in which to create the new PLC folder with the cursor.
2. Select ***File*** – ***New*** – ***Controller Folder*** from the File Manager Menu.
   Alternatively, right-click the order folder and make the selection using the pop-up menu.
3. Set the information for each Machine Controller in the Controller Configuration Window, and then click the **OK** Button. Change the Machine Controller information using the following three tabs in the Controller Configuration Window: Information Tab, Network Tab, and Application Tab.



The new PLC folder will be created.

- Information Tab Page Settings

Setting	Details
Order Name	Displays the order folder name. The order folder name cannot be changed.
Controller Name	Enter the Machine Controller name up to 8 characters maximum.
CPU Name	CPU names can be set only for the MP920.
Comment	Enter comments for the Machine Controller and CPU up to 32 characters maximum.
Controller Type	Select the MP Series.
Multi-CPU	Multi-CPU can be set only for the MP920.

- Network Tab Page Settings

Set the communication port for the Machine Controller to which the MPE720 will log on.

Setting	Details
Online	Set whether or not the MPE720 and the Machine Controller will be connected online.
Logical Port No.	Specify the logical port number set using the communication process.
Port Type	Displays the Communication Module type.
Unit No.	If the MPE720 is connected to a serial port, specify the serial port device address.

- Application Tab Page Settings

Setting	Details
Customer	Enter the client name up to 32 characters maximum.
Used at (User)	Enter the user name up to 32 characters maximum.
Equipment	Enter the facilities name up to 32 characters maximum.
Usage	Enter the application name up to 32 characters maximum.
Date	Enter the date of creation. The current date will be displayed as the default.
Revision history	When creating a new Machine Controller, a revision history cannot be entered. To enter the revision history information, refer to the following page.

(b) Changing Folder Information

Change PLC folder information using the following procedure.

1. Select the PLC folder to be changed with the cursor.
2. Select ***File*** – ***Properties*** from the File Manager Menu.
   Alternatively, right-click the PLC folder and make the selection from the pop-up menu.
3. The Controller Configuration Window will be displayed. Refer to *(a)* for the Information Tab Page, Network Tab Page, and Application Tab Page settings.

INFO When logged on to the Machine Controller or CPU, the Machine Controller information cannot be changed.

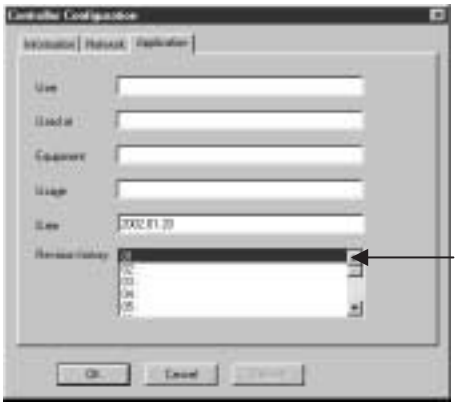
- Information Tab Page

Set the new PLC information, and then click the **OK** Button.

- Network Tab Page

Set the new network information, and then click the **OK** Button.

- Revision History on Application Tab Page



Double-click a number entered in the revision history to display the Controller Configuration Window. Next, enter the revision history information up to 50 characters maximum, and click the **OK** Button to set the revised data of the application tab page.

(c) Deleting Folders

Refer to *(b)* and *(c)* in *(1) Group Folders*.

IMPORTANT

- Deleting files and folders while the system is operating may cause the currently operating device to malfunction. Be sure to check before deleting.
- If the user's write privileges are set lower than the write privileges of the deleted programs, the program cannot be deleted.
- When a program is deleted, all the sub-programs pertaining to the main program (SFC program, table format program, etc.) will also be deleted at the same time.
- The delete function deletes files and folders created by the user. Consequently, folders (including program folders and definition folders) created by the MPE720 cannot be deleted.

2.2.5 User Management

This function manages the registration of users who can access the PLC folders. Users are managed by user ID and password, and a privilege level can be set individually for each user.

In online mode, the user management data stored in the Machine Controller used, and in offline mode, the user management data stored in the Programming Device hard disk is used.

(1) User Management Window

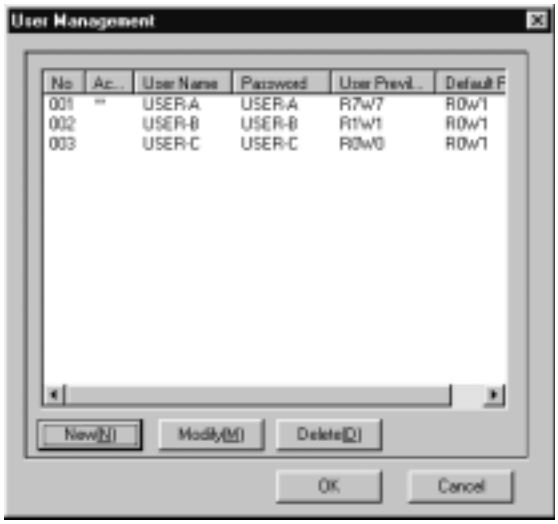
Register new user information, and change and delete existing information in the User Management Window.

1. Select the PLC folder with the cursor. Next, select ***Edit*** − ***User Manager*** from the File Manager Menu.

INFO

Log on the PLC folder before opening the User Management Window. The User Management Window cannot be opened if the user is not logged on to the PLC folder.

2. The User Management Window will be displayed.



Display	Details
Active	Two asterisks (**) are displayed for the current user. User-A is shown as logged on in the dialog box shown above.
User Name	Displays the current user and users with privileges lower than the current user.
Password	Displays the password corresponding to each user name.
User Privilege	User privileges enable reading and writing to existing programs. The higher the number, the higher the privilege. The user privilege and the privilege of the file for each program are compared, and if the user's read (R) privilege is the same or greater than the program's read (R) privilege, the user can read the program. Similarly, if the user's write (W) privilege is the same or greater than the program's write (W) privilege, the user can save or update the program.
Default Privilege	When a user creates a new program, the privilege for the new program is set. The default privilege is set automatically for the new program, so if you set the privileges most often used, there is normally no need to change the program privileges afterwards.

INFO

- The first user in *User Name* is the current user, followed by users with lower privileges. Information on users with higher privileges will not be displayed.
- Program file privileges can be set and browsed via the drawing program or motion program properties.

(2) Relationship between User and File Privileges

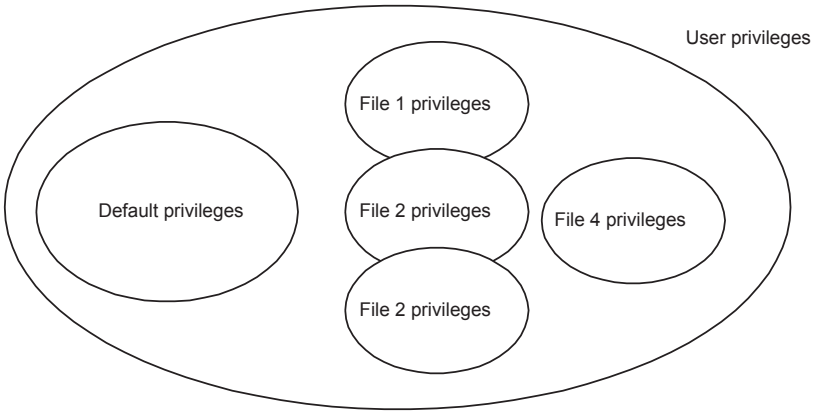
A user privilege level is given to each user, but the user can allocate any file privileges within their user privilege range to files they have created.

For example, if the user privileges granted to USER-M are R7W7, the default privileges can be set in between R0 to R7 and W0 to W7. The file privileges are set automatically by default privileges when the file is created, however, they can be reset within the user privilege range by manipulating the sequence or motion program properties.

Example:

User privilege: R7W7 Default privilege: R3W3 File 1 privilege: R0W1
File 2 privilege: R2W2
File 3 privilege: R4W2
File 4 privilege: R3W3
. . . . . .

In the above example, the file privileges for Files 1 to 3 created by USER-M are different from the default privileges. This indicates that the properties for each program file have been manipulated and the file privileges changed. The default privileges are used for File 4.



The read (R) and write (W) privilege values in the user privileges are the maximum values that the user can allocate as file privileges.

(3) Registering New Users

Up to 20 users can be registered.

Register new users in the User Management Window using the following procedure.

1. Click the **New** Button in the User Management Window. Input the new user information in the User Info-New Dialog Box that is displayed, and click the **OK** Button.

Setting	Details
User Name	Input a user name of up to 16 characters. Spaces, comma (,), and an existing user name cannot be used. USER-A, USER-B, and USER-C are already registered in the MPE720, and cannot be used.
Password	Input a password of up to 16 characters. Passwords can be the same as long as the user name is not.
User Privilege	Input the program file's read privilege in the *R* column, and the write privilege in the *W* column as numbers between 0 and 7. The higher the number, the higher the privilege.
Default User (Default Privileges)	Input the new program file's read privilege in the *R* column, and the write privilege in the *W* column as numbers between 0 and 7. The higher the number, the higher the privilege.

2. When the settings have been completed, click the **OK** Button. The new user that has been set will be registered.

INFO

■ Standard Registered Users

- The MPE720 has users that are registered beforehand for each Machine Controller. Standard user privileges and default privileges are also registered for each of these users.
- The following table shows the standard registered users.

User Name	Password	User Privileges	Default Privileges	Remarks
USER-A	USER-A	R7W7	R0W1	For system administrator
USER-B	USER-B	R1W1	R0W1	For maintenance administrator
USER-C	USER-C	R1W0	R0W1	For operators

(4) Changing User Information

The registered user information can be changed from the User Management Window.

Change the user information using the following procedure.

1. In the *No.* column, click the number of the user to be changed.
2. Click the **Modify** Button. User Info-New Window will be displayed. Set the new user information, and then click the **OK** Button. The information for the selected user will be changed.

(5) Deleting Users

The registered user information can be deleted from the User Management Window.

Delete users using the following procedure.

1. In the *No.* column, click the number of the user to be deleted.
2. Click the **Delete** Button. A confirmation message will be displayed. Click the **Yes** Button after confirming that the user is to be deleted. The user will be deleted.

INFO

The current user cannot be deleted. The current user is indicated by ** in the *Active* column.

(6) Saving User Management Data

Save user management data using the following procedure.

1. Click the **OK** Button in the User Management Window to save user management data.

   When in online mode, the data is saved to both the Machine Controller and the Programming Device's hard disk. When in offline mode, the data is saved only to the Programming Device hard disk.
2. The User Management Window closes once the data has been saved.

INFO

The Error Detected Message is displayed if the data was not saved successfully.

Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

(7) Setting the Default User

Normally, a user name and password must be input when logging on to a PLC folder. This step can be omitted by setting a default user. The default user will then be logged on automatically.

Set and delete the default user using the following procedure.

1. Select the PLC folder to set the default user with the cursor, and select ***Edit − Set Default User***.
2. Input the user name and password in the Default User Set Window, and then click the **OK** Button. The default user will be set.

(8) Deleting Default Users

The default user can be deleted by clearing the user name and password in the Default User Set Window and clicking the **OK** Button.

INFO

The default user is not saved on the Machine Controller or Programming Device hard disk, and, therefore, is deleted if the File Manager is closed or the system rebooted. The default user must be reset if the MPE720 is restarted.

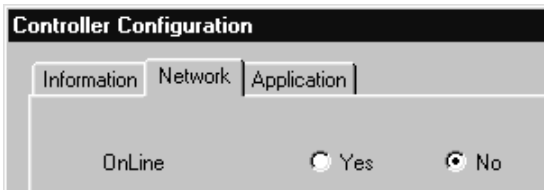
2.2.6 Switching between Online and Offline Modes

Once a PLC folder has been registered, logging on to the CPU is possible, but always be aware of whether logging on is being performed online or offline.

When online, the Programming Device hard disk and the Machine Controller data are both updated simultaneously, but when offline, only the Programming Device hard disk is updated. Consequently, caution is required.

Switch between online and offline modes using the following procedure.

1. Select the PLC folder which is to be switched to either online or offline mode.
2. Select ***File*** – ***Properties*** from the File Manager Menu. Alternatively, right-click the PLC folder and make the selections from the pop-up menu.
3. Select either *Yes* or *No* for *Online* on the Network Tab Page in the Controller Configuration Window, and then click the **OK** Button.



INFO

The user cannot switch between online and offline mode when logged on to the CPU. Set whether to use online or offline mode before logging on.

2.2.7 Logging On and Logging Off the CPU

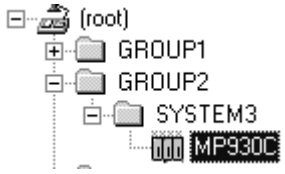
The user must log on to the PLC folder's CPU to operate or reference data in the PLC folder, such as Machine Controller programs and definition settings.

The data to be handled is important, so security management using user IDs and passwords is provided for logging on. The management of the privilege levels set for each user ID is also supported.

(1) Logging On to the CPU

Log on to the CPU using the following procedure.

1. Double-click the PLC folder to be logged on to.



TERMS

Online Mode

The Programming Device and the Machine Controller are connected and data is transferred back and forth between them via the MPE720. The MPE720 must be online to display or update Machine Controller data. When the data is updated, both the Programming Device hard disk and the Machine Controller data are updated.

Offline Mode

The Programming Device is operated independently. Machine Controller data cannot be referred or updated. Only data stored on the Programming Device hard disk can be accessed.

2. The CPU Log On Dialog Box is displayed. Input the user name and password, and click the **OK** Button.

3. A plus (+) mark will appear in front of the PLC folder. The logon process has now been completed.
   The programs and definition data in the PLC folder that has been logged on to can now be referenced or edited.

INFO

The user name and password do not need to be input when a default user has been set. The default user setting, however, will be deleted when the File Manager is closed.

(2) Logging Off from the CPU

Log off from the CPU using the following procedure.

1. Select the PLC folder to be logged off from the CPU.
2. Select ***File*** – ***Log Off*** from the File Manager Menu. Alternatively, right-click the PLC folder, and make the selections from the pop-up menu.
3. Click the **Yes** Button in the Logoff Confirmation Dialog Box.
4. The plus (+) mark in front of the selected folder name (the minus (–) mark if the folder is open) will disappear. The logoff process has now been completed.

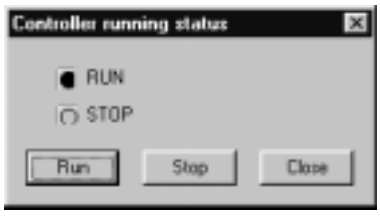
2.2.8 Switching the CPU Status

The CPU status refers to the operating status of the Machine Controller. *RUN* means the Machine Controller is operating, and *STOP* means it is not operating. The CPU status is valid in online mode.

Normally, the CPU can be in RUN mode, but must be in STOP mode in some cases, for example, when transferring files, or the command will not operate.

Switch the CPU status using the following procedure.

1. Select the PLC or CPU folder for which the CPU status is to be switched with the cursor.
2. Select ***Edit*** – ***Controller Operation*** from the File Manager Menu. Alternatively, right-click the PLC or CPU folder and make the selections from the pop-up menu.
3. Click either the **RUN** Button to start operation, or the **STOP** Button to stop operation, in the Controller Running Status Dialog Box



4. The CPU status will be switched.

INFO

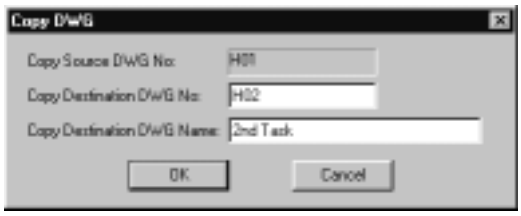
The current CPU status is indicated by a black dot. The CPU status cannot be switched in offline mode or if the user has not logged on to the CPU.

2.2.9 Program File Operations

(1) Copying Drawing (DWG) Program Files

Copy DWG program files using the following procedure.

1. Right-click the DWG program file to be copied.
2. Select ***Copy DWG*** from the pop-up menu.
3. Input the *Copy Destination DWG No.* and *Copy Destination DWG Name*, and click the **OK** Button.



4. The specified program will be saved as a new program under *Copy Destination DWG No*.

INFO

- All drawings contained in the program file will be copied.
- The program name must be 48 characters maximum.
- If a main program is copied, all associated subroutines, such as table format programs, will be copied at the same time.
- Programs cannot be copied to existing DWG/function programs.

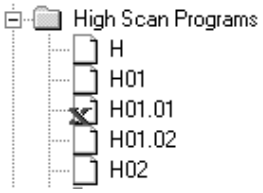
(2) Enabling and Disabling DWG Programs

The DWG program can be set to enable or disable in online mode.

Enable and disable DWG programs using the following procedure.

1. Select the DWG program to be disabled with the cursor.
2. Select ***Edit*** – ***Enable/Disable*** from the File Manager Menu. Alternatively, right-click the DWG program and make the selections from the pop-up menu.
3. Select ***Enable*** or ***Disable***. A confirmation window will be displayed. Click the **Yes** Button in the confirmation window.

   An *X* will appear on the icon for the disabled program file. This means this file will not be executed.



INFO

- If the selected program is already disabled, the disable setting will be cancelled. If the selected program is not disabled, it will be disabled.
- Only DWG or function programs can be enabled or disabled.

(3) Switching Display between Subroutines

This function can be used in all interrupt program, function program, high-speed scan program, startup program, and low-speed scan program folders that have been selected. File types displayed in the List Section of the File Manager Window can be designated.

Select the type of subroutine to be displayed after selecting ***View*** – ***List Display*** from the File Manager Menu. Alternatively, right-click the subroutine and make the selection from the pop-up menu.

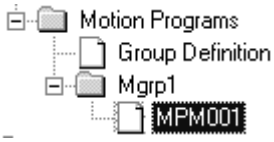
(4) Updating Information

When executing motion programs and DWG/function program files, display the latest information by selecting ***View*** – ***Refresh*** from the File Manager Menu.

(5) Copying Motion Programs

Copy motion programs using the following procedure.

1. Select the motion program file to be copied with the cursor.



2. Select ***File*** – ***Copy to*** from the File Manager Menu. Alternatively, right-click the motion program file to be copied and make the selection from the pop-up menu.
3. Input the name of the copy destination motion program and click the **OK** Button.

4. A program will be correctly created at the copy destination.

INFO

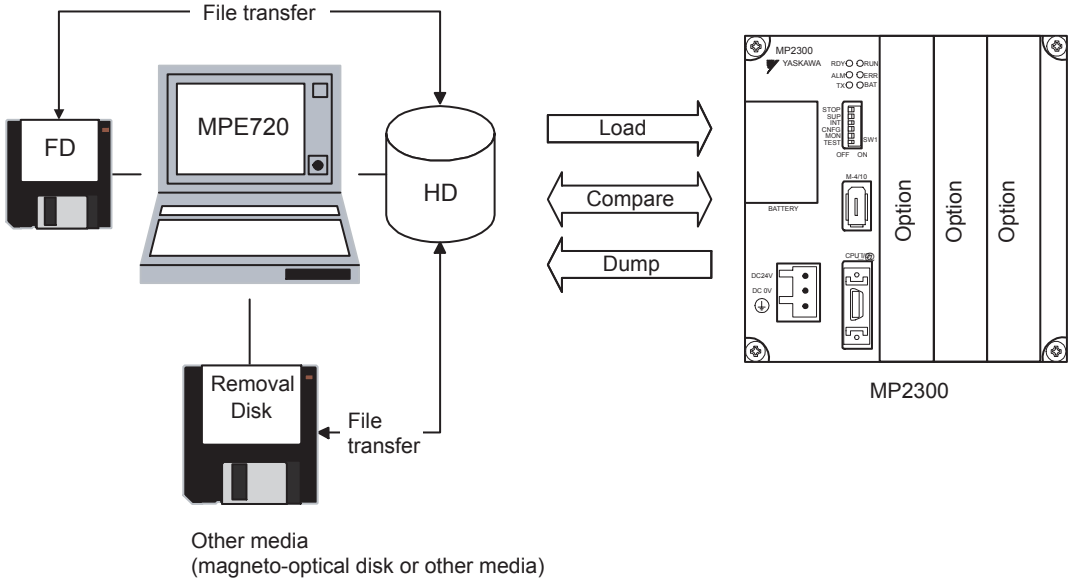
Existing motion programs cannot be copied to or overwritten.

2.2.10 Transferring Files

This function reads and writes data between the Programming Device and the Machine Controllers using the MPE720.

(1) Outline of File Transfers

All data in the PLC folder can be transferred at one time, or individual files can be designated for transfer. Generally, the Transfer To Controller is used to register or update data or programs that have been defined or developed using the MPE720 on the Machine Controller. The Transfer From Controller is used when Machine Controller data is to be saved in the MPE720. The Compare Function is used to compare data stored on both the MPE720 and the Machine Controller to see if it is the same. In addition, there are functions to register, update, and store data on Proramming Device hard disk, floppy disks, or other media. The Transfer To Controller, Transfer From Controller, and Compare functions can be used only when the user is logged on in online mode. The transfer source and destination will be either the Programming Device hard disk or the Machine Controller.



The following table outlines the transfer functions.

Transfer Type	Transfer Function	Function
All Files	From MPE720 to Controller (L)	Transfers all programs or definition data.
	From Controller to MPE720 (D)	
	Compare Controller and MPE720 (C)	
	From MPE720 to Another Drive (T)	
	From Another Drive to MPE720 (R)	
	Compare Another Drive to MPE720 (O)	
Selected Files	From MPE720 two Controller (L)	Transfers individual designated programs or definition data.
	From Controller to MPE720 (D)	
	Compare Controller and MPE720 (C)	
	From MPE720 to Another Drive (T)	
	From Another Drive to MPE720 (R)	
	Compare Another Drive to MPE720 (O)	
Continuous File Transfer	From MPE720 two Controller (L)	Transfers multiple Machine Controller programs or definition data.
	From Controller to MPE720 (D)	
	From MPE720 to Another Drive (T)	
	From Another Drive to MPE720 (R)	
Other	Save to Flah (S)	Transfers programs or definition data between flash memory and the Machine Controller.
	Compare Flash (C)	

Table 2.1 shows list of transfer files for each file transfer function.

Table 2.1 Transfer File List

Transfer File	All Files			Selected Files		
	Transfer To Controller	Transfer From Controller	Transfer	Transfer To Controller	Transfer From Controller	Transfer
DWG (program)	Yes		Yes	(Yes)		(Yes)
FUNC (program)	Yes		Yes	(Yes)		(Yes)
Table Data	Yes		Yes	(Yes)		(Yes)
Constant Table (C REG)	Yes		Yes	(Yes)		(Yes)
FBD Menu	Yes		Yes	(Yes)		No
System Definition	Yes		Yes	(Yes)		(Yes)
Application Information	Yes		Yes	(Yes)		(Yes)
Module Configuration	Yes		Yes	(Yes)		(Yes)
Type Definition	No	Yes	Yes	No	(Yes)	(Yes)
Scan Time	Yes		Yes	(Yes)		(Yes)
Data Trace	Yes		Yes	(Yes)		(Yes)
Failures Definition	Yes		Yes	(Yes)		(Yes)
Definition Group	Yes		Yes	(Yes)		(Yes)
Motion Parameters	Yes		Yes	(Yes)		(Yes)
Motion Main Program	Yes		Yes	(Yes)		(Yes)
Motion Sub Program	Yes		Yes	(Yes)		(Yes)
M Register	Yes		Yes	(Yes)		(Yes)
S Register	No	Yes	Yes	No	(Yes)	(Yes)
I Register	No	Yes	Yes	No	(Yes)	(Yes)
O Register	No	Yes	Yes	No	(Yes)	(Yes)
D Register	Yes		Yes	(Yes)		(Yes)
DWG (comments)	No		(Yes)	No		(Yes)
FUNC (comments)	No		(Yes)	No		(Yes)

Note: Yes: Automatically transferred. Can be set not to be transferred.
(Yes): Can be transferred by selecting a file.
No: Cannot be transferred.

(2) Opening the Transfer Window

Open the Transfer Window using the following procedure.

1. Select the PLC folder with the cursor.
2. Select ***File*** – ***Transfer*** from the File Manager Menu, and then click the required file transfer function.
   Alternatively, right-click the PLC folder, point to ***Transfer*** from the pop-up menu, and select from the range of transfer functions ***All Files, Selected Files, Continuous File Transfer***, and ***Other***.
   The window for the selected Transfer will be displayed.

INFO

- For *file transfer to and from controller,* and *Flash save*, you can open the Transfer Window by clicking on the following icons in the Tool Bar.

	File transfer to controller
	File transfer from controller
	Flash save

- Transfer cannot be executed if the user is not logged onto the Machine Controller.
- *Continuous File Transfer* and *Other* transfer functions are not available for the MP930.
- For functions that use floppy disks or magneto-optical disks, the floppy disk or magneto-optical disks must be inserted into the disk drive. Transfer to or from the Machine Controller cannot be executed when the user is in offline mode.

(3) Transferring All Files

All files, such as programs or definition data, are transferred.

If this function is to be used to transfer all files to the Machine Controller, Machine Controller operation status, i.e. CPU status must be set to *STOP* mode first. Refer to *2.2.8 Switching the CPU Status*.

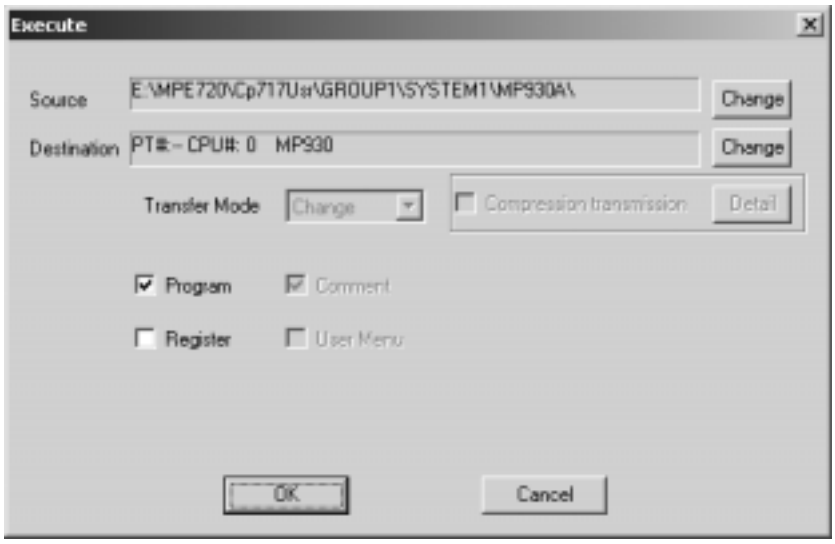
IMPORTANT

When transferring all files to the Machine Controller, set the Machine Controller in STOP mode to stop program operation before executing the transfer.

(a) Opening the Execute Window for the All Files

Open the Execute Window to start the All Files.

1. Select the required file transfer function from the sub menu displayed after selecting ***File – Transfer – All Files*** from the File Manager Menu. For example, select ***All Program File Transfer To Controller***. The following Execute Window will be displayed. Make the required settings.



Setting	Details
Source	The transfer source path name will be displayed if the source is a Programming Device hard disk, floppy disk, or magneto-optical disk. If the transfer source is a Machine Controller, the communication address and Machine Controller type of the source Machine Controller will be displayed.
Destination	If the transfer destination is a Programming Device hard disk, floppy disk, or magneto-optical disk, the destination path name will be displayed. If the transfer destination is a Machine Controller, the communication address and Machine Controller type of the destination Machine Controller will be displayed.
Transfer Mode	Select the write mode for the destination. ***Change***:If a folder with the same name exists at the destination, it will be overwritten. ***New***:If a folder with the same name exists at the destination, the folder and its contents will be deleted, a new folder created, and then the file transferred. The transfer mode will be ***Change*** if the destination is a Machine Controller. The mode cannot be changed to ***New***.
Type of File to be Transferred (Program to User Menu)	Select the type of file to be transferred. Program and register files are already specified for transferring. These specifications can be cancelled. Refer to *Table 2.1* to see specifically which file is transferred. Normally, the default settings should be used.

2. Click the **OK** Button once the settings have been checked. The transfer will start. A confirmation message will be displayed when transfer has been completed. Click the **OK** Button.

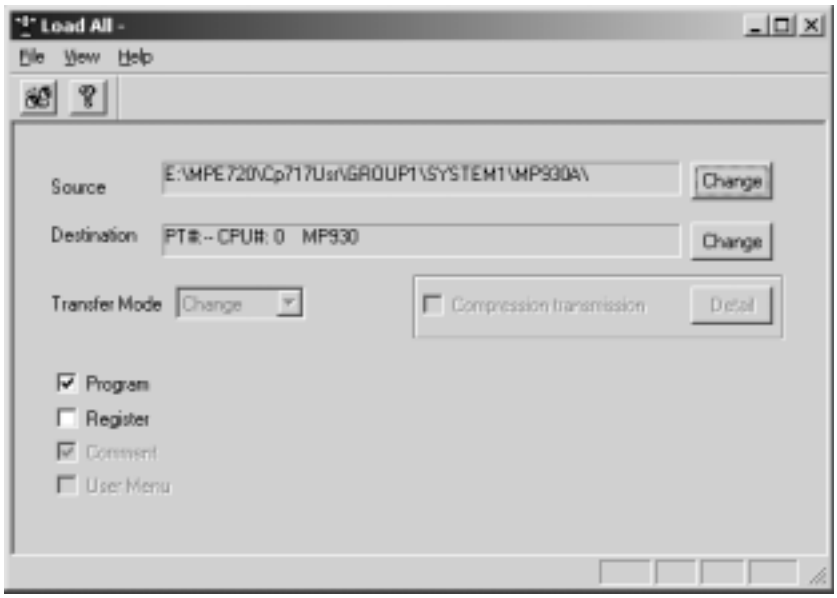
   The All Files Window will be displayed. The All Files Window will appear if the operation is cancelled or an error is generated before the transfer has been completed.

(b) All Files Windows

The process of transferring all files can be continued or stopped on the All Files Window. To stop Transfer, select ***File*** – ***Exit*** and return to the File Manager Window.

To continue Transfer, perform the procedures explained below.

The title of the All Files Window will change depending on whether the function to be performed is Transfer To Controller, Transfer From Controller. The procedure, however, is the same.



(c) All Files Menus

The following table shows the menu commands and functions displayed for transferring all files.

Menu Command		Function
File		
	Execute	Starts transfer of all files.
	Clear	Cancels the settings for the transfer files.
	Exit	Closes the All Files Window.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Error List	Reopens the Error List Window.
	PLC Running Status	Changes the status of the Machine Controller.
	Change Source	Changes the transfer source.
	Change Destination	Changes the transfer destination.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(d) Changing Transfer Source and Destination

Check and set the transfer source and destination. Skip this step if no changes are required.

Change transfer source and transfer destination using the following procedure.

1. Changing the CPU

   If the transfer source or destination is a Machine Controller, the communication settings or CPU used in the transfer can be changed.

   a) Select ***View – Change Source*** or ***Change Destination*** from the Transfer Menu. The transfer source and transfer destination can also be changed by clicking the **Change** Button in the Transfer Window.

   b) Input the communication information in the Select CPU Dialog Box, and click the **OK** Button.

2. Changing Floppy Disk Transfer Directories

   If the transfer source or destination is a floppy disk, the floppy disk drive number and the PLC folder name can be changed.

   a) Select ***View – Change Source*** or ***Change Destination*** from the Transfer Menu. The transfer directory can also be changed by clicking the **Change** Button in the Transfer Window.

   b) The Transfer Path Change Window will be displayed. Set the floppy disk drive letter and PLC name, and click the **OK** Button. Enter the directory name on the floppy disk as the PLC name up to 8 characters maximum.

3. Changing Hard Disk Transfer Directories

   If the transfer source or destination is a hard disk, the PLC information on the hard disk can be changed.

   a) Select ***View – Change Source*** or ***Change Destination*** from the Transfer Menu. Or click the **Change** Button in the Transfer Window.

   b) The Select CPU Window will be displayed. Select the appropriate Machine Controller name, and click the **OK** Button.

4. Changing Transfer Drives for Other Media

   If the transfer source or destination is a magneto-optical disk or other medium, the drive number and path name can be changed.

   a) Select ***View – Change Source*** or ***Change Destination*** from the Transfer Menu. Or click the **Change** Button in the All Files Window.

   b) The Transfer Path Window will be displayed. Set a new drive number and transfer path name, and click the **OK** Button.

(e) Starting Transfer

Start transfer using the following procedure.

1. Select ***File*** – ***Execute*** from the Transfer Menu.
2. A File Transfer confirmation message will be displayed. Click the **Yes** Button to continue.
3. Once the transfer has been completed, a transfer completed confirmation message will be displayed. Click the **OK** Button.

The screen display will return to the Transfer Window when the Transfer has been completed.

(f) Stopping Transfers

The Execute Status Window will be displayed while files are being transferred. Click the **Cancel** Button to stop the transfer.

(g) Transfer Errors

The Error List Window will be displayed if an error is generated during transfer. Click the **Cancel** Button to close this window, and select ***View*** – ***Error List*** from the Transfer Menus to display this window again.

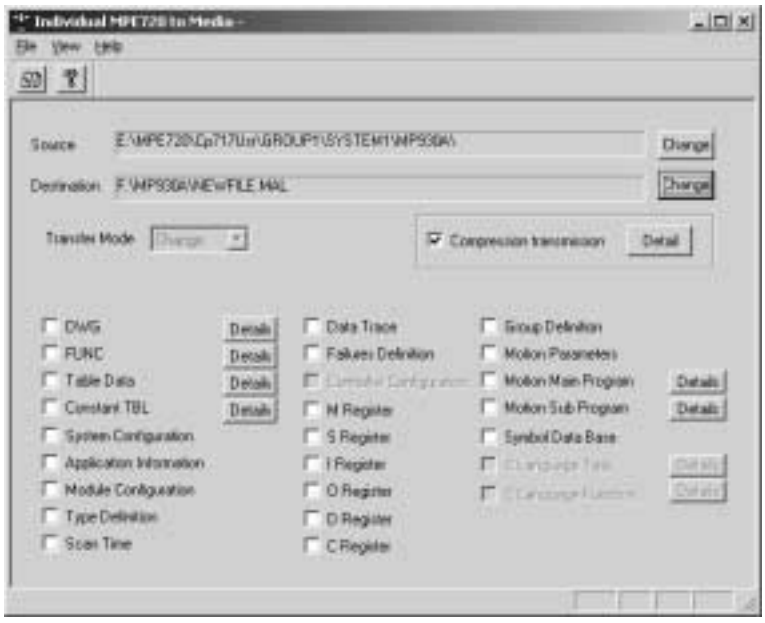
Data listed in the *Data Name* in the Error List Window must be transferred again. Check the error and retransfer the data.

(4) Transferring Individual File

This function differs from All Files in that individual files are selected for transfer.

(a) Selected Files Window

Select ***File*** − ***Transfer*** − ***Selected Files*** from the File Manager Menu, and then select the required Transfer function. The window for the selected Transfer will be displayed.



Setting	Details
Source	If the transfer source is a hard disk, floppy disk, or magneto-optical disk, the source directory name will be displayed. If the transfer source is a Machine Controller, the communication address and Machine Controller type of the source Machine Controller will be displayed.
Destination	If the transfer destination is a Programming Device hard disk, floppy disk, or magneto-optical disk, the destination directory name will be displayed. If the transfer destination is a Machine Controller, the communication address and Machine Controller type of the destination Machine Controller will be displayed.
Transfer Mode	Select the write mode for the destination. ***Change***:If a folder with the same name exists at the destination, it will be overwritten. ***New***:If a folder with the same name exists at the destination, the folder and its contents will be deleted, a new folder created, and then the file transferred. The transfer mode will be ***Change*** if the transfer is for a Machine Controller. The mode cannot be changed to ***New***.
Type of File to be Transferred (DWG to Motion Sub Program)	Select the type of file to be transferred. Select ***File*** − ***Clear*** in the Selected Files Window to clear transfer file type settings.

(b) Selected Files Menus

The following table shows the menu commands and functions displayed for transferring individual files.

Menu Command		Function
File		
	Execute	Starts transfer of individual files.
	Clear	Cancels the settings for the transfer files.
	Exit	Closes the Selected Files Window.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Error List	Reopens the Error List Window.
	Change Source	Changes the transfer source.
	Change Destination	Changes the transfer destination.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(c) Changing Transfer Source and Destination

The Machine Controller or floppy disk used in the transfer can be changed. Refer to *(d)* in *(3) Transferring All Files*.

(d) Detailed Data Settings

If a **Details** Button is displayed to the right of a file type, detailed data settings must be made for that type of file.

Click the **Details** Button to display the Set Drawing Details Window for that type of file. Make the data settings and click the **OK** Button to save the settings.

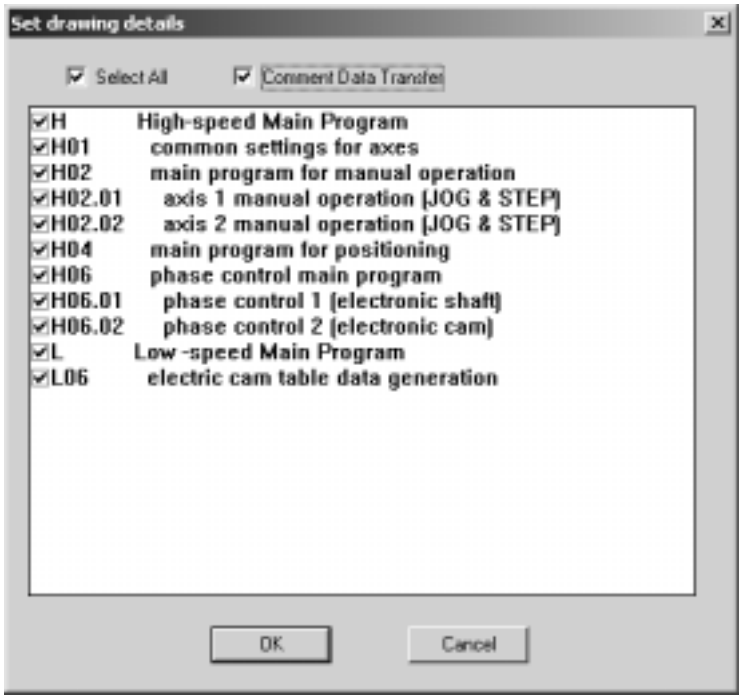
Make detailed data settings in each Set Drawing Details Window using the following procedure.

1. DWG

   Select the DWG program to be transferred.

   Select the ***Select All*** Check Box to select all DWG programs for transfer.

   Clear the ***Select All*** Check Box to cancel the selection of all DWG programs for transfer.



2. FUNC

   Select the function programs to be transferred.

   Select the ***Select All*** Check Box to select all function programs for transfer.

   Clear the ***Select All*** Check Box to cancel the selection of all function programs for transfer.

3. Table Data

   Select the table data to be transferred.

   Select the ***Select All*** Check Box to select all table data for transfer.

   Clear the ***Select All*** Check Box to cancel the selection of all table data for transfer.

   If *Table Data Transfer* is selected, column attribute definitions and table data will be transferred. If not selected, only column attribute definitions are transferred.

4. Constant Tables (C registers)

   Select the C register tables to be transferred.

   Select the ***Select All*** Check Box to select all C register tables for transfer.

   Clear the ***Select All*** Check Box to cancel the selection of all C register tables for transfer.

5. Motion Main Program

   Select the motion main programs to be transferred.

   Select the ***Select All*** Check Box to select all motion main programs for transfer.

   Clear the ***Select All*** Check Box to cancel the selection of all motion main programs for transfer.

6. Motion Sub Program

   Select the motion subroutines to be transferred.

   Select the ***Select All*** Check Box to select all motion subroutines for transfer.

   Clear the ***Select All*** Check Box to cancel the selection of all motion sub programs for transfer.

(e) Starting Transfer

Start individual file transfers using the following procedure.

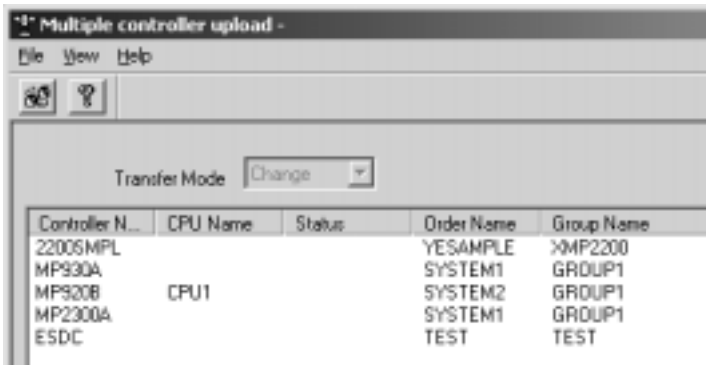
1. Select ***File*** – ***Execute*** from the Selected Files Menu.
2. A File Transfer confirmation message will be displayed. Click the **Yes** Button to continue.
3. When transfer has been completed, a transfer completed confirmation message will be displayed. Click the **OK** Button to finish.

(5) Transferring Files Continuously

Multiple Machine Controller programs or definition data files can be transferred.

(a) Continuous Transfer Window

Select ***File*** – ***Transfer*** – ***Continuous File Transfer*** from the File Manager Menu, and then click the required Transfer function. The window for the selected Transfer will be displayed.



Setting	Details
Transfer Mode	Select the write mode for the destination. ***Change***: If a folder with the same name exists at the destination, it will be overwritten. ***New***: If a folder with the same name exists at the destination, that folder and its contents will be deleted, a new folder created, and then the file transferred. The transfer mode will be ***Change*** if the transfer is for a Machine Controller. The mode cannot be changed to ***New***.
Type of File to be Transferred	Select the type of file to be transferred. All of the files on the selected Machine Controller will be selected for transfer.

(b) Continuous File Transfer Menus

The following table shows the menu commands and functions displayed for transferring continuous file.

Menu Command		Function
File		
	Execute	Starts continuous file transfer.
	Exit	Closes the Continuous File Transfer Window.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Error List	Reopens the Error List Window.
	Change Transfer Drive	Changes the transfer destination drive.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(c) Changing Transfer Drives

Change the transfer drive when the files to be transferred are in the Other Media category.

Change the transfer drive using the following procedure.

1. Select ***View*** – ***Change Transfer Drive*** from the Continuous File Transfer Menu.
2. The Select Drive Dialog Box will be displayed. Select the drive letter and click the **OK** Button.

(d) Starting a Transfer

Start continuous file transfers using the following procedure.

1. Select ***File*** – ***Execute*** from the Continuous File Transfer Menu.
2. A Transfer start confirmation message will be displayed. Click the **Yes** Button to continue.
3. When transfer has been completed, a transfer completed confirmation message will be displayed. Click the **OK** Button to finish.

(6) Saving in and Comparing with Flash Memory

(a) Save/Compare Flash Memory Content Window

Select ***Save Flash Memory*** or ***Compare Flash Memory*** from the sub menu displayed after selecting ***File*** – ***Transfer*** – ***Other*** from the File Manager Menu. The Save/Compare Flash Memory Content Window will be displayed.

The window used to transfer files between the Machine Controller RAM and the flash memory is shown below.

Setting	Details
CPU	The communication information for the transfer CPU and the type of Machine Controller is displayed.
Status	When transfer is being executed, the status will be *Running*. When transfer has been completed, the status will be *Completed Normally*.

INFO The Transfer between the Machine Controller RAM and flash memory is not available in offline mode.

(b) Save/Compare Flash Memory Content Menus

The following table shows the menu commands and functions displayed for saving and comparing with flash memory.

Menu Command		Function
File		
	Execute	Starts saving to flash memory or comparing to flash memory.
	Exit	Closes the Save/Compare File Memory Content Window.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Change Controller	Changes the transfer CPU.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(c) Changing the Transfer CPU

The communication information and the transfer CPU can be changed. For details, refer to *(c)* in *(3) Transferring All Files*.

Select ***File*** – ***Change Controller*** from the Save/Compare Flash Memory Content Menu.

(d) Starting a Transfer

Start Transfer between the Machine Controller and the flash memory using the following procedure.

1. Select ***File*** – ***Execute*** from the Save/Compare Flash Memory Content Menu.
2. A Transfer start confirmation message will be displayed. Click the **Yes** Button.
3. When transfer has been completed, a transfer completed confirmation message will be displayed. Click the **OK** Button.

INFO

To compare RAM with flash memory, stop Machine Controller operation and start the comparison immediately after saving the flash memory. Comparison errors may be generated for the D register if the comparison is executed while the Machine Controller is operating.

(7) Closing the Transfer Window

Close the Transfer Window using the following procedure.

Select ***Exit*** – ***Transfer Completed*** from the Transfer Menu.

The Transfer Window will be closed.

INFO

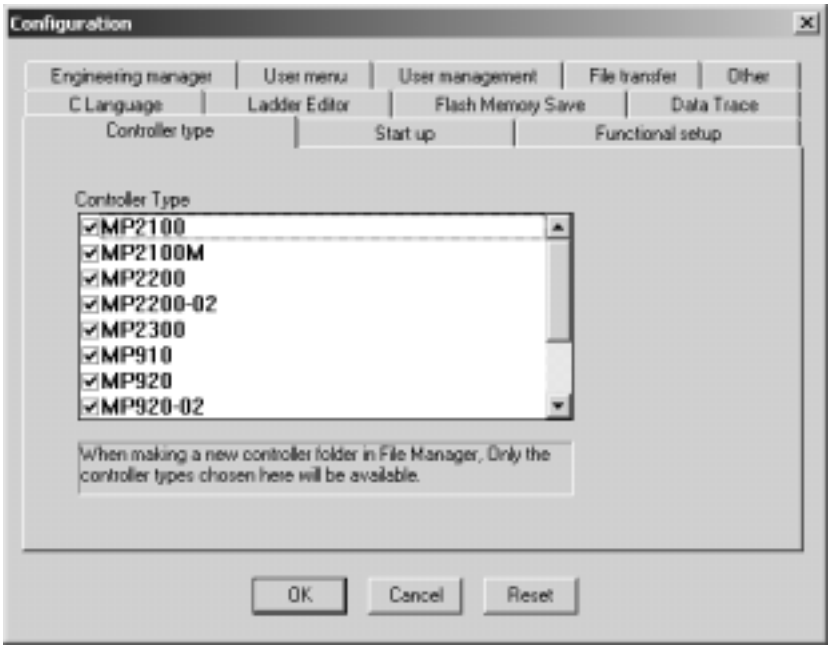
.Log on again to the CPU when files that may change the User Management file are transferred.

2.2.11 Configuration

The Configuration Window is used to set the MPE720 system environment.

(1) Opening the Configuration Window

Select ***View*** – ***Configuration*** from the File Manager Menu. The following Configuration Window will be displayed.



(2) Configuration of the Configuration Window

The Configuration Window consists of tab pages and operation buttons for each function.

Tab Page	Details
Start up	Sets the operating environment.
Controller type	Displays the types of Machine Controller compatible with the MPE720.
Functional setup	Sets write protect, etc.
Engineering manager	Sets the conditions for the Engineering Manager.
User menu	Not currently supported.
User management	Registers default user names and passwords for logging on.
Transfer	Sets the default drive letter for other transfer destinations except a Programming Device hard disk, floppy disk, or magneto-optical disk.
Ladder Editor	Switches the ladder editor.
Flash Memory Save	Sets the method to save the data in the FLASH memory.
C Language	Used for C language.
Data Trace	Sets whether to enable or disable the Trace Manager.
Other	Sets the communication process timeout value.

Operation Button	Details
OK	Updates system environment information. Enabled from the next time the system is started.
Cancel	Disables the operation.
Reset	Resets all set values to their initial values.

(a) Controller Type Tab Page

The type of Machine Controller that can be currently operated is selected.

(b) Functional Setup Tab Page

Setting	Details	Default
Monitor Mode (Write protected)	When turned *On*, the user cannot write files to the Machine Controller.	Off
Server appointment	Not currently supported.	–
Client appointment	Not currently supported.	–
Ladder conversion function	Not currently supported.	–
Function Key	Set whether to enable or disable the function keys.	On
Total number of function Keys	Select the number of function keys on the keyboard (10 or 12).	12

(c) Engineering Manager Tab Page

Setting	Details	Default
Default	Not currently supported.	–
Retain settings after closing	Not currently supported.	–
Monitor ON/OFF	Set whether to enable or disable the Get Current Value ON/OFF function while the ladder program is open.	Enable
Monitor start when open window	Set whether or not to get current value when ladder program is open.	Yes
The number of ladder program windows	Set the number of ladder programs that can be opened simultaneously (2 to 16).	5

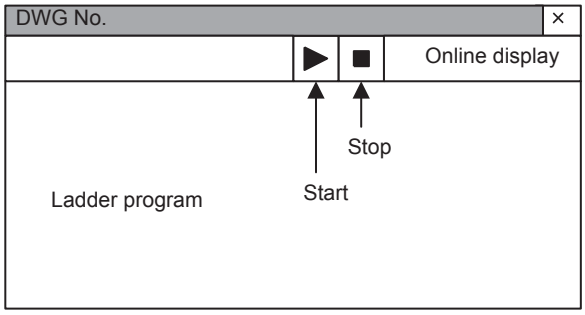
■ Get Current Value

This function reads and displays the current value in the register when online. Although a real-time system is required, a load is applied to the system when multiple ladder programs are open. For example, when multiple ladder programs are open, attempting to open a queued ladder may require more time than expected.

This phenomenon can be avoided by using the Display Current Value ON/OFF function.

When the Get Current Value ON/OFF function is enabled and a ladder program is opened in online mode, the Get Current Value Start/Stop Button is displayed in the top right of the Ladder Program Editing Window.

Use these buttons to turn ON and OFF get current value processing.



When the ladder program is open, the ON/OFF function can be specified using *Monitor ON/OFF*.

■ Number of Open Ladder Program Editing Windows

A maximum of 16 ladder programs can be open simultaneously, but time may be required to open them, depending on the personal computer's memory resources.

(d) User Management Tab Page

Register the default user name and password.

When logging on to the Machine Controller from the MPE720, the user name and password registered using this tab page will be used unless a default user has been specified.

This value is normally enabled, so once registered, there is no need to enter a user name and password when logging on.

(e) Transfer Tab Page

Setting	Details	Default
Alternative Default Drive for All Transfers	Set the drive letter for other transfer destinations except a Programming Device hard disk, floppy disk, or magneto-optical disk.	E
M Register Clearing Setup During All Transfer To Controller	Set whether or not to clear the contents of the M registers to zero when Transfering all files to Controller.	On
Overwrite Message	Set whether to enable or disable the *Overwrite* message when transferring files.	Disable

(f) Name Tab Page

Setting	Details	Default
Mode (Operation Mode)	Set whether to write registers using names in the ladder program or to write them normally.	Normal
Color	Set each register color displayed in the ladder program.	S Register: Red I Register: Green O Register: Blue M Register: Cyan C Register: Magenta Local Register: Yellow Undefined Name: Purple

(g) Ladder Editor Tab Page

Setting	Details	Default
Uses the new ladder editor (Uses the Ladder Works)	Select this when using the Ladder Works for the MPE720.	Selected.

INFO

When *Uses the new ladder editor* (Uses the Ladder Works) is selected, the applications created using the ladder editor cannot be used.

(h) Other Tab Page

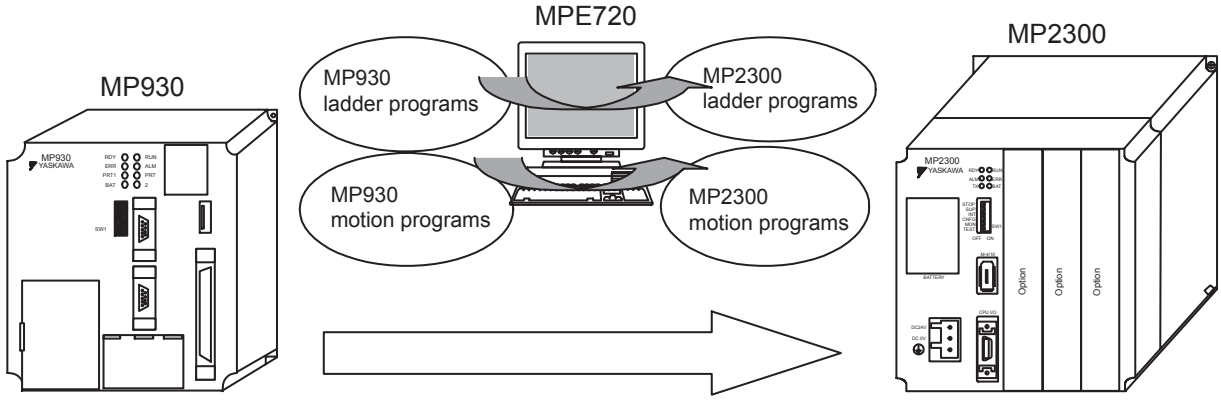
Setting	Details	Default
Hard Disk Usage	Check the hard disk remained capacity.	20
Communication Timeout	Set the communication process timeout value in milliseconds.	20000
Logon Timeout	Set the logon communication timeout value in milliseconds.	10000
Path for Online Monitor Animation File	The animation file, which shows that the system is connected online, is displayed. The animation file name is displayed here.	C:\YeTools\MPE720\Cp717Sys\Dll\EwsOnl.avi

2.2.12 Application Converter

This section describes the Application Converter.

The Application Converter is a software tool that converts/substitutes application data created for the MP900-series Machine Controller so that it can be used with the MP2000-series Machine Controller. The Application Converter is equipped with the following functions.

Conversion Wizard	The Conversion Wizard takes all of the MP900-series application data and converts it for use in an MP2000-series environment. The following data can be converted. • Ladder programs • Ladder programs by Ladder Works • Motion programs • Motion parameters • Register
Multi-register Replace	Use this function when you want to globally change the allocation of registers, such as program I/O registers, in an MP-series environment. Set the registers that you want to change and convert them globally. This function can be used as a general-purpose register converter, so it is compatible with all Machine Controller types supported by the MPE720.

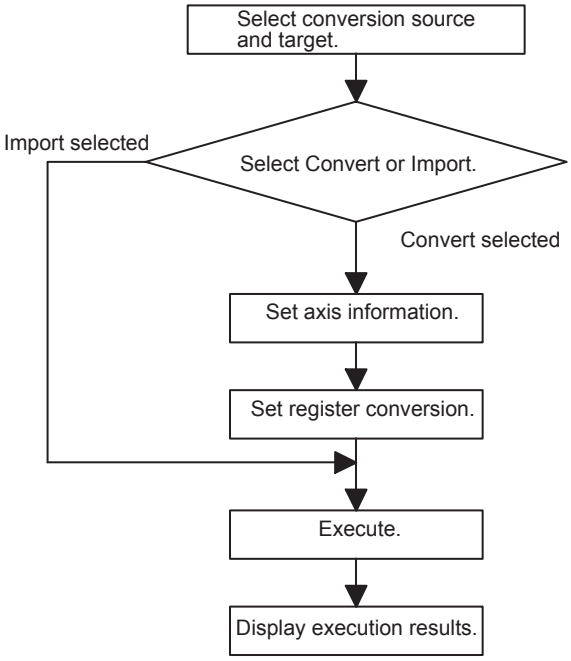


(1) Conversion Wizard

The Conversion Wizard takes all of the MP900-series application data and converts it for use in an MP2000-series environment. The conversion conditions are set with interactive dialogue boxes and then the application data is converted. The convert function and import function can be used in the Conversion Wizard. The following table explains the convert and import functions.

Convert Function	Imports the MP900-series application data and automatically converts the motion parameters to match the new MP2000-series axis information. Since the MP900-series axis information is not entirely compatible with the MP2000-series Machine Controller, a 100% data conversion is not possible. The motion parameters that cannot be converted automatically must be changed manually.
Import Function	Imports the MP900-series application data into the MP2000-series. When this function is used in the MP2000-series Machine Controller, the axis information parameters must be converted manually.

The following flowchart shows an outline of the Conversion Wizard procedure.



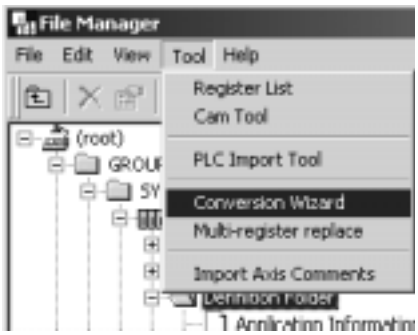
A list of types that can be converted will be displayed by the Conversion Wizard.

Conversion Source	Conversion Target
MP920 MP920-02 MP930 MP930-02 MP930-03 MP931	MP2300
MP910	MP2100

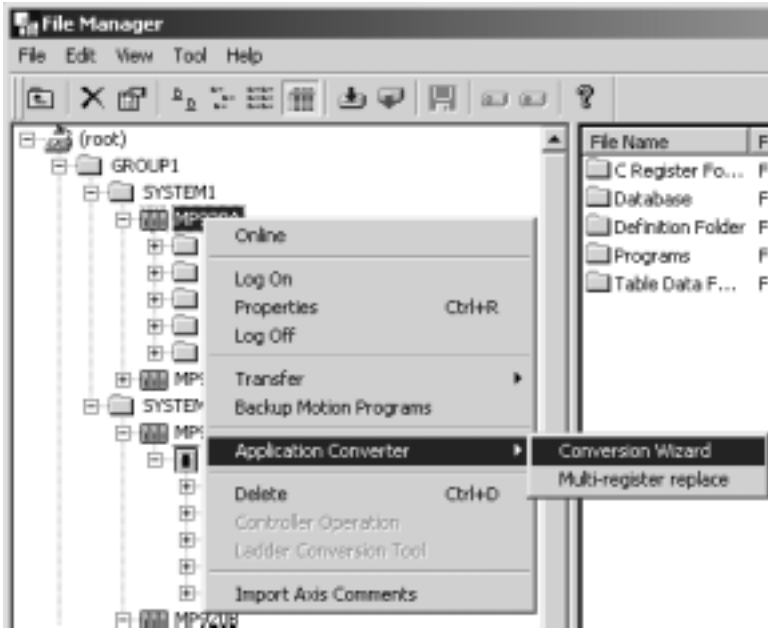
- Starting the Conversion Wizard

Open the Conversion Wizard using the following procedure. There are two ways to open the Conversion Wizard. Being in the offline environment is a prerequisite for both methods. The Conversion Wizard cannot be executed while in the online environment.

Select a CPU Environment Folder (PLC Folder or CPU Folder) and select ***Tool – Conversion Wizard***.

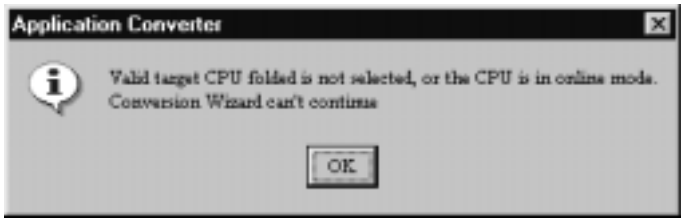


Alternatively, select a CPU Environment Folder (PLC Folder or CPU Folder), right-click to display the popup menu, and select ***Application Converter – Conversion Wizard***.



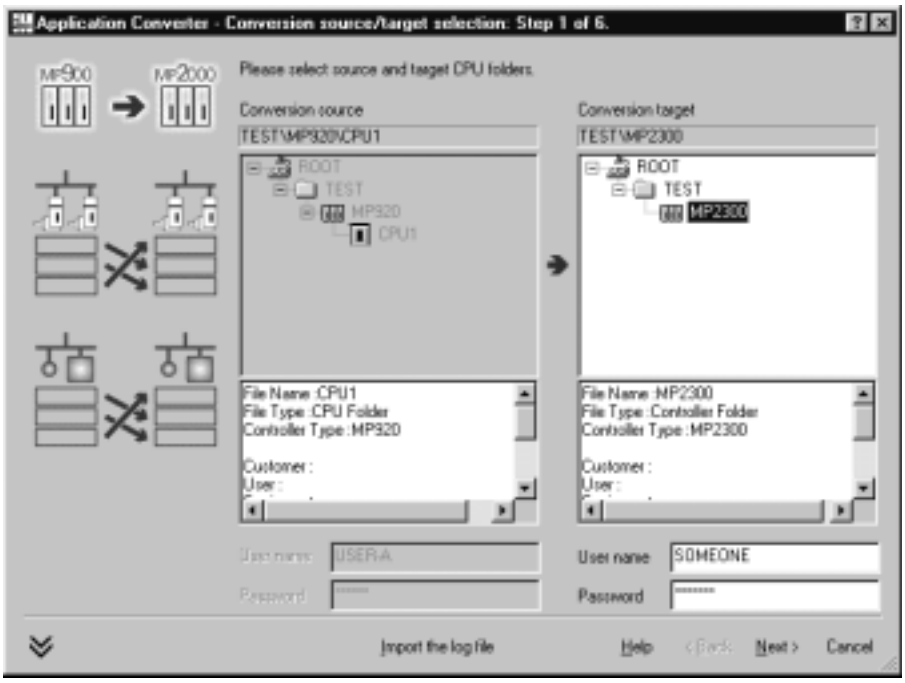
INFO

Before starting the Conversion Wizard, always create an offline PLC folder that can be selected as the conversion target. If you attempt to start the Conversion Wizard without creating a valid folder, the following message will be displayed and it will not be possible to start the Conversion Wizard.



a) Conversion Source and Target Selection

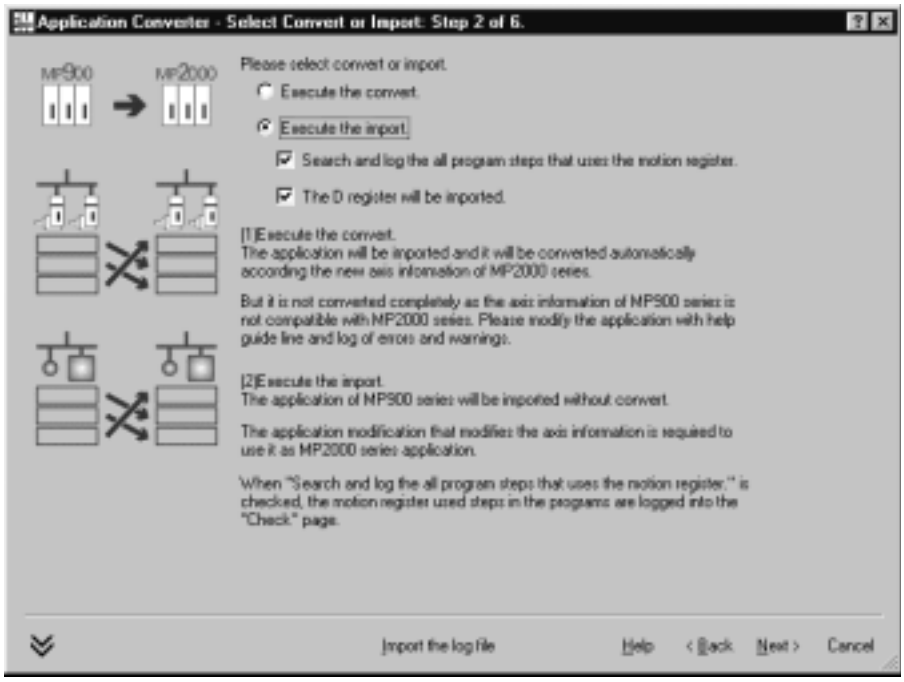
Select the conversion source CPU or PLC Folder and conversion target CPU or PLC Folder.



Setting	Details
Conversion Source	Displays the conversion source CPU Folders and PLC Folders. CPU Folders and PLC Folders of Machine Controllers not for conversion are not displayed. A CPU Folder or PLC Folder cannot be selected as the conversion source if the Conversion Wizard was started from that CPU Folder or PLC Folder.
Conversion Target	Displays the conversion target CPU Folders and PLC Folders. CPU Folders and PLC Folders of Machine Controllers not for conversion targets is not displayed. A CPU Folder or PLC Folder cannot be selected as the conversion target if the Conversion Wizard was started from that CPU Folder or PLC Folder.
User Name	Input the user name required to logon. The input is not required if the user name cannot be selected. When it can be selected, the system gets the default user name for the configuration and sets it as the default.
Password	Input the password required to logon. The input is not required if the user name cannot be selected. When it can be selected, the system gets the default password for the configuration and sets it as the default.
Import the log file	Reads the log file (*.ycl). When the log file has been changed incorrectly, a read error will occur when the file is imported.
Help	Displays help.
Back	Does not operate in this window.
Next	Advances to the Select Convert or Import Window.
Cancel	Cancels conversion processing and exits the Conversion Wizard.

b) Convert/Import Selection

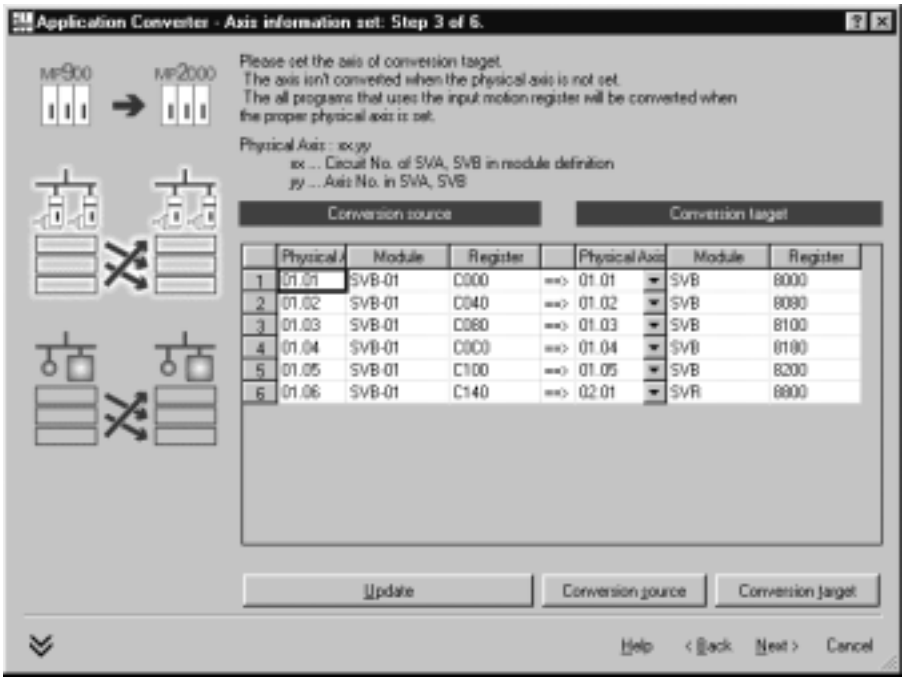
Selects the Convert or Import function.



Setting	Details
Execute the convert.	Select this option when executing the Convert function. This option cannot be selected when there are no Module configuration definitions set for the conversion source, conversion target, or both.
Execute the import.	Select this option when executing the Import function.
Search and log the all program steps that uses the motion register.	Select this option to search for locations in which the motion registers are used. When this function is used, a list of the motion registers that are used in the application will be output to a log file after the Import function has been completed. This option can be selected only when the *Execute the import.* Option has been selected.
The D register will be imported.	Select this option to include the D registers in the imported data. This option can be selected only when the *Execute the import.* Option has been selected.
Import the log file	Reads the log file (*.ycl). When the log file has been changed incorrectly, a read error will occur when the file is imported.
Help	Displays help.
Back	Returns to the Conversion Source/Target Selection Window.
Next	Advances to the next window. The next window depends on whether the *Execute the convert.* or *Execute the import.* Option was selected. If the *Execute the convert*. Option was selected, the Axis Information Set Window will be displayed. (Refer to *(c)*.) If the *Execute the import*. Option was selected, the Confirm the Convert Configuration Window will be displayed. (Refer to *(e)*.)
Cancel	Cancels conversion processing and exits the Conversion Wizard.

c) Axis Information Settings

Set the conversion target's physical axes that correspond to the conversion source's axes. Make these settings only when executing the Convert Function.

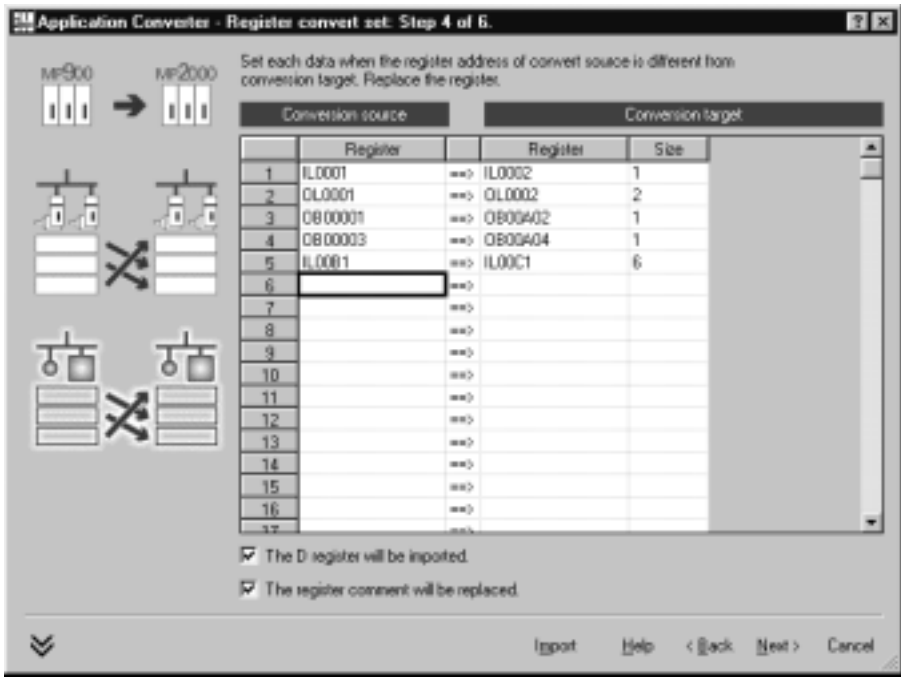


Setting		Details
Conversion Source	Physical Axis	Displays all of the physical axes that are set to be read in the conversion source's module configuration and SVB settings.
	Module	Displays the Module corresponding to the physical axis.
	Register	Displays the register corresponding to the physical axis.
Conversion Target	Physical Axis	Sets the physical axis number.
	Module	Displays the Module corresponding to the physical axis.
	Register	Displays the register corresponding to the physical axis.
Update		Reads the conversion source/target module configuration information again and updates the axis information.
Conversion source		Opens the conversion source's Module configuration definitions.
Conversion target		Opens the conversion target's Module configuration definitions.
Help		Displays help.
Back		Returns to the Conversion Source/Target Selection Window.
Next		Advances to the Register Convert Set Window. (Refer to *(d)*.)
Cancel		Cancels conversion processing and exits the Conversion Wizard.

d) Register Convert Settings

Make these settings when changing the conversion source's I/O registers. These settings can be made only when executing the Convert function.

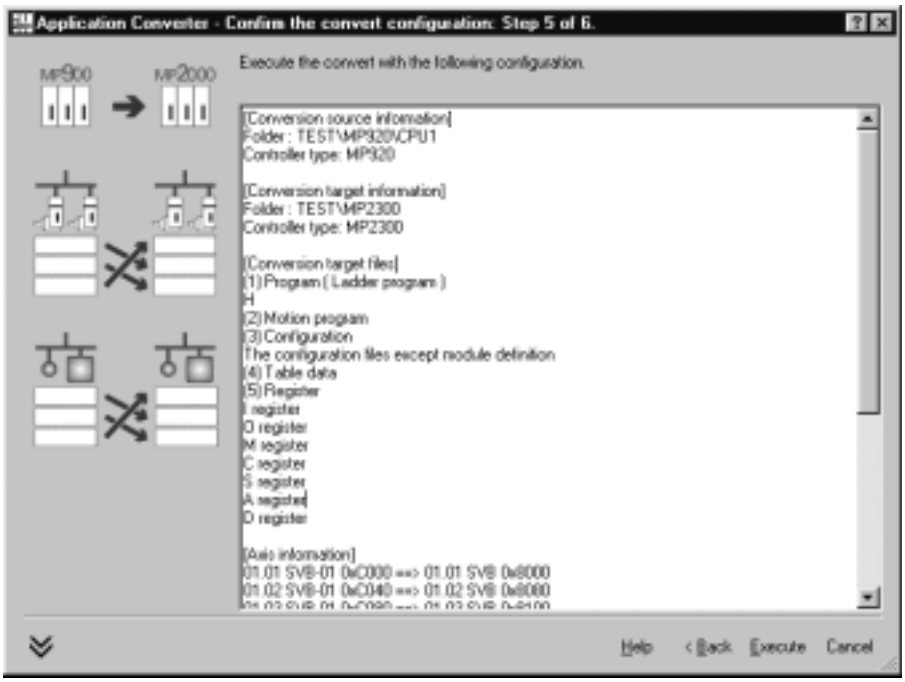
The registers to be converted are DWG common registers (S, I, O, M, or C registers).



Setting	Details
Register	Set the registers in the *Conversion source* that will be converted and the destination registers in the *Conversion target*.
Size	Set the number of consecutive registers that will be converted. For example, if the conversion source is MB001000, the conversion target is MB002000, and the size is 5, registers MB001000 through MB001004 will be converted to registers MB002000 through MB002004.
The D register will be imported.	Select this option to include the D registers in the imported data.
The register comment will be replaced.	Select this option to include the register comments in the converted data.
Import	Reads the settings file (register's conversion definition information) in CSV format.
Help	Displays help.
Back	Returns to the Axis Information Set Window.
Next	Advances to the Confirm the Convert Configuration Window. (Refer to *(e)*.)
Cancel	Cancels conversion processing and exits the Conversion Wizard.

e) Confirming the Data to be Converted or Imported

Displays the selected Convert or Import function settings for confirmation before execution.

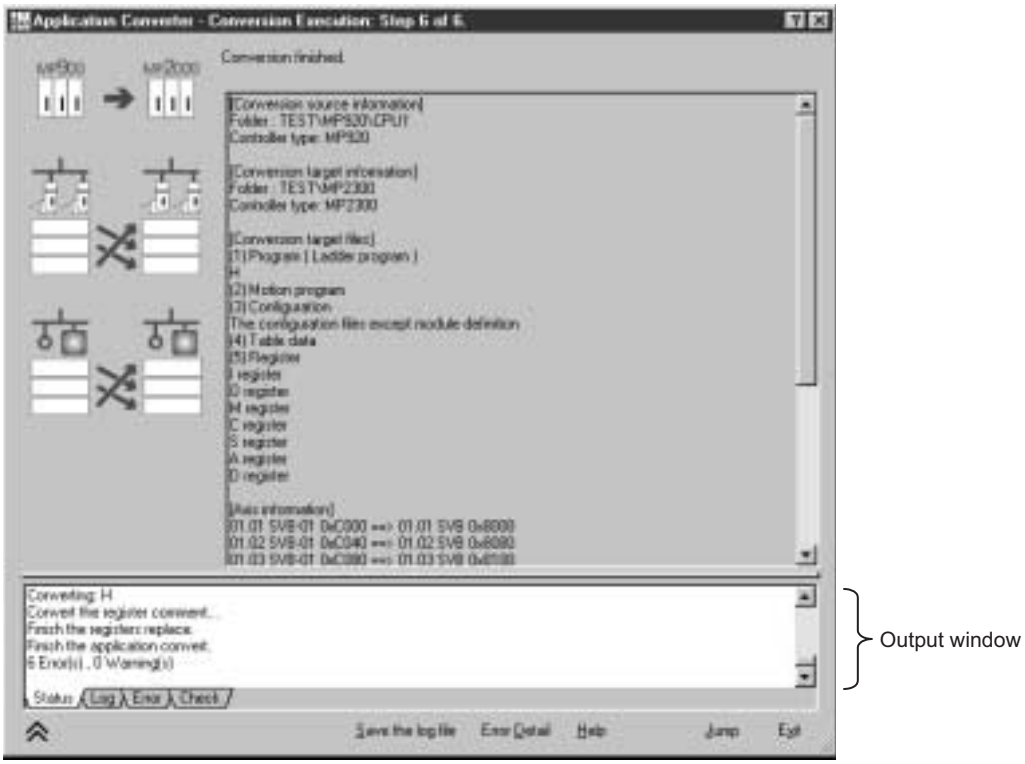


Setting	Details
Help	Displays help.
Back	Returns to the previous window. The previous window depends on whether the Convert function or Import function is being executed. If the Convert function is being executed, the Register Convert Set Window will be displayed. If the Import function is being executed, the Select Convert or Import Window will be displayed.
Execute	Executes the Convert or Import function.
Cancel	Cancels conversion processing and exits the Conversion Wizard.

f) Convert/Import Results

The results for the Convert or Import function are displayed in an output window of the Conversion Execution Window.

The Conversion Execution Window contains buttons that perform functions such as displaying detailed information about results output to the log or jumping an applicable program.



Tab Page	Details
Status	Displays the results of Convert/Import function.
Log	Displays the log from Convert/Import function.
Error	Displays the error log from Convert/Import function.

Setting	Details
Save the log file	Outputs the log of Convert/Import results to a file (*.ycl).
Error Detail	Displays errors selected on the Error Tab Page. This button will not be displayed unless an error is selected.
Help	Displays help.
Jump	Jumps to the conversion source or conversion target of the log selected on the Log Tab Page.
Exit	Exits the Conversion Wizard.

(2) Multi-register Replacement

The Multi-register Replace function is used to convert multiple registers at one time. This function can be used at any time regardless of execution of the Convert function. (In addition, this function is compatible with all of the Machine Controller types that can be used with the MPE720.)

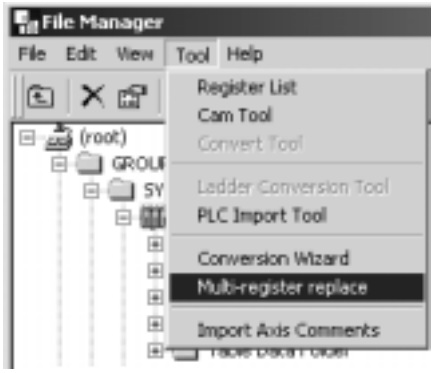
The replacement conditions are set with interactive dialogue boxes and then the register replacement is executed.

The registers to be replaced are DWG common registers (S, I, O, M, or C registers).

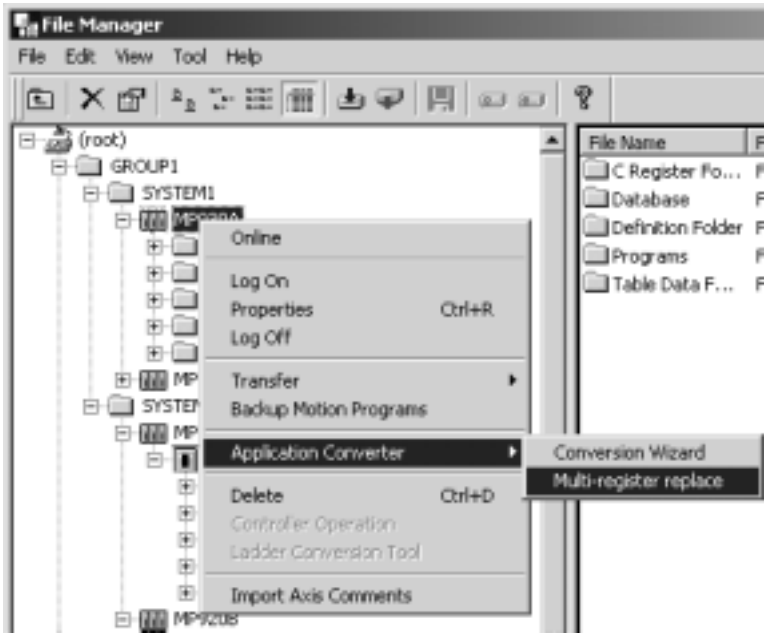
- Starting the Multi-register Replace Function

Start the Multi-register Replace function using the following procedure. There are two ways to start the Multi-register Replace function. Being in the offline environment is a prerequisite for both methods. The Multi-register Replace function cannot be executed while in the online environment.

Select a CPU Folder or PLC Folder and select ***Tool – Multi-register Replace*** from the File Manager Menu.



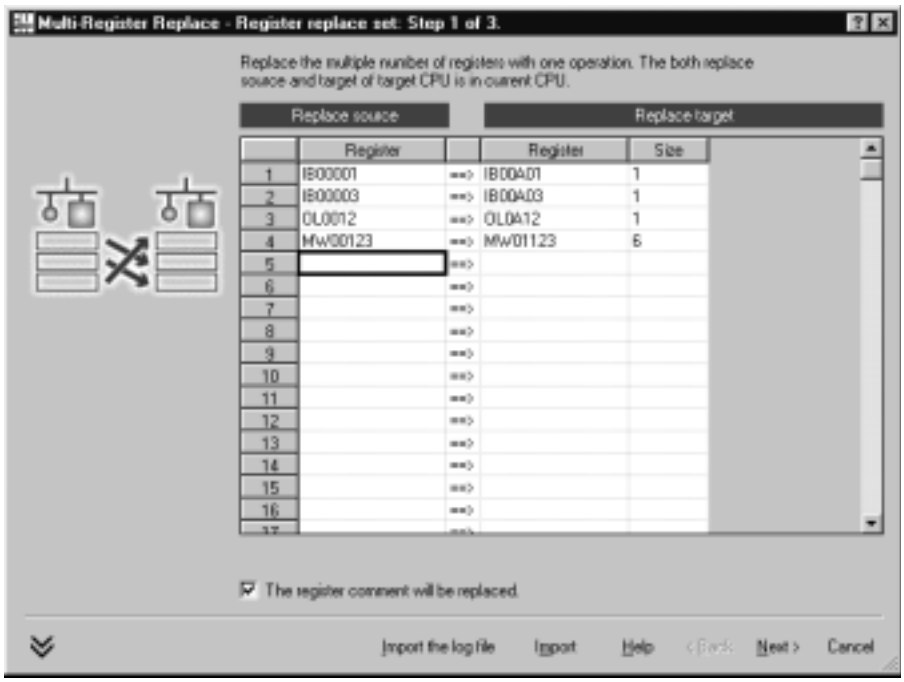
Alternatively, select a CPU Folder or PLC Folder, right-click to display the popup menu, and select ***Application Converter – Multi-register Replace***.



a) Register Replace Settings

Specify the register numbers that you want to replace.

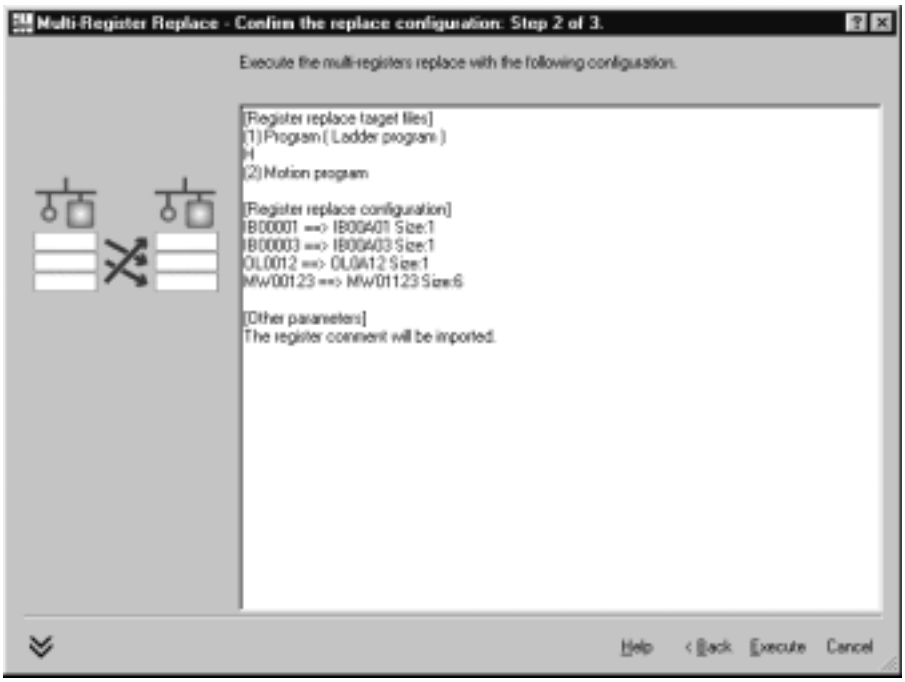
The registers to be replaced are DWG common registers (S, I, O, M, or C registers).



Setting	Details
Replace Source	Set the register to be replaced.
Replace Target	Set the replace target's registers. The replace source and replace target register types must match in each pair. If the registers are not the same type, an error will occur and that type will be displayed in red.
Size	Set the number of consecutive registers to be replaced. For example, if the replace source is MB001000, the replace target is MB002000, and the size is 5, registers MB001000 through MB001004 will be replaced by registers MB002000 through MB002004.
The register comment will be replaced.	Select this option to include the register comments in the replaced data.
Import the log file	Reads the log file (*.ydr). When the log file has been changed incorrectly, a read error will occur when the file is imported.
Import	Reads the register replacement settings data, which is stored in CSV file format (*.csv). Importing will be cancelled if there is invalid data.
Help	Displays help.
Back	Does not operate in this window.
Next	Advances to the Confirm the Replace Configuration Window. (Refer to *(b)*.)
Cancel	Cancels replacement processing and exits the Multi-register Replace function.

b) Confirming the Data to be Replaced

Displays the selected replacement settings for confirmation before execution.

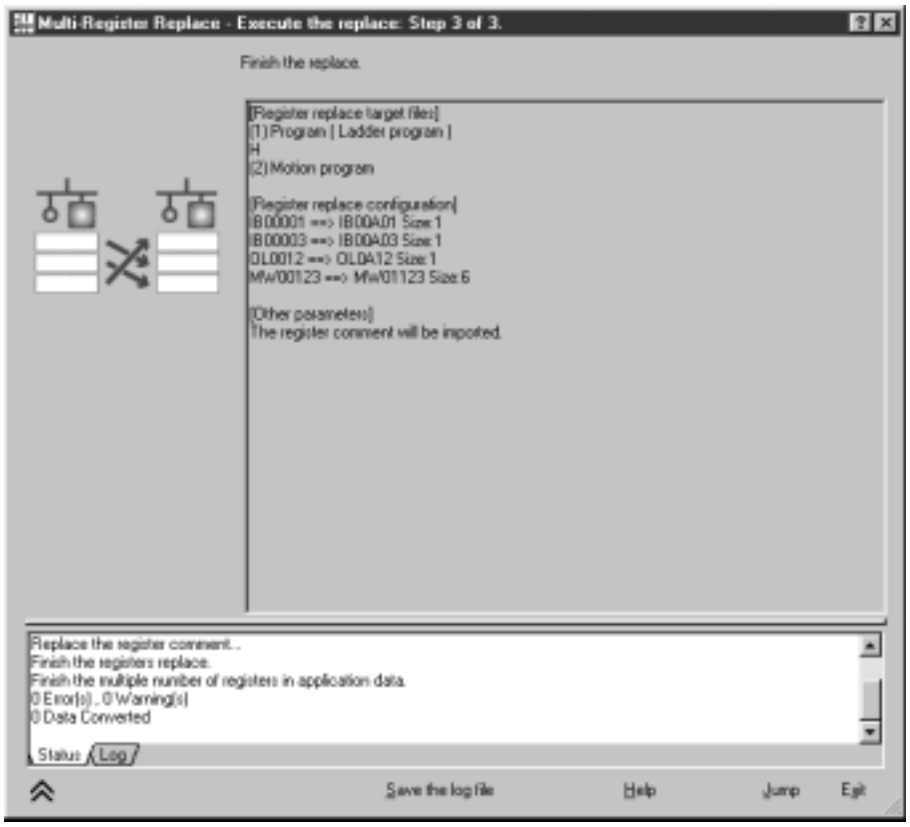


Setting	Details
Help	Displays help.
Back	Returns to the Register Replace Set Window.
Execute	Executes multi-register replacement processing.
Cancel	Cancels replacement processing and exits the Multi-register Replace function.

c) Replacement Execution

Displays the execution results for the Register Replace function.

The Execute the Replace Window contains buttons that perform functions such as displaying detailed information about results output to the log on the Log Tab Page, or jumping an applicable program.



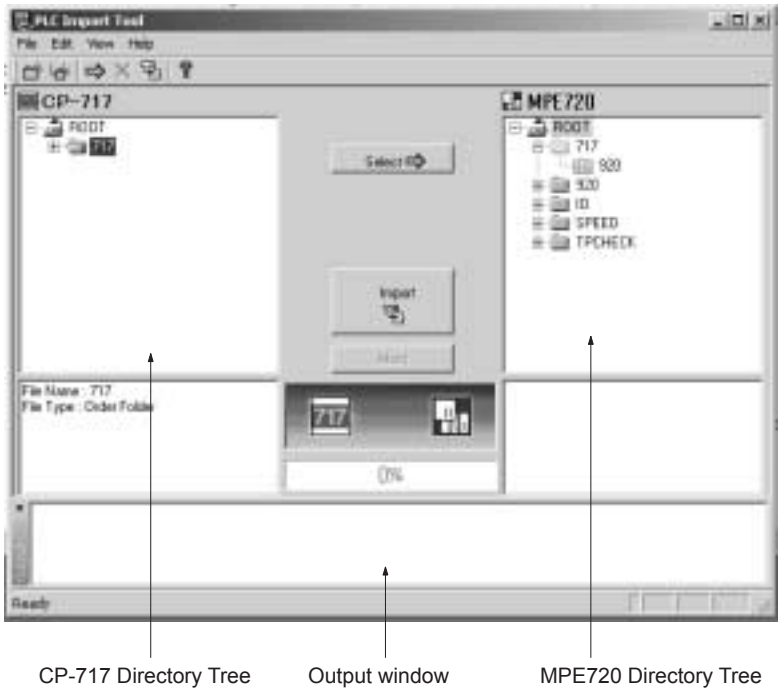
Tab Page	Details
Status	Displays the results of Multi-register Replace function execution.
Log	Displays the log from Multi-register Replace function processing.

Setting	Details
Save the log file	Outputs the log of Multi-register Replace results to a file (*.ydr).
Help	Displays help.
Jump	Jumps to the replace source or replace target of the log selected on the Log Tab Page.
Exit	Exits the Multi-register Replace function.

2.2.13 PLC Import Tool

When both CP-717 and MPE720 are installed in one personal computer, the PLC Import Tool can be used to import a CP-717 user folder into MPE720. The PLC Import Tool can import user folders only for Machine Controller types supported by the MPE720.

Start the PLC Import Tool from the MPE720.



Setting	Details
CP-717 Directory Tree	Displays the user folders in the CP-717.
MPE720 Directory Tree	Displays the user folders in the MPE720.
Output window	Displays the import completion status and error status.
Select	Pre-imports* the group folder, order folder, or PLC folder selected in the CP-717 Directory Tree to the location selected in the MPE720 Directory Tree.
Import	Executes the PLC Import operation.
Abort	Cancels the PLC Import operation.

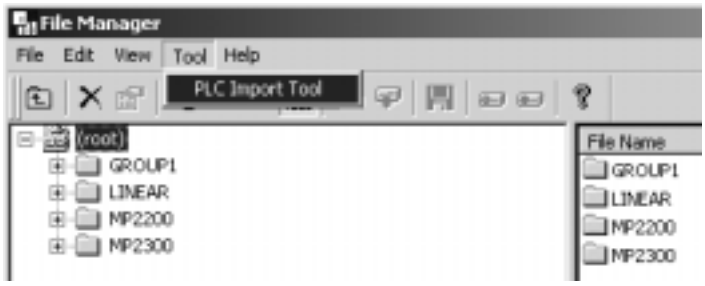
* The pre-import operation creates a folder in the MPE720 Directory Tree, that will be imported from the CP-717 Directory Tree to the MPE720 Directory Tree, before the import operation itself is executed. In the pre-import status, the user folder in the CP-717 is not actually imported to the MPE720.

(1) Starting the PLC Import Tool

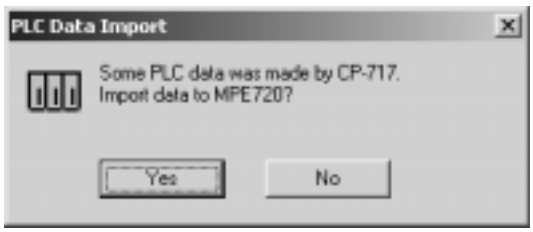
Start the PLC Import Tool using the following procedure. There are two ways to start the PLC Import Tool.

(a) Starting from the File Manager

Select ***Tool – PLC Import Tool*** from the File Manager Menu.

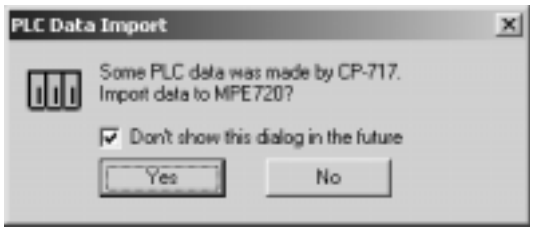


The following message will be displayed. Click the **Yes** Button to continue.



(b) Automatic Start

The following message will be displayed when the MPE720 is started. Click the **Yes** Button to continue.



INFO

This message will be displayed the first time that the MPE720 is started after installation.

This message will be displayed every time the MPE720 is started if you clear the *Don't show this dialog in the future.* Option.

(2) PLC Import Tool Menu

The following table shows the menu commands and functions displayed for PLC Import Tool.

Menu Command		Function
File		
	New	Creates a new group folder or order folder in the MPE720.
	Rename	Changes the name of a group folder or order folder. Only group folders or order folders newly created by the PLC Import Tool can be renamed. Existing group folders and order folders cannot be renamed.
	Exit	Exits the PLC Import Tool.
Edit		
	Select	Pre-imports the group folder, order folder, or PLC folder selected in the CP-717 Directory Tree to the location selected in the MPE720 Directory Tree.
	Delete	Deletes the folder selected in the MPE720 Directory Tree. Only group folders or order folders newly created by the PLC Import Tool can be deleted. Existing group folders and order folders cannot be deleted.
	Import	Executes the PLC Import operation.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Output Window	Displays the Output window.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays the version information.

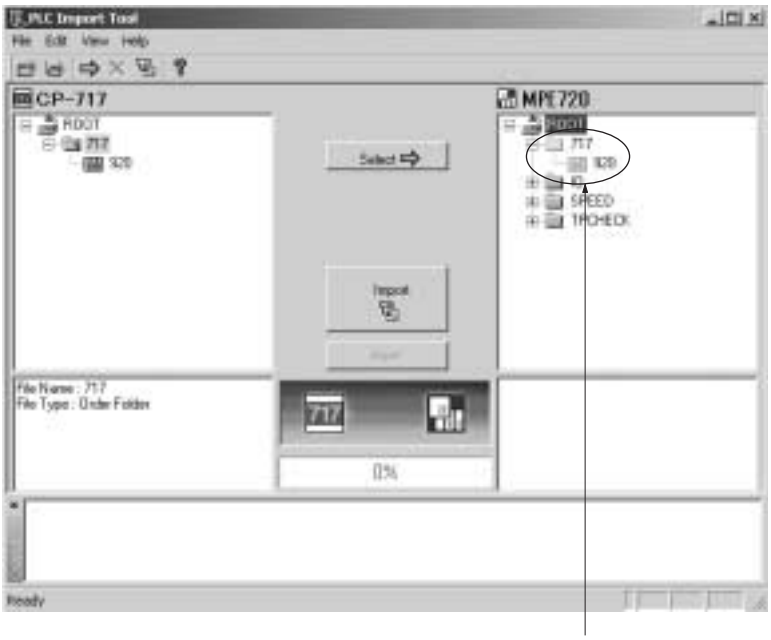
(3) PLC Import Tool Operations

This section explains the operation of the PLC Import Tool.

(a) Executing Pre-import

Select the group folder, order folder, or PLC folder in the CP-717 Directory Tree that will be the import source folder. Select the group folder or order folder in the MPE720 Directory Tree that will be the import target folder. Select ***Edit*** – ***Select*** from the menu. Alternatively, click the **Select** Button.

The following screen shows an example of pre-importing from the CP-717's PLC environment to the MPE720 environment. In this case, the group folder named "GROUP1" in the CP-717 environment has been pre-imported to the MPE720's root folder "Root."



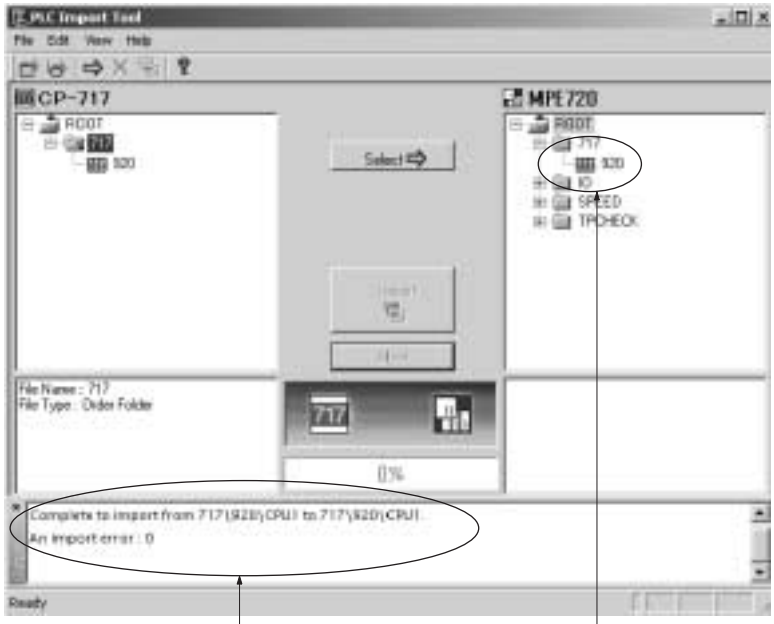
The pre-imported folder is displayed in a light color.

- A group folder cannot be pre-imported into an order folder. Also, a PLC folder cannot be pre-imported directly below a group folder.
- The pre-import can also be performed by dragging and dropping the import source folder from the CP-717 Directory Tree to the import target location in the MPE720 Directory Tree.

(b) Executing the Import Operation

To execute the Import operation, select ***Edit*** – ***Import*** from the menu. Alternatively, click the **Import** Button.

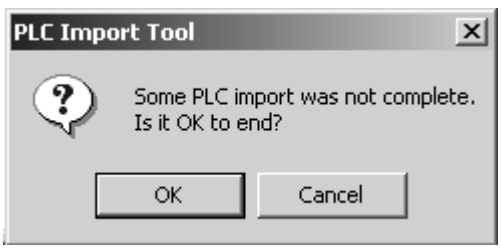
When the import operation has been completed, the import completion status will be displayed in the Output window. Also, the display of the imported folder will change from a light color to normal text. The following screen shows the display after the import operation was completed properly.



(4) Exiting the PLC Import Tool

To close the PLC Import Tool, select ***File*** – ***Exit*** from the menu.

The following message will be displayed if you exit the PLC Import Tool while a folder is pre-imported.

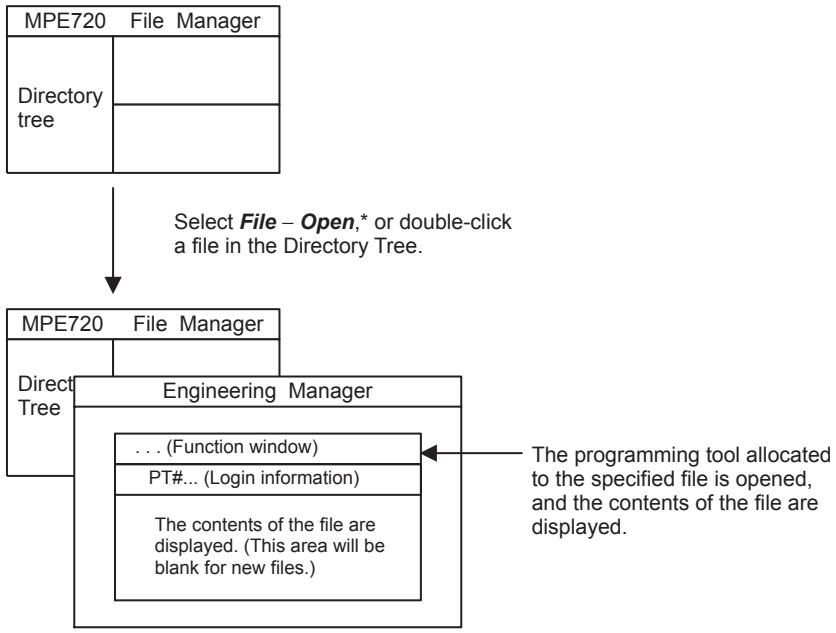


2.3 Engineering Manager

This section explains how to start the Engineering Manger and the role it plays.

2.3.1 Automatic Startup

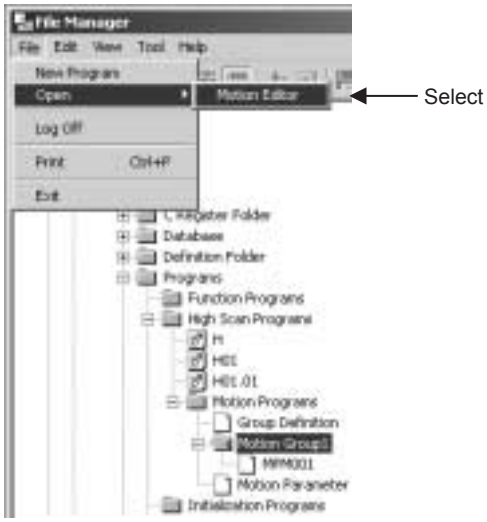
The Engineering Manager is automatically started as a result of operations performed in the File Manager. It cannot be started independently. If certain programming tools are called from the File Manager, the Engineering Manager is started first, and then the function window for the programming tool is opened in the Engineering Manager. All function windows are managed under the Engineering Manager.



* The file program that is opened from the File Manager Menu will depend on the type of file or folder that was selected.

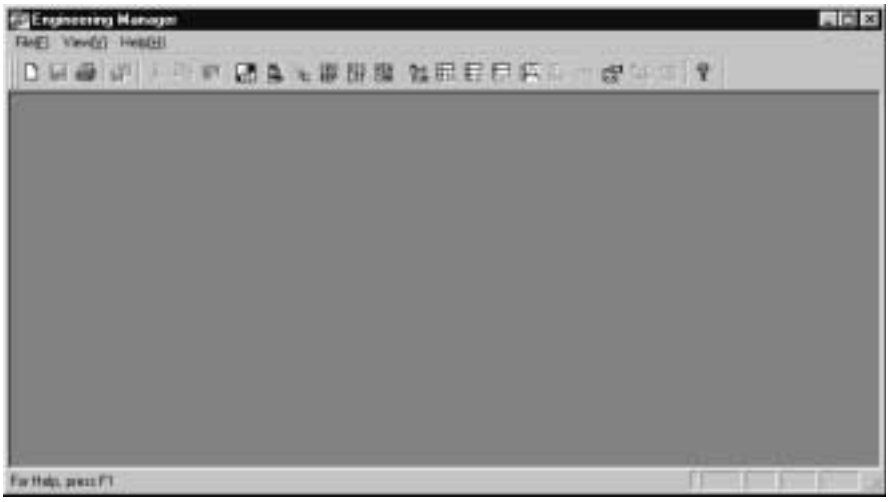
◀ EXAMPLE ▶ The following screens are displayed when the Motion Editor is opened from the File Manager.

1. Select ***File – Open – Motion Editor*** from the File Manager Menu. Alternatively, double-click the Motion Group1 Folder.



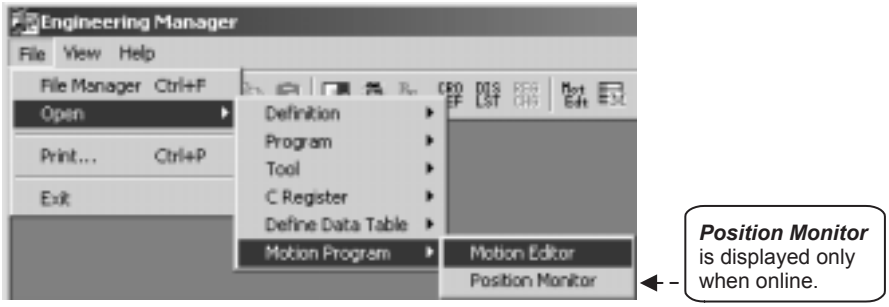
2. The Motion Editor Window will open in the Engineering Manager Window as shown below.

3. If the Motion Editor is closed at this stage, only the Engineering Manager Window will be displayed.



2.3.2 Basic Functions

All of the functions called using the Engineering Manager can be selected by selecting ***File*** – ***Open***.



Several function windows can be open at once, and the window to be used can be activated as needed.

2.3.3 Basic Menus

The basic menus are active when no function windows are open in the Engineering Manager Window.

Menu Command	Function
File	
File Manager	Opens the File Manager.
Open	
Definition	
Module Configuration	Define the Modules.
System Configuration	
Scan Time Setting	
Application Info.	
Data Trace	
Fault Monitor	
Definition Group	
Motion Parameters *1	
Program	
New Drawing	Calls programming tools.
Properties	
Main Program	
SFC Flow Chart	
SFC Time Chart	
SFC Action Box	
Constant Table (# Reg)	
Constant Table (M Reg)	
I/O Conversion Table	
Interlock Table	
Part Composition Table	
Tuning Panel	
Tool	
Register List	Calls programming support tools.
Cross Reference	
Disable Coil List	
Comment List	
Register Replace	
C Register	
C Register List	Displays C registers.
Define Data Table	
Table Data List	Displays table data.
Motion Program	
Motion Editor	Calls motion programming tools.
Position Monitor *2	
Task Monitor *2	
Motion Alarm *2	
Print	Prints data.
Exit	Closes the Engineering Manager.
View	
Tool Bar	Displays the Tool Bar.
Status Bar	Displays the status bar.
Help	
Contents and Index (F1)	Displays help information.
About Application	Displays version information.

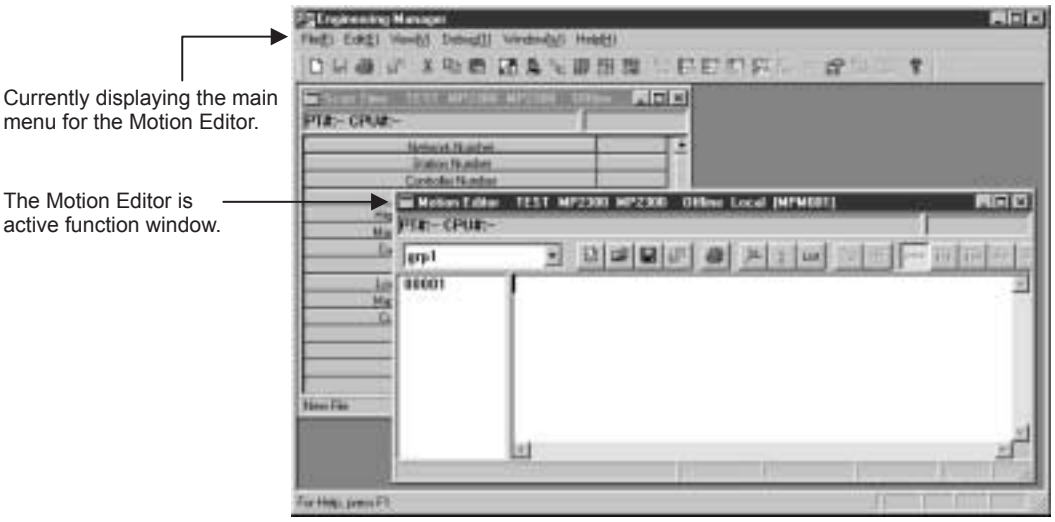
* 1. ***Motion Parameters*** is only displayed when the MP930 is used.
* 2. ***Position Monitor***, ***Task Monitor***, and ***Motion Alarm*** are active only when online.

2.3.4 Function Windows

The function windows are used to create, edit, and debug application programs.

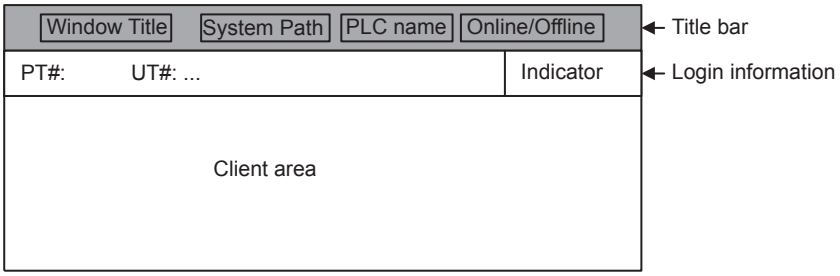
More than one function window can be open at the same time in the Engineering Manager. The menus differ for each function window. The menu for the active function window will be displayed. Refer to the explanations for each function window menu.

In the following figure, the Motion Editor and Scan Time Windows are open. The Engineering Manager uses the Motion Editor Menu because the Motion Editor is the active function window. The menu will switch to the Scan Time Menu if the Scan Time Window is made active.



(1) Window Configuration

This section explains the basic configuration of function windows.



(a) Title Bar

Display	Details
Window Title	Displays the title of the function window to the right of the icon.
System Path	Displays the path information from the group name to the PLC folder.
PLC Name	Displays the connected Machine Controller name.
Online/Offline	Displays whether currently online or offline.

(b) Login Information

The login information is displayed under the title bar. When logging in while offline, hyphens are displayed for the number.

Display	Details
PT#	Displays the communication logical port number.
UT#	Displays the Machine Controller unit number.
CPU#	Displays the number of the CPU currently logged in.
Indicators	Displays the animation data when online.

(c) Client Area

The function window internal information is displayed in the Client area. Refer to *Chapter 3 System Configuration Definitions*.

2.3.5 Exiting the Engineering Manager

Exit the Engineering Manager using the following procedure.

1. Close all open function windows.
2. Close the Engineering Manager by selecting ***File*** – ***Exit***.

No confirmation message will be displayed.

Be sure to close the Engineering Manager. If the Engineering Manager is not closed, the logoff operation will not be possible.

2.4 List and Print Managers

Use this manager to print lists and details of motion programs, ladder programs, registers, and definition files managed by the MPE720.

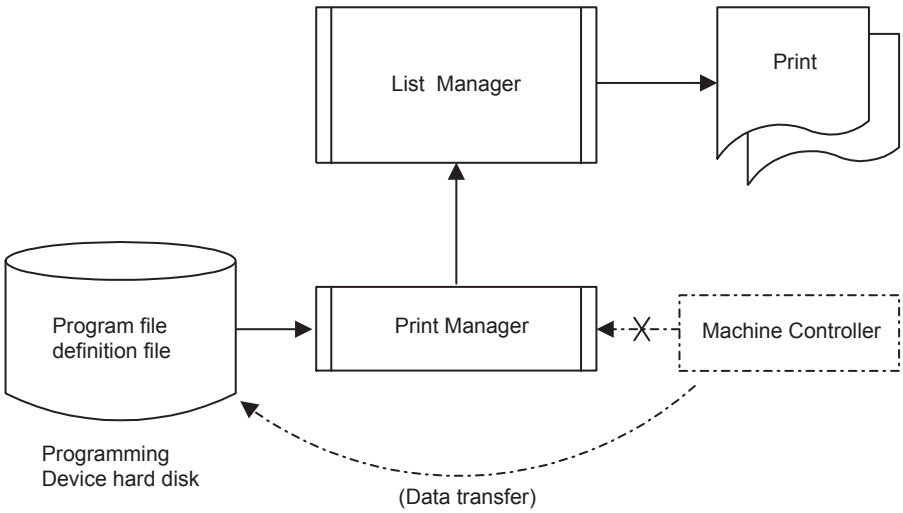
Print processing is executed by the List Manager and Print Manager.

The List Manager is equipped with a print cancellation function for print jobs that are queued, and a print status is displayed at the same time as actually printing data requested from the Print Manager.

The List Manager starts when the Print Manager Window is opened. The List Manager is an independent window, as print jobs can also be requested from applications other than the MPE720. Consequently, when the MPE720 finishes, the List Manager must be closed manually.

The Print Manager edits data selected via the user interface and requests print jobs to the List Manager.

Data for printing is stored on the Programming Device hard disk. To print data stored on the Machine Controller, the data must be transferred to the hard disk using the transfer function. In normal operations, however, Machine Controller and hard disk data are the same, so no transfer is necessary.



2.4.1 List Manager

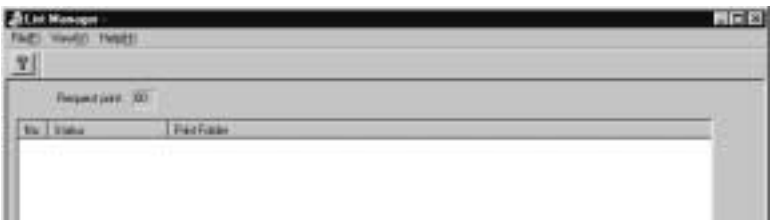
The List Manager is used to print the data and display the printing status and cancel printing jobs.

(1) Opening the List Manager Window

The List Manager can be opened from the Print Manager.

To open the List Manager, select ***Print – Printing Status*** from the Print Manager Menu, or click the **List Manager** Icon on the task bar. The Print Status Window will open.

List Manger Icon



INFO

The List Manager is started automatically when the Print Manager is opened. If the Print Manager has never been opened, the List Manager will not have been started, and so will not be registered on the task bar. The List Manager cannot be started independently.

(2) List Manager Menus

The following table shows the menu commands and functions displayed for List Manager.

Menu Command		Function
File		
	Cancel	Cancels printing jobs.
	Exit	Exits the List Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(3) Displaying Printing Status

The current printing status is displayed in the List Manager Window.

Display	Details
No.	Displays the queue number of queued printing jobs.
Status	*Preparing for print.*: The printing data is being converted to a printing image. *Print job cancelled.*: The printing job has been cancelled.
Print Folder	Group name, order name, PLC name, CPU number, and print setting file title are all displayed.

(4) Cancelling Printing Jobs

Cancel printing jobs using the following procedure.

1. Select the printing job to be cancelled.
2. Select ***File*** – ***Cancel*** from the List Manager Menu.
3. A confirmation message will be displayed. Click the **Yes** Button.
   The printing job selected in step 1. will be cancelled.

2.4.2 Print Manager

(1) Opening the Print Manager Window

(a) Opening from the File Manager

Select a PLC Folder, CPU Folder, or a drawing folder under within these folders on the Directory Tree. Select ***File*** – ***Print*** from the File Manager Menu. The Print Manager is started and the Print Manager Window is opened.

(b) Opening from the Engineering Manager

Select ***File*** – ***Print*** from the Engineering Manager Menu. The Print Manager will start and the Print Manager Window will open.

Setting	Details
O/#	Displays the data from the *Order No.* column in the Application Information Window. Refer to *Chapter 4 Definition Folder 1: Application Information Definitions* for the Application Information Window. This data cannot be changed. This information is printed on the cover page and in the footer of the document.
DWG No.	Enter a drawing number of up to 16 characters. This data is printed in the header and footer of the documents.
Draw	Enter a name of up to 16 characters of the person who created the drawing. This data is printed in the *Draw* column of the document footer.
Date	Enter a date of up to 16 characters for when the drawing was created. This data is printed in the *Date* column of the document footer.
User	Displays the data from the *User* column in the Application Information Window. Refer to *Chapter 4 Definition Folder 1: Application Information Definitions* for the Application Information Window. This data cannot be changed. This data is printed in the *User* column on the document cover page.
Used At	Displays the data from the *Used* column in the Application Information Window. Refer to *Chapter 4 Definition Folder 1: Application Information Definitions* for the Application Information Window. This data cannot be changed. This data is printed in the *Used At* column on the document cover page.
Equipment	Displays the data from the *Equip.* column in the Application Information Window. Refer to *Chapter 4 Definition Folder 1: Application Information Definitions* for the Application Information Window. This data cannot be changed. This data is printed in the *Equipment* column on the document cover page.
Usage	Displays the data from the *Usage* column in the Application Information Window. Refer to *Chapter 4 Definition Folder 1: Application Information Definitions* for the Application Information Window. This data cannot be changed. This data is printed in the *Usage* column on the document cover page.

The Print Manager cannot be started in the LADDER Windows. Select ***File – Print Program*** from the menu to print the main program.

(2) Print Manager Menus

The following table shows the menu commands and functions displayed for the Print Manager.

Menu Command		Function
File		
	Read	Reads printing settings files.
	Close	Cannot be used in this window.
	Save	Saves printing settings data.
	Delete	Deletes printing settings files.
	Exit	Exits the Print Manager.
Edit		
	Date	Sets the current date.
	Copy History	Copies revision history data.
Print		
	Execute Print	Executes printing.
	Printing Status	Displays the printing status.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

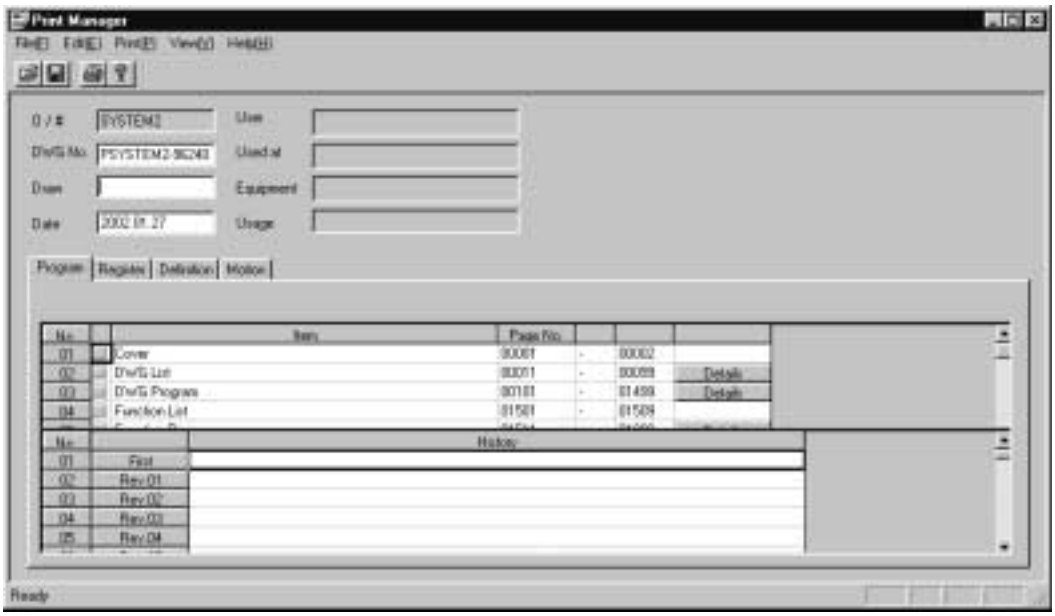
(3) Tab Pages

The Print Manager Window has the four tab pages shown below.

Tab Page	Details
Program	Sets the printing data for DWG and function programs.
Register	Sets printing data for S, I, O, M, and D registers.
Definition	Sets printing data for system definitions, transfer definitions, and other definitions.
Motion	Sets printing data for motion programs.

(a) Program Tab Page

- Program Print Settings



Setting	Details
Selection Status	Displayed between *No.* and *Item*. The items to be printed are selected and the selection status indicated. • : Indicates items that have not been selected for printing. • : Indicates items that have been selected for printing.
Item (Print Items)	Displays printing items. This data is printed in the *Draw* column of the document footer.
Page No.	Enter the first and last page numbers to be printed for the printing item. If the document has more pages than the number of pages specified, the pages following the page designated as the last page will also be printed.
Details	Detail printing item selections can be made. Refer to the next section for information on the **Details** Button.
History	Enter revision history data for the printing settings file of up to 64 characters. Up to 20 pieces of revision history data can be entered. Select ***Edit*** – ***Copy History*** from the Print Manager Menu to copy revision history data from the current tab page to revision history data on another tab page.

- Detailed Settings

Detailed printing settings are required for items that have a **Details** Button to the right of the printing item. Click the **Details** Button and make the detailed settings.

1. DWG List

Select either *drawing trees* or *drawing lists* for printing in the Select the Print Class Window.

Setting	Details
DWG Tree	Print drawing trees, which are drawing levels displayed in a directory tree format.
DWG List	Print a list of drawings.

2. DWG Program

Select either *Select All* or *Individual Select* in the DWG Program List Detail Window.

Setting	Details
Select All	Print all drawing programs.
Individual Select	Select and prints individual drawing programs from the list box.
Type	Displays the Select the Print Class Window to select the type of drawing program to be printed. Only the selected data will be printed.
Print Cross	Print the cross-reference information of the DWG program register.

3. Function Programs

Select either *Select All* or *Individual Select* in the Function Program List Details Window.

Setting	Details
Select All	Print all function programs.
Individual Select	Select individual function programs from the list box.
Type	Displays the Select the Print Class Window to select the type of function program to be printed. Only the selected data will be printed.
Print Cross	Print the cross-reference information of the function program register.

4. C Register Constant Tables

Select either *Select All* or *Individual Select* in the C Register Constant Table (Creg) Detail Window.

Setting	Details
Select All	Print all C register constant tables.
Individual Select	Select individual C register constant tables from the list box.
Print Cross	Print the C register cross information.

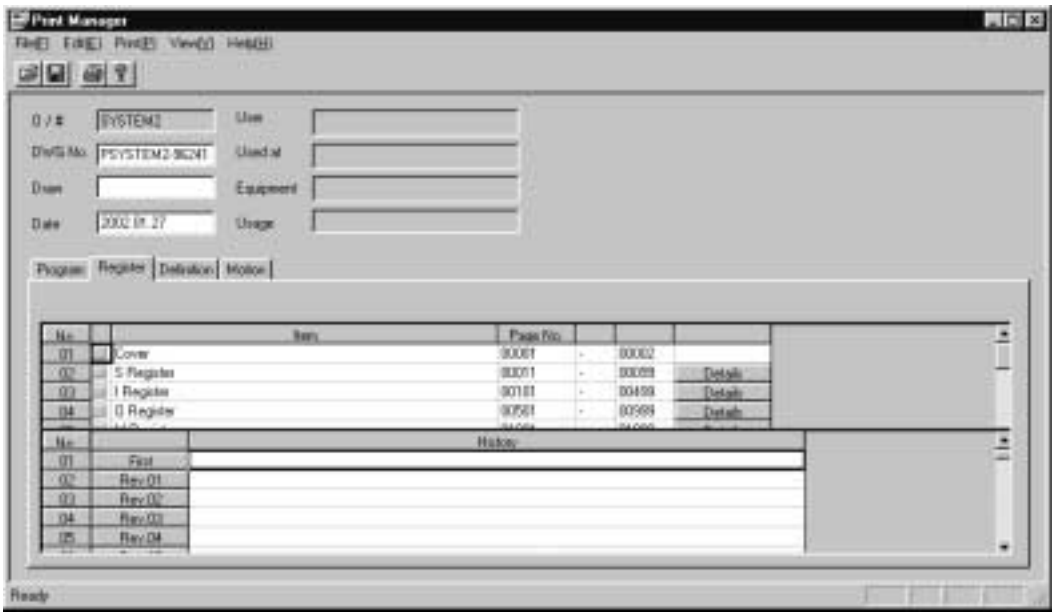
5. Table Data

Select either *Select All* or *Individual Select* in the Table Data Detail Window.

Setting	Details
Select All	Select all the table data.
Individual Select	Select individual table data from the list box. If the table data exceeds 501, switch the displayed lists of table data in the list box in units of 500 by pressing the **PageUp** Key and the **PageDown** Key.
Print Data	Print the table data.

(b) Register Tab Page

• Register Printing Settings



Setting	Details
Selection Status	Displayed between *No.* and *Item*. The items to be printed are selected and the selection status indicated. • ☐ : Indicates items that have not been selected for printing. • ☑ : Indicates items that have been selected for printing.
Item (Print Items)	Displays printing items. This data is printed in the *Draw* column of the document footer.
Page No.	Enter the first and last page numbers to be printed for the printing item. If the document has more pages than the number of pages specified, the pages following the page designated as the last page will also be printed.
Details	Detail printing item selections can be made. Refer to the next section for information on the **Details** Button.
History	Enter revision history data for the printing settings file of up to 64 characters. Up to 20 pieces of revision history data can be entered. Select ***Edit*** – ***Copy History*** from the Print Manager Menu to copy revision history data from the current tab page to revision history data on another tab page.

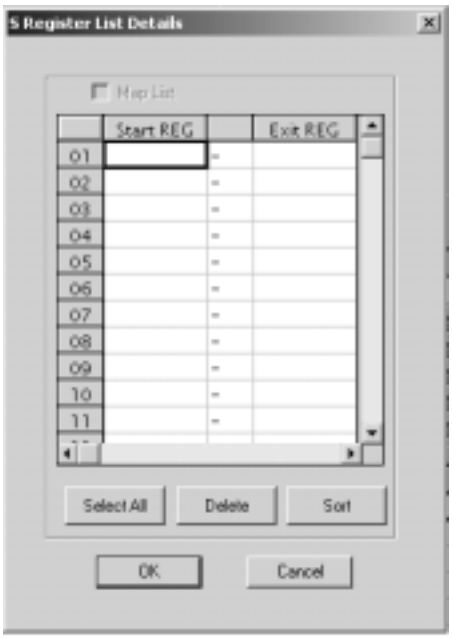
- Detailed Settings

Detailed printing settings are required for items that have a **Details** Button to the right of the printing item. Click the **Details** Button and make the detailed settings.

1. S Register

   The whole register range can be selected at a time, and the registers can be sorted and displayed in the S Register List Details Window.

   When registers are set in each *Start REG* and *Exit REG* field, the cross-references and comments of the set register range can be printed. Up to 128 registers can be set.



Setting	Details
Start REG	Enter leading number of register range to be printed.
Exit REG	Enter ending number of register range to be printed.
Select All	Designates all the S registers. When the **Select All** Button is clicked, all bit, integer, double-length integer, and real-number registers will be set.
Delete	Select the register range to be deleted with the cursor and click the **Delete** Button to delete the selected register range.
Sort	Sorts the entered register range by register number.

2. I Register

   Enter in hexadecimal the leading and ending numbers of the I registers to be printed in the I Register List Details Window.

   The method for selecting the register range is the same as for S registers.

3. O Registers

   Enter in hexadecimal the leading and ending numbers of the O registers to be printed in the O Register List Details Window.

   The method for selecting the register range is the same as for S registers.

4. M Registers

   Enter in hexadecimal the leading and ending numbers of the M registers to be printed in the M Register List Details Window.

   The method for selecting the register range is the same as for S registers.

Setting	Details
Map List	Prints the M register utilization status list before the M registers.

5. D Registers

Select either *Select All* or *Individual Select* in the D Register List Details Window.

Setting	Details
Map List	Prints the D register utilization status list before the D registers.
Select All	Prints all drawing and function program D registers.
Individual Select	Selects individual drawing or function programs, and prints the D registers used in the selected programs.

6. # Registers

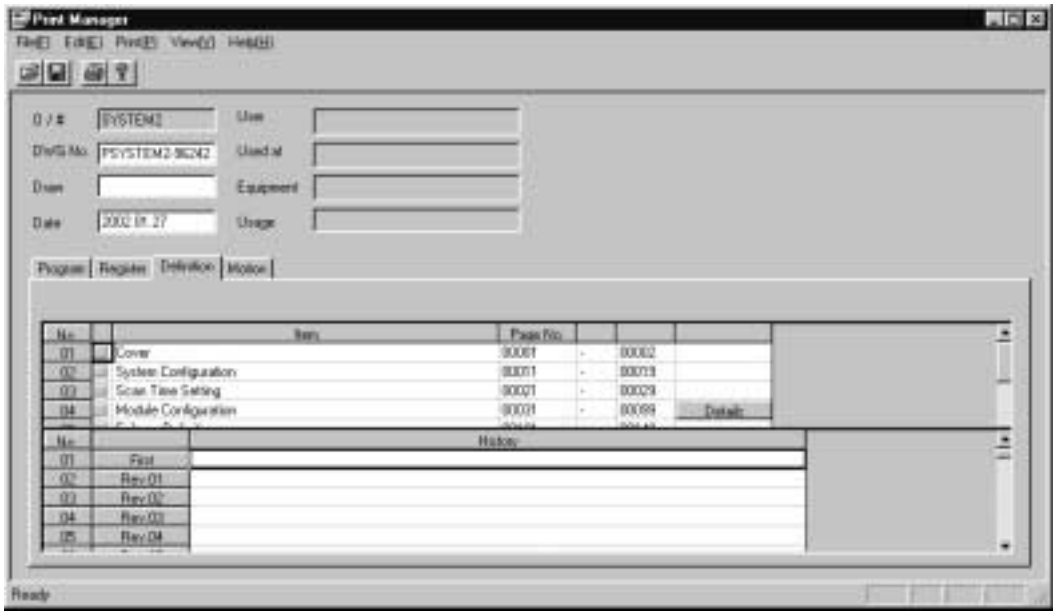
Select either *Select All* or *Individual Select* in the # Register List Details Window.

Setting	Details
Print Cross	Prints the # register cross-reference information before the # registers.
Print Data	Prints the # register data.
Select All	Prints all drawing and function program # registers.
Individual Select	Selects individual drawing or function programs, and prints the # registers used in the selected programs.

(c) Definitions Tab Page

System definition, scan time, module configuration definition, failure monitor definition, and data trace printing data can be selected.

- Definition Printing Settings



Setting	Details
Selection Status	Displayed between *No.* and *Item*. The items to be printed are selected and the selection status indicated. • : Indicates items that have not been selected for printing. • : Indicates items that have been selected for printing.
Item (Print Items)	Displays printing items. This data is printed in the *Draw* column of the document footer.
Page No.	Enter the first and last page numbers to be printed for the printing item. If the document has more pages than the number of pages specified, the pages following the page designated as the last page will also be printed.
Details	Detail printing item selections can be made. Refer to the next section for information on the **Details** Button.
History	Enter revision history data for the printing settings file of up to 64 characters. Up to 20 pieces of revision history data can be entered. Select ***Edit*** – ***Copy History*** from the Print Manager Menu to copy revision history data from the current tab page to revision history data on another tab page.

- Detailed Settings

Detailed printing settings are required for items that have a **Details** Button to the right of the printing item. Click the **Details** Button and make the detailed settings.

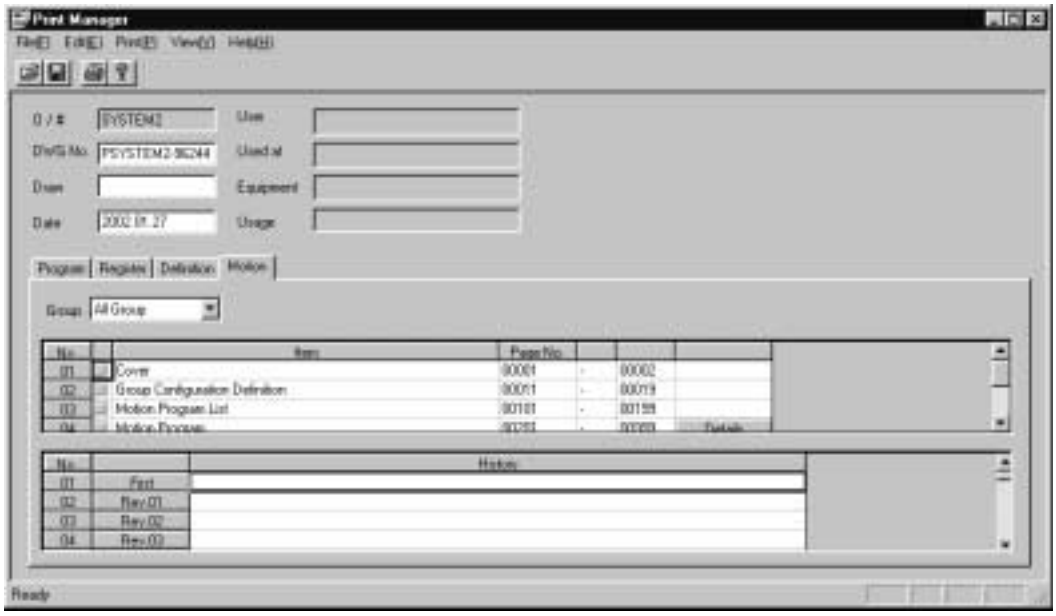
- Module Configuration
  Select the slot numbers for the definition data to be printed using the Select the Print Class Window, and then click the **OK** Button.

Data at *RESERVED* or *UNDEFINED* slot numbers is invalid even if selected.

(d) Motion Tab Page

Motion program and motion parameter printing data can be selected.

- Motion Printing Settings



Setting	Details
Group	Select a group. The motion program and other data for the designated group will be printed.
Selection Status	Displayed between *No.* and *Item*. Select the items to be printed. • : Indicates items that have not been selected for printing. • : Indicates items that have been selected for printing.
Item (Print Item)	Displays the items to be printed. The items will be printed in the *Draw* column in the document footer.
Page No.	Enter the first and last page numbers to be printed for the printing item. If the document has more pages than the number of pages entered, the pages following the page designated as the last page will also be printed.
Details	Printing item details are selected.
History	Enter revision history data for the printing settings file of up to 64 characters. Up to 20 pieces of revision history data can be entered. Select ***Edit*** – ***Copy History*** from the Print Manager Menu to copy revision history data from the current tab page to revision history data on another tab page.

- Detailed Settings

Detailed printing settings are required for items that have a **Details** Button to the right of the printing item. Click the **Details** Button and make the detailed settings.

- Motion Program

Select either *Select All* or *Individual Select* in the Motion Program List Details Window.

Setting	Details
Select All	Prints all motion programs.
Individual Select	Selects and prints individual motion programs from the list box.
Print Cross	Prints the motion program cross-reference information.
Type Button	Select individual MP configuration definitions, MP texts, and revision histories from the Select the Print Class Window.

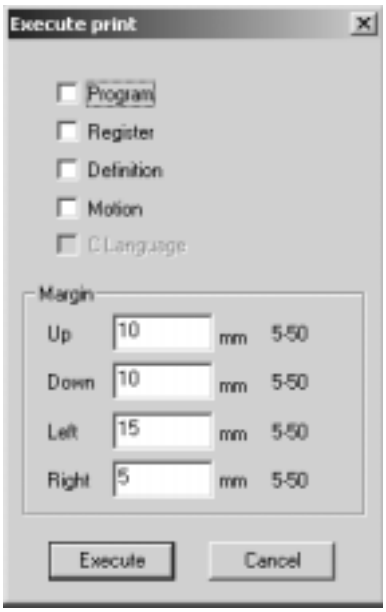
(4) Printing

The Print command is executed according to the Program, Register, Definition, and Motion Tab Page settings. The current printing status can be displayed during printing.

- Printing Procedure

Print the data using the following procedure.

1. Select ***Print*** – ***Execute Print*** from the Print Manager Menu.
2. Set the file to be printed and the printing margins in the Execute Print Window, and click the **Execute** Button.



3. Set the printer in the Print Window and click the **OK** Button.

INFO Refer to individual printer manuals for information on printing setting details.

(5) Editing Printing Settings Files

Printing settings selected in the Program, Register, Definition, and Motion Tab Pages can be saved as files. Such files are called printing settings files. This section explains how to read, delete, and save printing settings files.

(a) Reading Printing Settings Files

Select ***File*** – ***Read*** from the Print Manager Menu. In the Read Print Information File Window, select the printing settings file to be read and click the **OK** Button.

(b) Deleting Printing Settings Files

Select ***File*** – ***Delete*** from the Print Manager Menu. In the Delete Print Information File Window, select the printing settings file to be deleted and click the **OK** Button.

(c) Saving Printing Settings Files

Select ***File*** – ***Save*** from the Print Manager Menu. In the Save Print Information File Window, enter the file name and title and click the **OK** Button.

INFO Enter a file name of up to 8 characters and a title of up to 48 characters.

3

System Configuration Definitions

This section describes the system configuration definitions that set the system operating environment for the hardware settings made with the module configuration definitions in *Chapter 8 Definition Folder 5: Module Configuration Definitions*.

3.1 Outline of System Configuration Definitions

The Definition Folder is registered under the PLC folder in the File Manager Window. It is used to access the definitions folder containing the Machine Controller's system environment and operating environment settings.

(1) Types of System Configuration Definitions

The following table lists the System Configuration Definition Files that can be accessed by opening the Definitions Folder in the PLC Folder. The files listed as *Yes* in the required column must be set. The other files are set as required by the system configuration.

System Configuration Definition File	Function	Required	Reference
Application Information	Edits the system information history.	–	*Chapter 4*
System Configuration	Checks and modifies the Machine Controller status.	–	*Chapter 5*
Scan Time	Sets the high-speed, low-speed, and system scan times.	Yes	*Chapter 6*
Data Trace	Defines the data to be traced.	–	*Chapter 7*
Module Configuration	Defines the Module configuration.	Yes	*Chapter 8*

3.2 Opening System Configuration Definitions Windows

The methods used to open the following System Configuration Definitions Windows will be described.

- System definitions
- Scan time definitions
- Application information definitions
- Data trace definitions
- Module configuration definitions

The System Configuration Definitions Windows can be opened from the File Manager or the Engineering Manager.

(1) Opening from the File Manager

Open the relevant PLC folder from the Directory Tree of the File Manager.

Select the Definition Folder from the PLC Folder, and then double-click the folder. The files contained in the selected Definition Folder will also be displayed in the List of the File Manager, so double-clicking the file here will have the same effect.

(2) Opening from the Engineering Manager

The definition menu can be displayed by selecting ***File*** – ***Open*** – ***Definition*** from the Engineering Manager Menu. Select the desired item from the menus.

(3) New Definition Files

When a system information definition file is opened for the first time, a dialog box will be displayed to confirm that a new file is to be created because the setting data for each of the definition files has not been defined. Click the **OK** Button to continue with the definition operations.

3.3 Updating Files in Online Mode and Offline Mode

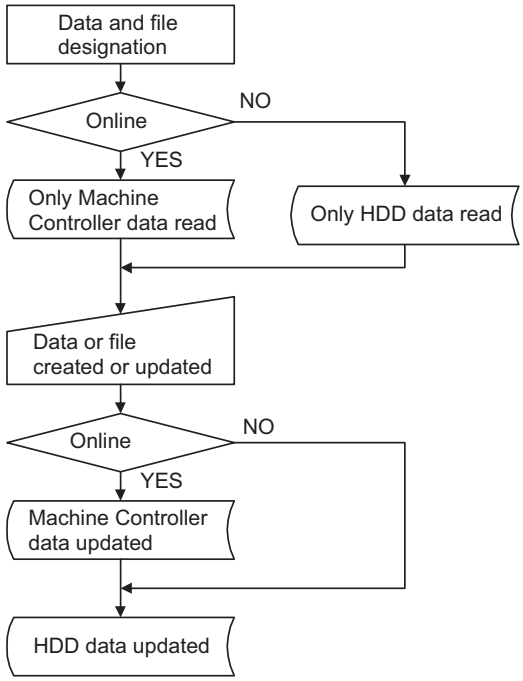
When the data or files are created or modified, the location where they are stored depends on whether the Machine Controller has been logged onto in online mode or offline mode.

(1) Logging On in Online

When in online mode, the data stored at the Machine Controller is accessed. When data is newly created or updated, it is saved to both the Machine Controller and the Programming Device hard disk.

(2) Logging On in Offline

When in offline mode, the Machine Controller is not connected, and the data stored on the Programming Device hard disk is accessed. When data is newly created or updated, it is saved only to the Programming Device hard disk. When data is created in offline mode, the data must later be transferred to the Machine Controller in online mode to enable using it in the Machine Controller. If the data is not transferred, the data in the Machine Controller will not be updated.



IMPORTANT

The creation and modification of all data and files is managed by the Programming Device.

4

Definition Folder 1: Application Information Definitions

This chapter explains how to set application information.
The procedure to set the current application information is given below such as the names of equipment using the Machine Controller and revision history. Parts of the data set here are reflected in the covers of document printouts, but it does not affect actual Machine Controller operation.
Use the application information for system development-related history, memos, etc.

4.1 Opening the Application Information Window

Open the Application Information Window according to instructions in *3.2 Opening System Configuration Definitions Windows*.

(1) Application Information Menus

The following table shows the menu commands and functions displayed in the Application Information Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the Application Information Window.
	Save & Save to Flash	Saves to flash memory.
	Save	Saves application information data.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(2) Setting Application Information

Setting	Details
Order No.	Input the system order number, up to eight characters.
Controller Name	Input a name for the Machine Controller, up to eight characters.
Controller Type	Input the type of the Machine Controller that is to be used, up to 32 characters.
User	Input the user, up to 32 characters.
Used	Input the area of use, up to 32 characters.
Equip.	Input the name of the equipment, up to 32 characters.
Usage	Input the application, up to 32 characters.
Date Prepared	Input the date prepared, up to 48 characters.
Revision History	Input the revision history, up to 48 characters. Up to 15 revision history records can be input.

4.2 Saving Application Information

Save application information using the following procedure.

1. Select ***File*** – ***Save*** from the menus.
2. Click the **Yes** Button in the Application Information message box.

4.3 Closing Application Information

Exit the application information settings by closing the Application Information Window.

To close the window, select ***File*** – ***Close*** from the menus.

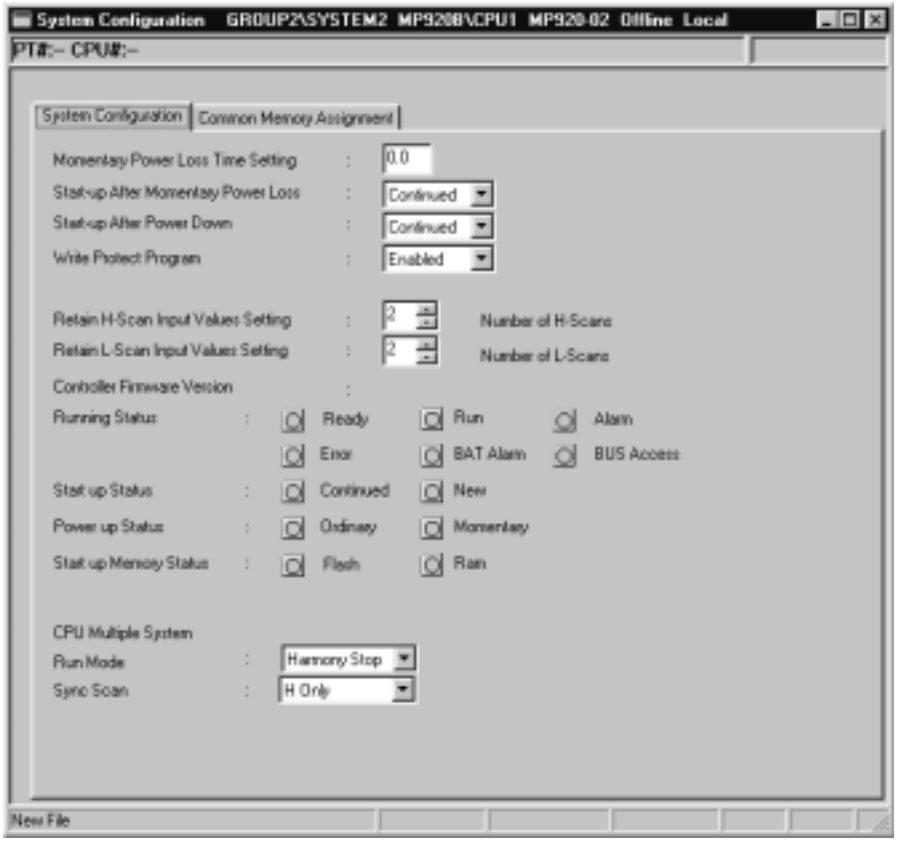
5

Definition Folder 2: System Configuration

This chapter explains how to perform operations in the System Configuration Window. The System Configuration Window is used to check the operating mode and status of the Machine Controller's CPU, and to make settings.

5.1 Opening the System Configuration Window

Open the System Configuration Window according to instructions in *3.2 Opening System Configuration Definitions Windows*.



(1) Login Information

Login information is displayed below the title bar in the System Configuration Window. Hyphens will be displayed in offline mode.

Login Information	Details
PT#	Displays the communication logical port number.
UT#	Displays the unit number of the Machine Controller.
CPU#	Displays the number of the CPU which was logged onto.

(2) System Configuration Menus

The following table shows the menu commands and functions displayed in the System Configuration Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the System Configuration Window.
	Save & Save to Flash	Saves to flash memory.
	Save	Saves system definition data.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
Edit		
	Delete Assignment	Clears the shared memory allocation data.
Control		
	CALENDAR	Changes the calendar values.
	CPU RUN	Sets online operating mode.
	CPU STOP	Sets offline stop mode.
	Error Reset	Resets the display of detected errors.
	Memory Clear	Clears the Machine Controller's memory.
	MEM COMPACT	Compresses the Machine Controller's user program memory.
	CPU RESET	Resets the CPU.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(3) Tab Pages

The System Configuration Window has two tab pages.

Tab Page	Details
System Configuration	Sets the Machine Controller status and calendar values.
Common Memory Assignment	Assigns common memory when the CPU multiple system is used.

(a) System Configuration Tab Page

Status-related items can be accessed only in online mode.

Setting	Details
Momentary Power Loss Time Setting	Enter the power loss decision time. Enter a time from 0.0 to 9.9 s. If 0.0 is entered, all power losses will be judged as ordinary power losses, rather than as momentary power losses.
Start-up After Momentary Power Loss	Select the method with which the Machine Controller will be started following momentary power losses.
Start-up After Power Down	Select the method with which the Machine Controller will be started following power ON after power losses.
Write Protect Program	***Enabled***: Programs and definition data can be changed. ***Disabled***: Programs and definition data can be displayed but they cannot be changed. Register values, however, can still be changed.
Retain H-Scan Input Values Setting (Retention of Previous High-scan Input Value)	Enter the number of times that the previous high-speed scan input values are to be retained in the event of an I/O error. Enter a number from 1 to 255. If ***3*** is entered, for example, then high-speed scan inputs will be reset when an I/O error occurs for four consecutive times for high-speed scan inputs.
Retain L-Scan Input Values Setting (Retention of Previous Low-scan Input Value)	Enter the number of times that the previous low-speed scan input values are to be retained in the event of an I/O error. Enter a number from 1 to 255. If ***3*** is entered, for example, then low-speed scan inputs will be reset when an I/O error occurs for four consecutive times for low-speed scan inputs.
Controller Firmware Version (System Software Number)	Displays the Machine Controller's system software number (in online mode only).
Running Status	Displays the current operating status of the Machine Controller in online mode.
Start up Status	Displays the Machine Controller's status at startup.
Power up Status	Displays the Machine Controller's status when rebooted.
Start up Memory Status	Displays the memory status at startup.
CPU Multiple System	Makes the settings for the CPU multiple system.

1. Running Status

Status	Meaning	
Ready	Lit: Notrmal Not lit: Self-diagnosis error	Lit when Module is normal. Not lit when an error has occurred.
Run	Lit: Running Not lit: Stopped	Lit when scan is executed. Not lit if a fatal error occurs or if an operation is executed in the System Configuration Window that stops the Machine Controller.
Alarm	Lit: Alarm Not lit: Notrmal	Lit when an alarm has occurred. Not lit when normal.
Error	Lit: Error Not lit: Notrmal	Lit when an error has occurred. Not lit when normal.
BAT Alarm	Lit: Battery voltage low Not lit: Battery voltage normal	Lit when battery voltage is low. Not lit when battery voltage is normal.
BUS Access	Lit: Bus being accessed Not lit: Bus accessed stopped	Lit during CPU Module bus access. Not lit when bus access is stopped.

2. CPU Multiple System

- Run Mode

  Set the CPU multiple system operational mode.

  - ***Harmony Stop*** (coordinated stop): Linked operation, so the stopping of one CPU will also stop the other CPU.
  - ***Stand alone*** (independent run): The CPU operations have no effect on each other.

- Sync Scan (Synchronized Scan)

  Set the synchronized scan for the CPU multiple system.

  - ***H/L***: Synchronize both high-speed scan and low-speed scan.
  - ***H only***: Synchronize only high-speed scan.
  - ***L only***: Synchronize only low-speed scan.
  - ***No Synchronize***: Both CPUs run without synchronization.

  For the MP920, set this to ***H only.***

(b) Common Memory Assignment Tab Page

Setting		Details
Range		Set the M registers.
SCAN	HO/LO	Writes the contents of the M registers in the local CPU to the M registers with the same addresses in the remote CPU. *HO* will execute the write during the system I/O processing in the high-speed scan. *LO* will execute the write during the system I/O processing in the low-speed scan. Select *HO* when the user ladder program is being used in the high-speed scan and select *LO* when the user ladder program is being used in the low-speed scan.
	HI/LI	Reads the contents of the M registers specified by the remote CPU and writes them to the M registers with the same addresses in the local CPU. *HI* will execute the write during the system I/O processing in the high-speed scan. *LI* will execute the write during the system I/O processing in the low-speed scan. Select *HI* when the user ladder program is being used in the high-speed scan and select *LI* when the user ladder program is being used in the low-speed scan.
Station Name (Comment)		Input a station name.

5.2 Changing Machine Controller Status

When the System Configuration Window is displayed and active, the status of the Machine Controller can be changed using the Control (C) Menu from the Engineering Manager Menu. The changes made are immediately reflected in the Machine Controller's operation.

IMPORTANT

Machine Controller status cannot be changed in offline mode.

(1) Starting Machine Controller Operation

1. Select ***Control*** – ***CPU RUN*** from the menus.
2. Click the **Yes** Button in the message box.

(2) Stopping Machine Controller Operation

1. Select ***Control*** – ***CPU STOP*** from the menus.
2. Click the **Yes** Button in the message box.

Execution of the user program will stop when the Machine Controller stops operation.

(3) Resetting the Machine Controller's Error Display

Reset the display of errors detected by the Machine Controller using the following procedure. Before resetting the display, use the register list function to check the Error Description.

1. Select ***Control*** – ***Error Reset*** from the menus.
2. Click the **Yes** Button in the message box.

(4) Clearing Machine Controller Memory

When the Machine Controller's memory is cleared, the user programs and definition data will be deleted. The contents of the flash memory, however, will not be cleared.

1. Select ***Control*** – ***Memory Clear*** from the menus.
2. Click the **Yes** Button in the message box.

IMPORTANT

The Machine Controller operation must be stopped when clearing Machine Controller memory is executed. The basic control cycle will not return to its default value when Machine Controller memory is cleared. The power supply must be turned OFF and then back ON to return the basic control cycle to the default value.

(5) Compressing Memory

If the user program becomes too large and the available user program memory is reduced, then the user program memory will become fragmented when the program is repeatedly changed. If that occurs, it may become impossible to make changes or additions to the program even if the required memory capacity is available. By executing the memory compression, the utilized area in the user program memory will be packed and the fragmented area will be repaired.

1. Select ***Control*** – ***MEM COMPACT*** from the menus.
2. Click the **Yes** Button in the message box.

IMPORTANT

By using memory compression, programs can be created up to the limit of the user program memory. When the user program memory is full, however, existing programs cannot be changed.

(6) Resetting the CPU

When the CPU is reset, the status will be the same as when the power is turned OFF and then ON.

Reset the CPU using the following procedure.

1. Select ***Control*** – ***CPU RESET*** from the System Configuration Menu.
2. Click the **Yes** Button in the message box.

IMPORTANT

- The CPU reset function cannot be used with the MP930.
- The Machine Controller operation must be stopped before resetting the CPU. For the method to stop the Machine Controller operation, refer to *(2)* in *5.2 Changing Machine Controller Status*.

5.3 Saving System Configuration

Save the system definitions using the following procedure.

1. Select ***File*** – ***Save*** from the System Configuration Menu.
2. Click the **Yes** Button in the message box.
3. Click the **OK** Button in the message box.

An Error Detection Message is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

5.4 Closing System Configuration

Exit the system configuration definitions by closing the System Configuration Window.

To close the Window, select ***File*** – ***Close*** from the menus.

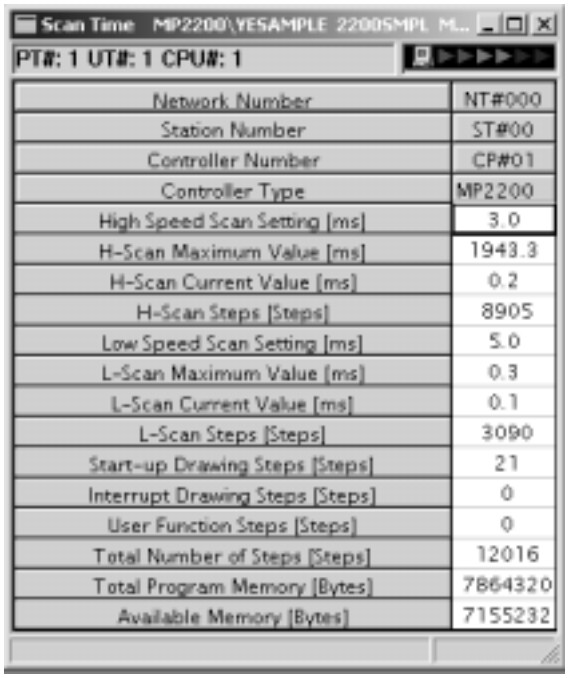
6

Definition Folder 3: Scan Time Definitions

This chapter explains how to set the scan times.
The scan times are the cycles repeated by Machine Controller to execute the user programs (high-speed scan program, low-speed scan program) over and over. The MP940 also features a system scan to enable high-precision servo control.
All three scan times must be set for the MP940: High-speed, low-speed, and system. The scan time settings are important factors in Machine Controller operation. Refer to the relevant User's Manual: Design and Maintenance and be sure that suitable times are set.

6.1 Opening the Scan Time Window

Open the Scan Time Window according to instructions in *3.2 Opening System Configuration Definitions Windows*.



(1) Login Information

Login information is displayed below the title bar in the System Configuration Window. Hyphens will be displayed in offline mode.

Login Information	Details
PT#	Displays the communication logical port number.
UT#	Displays the unit number of the Machine Controller.
CPU#	Displays the number of the CPU which was logged onto.

(2) Network Information

Machine Controller network information is displayed.

Information	Details
Network Number	Displays the network number.
Station Number	Displays the station number.
Controller Number	Displays the CPU number.
Controller Type	Displays the Machine Controller type.

(3) Scan Time Menus

The following table shows the menu commands and functions displayed in the Scan Time Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the Scan Time Window.
	Save	Saves scan time setting data.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	PC Add	Adds the Machine Controller displaying the scan time.
	PC Delete	Deletes the Machine Controller displaying the scan time.
Set		
	Basic Control Cycle	Sets the basic control cycle (MP940 only).
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(4) Setting Scan Time Definitions

In online mode, the Machine Controller's high-speed scan time is displayed. In offline mode, the scan time data saved on the Programming Device hard disk is displayed.

Setting	Details
High-speed Scan Setting	*Setting*: Input the set value for the scan time.
	Maximum Run Time: Displays the maximum value for the high-speed scan time. To clear the maximum value, input 0. In offline Mode, 0 is always displayed.
	Current Run Time: Displays the current high-speed scan time. In offline mode, 0 is always displayed.
	Number of steps: Displays the total number of steps in the high-speed scan program.
Low-speed Scan Setting	Sets the low-speed scan time. The meaning of each item is the same as for the high-speed scan.
Start-up DWG Steps	Displays the total number of steps in the startup drawing.
Interrupt DWG Steps	Displays the total number of steps in the interrupt drawing.
User Function Steps	Displays the total number of steps in user functions.
Total Steps	Displays the total number of steps in all drawings.
Program Memory	*Total*: Displays the total capacity of the program memory (drawings, functions, and motion programs). In offline mode, 0 is always displayed.
	Available: Displays the amount of program memory available. In offline mode, 0 is always displayed.

In online mode, the maximum value can be cleared by inputting 0 in the *Maximum H-Scan Run Time* or the *Maximum L-Scan Run Time* and saving it. After the old maximum value has been cleared, a new one will be entered.

6.2 Setting the System Scan Time

The system scan time is set only for the MP940.

The scan times determine the flow of program execution. The MP940 provides three different scan times: system, high-speed, and low-speed. The system scan time must be set first because it is used as a basis for setting the high-speed and low-speed scan times.

The scan times must be set as shown in the following table. Refer to the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details.

Scan	Scan Time Setting
System scan	Select one of 0.5, 1, 2, or 4 ms.
High-speed scan	A multiple of the system scan time between 0.5 and 32 ms
Low-speed scan	A multiple of the system scan time between 2.0 and 100 ms

(1) Opening the Basic Control Cycle Window

Select ***Set*** – ***Basic Control Cycle*** from the Scan Time Menu. The following Basic Control Cycle Window will be displayed.

Setting	Details
Set Time	Set the system scan time. The current system scan time setting is shown underneath the setting.
Maximum Time	Set the maximum value of the system scan time. The maximum value measured to present is shown underneath the setting.
Current Time	Displays the current system scan time.
Steps	Displays the number of steps for the system scan.
Background Time	Displays the percentage of background processing in the overall system processing.
Watchdog Set	Set the watchdog time as a presumed maximum limit to the system scan time.

IMPORTANT

- The power supply must be turned OFF and back ON after the basic control cycle is changed.
- The basic control cycle will not return to its default value when Machine Controller memory is cleared. The power supply must be turned OFF and then back ON to return the basic control cycle to the default value.

6.3 Saving Scan Time Definitions

Save the scan time definitions using the following procedure.

1. Select ***File*** – ***Save*** from the Scan Time Menu.
2. Click the **Yes** Button in the Scan Time Message Box.
3. Click the **OK** Button in the message box.

6.4 Closing Scan Time Definitions

Exit the scan time definitions by closing the Scan Time Window.

To close the window, select ***File*** – ***Close*** from the menus.

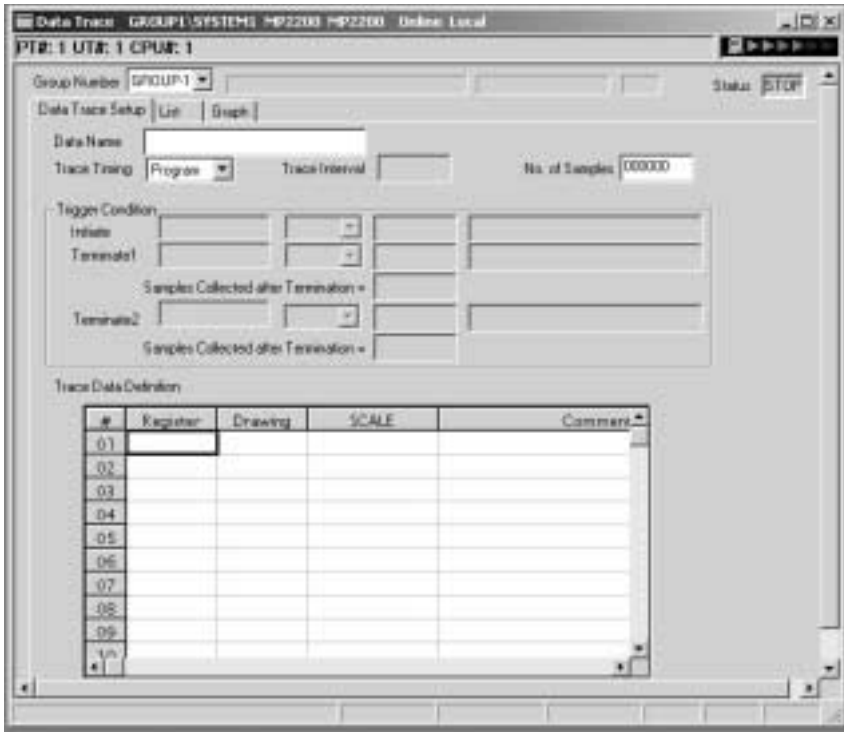
7

Definition Folder 4: Data Trace Definitions

This chapter explains how to define data to be traced and how traced data is displayed. Data being traced can be obtained using trigger conditions. The trace data can be displayed in either a list or a graph, and it can be saved.

7.1 Opening the Data Trace Window

Open the Data Trace Window according to instructions in *3.2 Opening System Configuration Definitions Windows*.



(1) Login Information

Login information is displayed below the title bar in the Data Trace Window. Hyphens will be displayed in offline mode.

Login Information	Details
PT#	Displays the communication logical port number.
UT#	Displays the unit number of the Machine Controller.
CPU#	Displays the number of the CPU which was logged onto.

(2) Group and Status Information

Information	Details
Group Number	Select the group number.
Status	Displays the data trace status in the CPU of the currently displayed group number.
	RUN: Data trace currently being executed. *STOP*: Data trace not being executed.

(3) Tab Pages

The Data Trace Window has three tab pages.

Tab Page	Details
Data Trace Setup	Sets the data trace trigger.
List	Displays the traced data in a list.
Graph	Displays the traced data in a graph.

INFO

While the Data Trace Window is active, the tab pages can be accessed in the following order by selecting ***View – Next Page*** from the menus.

- Data Trace Setup → List → Graph → Data Trace Setup

To access the tab pages in reverse order, select ***View – Back Page*** from the menus.

(4) Data Trace Menus

The following table shows the menu commands and functions displayed in the Data Trace Window.

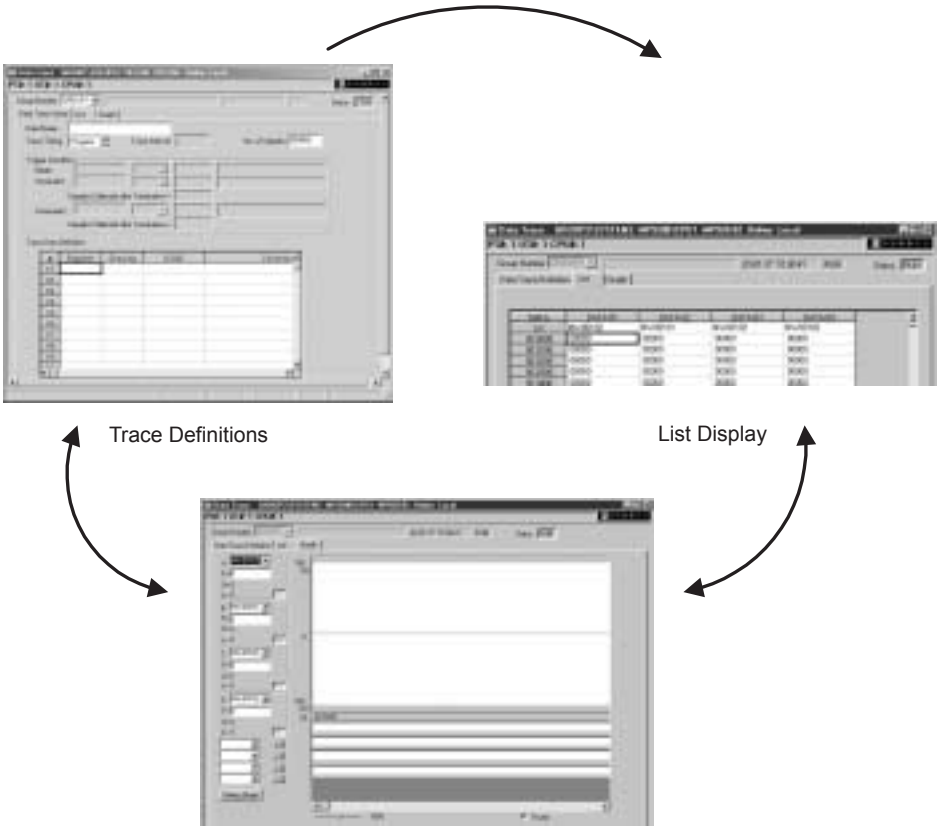
Menu Command	Function
File	
File Manager	Opens the File Manager.
Open	Opens windows for individual functions.
Close	Closes the Data Trace Window.
Save & Save to Flash	Saves to flash memory.
Save	Saves trace definition data.
Delete	Deletes trace definition data.
Trace Data	
Read	Reads trace data from floppy disk.
Write	Writes trace data to floppy disk.
Trace Data Write (CSV Type)	Saves trace data in CSV format.
Page Setting	Makes the page settings for printing.
Trace Data Print	Prints trace data.
Exit	Exits the Engineering Manager.
Edit	
Trigger Initiate Condition	
Delete	Deletes the trigger condition.
Trace Setting	
Delete	Deletes rows of the specified trace data.
Add	Adds rows of the specified trace data.
Default Setting	Sets the default values.
View	
Tool Bar	Displays the Tool Bar.
Status Bar	Displays the status bar.
Quick Reference	Displays the Quick Reference.
Mode	
RE-DSP	Refreshes the display data.
AUTO	Automatically refreshes the display data.
Sampling	
Number of read data	Changes the number of data to be read.
Trace Time Axis	Changes the trace time axis.
Jump to Appoint Data	Displays a row of trace data from any sample number.
Data	
DEC	Displays trace data in decimal.
HEX	Displays trace data in hexadecimal.
m/s	Switches the time axis unit.
Next Page	Displays the next tab page.
Back Page	Displays the previous tab page.
Control	
Trace Start	Starts the data trace.
Trace Stop	Stops the data trace.
Window	
Cascade	Stacks windows in the display.
Tile	Lines up windows in the display.
Arrange Icons	Lines up icons.
Help	
Contents and Index (F1)	Displays help information.
About Application	Displays version information.

7.2 Outline of Data Trace Operations

The three tab pages are switched between to set the trace trigger, check trace data, and perform other operations for tracing.

A standard procedure for data tracing is given below.

1. Set the data trace trigger conditions on the Data Trace Setup Tab Page.
2. Start the trace.
3. Check the trace data list on the List Tab Page.
4. Set the graph scale and other parameters on the Graph Tab Page to display the trace data as a graph.
5. Repeat the above steps to produce various trace data. It is often convenient to switch between the list display and the graph display.



7.3 Data Trace Setup Tab Page

This tab page is used to set the following items.

- Setting trace definitions
- Editing trace definitions
- Saving and deleting trace definitions
- Starting traces
- Saving and deleting trace data
- Reading trace data

(1) Setting Trace Definitions

Refer to the Data Trace Setup Tab Page in *7.1 Opening the Data Trace Window*.

Setting	Details
Data Name	Input a name for the trace definition data, within 32 characters. The name entered here has no effect on data trace execution.
Trace Timing	Select the timing for executing the data trace. ***Program***: Executes the data trace when a TRACE system function is executed in a DWG or function program. ***H-SCAN***: Executes the data trace each high-speed scan. ***L-SCAN***: Executes the data trace each low-speed scan. ***S-SCAN***: Executes the data trace each system scan. (MP940 only)
Trace Interval	When ***H-SCAN/L-SCAN*** is selected for the *Trace Timing*, input the trace scan cycle (0 to 32,767). Cannot be set when ***Program*** is selected for the *Trace Timing*. If 3 is input, for example, the data trace will be executed at an interval of once every four scans. If 0 is input, then the data trace will be executed each scan.
No. of Samples	Input the maximum number of times (0 to 999,999) that the data trace is to be executed. Cannot be set when ***Program*** is selected for the *Trace Timing*. If 0 is input, a continuous trace (cyclic trace) will be executed until it is stopped either manually or by the condition of *Terminate 1* or *Terminate 2* for the *Trigger Condition*. If 1000 is input, the trace will be executed for 1,000 data samples.
Trigger Condition: Initiate (Initiate Trigger Condition)	When ***H-SCAN/L-SCAN*** is selected for the *Trace Timing*, input the condition for beginning the data trace. Cannot be set when ***Program*** is selected for the *Trace Timing*. If no condition is input here, then the trace operation must be started manually.
Trigger Condition: Terminate 1 or Terminate 2 (Terminate Trigger Condition)	When ***H-SCAN/L-SCAN*** is selected for the *Trace Timing*, input the condition for stopping the data trace and the number of traces to be executed from when the condition is met to when the data trace is stopped. Up to two terminate trigger conditions can be set. Cannot be set when ***Program*** is selected for the *Trace Timing*. If 0 is input for the *Samples Collected after Termination*, the trace will be stopped immediately when the trigger condition is met. If the *Terminate 1* or *Terminate 2* in the *Trigger Condition* is not input, the data trace will be executed until it is stopped either manually or by reaching the number of traces specified for the *No. of Samples*. If there are two conditions set for *Terminate 1* and *Terminate 2* in the *Trigger Condition*, then the data trace will be stopped when either of those conditions is met.
Trace Data Definition	Input the register numbers (Register), drawing numbers (Drawing), scale conversion values (SCALE), or comments that are to be traced. A maximum of 16 items can be specified.

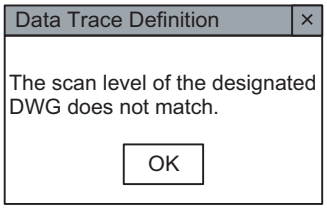
(2) Details of Trace Data Definition

Setting	Details
Register (Register Number)	Input the numbers of the registers to be traced. The types of registers that can be input are S, O, M, and D registers. Depending on the format of the register, the data to be traced can be integer data, double-length integer data, or bit data.
Drawing (Drawing Number)	If the register number to be traced is a D register (i.e., if a D register is input for the *Register*), then input a D register drawing number. For a motion program, input a motion program drawing number (MP□□□□). If the register number is not a D register, there is no need to input anything here. D registers in different scans cannot be specified at the same time. Also, the data trace can be executed only when the scan level of the D registers to be traced is the same as the scan level specified for the *Trace Timing*.*
SCALE (Scale Conversion Value)	Input the scale conversion value for the traced data. This value will be the amplitude when the trace data is displayed in a graph.
Comment	Input a comment for the register to be traced, up to 32 characters.

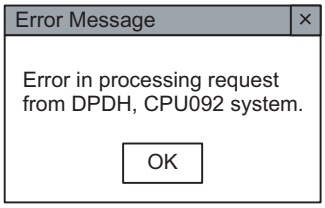
* The trace timing and drawing settings are checked when the trace definitions data is saved. The following table shows the possible combinations. Do not use any other combinations when tracing D registers.

Trace Timing	Drawing
Program	H□□, H□□.□□, MP□□□□
H-SCAN	H□□, H□□.□□, MP□□□□
L-SCAN	L□□, L□□.□□

For example, an error will occur if an MP□□□□ drawing with the trace timing set to the ***L-SCAN*** (low-speed scan) is detected when saving.



An error will be detected at the Machine Controller when online if the motion program or drawing is not registered or if the upper limit of D register numbers is exceeded.



Error checks are not performed in offline mode.

If the trace data definition is saved with no data entered for the *Trace Data Definition*, the trace definition data for the currently displayed group will be deleted. In effect, this is the same as deleting it by selecting ***File*** – ***Delete*** from the Data Trace Menu.

INFO

■ Trigger Conditions

- There are three trigger conditions: Initiate trigger, terminate trigger 1, and terminate trigger 2.
- If a bit register number is input on the left side, only = can be selected as the operator. Input either ON or OFF on the right side.
- If a non-bit register number is input on the left side, select the operator from among <, ≤, =, ≠, ≥, or >, and input a number on the right side.
- Input the number of samples to be taken from when the trigger condition is met to when the data trace is stopped, in the *Samples Collected after Termination* of *Terminate 1* or *Terminate 2* of the *Trigger Condition*. Input a number from 0 to 65,534.
- Input a comment up to 32 characters.

■ Setting Default Values

The default values can be set by selecting ***Edit*** – ***Default Setting*** from the Data Trace Menu. The *Trace Timing* will become ***Program***, the *No. of Samples* will become 0, and all other data will be cleared.

(3) Editing Trace Definition Data

This section explains how to edit trace definition data.

(a) Deleting the Trigger Condition

Delete the trigger condition using the following procedure.

1. Move the cursor to the trigger condition to be deleted.
2. Select ***Edit*** – ***Trigger Initiate Condition*** – ***Delete*** from the Data Trace Menu.
3. The trigger condition specified in step 1. will be deleted.

INFO

When a trigger condition is deleted, all of the settings associated with that trigger condition will be deleted. For example, if *Terminate 1* of the *Trigger Condition* is deleted, the data for the condition type, comment, and delay will all be deleted.

(b) Deleting a Trace Data Definition Row

Delete a *Trace Data Definition* row using the following procedure.

1. Move the cursor to the row of the trace data to be deleted.
2. Select ***Edit*** – ***Trace Setting*** – ***Delete*** from the Data Trace Menu.
3. The trace definition selected in step 1. will be deleted.

(c) Inserting a Trace Data Definition Row

Insert a *Trace Data Definition* row using the following procedure.

1. Move the cursor to the position where the trace data definition is to be inserted.
2. Select ***Edit*** – ***Trace Setting*** – ***Add*** from the Data Trace Menu.
3. A blank row will be inserted at the position specified in step 1.

(4) Saving and Deleting Trace Definition Data

(a) Saving

1. Select ***File*** – ***Save*** from the Data Trace Menu.
2. Click the **Yes** Button in the Data Trace Message Box.

IMPORTANT

Saving a trace definition with no data is the same as deleting it. If the save operation fails, an error message will be displayed. Refer to *Appendix A Error Messages*, remove the cause of the error, and then save the data again.

(b) Deleting

1. Select ***File*** – ***Delete*** from the Data Trace Menu.
2. Click the **Yes** Button in the Data Trace Message Box.

(5) Starting the Data Trace

The Machine Controller starts the data trace operation immediately when trace definition data is saved to the Machine Controller. If trace definitions are changed and saved again, the data traced up to that point will be lost and the data trace operation will start again from the beginning.

The current trace execution status is displayed in the *Status* Box.

INFO

■ If the Machine Controller does not perform a data trace, it may be due to the following conditions:

- The currently used Machine Controller is in offline stop mode.
- The MPE720 is in offline mode.
- The TRACE system function in the main program is not being executed when ***Program*** is set for the *Trace Timing* under the Data Trace Setup Tab Page.
- The RESET input for the TRACE system function in the main program is ON when ***Program*** is set for the *Trace Timing* under the Data Trace Setup Tab Page.
- The actual number of traces has reached the value set for the *No. of Samples* on the Data Trace Setup Tab Page.
- The condition set for *Terminate 1* or *Terminate 2* of the *Trigger Condition* under the Data Trace Setup Tab Page has been met.
- The data trace has been manually stopped.

(6) Saving and Deleting Trace Data

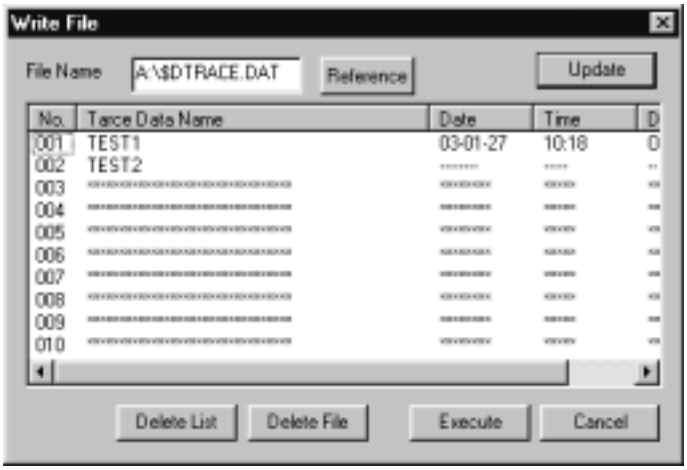
The data resulting from a data trace can be saved to a floppy disk. The data that is saved depends on the tab page that is active.

If the Data Trace Setup Tab Page is active, only the trace definitions will be saved. If the List or Graph Tab Page is active, the trace definitions and the trace results will both be saved.

(7) Writing the Trace Data

The trace data can be written (saved) in a floppy disk in the Write File Window.

Select ***File*** – ***Trace Data*** – ***Write*** from the Data Trace Menu. The Write File Window will be displayed.



Display	Details
File Name	Input the file name and the drive letter of the floppy disk where the trace data is to be saved. The default file name is $DTRACE.DAT. After inputting the file name, click the **Update** Button. The trace data saved to the file that was input will then be displayed under *No.001* to *010*.
No.	Displays the trace data number.
Trace Data Name	Displays the name of the trace data. The trace data name is the same as the data saved in the *Data Name* on the Data Trace Setup Tab Page.
Date	Displays the date when the data last traced was saved.
Time	Displays the time when the data last traced was saved.
Data	Displays the type of data saved.

(a) Symbols

The following symbols have special meanings in the client area of the Write File Window.

- A hyphen (-) indicates that the data saved there is trace definition data only.
- ○ indicates the data saved there includes both trace definition data and traced results.
- ×× indicate that no data is saved there.

(b) Saving Trace Data

Save trace data using the following procedure.

1. Input the name of the file to be written for the *File Name* and click the **Update** Button. A list of trace data will be displayed.
2. Click on the *No.* column at which to write the trace data.
3. Click the **Execute** Button.
4. Click the **Cancel** Button.
   The trace data will be written successfully.

(c) Deleting Trace Data

Either a trace data file or individual trace data saved in a floppy disk can be deleted.

Delete trace data using the following procedure.

- Deleting Trace Data Files

Delete the trace data file displayed for the *File Name* in the Write File Window.

1. For the *File Name*, input the name of the file to be deleted, and then click the **Update** Button.
2. Click the **Delete File** Button.
3. Click the **Yes** Button in the message box. The trace data file specified in step 1 will be deleted.
4. Click the **Cancel** Button to complete the deletion of the trace data file.

- Deleting Individual Trace Data

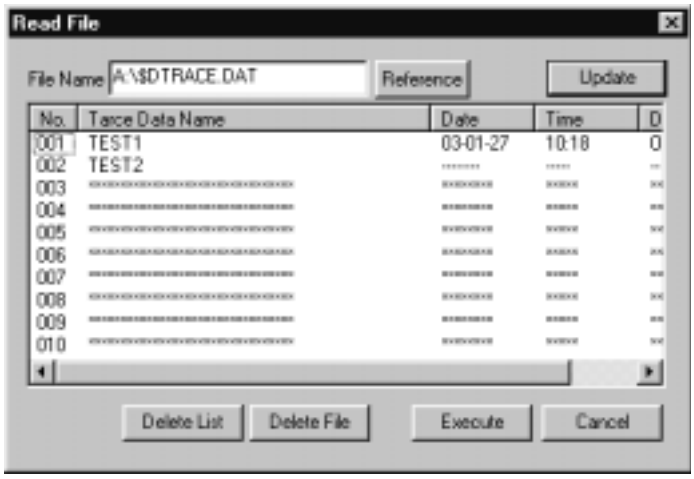
Delete trace data for specific trace data numbers.

1. For the *File Name*, input the name of the file containing the data to be deleted. Then click the **Update** Button.
2. Select the number of the data that is to be deleted.
3. Click the **Delete List** Button.
4. Click the **Yes** Button in the message box. The trace data item specified in step 2 will be deleted.
5. Click the **Cancel** Button to complete the deletion of the trace data items.

(8) Reading Trace Data from a Floppy Disk

This section explains how to read trace data that has been saved to a floppy disk.

Select ***File*** – ***Trace Data*** – ***Read*** from the Data Trace Menu. The Read File Window will be displayed.



(a) Reading Trace Data

Read trace data from a floppy disk using the following procedure.

1. For the *File Name*, input the name of the file containing the data to be read. Then click the **Update** Button. A list of trace data will be displayed.
2. Select the number of the trace data that is to be read.
3. Click the **Execute** Button.
4. Click the **Cancel** Button to complete the reading of the trace data.

INFO

- A maximum of 10 trace data items can be written to a single file.
- Trace data is read by group.

(b) Deleting Trace Data

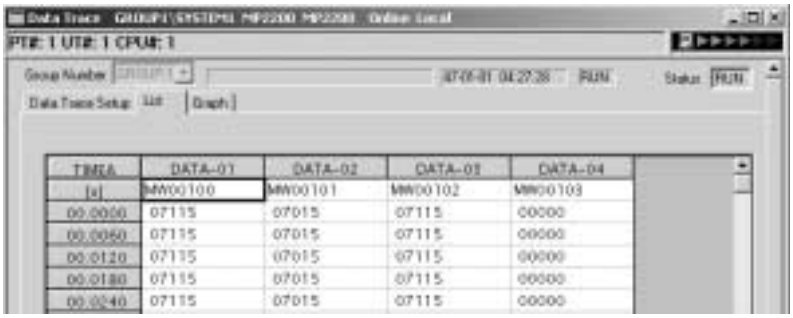
Refer to *(c)* in *(7) Writing the Trace Data*.

7.4 List Tab Page

This tab page is used to display the results of a data trace in numeric form. The following items can be set in the List Tab Page.

- Updating displayed data
- Changing the base number of displayed data
- Starting and stopping manual traces
- Changing the trace time axis
- Changing the sample number from which to start the display
- Setting the number of data items to be read

(1) Setting the List Tab Page

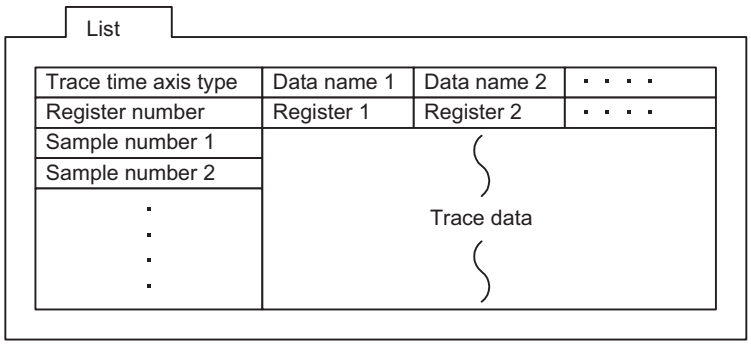


(a) Group and Status Information

Group and status information are displayed above the tab.

Information	Details
Group Number	Selects the group number.
Data Name	Displayed to the right of the *Group Number*. Displays the name input for the *Data Name* in the Data Trace Setup Tab Page.
Last Status	Displayed to the left of the *Status*. Displays the time when data was last traced and the execution status of that data trace.
	RUN: Data trace being executed. *STOP*: Data trace stopped.
Status	Displays the data trace execution status in the CPU of the currently displayed group number.
	RUN: Data trace being executed. *STOP*: Data trace stopped.

(b) Display Configuration



- The trace time axis type is determined by the trace time axis setting.
- The register number is displayed first in the column under the trace time axis type, and then the sample numbers are displayed.
- The registers set for the *Trace Data Definition* on the Data Trace Setup Tab Page are displayed in order in the register number row.

(c) Display Items

Display	Details
Trace time axis	Displays the axis type for trace data. Refer to *Details of Trace Time Axis Setting* provided after this table.
Data names	Displays the names automatically given to trace data: DATA-01, DATA-02, DATA-03, etc.
Register numbers	Displays the numbers of the registers that are traced.
Sample numbers	Displays the sample numbers. The display format depends on the data displayed on the trace time axis.
Trace data	Displays the traced data according to the register data types (integer, double-length integer, real, or bit).

IMPORTANT

■ Details of Trace Time Axis Setting

There are four types of trace time axes: TIMEA, TIMEB, SNOA, and SNOB. Each of these is explained below.

- TIMEA
  Trace data is displayed in time units*, with the time at which the trace was begun as 0. Accordingly, 0 represents the oldest trace data. The data is traced each scan as set in the Scan Time Window.
- TIMEB
  Trace data is displayed in time units*, with the time at which the trace was stopped as 0. Accordingly, 0 represents the newest trace data. The data is traced each scan as set in the Scan Time Window.
- SNOA
  Trace data is displayed in sample number units, with the time at which the trace was begun as 0. Data is traced at the interval set for the *Trace Timing* in the Data Trace Setup Tab Page. Trace data numbers are displayed in order, from smaller to larger (0 1, 2, 3...), with 0 being the oldest.
- SNOB
  Trace data is displayed in sample number units, with the time at which the trace was stopped as 0. Data is traced at the interval set for the *Trace Timing* in the Data Trace Setup Tab Page. Trace data numbers are displayed in order, from larger to smaller (...−3, −2, −1, 0), with 0 being the newest.

* The data can be displayed in units of either 1 or 0.01 second. To switch these two unit settings, select ***View*** − ***Data*** − ***m/s*** from the Data Trace Menu. For example, 01.000 will be 1 second in units of 1 second, and 0.01 seconds in units of 0.01 seconds. The placement of the decimal point will vary depending on the length of time for the trace, so 01.000 is the same as 1.0000.

(2) Updating Display Data

The most recent trace data can be displayed.

Update the trace data using the following procedure.

Select ***View*** − ***Mode*** − ***RE-DSP*** from the Data Trace Menu.

IMPORTANT

■ Automatic Updating of Trace Data

When ***View*** − ***Mode*** − ***Auto*** is selected from the Data Trace Menu, the trace data is automatically scrolled and the most updated trace data is displayed. It is not possible to switch to another tab page while in the automatic update mode.

Selecting ***View*** − ***Mode*** − ***Auto*** again cancels the automatic updating.

(3) Changing the Base Number of Display Data

The data can be displayed in either decimal or hexadecimal format by changing the base number. The base number, however, cannot be changed, for bit data.

(a) Decimal Display

Display the data in decimal format using the following procedure.

1. Move the cursor to the item to be displayed in decimal.
2. Select ***View*** – ***Data*** – ***DEC*** from the Data Trace Menu. The data will be displayed in decimal.

(b) Hexadecimal Display

Display the data in hexadecimal format using the following procedure.

1. Move the cursor to the item to be displayed in hexadecimal.
2. Select ***View*** – ***Data*** – ***HEX*** from the Data Trace Menu. The data will be displayed in hexadecimal.

(4) Manually Starting and Stopping Data Traces

Traces can be started and stopped manually.

(a) Starting Manually

To manually start a data trace operation, select ***Control*** – ***Trace Start*** from the Data Trace Menu.

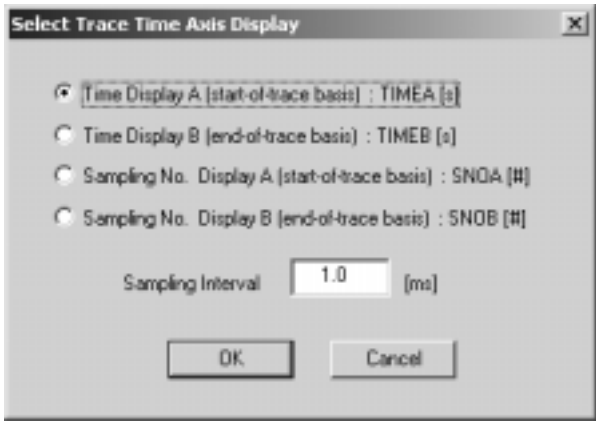
(b) Stopping Manually

To manually stop a data trace operation, select ***Control*** – ***Trace Stop*** from the Data Trace Menu.

(5) Changing the Trace Time Axis

Change the time axis for displaying the trace data using the following procedure.

1. Select ***View*** – ***Sampling*** – ***Trace Time Axis*** from the Data Trace Menu.
2. In the Select Trace Time Axis Display Window, select the time axis display and set the sampling interval and then click the **OK** Button.
   The trace time axis display will be switched and the numeric data will be displayed.



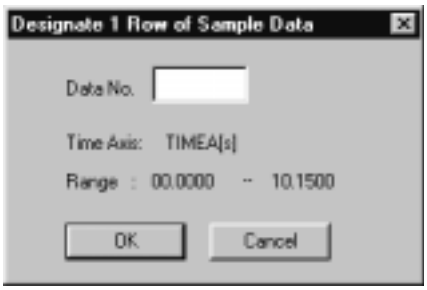
INFO

If the *Trace Timing* on the Data Trace Setup Tab Page is set to ***Program*** and the time axis is changed to either Time Display A or Time Display B, the sampling interval must be input in the window in step 2 of the above procedure.

(6) Changing the Beginning Sample Number for Display

Change and display trace data beginning with any desired sample number using the following procedure.

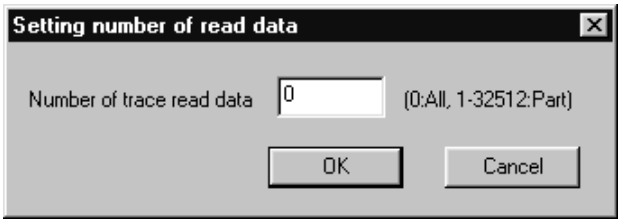
1. Select ***View – Sampling – Jump to Appoint Data*** from the Data Trace Menu.
2. Input the beginning sampling number in the Designate 1 Row of Sample Data Window, and then click the **OK** Button. The trace data will be displayed beginning with the number that was input.



(7) Setting the Amount of Data to Be Read

Set the number of trace data items to be read using the following procedure. When the RE-DSP function is subsequently executed, the number of data items set here will be read from the Machine Controller.

1. Select ***View – Sampling – Number of Read Data*** from the Data Trace Menu.
2. Input the number of data items to be read in the Setting Number of Read Data Window, and then click the **OK** Button.



INFO

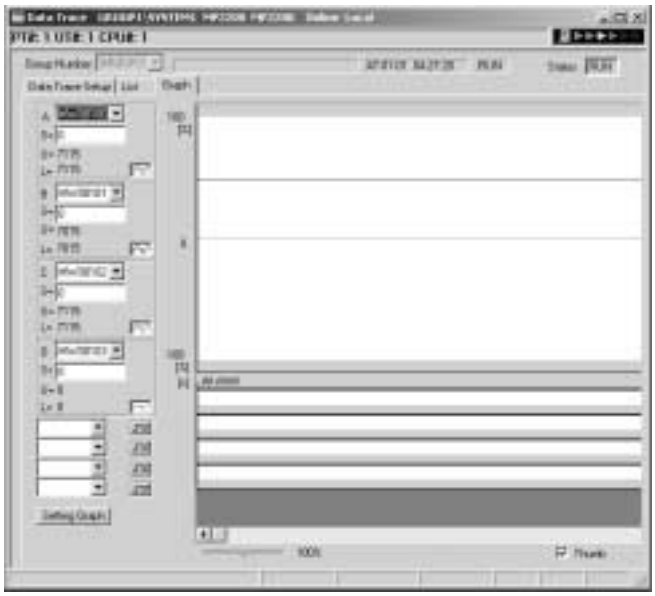
- Specify the number of data items to be read as the number of frames. A frame is the number of registers set on the Data Trace Setup Tab Page.
- Select ***View – Mode – RE-DSP*** from the Data Trace Menu to execute the RE-DSP function.

7.5 Graph Tab Page

This tab page is used to display the data resulting from a data trace in graphic form. The following operation can be performed from the Graph Tab Page.

- Updating the displayed data
- Starting and stopping manual traces
- Changing the trace time axis
- Changing the sample number from which to start the display
- Changing the number of data items to be read
- Closing the data trace definitions

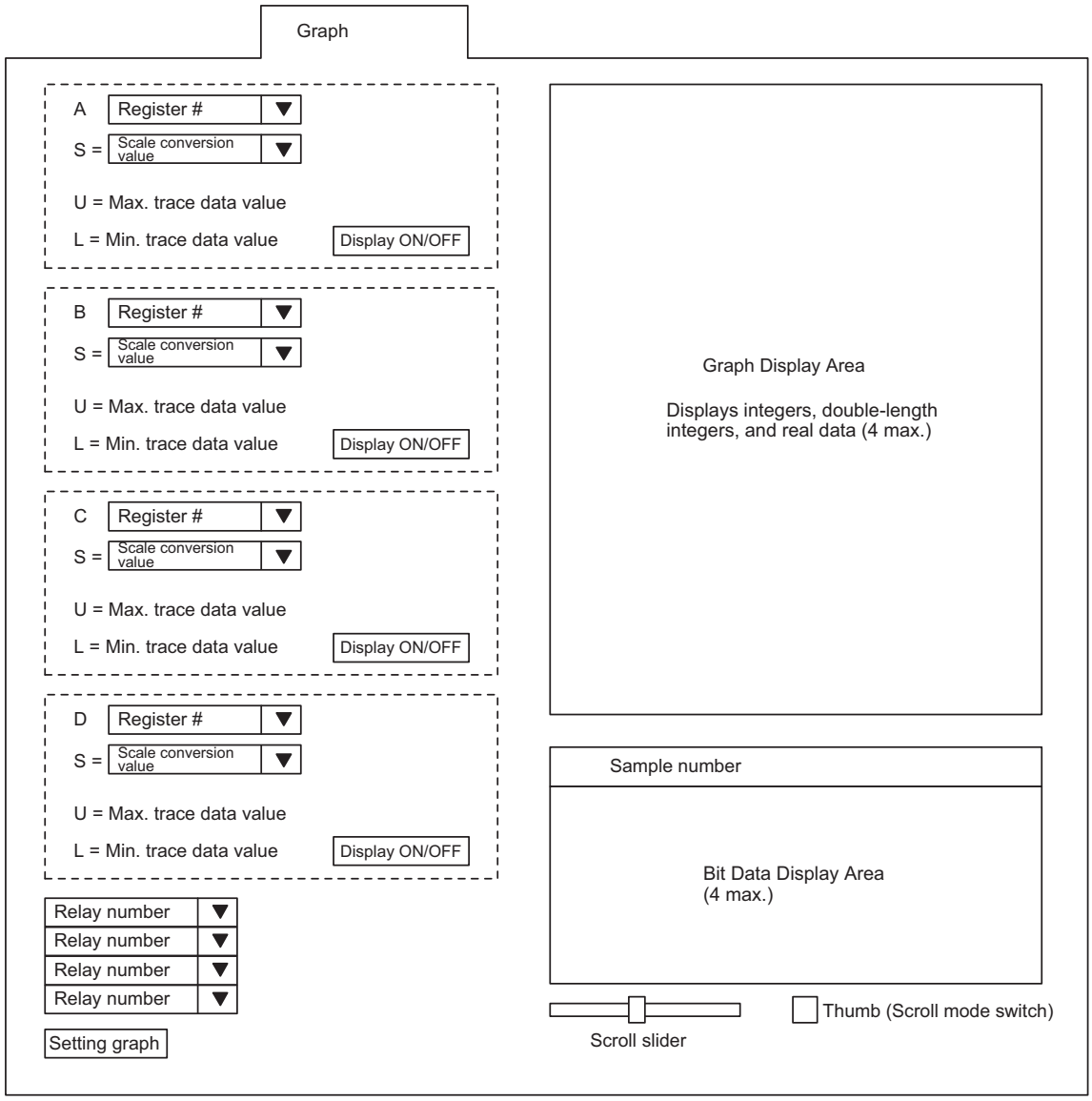
(1) Setting the Graph Tab Page



(a) Group and Status Information

Refer to *(a)* in *(1)* of *7.4 List Tab Page*.

(b) Display Configuration



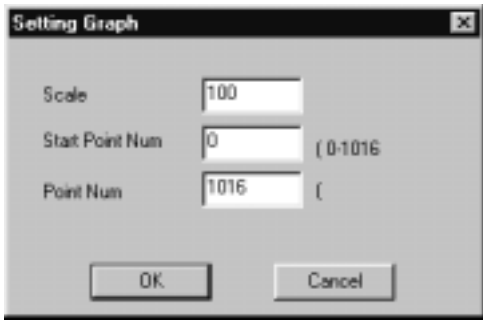
(c) Setting Items

Setting	Details
Register Number	Select the number of the integer, double-length integer, or real number register to be traced. Any register number set in the *Trace Data Definition* under the Data Trace Setup Tab Page can be selected. Register numbers cannot be selected, however, while in the automatic update mode.*
Scale Conversion Value	Input the scale conversion value for the trace data. Changing this value adjusts the vertical amplitude of the graph. With automatic updating, this value is continually displayed as the amplitude. The default setting is the value set for *SCALE* in the *Trace Data Definition* under the Data Trace Setup Tab Page. If 0 is set, the amplitude will be the same as if 32767 is set.
Max. Trace Data Value	Displays the maximum value for the trace data.
Min. Trace Data Value	Displays the minimum value for the trace data.
Display ON/OFF	The trace data display can be switched ON and OFF by clicking here.
Relay Number	Displays the number of the bit register to be traced.
Graph Display (Integer, Double-length Integer, Real number Data Display)	Displays integer, double-length integer, and real number data in graph form. A maximum of four data items can be displayed at one time.
Bit Data Display	Displays bit data in graph form. A maximum of four data items can be displayed at one time.
Scale Slider	Used to adjust the horizontal oscillation of the trace data by dragging the slider, or by pressing the Right and Left Cursor Keys. With automatic updating, this value is continually displayed as the oscillation.
Thumb (Scroll Mode Switch)	Turn this switch ON (indicated by a check mark) to scroll the graph according to the movement of the scroll box when the scroll box in the scroll bar in the data display area is dragged. When this is turned OFF, the graph is not scrolled while the box is being dragged, and the graph display is then modified after the dragging has stopped.
Sample Number	Displays the sample number. The form of the display will vary depending on the trace time axis. By clicking on a sample number position, a vertical line can be displayed in the graph display area at that position.
Setting Graph Button	Used to change settings such as the scale graduation for the currently displayed graph, the number of display points, etc. in the following procedure.

* Select ***View – Mode – AUTO*** from the Data Trace Menu to set the automatic updating of trace data.

(d) Setting Graph Button

1. Click the **Setting Graph** Button. The following Setting Graph Window will be displayed.
2. Input the graph settings in the Setting Graph Window, and then click the **OK** Button.
   The graph display will be changed according to the new settings.



(2) Updating Display Data

The most recent trace data can be displayed.
For details, refer to *(2) Updating Display Data* in *7.4 List Tab Page*.

(3) Manually Starting and Stopping Data Traces

Traces can be started and stopped manually.
For details, refer to *(4) Manually Starting and Stopping Data Traces* in *7.4 List Tab Page*.

(4) Changing the Trace Time Axis

The trace time axis can be changed.
For details, refer to *(5) Changing the Trace Time Axis* in *7.4 List Tab Page*.

(5) Changing the Beginning Sample Number for Display

Trace data beginning with any desired sample number can be changed.
For details, refer to *(6) Changing the Beginning Sample Number for Display* in *7.4 List Tab Page*.

(6) Setting the Amount of Data to Be Read

The number of data items to be read can be set.
For details, refer to *(7) Setting the Amount of Data to Be Read* in *7.4 List Tab Page*.

7.6 Closing Data Trace Setup

Exit the data trace definitions by closing the Data Trace Window.

To close the window, select ***File*** − ***Close*** from the menus.

8

Definition Folder 5: Module Configuration Definitions

This chapter explains how to set the module configuration definitions for each Machine Controller. The configuration of each Machine Controller is summarized, but you are advised to refer to the following manuals for more details.

- Relevant Machine Controller User's Manual: Design and Maintenance
  (Manual No.: SIEZ-C887-3.1 for MP910, SIEZ-C887-2.1 for MP920, SIEZ-C887-1.1 for MP930, SIEZ-C887-4.1 for MP940, and SIEPC88070001 for MP2100)
- Machine Controller MP920 User's Manual: Motion Module
  (Manual No.: SIEZ-C887-2.5)
- Machine Controller MP920, MP2300 User's Manual: Communication Module (Manual No.: SIEZ-C887-2.6 for MP920, SIEPC88070004 for MP2300)
- Machine Controller MP2300 Basic Module User's Manual
  (Manual No.: SIEPC88070003)

8.1 Machine Controller Module Configurations

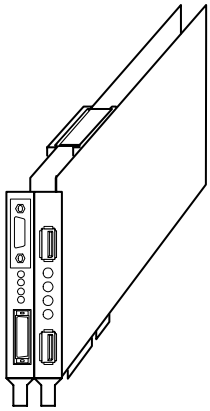
The system configurations of Machine Controllers shown below are available to meet specific applications.

Machine Controller	Module Configuration
MP910	Interface board (ISA bus, C-PCI bus supported)
MP920	Building block type for mounting the necessary Modules onto mounting bases.*
MP930	All-in-one type with all functions in a single case.
MP940	Integrated with SERVOPACK, for use by bus connection.
MP2100	Interface board (PCI bus supported)
MP2300	Block type for freely selecting optional modules.

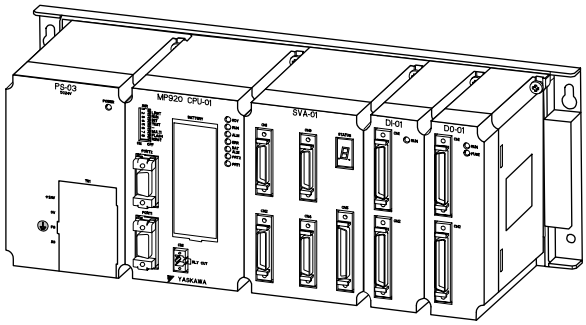
* For Building-block Machine Controllers, Expansion Interface Modules of system bus can be used to connect up to 4 Mounting Bases (Racks). When multiple building blocks are connected in a single system, the racks are identified by their rack numbers, rack 1 to rack n ($n \leq 4$) in the Module configuration definitions.

The following illustrations show the external appearances of the MP-series Machine Controllers.

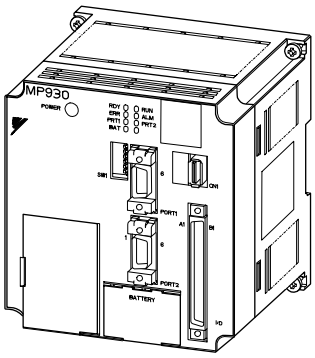
MP910



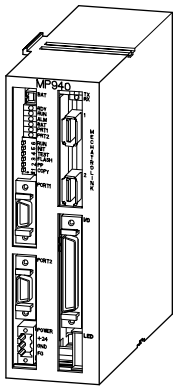
MP920



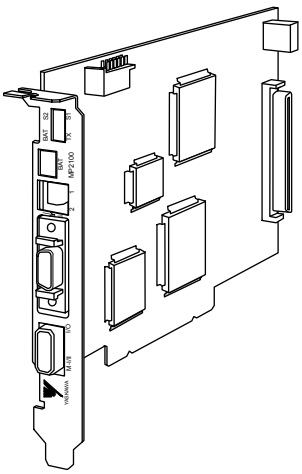
MP930



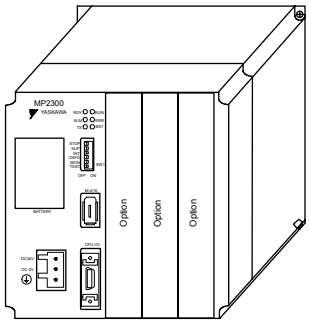
MP940



MP2100



MP2300



8.2 Basic Module Configuration Definition Operation

(1) MP900 Series

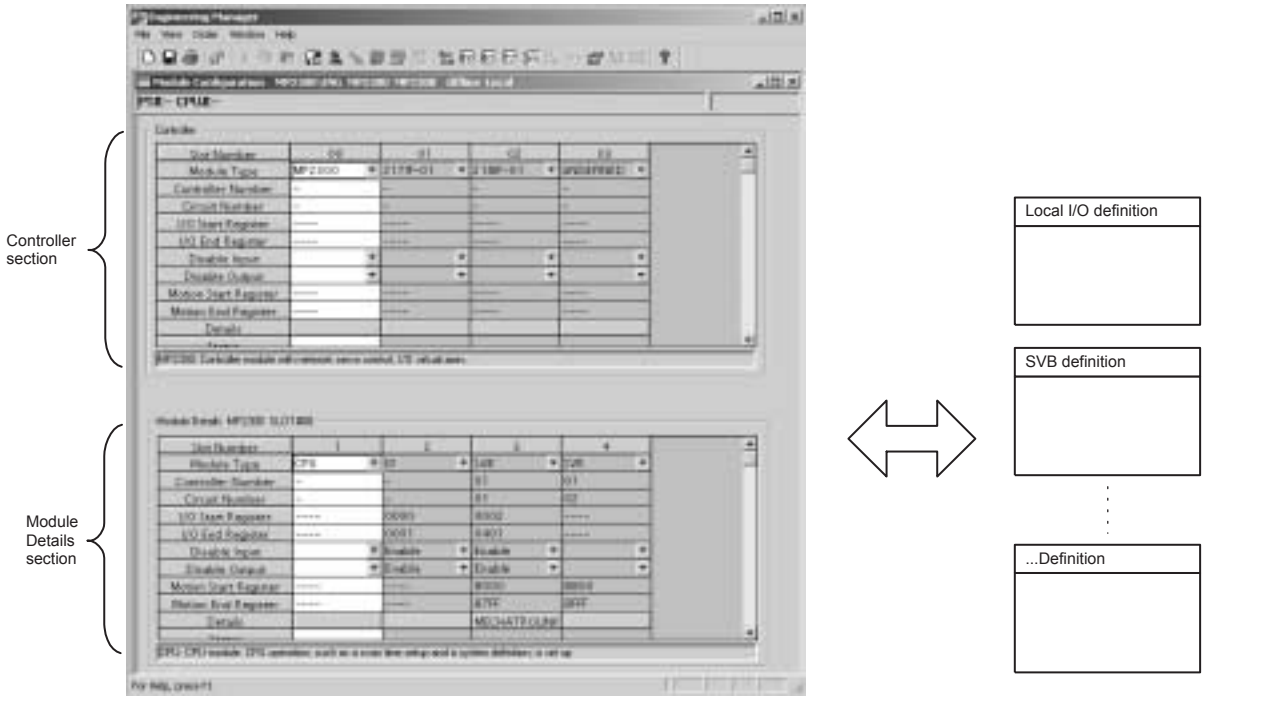
The Module Configuration Definitions of the MP900-series Machine Controller consist of Individual Module Definitions Windows, which define individual Modules, and the Module Configuration Window, which shows the overall configuration, regardless of the type of Machine Controller. Select the Module to be defined in the Module Configuration Window to open the Individual Module Definitions Windows.

Module Configuration Window

Individual Module Definitions Windows

(2) MP2000 Series

The Module Configuration Definitions of the MP2000-series Machine Controller consist of Individual Module Definitions Windows, which define individual Modules, and the Module Configuration Window, which shows the overall configuration, regardless of the type of Machine Controller. The Module Configuration Window also consists of two levels. When a Module to be defined is selected in the upper Controller section, the configuration of that Module is shown in the Module Details section below. Select the Module to be defined in the Controller section to open the Individual Module Definitions Windows displayed in the Module Details section.

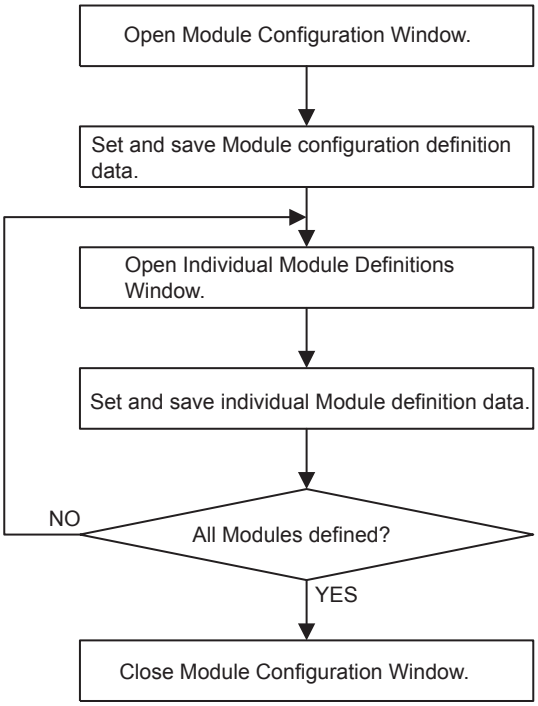


Module Configuration Window

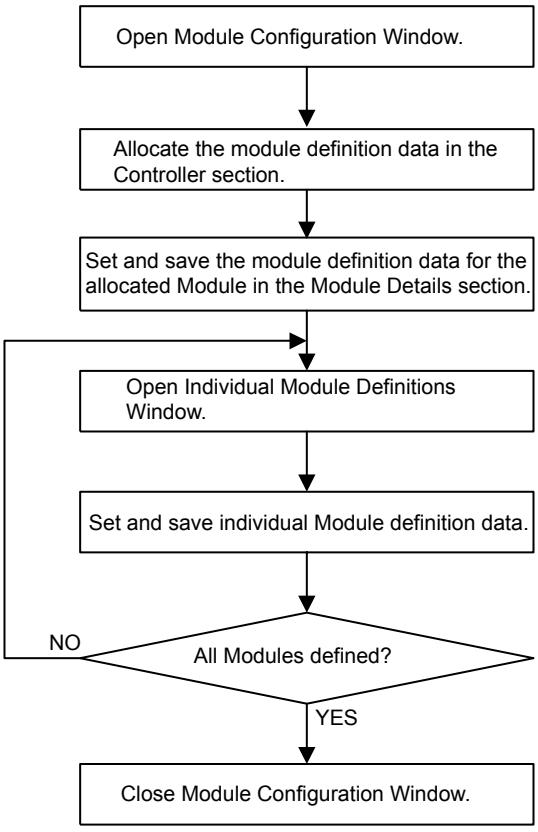
Individual Module Definitions Windows

8.2.1 Basic Flowchart

(1) MP900 Series



(2) MP2000 Series



8.2.2 Opening the Module Configuration Window

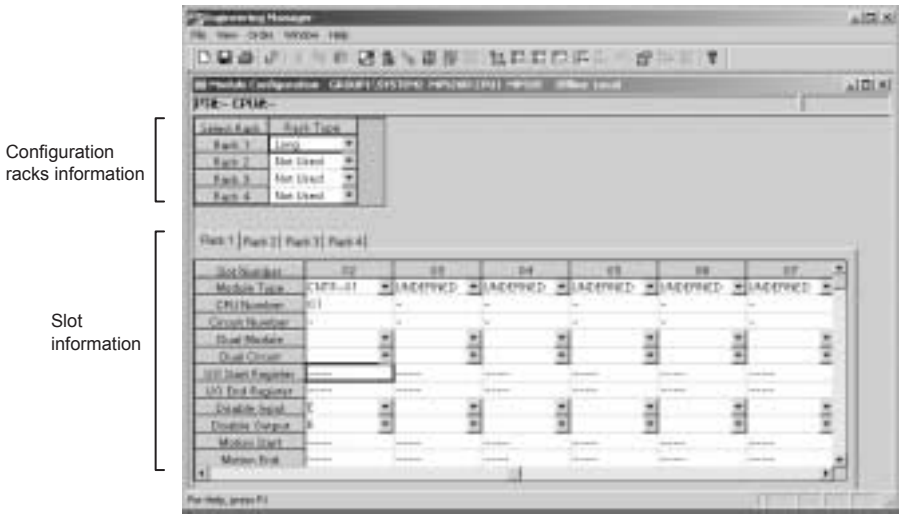
The Module Configuration Window can be opened from the File Manager or Engineering Manager.

- Opening from the File Manager

  Open the **Definition Folder** on the Directory Tree and double-click ***Module Configuration***.

- Opening from the Engineering Manager

  Select ***File*** – ***Open*** – ***Definition*** – ***Module Configuration***.



Module combinations depend on the Machine Controller.

Setting	Details
Select Rack and Rack Type	Sets the configuration rack information.
Slot Number	Displays the slot numbers on the rack.
Module Type	Sets the name of the Module installed in the slots.
CPU Number	Sets the CPU number to control the Modules.
Circuit Number	Sets the circuit number in order from 01 for each Communication and Motion Module.
Dual Module	Sets Dual Modules.
Dual Circuit	Sets Dual Transmission Paths.
I/O Start Register	Sets the I/O register start (leading) address.
I/O End Register	Sets the I/O register ending address.
Disable Input	Sets to enable/disable the input registers. Blank: Setting not allowed, D: Disabled, E: Enabled
Disable Output	Sets to enable/disable the output registers. Blank: Setting not allowed, D: Disabled, E: Enabled
Motion Start (Motion Start Register)	Sets the start address for the motion parameters register. This address is set automatically.
Motion End (Motion End Register)	Sets the end address for the motion parameters register. This address is set automatically.
Details	Performs MECHATROLINK communication definitions when the SVB-01 is set in the *Module Type*.
Status	Displays each Module's status when online.

INFO

For details, refer to the following sections separately.

- *8.4 MP910 Module Configuration Definitions*
- *8.5 MP920 Module Configuration Definitions*
- *8.6 MP930 Module Configuration Definitions*
- *8.7 MP940 Module Configuration Definitions*
- *8.8 MP2100 Module Configuration Definitions*
- *8.9 MP2300 Module Configuration Definitions*

• Module Configuration Menus

The following table shows the menu commands and functions displayed in the Module Configuration Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Selects or executes another function.
	Close	Closes the Module Configuration Window.
	Save & Save to Flash Memory	Saves to flash memory.
	Register with user menu	Opens the Register with user menu window.
	Save	Saves definition data.
	Delete	Deletes definition data.
	Delete Slot	Deletes definition data for one slot.
	Open Slot	Displays the Module Configuration Window for a slot.
	Print	Prints definition data.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
Order		
	Reset Module	Resets a Module.
	All Module Self Configuration	Executes self-configuration of all Modules.
	Module Self Configuration	Executes self-configuration of the selected Module.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

8.2.3 Saving Module Configuration Definitions

Nothing has been set immediately after installation, so be sure to save the data at least one time.

1. Select ***File*** – ***Save*** from the menus.
2. Verify the displayed message and click the **Yes** Button to save the definition data.

8.2.4 Deleting Module Configuration Definitions

When deleting the module configuration definitions file, the definition files for all the individual Modules are also deleted.

1. Select ***File*** – ***Delete*** from the menus.
2. Verify the displayed message and click the **Yes** Button to delete the definition data.

8.2.5 Ending the Module Configuration Definitions

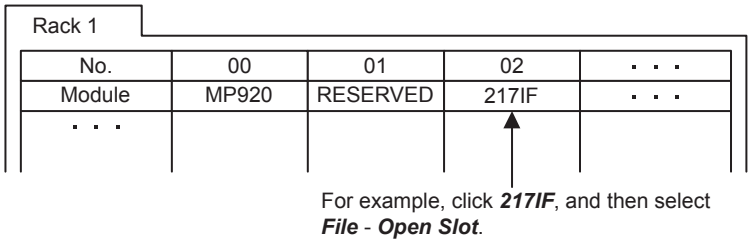
Select ***File*** – ***Close*** from the menus to return to the Engineering Manager Window.

8.3 Basic Individual Module Definition Operations

8.3.1 Opening Individual Module Definitions Windows

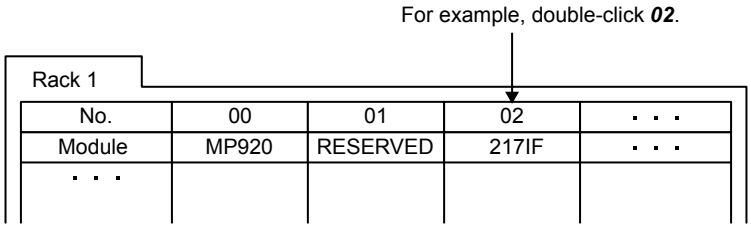
- Opening from the File Menu

1. Click the name of the desired Module in the Module Configuration Window.
2. Select ***File*** – ***Open Slot***. The Individual Module Definitions Window will be displayed.



- Opening from the Slot Number Row

To open a window directly from its slot number, double-click the slot number of the slot in which the desired Module is mounted in the Module Configuration Window. The individual Module Definitions Window will be displayed.



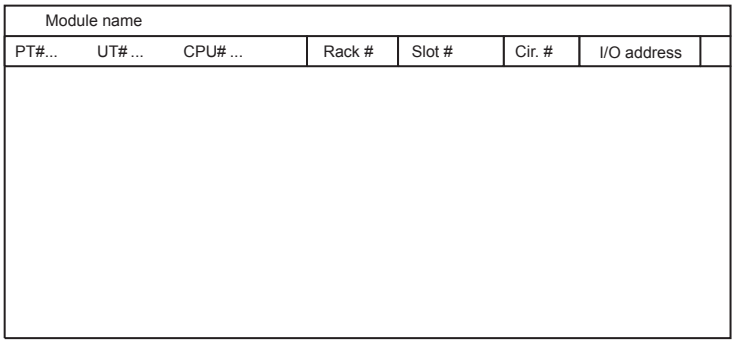
INFO

■ New File Confirmation Window

Attempting to open an Individual Module Definitions Window for the first time will display a confirmation message that this is a new file. Click the **OK** Button to proceed.

(1) Configurations of Individual Module Definitions Window

The basic configuration of Individual Module Definitions Windows is shown below.



(2) Individual Module Definitions Settings

The title of the Individual Module Definitions Window will be displayed in the title bar, and the login information bar, including the following information, will be displayed below the title bar. Hyphens will be displayed in offline mode. Login information items can vary depending on the Module model.

Login Information	Details
PT #	Displays the logical port number used when online.
UT#	Displays the unit number of the Machine Controller.
CPU #	Displays the logged on CPU number when online.
RACK #	Displays the rack number to which the Module is mounted.
SLOT #	Displays the slot number to which the Module is mounted on the rack.
CIR# (Circuit #)	Displays the circuit number allocated using Module configuration definitions for Communication Modules.
I/O Address	Displayed to the right of *CIR#*. Displays the I/O address area allocated to the Module using Module configuration definitions.

INFO

■ Individual Module Definition Data Settings

For details, refer to the following sections separately.

- *8.4.3 Opening Individual Module Definitions Window* for MP910
- *8.5.3 Opening Individual Module Definitions Window* to *8.5.18 MECHATROLINK Definitions* for MP920
- *8.6.3 Opening Individual Module Definitions Window* for MP930
- *8.7.3 Opening Individual Module Definitions Window* for MP940
- *8.8.3 Opening Individual Module Definitions Window* for MP2100
- *8.9.3 Opening Individual Module Definitions Window* for MP2300

8.3.2 Saving Individual Module Definitions

Nothing has been set immediately after installation, so be sure to save the data at least one time.

1. Select ***File*** – ***Save*** from the menus.
2. Verify the displayed message and click the **Yes** Button to save the definition data.

8.3.3 Deleting Individual Module Definitions

1. Select ***File*** – ***Delete*** from the menus.
2. Verify the displayed message and click the **Yes** Button to delete the definition data.

8.3.4 Closing Individual Module Definitions

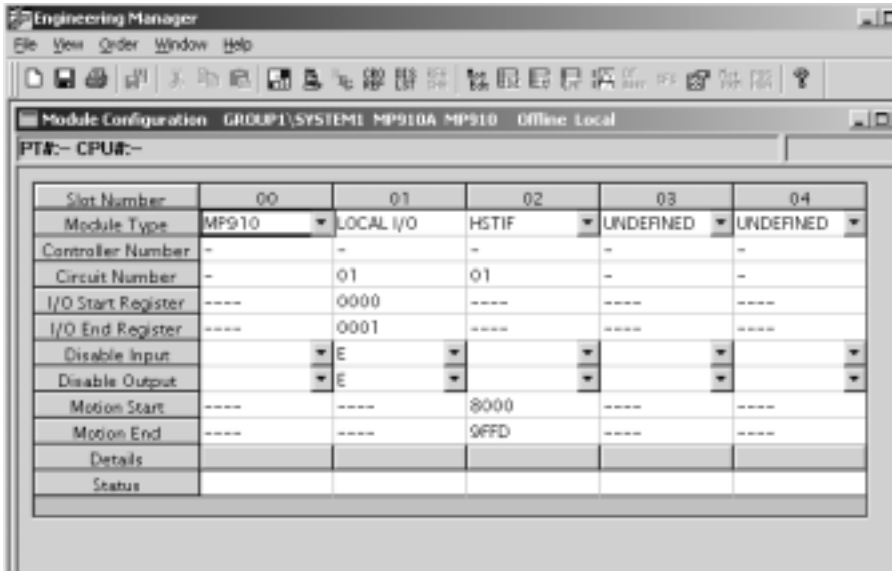
Select ***File*** – ***Close*** from the menus to return to the Module Configuration Window.

8.4 MP910 Module Configuration Definitions

This section explains the parameter settings for the Main Control Board and the Servo Control Board installed in the personal computer as the MP910.

8.4.1 Opening the Module Configuration Window

Open the following window according to *8.2.2 Opening the Module Configuration Window*.



- Configuration of Module Configuration Window

This Module configuration definitions consist of windows that define the slot details.

The MP910 is installed in a personal computer, so settings are limited to slot 04. Also, the Modules allocated to the slots cannot be changed.

Table 8.1 MP910 Slot Configuration

Slot 00	Slot 01	Slot 02	Slot 03	Slot 04
MP910	LOCAL I/O	HSTIF	UNDEFINED (SVB-01)	UNDEFINED (SVB-01)

Setting	Details
Slot Number	Displays the slot numbers.
Module Type	The name of the Module installed in each slot is set automatically.
Controller Number	The MP910 CPU is set automatically to 01.
Circuit Number	In the MP910, LOCAL I/O and HSTIF Modules are automatically set to 01.
I/O Start Register	Refer to *(1)* and *(2)* in *8.4.3 Opening Individual Module Definitions Window*.
I/O End Register	Refer to *(1)* and *(2)* in *8.4.3 Opening Individual Module Definitions Window*.
Disable Input	Sets to enable/disable input registers. Blank: Setting not allowed, D: Disabled, E: Enabled
Disable Output	Sets to enable/disable output registers. Blank: Setting not allowed, D: Disabled, E: Enabled
Motion Start (Motion Start Register)	This is set automatically.
Motion End (Motion End Register)	This is set automatically.
Details	Performs MECHATROLINK communication definitions when the ***SVB-01*** is set in the *Module Type*.
Status	Displays each Module's status when online.

INFO

■ Setting Ranges for the MP910 I/O Start/End Register Numbers

- 0000 to 13FF hex (5,120 words total)
  Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.
- With the MP910, standard register numbers have been set for each Module. We recommend using these standard register number settings.
  - For LOCAL I/O Module: 0000 to 0001 hex
  - For SVB-01 Module: 0100 to 04FF hex (slot 03)
    0500 to 08FF hex (slot 04)

8.4.2 Saving, Deleting, and Closing Module Configuration Definitions

Refer to *8.2.3 Saving Module Configuration Definitions*, *8.2.4 Deleting Module Configuration Definitions*, and *8.2.5 Ending the Module Configuration Definitions*.

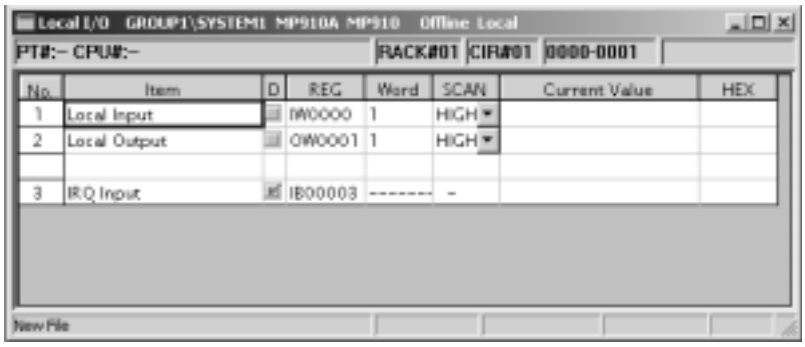
8.4.3 Opening Individual Module Definitions Window

Set the individual Module definition data for the MP910 using the procedure in *8.3.1 Opening Individual Module Definitions Windows*. Refer to *(1) Local I/O Definitions* or *(2) SVB-01 Definitions* for individual Module setting data.

(1) Local I/O Definitions

This section explains the local I/O definitions that are set for slot 01.

Open the following window according to *8.3.1 Opening Individual Module Definitions Windows*.

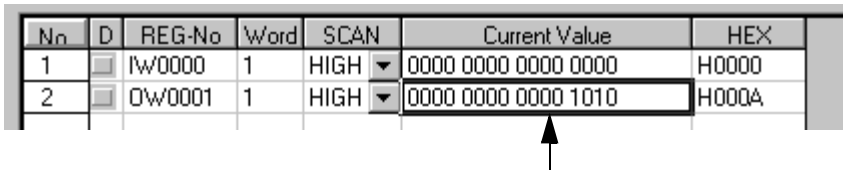


Setting	Details
No.	Displays the number of the setting.
Item	Displays the name of the setting and the I/O signal name.
D (Register Enable/Disable)	Controls the register's enable/disable setting. A register is one word in length, so the setting applies to 16 I/O bits. The register is disabled when a check is displayed in the box. • : Enabled • : Disabled
REG (Register Number)	Displays the I/O register number. In the MP910, the inputs use 5 bits and the outputs use 4 bits, and the register number allocation is fixed (IW0000 and OW0001).
Word (Number of Words)	Displays the number of consecutive words in the register. In the MP910, the allocation is fixed at 1 word, so the number of words is 1.
SCAN	Sets the transmission processing scan. HIGH: High-speed scan LOW: Low-speed scan (NA): No scan specification

(Cont'd)

Setting	Details
Current Value	In online mode, the current value of the allocated Machine Controller register will be displayed in binary. The current value of *Local Output* for *Item* can be changed and is immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the current value column. In offline mode, nothing will be displayed.

The following window shows a display example of a *Current Value*.



(2) SVB-01 Definitions

For SVB-01 definitions, which can be allocated to MP910 slot numbers 03 and 04, refer to *8.5.17 SVB-01 Definitions* and *(3)* in *8.8.3 Opening Individual Module Definitions Window*.

8.4.4 Saving, Deleting, and Closing the Individual Module Definitions

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

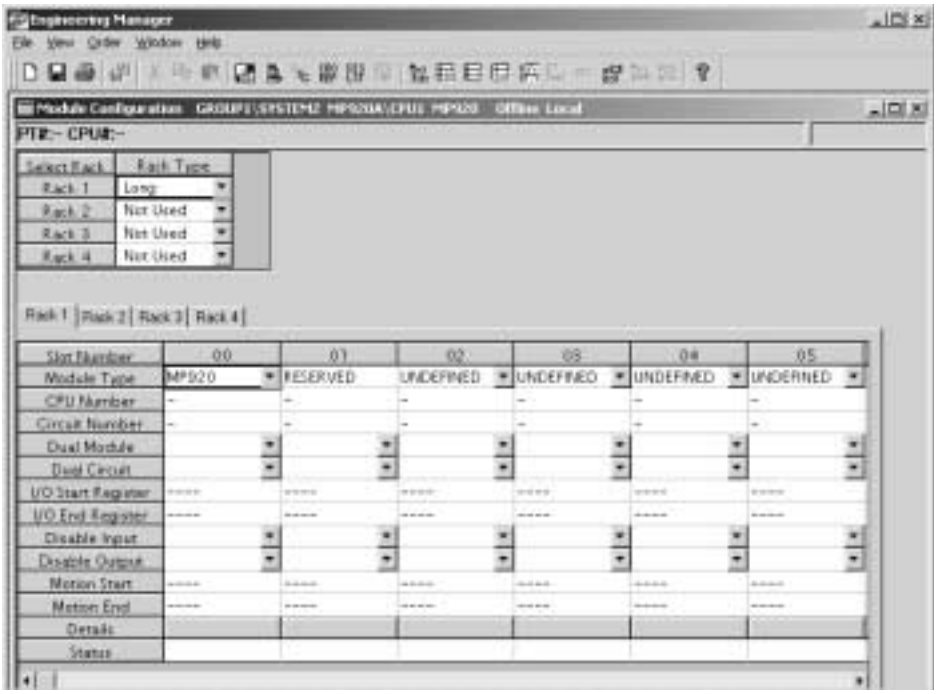
8.5 MP920 Module Configuration Definitions

This section explains how to select Modules that compose the MP920 and how to make settings such as disabling I/O registers. After defining the Module configuration here, make the individual I/O and transmission definitions for each Module.

8.5.1 Opening the Module Configuration Window

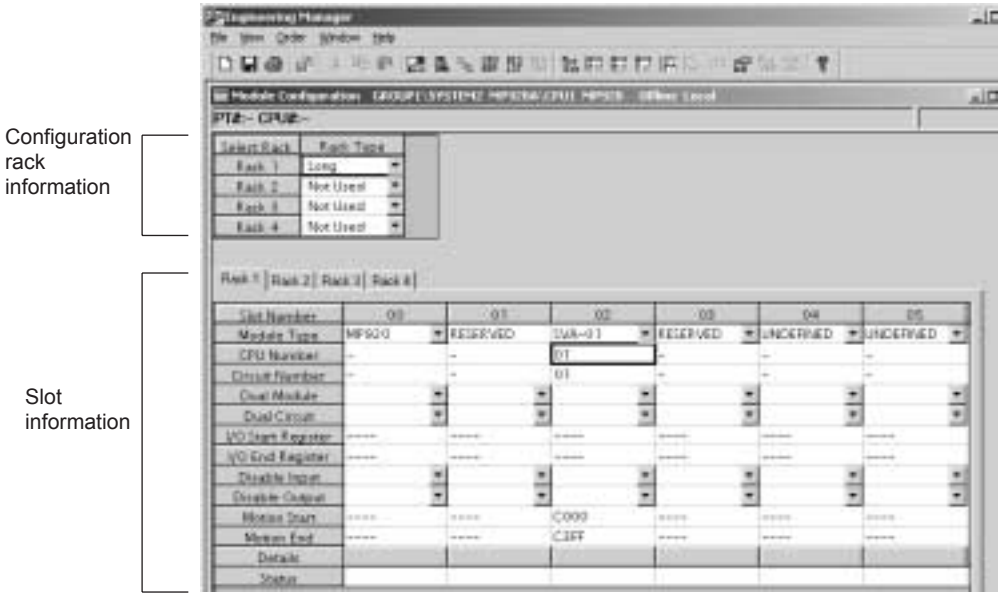
Open the following window according to the procedure in *8.2.2 Opening the Module Configuration Window*.

On the MP920, slots 00 to 08 (with a long rack) on racks 1 to 4, the maximum system configuration, must be set. In a new file, all Modules will be UNDEFINED, so settings must be made from the CPU Module. For detailed information concerning racks and slots, refer to the *Machine Controller MP920 User's Manual: Design and Maintenance* (SIEZ-C887-2.1).



(1) Configuration of the Module Configuration Window

This section describes the information displayed in the Module Configuration Window and the settings that can be changed in the window. In the following window, several Modules have already been set.

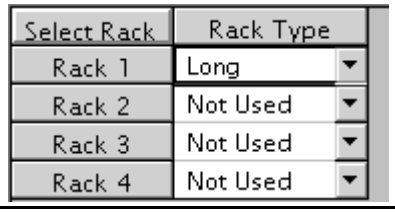


The Power Supply Module is required, even though it is not displayed in the Module Configuration Window.

(2) Setting Configuration Rack Information

Select the kind of rack to be connected to the Module. A maximum of 4 racks can be connected to the MP920. A short rack has 6 slots and a long rack has 9 slots.

Machine Controller	Maximum No. of Racks
MP920	4



Rack numbers must be consecutive. For example, it is not possible to jump from rack 1 to rack 3. When setting two or more racks from rack 1 to rack 4, always define an EXIOIF Module on each rack.

Set the configuration rack information depending on the system configuration in use.

For example, if Modules from slot 6 onwards are defined using the long-rack configuration, and this is changed to the short-rack configuration, Modules from slot 6 onwards cannot be edited.

IMPORTANT

If changing racks in online mode, execute the change while MP920 operation is stopped. Refer to *2.2.8 Switching the CPU Status* for the procedure to stop the MP920.

(3) Setting Slot Information

This section explains the following setting items for the slot information.

- Slot Number
- Module Type
- CPU Number (Control CPU Number)
- Circuit Number
- Dual Module
- Dual Circuit (Dual Transmission Paths)
- I/O Start Register
- I/O End Register
- Disable Input
- Disable Output
- Motion Start Register
- Motion End Register
- Details
- Status

(a) Slot Number

Indicates the slot number of the slot in which Modules are mounted. The maximum slot number that can be set depends on whether a short rack or long rack is used.

Slot numbers are determined by the kind of rack for racks 1 through 4. Modules are defined for slot numbers that are in the long/short rack's range.

Rack Type	Slot Numbers
Long	00 to 08
Short	00 to 05

(b) Module Type

Select the Module mounted in each slot. Some Modules occupy one slot and others occupy two slots.

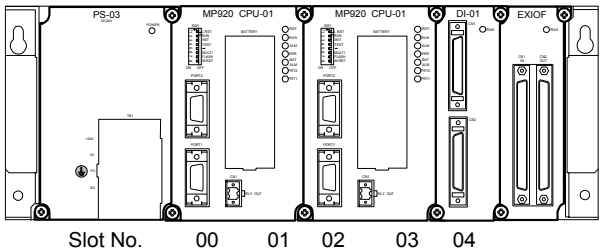
Selected Item	Module Name	Function	No. of Occupied Slots	Remarks
UNDEFINED	Not defined	Undefined	1	
MP920*	CPU Module	CPU	2	Can only be mounted to slots 00 and 02 on rack 1.
EXIOIF	EXIOIF Module	System bus expansion interface	1	
215IF	215IF Module	Real time core network	1	
217IF	217IF Module	Serial	1	
218IF	218IF Module	Ethernet	1	
260IF	260IF Module	DeviceNet	1	
LIO-01	LIO-01 Module	Local I/O	1	
AI-01	AI-01 Module	Analog input	1	
AO-01	AO-01 Module	Analog output	1	
DI-01	DI-01 Module	Digital input	1	
DO-01	DO-01 Module	Digital output	1	
CNTR-01	CNTR-01 Module	Counter	1	
SVA-01*	SVA Module	4-axis servo	2	Can be set when the *CPU Number* is set to ***1***.
PO-01	PO-01 Module	Pulse output	1	
SVB-01	SVB-01 Module	MECHATROLINK interface	1	
SVA-02	SVA-02 Module	2-axis servo	1	

* When a Module (MP920 or SVA-01) requiring two slots is selected, *RESERVED* will be displayed in the next slot number's *Module Type* and another Module can't be defined in that slot. If another Module has already been defined in the next slot, either delete that Module or define it in a different slot.

IMPORTANT

MP920: CPU Modules must be mounted in slots 00 and 02 of rack 1. When a single CPU Module is used, mount it in slot 00; when two CPU Modules are used, mount them in slot 00 and slot 02.

The following figure shows a multiple-CPU configuration.



(c) CPU Number (Control CPU Number)

Input the CPU number of the CPU which controls each Module.

For a multiple-CPU configuration, input ***1*** to select the CPU Module in slot 00 or ***2*** to select the CPU Module in slot 02. Input ***1*** for a single-CPU configuration.

Input ***1*** for the SVA, PO-01, and SVB Modules regardless of the CPU configuration.

It is not necessary to input a Control CPU Number for the MP920 CPU Module or an EXIOIF Module.

An error will occur when the settings are saved if the Control CPU Number is set to ***2*** but there is only one CPU Module.

An error will occur when the settings are saved if different Control CPU Numbers are set for Dual Modules.

INFO

To use the multiple-CPU configuration, multiple CPUs must be specified when creating a new PLC folder with the File Manager. Refer to *2.2 File Manager* for details.

1. CPU Configuration

a) Single/Multiple CPU

There are two CPU configurations: The single CPU configuration and the multiple CPU configuration. The CPU configuration can be defined by setting the Modules as shown in the following table.

Rack Number	Slot Number	MP920	
1	00	MP920	MP920
1	01	RESERVED	RESERVED
1	02	Desired Modules	MP920
1	03		RESERVED
1	04		Desired Modules
1	05		
1	06		
1	07		
1	08		
		↓	↓
		Single CPU	Multiple CPUs

b) CPU Rack

Define the MP920 CPU Module in slot number 00 (and 02 for a multiple-CPU configuration) of rack 1 and define other Modules in slot 02 and later slots (slot 04 and later slots for a multiple-CPU configuration). An error will occur when the settings are saved in the following cases:

- If a CPU Module is not defined in slot 00 of rack 1.
- If the multiple-CPU configuration has been set in the File Manager Window, but only one CPU Module is set in the Module Configuration Window.

c) Other Points

The definition data of defined Modules cannot be changed when or both one of the CPUs in a multiple-CPU configuration are in RUN state, but Modules can be added and deleted. When a Module such as a 217IF Module is defined in a slot that was occupied by a 215IF Module, the previous Module's definition data (the 215IF transmission definition parameters) will be deleted.

2. Control CPU Number Setting and Module Operation

A multiple-CPU configuration requires setting the CPU numbers to control the Modules.

- Control CPU Number = 1
  Control CPU: CPU Module in slot 00 (CPU #1)
  Non-Control CPU: CPU Module in slot 02 (CPU #2)
- Control CPU Number = 2
  Control CPU: CPU Module in slot 02 (CPU #2)
  Non-Control CPU: CPU Module in slot 00 (CPU #1)

a) Module Initialization

All Modules are initialized by the Control CPU. The non-control CPU does not perform any initialization processing on any Modules.

b) Link I/O Processing

A 215IF Module's I/O scan is executed in synchronization with the control CPU's scan.

The only compatible Module is the 215IF Module.

c) Local I/O Processing

For the following Modules, the I/O scan is executed in synchronization with the control CPU's scan.

Compatible Modules are as follows:

- LIO-01, AI-01, AO-01, DI-01, DO-01, CNTR-01

d) Message I/O Processing

For the following Modules, messages can be input and output by using the system functions (MSG-SND and MSG-RCV) in the control CPU.

Compatible Modules are as follows: 215IF, 217IF, 218IF, and 260IF.

- Master (Send):
  Messages can be sent using the MSG-SND function in the control CPU.
- Slave (Receive):
  Messages that have the same CPU number are received using the MSG-RCV function in the control CPU. With the 217IF Module, the CPU number is not specified in messages, so the receiving CPU can be selected by controlling the MSG-RCV function startup in the application.

e) Motion Control

The SVA-01/02, PO-01, and SVB-01 Modules can perform motion control. Motion can be controlled only for Control CPU = 1. Only CPU #1 can be displayed and set in the Motion Parameter Window, but it is possible to program motion I/O with CPU #2's drawing/function programs or display and set the motion I/O registers in the register list.

f) Other Points

- External Interrupt Processing
  External interrupts are controlled by the control CPU, although the Interrupt Process Drawing (DWG.I) is activated simultaneously for both the control CPU and the non-control CPU.
  Compatible Modules are as follows: LIO-01, CNTR-01, and DI-01.
- Dual Modules
  These functions are controlled by the control CPU.
  Compatible Modules are the 215IF and EXIOIF Modules.

(d) Circuit Number

Input each Module's circuit number. When two or more of the same model Module are used, assign circuit numbers in order (1, 2, 3, ...).

The circuit number for Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01) are handled as Motion Module numbers.

The following table shows the range of circuit numbers that can be input for each Module.

Module	Circuit Numbers	Module	Circuit Numbers
MP920	-	AO-01	-
EXIOIF	-	DI-01	-
215IF	1 to 8	DO-01	-
217IF	1 to 25	CNTR-01	-
218IF	1 to 8	SVA-01	1 to 16
260IF	1 to 8	SVA-02	1 to 16
LIO-01	-	PO-01	1 to 16
AI-01	-	SVB-01	1 to 16

Each 217IF Module uses three circuits, so allow three circuit numbers for each Module by inputting values 3n+1 (1, 4, 7, ...).

Modules other than the 217IF Module use just 1 circuit per Module, so allow just one circuit number for each Module by inputting consecutive values (1, 2, 3, ...).

Circuit numbers for Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01) are 1 to 16 for each type, and treated as Motion Module numbers. The maximum number of Motion Modules that can be used in one system is limited to 16.

The same circuit number cannot be set for more than one of the same type of Module, in systems using multiple racks.

An error will occur when the settings are saved if the same circuit number is set for more than one of the same type of Module.

(e) Dual Module

Some Modules can be set as Dual Modules to improve reliability.

The following table shows the Modules for which can be set as Dual Modules.

Module	Specification	Module	Specification
MP920	No	AO-01	No
EXIOIF	Yes	DI-01	No
215IF	Yes	DO-01	No
217IF	No	CNTR-01	No
218IF	No	SVA-01	No
260IF	No	SVA-02	No
LIO-01	No	PO-01	No
AI-01	No	SVB-01	No

- Dual Module Setting

  When setting a Dual Module, the same type of Module must be defined in another slot and the Dual Module setting for the Modules must be set to *Enable*.

- Dual Setting Error

  An error will occur when the settings are saved if Dual Modules are set but there are not two Dual Modules, i.e., if there is just one Module or more than two Modules.

- Dual Transmission Paths

  With 215IF Modules, it is possible to specify a dual transmission path. The Dual Module setting must also be made for the 215IF Module.

(f) Dual Circuit (Dual Transmission Paths)

Sets a dual 215IF transmission path.

(g) I/O Start Register

Inputs the leading register number for each Module's I/O.

- Register Ranges
  The following table shows the range of registers for each Module.

Table 8.2 Register Ranges

Module	Minimum Number of Registers	Maximum Number of Registers
MP920 (CPU)	-	-
LIO-01	-	-
215IF	0 Hex	800 Hex
217IF	-	-
218IF	-	-
260IF	-	-
LIO-01	1 Hex	10 Hex
AI-01	1 Hex	8 Hex
AO-01	1 Hex	4 Hex
DI-01	1 Hex	4 Hex
DO-01	1 Hex	4 Hex
CNTR-01	1 Hex	40 Hex
SVA-01	400 Hex	400 Hex
SVA-02	400 Hex	400 Hex
PO-01	400 Hex	400 Hex
SVB-01	400 Hex	400 Hex

When the leading register number of the register range is input, the default ending register will be calculated automatically by adding the fixed register range for each Module to the leading register number. A value of "-" can be input to set the register range to 0. (The display will show "-----" when the register range is 0.)

An error will occur when the settings are saved if a value that exceeds the register range has been input.

An error will occur when the settings are saved if Dual Modules has been set but the Modules have different register ranges.

INFO

With the SVA-01, SVA-02, PO-01, and SVB-01 Modules, the circuit number is also the Motion Module number and the register range is fixed according to that Motion Module number. This fixed register range is not displayed in the *I/O Start Register* and *I/O End Register*, but in the *Motion Start Register* and *Motion End Register*.

Details on register ranges for the above Modules are displayed in *Table 8.4 Register Ranges* on page 8-58, *Table 8.5 Register Ranges* on page 8-61, or *Table 8.6 Register Ranges* on page 8-64.

(h) I/O End Register

Inputs the ending register number for each Module's I/O. Refer to *Table 8.2 Register Ranges* for details.

(i) Disable Input

Controls the Disable Input setting for each Module.

- Blank: Disable specification not allowed.
- D: Inputs disabled.
- E: Inputs enabled.

An error will occur when the settings are saved if Dual Modules has been set but the Modules have different *Disable Input/Output* settings.

The following table shows the Modules in which I/O can be disabled.

Module	Specification Allowed	Module	Specification Allowed
MP920 (CPU)	No	AO-01	Yes
EXIOIF	No	DI-01	Yes
215IF	No	DO-01	Yes
217IF	No	CNTR-01	Yes
218IF	No	SVA-01	No
260IF	No	SVA-02	No
LIO-01	Yes	PO-01	No
AI-01	Yes	SVB-01	–

Modules marked with a "–" in the *Disable Input* and *Disable Output* cannot be disabled.

(j) Disable Output

Controls the Disable Output setting for each Module. See Disable Input above for a table listing the Modules in which I/O can be disabled.

- Blank: Disable specification not allowed.
- D: Outputs disabled.
- E: Outputs enabled.

(k) Motion Start Register

With Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01), this row displays the motion parameter register's leading offset address, which is allocated according to the circuit number (Motion Module number) setting for the Module. The Motion Start Register cannot be set.

Motion Module Number	Leading Register Number (Motion Start Register)	Ending Register Number (Motion End Register)
1	C000	C3FF
2	C400	C7FF
3	C800	CBFF
4	CC00	CFFF
5	D000	D3FF

(Cont'd)

Motion Module Number	Leading Register Number (Motion Start Register)	Ending Register Number (Motion End Register)
6	D400	D7FF
7	D800	DBFF
8	DC00	DFFF
9	E000	E3FF
10	E400	E7FF
11	E800	EBFF
12	EC00	EFFF
13	F000	E3FF
14	F400	E7FF
15	F800	EBFF
16	FC00	FFFF

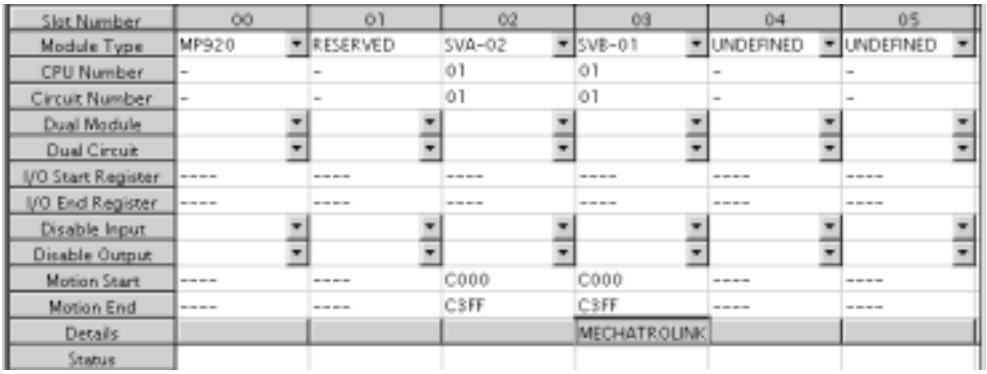
(l) Motion End Register

With Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01), this row displays the motion parameter register's ending offset address, which is allocated according to the circuit number (Motion Module number) setting for the Module. The Motion End Register cannot be set. Refer to the table above.

(m) Details

This heading was provided to indicate a second set of individual definitions when the Module assigned to the slot has individual definitions that are divided into more than one group.

For example, both MECHATROLINK Interface Definitions and Servo Parameter Definitions are required when an SVB-01 Module is assigned, so ***MECHATROLINK*** will be displayed under the *Details* heading and the Module's MECHATROLINK Definitions can be displayed by double-clicking ***MECHATROLINK***.



(n) Status

The status of each Module will be displayed when in online mode. Nothing will be displayed in this row in offline mode. The following table lists the status that is displayed.

Display	Details
Empty	A Module has been defined, but no Module is mounted.
Running	The Module is operating normally.
Waiting	The Module is in standby status.
Module Breaking	An error was detected in the Module.
X Module_name	The mounted Module doesn't match the defined Module.
Unsetting (Waiting to Initialize)	A Module is mounted, but no Module is defined.
Stopped	An LIO-01 Module is stopped.
Running (Control)	The Module is operating in Dual Synchronous Operation* and has control of the bus.
Running (Standby)	The Module is operating in Dual Synchronous Operation* but does not have control of the bus.

* Dual Synchronous Operation
In Dual Synchronous Operation, which increases reliability in RUN mode, two of the same Modules are run simultaneously for redundant control. The specification can be made for the 215IF and EXIOIF Modules.

8.5.2 Saving, Deleting, and Closing Module Configuration Definitions

For the saving, deleting, and closing procedures, refer to *8.2.3 Saving Module Configuration Definitions*, *8.2.4 Deleting Module Configuration Definitions*, and *8.2.5 Ending the Module Configuration Definitions*.

INFO

In a multiple-CPU configuration, the Module configuration definitions cannot be deleted if one of the CPUs is in RUN state.

IMPORTANT

Saving or deleting Module configuration definitions in online mode can have a significant effect on operation. Be sure that it is safe to change the Module configuration definitions before saving or deleting Module configuration definitions in online mode.

8.5.3 Opening Individual Module Definitions Window

Set the definition data for the individual MP920 Modules according to *8.3.1 Opening Individual Module Definitions Windows*. Table 8.3 lists the Modules for the MP920.

INFO

When the Individual Module Definitions Window of one Dual Module is opened and its configuration data is saved, the other duplicated Module's configuration data will be saved at the same time.

Table 8.3 Individual Definitions Table

Selected Item	Module Name	Function	No. of Occupied Slots	Reference Section
MP920	CPU Module	CPU	2	*8.5.4 Generic Serial Communication Definitions*
RESERVED	---	Reserved by system	1	No individual definitions. Reserved using slot 2 Module.
UNDEFINED	---	Undefined	1	No individual definitions.
EXIOIF	EXIOIF Module	System bus expansion interface	1	No individual definitions.
215IF	215IF Module	Real time core network	1	*8.5.5 215IF Definitions*
217IF	217IF Module	Serial	1	*8.5.6 217IF Definitions*
218IF	218IF Module	Ethernet	1	*8.5.7 218IF Definitions*
260IF	260IF Module	DeviceNet	1	*8.5.8 260IF Definitions*
LIO-01	LIO-01 Module	Local I/O	1	*8.5.9 LIO-01 Definitions*
DI-01	DI-01 Module	Digital input	1	*8.5.10 DI-01 Definitions*
DO-01	DO-01 Module	Digital output	1	*8.5.11 DO-01 Definitions*
CNTR-01	CNTR-01 Module	Counter	1	*8.5.12 CNTR-01 Definitions*
AI-01	AI-01 Module	Analog input	1	*8.5.13 AI-01 Definitions*
AO-01	AO-01 Module	Analog output	1	*8.5.14 AO-01 Definitions*
SVA-01	SVA-01 Module	4-axis servo	2	*8.5.15 SVA Definitions*
SVA-02	SVA-02 Module	2-axis servo	1	*8.5.15 SVA Definitions*
PO-01	PO-01 Module	Pulse output	1	*8.5.16 PO-01 Definitions*
SVB-01	SVB-01 Module	MECHATROLINK Interface	1	*8.5.18 MECHATROLINK Definitions*, *8.5.17 SVB-01 Definitions*

- An Individual Module Definitions Window cannot be opened for slots set to ***EXIOIF***, ***UNDEFINED***, or ***RESERVED***.
- The CPU Module (MP920) has two general-purpose serial ports. The Generic Serial Definitions Window will be displayed when the ***MP920*** is clicked. The general-purpose serial port parameters are the only parameters set for the CPU Module.
- The SVB-01 Module's MECHATROLINK settings must be made before the Motion Parameters. The MECHATROLINK Definitions Window can be opened by double-clicking ***MECHATROLINK*** in the *Details* of the Module Configuration Window.

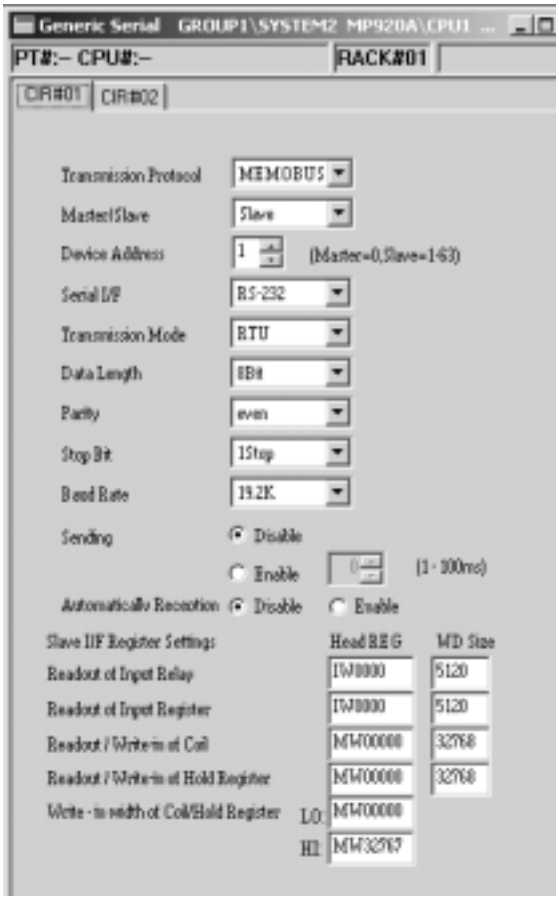
8.5.4 Generic Serial Communication Definitions

This section explains the methods for defining generic serial communication systems.

(1) Opening the Generic Serial Definitions Window

Open the Generic Serial Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.

The generic serial ports are provided on the MP920 CPU Module. The CPU Module is installed in slot 00.



- Setting Generic Serial Parameters

Set the required parameters to use the generic serial communication system.

Use the CIR#01 Tab Page to set generic serial 01, and use the CIR#02 Tab Page to set generic serial 02.

Setting	Details
Transmission Protocol	Select the desired protocol. • ***MEMOBUS***: Yaskawa's standard MEMOBUS protocol. • ***MELSEC***: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links. • ***None***: Data can be transferred at any time by the user application program.
Master/Slave	When the *Transmission Protocol* has been set to ***MEMOBUS*** or ***MELSEC***, select whether the Machine Controller will operate as a ***Master*** or a ***Slave***.
Device Address	Select the device address. When the Machine Controller is being used as a ***Master***, set the device address to 0. When the Machine Controller is being used as a ***Slave***, set the device address to a value between 1 and 63.
Serial I/F (Serial Interface)	Select the serial interface.
Transmission Mode	Select the transmission mode. • ***RTU***: Specifies RTU mode when the *Transmission Protocol* is set to ***MEMOBUS***. • ***ASCII***: Specifies ASCII mode when the *Transmission Protocol* is set to ***MEMOBUS***. • ***none***: Use when the *Transmission Protocol* is set to ***MELSEC***, and ***None***.
Data Length	Select the number of bits in one character. • ***8Bit***: 8 bits • ***7Bit***: 7 bits
Parity	The parity bit is used to detect bit errors in transmitted data. It indicates if the number of "1" bits in the data is even or odd. ***none*** can also be specified to disable the parity check. • ***Even***: Even parity • ***Odd***: Odd parity • ***none***: No parity check
Stop Bit	Select whether there will be one or two stop bits at the end of the sending character. • ***1stop***: 1 stop bit • ***2stop***: 2 stop bits
Baud Rate	Select the transmission speed (bps).
Sending (Send Delay Setting)	When ***Enable*** is selected, a delay until the beginning of transmissions (1 to 100 ms) can be set. • Master Station: The delay will be included between execution of the MSG-SND function and the transmission of the command. • Slave Station: The delay will be included between reception of a command by the MSG-RCV function and the transmission of the response.
Automatically Reception	Specify whether or not to send an automatic response to a query from the master station. For details, refer to *Slave I/F Register Settings (Automatic Response)*.

- *Slave I/F Register Settings* (Automatic Response)

  These settings are valid for slave stations only.

  Specify the ranges of relays, registers, and coils to check when automatically sending a response message to a query from the master.

  There is no need to set the ranges when message communication will not be performed between the master and slaves. Also, if the ladder program that has returned a response message with the MSG-RCV function is being used, disable the MSG-RCV so that redundant processing is not performed.

  With the system default settings, response messages will be sent using the ranges set with the following parameters.

Setting	Details
Readout of Input Relay	With generic serial communication, set the range and start address of input relays that can be read using serial communication. Refer to the table* below for setting details.
Readout of Input Register	With generic serial communication, set the range and start address of input registers that can be read using serial communication. Refer to the table* below for setting details.
Readout/Write-in Coil	With generic serial communication, set the range and start address of coils that can be read or written to using serial communication. Refer to the table* below for setting details.
Readout/Write-in of Hold Register	With generic serial communication, set the range and start address of holding registers that can be read or written to using serial communication. Refer to the table* below for setting details.
Write-in width of Coil/ Hold Register	Set the range that can be written to of the coils and holding registers as a whole.

* Start Register Address and Number of Words

Setting		MP920
Readout of Input Relay	Head REG (Start register address)	IW0000
	WD Size (No. of words)	5120
Readout of Input Register	Head REG (Start register address)	IW0000
	WD Size (No. of words)	5120
Readout/Write-in Coil	Head REG (Start register address)	MW00000
	WD Size (No. of words)	32768
Readout/Write-in of Hold Register	Head REG (Start register address)	MW00000
	WD Size (No. of words)	32768

(2) Saving, Deleting, and Closing Generic Serial Definitions Data

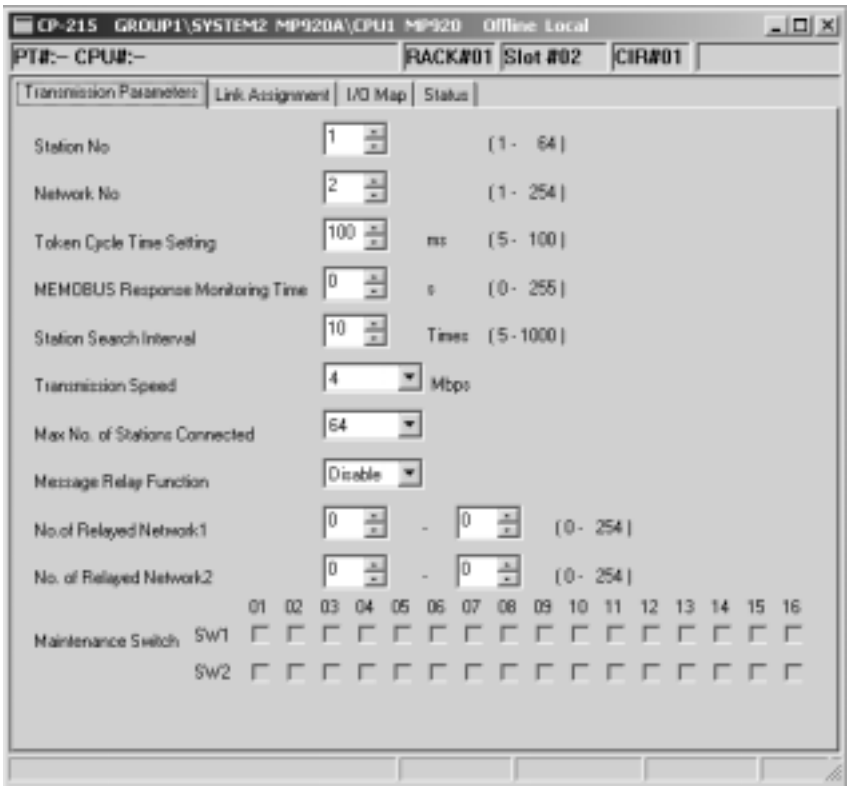
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.5.5 215IF Definitions

This section explains how to set the parameters for the 215IF transmission system.

(1) Opening the CP-215 (215IF) Definitions Window

Set the *I/O Start Register* and *I/O End Register* in the Individual Module Definitions Window, and open the CP-215 Definitions Window according to the procedure in *8.3.1 Opening Individual Module Definitions Windows*.



(2) CP-215 Definitions Menus

The following table shows the menu commands and functions displayed in the CP-215 Definitions Window.

Menu Command		Function
Edit		
	Default	Sets default values.
	Assignment Delete	Deletes assignment data.
Set		
	Set DI/DO	Allocates DI/DO for the RIO-05. (Not currently supported.)

(3) Tab Pages

The CP-215 Definitions Window is composed of four tab pages: the Transmission Parameters, Link Assignment, I/O Map, and **Status** Tab Pages. The following table shows the functions of each tab page.

Tab Page	Details
Transmission Parameters (Parameter Settings)	Sets the 215IF transmission parameters.
Link Assignment	Allocates the 215IF link transmissions.
I/O Map	Sets the I/O map.
Status	Displays the Link status.

(a) Transmission Parameters Tab Page

The Transmission Parameters Tab Page contains the various parameters required to use the 215IF transmission system.

Setting	Details
Local Station No.	Input the local station number (1 to 64) of the 215IF Module.
Local Network No.	Input the network number (1 to 254) of the network in which the 215IF Module is connected.
Token Cycle Time Setting*1	Input the desired time (5 to 100 ms) for the interval between station receptions of the token.*2
MEMOBUS Response Monitoring Time	Input the time to wait (0 to 255 s) for a response after sending a MEMOBUS command by executing the MSG-SND function. If the time is set between 1 and 255, a timeout will occur after the time setting × 2 s and the MSG-SND function will return an error. One retry will be attempted if a timeout occurs. If the time is set to 0, the MSG-SND function will wait indefinitely for a response without returning an error.
Station Search Interval*1	Input the number of cycles (5 to 1,000) between each search for a new station. A station search will be performed at this interval (once every 5 to 1,000 token cycles) to determine whether a new station has been started.
Transmission Speed*1	Select the 215IF transmission speed (1, 2, or 4 Mbps).
Max No. of Stations Connected*1	Input the maximum number of stations that can be connected (16, 32, 48, or 64). This setting is used as an upper limit value during station searches. Input a value higher than the local station number shown in the *Local Station No*.
Message Relay Function	This setting determines whether the 215IF will relay messages received from another transmission interface through the 215IF interfaces, i.e., this setting enables or disables the Message Relay Function. When not using the Message Relay Function, set to ***Disable***. When using the Message Relay Function, set to ***Enable***.
No. of Relayed Network 1	When the Message Relay Function is enabled, this setting specifies the range of network numbers (0 to 254) that can be relay destinations. Messages will not be relayed to networks that are outside of the specified range. The network number in the *No. of Relayed Network 1* setting is ORed with the network number in the *No. of Relayed Network 2* setting. The Relay Function will be disabled if both settings are 0.
No. of Relayed Network 2	See the explanation for the *No. of Relayed Network 1* setting, above.
Maintenance Switch	These settings are all OFF during operation. These switches are used for Yaskawa maintenance. Do not change the settings.

* 1. For parameter set values and network configuration, refer to the *MP920 Machine Controller User's Manual: Communication Module* (SIEZ-C887-2.6).
* 2. A token is a piece of data that circulates from station to station in the network and provides each station with the right to send data. The Token Cycle Time is the time required for the token to make a complete cycle through the network and return to a given station.

- Setting Default Values

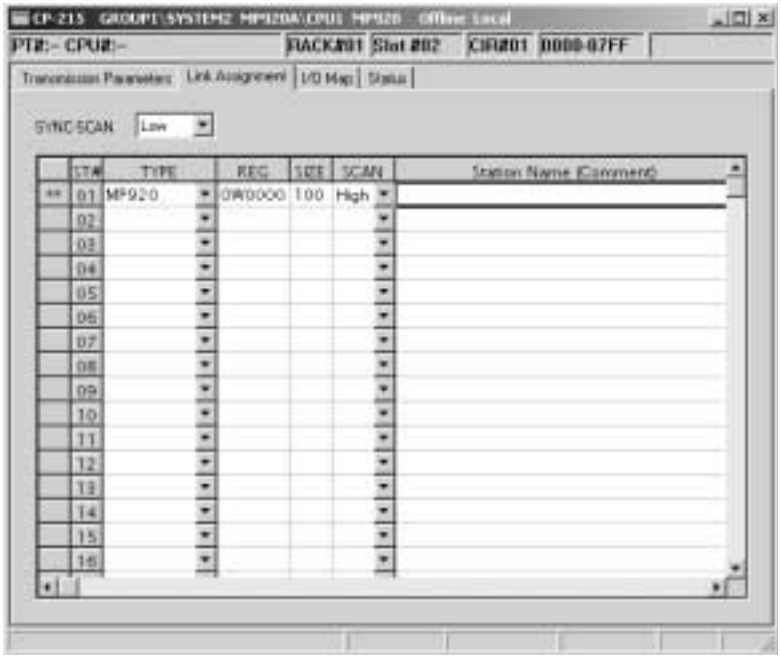
The transmission parameters can be reset to their default values without inputting each parameter, by selecting ***Edit*** **–** ***Default*** from the 215IF Definitions Menu.

Parameter	Default
Local Station No.	0
Local Network No.	0
Token Cycle Time Setting	100
MEMOBUS Response Monitoring Time	0
Station Search Interval	10
Transmission Speed	4
Max No. of Stations Connected	64
Message Relay Function	0
No. of Relayed Network 1	0
No. of Relayed Network 2	0
Maintenance Switches SW1 SW2	All OFF

(b) Link Assignment Tab Page

- Setting Assignment Data

Parameters such as the 215IF I/O assignment data, station name, and synchronous scan parameters are set in the Link Assignment Tab Page.



Setting	Details
SYNC-SCAN	215IF transmission is always executed. Select the scan frequency at which the 215IF transmission data is to be synchronized with the Machine Controller. • ***High***: High-speed scan • ***Low***: Low-speed scan
ST#	Displays the station number. Two asterisks (**) will be displayed for the local station number. The local station number is the number input for the *Local Station No.* of the Transmission Parameter Tab Page. The station number displays only the number input in the *Max No. of Stations Connected* of the Transmission Parameter Tab Page.
TYPE	Select a name for the I/O device connected to each station. The following table* shows the I/O devices that can be selected.

(Cont'd)

Setting	Details
REG, SIZE	Set the leading register number (I register number) and amount of I/O data. Input an O register number for the leading register number of the local station. Be sure that the registers set for each station does not overlap with the register numbers for another station.
SCAN	Select the transmission processing scan that services I/O. • ***High***: High-speed scan • ***Low***: Low-speed scan
Station Name (Comment)	Comments up to 32 characters can be input for each station.

* The following table shows the I/O devices that can be selected.

Selected Item	I/O Device Name	Selected Item	I/O Device Name
CP-3500H	CP-3500H	CP-517	CP-517
CP-316	CP-316	MP920	MP920
CP-916A	CP-916A	CP-902	CP-902
CP-9200SH	CP-9200SH	215IF/INV	215IF/INV
CP-317	CP-317	RIO-05	RIO-05
CP-316H	CP-316H	RIO-2000	RIO-2000
CP-916G	CP-916G	RIO-120	RIO-120
ACGC4000	ACGC4000	-	-

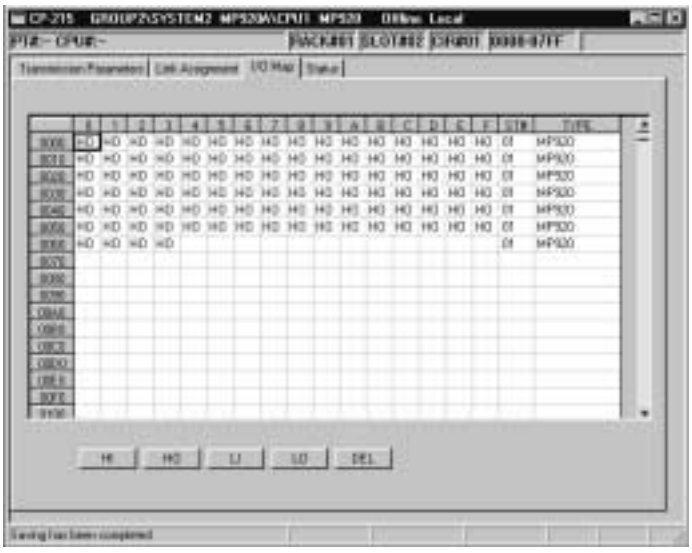
- Deleting Assignment Data

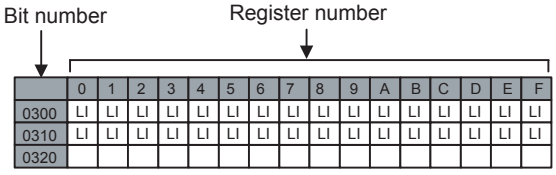
Delete the assignment data for one station using the following procedure.

1. Move the cursor to the row to be deleted.
2. Select ***Edit*** – ***Assignment Delete*** from the 215IF Definitions Menu.
   The assignment data selected in step 1 will be deleted.

(c) I/O Map Tab Page

Allocate the Machine Controller's process I/O (local I/O and remote I/O) in the I/O Map Tab Page.





Setting	Details
Register Number	Each column in the table represents the first digit of the register numbers displayed on the left side of the table.
I/O Assignments (HI, HO, LI, LO)	Allocate bits to I/O registers for high-speed or low-speed scan. • HI: Input set for a high-speed scan. • HO: Output set for a high-speed scan. • LI: Input set for a low-speed scan. • LO: Output set for a low-speed scan. To allocate I/O, move the cursor to the desired bit and click ***HI***, ***HO***, ***LI***, or ***LO*** at the bottom of the display. An I/O allocation can be deleted by moving the cursor to the desired bit and clicking ***DEL*** at the bottom of the display.
ST#	Displays the station number set in the *ST#* of the Link Assignment Tab Page.
TYPE	Displays the I/O device name set in the *TYPE* of the Link Assignment Tab Page.

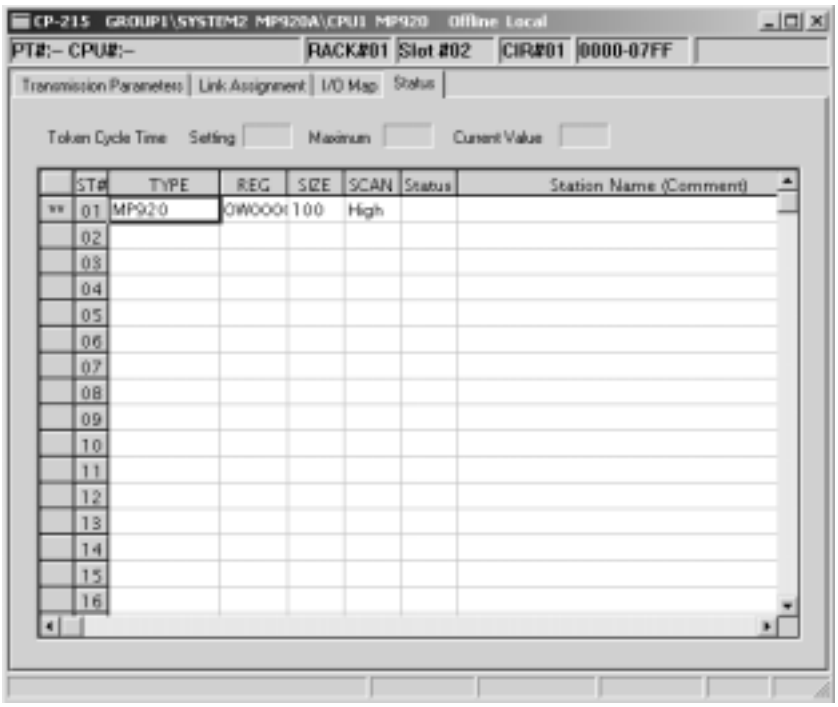
- Limitations on Changing I/O Map Allocations

The settings made in advance in the Link Assignment Tab Page are allocated as defaults for the high-speed scan I/O and low-speed scan I/O. The following limitations apply when changing I/O allocations.

- I/O allocation can be deleted.
- The scan speed designation can be changed. (For example, *LI* can be changed to *HI*.)
- The I/O designation cannot be changed. (For example, *LI* cannot be changed to *LO*.)

(d) Status Tab Page

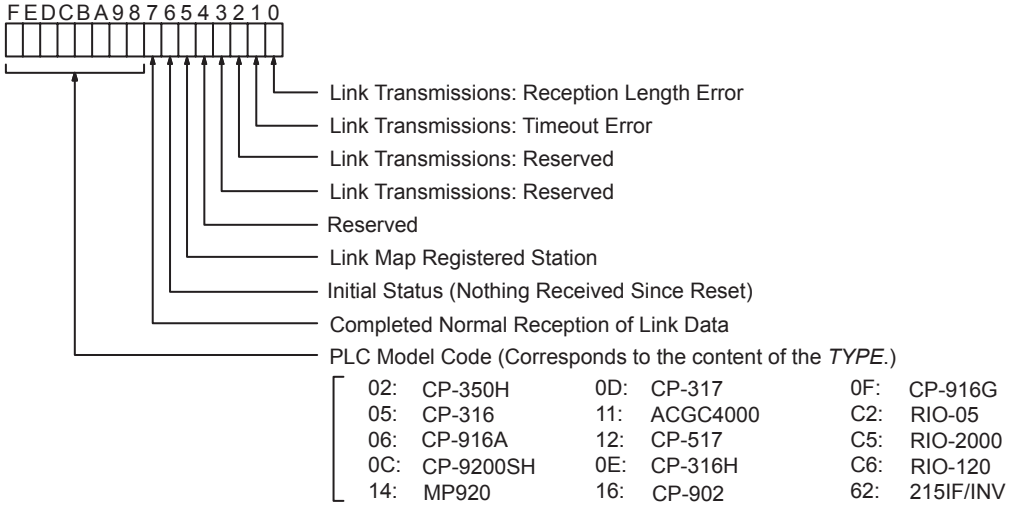
The Status Tab Page displays the data that the 215IF is actually handling in link transmissions. The tab page only displays the data; the settings cannot be changed.



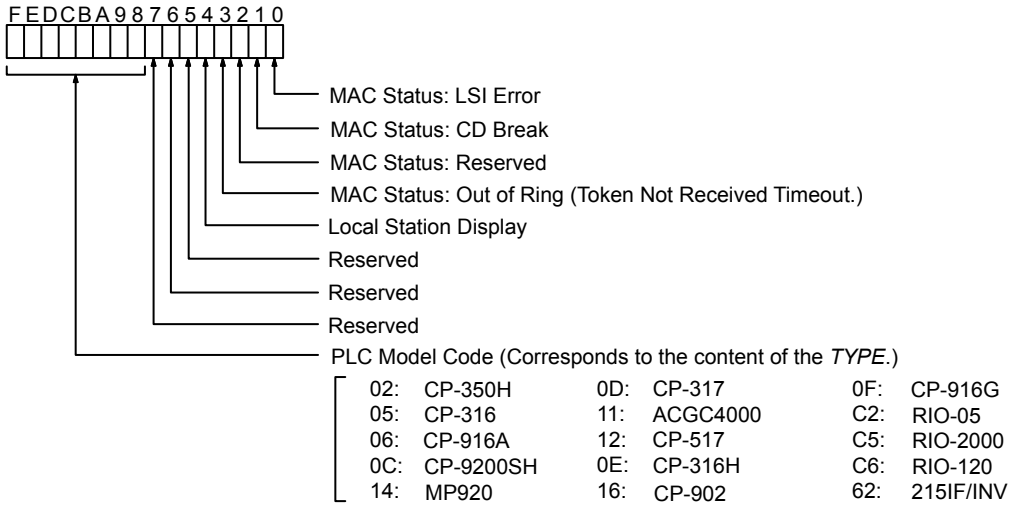
8

Display	Details
Token Cycle Time, Setting, Maximum (Max. Value), Current Value	Displays the value set in the *Token Cycle Time Setting* of the Transmission Parameter Tab Page, as well as the actual maximum and current values. In offline mode, data will not be displayed in the *Maximum* (Max. Value) and *Current Value*.
ST#	Displays the station number. Two asterisks (**) will be displayed for the local station number. The local station number is the number input for the *Local Station No.* of the Transmission Parameter Tab Page. The station number displays only the number input for the *Max. No. of Stations Connected* of the Transmission Parameter Tab Page.
TYPE	Displays the I/O device name set in the Link Assignment Tab Page.
REG, SIZE	Displays the leading register number and amount of I/O data set in the Link Assignment Tab Page.
SCAN	Displays the transmission mode set in the Link Assignment Tab Page.
Status	In online mode, the 215IF's link status data is displayed in hexadecimal. In offline mode, nothing will be displayed. The following figures show the meaning of the link status data for other stations and the local station.
Station Name (Comment)	Displays the station name set in the Link Assignment Tab Page.

- Link Status Data for Other Stations



- Link Status Data at the Local Station



(4) Saving, Deleting, and Closing 215IF Definitions Data

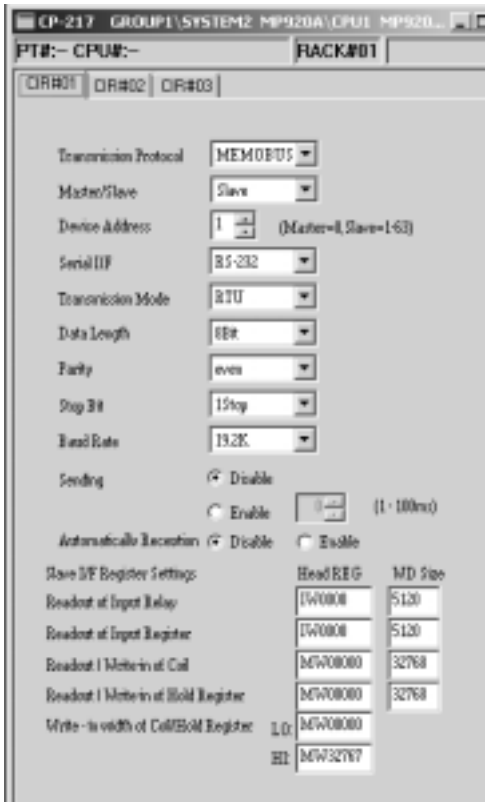
Refer to the procedures in *8.3 Basic Individual Module Definition Operations* for details.

8.5.6 217IF Definitions

This section explains how to set the parameters for the 217IF transmission system.

(1) Opening the CP-217 (217IF) Definitions Window

Open the CP-217 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



This section explains the various parameters required to use the 217IF transmission system.

The CP-217 Definitions Window has tabs for the current circuit and the next two circuits. Click another circuit's tab to switch to that circuit's tab page.

The numbers displayed in the tabs at the top of the window (CIR#nn) are the 217IF Module circuit numbers.

Each 217IF Module requires 3 circuits and the same circuit number must not be used more than once.

Machine Controller	Circuit Numbers
MP920	1 to 25

Setting	Details
Transmission Protocol	Select the desired protocol. • ***MEMOBUS***: Yaskawa's standard MEMOBUS protocol. • ***MELSEC***: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links. • ***OMRON***: OMRON's SYSMAC-C-series Host Link protocol. • ***None***: Data can be transferred at any time by the user application program.
Master/Slave	When the *Transmission Protocol* has been set to ***MEMOBUS***, ***MELSEC***, or ***OMRON***, select whether the Machine Controller will operate as a ***Master*** or a ***Slave***.
Device Address	Select the device address. When the Machine Controller is being used as a ***Master***, set the device address to 0. When the Machine Controller is being used as a ***Slave***, set the device address to a value between 1 and 63.
Serial I/F	Select the serial interface.
Transmission Mode	Select the transmission mode. • ***RTU***: Specifies RTU mode when the Transmission Protocol is set to MEMOBUS. • ***ASCII***: Specifies ASCII mode when the Transmission Protocol is set to MEMOBUS. • ***none***: Use for MELSEC, OMRON, and None.
Data Length	Select the number of bits in one character. • ***8Bit***: 8 bits • ***7Bit***: 7 bits
Parity	Specify whether or not the parity bit will be used. • ***Even***: Even parity • ***Odd***: Odd parity • ***none***: No parity check
Stop Bit	Select the number of stop bits. • ***1stop***: 1 stop bit • ***2stop***: 2 stop bits
Baud Rate	Select the transmission speed (bps).
Sending (Send Delay Setting)	When ***Enable*** is selected, a delay until the beginning of transmissions (1 to 100 ms) can be set. • Master Station: The delay will be included between execution of the MSG-SND function and the transmission of the command. • Slave Station: The delay will be included between reception of a command by the MSG-RCV function and the transmission of the response. See the relevant Machine Controller's User's Manual for details on each parameter's settings.
Automatically Reception	Specify whether or not to send an automatic response to a query from the master station.
Slave I/F Register Settings (Automatic Response)	See *(1)* in *8.5.4 Generic Serial Communication Definitions* for details.

(2) Saving, Deleting, and Closing 217IF Transmission Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

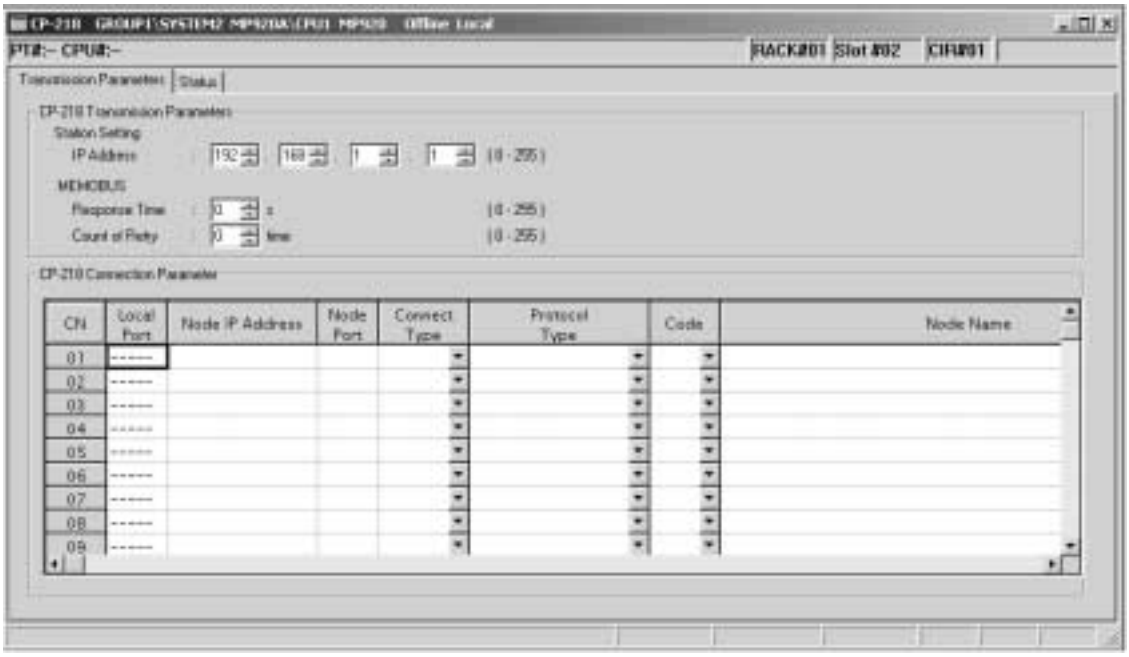
INFO When the Delete operation is executed, the 217IF transmission definitions data settings for all 3 circuits will be deleted.

8.5.7 218IF Definitions

This section explains how to set the parameters for the 218IF transmission system.

(1) Opening the CP-218 (218IF) Definitions Window

Open the CP-218 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(2) CP-218 Definitions Menus

The following table shows the menu commands and functions displayed in the CP-218 Definitions Window.

Menu Command		Function
Edit		
	Local Port: TCP/IP Setting	Sets local station and TCP/IP.
	Ethernet Address Setting	Sets the Ethernet address of the remote station.
	Transmission Parameters Default Setting	Sets the default values of transmission parameters.
	Assignment Delete	Deletes assignment data.

(3) Tab Pages

The CP-218 Definitions Window is composed of two tab pages: the Transmission Parameters and Status Tab Pages.

Tab Page	Details
Transmission Parameters	Sets the 218IF transmission parameters.
Status	Displays the transmission status.

(a) Transmission Parameters Tab Page

Set the transmission parameters and connection parameters in the Transmission Parameters Tab Page.

Setting	Details
IP Address	Input the local station's IP address. Do not use the same address as another node in the Ethernet system.
Response Time	Input the time (0 to 255) that the 218IF will wait for a response after sending a command using the system function (the MSG-SND function). If a response is not returned and a timeout occurs, the transmission will be retried. (The number of retries is set with the *Count of Retry*.) Input 0 for the *Response Time* if the *Count of Retry* is set to 0 and the *Protocol Type* is set to ***MEMOBUS***.
Count of Retry (Number of Retries)	Input the number of retries (0 to 255) to attempt when a timeout is detected after execution of the system function (the MSG-SND function). An error will be returned for the MSG-SND function if a response is not returned after the command is resent by the setting number of retries. Input 0 for the *Count of Retry* if the *Response Time* is set to 0 and the *Protocol Type* is set to ***MEMOBUS***.
CN	Displays the connection number (1 to 20).
Local Port (Local Station's Port Number)	Input the local station's port number (256 to 65,535) for connections. Be sure to input a port number that is not used for other connections or for diagnostics. If "0" is input for this parameter, that connection number's data will be cleared and "-----" will be displayed in the *Local Port*.
Node IP Address (Remote Station's IP Address)	Input the remote station's IP address for connections. The input ranges are different for each field of the Node IP Address: • Field No. 1: 0 to 255 (excluding 127) • Field No. 2: 0 to 255 • Field No. 3: 0 to 255 • Field No. 4: 1 to 254 When an unpassive open is being used, input 0 in all four fields. Refer to *INFO* on the next page for fields.
Node Port (Remote Station's Port Number)	Input the remote station's port number (0 or 256 to 65,535) for connections. Be sure that the *Node IP Address* and *Node Port* combination are not the same as those for another connection.
Connect Type	Select the transport-layer protocol. • ***TCP***: Communication operate according to TCP (Transmission Control Protocol). • ***UDP***: Communication operate according to UDP (User Datagram Protocol).
Protocol Type	Select an application-layer protocol supported by the remote station. • ***Extended MEMOBUS***: Yaskawa's Extended MEMOBUS protocol • ***MEMOBUS***: Yaskawa's MEMOBUS protocol • ***MELSEC***: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links. • ***None***: General-purpose message communication. Data of continuous MW registers can be sent or received without being processed.

(Cont'd)

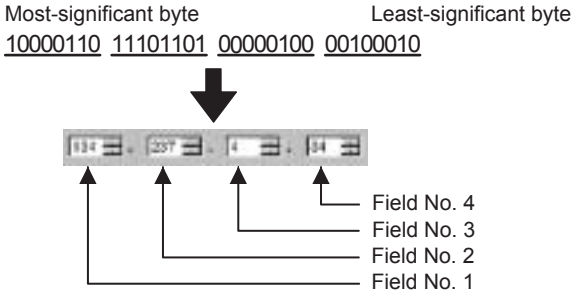
Setting	Details
Code	Input the data format that matches the format set in the remote station. • ***RTU***: Specifies RTU mode when MEMOBUS protocol is being used. • ***ASCII***: Specifies ASCII mode. • ***BIN***: Specifies binary mode. The codes that can be selected depend on the data in the *Protocol Type*. The codes that can be selected are shown in the table below.*
Node Name (Remote Station's Name)	Input a station name (comment) for the remote station. The station name can be up to 32 characters.

* The following table shows the codes that can be selected.

Protocol Type	Data Code		
	RTU	ASCII	BIN
Extended MEMOBUS	No	Yes	Yes
MEMOBUS	Yes	Yes	No
MELSEC	No	Yes	Yes
None	No	Yes	Yes

INFO

- The address is made up of 32 bits, as shown in the following figure. The 4 bytes (8 bits each) are separated by periods and the byte values are input in decimal.
  The bytes are handled as 4 fields: Field No. 1 through Field No. 4 from the most-significant byte through the least-significant byte.

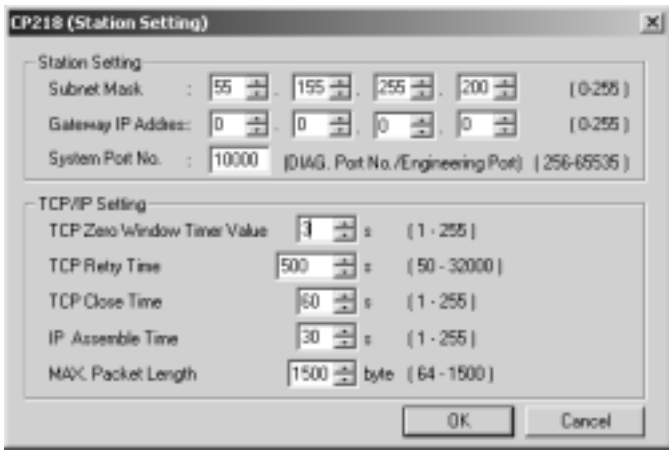


  The input ranges of IP address are different for each field:
  - Field No. 1: 0 to 255 (excluding 127)
  - Field No. 2: 0 to 255
  - Field No. 3: 0 to 255
  - Field No. 4: 1 to 254
- We recommend IP addresses 192.168.1.1 through 192.168.1.254 as private addresses, but contact your company's system administrator for confirmation.
- When the *Node IP Address* and *Node Port* are both set to 0, that connection will be in unpassive open mode and will connect to a station that accesses it. If more than one station accesses a connection in unpassive open mode, the connection will connect to the first station that requests access. The second station will be connected after the first station is disconnected.

- Setting Local Station and TCP/IP

Set the local station and TCP/IP using the following procedure.

1. Select ***Edit – Local Port: TCP/IP Settings*** from the 218IF Definitions Menu.
2. Set each parameter in the dialog box and click the **OK** Button.



Setting	Details
Subnet Mask*1	Input a subnet mask for the local station's IP address. When the subnet mask is not being used, input 0 in fields 1 through 4.
Gateway IP Address*2	Input the gateway's IP address when transmitting data between connected networks through a gateway (router). The input ranges are different for each field of the gateway's IP address: • Field No. 1: 0 to 255 (excluding 127) • Field No. 2: 0 to 255 • Field No. 3: 0 to 255 • Field No. 4: 1 to 254 If a gateway is not being used, input 0 in all four fields of the *Gateway IP Address*. When a gateway IP address is being input, be sure not to duplicate any other IP address.
System Port No. (Diagnostic/Engineering Port No.)	Input the port number/engineering port (256 to 65,535) that receives diagnostic commands from the diagnostic terminal.
TCP (Transmission Control Protocol) Zero Window Timer Value	Input the retry time (1 to 255 s) for the Send Window confirmation packet when the TCP's Send Window size is set to 0.
TCP Retry Time	Input the retry time (50 to 32,000 ms) for resending data when an ACK (acknowledgment) is not returned after opening a TCP connection or transmitting data.
TCP Close Time	Input the time to wait (1 to 255 s) for a remote station to completely close the connection when a TCP connection is being closed.
IP Assemble Time	Input the time to wait (1 to 255 s) for the next segment of data after the IP has received a segment of data.
MAX. Packet*3 Length	Input the maximum packet length (64 to 1,500) in the 218IF.

* 1. Subnet Mask
The IP address is composed of a network address and a host address, but part of the host address can be used as the network address. This is known as the subnet address and the bit pattern is known as the subnet mask.

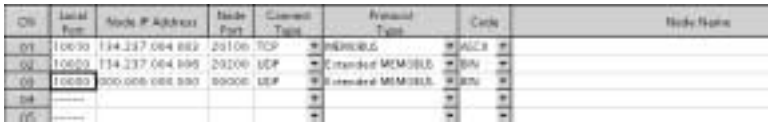
* 2. Gateway IP Address
Normally transmissions are relayed through a router when transmitting between different network addresses. This router's IP address is known as the gateway address or default IP address.

* 3. Packet
A packet is a single segment of transmission message that has a destination address.

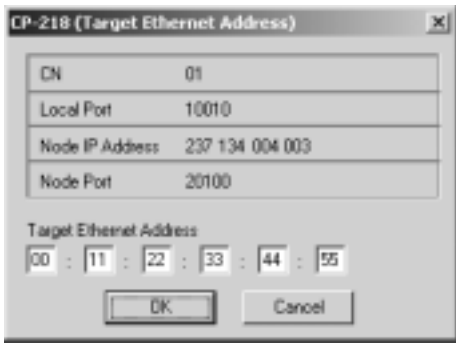
- Setting a Remote Station's Ethernet Address

When a remote station does not support the ARP (Address Resolution Protocol), use the following procedure to set a remote station's Ethernet address.

1. Move the cursor to the connection where the Ethernet address needs to be set.



2. Select ***Edit*** – ***Ethernet Address Setting*** from the 218IF Definitions Menu.
3. Complete each setting in the following dialog box and then click the **OK** Button.



- Connection Parameter Consistency Check

The following restrictions apply to the input values of connection parameters:

Consistency Item	Details
Duplication of the Local Station Port Number	The same combination of settings in *Local Port* (local station's port number) and *Connect Type* of the connection parameters must not be used for any other connection.
Duplication of the System Port	When the *Connect Type* is set to ***TCP*** in the connection parameters, the *Local Port* (local station's port number) setting must not be the same as the *System Port Number* (diagnostic/engineering port) setting.
Open Mode	When the *Node IP Address* (remote station's IP address) is set to all zeros in the connection parameters, the *Node Port* (remote station's port number) must be 0 and all the Ethernet address must be all zeros.
Duplication of a Remote Station	The same combination of settings in the *Node IP Address* (remote station's IP address), the *Node Port* (remote station's port number), and the *Connect Type* of the connection parameters must not be used for any other connection. This restriction does not apply when the settings in the *Node IP Address* (remote station's IP address) and the *Node Port* (remote station's port number) are set to all zeros.
Ethernet Address	The *Node IP Address* (remote station's IP address) settings must be the same when the same Ethernet address has been set in the connection parameters. This restriction does not apply when the Ethernet address is set to all zeros.

The following restrictions on communication within the local station apply when the DST.IP Address is the same as the local station IP Address (when the local station itself is designated as the remote station):

Consistency Item	Details
Duplication of the Port Number:	The *Node IP Address* (remote station's IP address) setting must not be the same as the *Local Port* (local station's port number) setting.
Remote Station	There can be only one local station/remote station pair. The two stations are paired in the connection parameters, i.e., *Local Port* (local station's port number) is specified for the *Node Port* (remote station's port number) and the *Node Port* (remote station's port number) is specified for *Local Port* (local station's port number). The parameter pairing conditions are shown in the following table.*1
Protocol Type and Code Settings	The Combination of the *Protocol Type* and *Code* (data format) settings for each connection parameter must be correct. The *Protocol Type* and *Code* combinations are shown in the following table.*2

* 1. The following table shows the Parameter Pairing Conditions.

Parameter	XX	YY	Pairing Condition
Local Port (Local Station's Port Number)	10000	20000	Set each other's port numbers.
Node Port (Remote Station's Port Number)	20000	10000	
Node IP Address (Remote Station's IP Address)	134.237.127.004	134.237.127.004	Set both to the local station's IP address.
Connect Type	TCP	TCP	Set both to the same value.
Protocol Type	Extended MEMOBUS	Extended MEMOBUS	
Code	Binary	Binary	
Remote Station's Ethernet Address	12:34:56:78:9A:BC	12:34:56:78:9A:BC	

* 2. The following table shows the Protocol Type and Code combinations.

Protocol Type	Code
Extended MEMOBUS	Binary or ASCII
MEMOBUS	RTU or ASCII
MELSEC	Binary or ASCII
General-purpose	Binary or ASCII

- Setting Default Values

The transmission parameters can be reset to their default values without inputting each parameter, by selecting ***Edit – Transmission Parameters Default Settings*** from the 218IF Definitions Menu.

Parameter	Default
IP Address	192.168.001.001
Response Time	0
Count of Retry (Number of Retries)	0
Subnet Mask	000.000.000.000
Gateway IP Address	000.000.000.000
System Port No. (Diagnostic/Engineering Port)	65535
TCP Zero Window Timer Value	3
TCP Retry Time	500
TCP Close Time	60
IP Assemble Time	30
MAX. Packet Length	1500

INFO This operation does not return the remote stations' Ethernet addresses or the connection parameters to their default values.

- Deleting Assignment Data

Delete the assignment data for one connection using the following procedure.

1. Move the cursor to the connection to be deleted.

CN	Local Port	Node IP Address	Node Port	Connect Type	Protocol Type	Code	N
01	10010	134.237.004.003	20100	TCP	MELSEC	ASCII	
02	10020	134.237.004.006	20200	UDP	Extended MEMOBUS	BIN	
03	10030	000.000.000.000	00000	UDP	Extended MEMOBUS	BIN	

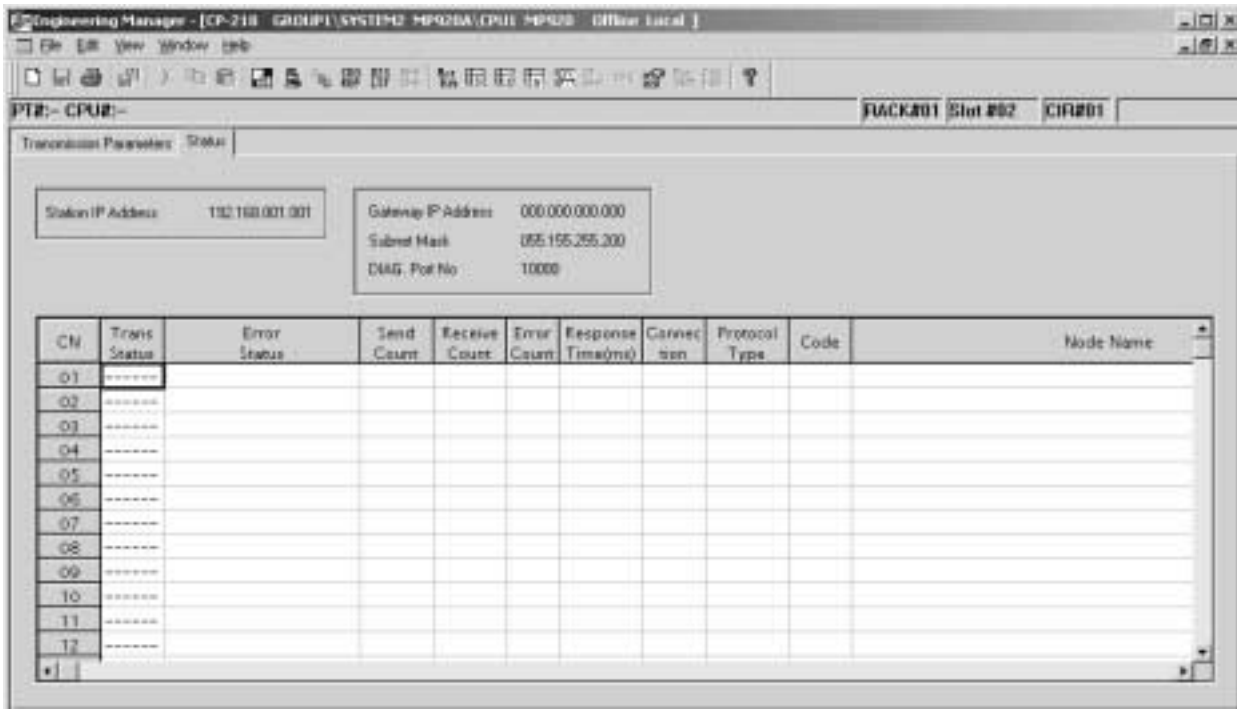
2. Select ***Edit – Assignment Delete*** from the 218IF Definitions Menu.
   The assignment data selected in step 1 will be deleted.

CN	Local Port	Node IP Address	Node Port	Connect Type	Protocol Type	Code	N
01	-----						
02	10020	134.237.004.006	20200	UDP	Extended MEMOBUS	BIN	
03	10030	000.000.000.000	00000	UDP	Extended MEMOBUS	BIN	

INFO The definitions data can be deleted even if 0 is input for *Local Port* (local station's port number).

(b) Status Tab Page

The Status Tab Page displays the data that the 218IF is actually transmitting. The tab page only displays the data; the settings cannot be changed.



Setting	Details
Station IP Address (Local Station's IP Address)	Displays *Local Port* (local station's IP address) set in the Transmission Parameters Tab Page.
Gateway IP Address	Displays the *Gateway IP Address* set in the Transmission Parameters Tab Page.
Subnet Mask	Displays the *Subnet Mask* set in the Transmission Parameters Tab Page.
DIAG. Port No. (Diagnostic/ Engineering Port No.)	Displays the *System Port No.* (diagnostic/engineering port number) set in the Transmission Parameters Tab Page.
CN	Displays the connection number (1 to 20).
Trans Status	Displays the status of the connection when in online mode. The following table lists the transmission status values.*

* The following table shows the transmission status values.

Status Value	Meaning
1	IDLE status
2	WAIT status (waiting for connection)
3	CONNECT status (data transfers possible)
–	Unused connection

Setting	Details
Error Status	Displays the details on the error when an error has occurred in transmission status. The following table lists the error status.*
Send Count	Displays the number of data (number of packets) sent to the remote station.
Receive Count	Displays the number of data (number of packets) received from the remote station.
Error Count	Displays the number of times that an error has occurred.
Response Time [ms]	Displays the time taken for a response to be received after a command was sent with the MSG-SND function.

(Cont'd)

Setting	Details
Connection	Displays the *Connect Type* (connection type) set in the Transmission Parameters Tab Page.
Protocol Type	Displays the *Protocol Type* set in the Transmission Parameters Tab Page.
Code	Displays the *Code* (data format) set in the Transmission Parameters Tab Page.
Node Name (Remote Station's Name)	Displays the *Node Name* (remote station's name) set in the Transmission Parameters Tab Page.

* The following table shows the error status values.

Status Value	Meaning
0	No error
1	System error
2	Local station port number setting error
3	System error (TCP settings)
4	System error (TCP settings)
5	Connection error (TCP settings)
6	System error
7	Data send error (TCP settings)
8	Data send error (TCP settings)
9	Data send error (TCP settings)
10	Data send error (TCP settings)
11	System error
12	Data conversion error (MEMOBUS and MELSEC settings)

All of the data listed above will be displayed in online mode. Nothing will be displayed in offline mode.

(4) Saving, Deleting, and Closing 218IF Transmission Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

IMPORTANT

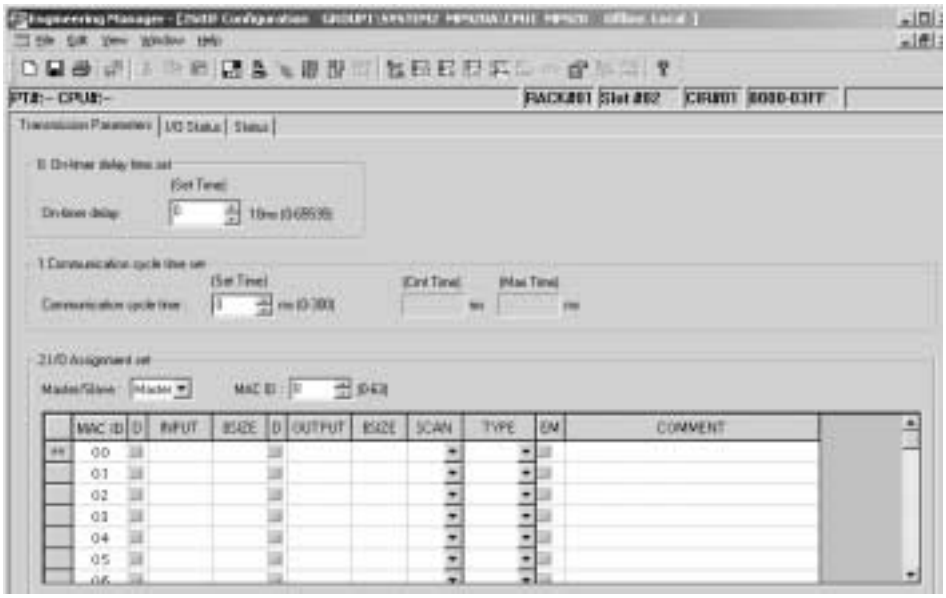
- The connection parameters cannot be saved unless the parameter input values pass a consistency check. Refer to *Connection Parameter Consistency Check* on page 8-39 for details.
- An Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

8.5.8 260IF Definitions

This section explains how to set the parameters for the 260IF transmission system.

(1) Opening the 260IF Definitions Window

Open the 260IF Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(2) Tab Pages

The 260IF Definitions Window is composed of three tab pages: the Transmission Parameters, I/O Status, and Status Tab Pages.

Tab Page	Details
Transmission Parameters	Sets the communication and network parameters for the 260IF Module.
I/O Status	Displays the communication status with the slaves when setting the online master. For details, refer to *6.2 I/O Status* in the *Machine Controller MP900 Series User's Manual: 260IF DeviceNet System* (SIEZ-C887-5.2).
Status	Displays the 260IF Module status when online. For details, refer to *6.3 Status* in the *Machine Controller MP900 Series User's Manual: 260IF DeviceNet System* (SIEZ-C887-5.2).

- Transmission Parameters Tab Page

0. On-timer Delay Time Set (On-time Delay Set Time)

Setting	Details
On-timer Delay	Input the setting value (time) for the on-delay timer.

1. Communication Cycle Time Set (Communication Cycle Time Information Settings)

Setting	Details
Communication Cycle Time (Set Value)	If using the 260IF as a DeviceNet master, enter the communication cycle time set value.
Communication Cycle Time (Current Time); Display Only	Displays the communication cycle current value during I/O transmissions.
Communication Cycle Time (Maximum Time); Display Only	Displays the communication cycle maximum value during I/O transmissions.

Refer to *4.2 Calculating Communication Cycle Times* in the *Machine Controller MP900 Series User's Manual: 260IF DeviceNet System* (SIEZ-C887-5.2) for details.

2. I/O Assignment Set (I/O Allocation Settings)

The asterisks (**) displayed on the left of the I/O allocations setting table denote the 260IF Module itself, allocated using the Module configuration definitions.

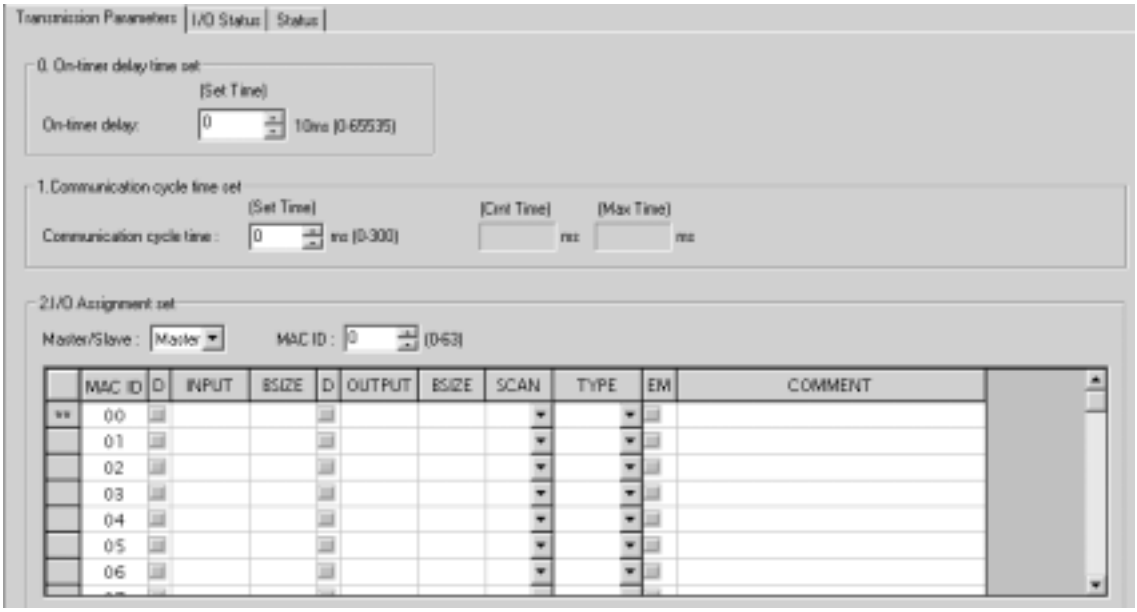
Setting	Details
Master/Slave	Set the operating mode (i.e., DeviceNet master or slave) for the 260IF Module. Set to the same item as the item set using 260IF Module setting switch 1 (×1).
MAC ID	The MAC ID is the DeviceNet MAC ID (i.e., DeviceNet address) of the 260IF Module. Set to the same value as the value set using 260IF Module setting switches 2 and 3.
MAC ID column	The MAC ID column is the DeviceNet MAC ID (i.e., DeviceNet address) for I/O allocation. MAC ID column are set automatically in order starting from 00.
D (Input Enable/Disable)	Input enable/disable sets whether or not the MP920 CPU exchanges I/O data with the 260IF Module. Select it to disable I/O data exchange.
INPUT	Set the start address of the input area (input register IWxxxx) allocated to the relevant device. Specify using a hexadecimal word address.
BSIZE	Displays in bytes the size of the output area (input register IWxxxx) allocated to the relevant device. Specify from 1 to 256 (in decimal) for 1 slave.*
D (Output Enable/Disable)	Output enable/disable sets whether or not the MP920 CPU exchanges I/O data with the 260IF Module. Select it to disable I/O data exchange.
OUTPUT	Set the start address of the output area (output register OWxxxx) allocated to the relevant device. Specify using hexadecimal word address.
BSIZE	Displays in bytes the size of the output area (output register OWxxxx) allocated to the relevant device. Specify from 1 to 256 (in decimal) for 1 slave. The bytes are little endian, the same as the input registers.
SCAN	The data exchange cycle (SCAN) is the timing for exchanging I/O data between the MP920 CPU and the 260IF Module. The MP920 CPU data exchange cycle is asynchronous with I/O transmissions. When set to ***High***, the MP920 CPU exchanges I/O data using the CPU's high-speed scan timing. When set to ***Low***, the MP920 CPU exchanges I/O data using the CPU's low-speed scan timing.
TYPE	Set the I/O transmission type (TYPE) to ***Polled*** or ***Strobed***. • ***Polled*** enables any DeviceNet slaves to be set. • ***Strobed*** enables input only, and limits DeviceNet slaves to communication of 8 bytes maximum. For details on polled and strobed connections, refer to the DeviceNet specifications manual.
EM (Explicit Message)	Select EM allocation (EM) only when the 260IF is the DeviceNet master and message communication are to be performed with the slaves. DeviceNet slaves performing I/O transmissions can exchange messages, but EM allocation setting is not necessary.
COMMENT	A comment of up to 32 characters can be input to include the name, type, or other information on the relevant device.

* For example, if setting 3 bytes from IW1100 and 1 byte from IW1102, the registers are used as shown below.

Register Address	F to 8	7 to 0
IW1100H		
IW1101H		
IW1102H		
IW1103H		

When the parameter settings have been completed, save the parameters by selecting ***File*** – ***Save*** from the menu.

- Master/Slave Selection and MAC ID Settings
  Select the operating mode in *Master/Slave* to match the 260IF setting switch 1 (×1) set item.
  Set the DeviceNet address in *MAC ID* to match the 260IF setting switches 2 and 3 set values.
- Communication Cycle Settings
  Enter the communication cycle time required in *4.2 Calculating Communication Cycle Times* in the *Machine Controller MP900 Series User's Manual: 260IF DeviceNet System* (SIEZ-C887-5.2).
  This setting is not necessary when using the 260IF as a DeviceNet slave.
- I/O Allocation
  Allocate the I/O registers for sending and receiving I/O data between the MP920 CPU and the 260IF Module according to the DeviceNet system configuration.



- I/O Allocation Using Network Configuration Information
  When using the 260IF Module as a DeviceNet master, the settings can be configured based on the I/O sizes read from the slaves.
  To read the I/O sizes from the slaves, use the network configuration information read function.
  For setting method details, refer to *6.1 Reading Network Configuration Information* in the *Machine Controller MP900 Series User's Manual: 260IF DeviceNet System* (SIEZ-C887-5.2).
- If allocating I/O using the network configuration information, delete the I/O allocation from all the slaves before performing allocation.

(3) Saving, Deleting and Closing 260IF Definitions Data

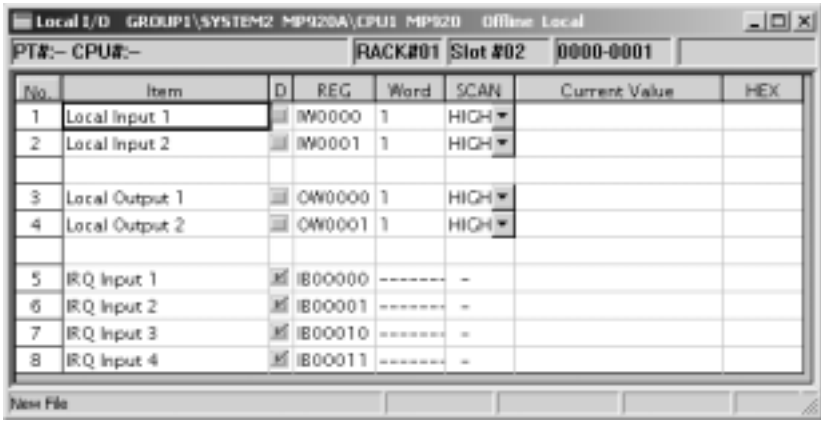
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.5.9 LIO-01 Definitions

This section explains how to set LIO-01 Definitions.

(1) Opening the Local I/O Definitions Window

Open the Local I/O Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Setting	Details
Item	Displays the I/O items.
D (Register Enable/Disable)	Sets the register's enable/disable setting. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8. • : Enabled • : Disabled
REG (Register Number)	Displays the I/O register number. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.
Word (Number of Words)	Displays the number of consecutive register words. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.
SCAN	Sets the transmission processing scan. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan • ***(NA)***: No scan specification
Current Value	In online mode, this column displays the current value of the Machine Controller's register. The current values of Local I/O are displayed in binary and the current values of Local outputs can be changed. The current values of interrupt inputs 1 to 4 are displayed as ***ON*** or ***OFF***. When a new current value is input, the value will be checked and immediately stored in the Machine Controller's register. In offline mode, nothing will be displayed. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.
HEX	Displays the hexadecimal equivalent of the binary values in the *Current Value*. In offline mode, nothing will be displayed. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.

(2) Saving, Deleting, and Closing Local I/O Definitions Data

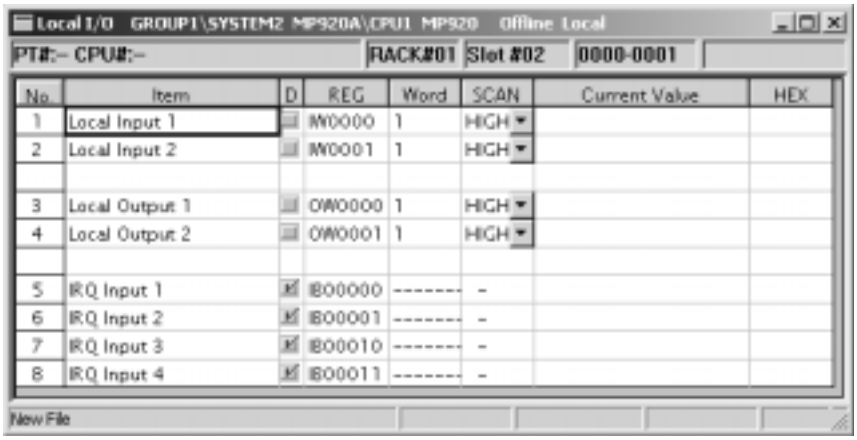
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.5.10 DI-01 Definitions

This section explains how to set the DI-01 Definitions.

(1) Opening the DI-01 Definitions Window

Open the DI-01 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Setting	Details
Item	Displays the input item.
D (Register Enable/Disable)	Sets the register's enable/disable setting. • : Enabled • : Disabled
REG (Register Number)	Input the number of the register (I register number) that handles the input. Register numbers are allocated to interrupt inputs automatically if the register number for a Local input is entered.
WD (Number of Words)	Displays the number of consecutive register words.
SCAN	Sets the transmission processing scan in which inputs are serviced. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan • ***(NA)***: No scan specification
Current Value	In online mode, this column displays the current value of the Machine Controller's register. The current values of Local inputs are displayed in binary and the current values of interrupt inputs are displayed as ***ON*** or ***OFF***. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the *Current Value*. In offline mode, nothing will be displayed.

(2) DI-01 Definitions Menus

The following table shows the menu commands and functions displayed in the DI-01 Definitions Window.

Menu Command		Function
Edit		
	Assignment Delete	Deletes allocation data.

(3) Deleting Allocation Data

1. Click the *REG-No* line to be deleted.
2. Select ***Edit – Assignment Delete*** from the DI-01 Definitions Menu.
   The data selected in step 1 will be deleted.

INFO

Register allocations can be deleted for Local inputs 1 to 4. When the register allocation for Local input 1 is deleted, the allocations for interrupt inputs 1 and 2 will be deleted simultaneously. When the allocation for Local input 2 is deleted, the allocations for interrupt inputs 3 and 4 will be deleted simultaneously.

(4) Saving, Deleting, and Closing DI-01 Definitions Data

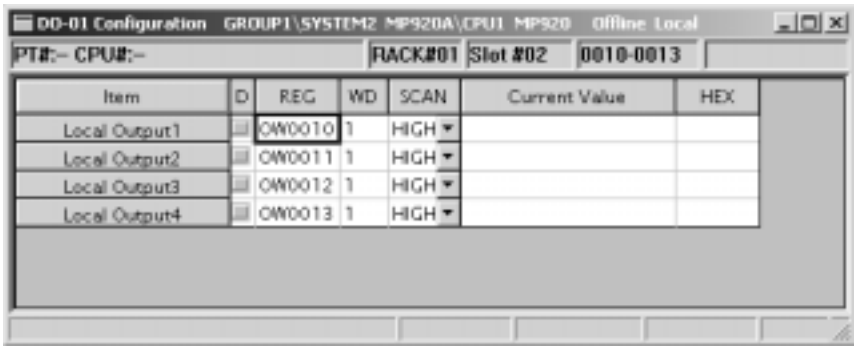
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.5.11 DO-01 Definitions

This section explains how to set the DO-01 Definitions.

(1) Opening the DO-01 Definitions Window

Open the DO-01 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Setting	Details
Item	Displays the output item.
D (Register Enable/Disable)	Sets the register's enable/disable setting. • : Enabled • : Disabled
REG (Register Number)	Input the number of the register (O register number) that handles the output.
WD (Number of Words)	Displays the number of consecutive register words.
SCAN	Sets the transmission processing scan in which outputs are serviced. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan • ***(NA)***: No scan specification
Current Value	In online mode, this column displays the current values of the Machine Controller's registers in binary. The current values of Local outputs can be changed. When a new current value is input, the value will be checked and immediately stored in the Machine Controller's register. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the *Current Value*. In offline mode, nothing will be displayed.

(2) DO-01 Definitions Menus

The following table shows the menu commands and functions displayed in the DO-01 Definitions Window.

Menu Command		Function
Edit		
	Assignment Delete	Deletes allocation data.

(3) Deleting Allocation Data

1. Click the *REG-No* line to be deleted.
2. Select ***Edit – Assignment Delete*** from the DO-01 Definitions Menu.
   The data selected in step 1 will be deleted.

(4) Saving, Deleting, and Closing DO-01 Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

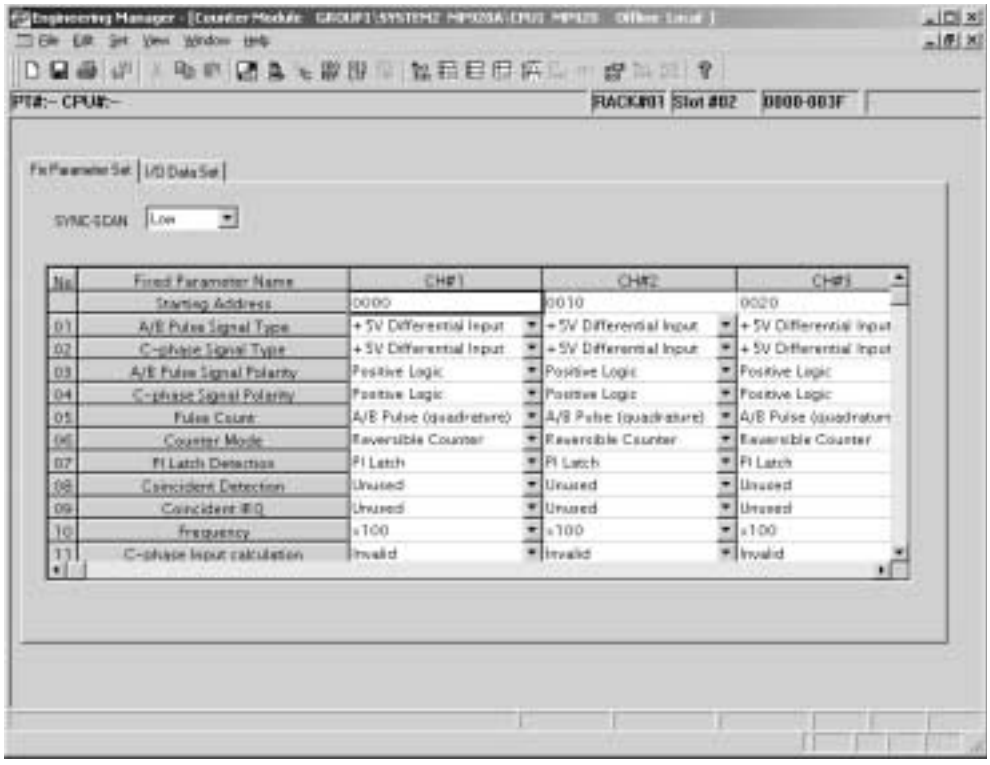
8.5.12 CNTR-01 Definitions

This section explains how to set the CNTR-01 Definitions.

(1) Opening the Counter Module Definitions Window

Open the Counter Module Defintions Window according to *8.3.1 Opening Individual Module Definitions Windows*.

The Fix Parameter Set Tab Page will be displayed.



(2) Counter Module Definitions Menus

The following table shows the menu commands and functions displayed in the Counter Module Definitions Window.

Menu Command		Function
Set		
	Default	Returns settings to default values by channel.
	All Default	Sets all settings to default values.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	DEC	Displays the I/O data in decimal.
	HEX	Displays the I/O data in hexadecimal.
	BIN	Displays the I/O data in binary.

- Switching the Data Format of the Display

The I/O Data of the Counter Module can be switched among three data formats: decimal, hexadecimal, and binary. Switch the data format by selecting another format from the menu.

- Decimal:
  Select ***View – DEC*** from the Counter Module Definitions Menu.

- Hexadecimal:
  Select ***View*** – ***HEX*** from the Counter Module Definitions Menu.
- Binary:
  Select ***View*** – ***BIN*** from the Counter Module Definitions Menu.

(3) Tab Pages

The Counter Module Definitions Window is composed of two tab pages: the Fix Parameter Set and I/O Data Set Tab Pages. The following table shows the functions of each tab page.

Tab Page	Details
Fix Parameter Set	Sets fixed parameters.
I/O Data Set	Sets I/O data.

(a) Fixed Parameter Set Tab Page

The various fixed parameters for the Counter Module are set in the Fix Parameter Set Tab Page.

Setting	Details
SYNC-SCAN	This setting determines whether the I/O data refresh cycle of the CNTR-01 Module is synchronized with the HIGH or LOW scan cycle of the Machine Controller. • ***High***: High-speed scan • ***Low***: Low-speed scan
Top Register No. (Leading Register Number)	Displays the leading register number that corresponds to the parameter.
Fix Parameter Name	Displays the name of the fixed parameter.
Parameter Settings	Displays the parameter settings for channels 1 to 4 (CH#1 to CH#4).

- Setting Default Values

The fixed parameters can be reset to their default values (of each channel) without inputting each parameter. The following table shows the default values of the fixed parameters.

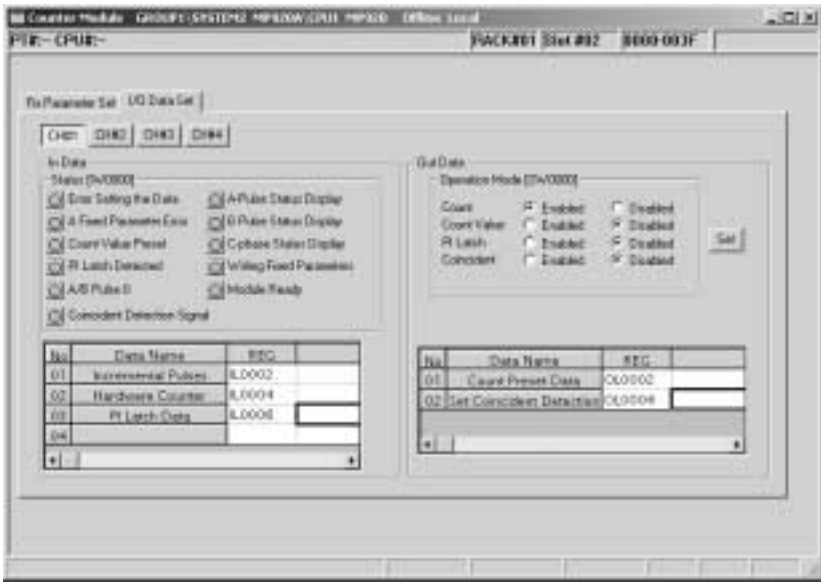
Fixed Parameter	Default Value
A/B Pulse Signal Type	+5V Differential Input
C Pulse Signal Type	+5V Differential Input
A/B Pulse Signal Polar	Plus Logic (positive logic)
C Pulse Signal Polar	Plus Logic (positive logic)
Pulse Count	A/B Pulse (Mult ×4)
Counter Mode	Reversible Counter
PI Latch Detection	PI Latch
Coincident Detection	Unused.
Coincident IRQ	Unused.
Frequency	x100
By C-phase Input A Calculating (Measure with C Pulse Input)	Prohibition

Reset parameters to their default values using the following procedure.

1. Move the cursor to the channel number that you want to reset to default values.
2. Select ***Set*** – ***Default*** from the Counter Module Menu.
3. Verify the displayed message and click the **Yes** Button.
4. The fixed parameters in the channel number selected in step 1 will be returned to their default values.

(b) I/O Data Set Tab Page

The Counter Module's I/O data is set in the I/O Data Set Tab Page.



Setting	Details
Channel Number Selection	Selects the channel tab (CH#1 to CH#4) to display the I/O Data to be set.
Status (Operating Status Display)	Displays the status of each bit in the register that contains the operating status. The corresponding box will contain a black circle when the bit is ON and a white circle when the bit is OFF.
Operation Mode (Operating Mode Settings)	Selects the status of each bit in the register that controls the operating mode. Click the **Set** Button to activate the new operating mode settings.
Data Name (for input)	Displays the name of the input data.
REG (Register Number for input)	Displays the register number of the corresponding input data name.
In Data (Input Data)	Displays the current value of the corresponding register number and input data name.
Data Name (for output)	Displays the name of the output data.
REG (Register Number for output)	Displays the register number of the corresponding output data name.
Out Data (Output Data)	Displays the current value of the corresponding register number and output data name.

(4) Saving, Deleting, and Closing CNTR-01 Definitions Data

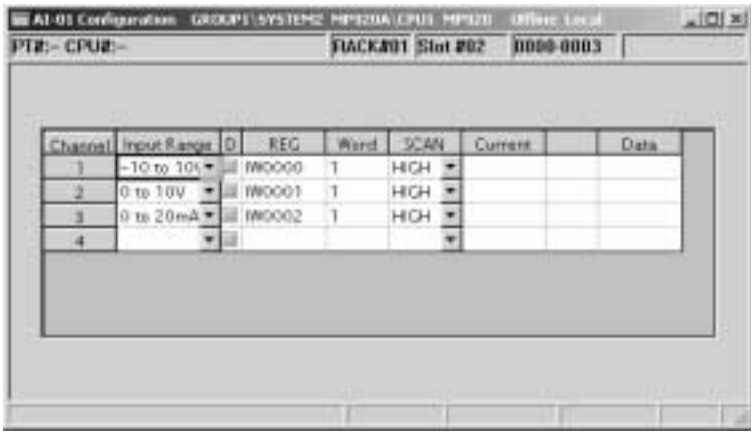
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.5.13 AI-01 Definitions

This section explains how to set the AI-01 Definitions.

(1) Opening the AI-01 Definitions Window

Open the AI-01 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Setting	Details
Channel	Displays the channel number (1 to 8).
Input Range	Selects the input range: −10 to +10 V, 0 to 10 V, or 0 to 20 mA.
D (Register Enable/Disable)	Sets the register's enable/disable setting. • : Enabled • : Disabled
REG (Register Number)	Input the number of the register (I register number) that handles the input.
Word (Number of Words)	Displays the number of consecutive register words.
SCAN	Sets the transmission processing scan in which inputs are serviced. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan
Current (Current Value)	In online mode, this column displays the current value in the order of current value, units, and hexadecimal current value of the Machine Controller's register. The unit corresponds to the unit set in *Input Range*. In offline mode, nothing will be displayed.

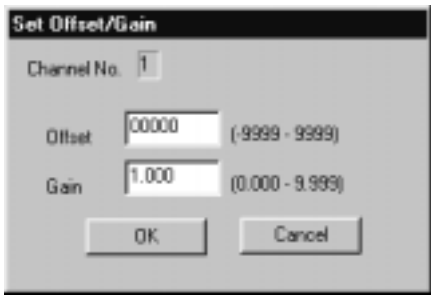
(2) AI-01 Definitions Menus

The following table shows the menu commands and functions displayed in the AI-01 Definitions Window.

Menu Command		Function
Edit		
	Assignment Delete	Deletes allocation data.
Set		
	Offset/Gain	Sets the offset and gain.

(3) Setting the Offset and Gain

1. Select ***Set*** – ***Offset/Gain*** from the AI-01 Definitions Menu.
2. Input the desired offset and gain in the following dialog box and then click the **OK** Button.



(4) Deleting Allocation Data

1. Move the cursor to the channel number to be deleted.
2. Select ***Edit*** – ***Assignment Delete*** from the AI-01 Definitions Menu.
   The data selected in step 1 will be deleted.

(5) Saving, Deleting, and Closing AI-01 Definitions Data

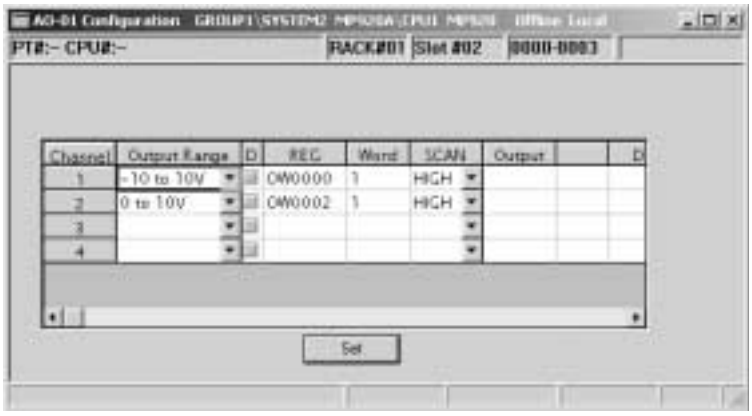
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.5.14 AO-01 Definitions

This section explains how to set the AO-01 Definitions.

(1) Opening the AO-01 Definitions Window

Open the AO-01 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Setting	Details
Channel	Displays the channel number (1 to 4).
Output Range	Selects the output range: -10 to +10 V or 0 to 10 V.
D (Register Enable/Disable)	Sets the register's enable/disable setting. • : Enabled • : Disabled
REG (Register Number)	Input the number of the register (O register number) that handles the output.
Word (Number of Words)	Displays the number of consecutive register words.

(Cont'd)

Setting	Details
SCAN	Sets the transmission processing scan in which outputs are serviced. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan
Output, Data	In online mode, these columns display the current value in the order of current value, units, and hexadecimal current value of the Machine Controller's register. The unit corresponds to the unit set in *Output Range*. A new current value input in the *Output* can be stored in the Machine Controller's register immediately by clicking the **Set** Button or selecting ***Set*** – ***Set Register*** from the AO-01 Definitions Menu. In offline mode, nothing will be displayed.

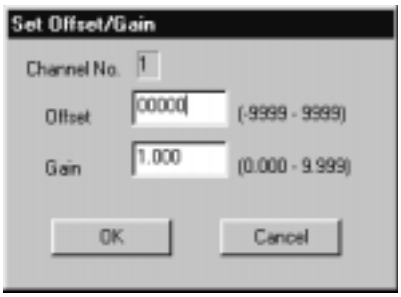
(2) AO-01 Definitions Menus

The following table shows the menu commands and functions displayed in the AO-01 Definitions Window.

Menu Command		Function
Edit		
	Assignment Delete	Deletes allocation data.
Set		
	Offset/Gain	Sets the offset and gain.
	Set Register	Sets the register.

(3) Setting the Offset and Gain

1. Select ***Set*** – ***Offset/Gain*** from the AO-01 Definitions Menu.
2. Input the desired offset and gain in the following dialog box and then click the **OK** Button.



(4) Deleting Allocation Data

1. Move the cursor to the channel number to be deleted.
2. Select ***Edit*** – ***Assignment Delete*** from the AO-01 Definitions Menu.
   The data selected in step 1 will be deleted.

(5) Saving, Deleting, and Closing AO-01 Definitions Data

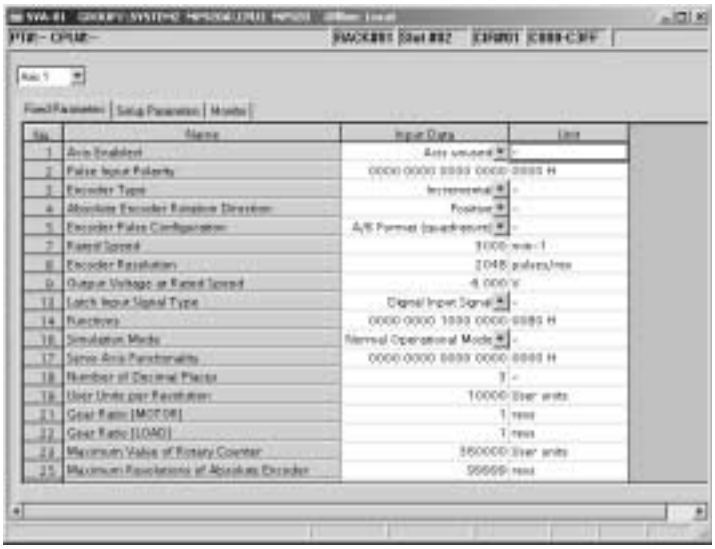
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.5.15 SVA Definitions

This section explains how to set the motion parameters of the SVA Modules.

(1) Opening the SVA Definitions Window

Open the SVA Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(2) SVA-01 Definitions Menus

These menus can be used only in the windows for the motion parameters.

Menu Command		Function
Edit		
	Axis Data Copy	Temporarily saves the displayed axis setting data.
	Axis Data Paste	Copies the temporarily saved axis data to the currently selected axis data.
	Details	Displays individual data in bit format.
	Default Set	Sets the default value.
	Copy Current Value	Sets the current value to the set data.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
	Update Current Value	Updates the display of the current value of the servo parameters.

(a) Axis Data Copy

Select the axis data to be copied, and then select ***Edit – Axis Data Copy*** from the menu. The source axis data will be copied and saved temporarily in the cut buffer.

(b) Axis Data Paste

Select the axis data to be copied, and then select ***Edit – Axis Data Paste*** from the menu. The axis data saved temporarily in the cut buffer will overwrite the axis data at the copy destination.

IMPORTANT

Copying between axes is possible using the Copy Axis Data and the Paste Axis Data functions. Copying between axes requires separate operations for fixing, setting, and SERVOPACK parameters.If the pasted data is for a different type of parameter, an error message will be displayed.

(c) Details

Use this function to display setting data as bit images for motion parameters except for servo parameters. The information can be displayed for each bit by selecting ***Edit – Details*** from the menu.

(d) Default Set

Use this function to restore the settings data for the motion fixed parameters, setting parameters, and servo parameters (for the MECHATROLINK interface only) to their default values.

Select ***Edit – Default Set*** from the menu. The axis parameters currently displayed will be set to their default values. Parameters whose current values are displayed will have their current values updated.

(e) Copy Current Value

This function is enabled only for servo parameters. It overwrites the settings data using the data displayed in the *Current Value*. Select ***Edit – Copy Current Value*** from the menu. The data on the SERVOPACK will be overwritten temporarily.

Check the details displayed, and then select ***File – Save*** from the menu to save the data permanently. This operation is possible while the servo is ON.

(f) Update Current Value

This function is enabled only for servo parameters. Current values are not automatically updated when the servo parameters are displayed. Select ***View – Update Current Value*** to read and display the most recent values.

The following table shows the functions given above.

	Motion Fixed Parameters	Motion Setting Parameters	Servo Parameters*	Motion Monitor Parameters	Remarks
Axis Data Copy / Axis Data Paste	Yes	Yes	No	No	---
Details	Yes	Yes	No	Yes	Parameters in bit format only
Default Set	Yes	Yes	Yes	No	---
Copy Current Value	No	No	Yes	No	Enabled only when online
Update Current Value	No	No	Yes	No	Enabled only when online

* Possible when the servo is ON.

Note: Yes: Operation possible, NO: Operation not possible.

(3) Tab Pages

The SVA Definitions Window is composed of three tab pages: the Fixed parameters, Setup Parameters, and Monitor Tab Pages.

Tab Page	Details
Fixed Parameters	Sets the Motion Fixed Parameters.
Setup Parameters	Sets the Motion Setting Parameters.
Monitor	Displays the Motion Monitor Parameters.

(a) Fixed Parameters Tab Page

The motion fixed parameters required for Servo adjustment are set in the Fixed Parameters Tab Page.

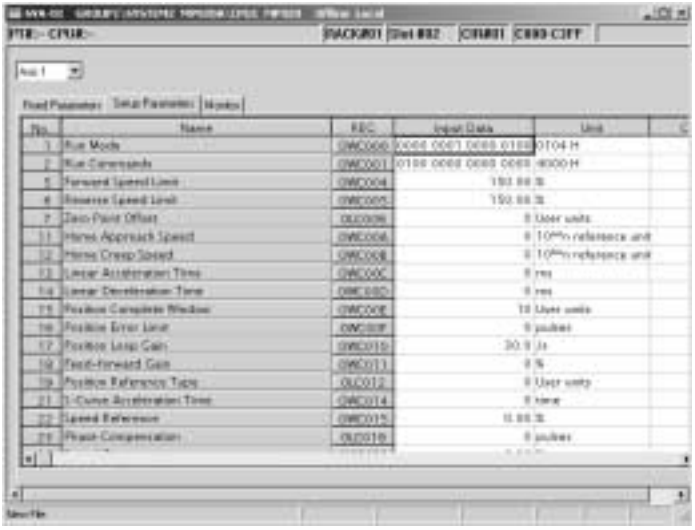
Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 4***). Set the fixed parameters for each axis in the Fixed Parameter Tab.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding set data.

INFO

Refer to *Machine Controller MP920 User's Manual: Design and Maintenance (SIEZ-C887-2.1)* or *Machine Controller MP920 User's Manual: Motion Module (SIEZ-C887-2.5)* for details on motion fixed parameter settings.

(b) Setup Parameters Tab Page

Parameters required for Servo adjustment are set in the Setup Parameters Tab Page.



Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 4***). The parameters for each axis are displayed.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed, as shown in the following *Table 8.4 Register Ranges*.
Input Data (Set Data)	Input the parameter value.
Unit	Displays the units of the corresponding set data.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Table 8.4 Register Ranges

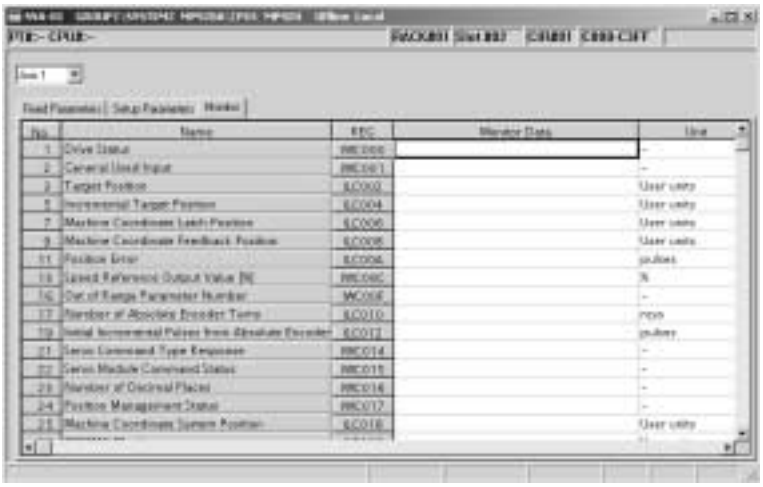
Circuit Number	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4
1	C000 to C03F	C040 to C07F	C080 to C0BF	C0C0 to C0FF
2	C400 to C43F	C440 to C47F	C480 to C4BF	C4C0 to C4FF
3	C800 to C83F	C840 to C87F	C880 to C8BF	C8C0 to C8FF
4	CC00 to CC3F	CC40 to CC7F	CC80 to CCBF	CCC0 to CCFF
5	D000 to D03F	D040 to D07F	D080 to D0BF	D0C0 to D0FF
6	D400 to D43F	D440 to D47F	D480 to D4BF	D4C0 to D4FF
7	D800 to D83F	D840 to D87F	D880 to D8BF	D8C0 to D8FF
8	DC00 to DC3F	DC40 to DC7F	DC80 to DCBF	DCC0 to DCFF
9	E000 to E03F	E040 to E07F	E080 to E0BF	E0C0 to E0FF
10	E400 to E43F	E440 to E47F	E480 to E4BF	E4C0 to E4FF
11	E800 to E83F	E840 to E87F	E880 to E8BF	E8C0 to E8FF
12	EC00 to EC3F	EC40 to EC7F	EC80 to ECBF	ECC0 to ECFF
13	F000 to F03F	F040 to F07F	F080 to F0BF	F0C0 to F0FF
14	F400 to F43F	F440 to F47F	F480 to F4BF	F4C0 to F4FF
15	F800 to F83F	F840 to F87F	F880 to F8BF	F8C0 to F8FF
16	FC00 to FC3F	FC40 to FC7F	FC80 to FCBF	FCC0 to FCFF

INFO

- The register number by motion parameter axis is determined by the following equation:
  Motion parameter register address = I (O) WC000 + (Circuit number - 1) × 400 (HEX) + (Axis number - 1) × 40 (HEX)
- Refer to the *Machine Controller MP920 User's Manual: Design and Maintenance (SIEZ-C887-2.1)* or *Machine Controller MP920 User's Manual: Motion Module (SIEZ-C887-2.5)* for details on motion parameters.

(c) Monitor Tab Page

The Monitor Tab Page displays the current values of the motion monitor parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 4***). The parameters for each axis are displayed.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed. Refer to *Table 8.4 Register Ranges* on the previous page for details.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the parameter.

INFO

Refer to *Machine Controller MP920 User's Manual: Design and Maintenance* (SIEZ-C887-2.1) or *Machine Controller MP920 User's Manual: Motion Module* (SIEZ-C887-2.5) for details on monitor parameter settings.

(4) Saving, Deleting, and Closing the SVA Motion Parameters

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

IMPORTANT

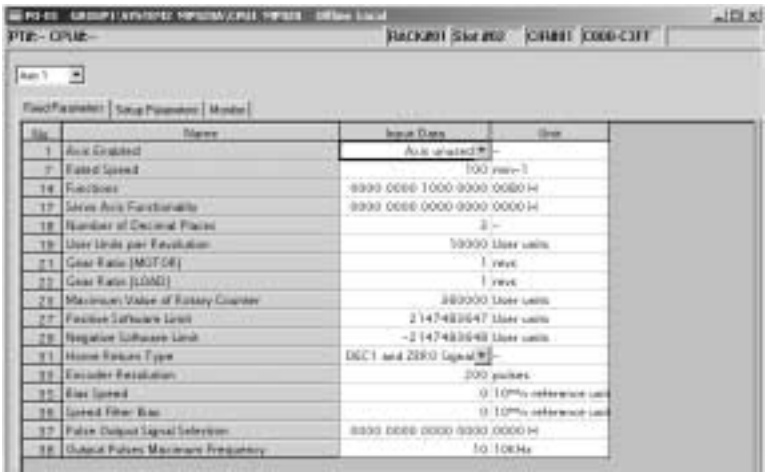
- The Delete operation deletes the SVA motion fixed parameters and setting parameters of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.
  The Servo ON is bit 0 of parameter number 2 (*RUN Commands* Settings) in the Setup Parameters Tab Page.
- The Save command saves the motion fixed parameters for all axes of the servo number currently being displayed.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

8.5.16 PO-01 Definitions

This section explains how to set the motion parameters of the PO-01 Module.

(1) Opening the PO-01 Definitions Window

Open the PO-01 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(2) PO-01 Definitions Menus

Refer to *(2)* in *8.5.15 SVA Definitions* for PO-01 Definitions Menu.

(3) Tab Pages

The PO-01 Definitions Window is composed of three tab pages: the Fixed Parameters, Setup Parameters, and Monitor Tab Pages.

Tab Page	Details
Fixed Parameters	Sets the Motion Fixed Parameters.
Setup Parameters	Sets the Motion Setting Parameters.
Monitor	Displays the Motion Monitor Parameters.

It is possible to switch between these tab pages by selecting ***View – Next Page*** or ***View – Back Page*** from the PO-01 Definitions Menu.

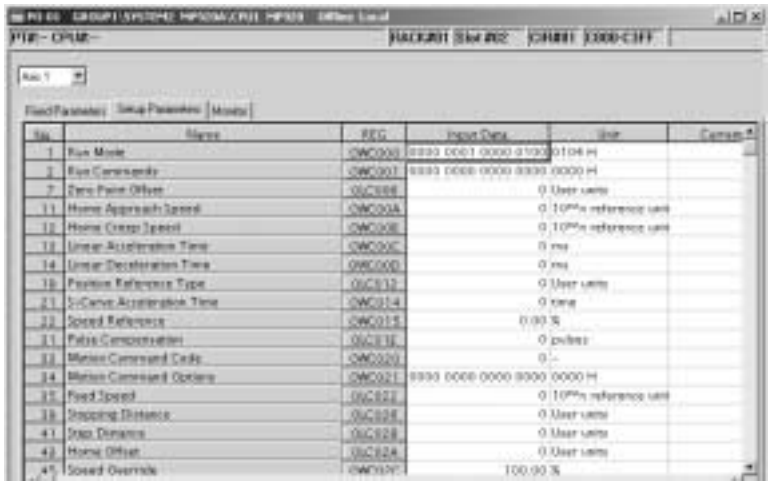
(a) Fixed Parameters Tab Page

Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 4***). Set the motion fixed parameters for each axis.
No.	Displays the parameter number of the motion fixed parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *Machine Controller MP920 User's Manual: Motion Module (SIEZ-C887-2.5)* for details on motion fixed parameter settings.

(b) Setup Parameters Tab Page



Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 4***). Set the parameters for each axis.
No.	Displays the parameter number of the setting parameter.
Parameter Name	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed. Refer to *Table 8.5 Register Ranges* below.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Table 8.5 Register Ranges

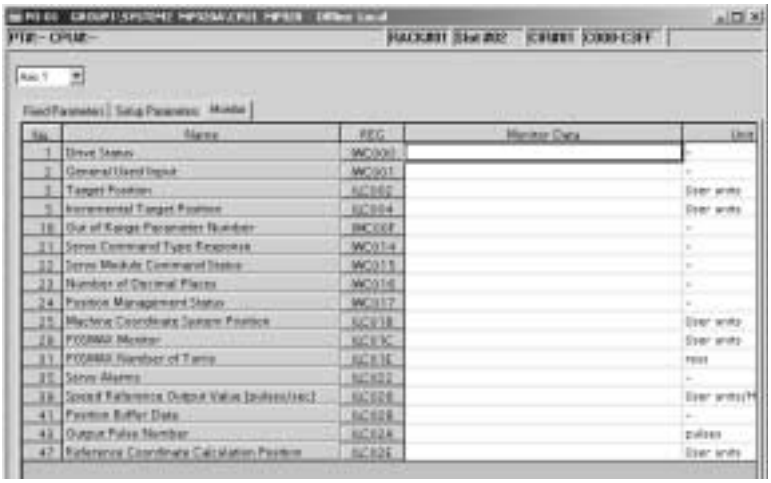
Circuit Number	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4
1	C000 to C03F	C040 to C07F	C080 to C0BF	C0C0 to C0FF
2	C400 to C43F	C440 to C47F	C480 to C4BF	C4C0 to C4FF
3	C800 to C83F	C840 to C87F	C880 to C8BF	C8C0 to C8FF
4	CC00 to CC3F	CC40 to CC7F	CC80 to CCBF	CCC0 to CCFF
5	D000 to D03F	D040 to D07F	D080 to D0BF	D0C0 to D0FF
6	D400 to D43F	D440 to D47F	D480 to D4BF	D4C0 to D4FF
7	D800 to D83F	D840 to D87F	D880 to D8BF	D8C0 to D8FF
8	DC00 to DC3F	DC40 to DC7F	DC80 to DCBF	DCC0 to DCFF
9	E000 to E03F	E040 to E07F	E080 to E0BF	E0C0 to E0FF
10	E400 to E43F	E440 to E47F	E480 to E4BF	E4C0 to E4FF
11	E800 to E83F	E840 to E87F	E880 to E8BF	E8C0 to E8FF
12	EC00 to EC3F	EC40 to EC7F	EC80 to ECBF	ECC0 to ECFF
13	F000 to F03F	F040 to F07F	F080 to F0BF	F0C0 to F0FF
14	F400 to F43F	F440 to F47F	F480 to F4BF	F4C0 to F4FF
15	F800 to F83F	F840 to F87F	F880 to F8BF	F8C0 to F8FF
16	FC00 to FC3F	FC40 to FC7F	FC80 to FCBF	FCC0 to FCFF

INFO

- The register number by motion parameter axis is determined by the following equation:
  Motion parameter register address = I (O) WC000 + (Circuit number - 1) × 400 (HEX) + (Axis number - 1) × 40 (HEX)
- Refer to the *Machine Controller MP920 User's Manual: Design and Maintenance (SIEZ-C887-2.1)* or *Machine Controller MP920 User's Manual: Motion Module (SIEZ-C887-2.5)* for details on motion parameters.

(c) Monitor Tab Page

The Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 4***). The parameters for each axis are displayed.
No.	Displays the parameter number of the motion monitor parameter.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed. Refer to *Table 8.5 Register Ranges* on the previous page for details.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.

INFO

Refer to *Machine Controller MP920 User's Manual: Motion Module* (SIEZ-C887-2.5) for details on monitor parameter settings.

(4) Saving, Deleting, and Closing the PO-01 Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

IMPORTANT

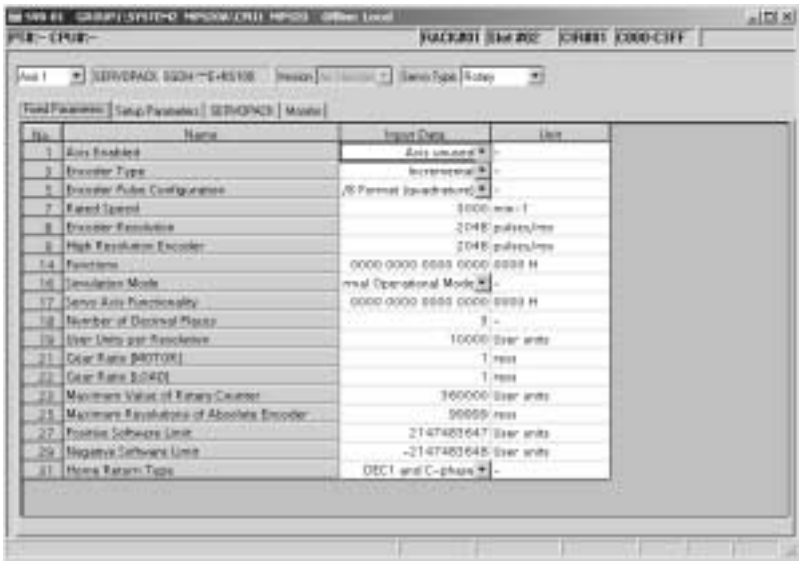
- The Delete operation deletes the motion fixed parameter and setting parameter settings of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.
  The Servo ON is bit 0 of parameter number 2 (*RUN Commands* Settings) in the Setup Parameters Tab Page.
- The Save command saves the fixed parameters for all axes of the servo number currently being displayed.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

8.5.17 SVB-01 Definitions

This section explains how to set the motion parameters for the SVB-01 Module.

(1) Opening the SVB Definitions Window

Open the SVB-01 Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(2) SVB-01 Definitions Menus

Refer to *(2)* in *8.5.15 SVA Definitions* for SVB-01 Definitions Menu.

(3) Tab Pages

The SVB-01 Definitions Window is composed of four tab pages: the Fixed Parameters, Setup Parameters, SERVOPACK, and Monitor Tab Pages.

Tab Page	Details
Fixed Parameters	Sets the Motion Fixed Parameters.
Setup Parameters	Sets the Motion Setting Parameters.
SERVOPACK	Sets the SERVOPACK Parameters.
Monitor	Displays the Motion Monitor Parameters.

It is possible to switch between these tab pages by selecting ***View – Next Page*** or ***View – Back Page*** from the motion parameters window's menus.

(a) Fixed Parameters Tab Page

Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 14***). Set the fixed parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the motion fixed parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *Machine Controller MP920 User's Manual: Design and Maintenance (SIEZ-C887-2.1)* or *Machine Controller MP920 User's Manual: Motion Module (SIEZ-C887-2.5)* for details on motion fixed parameter settings.

(b) Setup Parameters Tab Page

Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 14***). Set the setting parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the setting parameter.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed. Refer to *Table 8.6 Register Ranges* on the next page for details.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Table 8.6 Register Ranges

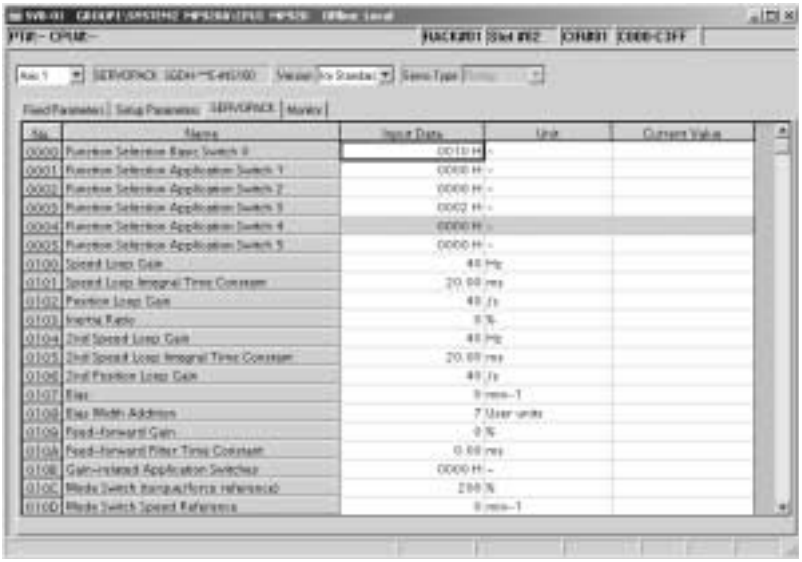
Circuit Number	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4	Axis Number 5	to	Axis Number 14
1	C000 to C03F	C040 to C07F	C080 to C0BF	C0C0 to C0FF	C100 to C13F	to	C340 to C37F
2	C400 to C43F	C440 to C47F	C480 to C4BF	C4C0 to C4FF	C500 to C53F	to	C740 to CB7F
3	C800 to C83F	C840 to C87F	C880 to C8BF	C8C0 to C8FF	C900 to C93F	to	CF40 to CF7F
4	CC00 to CC3F	CC40 to CC7F	CC80 to CCBF	CCC0 to CCFF	CD00 to CD3F	to	D340 to D37F
5	D000 to D03F	D040 to D07F	D080 to D0BF	D0C0 to D0FF	D100 to D13F	to	D740 to D77F
6	D400 to D43F	D440 to D47F	D480 to D4BF	D4C0 to D4FF	D500 to D53F	to	DB40 to DB7F
7	D800 to D83F	D840 to D87F	D880 to D8BF	D8C0 to D8FF	D900 to D93F	to	DF40 to DF7F
8	DC00 to DC3F	DC40 to DC7F	DC80 to DCBF	DCC0 to DCFF	DD00 to DD3F	to	E340 to E37F
9	E000 to E03F	E040 to E07F	E080 to E0BF	E0C0 to E0FF	E100 to E13F	to	E740 to E77F
10	E400 to E43F	E440 to E47F	E480 to E4BF	E4C0 to E4FF	E500 to E53F	to	EB40 to EB7F
11	E800 to E83F	E840 to E87F	E880 to E8BF	E8C0 to E8FF	E900 to E93F	to	EF40 to EF7F
12	EC00 to EC3F	EC40 to EC7F	EC80 to ECBF	ECC0 to ECFF	ED00 to ED3F	to	EC40 to EC7F
13	F000 to F03F	F040 to F07F	F080 to F0BF	F0C0 to F0FF	F100 to F13F	to	F340 to F37F
14	F400 to F43F	F440 to F47F	F480 to F4BF	F4C0 to F4FF	F500 to F53F	to	F740 to F77F
15	F800 to F83F	F840 to F87F	F880 to F8BF	F8C0 to F8FF	F900 to F93F	to	FB40 to FB7F
16	FC00 to FC3F	FC40 to FC7F	FC80 to FCBF	FCC0 to FCFF	FD00 to FD3F	to	FF40 to FF7F

INFO

- The register number by motion parameter axis is determined by the following equation:
  Motion parameter register address = I (O) WC000 + (Circuit number - 1) × 400 (HEX) + (Axis number - 1) × 40 (HEX)
- Refer to the *Machine Controller MP920 User's Manual: Design and Maintenance (SIEZ-C887-2.1)* or *Machine Controller MP920 User's Manual: Motion Module (SIEZ-C887-2.5)* for details on motion parameters.

(c) SERVOPACK Tab Page

The SERVOPACK parameters required in the MP920 are set in the SERVOPACK Tab Page.



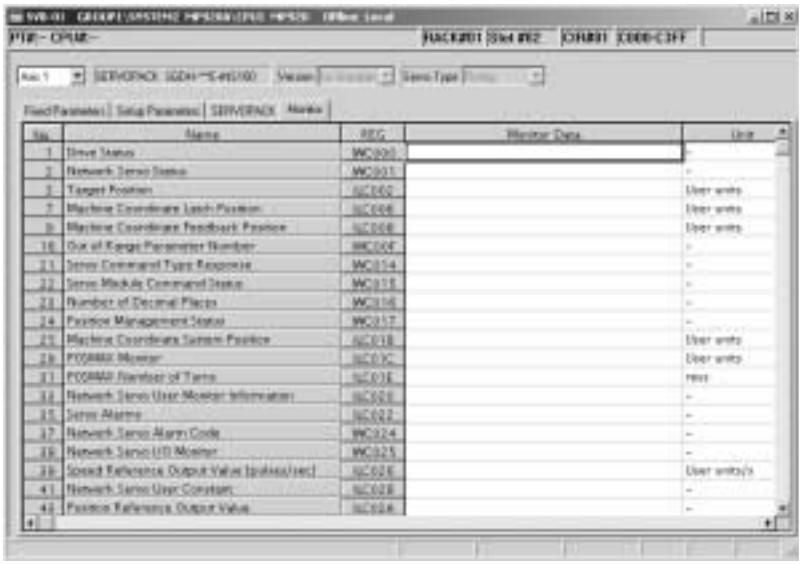
Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** to ***Axis 14***). Set the SERVOPACK for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the SERVOPACK parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *Machine Controller MP920 User's Manual: Design and Maintenance* (SIEZ-C887-2.1) or *Machine Controller MP920 User's Manual: Motion Module* (SIEZ-C887-2.5) for details on SERVOPACK parameter settings.

(d) Monitor Tab Page

The Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number (***Axis 1*** or ***Axis 14***). The parameters for each axis are displayed.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the motion monitor parameter.
Parameter Name	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed, as shown in *Table 8.6 Register Ranges*.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *Machine Controller MP920 User's Manual: Design and Maintenance* (SIEZ-C887-2.1) or *Machine Controller MP920 User's Manual: Motion Module* (SIEZ-C887-2.5) for details on monitor parameter settings.

(4) Saving, Deleting, and Closing the SVB Motion Parameters

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

IMPORTANT

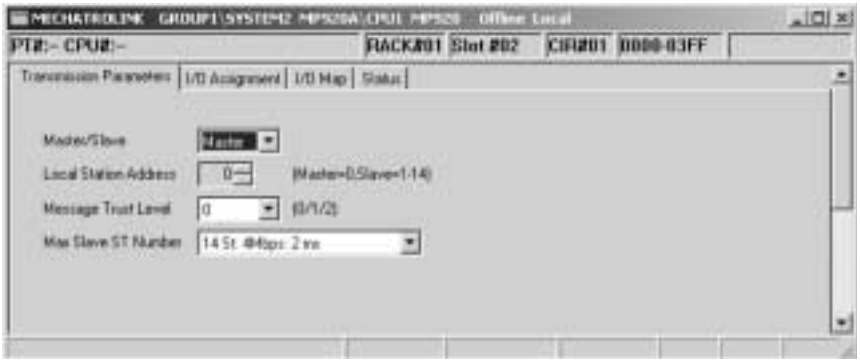
- The Delete operation deletes the motion fixed parameter and setting parameter settings of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.
  The Servo ON is bit 0 of parameter number 2 (*RUN Commands* Settings) in the Setup Parameters Tab Page.
- The Save command saves the fixed parameters for all axes of the servo number currently being displayed.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

8.5.18 MECHATROLINK Definitions

This section explains how to set the MECHATROLINK Definitions.

(1) Opening the MECHATROLINK Definitions Window

Open the MECHATROLINK Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*. The MECHATROLINK Definitions Window can be opned by double-clicking the ***MECHATROLINK*** in the *details* of the Module Configuration Window.



(2) MECHATROLINK Definitions Menus

The following table shows the menu commands and functions displayed in the MECHATROLINK Definitions Window.

Menu Command		Function
Edit		
	Parameter Setting	Returns the allocation settings to default values.
	Assignment Delete	Clears the allocation settings.

(3) Tab Pages

The MECHATROLINK Definitions Window is composed of four tab pages: the Transmission Parameters, I/O Assignment, I/O Map, and Status Tab Pages.

Tab Page	Details
Transmission Parameters	Sets the MECHATROLINK transmission parameters.
I/O Assignment	Allocates the MECHATROLINK's I/O.
I/O Map	Sets the I/O map.
Status	Displays the transmission status.

(a) Transmission Parameters Tab Page

Setting	Details			
Master/Slave	Sets whether the Machine Controller is used as a Master station or a Slave station.			
Local Station Address	When the Machine Controller is being used as a master station, the local station address is fixed at 0 and cannot be changed. When it is being used as a slave station, set a station address between 1 and 30.			
Message Trust Level	Sets the error recovery level for sending MEMOBUS commands.			
	0	Send command just once and wait indefinitely for a response from the destination.		
	1	Send command once and resend if a response is not received within 8 seconds.		
	2	When sending the command, send each word of data twice consecutively and wait indefinitely for a response from the destination. This method improves transmission quality but reduces transmission efficiency by 50%.		
Max. Slave ST Number (Maximum Number of Slave Stations)	Number of Slaves		Baud Rate	Communication Cycle
	14 Stations		4 Mbps	2 ms
	29 Stations		4 Mbps	4 ms

(b) I/O Assignment Tab Page

- Setting Assignment Data

  The I/O Assignment Tab Page is used to set the I/O devices, I/O registers, scan, etc., connected in the MECHATROLINK.

Setting	Details
ST#	Displays the station number. Up to 14 stations can be set.
TYPE	Sets the type of I/O device connected to the station. Select an I/O device type from the pull-down list.
D (Input Register Enable/ Disable)	Sets the input register's enable/disable setting. • : Enabled • : Disabled
INPUT, SIZE	Sets the leading input register and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station does not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Window. This setting is not required when a SERVOPACK has been selected for the *TYPE*.

(Cont'd)

Setting	Details
D (Output Register Enable/Disable)	Sets the output register's disable setting. • : Enabled • : Disabled
OUTPUT, SIZE	Sets the leading output register and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station do not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Window. This setting is not required when a SERVOPACK has been selected for the *TYPE*.
SCAN	Sets the scan for I/O servicing. The scan will be fixed at ***High*** when a SERVOPACK has been selected for the *TYPE*. • ***High***: High-speed scan • ***Low***: Low-speed scan
Station Name (Comment)	Comments up to 32 characters can be input for each station.

INFO

The I/O devices set in the *TYPE* are shown in *Appendix D MECHATROLINK Devices*.

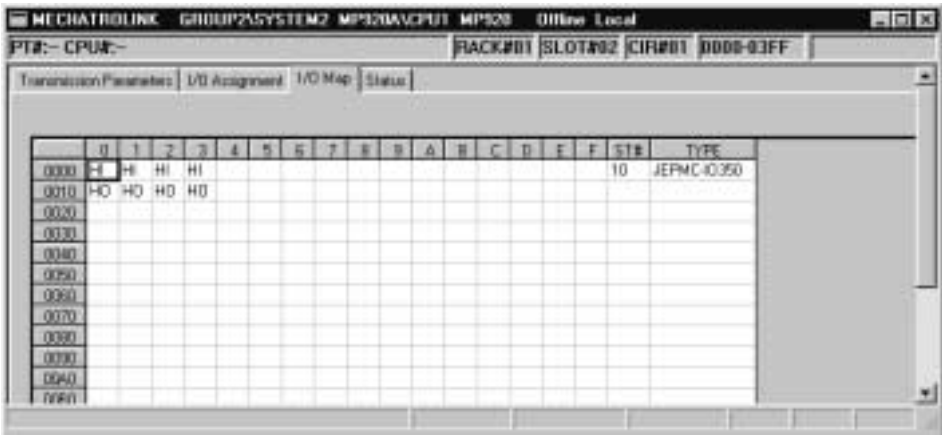
- Deleting Assignment Data

  Delete the allocation data for one station using the following procedure.

1. To delete a station's allocation data, move the cursor to the row of the station to be deleted, and select ***Edit – Assignment Delete***.
2. The station's allocation data will be deleted.

(c) I/O Map Tab Page

The I/O Map Tab Page displays the status of the Machine Controller's I/O allocations.



HI	Allocates to an input set for a high-speed scan.
HO	Allocates to an output set for a high-speed scan.
LI	Allocates to an input set for a low-speed scan.
LO	Allocates to an output set for a low-speed scan.
DEL	Deletes allocations.

(d) Status Tab Page

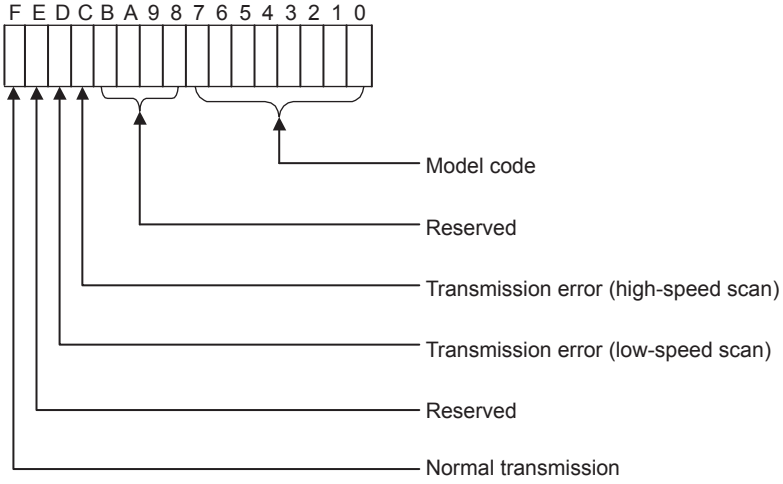
The Status Tab Page displays the data that is currently being transmitted by the MECHATROLINK.

The tab page only displays the status; the displayed values cannot be changed here.

The meaning of each column is identical to the columns in the I/O Assignment Tab Page except for the additional *STS* column.

- STS

In online mode, the MECHATROLINK transmission status information is displayed in hexadecimal. The meaning of each bit is shown in the following figure. In offline mode, nothing will be displayed.



(4) Saving, Deleting, and Closing MECHATROLINK Definitions Data

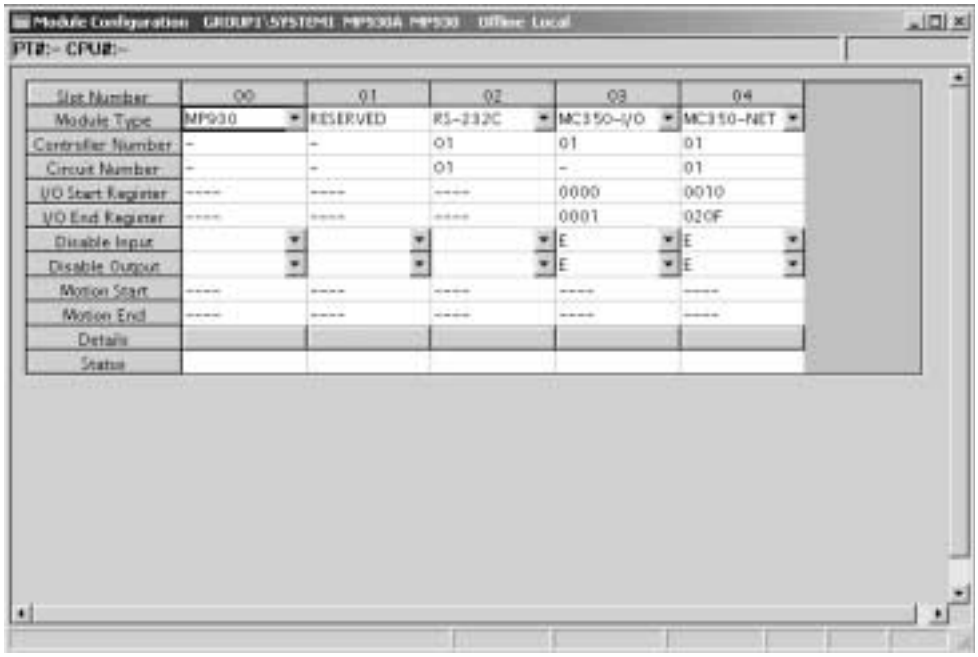
Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

8.6 MP930 Module Configuration Definitions

This section explains the parameter settings for RS-232C, MC350-I/O, and MC350-NET in the MP930.

8.6.1 Opening the Module Configuration Window

Open the Module Configuration Window according to *8.2.2 Opening the Module Configuration Window*.



- Configuration of the Module Configuration Window

The Module Configuration Window consists of columns used to define the slots.

The Modules allocated to the MP930 slots cannot be changed.

Table 8.7 MP930 Slot Configuration

Slot 00	Slot 01	Slot 02	Slot 03	Slot 04
MP930	RESERVED	RS-232C	MC350-I/O	MC350-NET

Setting	Details
Slot Number	Displays the slot numbers.
Module Type	The name of the Module installed in each slot is set automatically.
Controller Number	The MP930 CPU is set automatically to ***01***.
Circuit Number	The *Circuit Number* for RS-232C and MC350-NET Modules is set automatically to ***01***.
I/O Start Register	Refer to *(2) MC350-I/O Definitions* in *8.6.3 Opening Individual Module Definitions Window* and *8.5.18 MECHATROLINK Definitions.*
I/O End Register	Refer to *(2) MC350-I/O Definitions* in *8.6.3 Opening Individual Module Definitions Window* and *8.5.18 MECHATROLINK Definitions.*
Disable Input	Sets each Module's input enable/disable setting. Blank: Setting not allowed, D: Disabled, E: Enabled
Disable Output	Sets each Module's output enable/disable setting. Blank: Setting not allowed, D: Disabled, E: Enabled
Motion Start (Motion Start Register)	This is set automatically.
Motion End (Motion End Register)	This is set automatically.
Details	This is not supported in the current version.
Status	Displays each Module's status when online.

INFO

■ Setting Ranges for the MP930 I/O Start/End Register Numbers

- 0000 to 07FF hex (2,048 words total)
  Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.
- With the MP930, standard register numbers have been set for each Module. We recommend using these standard register number settings.
  - MC350-I/O (Local I/O): 0000 to 0001 hex
  - MC350-NET (Remote I/O): 0010 to 020F hex

Settings made automatically cannot be changed.

8.6.2 Saving, Deleting, and Closing Module Configuration Definitions

Refer to *8.2.3 Saving Module Configuration Definitions*, *8.2.4 Deleting Module Configuration Definitions*, and *8.2.5 Ending the Module Configuration Definitions*.

8.6.3 Opening Individual Module Definitions Window

Open the Individual Module Definitions Windows according to *8.3.1 Opening Individual Module Definitions Windows*. Refer to the following for setting data for individual Modules.

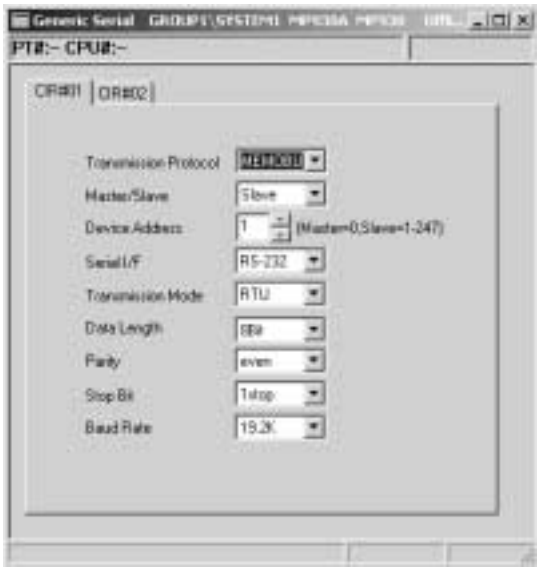
- RS-232C definitions
- MC350-I/O definitions
- MC350-NET definitions

Refer to *8.5.18 MECHATROLINK Definitions* for the MC350-NET definitions.

(1) RS-232C Definitions

This section explains the settings for the generic serial (RS-232C) port allocated to slot number 02.

Open the Generic Serial Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Use the tab pages to set the parameters for the RS-232C Module. There are two tab pages one for each port.

Tab Page	Details
CIR#01	Sets the RS232-C transmission parameters.
CIR#02	Sets the RS232-C transmission parameters.

INFO

When the Generic Serial Definitions Widow is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

Two CIR# definition tabs are displayed in the Generic Serial Definitions Window. Make the definitions while switching between the tabs as required.

Setting	Details
Circuit Number Tab	Select the CIR# using the tab.
Transmission Protocol*1	Select from ***MEMOBUS***, ***MELSEC***, or ***No Process***.
Master/Slave	Select whether the Module is a master or a slave.
Device Address	Set the master's address to 0, and slave addresses from 1 to 247.
Serial I/F	Select RS-232C.
Transmission Mode*2	Select from ***RTU***, ***ASCII***, or ***none***.
Data Length	***8Bit***: 8 bits; ***7Bit***: 7 bits
Parity	Select ***even***, ***odd***, or ***none*** (no parity).
Stop Bit	1stop: 1 stop bit; 2stop: 2 stop bits
Baud Rate	Select the transmission speed (bps).

* 1. Transmission Protocol
  - ***MEMOBUS***: Yaskawa's standard MEMOBUS protocol.
  - ***MELSEC***: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links.
  - ***No Process***: Data can be transferred at any time by the user application program.

* 2. Transmission Mode
  - ***RTU***: Specify ***RTU*** mode for ***MEMOBUS*** protocols.
  - ***ASCII***: Specify ***ASCII*** mode for ***MEMOBUS*** protocols.
  - ***none***: Specify ***none*** for ***MELSEC*** or ***No Process***.

IMPORTANT

The parameters are set to predetermined values, so it is necessary to set the parameters again only for special cases. The values shown in the Generic Serial Definitions Window are the default settings.

- Saving, Deleting, and Closing Generic Serial Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

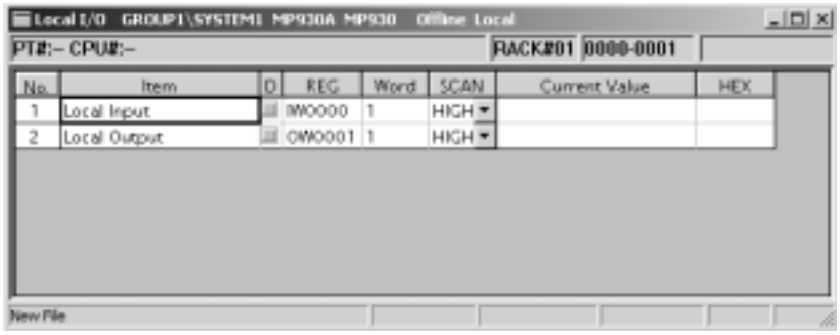
INFO

- When the Delete command is executed, the 2-circuit generic serial definitions data will be deleted.
- The transmission protocol for a port connecting to the MPE720 should be set to MEMOBUS. The MEMOBUS specification is the default setting. The maximum baud rate for a connection to the MPE720 is 19.2 Kbps.

(2) MC350-I/O Definitions

This section explains how to set the MC350-I/O (Local I/O) Definitions for slot 03.

Open the MC350-I/O (Local I/O) Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Setting	Details
No.	Displays the number of the setting.
Item	Displays the name of the setting and the I/O signal name.
D (Register Enable/Disable)	Sets the register's enable/disable setting. A register is one word in length, so the setting applies to 16 I/O points. • : Enabled • : Disabled
REG (Register Number)	Displays the I/O register number. In the MP930, the inputs and outputs both use 16 points, and the register number allocation is fixed (IW0000 and OW0001).
Word (Number of Words)	Displays the number of consecutive register words. In the MP930, the allocation is fixed at 1 word, so the number of words is ***1***.
SCAN	Sets the transmission processing scan. ***HIGH***: High-speed scan ***LOW***: Low-speed scan ***(NA)***: No scan specification
Current Value	In online mode, the current value of the allocated Machine Controller register will be displayed in binary. The current values of Local outputs can be changed and are immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the *Current Value*. In offline mode, nothing will be displayed.

- Saving, Deleting, and Closing Local I/O Definitions Data

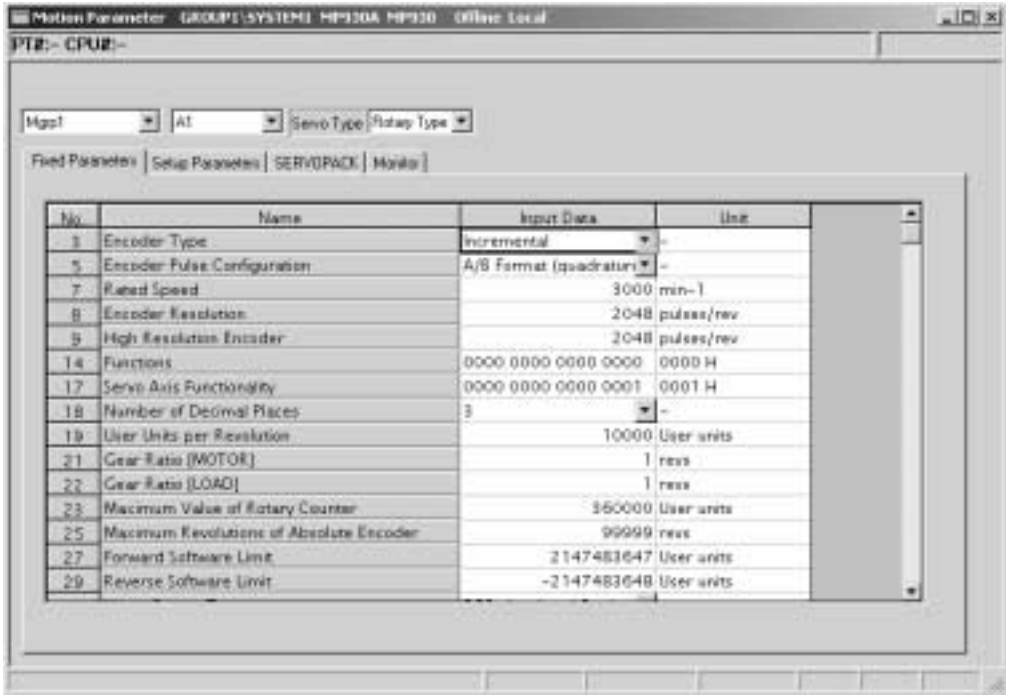
  Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

(3) Motion Parameter Definitions

Motion parameters must be set when a servo is set as a MECHATROLINK I/O device.

To open the MP930 Motion Parameter Window, double-click the **Motion Parameter** Icon in the Motion Programs Folder displayed in the File Manager.

To open the Motion Parameter Window from the Engineering Manager Window, select ***File – Open – Definition – Motion Parameter***.



INFO

The tab pages can be scrolled in the following order by selecting ***View – Next Page*** from the menus.

- Fixed parameters, Setup parameters, SERVOPACK parameters, Motion monitor parameters

To scroll in the opposite direction, select ***View – Back Page*** from the menus.

(a) Motion Parameter Menus

Refer to *(2)* in *8.5.17 SVB-01 Definitions*.

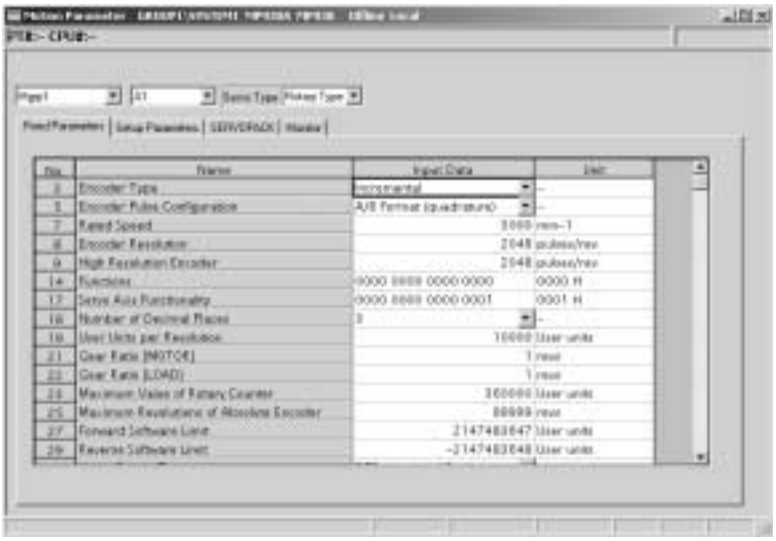
(b) Tab Pages

The MP930 Motion Parameter Window is composed of four control tab pages: the Fixed Parameters, Setup Parameters, SERVOPACK, and Monitor.

Tab Page	Details
Fixed Parameters	Sets the motion fixed parameters.
Setup Parameters	Sets the motion setting parameters.
SERVOPACK	Sets the servo parameters.
Monitor	Displays the motion monitor parameters.

- Fixed Parameters Tab Page

This tab page is used to set the motion fixed parameters required for servo adjustment.

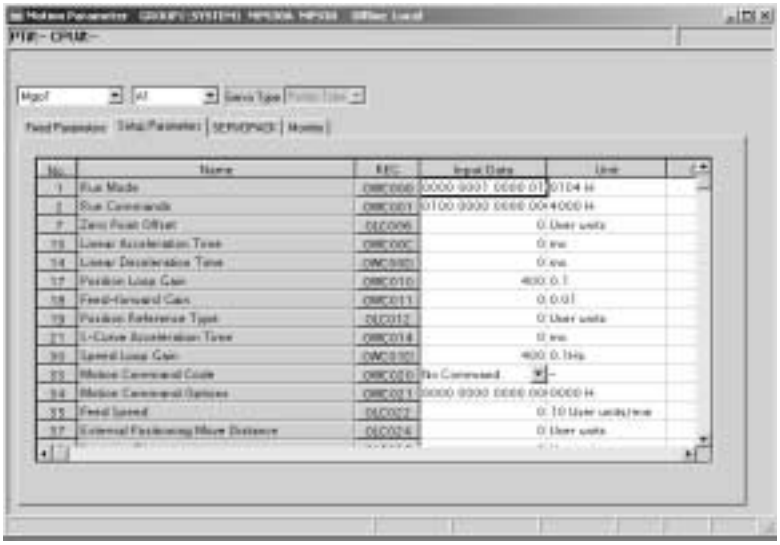


Setting	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. Set motion fixed parameters for each axis.
Servo Type (Motor Type)	Select the motor type.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the setting for the parameter.*

* Refer to *Machine Controller MP930 User's Manual: Design and Maintenance* (SIEZ-C887-1.1) for details on motion fixed parameter settings.

- Setup Parameters Tab Page

This tab page is used to set the motion setting parameters required for servo adjustment.



Setting	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. Set motion setting parameters for each axis.

(Cont'd)

Setting	Details
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the register number corresponding to the parameter name.
Input Data (Set Data)	Input the setting for the parameter.*
Unit	Displays the unit used to set the parameter.
Current Value	Displays the current setting of the parameter in online mode. Nothing will be displayed in offline mode.

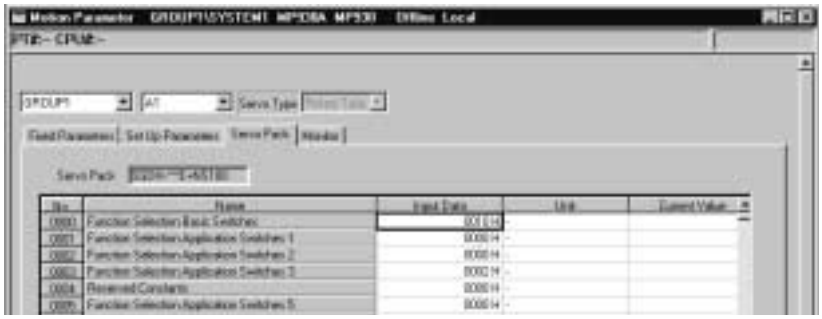
* Refer to *Machine Controller MP930 User's Manual: Design and Maintenance* (SIEZ-C887-1.1) for details on motion setting parameter settings.

IMPORTANT

In online mode, set values that are input are immediately saved to Machine Controller registers when the **Enter** Key is pressed. The current value displays will be refreshed using these values.

- SERVOPACK Tab Page

This tab page is used to set the servo parameters.



Setting	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. Set servo parameters for each axis.
SERVOPACK Name	Displays the SERVOPACK type.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input the setting for the parameter.*1
Unit	Displays the unit used to set the parameter.
Current Value	Displays the current value saved in the SERVOPACK.*2

* 1. Refer to *Machine Controller MP930 User's Manual: Design and Maintenance* (SIEZ-C887-1.1) for details on servo parameter settings.
* 2. The current values will not be displayed if a SERVOPACK alarm exists even when the SERVOPACK Tab is clicked. First clear the alarm, and then try again to display the current values.

- Monitor Tab Page

This tab page is used to display the current values for the motion parameters. This window is only for displaying the values, and settings cannot be changed here.

Setting	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. The parameters are monitored for each axis.
Parameter Name	Displays the parameter name.
REG (Register Number)	Displays the register number corresponding to the parameter name. Allocation of this register number is fixed according to the circuit number.
Monitor Data	Displays the current value for the parameter in online mode. Nothing will be displayed in offline mode.
Unit	Displays the unit used to set the parameter.

(c) Saving Motion Parameter Definitions Data

In online mode, the motion parameters are saved to both the Machine Controller and the Programming Device hard disk. In offline mode, they are saved only to the Programming Device hard disk.

Save motion parameters using the following procedure.

1. Select ***File*** – ***Save*** from the Motion Parameter Menu.
2. Click the **Yes** Button in the motion parameter message box.

IMPORTANT

- The save operation must be executed separately for each axis and for each of the Fixed Parameters, Setup Parameters, and SERVOPACK Tab Pages.
- In online mode, the edited motion fixed parameters and servo parameters cannot be saved if the Servo ON signal is ON. Save the data after this signal has gone OFF. The Servo ON is bit 0 of parameter number 2 (*RUN Commands* settings) in the Setup Parameters Tab Page.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

(d) Deleting Motion Parameter Definitions Data

Delete motion parameter setting using the following procedure.

1. Select ***File*** – ***Delete*** from the Motion Parameter Menu.
2. Click the **Yes** Button in the motion parameter message box.

INFO

When the delete operation is executed, the fixed and setting parameter data for all of the axes will be deleted, and the default values will be set.

(e) Closing Motion Parameter Definitions Data

To exit the motion parameter definitions and display operations, close the Motion Parameter Window by selecting ***File*** – ***Close*** from the Motion Parameter Menu.

8.7 MP940 Module Configuration Definitions

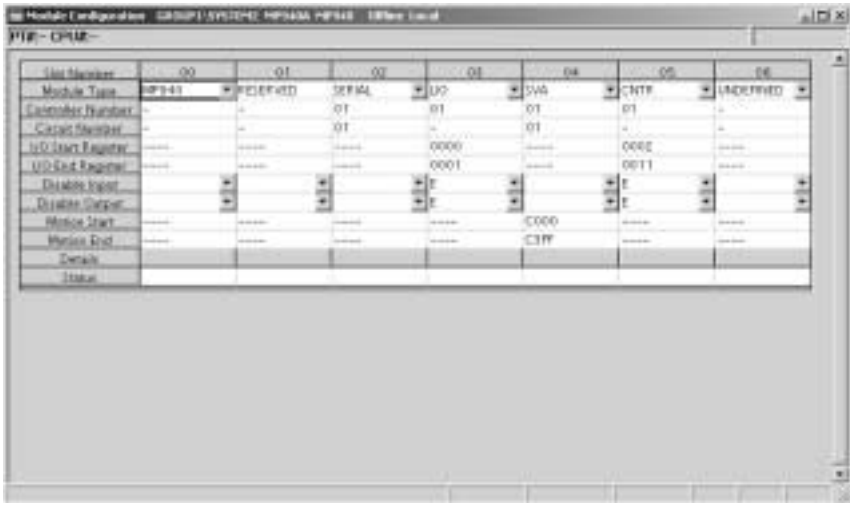
This section explains the basic parameter settings for the SERIAL, LIO, SVA, and CNTR in the MP940.

Table 8.8 Individual Module Definitions

Defined Module	Settings
MP940	Defines the main Machine Controller parameters. No settings are required.
SERIAL	Sets the serial communication parameters.
LIO	Sets the local I/O parameters.
SVA	Sets the motion parameters.
CNTR	Sets the counter parameters.

8.7.1 Opening the Module Configuration Window

Open the Module Configuration Window according to *8.2.2 Opening the Module Configuration Window*.



- Configuration of Module Configuration Window

The Module Configuration Window consists of columns used to define the slots.

The Modules allocated to the MP940 slots cannot be changed, except for that allocated to slot 06.

Table 8.9 MP940 Slot Configuration

Slot 00	Slot 01	Slot 02	Slot 03	Slot 04	Slot 05	Slot 06
MP940	RESERVED	SERIAL	LIO	SVA	CNTR	MLINK(C) or 260IF

Setting	Details
Slot Number	Displays the slot numbers.
Module Type	The Module is set automatically using the Module name set in each slot.
Controller Number	Set the number of the CPU to control each Module. The MP940 CPU is set automatically to ***01***.
Circuit Number	Circuit numbers are set for each type of Module starting from 01 for Communication and Motion Modules. With the MP940, this would be the Serial, SVA, and MECHATROLINK Modules. There is only one of each kind of Module, so the *Circuit Number* is set automatically to ***01*** for each.
I/O Start Register	Set the address of the leading I/O register. Refer to the settings in *(2)* and *(4)* for LIO and CNTR.
I/O End Register	Set the address of the ending I/O register. Refer to the settings in *(2)* and *(4)* for LIO and CNTR.

(Cont'd)

Setting	Details
Disable Input	Sets the input enable/disable setting. Blank: Setting not allowed, D: Disabled, E: Enabled
Disable Output	Sets the output enable/disable setting. Blank: Setting not allowed, D: Disabled, E: Enabled
Motion Start Register	This is set automatically.
Motion End Register	This is set automatically.
Details	This setting is not supported in the current version.
Status	Displays each Module's status when online.

■ Setting Ranges for the I/O Start/End Register Numbers

- 0000 to 07FF hex (2,048 words total)
  Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.
- With the MP940, standard register numbers have been set for each Module. We recommend using these standard register number settings.
  - LIO (Local I/O): 0000 to 0001 hex
  - CNTR (counters): 0002 to 0011hex
  - MLINK(C) (Remote I/O): 0100 to 02FF hex
  - 260IF (DeviceNet)

Settings made automatically cannot be changed.

8.7.2 Saving, Deleting, and Closing Module Configuration Definitions

Refer to *8.2.3 Saving Module Configuration Definitions*, *8.2.4 Deleting Module Configuration Definitions*, and *8.2.5 Ending the Module Configuration Definitions*.

8.7.3 Opening Individual Module Definitions Window

Open the Individual Module Definitions Windows set in the virtual slots according to *8.3.1 Opening Individual Module Definitions Windows*. Refer to the following for setting data for individual Modules.

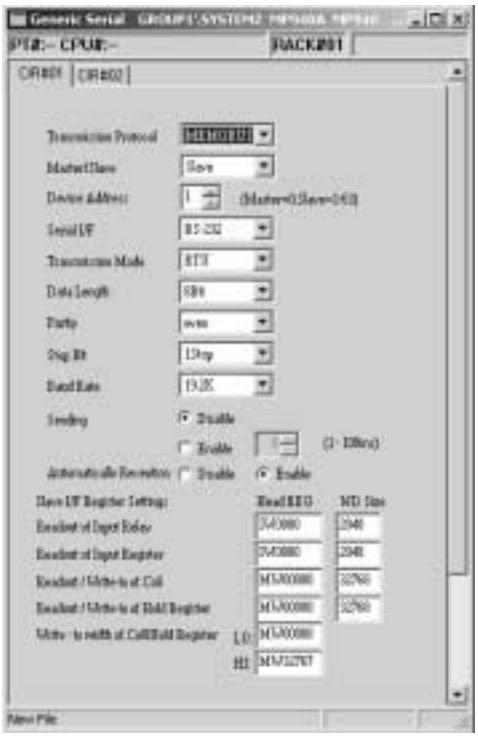
- SERIAL definitions
- LIO definitions
- SVA parameter definitions
- CNTR I/O definitions
- MLINK (CERF) definitions
- 260IF definitions

Refer to *8.5.18 MECHATROLINK Definitions* for details on MECHATROLINK (CERF) Definitions, and *8.5.8 260IF Definitions* for details on 260IF Transmission Definitions.

(1) Serial Definitions

This section describes how to set the Serial Port Definitions.

Open the Generic Serial Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



Use the tab pages to set the parameters for the Serial Module. There are two tab pages, one for each port.

Tab Page	Details
CIR#01	Sets the RS-232C transmission parameters.
CIR#02	Sets the RS-422/485 transmission parameters.

INFO When the Generic Serial Definitions Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

Two CIR# definition tabs are displayed in the Generic Serial Definitions Window. Make the definitions while switching between the tabs as required.

Setting	Details
Circuit Number Tab	Select the CIR# for the tab page.
Transmission Protocol*1	Select from ***MEMOBUS***, ***MELSEC***, or ***none***.
Master/Slave	Select whether the Module is a master or a slave.
Device Address	Set the master's address to 0, and slave addresses from 1 to 63.
Serial I/F*2	Select ***RS-232C***, ***RS-485***, or ***RS-422***.
Transmission Mode*3	Select from ***RTU***, ***ASCII***, or ***None***.
Data Length	***8Bit***: 8 bits; ***7Bit***: 7 bits
Parity	Select ***even***, ***odd***, or ***none*** (no parity).
Stop Bit	***1Stop***: 1 stop bit; ***2Stop***: 2 stop bits
Baud Rate	Select the transmission speed (bps).
Sending (Send Delay)*4	Set the delay between executing the send/receive functions (MSG-SND or MSG-RCV) and sending the message.

(Cont'd)

Setting	Details
Automatically Reception (Automatic Reception)*5	Set whether or not to automatically respond to quires from the master.
Readout of Input Relay	Set the leading address and range of the input relays that can be read for automatic response.
Readout of Input Register	Set the leading address and range of the input registers that can be read for automatic response.
Readout/Write-in of Coil	Set the leading address and range of the coils that can be read/written for automatic response.
Readout/Write-in of Hold Register	Set the leading address and range of the holding registers that can be read/written for automatic response.
Write-in Width of Coil/ Hold Register	Set the range of the coils and holding registers that can be written for automatic response.

* 1. Transmission Protocol
  - ***MEMOBUS***: Yaskawa's standard MEMOBUS protocol
  - ***MELSEC***: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links
  - ***None***: Data can be transferred at any time by the user application program.

* 2. Serial I/F (Serial Interface)

  Select *CIR#01* for RS-232C and *CIR#2* for RS-485/422.

* 3. Transmission Mode
  - ***RTU***: Specify RTU mode for MEMOBUS protocols.
  - ***ASCII***: Specify ASCII mode for MEMOBUS protocols.
  - ***None***: Specify None for MELSEC or no protocol.

* 4. Sending (Send Delay)

  When ***Enable*** is selected, a delay until the beginning of transmissions (1 to 100 ms) can be set.
  - Master Station:
    The delay will be included between execution of the MSG-SND function and the transmission of the command.
  - Slave Station:
    The delay will be included between reception of a command by the MSG-RCV function and the transmission of the response.

* 5. Automatically Reception (Automatic Reception)

  Specify the ranges of relays, registers, and coils to check when automatically sending a response message to a query from the master. These settings are valid for slave stations only.

  There is no need to set the ranges when message transmissions will not be performed between the master and slaves. Also, if the ladder program is being used to return a response message with the MSG-RCV function, disable the automatic response so that redundant processing is not performed.

  With the system default settings, response messages will be sent using the ranges set with the following parameters.

Note: 1. Leading Register Numbers and Number of Words

The leading register numbers and number of words are listed in the following table.

Setting		MP940
Readout of Input Relay	Head REG (Leading register)	IW0000
	WD Size (Number of words)	5120

(Cont'd)

Setting		MP940
Readout of Input Register	Head REG (Leading register)	IW0000
	WD Size (Number of words)	5120
Read/Write-in of Coil	Head REG (Leading register)	MW00000
	WD Size (Number of words)	32768
ReadoutWrite-in of Hold Register	Head REG (Leading register)	MW00000
	WD Size (Number of words)	32768

2. Default Settings for Generic Serial Parameters

The default setting of the serial parameters are listed in the following table.

Setting	CIR01	CIR02
Rack Number Slot Number	01 02	01 02
Circuit Number Tab	01	01
Transmission Protocol	MEMOBUS	MEMOBUS
Master/Slave	Slave	Slave
Device Address	01	02
Serial I/F	RS-232 (RS-232C)	RS-485
Transmission Mode	RTU	RTU
Data Length	8	8
Parity	Even	Even
Stop Bit	1	1
Baud Rate	19.2 k	19.2 k
Sending (Send Delay)	Disable	Disable
Automatically Reception (Automatic Reception)	Enable	Enable
Readout of Input Relay	IW0000/2048	IW0000/2048
Readout of Input Register	IW0000/2048	IW0000/2048
Readout/Write-in of Coil	MW00000/32768	MW00000/32768
Readout/Write-in of Hold Register	MW00000/32768	MW00000/32768
Write-in Width of Coil/ Hold Register	MW00000/MW32767	MW00000/MW32767

- Saving, Deleting, and Closing Generic Serial Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

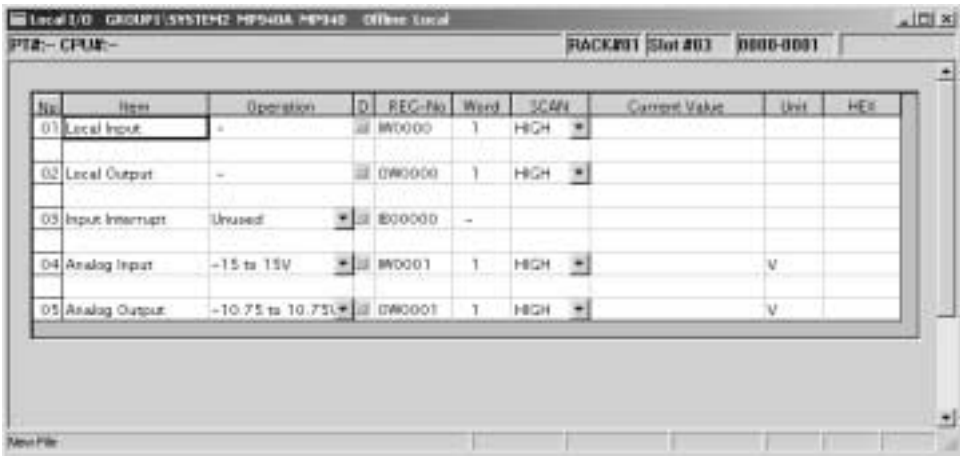
INFO

- When the delete operation is executed, the 2-circuit generic serial definitions data will be deleted.
- The transmission protocol for a port connecting to the MPE720 should be set to MEMOBUS. The MEMOBUS specification is the default setting. The maximum baud rate for a connection to the MPE720 is 19.2 Kbps.

(2) LIO Definitions

This section explains how to set the Local I/O Definitions.

Open the Local I/O Window according to *8.3.1 Opening Individual Module Definitions Windows*.



The LIO definitions set the I/O operations and disable status.

Setting	Details
No.	Displays the I/O item number.
Item	Displays the name of the I/O item.
Operation	Set the operation of the I/O item. This is set automatically except ***Interruption Input***.
D (Register Enable/Disable)	Sets the register's enable/disable setting. • : Enabled • : Disabled
REG-No.	Displays the I/O register number for the I/O item. This is set automatically and cannot be changed.
Word (Number of Words)	Displays the number of consecutive words of the I/O registers for the I/O item. This is set automatically and cannot be changed.
SCAN	Set the transmission processing scan. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan • ***SYSTEM***: System scan
Current Value	In online mode, the current value of the Machine Controller registers will be displayed. The current values of Local I/O are displayed in binary and the current values of Local outputs can be changed. The current values of interrupt inputs are displayed as ON or OFF. The current values are immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
Unit	Displays the unit of the I/O item.
HEX	Displays the hexadecimal equivalent of the binary values in the *Current Value*. In offline mode, nothing will be displayed.

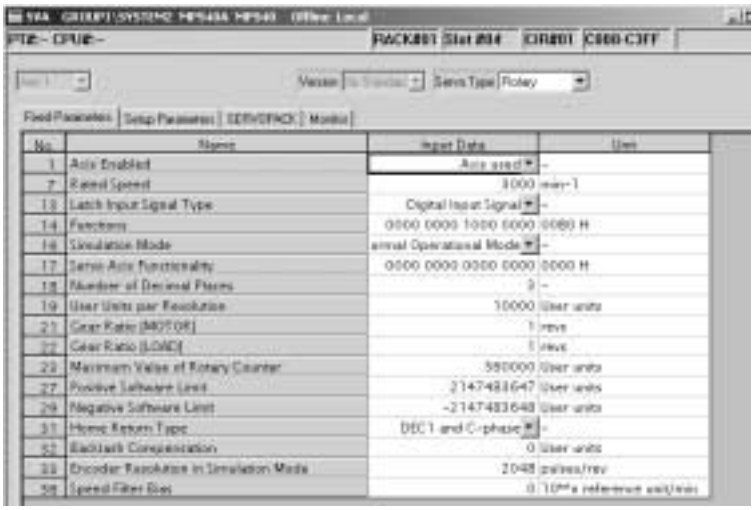
- Saving, Deleting, and Closing LIO Definitions

  Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

(3) SVA Definitions

This section explains how to set the SVA Definitions.

Open the SVA Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(a) SVA Definitions Menus

Refer to *(2)* in *8.5.15 SVA Definitions* for details.

(b) Tab Pages

The SVA Definitions Window is composed of four tab pages: the Fixed Parameters, Setup Parameters, SERVOPACK, and Monitor Tab Pages.

Tab Page	Details
Fixed Parameters	Sets the basic motion fixed parameters.
Setup Parameters	Sets the motion setting parameters in registers.
SERVOPACK	Sets the servo parameters of the SGDH SERVOPACK.
Monitor	Sets the parameters to monitor.

INFO When the SVA Definitions Window is opened without any settings having been made previously, a New File Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

8

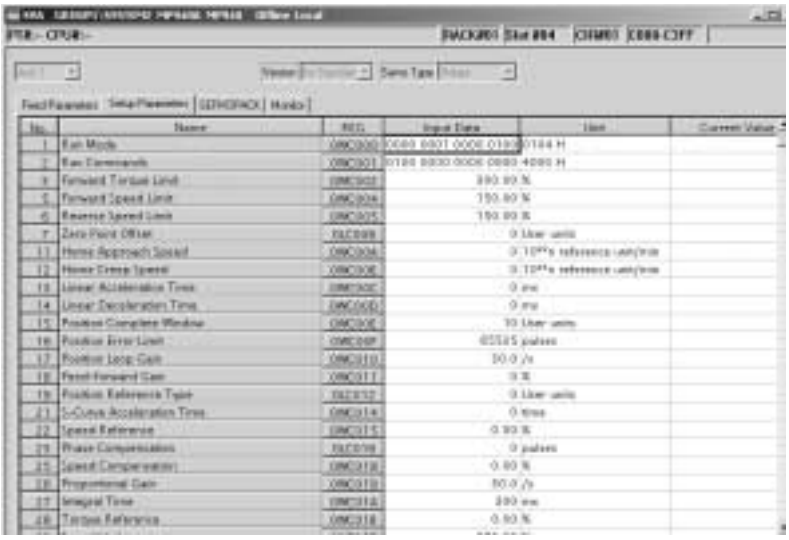
- Fixed Parameters Tab Page

This tab page is used to set the motion fixed parameters required for servo adjustment.

Setting	Details
Axis Number	Displays the axis number. The axis is fixed at ***Axis 1***.
Servo Type	Sets the motor type.
No.	Displays the number of the fixed parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the value for the parameter. Refer to the list of motion fixed parameters in the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details.
Unit	Displays the unit used to set the data.

Refer to *6.3.1 Motion Fixed Parameter Details* in the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on fixed parameter settings.

- Setup Parameters Tab Page



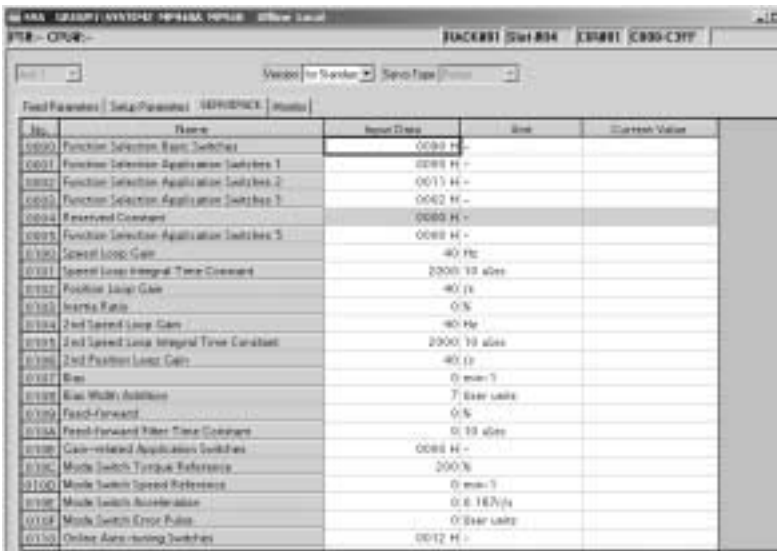
Setting	Details
Axis Number	Displays the axis number. The axis is fixed at ***Axis 1***.
Servo Type	Displays the motor type.
No.	Displays the number of the setting parameter.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name.
Input Data (Set Data)	Input (or select) the value for the parameter. Refer to the list of motion setup parameters in the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details.
Unit	Displays the unit uesd to set the data.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Refer to *6.3.2 Motion Setting Parameter Details* in the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on setting parameter settings.

INFO

Set values that are input are immediately saved to Machine Controller registers when the **Enter** Key is pressed. The current value displays will be refreshed using these values.

- SERVOPACK Tab Page

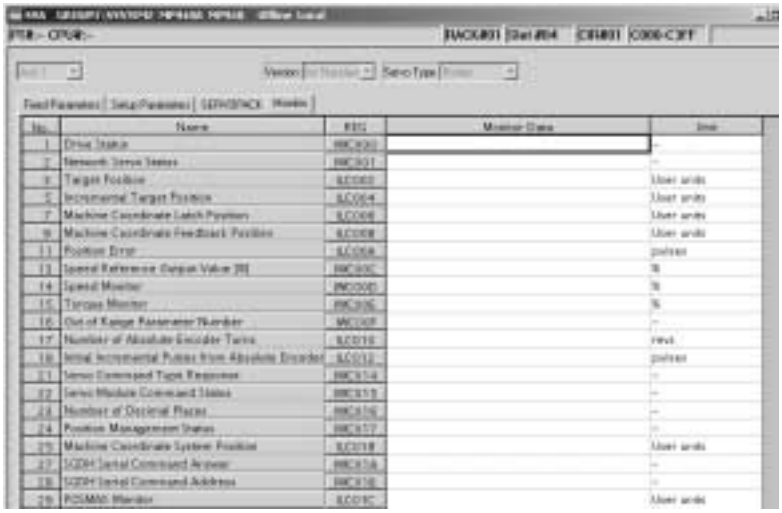


Setting	Details
Axis Number	Displays the axis number. The axis is fixed at ***Axis 1***.
Servo Type	Displays the motor type.
No.	Displays the number of the servo parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the value for the parameter. Refer to the list of motion SERVOPACK parameters in the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details.
Unit	Displays the unit used to set the data.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Refer to *6.4 Parameters for SGDH SERVOPACK* in the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on servo parameter settings.

- Monitor Tab Page

The settings cannot be changed here.



Setting	Details
Axis Number	Displays the axis number. The axis is fixed at ***Axis 1***.
Servo Type	Displays the motor type.
No.	Displays the number of the monitor parameter.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the register number corresponding to the monitor parameter.
Monitor Data	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.
Unit	Displays the unit used to set the data.

Refer to *6.3.3 Motion Monitoring Parameter Details* in the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on monitor parameter settings.

(c) Saving, Deleting, and Closing SVA Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

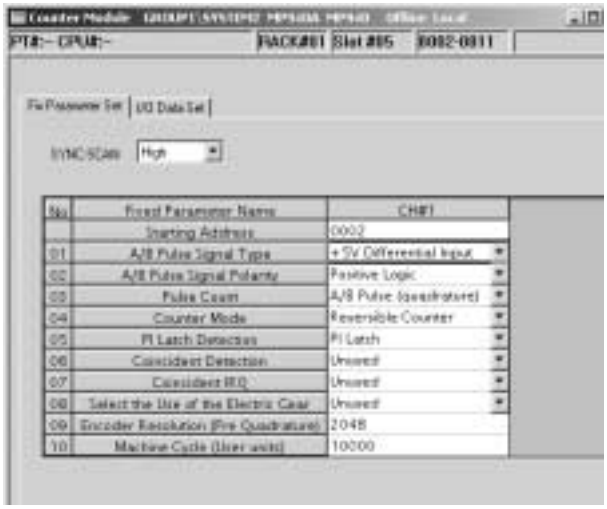
IMPORTANT

- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.
  The Servo ON is bit 0 of parameter number 2 (*RUN Commands* settings) in the Setup Parameters Tab Page.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

(4) CNTR Definitions

This section explains how to set the Counter Module Definitions.

Open the Counter Module Window according to *8.3.1 Opening Individual Module Definitions Windows.*



(a) Counter Module Menus

The following table shows the menu commands and functions displayed in the Counter Module Window.

Menu Command		Function
Set		
	Default	Returns settings to default values by channel.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	DEC	Displays I/O data in decimal.
	HEX	Displays I/O data in hexadecimal.
	BIN	Displays I/O data in binary.

(b) Tab Pages

The Counter Module Window is composed of two tab pages: the Fix Parameter Set and I/O Data Set Tab Pages.

Tab Page	Details
Fixed Parameter Set	Sets the CNTR fixed parameters.
I/O Data Set	Sets the CNTR I/O data.

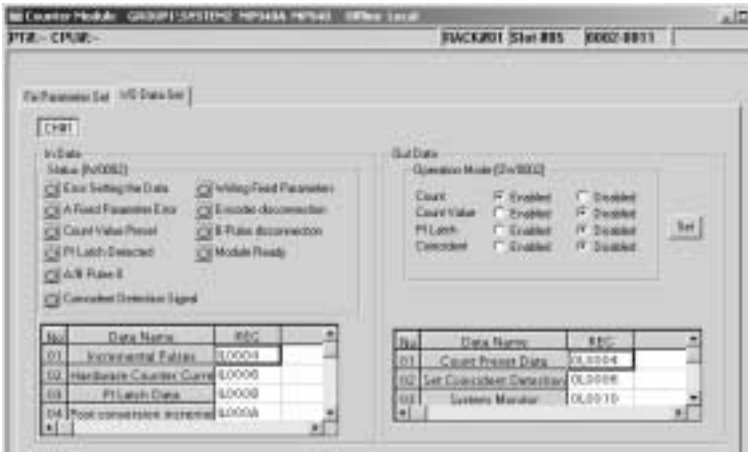
INFO When the Counter Module Window is opened without any settings having been made previously, a New File Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

- Fix Parameter Set Tab Page

This tab page is used to set the synchronous scan. Select ***System***, ***High***, or ***Low*** from the pull-down list. Refer to the *Machine Controller MP940 User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on scans.

No.	Setting	Details	Default
–	Starting Address (Leading Register Number)	Displays the leading address of the I/O register to be used.	I/O start register number
01	A/B Pulse Signal Type	Always set to ***+5V Differential Input***.	–
02	A/B Pulse Signal Polarity	The polarity of the A/B pulse ***Positive Logic***, ***Negative Logic***	Positive Logic
03	Pulse Count	***Pulse and Direction*** ***Pulse and Direction * 2*** ***Up/Down Counter*** ***Up/Down Counter * 2*** ***A/B Pulse*** ***A/B Pulse * 2*** ***A/B Pulse (quadrature)***	A/B Pulse (quadrature)
04	Counter Mode	Always set to ***Reversible Counter***.	–
05	PI Latch Detection	Always set to ***PI Latch***.	–
06	Coincident Detection	Specify the use of coincident detection. ***Unused, Used***	Unused
07	Coincident IRQ	Specify the use of coincident interrupt. ***Unused, Used*** *Coincident IRQ* is valid only when *Coincident Detection* above is set to ***Used***.	Unused
08	Select the use of the electronic gear	Specify the use of gear ratio. ***Unused, Used***	Unused
09	Encoder Resolution (Pre Quadrature)	1 to 65535	2048
10	Machine Cycle (User units)	1 to 2^{31-1}	10000
11	Encoder side gear ratio	1 to 65535	1
12	Gear ratio (load)	1 to 65535	1

- I/O Data Set Tab Page



1. Channel Number

   The channel number display is fixed at ***CH#1***.

2. IN Data (Input Data)

   a) Status (IW0002)

   Displays the status of each bit in the operating status register. The corresponding box will contain a black circle when the bit is ON and a white circle when the bit is OFF. The leading input register is the status word.

Status	Meaning
Error Setting the Data (Data Setting Error)	ON: Data setting error
A Fixed Parameter Error	ON: Fixed parameter setting error
Count Value Preset	ON: Count value preset completed.
PI Latch Detected	ON: PI latch detection completed.
A/B Pulse 0	ON: Feedback pulses within ±1 pulse
Coincident Detection Signal	ON: Coincident detected signal ON (pulse units)
Writing Fixed Parameters	ON: Parameters being written online.
Encoder disconnection	ON: Disconnected.
B-pulse disconnection	ON: Disconnected.
Module Ready	ON: CNTR Module is ready.

   b) IN Data Settings

Data Name	REG*	Range	Meaning
Incremental Pulses	IL0004	0 to 2147483647	1 = 1 pulse
Hardware Counter Current Value	IL0006	0 to 2147483647	1 = 1 pulse
PI Latch Data	IL0008	0 to 2147483647	1 = 1 pulse
Post Conversion Incremental Pulses	IL000A	0 to 2147483647	1 = 1 reference unit
Current Counter Value	IL000C	0 to 2147483647	1 = 1 reference unit
Post Conversion PI Latch Data	IL000E	0 to 2147483647	–
System Monitor	IL0010	0 to 2147483647	–

* The register numbers vary depending on the numbers set for the I/O Start Register in the Module Configuration Definitions.

3. OUT Data (Output Data)

a) Operation Mode (OW0002)

The status of each bit of the operation mode register is displayed. Settings can be selected with option buttons.

Status	Selected Item
Count	Enabled/Disabled
Count Value	Enabled/Disabled
PI Latch	Enabled/Disabled
Coincident	Enabled/Disabled

b) OUT Data Settings

Data Name	REG-No.*	Range	Meaning
Count Preset Data	OL0004	0 to 2147483647	1 = 1 pulse
Set Coincident Detection	OL0006	0 to 2147483647	1 = 1 pulse
System Monitor	OL0010	0 to 2147483647	–

* The register numbers vary depending on the numbers set for the I/O Start Register in the Module Configuration Definitions.

(c) Saving, Deleting, and Closing Counter Module Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

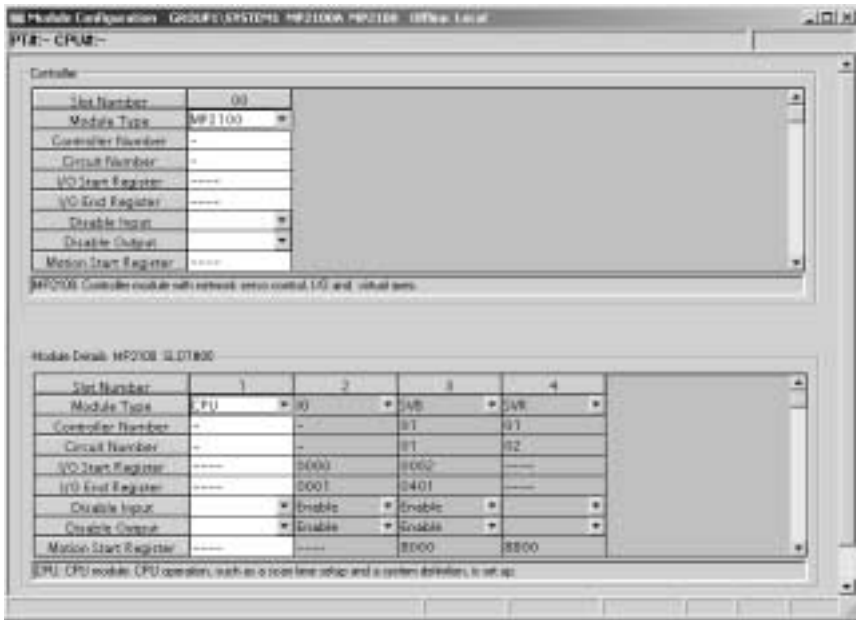
The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

8.8 MP2100 Module Configuration Definitions

This section explains the parameter settings for the MP2100.

8.8.1 Opening the Module Configuration Window

Open the following window according to *8.2.2 Opening the Module Configuration Window*.



Setting	Details
Slot Number	Displays the slot numbers.
Module Type	This is set automatically using the Module name set in the slots.
Controller Number	The MP2100 CPU is set automatically to ***01***.
Circuit Number	In the MP2100, *SVB* is automatically set to ***01***, and *SVR* is automatically set to ***02***.
I/O Start Register	Sets the I/O Start Register for the I/O and SVB Modules.
I/O End Register	Sets the I/O End Register for the I/O and SVB Modules.
Disable Input	Sets to enable/disable inputs. Blank: Setting not allowed, Disable: Disabled, Enable: Enabled
Disable Output	Sets to enable/disable outputs. Blank: Setting not allowed, Disable: Disabled, Enable: Enabled
Motion Start Register	This is set automatically for SVB and SVR Modules.
Motion End Register	This is set automatically for SVB and SVR Modules.
Details	Performs MECHATROLINK communication definitions for SVB.
Status	Displays the status of each Module in online mode.

INFO

■ Setting Ranges for the MP2100 I/O Start/End Register Numbers

- 0000 to 7FFF hex
  Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.
- With the MP2100, standard register numbers have been set for each Module. We recommend using these standard register number settings.
  - I/O: 0000 to 0001 hex
  - SVB: 0002 to 0401 hex

8.8.2 Saving, Deleting, and Closing Module Configuration Definitions

Refer to *8.2.3 Saving Module Configuration Definitions*, *8.2.4 Deleting Module Configuration Definitions*, and *8.2.5 Ending the Module Configuration Definitions*.

8.8.3 Opening Individual Module Definitions Window

Set the individual Module definition data for the MP2100 using the procedure in *8.3.1 Opening Individual Module Definitions Windows*. Refer to *(1) Local I/O Definitions* or *(2) SVB Definitions* for individual Module setting data.

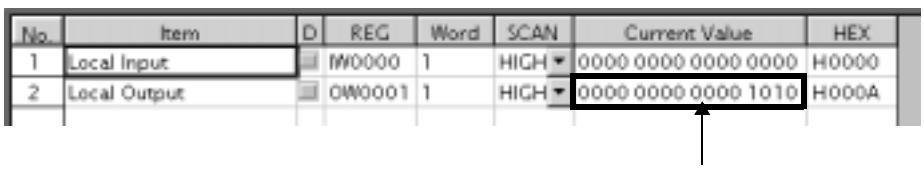
(1) Local I/O Definitions

This section explains the local I/O definitions.

Open the following window according to *8.3.1 Opening Individual Module Definitions Windows*.

Setting	Details
No.	Displays the number of the setting.
Item	Displays the name of the setting and the I/O signal name.
D (Register Enable/Disable)	Controls the register's enable/disable setting. A register is one word in length, so the setting applies to 16 I/O bits. The register is disabled when a check is displayed in the box. • : Enabled • : Disabled
REG (Register Number)	Displays the I/O register number.
Word (Number of Words)	Displays the number of consecutive words in the register. In the MP2100, the allocation is fixed at 1 word, so the number of words is 1.
SCAN	Sets the transmission processing scan. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan • ***(NA)***: No scan specification
Current Value	In online mode, the current value of the allocated Machine Controller register will be displayed in binary. The current value of "Local Output" can be changed and is immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the current value column. In offline mode, nothing will be displayed.

The following window shows a display example of a *Current Value*.



- Saving, Deleting, and Closing Local I/O Definition Data

  Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

(2) SVB Definitions

This section explains the SVB Module Definitions.

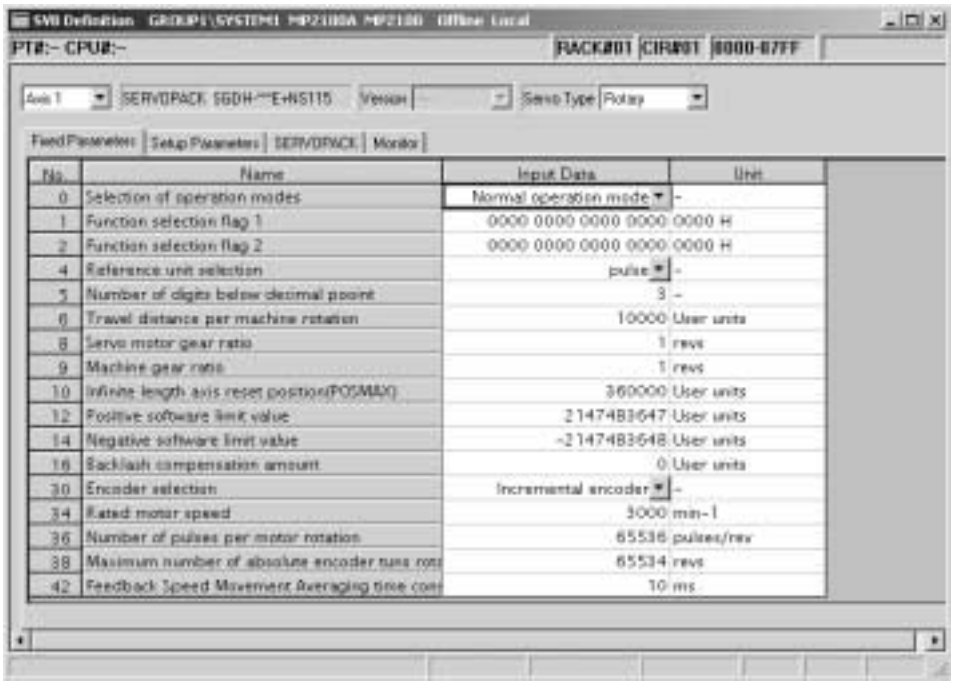
The SVB Module is equipped with MECHATROLINK-I and MECHATROLINK-II interfaces, and enables connection of up to 16 MECHATROLINK SERVOPACKs or other I/O devices.

The SVB Module Definitions are done in two stages: MECHATROLINK and motion parameters. The necessary settings vary depending on the devices connected to the MECHATROLINK.

	MECHATROLINK Device	
	SERVOPACK	I/O Device
MECHATROLINK Definitions	Yes	Yes
SVB Definition setting	Yes	No

Initially, define the MECHATROLINK interface accordingt to *(3) MECHATROLINK Definitions*. The SVB Definitions Window cannot be opened unless the MECHATROLINK has been defined.

Open the SVB Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(a) SVB Definitions Menus

These menus can be used only in the SVB Definitions Window.

Menu Command		Function
Edit		
	Axis Data Copy	Temporarily saves the displayed axis setting data.
	Axis Data Paste	Copies the temporarily saved axis data to the currently selected axis data.
	Details	Displays individual data in bit format.
	Default Set	Sets the default value.
	Copy Current Value	Sets the current value to the set data.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
	Update Current Value	Updates the display of the current value of the servo parameters.

- Axis Data Copy

Select the axis data to be copied, and then select ***Edit – Axis Data Copy*** from the menus. The source axis data will be copied and saved temporarily in the cut buffer.

- Axis Data Paste

Select the axis data to be copied, and then select ***Edit – Axis Data Paste*** from the menus. The axis data saved temporarily in the cut buffer will overwrite the axis data at the copy destination.

IMPORTANT

Copying between axes is possible using the Copy Axis Data and the Paste Axis Data functions. Copying between axes requires separate operations for fixing, setting, and servo parameters. If the pasted data is for a different type of parameter, an error message will be displayed.

- Details

Use this function to display setting data as bit images for motion parameters except for servo parameters. The information can be displayed for each bit by selecting ***Edit – Details*** from the menus.

- Default Set

Use this function to restore the settings data for the motion fixed parameters, setting parameters, and servo parameters to their default values.

Select ***Edit – Default Set*** from the menus. The axis parameters currently displayed will be set to their default values. Parameters whose current values are displayed will have their current values updated.

- Copy Current Value

This function is enabled only for servo parameters. It overwrites the settings data using the data displayed in the *Current Value*. Select ***Edit – Copy Current Value*** from the menus. The data on the SERVOPACK will be overwritten temporarily.

Check the details displayed, and then select ***File – Save*** from the menus to save the data permanently. This operation is possible while the servo is ON.

- Refresh Current Value

This function is enabled only for servo parameters. Current values are not automatically updated when the servo parameters are displayed. Select ***View – Update Current Value*** from the menus to read and display the most recent values.

The following table shows the functions given above.

	Motion Fixed Parameters	Setting Parameters	Servo Parameters*	Motion Monitor Parameters	Remarks
Axis Data Copy (C)/ Axis Data Paste (P)	Yes	Yes	No	No	–
Details (D)	Yes	Yes	No	Yes	Parameters in bit format only
Default Set (R)	Yes	Yes	Yes	No	–
Copy Current Value (D)	No	No	Yes	No	Enabled only when online
Update Current Value (R)	No	No	Yes	No	

* Possible also when the servo is ON.

Note: Yes: Operation possible, NO: Operation not possible.

(b) Tab Pages

The SVB Definitions Window is composed of four tab pages: the Fixed Parameters, Setup Parameters, SERVOPACK, and Monitor Tab Pages.

Tab Page	Details
Fixed Parameters	Sets the motion fixed parameters.
Setup Parameters	Sets the motion setting parameters.
SERVOPACK	Sets the servo setting parameters.
Monitor	Displays the motion monitor parameters.

It is possible to switch between these tab pages by selecting ***View – Next Page*** or ***View – Back Page*** from the SVB Definitions (Motion Parameters) Menu.

- Fixed Parameters Tab Page

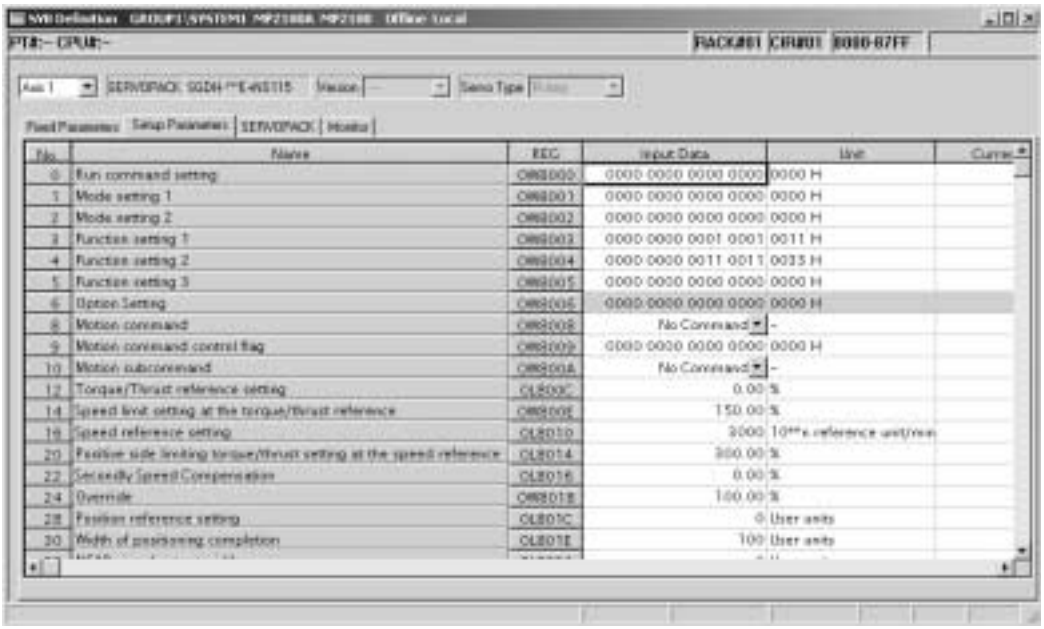
The fixed parameters required in the Machine Controller are set in the Fixed Parameters Tab Page.

Setting	Details
Axis Number	Select the desired axis number. Set the fixed parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the motion fixed parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.

Refer to *Machine Controller MP2100 User's Manual: Design and Maintenance* (SIEPC88070001) for details on motion fixed parameter settings.

- Setup Parameters Tab Page

The setting parameters required in the Machine Controller are set in the Setup Parameters Tab Page.



Setting	Details
Axis Number	Select the desired axis number. Set the setting parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the setting parameter.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the axis number and circuit number selected. Refer to *Table8.10 Register Ranges*.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Table 8.10 Register Ranges

Circuit Number	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4	Axis Number 5	to	Axis Number 16
1	8000 to 807F	8080 to 80FF	8100 to 817F	8180 to 81FF	8200 to 827F	to	8780 to 87FF
2	8800 to 887F	8880 to 88FF	8900 to 897F	8980 to 89FF	8A00 to 8A7F	to	8F80 to 87FF
3	9000 to 907F	9080 to 90FF	9100 to 917F	9180 to 91FF	9200 to 927F	to	9780 to 97FF
4	9800 to 987F	9880 to 98FF	9900 to 997F	9980 to 99FF	9A00 to 9A7F	to	9F80 to 9FFF
5	A000 to A07F	A080 to A0FF	A100 to A17F	A180 to A1FF	A200 to A27F	to	A780 to A7FF
6	A800 to A87F	A880 to A8FF	A900 to A97F	A980 to A9FF	AA00 to AA7F	to	AF80 to AFFF
7	B000 to B07F	B080 to B0FF	B100 to B17F	B180 to B1FF	B200 to B27F	to	B780 to B7FF
8	B800 to B87F	B880 to B8FF	B900 to B97F	B980 to B9FF	BA00 to BA7F	to	BF80 to B7FF
9	C000 to C07F	C080 to C0FF	C100 to C17F	C180 to C1FF	C200 to C27F	to	C780 to C7FF
10	C800 to C87F	C880 to C8FF	C900 to C97F	C980 to C9FF	CA00 to CA7F	to	CF80 to C7FF
11	D000 to D07F	D080 to D0FF	D100 to D17F	D180 to D1FF	D200 to D27F	to	D780 to D7FF
12	D800 to D87F	D880 to D8FF	D900 to D97F	D980 to D9FF	DA00 to DA7F	to	DF80 to D7FF

Table 8.10 Register Ranges (Cont'd)

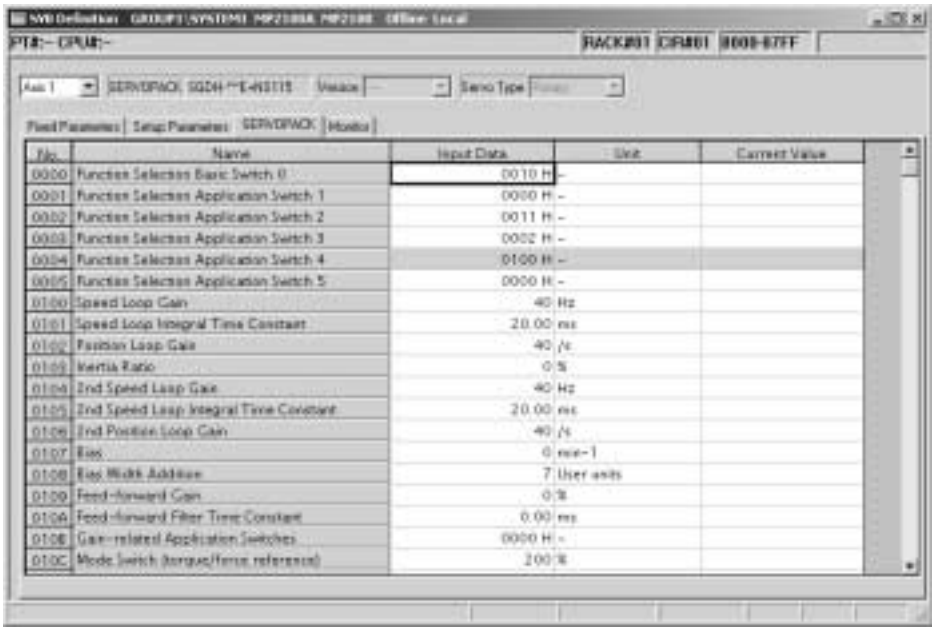
Circuit Number	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4	Axis Number 5	to	Axis Number 16
13	E000 to E07F	E080 to E0FF	E100 to E17F	E180 to E1FF	E200 to E27F	to	E780 to E7FF
14	E800 to E87F	E880 to E8FF	E900 to E97F	E980 to E9FF	EA00 to EA7F	to	EF80 to E7FF
15	F000 to F07F	F080 to F0FF	F100 to F17F	F180 to F1FF	F200 to F27F	to	F780 to F7FF
16	F800 to F87F	F880 to F8FF	F900 to F97F	F980 to F9FF	FA00 to FA7F	to	FF80 to F7FF

INFO

- The register number by motion parameter axis is determined by the following equation:
  Motion parameter register address = O (IW) 8000 + (Circuit number - 1) × 800 (HEX) + (Axis number - 1) × 80 (HEX)
- Refer to the *Machine Controller MP2100 User's Manual: Design and Maintenance* (SIEPC88070001) for details on motion setting parameters.

- SERVOPACK Tab Page

The servo parameters required for the Machine Controller are set in the SERVOPACK Tab Page.



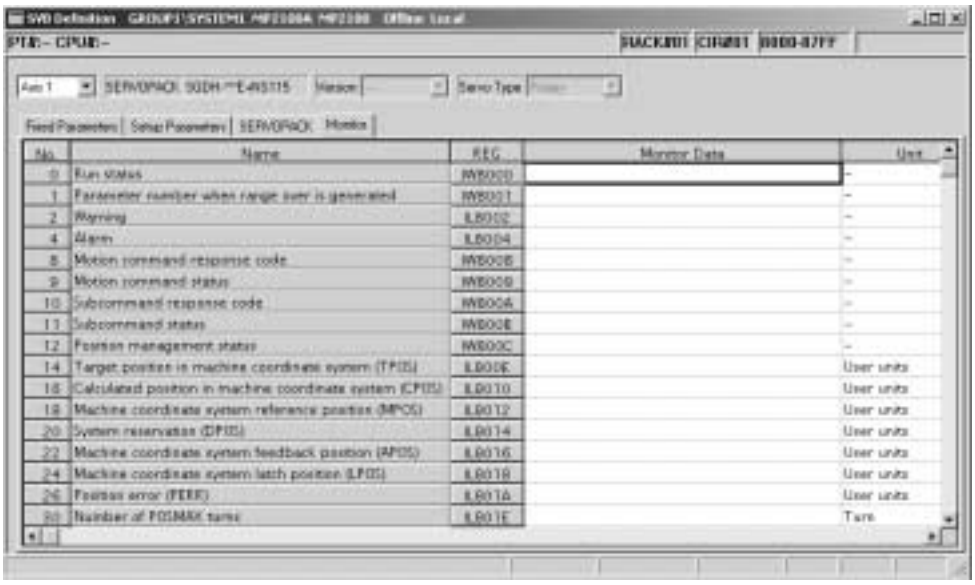
Setting	Details
Axis Number	Select the desired axis number. Set the SERVOPACK for each axis.
SERVOPACK	Displays the type of servo.
No.	Displays the parameter number of the servo parameter.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.

INFO

Refer to *Machine Controller MP2100 User's Manual: Design and Maintenance* (SIEPC88070001) for details on servo parameter settings.

- Motion Monitor Tab Page

The Motion Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Motion Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number. The parameters for each axis are displayed.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the motion monitor parameter.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed. Refer to *Table8.10 Register Ranges*.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the corresponding parameter.

INFO

.Refer to *Machine Controller MP2100 User's Manual: Design and Maintenance* (SIEPC88070001) for details on monitor parameter settings.

(c) Saving, Deleting, and Closing the SVB Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

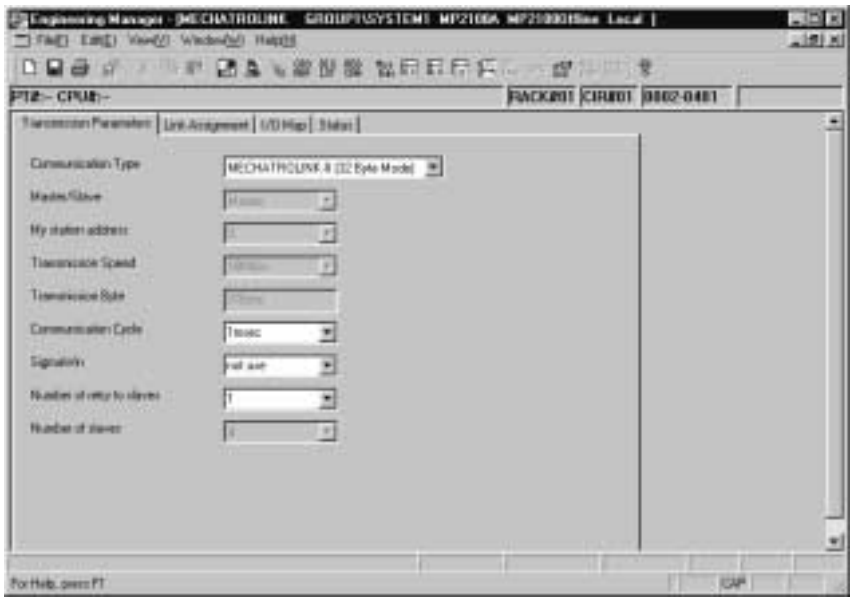
IMPORTANT

- The Delete operation deletes the motion fixed parameters and setting parameters of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.
  The Servo ON is bit 0 of parameter number 0 (*RUN Commands* Settings) in the Setup Parameters Tab Page.
- The Save command saves the motion fixed parameters for all axes of the servo number currently being displayed.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

(3) MECHATROLINK Definitions

This section explains how to set the MECHATROLINK Definitions.

Open the MECHATROLINK Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*. The MECHATROLINK Definitions Window can be opned by double-clicking the ***MECHATROLINK*** in the *details* of the Module Configuration Window.



(a) MECHATROLINK Definitions Menus

The following table shows the menu commands and functions displayed in the MECHATROLINK Definitions Window.

Menu Command		Function
Edit		
	Parameter Setting	Returns the allocation settings to default values.
	Assignment Delete	Clears the allocation settings.

(b) Tab Pages

The MECHATROLINK Definitions Window is composed of four tab pages: the Transmission Parameters, Link Assignment, I/O Map, and Status Tab Pages.

Tab Page	Details
Transmission Parameters	Sets the MECHATROLINK transmission parameters.
Link Assignment	Allocates the MECHATROLINK's I/O.
I/O Map	Sets the I/O map.
Status	Displays the transmission status.

- Transmission Parameters Tab Page

This tab sets the parameters required to use the MECHATROLINK communication system.

Setting	Details	
Communication Type	Sets the communication type, from among ***MECHATROLINK-I***, ***MECHATROLINK-II (32 Byte Mode)***, and ***MECHATROLINK-II (17 Byte Mode)***.	
Master/Slave	Sets whether the Machine Controller is used as a Master station or a Slave station. This setting is fixed at ***Master*** for the MP2100.	
My Station Address (Local Station Address)	When the Machine Controller is being used as a master station, the local station address is fixed at 0 and cannot be changed. When it is being used as a slave station, set a station address between 1 and 30. This setting is fixed at ***0*** for the MP2100.	
Transmission Speed*1	Sets the transmission speed for communication. The *Transmission Speed* varies depending on the *Communication Type*.	
Transmission Byte	Sets the number of transmission bytes. Set only for MECHATROLINK-II. In the MP2100, MECHATROLINK-II (17 Byte Mode) is fixed at ***16 Byte***, and MECHATROLINK-II (32 Byte Mode) is fixed at ***31 Byte***.	
Communication Cycle*2	Sets the communication cycle. The *Communication Cycle* varies depending on the *Communication Type*.	
Message Confidence Level*3	Sets the error recovery level for sending MEMOBUS commands. Set only for MECHATROLINK-I.	
	0	Send command just once and wait indefinitely for a response from the destination.
	1	Send command once and resend if a response is not received within 8 seconds.
	2	When sending the command, send each word of data twice consecutively and wait indefinitely for a response from the destination. This method improves transmission quality but reduces transmission efficiency by 50%.
SigmaWin	Sets whether or not to use SigmaWin. Set only for MECHATROLINK-II.	
Number of retry to slaves	Sets the number of retries to slaves. Set only for MECHATROLINK-II.	
Number of slaves*4	Sets the maximum number of slaves. In the MP2100, the maximum number of slaves is fixed, depending on the *Communication Type*, *Transmission Speed*, and *Communication Cycle*.	

* 1.

Communication Type	Transmission Speed
MECHATROLINK-I	Fixed at 4 Mbps.
MECHATROLINK-II (17 Byte Mode)	Fixed at 10 Mbps.
MECHATROLINK-II (32 Byte Mode)	Fixed at 10 Mbps.

* 2.

Communication Type	Communication Cycle
MECHATROLINK-I	Fixed at 2 ms.
MECHATROLINK-II (17 Byte Mode)	Set to 1 ms/2 ms.
MECHATROLINK-II (32 Byte Mode)	Fixed at 1 ms.

* 3. Displayed only for MECHATROLINK-I.

* 4.

Communication Type	Transmission Speed	Communication Cycle	Number of Slaves
MECHATROLINK-I	4 Mbps	2 ms	14
MECHATROLINK-II (17 Byte Mode)	10 Mbps	1 ms	9
		2 ms	21
MECHATROLINK-II (32 Byte Mode)	10 Mbps	1 ms	15

In the MECHATROLINK-II, the *Number of slaves* varies depending on the settings for *SigmaWin* and *Number of retry to slaves*. The *Number of slaves* is calculated as shown below.

X = The value set in *Number of retry to slaves*
Y = 1 when *SigmaWin* is set to ***use***, and 0 when *SigmaWin* is set to ***not use***

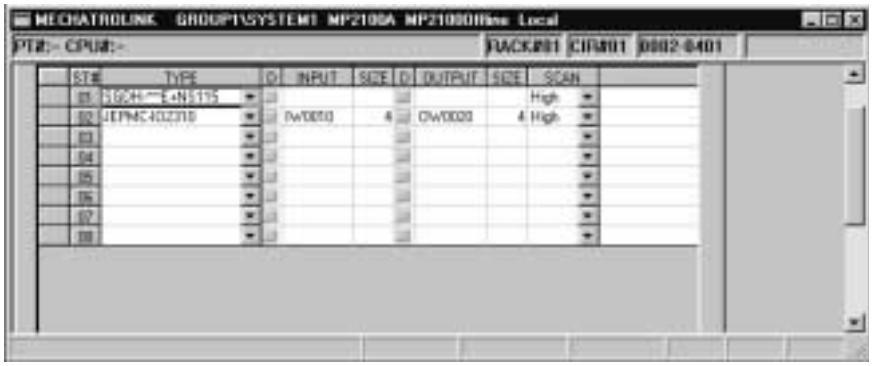
- When the *Communication Type* is set to ***MECHATROLINK-II (17 Byte Mode)*** and the *Communication Cycle* is set to ***1 msec***
  Number of slaves = 15 - (X + Y)
- When the *Communication Type* is set to ***MECHATROLINK-II (32 Byte Mode)*** and the *Communication Cycle* is set to ***1 msec***
  Number of slaves = 9 - (X + Y)
- When the *Communication Type* is set to ***MECHATROLINK-II (32 Byte Mode)*** and the *Communication Cycle* is set to ***2 msec***
  Number of slaves = 21 - (X + Y)

  However, the maximum number of Servo axes is 16.

• I/O Assignment Tab Page

- Setting Assignment Data

  The I/O Assignment Tab Page is used to set the I/O devices, I/O registers, scan, etc., connected in the MECHATROLINK.



Setting	Details
ST#	Displays the station number. Up to 16 stations can be set.
TYPE	Sets the type of I/O device connected at the station. Select an I/O device type from the pull-down list.
D (Register Enable/Disable)	Sets the input register's enable/disable setting. • ☐ : Enabled • ☑ : Disabled
INPUT, SIZE	Sets the leading input register number (INPUT) and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station does not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Window.
D (Register Enable/Disable)	Sets the output register's enable/disable setting. • ☐ : Enabled • ☑ : Disabled

(Cont'd)

Setting	Details
OUTPUT, SIZE	Sets the leading output register number (OUTPUT) and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station do not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Window. This setting is not required when a SERVOPACK has been selected for the *TYPE*.
SCAN	Sets the scan for I/O servicing. The scan will be fixed at ***High*** when a SERVOPACK has been selected for the *TYPE*. • ***High***: High-speed scan • ***Low***: Low-speed scan
Comment (Station Name)	Comments up to 32 characters can be input for each station.

INFO

The I/O devices set using the *TYPE* are shown in *Appendix D MECHATROLINK Devices*.

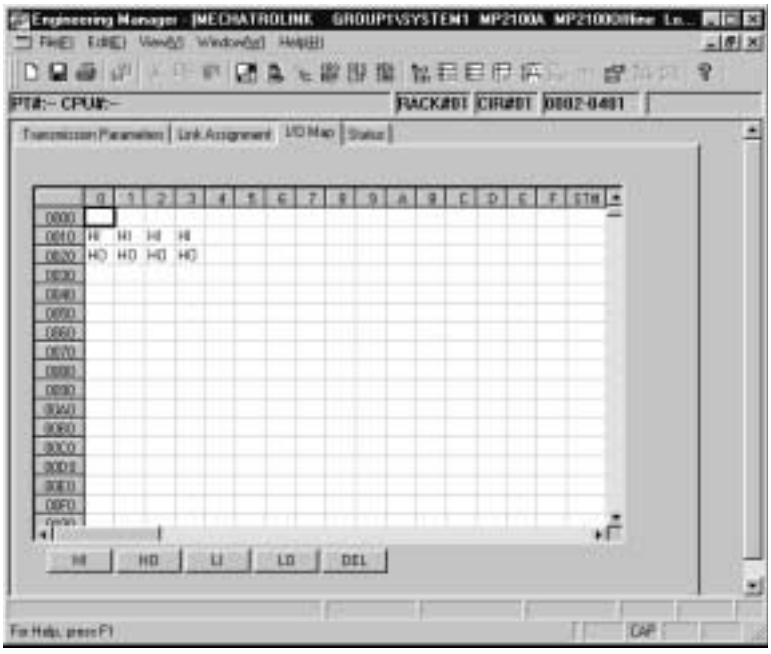
- Deleting I/O Assignments

Delete the allocation data for one station at a time using the following procedure.

1. To delete a station's allocation data, move the cursor to the row of the station, to be deleted, select ***Edit*** – ***Assignment Delete*** from the menus.
2. The station's allocation data will be deleted.

- I/O Map Tab Page

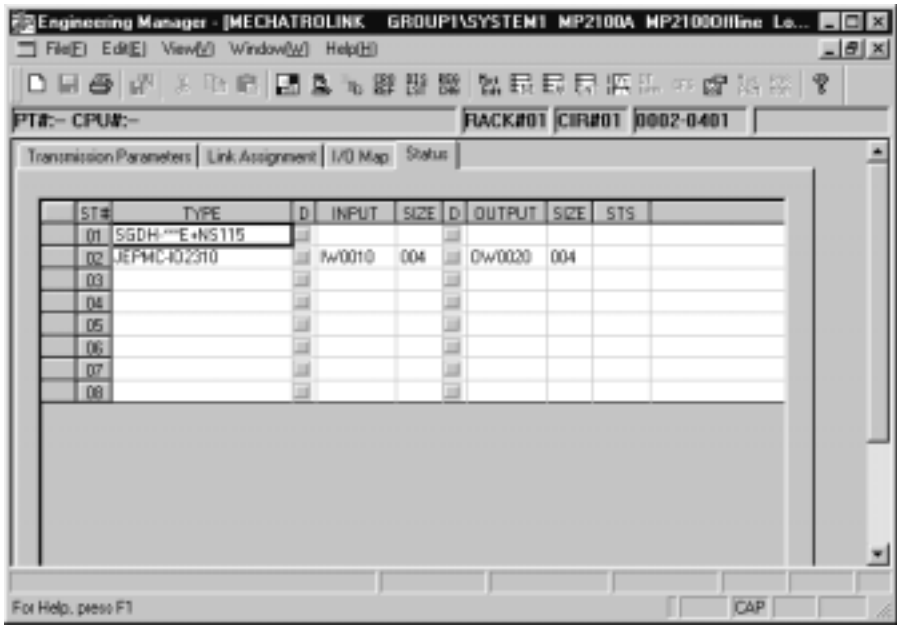
The I/O Map Tab Page displays the status of the Machine Controller's I/O allocations.



HI	Allocates to an input set for a high-speed scan.
HO	Allocates to an output set for a high-speed scan.
LI	Allocates to an input set for a low-speed scan.
LO	Allocates to an output set for a low-speed scan.
DEL	Deletes allocations.

- Status Tab Page

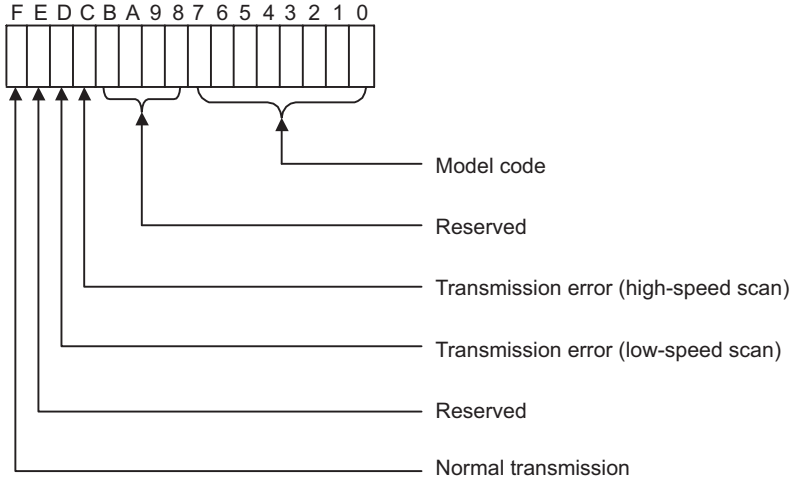
The Status Tab Page displays the data that is currently being transmitted by the MECHATROLINK.
The tab only displays the status; the displayed values cannot be changed here.



The meaning of each column is identical to the columns in the Link Assignment Tab Page except for the additional *STS* column.

- STS

  In online mode, the MECHATROLINK transmission status information is displayed in hexadecimal. The meaning of each bit is shown in the following figure. In offline mode, nothing will be displayed.



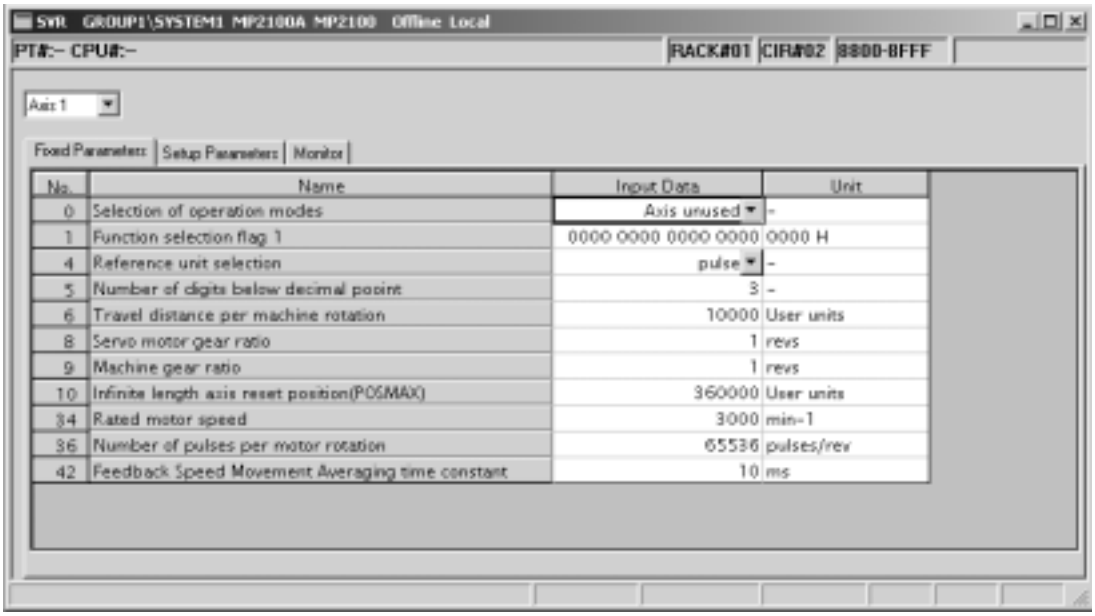
(c) Saving, Deleting, and Closing MECHATROLINK Definitions

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

(4) SVR Definitions

This section explains how to set the motion parameters of the SVR Module.

Open the SVR Definitions Window according to *8.3.1 Opening Individual Module Definitions Windows*.



(a) SVR Definitions Menus

Refer to *(2) SVB Definitions* for details.

(b) Tab Pages

The SVR Definitions Window is composed of three tab pages: the Fixed Parameters, Setup Parameters, and Monitor Tab Pages.

Tab Page	Details
Fixed parameters	Sets the motion fixed parameters.
Setup parameters	Sets the motion setting parameters.
Monitor	Displays the motion monitor parameters.

- Fixed Parameters Tab Page

The fixed parameters required for Servo adjustment are set in the Fixed Parameters Tab Page.

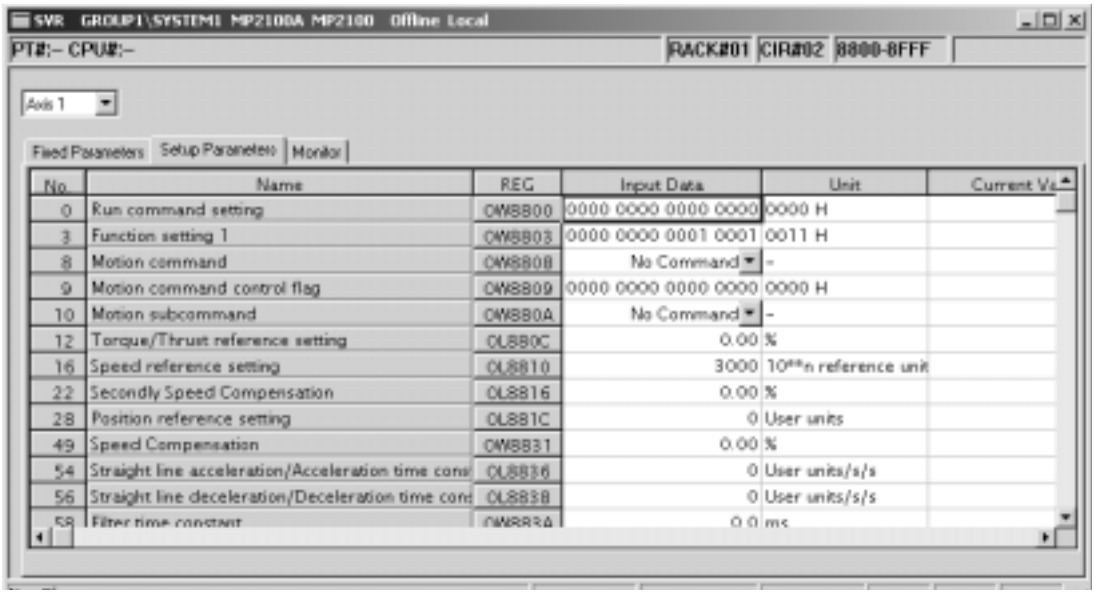
Setting	Details
Axis Number	Select the desired axis number. Set the motion fixed parameters for each axis.
Name (Parameter Name)	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value.
Unit	Displays the units of the displayed settings data.

INFO

Refer to *Machine Controller MP2100 User's Manual: Motion Module* (SIEPC88070001) for details on motion fixed parameter settings.

- Setup Parameters Tab Page

Parameters required for Servo adjustment are set in the Setup Parameters Tab Page.



Setting	Details
Axis Number	Select the desired axis number. Set the parameters for each axis.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being selected. Refer to *Table 8.11 Register Ranges*.
Input Data (Set Data)	Input the parameter value.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Table 8.11 Register Ranges

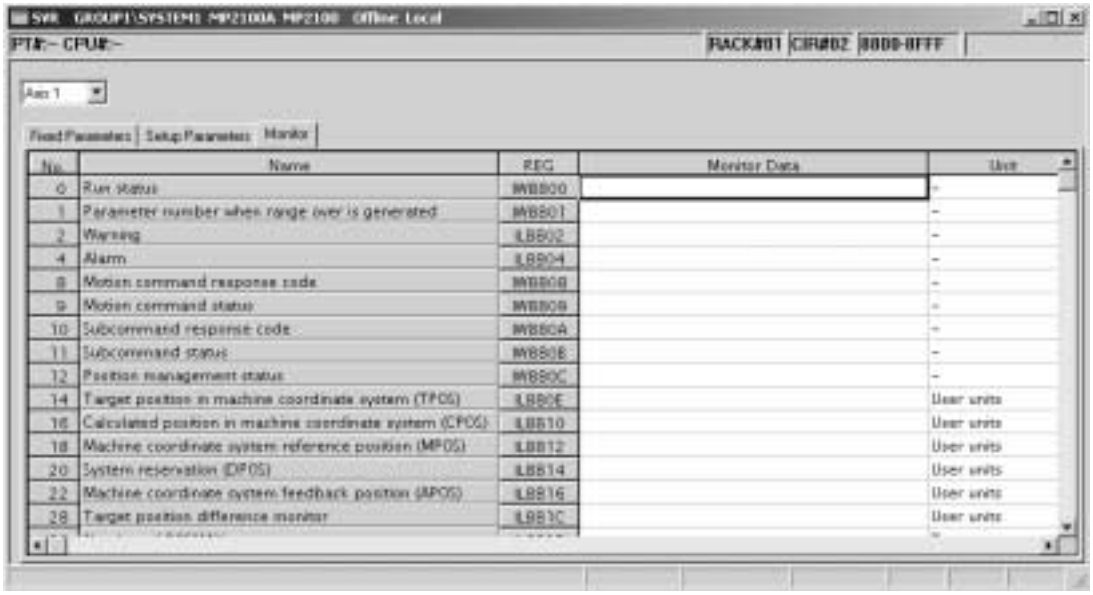
Circuit Number	Axis Number 1	Axis Number 2	Axis Number 3	Axis Number 4	Axis Number 5	to	Axis Number 16
1	8000 to 807F	8080 to 80FF	8100 to 817F	8180 to 81FF	8200 to 827F	to	8780 to 87FF
2	8800 to 887F	8880 to 88FF	8900 to 897F	8980 to 89FF	8A00 to 8A7F	to	8F80 to 87FF
3	9000 to 907F	9080 to 90FF	9100 to 917F	9180 to 91FF	9200 to 927F	to	9780 to 97FF
4	9800 to 987F	9880 to 98FF	9900 to 997F	9980 to 99FF	9A00 to 9A7F	to	9F80 to 9FFF
5	A000 to A07F	A080 to A0FF	A100 to A17F	A180 to A1FF	A200 to A27F	to	A780 to A7FF
6	A800 to A87F	A880 to A8FF	A900 to A97F	A980 to A9FF	AA00 to AA7F	to	AF80 to AFFF
7	B000 to B07F	B080 to B0FF	B100 to B17F	B180 to B1FF	B200 to B27F	to	B780 to B7FF
8	B800 to B87F	B880 to B8FF	B900 to B97F	B980 to B9FF	BA00 to BA7F	to	BF80 to B7FF
9	C000 to C07F	C080 to C0FF	C100 to C17F	C180 to C1FF	C200 to C27F	to	C780 to C7FF
10	C800 to C87F	C880 to C8FF	C900 to C97F	C980 to C9FF	CA00 to CA7F	to	CF80 to C7FF
11	D000 to D07F	D080 to D0FF	D100 to D17F	D180 to D1FF	D200 to D27F	to	D780 to D7FF
12	D800 to D87F	D880 to D8FF	D900 to D97F	D980 to D9FF	DA00 to DA7F	to	DF80 to D7FF
13	E000 to E07F	E080 to E0FF	E100 to E17F	E180 to E1FF	E200 to E27F	to	E780 to E7FF
14	E800 to E87F	E880 to E8FF	E900 to E97F	E980 to E9FF	EA00 to EA7F	to	EF80 to E7FF
15	F000 to F07F	F080 to F0FF	F100 to F17F	F180 to F1FF	F200 to F27F	to	F780 to F7FF
16	F800 to F87F	F880 to F8FF	F900 to F97F	F980 to F9FF	FA00 to FA7F	to	FF80 to F7FF

INFO

- The register number by motion parameter axis is determined by the following equation:
  Motion parameter register address = O (IW) 8000 + (Circuit number - 1) × 800 (HEX) + (Axis number - 1) × 80 (HEX)
- Refer to the *Machine Controller MP2100 User's Manual: Design and Maintenance* (SIEPC88070001) for details on motion setting parameters.

• Monitor Tab Page

The Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.



Setting	Details
Axis Number	Select the desired axis number. The parameter monitor data is displayed in axis units.
Name (Parameter Name)	Displays the parameter name.
REG (Register Number)	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the circuit number and axis number currently being displayed. Refer to *Table 8.11 Register Ranges*.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *Machine Controller MP2100 User's Manual: Design and Maintenance* (SIEPC88070001) for details on monitor parameter settings.

(c) Saving, Deleting, and Closing the SVR Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

IMPORTANT

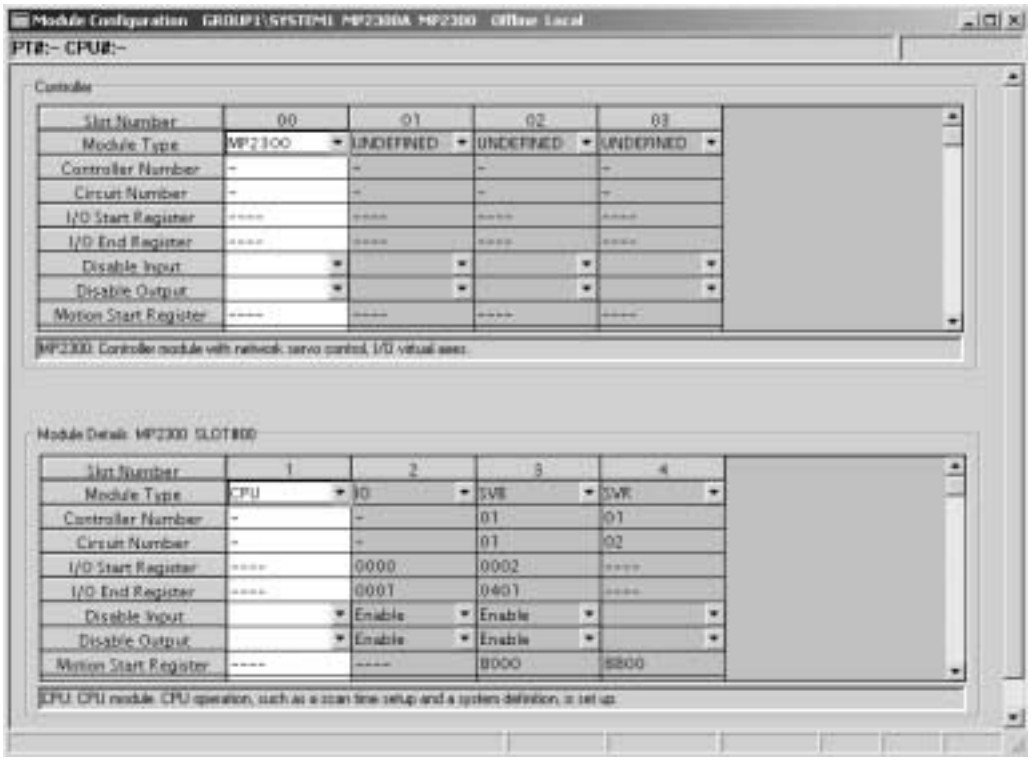
- The Delete operation deletes the motion fixed parameter and setting parameter settings of all axes.
- The edited motion fixed parameters cannot be saved if the Servo ON signal is ON. Save the motion fixed parameters data after this signal has gone OFF.
  The Servo ON is bit 0 of parameter number 0 (*RUN Commands* Settings) in the Setup Parameters Tab Page.
- The Save command saves the fixed parameters for all axes of the servo number currently being displayed.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

8.9 MP2300 Module Configuration Definitions

This section explains the parameter settings for the MP2300.

8.9.1 Opening the Module Configuration Window

Open the Module Configuration Window according to *8.2.2 Opening the Module Configuration Window*.



Setting	Details
Slot Number	Displays the slot numbers in the rack.
Module Type	Sets the name of the Module installed in each slot automatically.
Controller Number	In the MP2300, both SVB and SVR are automatically set to ***01***.
Circuit Number	In the MP2300, SVB is automatically set to ***01***, and SVR is automatically set to ***02***.
I/O Start Register	Sets the I/O Start Register for the I/O Module.
I/O End Register	Sets the I/O End Register for the I/O Module.
Disable Input	Sets to enable/disable inputs. Blank: Setting not allowed, D: Disabled, E: Enabled
Disable Output	Sets to enable/disable outputs. Blank: Setting not allowed, D: Disabled, E: Enabled
Motion Start Register	This is set automatically for SVB and SVR Modules.
Motion End Register	This is set automatically for SVB and SVR Modules.
Details	Performs MECHATROLINK communication definitions for SVB.
Status	Displays each Module's status when online mode.

INFO

■ Setting Ranges for the MP2300 I/O Start/End Register Numbers

- 0000 to 7FFF hex
  Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.
- With MP2300 Basic Modules, standard register numbers have been set for each Module. We recommend using these standard register number settings.
  - I/O: 0000 to 0001 hex
  - SVB: 0002 to 0401 hex

8.9.2 Saving, Deleting, and Closing Module Configuration Definitions

Refer to *8.2.3 Saving Module Configuration Definitions*, *8.2.4 Deleting Module Configuration Definitions*, and *8.2.5 Ending the Module Configuration Definitions*.

8.9.3 Opening Individual Module Definitions Window

Set each MP2300 Individual Module Definition according to *8.3.1 Opening Individual Module Definitions Windows*. Refer to the following for setting data for individual Modules.

- Basic Module Configurations
- LIO definitions
- 217IF-01 definitions
- 218IF-01 definitions
- 260IF-01 definitions
- 261IF-01 definitions

(1) Basic Module Configurations

This section explains the Basic Module Configurations.

(a) I/O Definitions

Refer to *(1)* in *8.8.3 Opening Individual Module Definitions Window*.

(b) SVB and MECHATROLINK Definitions

Refer to *(2)* and *(3)* in *8.8.3 Opening Individual Module Definitions Window*.

(c) SVR Definitions

Refer to *(4)* in *8.8.3 Opening Individual Module Definitions Window*.

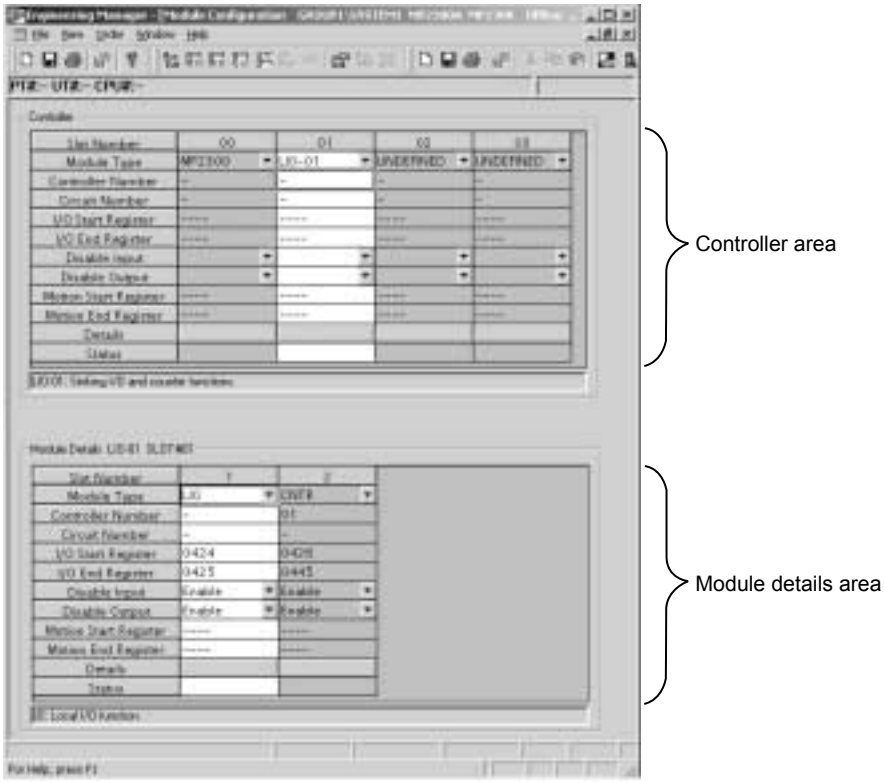
(2) LIO Definitions

This section explains how to make the LIO-01 and LIO-02 definitions for the applicable MP2300 Option Modules. The difference between the LIO-01 Module and the LIO-02 Module is that the digital outputs in the LIO-01 Module are sink mode outputs and the digital outputs in the LIO-02 Module are source mode outputs.

(a) Opening the Local I/O Definitions Window

Open the Local I/O Definitions Window. In online mode, the local I/O definitions data in the Machine Controller will be accessed. In offline mode, the local I/O definitions data in the Programming Device hard disk will be accessed.

Open the Local I/O Definitions Window from the Module Configuration Window. The following window will be displayed when the MP2300's Module Configuration Window is opened.



Select ***LIO-01*** in the Controller area to display details for the LIO in the Module details area. Open the transmission definitions from the Module details area.

INFO

If the Local I/O Definitions Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

Setting	Details
No.	Displays the setting item number.
Item	Displays the name of the setting item, i.e., the I/O signal name.
D (Register Enable/Disable)	Sets the register's enable/disable setting. Since the register is one word in length, so the setting applies to 16 I/O points. • : Enabled • : Disabled
REG (Register Number)	Displays the I/O register number.
Word (Number of Words)	Displays the number of consecutive words of the I/O registers. In the MP2300, the allocation is fixed at 1 word, so the number of words is ***1***.
SCAN	Set the transmission processing scan. • ***HIGH***: High-speed scan • ***LOW***: Low-speed scan • ***(NA)***: No scan specification
Current Value	In online mode, the current value of the allocated Machine Controller registers will be displayed in binary. The current values of Local outputs can be changed. The current values are immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the *Current Value*. In offline mode, nothing will be displayed.

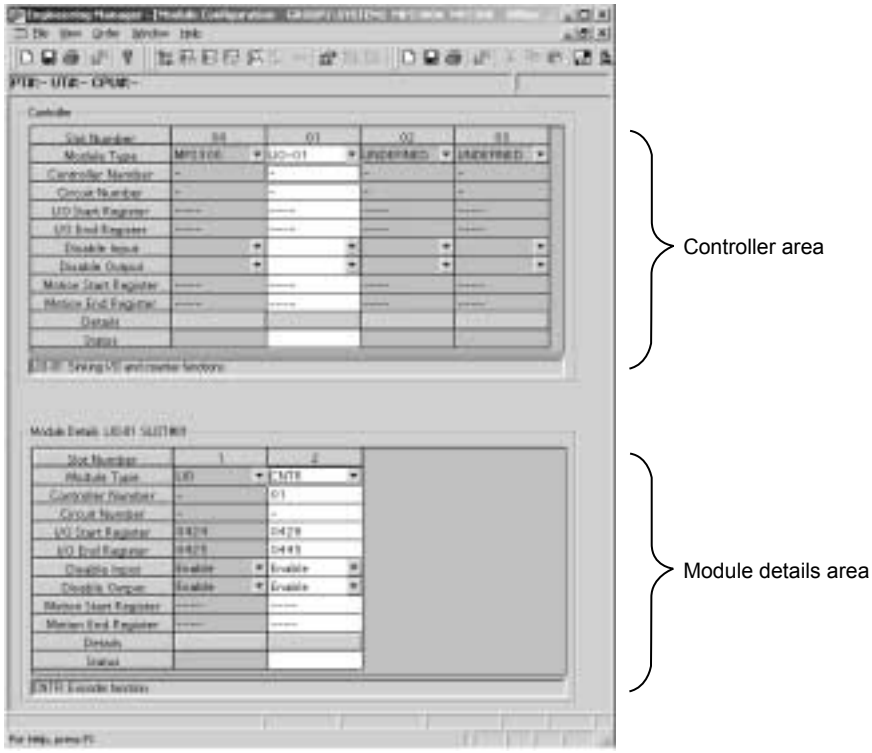
(b) Saving, Deleting, and Closing Local I/O Definitions Data

Refer to *8.3.2 Saving Individual Module Definitions*, *8.3.3 Deleting Individual Module Definitions*, and *8.3.4 Closing Individual Module Definitions*.

(3) Counter Module Definitions

Open the Counter Module Window. In online mode, the local I/O definitions data in the Machine Controller will be accessed. In offline mode, the Counter Module data in the Programming Device hard disk will be accessed.

Open the Counter Module Window from the Module Configuration Window. The following window will be displayed when the MP2300's Module Configuration Window is opened.



When LIO-01 is selected in the Controller area, the CNTR configuration information will be displayed in the Module details area and the Counter Module Window can be opened from the Module details area.

INFO

If the Counter Module Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

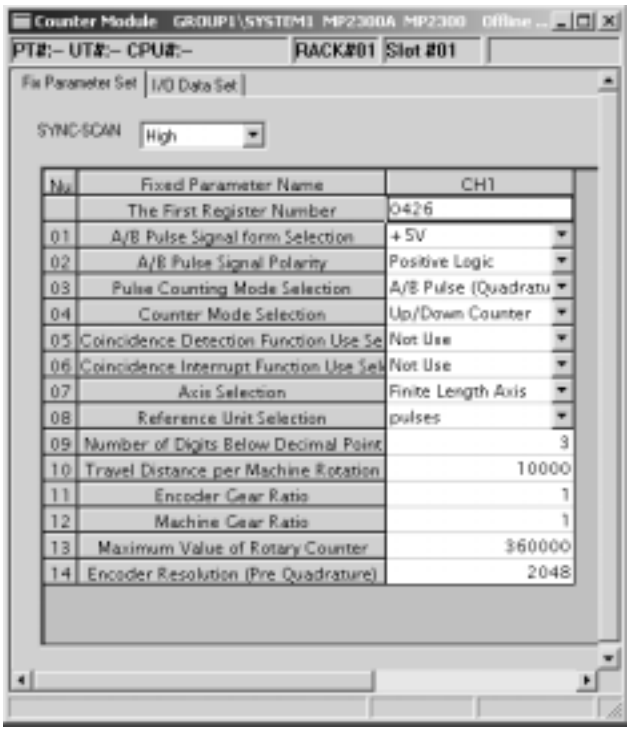
(a) Counter Module Menus

The following table shows the menu commands and functions displayed in the Counter Module Window.

Menu Command		Function
Set		
	Default	Sets the default values.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	DEC	Displays I/O data in decimal.
	HEX	Displays I/O data in hexadecimal.
	BIN	Displays I/O data in binary.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Topics and Keywords	Displays help information.
	About Application	Displays version information.

(b) Tab Pages

The Counter Module Window is composed of two tab pages: the Fix Parameter Set and I/O Data Set Tab Pages.



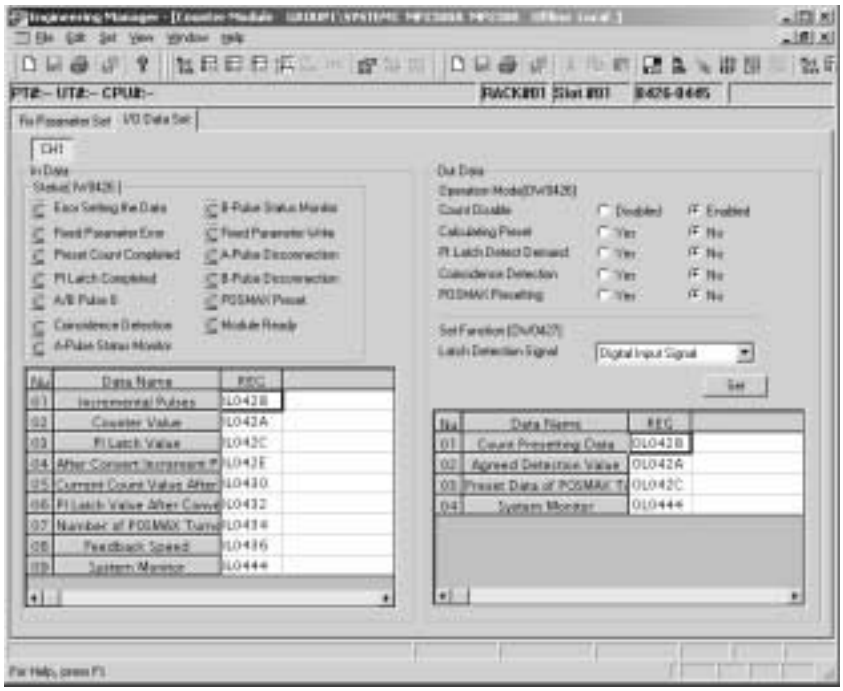
Tab Page	Details
Fix Parameter Set	Sets the Fixed Parameters.
I/O Data Set	Sets the I/O data.

- Fix Parameter Set Tab Page

The Counter I/O fixed parameters are set in the Fix Parameter Set Tab Page.

Setting	Details	Default
SYNC-SCAN (Synchronous Scan)	SCAN is the MP2300 scan timing for updating the I/O data of the Counter function. • ***High***: High-speed scan timing • ***Low***: Low-speed scan timing	High
The First Register Number (Leading Register Number)	Displays the leading address of the corresponding parameter.	–
A/B pulse signal form selection	Sets the signal type of the A/B pulse. Always set to ***+5V (fixation)*** (5-V Differential Input) for the MP2300.	+5V (fixation)
A/B pulse signal polarity	Sets the polarity of the A/B pulse, positive or negative.	Positive logic
Pulse counting mode selection	Selects the method of pulse counting. • Sign ×1 • Sign ×2 • Up/Down ×1 • Up/Down ×2 • A/B pulse ×1 • A/B pulse ×2 • A/B pulse ×4	A/B pulse ×4
Counter mode selection	Selects the Counter Mode. Always set to ***Up/Down counter fixation*** for the MP2300.	Up/Down counter fixation
Coincidence detection function use selection	Use/unuse of coincident detection	not use
Coincidence interrupt function use selection	Use/unuse of coincident interrupt	not use
Axis selection	Sets the axis type to limited length axis/unlimited length axis.	Finite length axis
Reference unit selection	Selects the reference unit. This setting is effective when the *Select the use of electronic gear* is set to ***Use***. • pulse • deg • mm • inch	pulse
Number of digits below decimal point	Sets the number of digits following the decimal point. This setting is effective when the *Select the use of electronic gear* is set to ***Use***.	3
Travel distance per machine rotation	Sets the moving amount per rotation of the machine.	10000
Encoder gear ratio	Sets the encoder gear ratio.	1
Machine gear ratio	Sets the load gear ratio.	1
Maximum Value of Rotary Counter	Sets the reset position of the unlimited length axis.	360000
Encoder resolution (pre quadrature)	Sets the number of pulses per rotation of the encoder prior to quadrature multiplication.	2048

- I/O Data Set Tab Page



1. Channel Number

   The channel number display is fixed at ***CH1***.

2. IN Data

   a) Status

   Displays the status of each bit in the operating status register. The corresponding box will contain a black circle when the bit is ON and a white circle when the bit is OFF. The leading input register is the status word.

Status	Meaning
Error setting the data	ON: Error setting the data
Fixed parameter error	ON: Fixed parameter error
Preset count completed	ON: Count is initialized
PI Latch completed	ON: PI latch detection completed.
A/B pulse 0	ON: Feedback pulses within ±1 pulse
Coincidence detection	ON: Coincident detected signal ON (pulse units).
A pulse status monitor	ON: High
B pulse status monitor	ON: High
Fixed parameter writing	ON: Fixed parameters being written.
A pulse disconnection	ON: Phase-A disconnected.
B pulse disconnection	ON: Phase-B disconnected.
POSMAX turn number	ON: Number of POSMAX turns completed.
Module ready	ON: Module is ready.

b) IN Data Settings

Data Name	REG-No.	Range	Meaning
Incremental pulses	IL□□□□ + 0□02	-2^{31} to 2^{31-1}	1 = 1 pulse
Counter value	IL□□□□ + 0□04	-2^{31} to 2^{31-1}	1 = 1 pulse
PI Latch value	IL□□□□ + 0□06	-2^{31} to 2^{31-1}	1 = 1 pulse
After Convert Increment Pulse	IL□□□□ + 0□08	-2^{31} to 2^{31-1}	1 = 1 reference unit
Current count value after converts	IL□□□□ + 0□0A	-2^{31} to 2^{31-1}	1 = 1 reference unit
PI Latch value after converts	IL□□□□ + 0□0C	-2^{31} to 2^{31-1}	1 = 1 reference unit
Number of POSMAX turns	IL□□□□ + 0□0E	-2^{31} to 2^{31-1}	1 = 1 turn
Feedback Speed	IL□□□□ + 0□10	-2^{31} to 2^{31-1}	1 = 1 reference unit/s
System Monitor	IL□□□□ + 0□1E	-2^{31} to 2^{31-1}	Use in system

3. OUT Data

a) Operation Mode

The status of each bit of the operation mode register is displayed. Settings can be selected with option buttons.

Status	Selected Item
Count Disable	Enabled/Disabled
Calculating Preset	Yes/No
PI Latch Detect Demand	Yes/No
Coincidence Detection	Yes/No
POSMAX Preseting	Yes/No

b) OUT Data Settings

Setting	REG-No.	Range	Meaning
Latch Detection Signal	OW□□□□ + 0□01	–	Digital Input signal/C pulse
Count Presetting Data	OL□□□□ + 0□02	-2^{31} to 2^{31-1}	1 = 1 reference unit
Agreed Detection Value	OL□□□□ + 0□04	-2^{31} to 2^{31-1}	1 = 1 reference unit
Preset Data of POSMAX Turn	OL□□□□ + 0□06	-2^{31} to 2^{31-1}	1 = 1 turn
System Monitor	OL□□□□ + 0□1E	-2^{31} to 2^{31-1}	Use in system

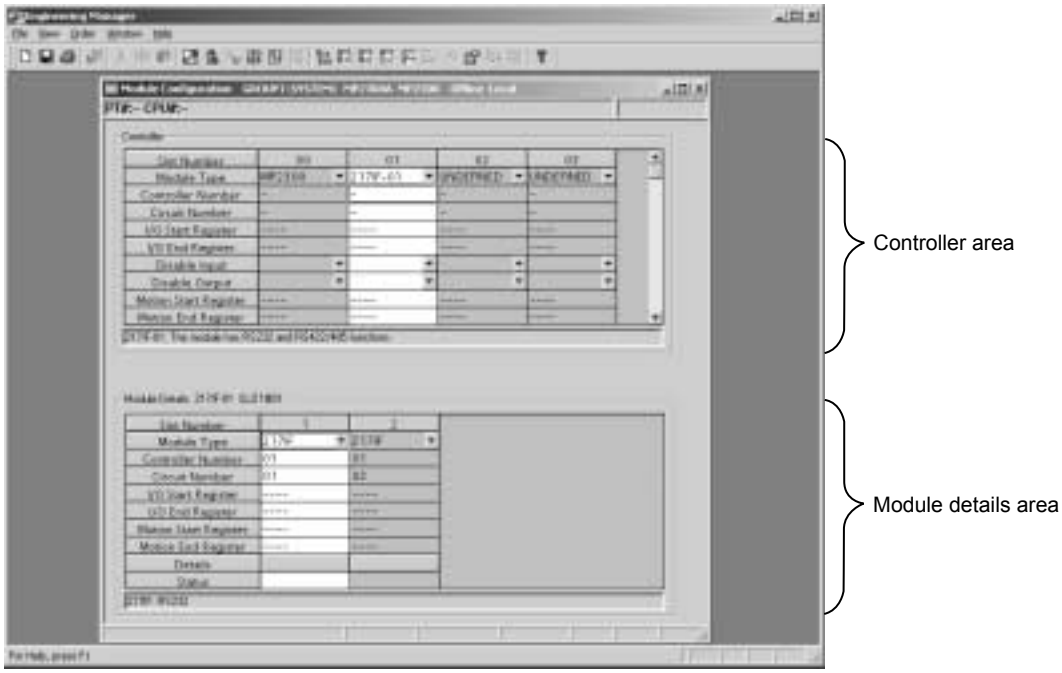
(4) 217IF-01 Definitions

This section explains how to make the 217IF-01 transmission definitions.

(a) Opening the CP-217 (217IF) Definitions Window

Open the CP-217 Definitions Window. In online mode, the local I/O definitions data in the Machine Controller will be accessed. In offline mode, the 217IF-01 transmission definitions data in the Programming Device hard disk will be accessed.

Open the CP-217 Definitions Window from the Module Configuration Window. The following window will be displayed when the MP2300's Module Configuration Window is opened.



Select ***217IF-01*** in the Controller area to display details for the 217IF-01 in the Module details area. Open the transmission definitions from the Module details area.

INFO

If the CP-217 Definitions Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

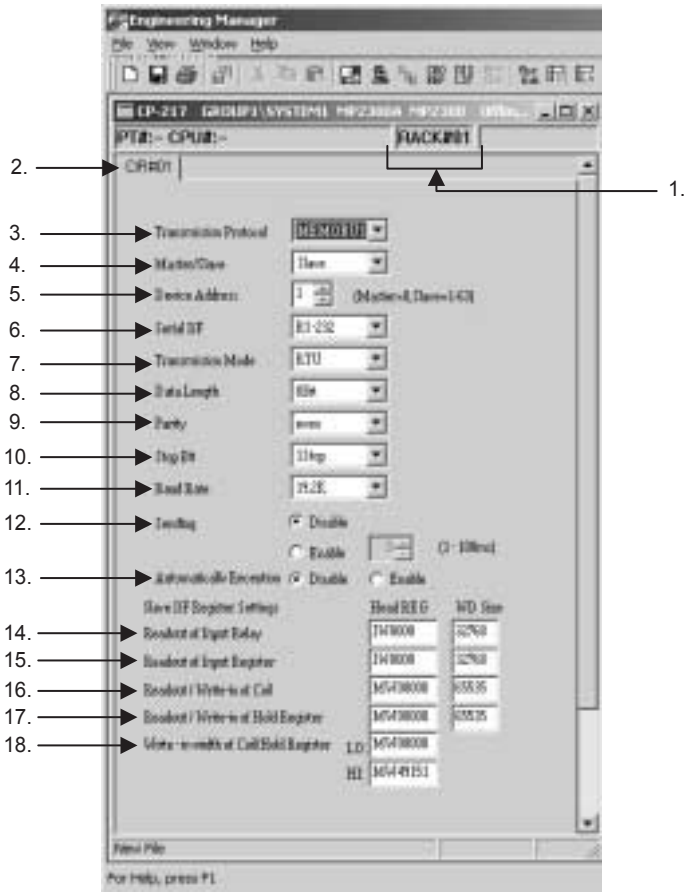
(b) CP-217 Definitions Menu

The following table shows the menu commands and functions displayed in the CP-217 Definitions Window.

Menu Commands		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the CP-217 Definitions Window.
	Save	Saves the 217IF parameter settings.
	Delete	Deletes the 217IF parameter settings.
	Print	Prints a document.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange icons	Lines up icons.
Help		
	Topics and Keywords	Displays help information.
	About Application	Displays version information.

(c) Setting the Parameters

Set the parameters required for configuring the serial transmission system.



- 217IF-01 Transmission Definitions

1. Configuration Information

   The 217IF-01 configuration information that was set in the Module Configuration Window is displayed.
   - RACK#: The rack number of the rack in which the 217IF-01 Module is defined.
   - SLOT#: The slot number of the slot in which the 217IF-01 Module is defined.

2. CIR# (Circuit Number)

   The circuit number of the 217IF-01 Module.

3. Transmission Protocol

   Select the desired protocol.
   - ***MEMOBUS***: Yaskawa's standard MEMOBUS protocol
   - ***MELSEC***: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers computer links
   - ***None***: Data can be transferred at any time by the user application program.

4. Master/Slave

   Select whether the Machine Controller should operate as a Master or a Slave if ***MEMOBUS*** or ***MELSEC*** is selected for the *Transmission Protocol*.

5. Device Address

   Select the device address. When the Machine Controller is being used as a Master, set the device address to 0. When the Machine Controller is being used as a Slave, set the device address between 1 and 63.

6. Serial I/F (Serial Interface)

   Select the serial interface.

7. Transmission Mode

   Select the transmission mode.
   - ***RTU***: Specify RTU mode for MEMOBUS protocols.
   - ***ASCII***: Specify ASCII mode for MEMOBUS protocols.
   - ***None***: Specify None for MELSEC or no protocol.

8. Data Length

   Select the number of bits that comprise one character.
   - ***8 Bit***: 8 bits
   - ***7 Bit***: 7 bits

9. Parity

   Select whether or not a Parity is used.
   - ***even***: Even parity
   - ***odd***: Odd parity
   - ***none***: No parity check

10. Stop Bit

    Select the number of stop bits.
    - ***1 Stop***: 1 stop bit
    - ***2 Stop***: 2 stop bits

11. Baud Rate

    Select the transmission speed (unit: bps).

12.Sending (Send Delay Setting)

When *Enable* is selected, a delay until the beginning of data transmission can be set between 1 and 100 ms.

- Master station: The delay will be included between executing the MSG-SND function and sending the command.
- Slave station: The delay will be included between receiving the command by the MSG-RCV function and sending the response.

The following parameters (13 through 18) set the ranges of relays, registers, and coils that are checked when a response message is automatically sent in response to a query from the Master. Therefore, these settings are valid when the MP2300 operates as a Slave.

It is not necessary to make these settings when messages are not transmitted between the Master and Slave. Also, disable *Automatically Reception* when using a ladder program that transmits a response message with the MSG-RCV function.

When the system defaults are used, responses are transmitted within the set ranges for the following parameters.

13.Automatically Reception (Automatic Reception)

Specify whether or not a response is returned automatically for a query from the Master.

14.Readout of Input Relay (Input Relay Read)

Set the leading register number and the range of input relays that can be read through serial communication when general-purpose serial transmission is used. Refer to *Table 8.12 Leading Register Numbers and Number of Words* for settings.

Table 8.12 Leading Register Numbers and Number of Words

Setting		MP2300
Readout of Input Relay	Head REG (Leading Register)	IW0000
	WD Size (Number of Words)	32768
Readout of Input Register	Head REG (Leading Register)	IW0000
	WD Size (Number of Words)	32768
Readout/Write-in of Coil	Head REG (Leading Register)	MW00000
	WD Size (Number of Words)	65535
Readout/Write-in of Hold Register	Head REG (Leading Register)	MW00000
	WD Size (Number of Words)	65535

15.Readout of Input Register (Input Register Read)

Set the leading register number and the range of input registers that can be read through serial communication when general-purpose serial transmission is used. Refer to *Table 8.12 Leading Register Numbers and Number of Words* for settings.

16.Readout/Write-in of Coil (Coil Read/Write)

Set the leading register number and the range of coils that can be read or written through serial communication when general-purpose serial transmission is used. Refer to *Table 8.12 Leading Register Numbers and Number of Words* for settings.

17.Readout/Write-in of Hold Register (Holding Register Read/Write)

Set the leading register number and the range of holding registers that can be read or written through serial communication when general-purpose serial transmission is used. Refer to *Table 8.12 Leading Register Numbers and Number of Words* for settings.

18.Write-in Width of Coil/Hold Register (Coil/Holding Register Write Range)

Set overall range of coils and holding registers that can be written.

(d) Saving the 217IF-01 Transmission Definitions Data

After setting the 217IF-01 transmission definitions data, save the definitions data. In Online Mode, the definitions data is saved in the Machine Controller and on the Programming Device hard disk. In Offline Mode, the definitions data is saved on the Programming Device hard disk.

Save the 217IF-01 transmission definitions data using the following procedure.

1. Select ***File*** – ***Save*** from the 217IF-01 Transmission Definitions Menu.
2. Confirm the displayed message and click the **Yes** Button.
3. Confirm the displayed message and click the **OK** Button.

(e) Deleting the 217IF-01 Transmission Definitions Data

It is possible to delete all of the 217IF-01 transmission definitions data. In Online Mode, the definitions data is deleted from the Machine Controller and the Programming Device hard disk. In Offline Mode, the definitions data is deleted from the Programming Device hard disk.

Delete the 217IF-01 transmission definitions data using the following procedure.

1. Select ***File*** – ***Delete*** from the 217IF-01 Transmission Definitions Menu.
2. Confirm the displayed message and click the **Yes** Button.

(5) 218IF-01 Definitions

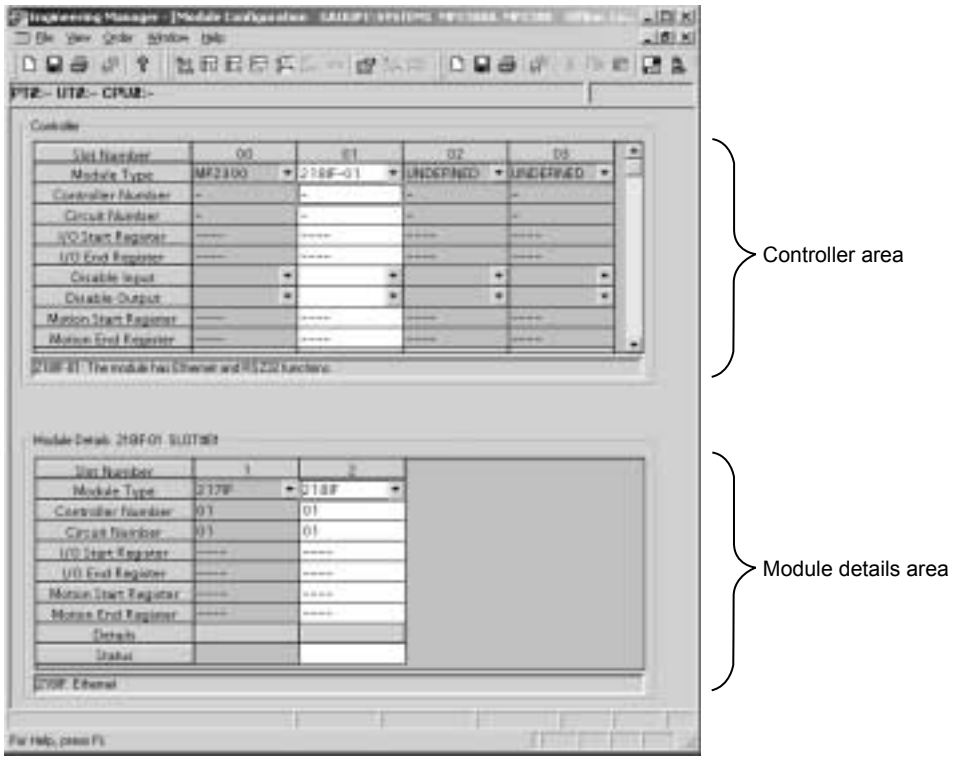
This section describes how to set the 218IF-01 Transmission Definitions.

(a) Opening the CP-218 (218IF) Definitions Window

Open the CP-218 Definitions Window. If the window is opened in Online Mode, the 218IF-01 Transmission Definitions data stored on the MP2300 is opened. In Offline Mode, the data stored on the Programming Device hard disk is opened.

The CP-218 Definitions Window is opened from the Module Configuration Window.

The Module Configuration Window for the MP2300 is shown below.



Select ***218IF-01*** in the Controller area to display details in the 218IF-01 in the Module details area. Open the transmission definitions from the Module details area.

INFO

If the CP-218 Definitions Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

(b) CP-218 Definitions Menus

The following table shows the menu commands and functions displayed in the CP-218 Definitions Window.

Menu Commands		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the CP-218 Definitions Window.
	Save	Saves the CP-218 parameter settings.
	Delete	Deletes the CP-218 parameter settings.
	Print	Prints a document.
	Exit	Exits the Engineer Manager.
Edit		
	Local Port: TCP/IP Setting	Sets the local station and TCP/IP.
	Ethernet Address Setting	Sets the Ethernet address of the remote station.
	Transmission Parameters Default Settings	Sets the default values of transmission parameters.
	Assignment Delete	Deletes the allocation data.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange icons	Lines up icons.
Help		
	Topics and Keywords	Displays help information.
	About Application	Displays version information.

(c) Tab Pages

The CP-218 Definitions Window is composed of two tab pages: the Transmission Parameters and Status Tab Pages.

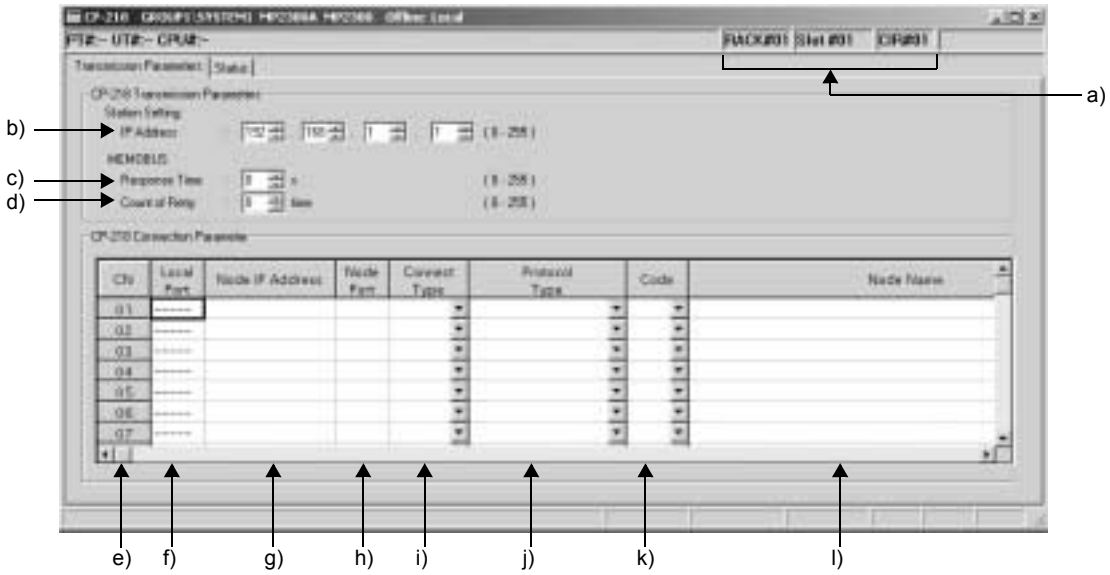
Tab Page	Details
Transmission Parameters	Sets the CP-218 transmission parameters.
Status	Displays the transmission status.

- Transmission Parameters Tab Page

Set the parameters required for using the CP-218 transmission system.

Setting these parameters enables data communication from user programs using the MSG-SND and MSG-RCV system functions. For serial communication parameters, refer to *(c)* in *(4) 217IF-01 Definitions*.

Set the transmission parameters and the connection parameters on the Transmission Parameters Tab Page.



a) Configuration Information

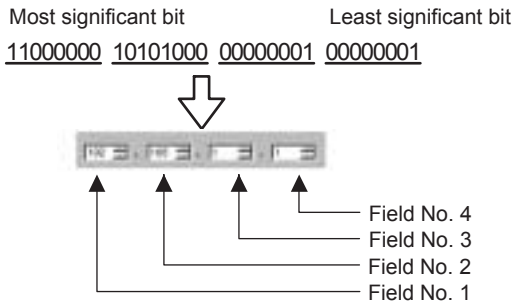
The CP-218 configuration information that was set in the Module Configuration Window is displayed.

- RACK#: The rack number of the rack in which the 218IF-01 Module is defined.
- SLOT#: The slot number of the slot in which the 218IF-01 Module is defined.
- CIR#: The circuit number of the 218IF-01 Module.

1. Setting the CP-218 Transmission Parameters

b) IP Address of Local Station

Enter the IP address of the local station. Do not use the same address as another node in the Ethernet system. An address consists of 32 bits as shown below. There are four 8-bit fields delimited by periods (.). Input a decimal number for each 8-bit field.



- The data input range depends on the field.
- Field No. 1: 0 to 255 (excluding 127)
- Field No. 2: 0 to 255
- Field No. 3: 0 to 255
- Field No. 4: 1 to 254

INFO

IP addresses 192.168.1.1 to 192.168.1.254 are recommended as private addresses. Check with your network administrator when setting an IP address.

c) Response Time (Response Check Monitoring Time)

Enter the time (0 to 255) that the 218IF transmission system waits for a response after sending a command using the MSG-SND system function. If a response is not returned causing a timeout, the command is sent again. The transmission is repeated as many times as set in *Count of Retry* described below.

The *Count of Retry* is not valid if ***0*** is set for the *Response Time*.

INFO

Enter ***0*** for the *Response Time* if ***0*** is set for the *Count of Retry* in the MEMOBUS setting (if ***MEMOBUS*** is set in the *Protocol Type*.

d) Count of Retry (Number of Retries)

Enter the number of retries (0 to 255) to be attempted if a timeout is detected after sending a command with the MSG-SND system function. An error is returned for the MSG-SND function if a response is not returned after the set number of retries.

INFO

No setting is necessary for the *Count of Retry* if only the TCP protocol is used. Set the *Response Time* and *Count of Retry* to ***0***.

2. Setting the Connection Parameters

e) CN (Connection Number)

The connection number (1 to 20) is displayed.

When the Machine Controller performs communication using the Ethernet Module system, it identifies a remote station using the connection number (1 to 20).

The CN corresponds to the Remote Connection # (parameter 02) of the MSG-SND and MSG-RCV system functions.

f) Local Port (Local Station's Port Number)

Enter the port number of the local station between 256 and 65,534 for each connection. Do not enter a port number used for another connection or for diagnostics. If ***0*** is entered for this parameter, the data for that connection number is cleared and "----" is displayed in the *Local Port*.

TERMS

Connection

The term connection means a series of processing to perform data transmission by confirming sending and receiving data in one-to-one communication between local station programs and remote station programs.
The connection protocol ensures reliable communication because it performs various steps of communication control, such as arrival check, error detection and action, sequence number checks, and transmission data size control.

In contrast, a non-connection protocol does not provide the procedures that ensure the quality of communication, and data transmissions are performed in only one direction. Because the processing in data communication is simple with the non-connection protocol, it enables high-speed communication but reliability is not as high as with the connection protocol.
TCP is a connection protocol and UDP is a non-connection protocol.
The selection of TCP or UDP depends on the requirements for communication. Select TCP if reliability is important and select UDP if speed is important.

Port Number

The port number is used to identify the communication target program in the remote station. There is a one-to-one correspondence between port numbers and communication programs. A port number is entered in the header section of the data, together with the IP address and other information. The remote station transfers the data to the target program identified by the *Node Port* number.
The port number at the local station also enables each local station and remote station communication service program to be identified.

g) Node IP Address (Remote Station's IP Address)

Enter the IP address of the remote station for each connection.

The data input range depends on the field of the IP address.

- Field No. 1: 0 to 255 (excluding 127)
- Field No. 2: 0 to 255
- Field No. 3: 0 to 255
- Field No. 4: 1 to 254

Enter ***0*** in all four fields for the unpassive open mode.

h) Node Port (Remote Station's Port Number)

Enter the port number (0 or 256 to 65,535) of the remote station for each connection. Do not use a combination of the Node IP Address and the Node Port that is the same as the one assigned for any other connection.

- If the *Node IP Address* and the *Node Port* are both set to ***0***, a connection will be established as described below.
  - Node IP Address: 000.000.000.000
  - Node Port: 0

  The connection is set in the unpassive open mode, and the connection is established with the station that has accessed that connection number.

  If more than one station accesses the same connection number in the unpassive open mode, the connection is established with the station that sent the connection request first. If a connection request is sent from a station when a connection is already established with another station, the connection that was established first is disconnected and a connection is established with the station that sent the connection request later.
- If the *Node IP Address* and *Node Port* are set, a connection cannot be established in the TCP protocol unless both the IP address and the port number of the remote station agree with the set address and port number. Although the remote station will be temporarily connected, the connection will be disconnected by the 218IF-01 Module.
  When setting the *Node IP Address* and *Node Port*, first allocate the port number that was set for the *Node Port* setting by executing the Bind ( ) system call to the socket interface of the personal computer or workstation, and then execute the Connect ( ) system call to establish the TCP protocol.
  When the UDP protocol is used, the data in the 218IF-01 Module will be discarded if the IP address and the port number do not match. As with the TCP protocol, allocate the port number set for the *Node Port* to the socket interface of the personal computer or workstation by executing the Bind ( ) system call before sending the data.

i) Connect Type (Connection Type)

Select the transport-layer protocol.

- ***TCP***: Communication are performed using TCP (Transmission Control Protocol).
- ***UDP***: Communication are performed using UDP (User Datagram Protocol).

Both the TCP protocol and UDP protocol are supported at the transport layer.

j) Protocol Type

Select the application-layer protocol for each connection according to the protocol supported by the remote station.

Protocol Type	Remarks
Extended MEMOBUS	Yaskawa's Extended MEMOBUS protocol
MEMOBUS	Yaskawa's standard MEMOBUS protocol
MELSEC	Ethernet interface protocol used with Mitsubishi General-purpose Sequencers.
None (no protocol)	For general-purpose message communication. Data is sent or received and written to consecutive MW registers without processing.

Unpassive Open mode

This mode enables a connection to be established with any station that has sent a connection request.

k) Code

The code of the data to be transferred at each connection is handled according to the code set at the remote station.

- ***RTU***: Specify RTU mode for MEMOBUS protocol.
- ***ASCII***: Specify ASCII mode.
- ***BIN***: Specify binary mode.

The code that can be selected depends on the selection of the protocol type in the *Protocol Type*.

Table 8.13 Selectable Codes

Protocol Type	Code		
	RTU	ASCII	BIN
Extended MEMOBUS	No	Yes	Yes
MEMOBUS	Yes	Yes	No
MELSEC	No	Yes	Yes
None (no protocol)	No	Yes	Yes

Note: Yes: Selectable, No: Not selectable

l) Node Station (Remote Station's Name)

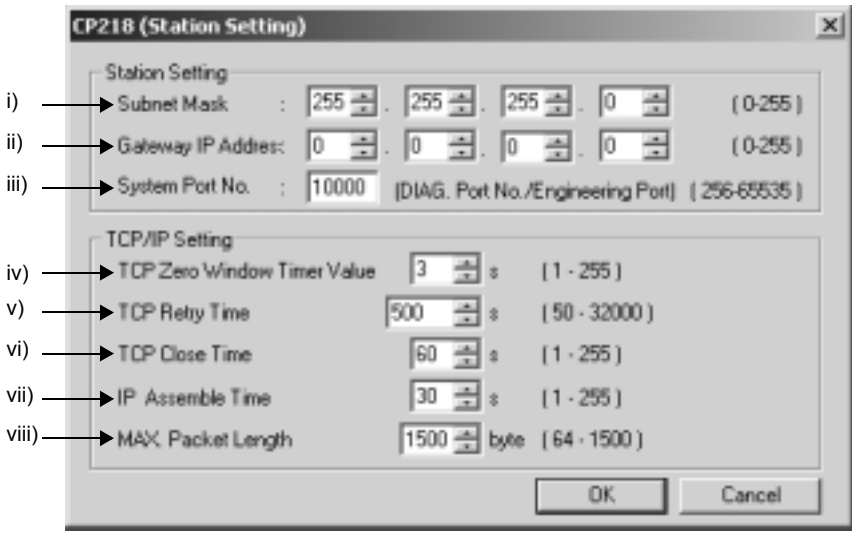
Enter a connection comment of up to 32 characters.

3. Local Station and TCP/IP Settings

Set the local station information and the TCP/IP data using the following procedure.

a) Select ***Edit – Local Port: TCP/IP Setting*** from the CP-218 Definitions Menu.

b) Set each of the items in the following dialog box and click the **OK** Button.



- Local Station Settings

i) Subnet Mask

Enter the subnet mask for the IP address of the local station. When a subnet mask is not being used, enter ***0*** in Field No. 1 to Field No. 4.

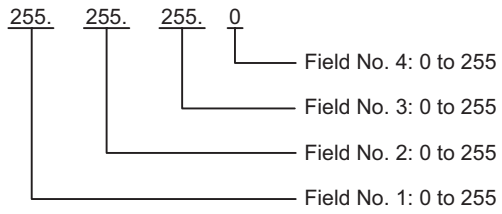
A subnet mask consists of 32 bits. There are four 8-bit fields delimited by periods (.). Input a decimal number for each 8-bit field.

TERMS

Subnet Mask

A subnet mask is a bit pattern that defines the valid bits in a network address displayed with IP address. Contact your network administrator when setting a subnet mask.

Setting Example:



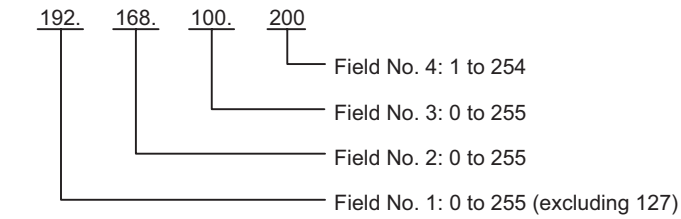
ii) Gateway IP Address

When communication is performed with other networks connected through a gateway (router), enter the IP address of the gateway.

A gateway IP address consists of 32 bits. There are four 8-bit fields delimited by a period (.). Input a decimal number for each 8-bit field.

The data input range depends on the fields.

Setting Example:



If there is no gateway or a gateway is not used, enter ***0*** for four fields. Do not enter an IP address that is already used for an IP addresses or another gateway IP addresses.

iii) System Port No.

Enter the Port No./Engineering Port (256 to 65535) that receives diagnostic commands from the diagnostic terminal. The default is 10000.

- TCP/IP Settings

iv) TCP Zero Window Timer Value

Enter the time (1 to 255) before sending the Transmission Window confirmation packet after the value of the TCP Transmission Window size is zero. The default is 3 s.

v) TCP Retry Time (TCP Retry Timer)

Enter the time (50 to 32000) before resending the data if ACK (acknowledgement) is not returned when opening a connection or sending data in the TCP mode. The default is 500 ms.

vi) TCP Close Time (TCP Close Timer)

Enter the time (1 to 255) for the 218IF transmission system waits while the remote station normally closes the connection in TCP mode. The default is 60 s.

vii) IP Assemble Time (IP Assemble Timer Value)

Enter the time (1 to 255) for the IP to wait to receive the next fragment of the data when it receives fragmented data. The default is 30 s.

viii)Max. Packet Length

Enter the maximum length of packet (64 to 1500) allowed in the 218IF-01 transmission system. The default is 1500 (bytes).

TERMS

Gateway IP Address

The IP address of the gateway device (router) through which communication are performed between multiple network segments. Contact your network administrator when setting a gateway IP address.

INFO

When setting a value smaller than the default (1500 bytes) for the *Max. Packet Length* with ***None*** **(no protocol)** set for the *Protocol Type*, set at least the total value of 40 bytes and the number of data item (bytes) to be transmitted.

4. Setting Default Values

   It is possible to set the default values for all transmission parameters by selecting ***Edit – Transmission Parameters Default Settings*** from the CP-218 Definitions Menu. The following table gives the default values of the parameters.

Transmission Parameter	Default Value
IP Address	192.168.001.001
Response Time	0
Count of Retry	0
Subnet Mask	000.000.000.000
Gateway IP Address	000.000.000.000
System Port No. (DIAG. Port No./ Engineering Port)	10000
TCP Zero Window Timer Value	3
TCP Retry Time	500
TCP Close Time	60
IP Assemble Time	30
Max. Packet Length	1500

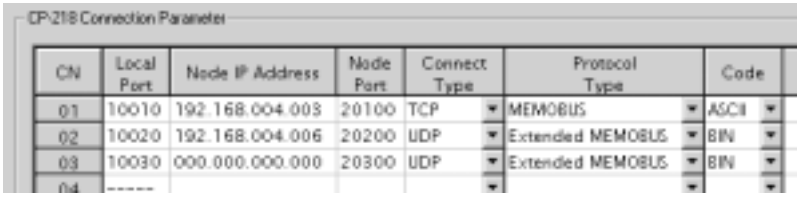
INFO

The default value setting operation does not reset the Ethernet address of the remote station and the connection parameters to the default values.

5. Setting the Ethernet Address of the Remote Station

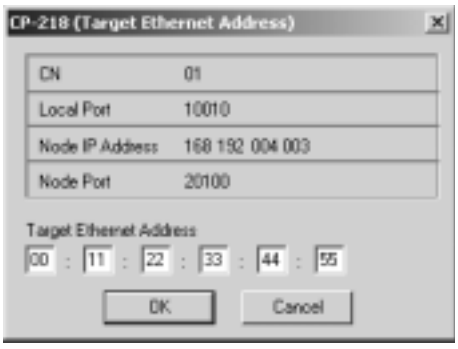
   Set the Ethernet address of the remote station using the following procedure if it does not have the ARP (Address Resolution Protocol) function.

   a) Move the cursor to the connection where the remote station's Ethernet address is set.



   b) Select ***Edit – Ethernet Address Setting*** from the CP-218 Definitions Menu.

   c) Set each of the items in the following dialog box and click the **OK** Button.



6. Precautions on Setting Connection Parameters

   Observe the following restrictions when setting connection parameters.

- Duplication of Local Station Port Numbers

  The combination of the *Local Port* (local station's port number) and the *Connect Type* set in the connection parameters must not be used for any other connection parameters.

- Duplication of System Ports

  When the *Connect Type* is set to ***TCP*** in the connection parameters, the *Local Port* (local station's port number) must not be the same as the *System Port No.*

- Open Mode

  When the *Node IP Address* values are set to all zeros in the connection parameters, the *Node Port* must be set to zero with the *Target Ethernet Address* set to all zeros.

- Duplication of Remote Stations

  The combination of *Node IP Address*, *Node Port*, and *Connect Type* set in the connection parameters must not be used for any other connection. This restriction does not apply to connections in which both the *Node IP Address* and the *Node Port* are set to all zeros.

- Ethernet Addresses

  If the same Ethernet address is set in the connection parameters, the *Node IP Address* must also be the same. This restriction does not apply if the *Target Ethernet address* is set to all zeros.

- Protocol Type and Code

  In the settings of the connection parameters, the combination of the *Protocol Type* and the *Code* must be any of the combinations shown in the following table.

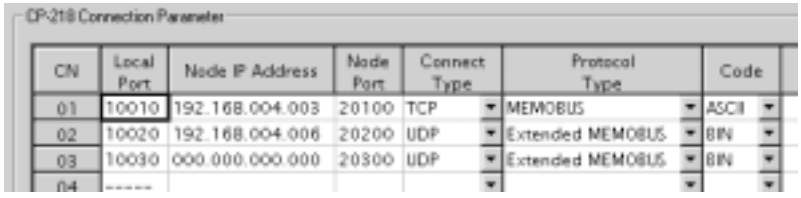
Table 8.14 Protocol Type and Code Combinations

Protocol Type	Code
Extended MEMOBUS	BIN (Binary) or ASCII
MEMOBUS	RTU or ASCII
MELSEC	BIN (Binary) or ASCII
Normal (no protocol)	BIN (Binary) or ASCII

7. Deleting Allocation Data

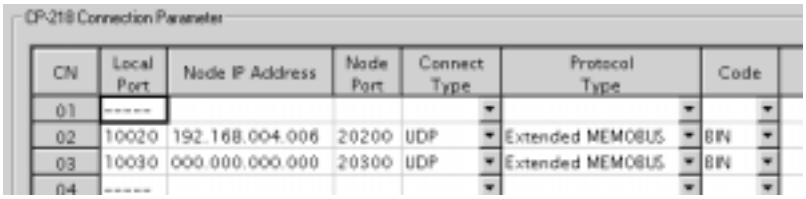
   Delete the allocation data for one connection using the following procedure.

   a) Move the cursor to the connection for which the allocation data is deleted.



   b) Select ***Edit*** – ***Assignment Delete*** from the CP-218 Definitions Menu.

   c) The allocation data of the connection selected in step a) will be deleted.

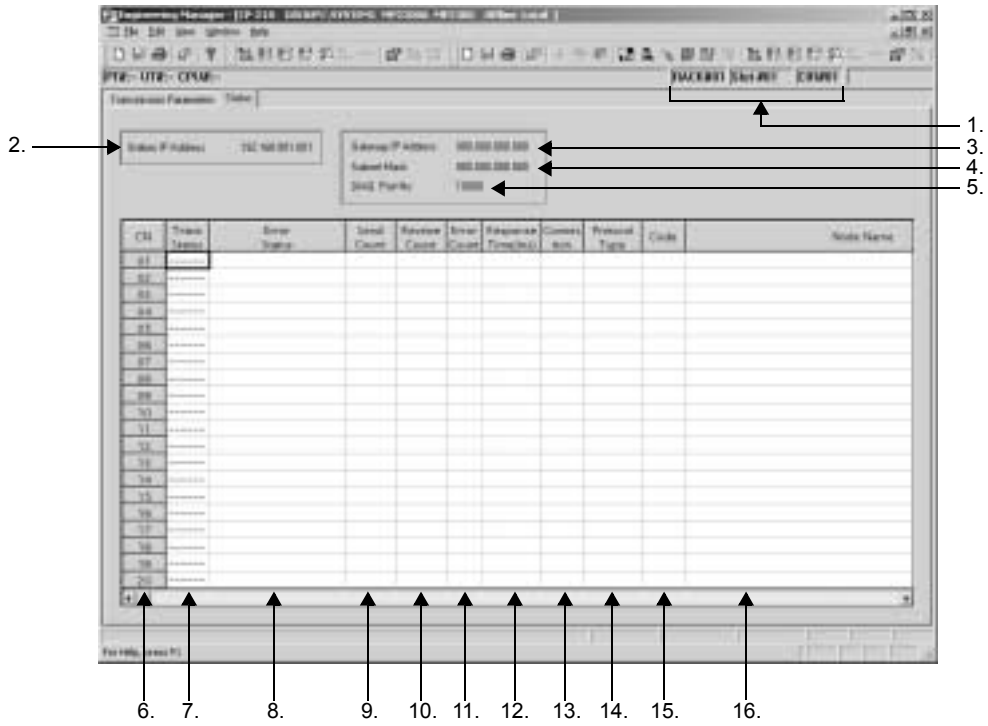


INFO

The definitions data can also be deleted by entering ***0*** for *Local Port*.

- Status Tab Page

The Status Tab Page displays the data that the 218IF-01 transmission system is actually transmitting. This page only displays the status; the displayed values cannot be changed here.



1. Configuration Information

   Displays the 218IF-01 Module configuration information.

2. Station IP Address (Local Station's IP Address)

   Displays the local station's IP address set in the Transmission Parameters Tab Page.

3. Gateway IP Address

   Displays the gateway (router) IP address set in the Transmission Parameters Tab Page.

4. Subnet Mask

   Displays the subnet mask set in the Transmission Parameters Tab Page.

5. DIAG. Port No.

   Displays the system port number that was set in the Transmission Parameters Tab Page.

6. CN (Connection Number)

   Displays the connection number (1 to 20).

7. Trans Status (Transmission Status)

   Displays the status of each connection in Online Mode. The following table shows the status displayed in this column.

Status	Meaning
IDLE	Idle status
WAIT	Wait status (waiting for connection)
CONNECT	Connected status (data send/receive enabled)
–	Unused connection

8. Error Status

Displays details on the error if an error occurs in the transmission status.

Table 8.15 Error Status

Error Status	Status	Remarks
No Error	No error	Error has not occurred.
Socket Generation Error	System error	Failure in socket generation
Local Station Port Number Error	Local station port number setting error (Binds the same address during disconnection of the TCP connection.)	• Binding error: Port number duplication • When the ABORT function was executed, a binding error occurred during disconnection. This error occurs if the sequence below is performed within 1 minute. ABORT → COMPLETE → Elapse of 1 min. → EXECUTION • Before the completion of connection processing, the same connection processing was performed by another function.
Socket Attribute Change Error	System error (in TCP mode)	The error occurred while setting the socket attribute.
Connection Error (M-SND)	Connection error (Connection was rejected by the remote station when establishing a connection with an unpassive open in TCP mode.)	• This error occurs in the sequence below. MSG-SND → Connection → Reset. • This error occurs when the retry time exceeds the set value (default: 1 min) at cable disconnection.
Connection Error (M-RCV)	Connection error (Connection with a passive open in TCP mode)	M-RCV command accept error
System Error	System error	Socket polling (SELECT used) error while receiving data.
Data Sending Error (TCP)	Data sending error (The remote station does not exist or the remote station has not started when using TCP.)	A response transmission error occurred with the MSG-RCV function. The same error occurred with the MSG-SND function. The target remote station for sending the data does not exist. The error occurs when the remote station is rebooted (only with a TCP connection).
Data Sending Error (UDP)	Data sending error (When using UDP)	The data send request command was sent to a socket that does not exist.
Data Receiving Error (TCP)	Data receiving error (The Module received a request to disconnect the connection from the remote station when using TCP.)	This error occurs when the connection is disconnected by the remote station. The error occurs even if close processing is performed normally.
Data Receiving Error (UDP)	Data receiving error (When using UDP)	The RECEIVE FROM command was executed for a socket that does not exist.
Socket Option Change Error	System error	An error occurred while changing the socket option.
Data Conversion Error	Data conversion error (Failure in data conversion in MEMOBUS or MELSEC communication)	Protocol conversion error

9. Send Count (Transmission Path Counter)

Displays the amount of data (number of packets) sent to the remote station.

10. Receive Count (Reception Path Counter)

Displays the amount of data (number of packets) received from the remote station.

11. Error Count (Error Counter)

Displays the number of times an error has occurred in each connection.

12.Response Time [ms]

Displays the time (ms) taken to receive a response for a command sent using the MSG-SND function.

13.Connection (Connection Type)

Displays the Connect Type (TCP or UDP) set on the Transmission Parameter Tab Page.

14.Protocol Type

Displays the Protocol Type (MEMOBUS, Extended MEMOBUS, MELSEC, or None) set on the Transmission Parameters Tab Page.

15.Code

Displays the Code (ASCII, BIN, or RTU) set at the Transmission Parameters Tab Page.

16.Node Name (Remote Station's Name)

Displays the remote station's name set at the Transmission Parameters Tab Page.

The data above is displayed only in Online Mode. In Offline Mode, nothing will be displayed.

(d) Saving the CP-218 Definitions Data

After setting the CP-218 definitions data, save the definitions data. In Online Mode, the definitions data is saved in the Machine Controller and on the Programming Device hard disk. In Offline Mode, the definitions data is saved on the Programming Device hard disk.

Save the CP-218 definitions data using the following procedure.

1. Select ***File*** – ***Save*** from the 218IF Definitions Menu.
2. Confirm the displayed message and click the **Yes** Button.
3. Confirm the displayed message and click the **OK** Button.

IMPORTANT

- The connection parameters cannot be saved unless the input values pass the consistency check. Refer to *Connection Parameter Consistency Check* in *(3)* of *8.5.7 218IF Definitions* to input the connection parameters.
- The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

(e) Deleting the CP-218 Definitions Data

It is possible to delete all of the CP-218 transmission definitions data. In Online Mode, the definitions data is deleted from the Machine Controller and the Programming Device hard disk, and in Offline Mode, the definitions data is deleted from the Programming Device hard disk.

Use the following procedure to delete the CP-218 transmission definitions data.

1. Select ***File*** – ***Delete*** from the CP-218 Definitions Menu.
2. Confirm the displayed message and click the **Yes** Button.

(6) 260IF-01 Definitions

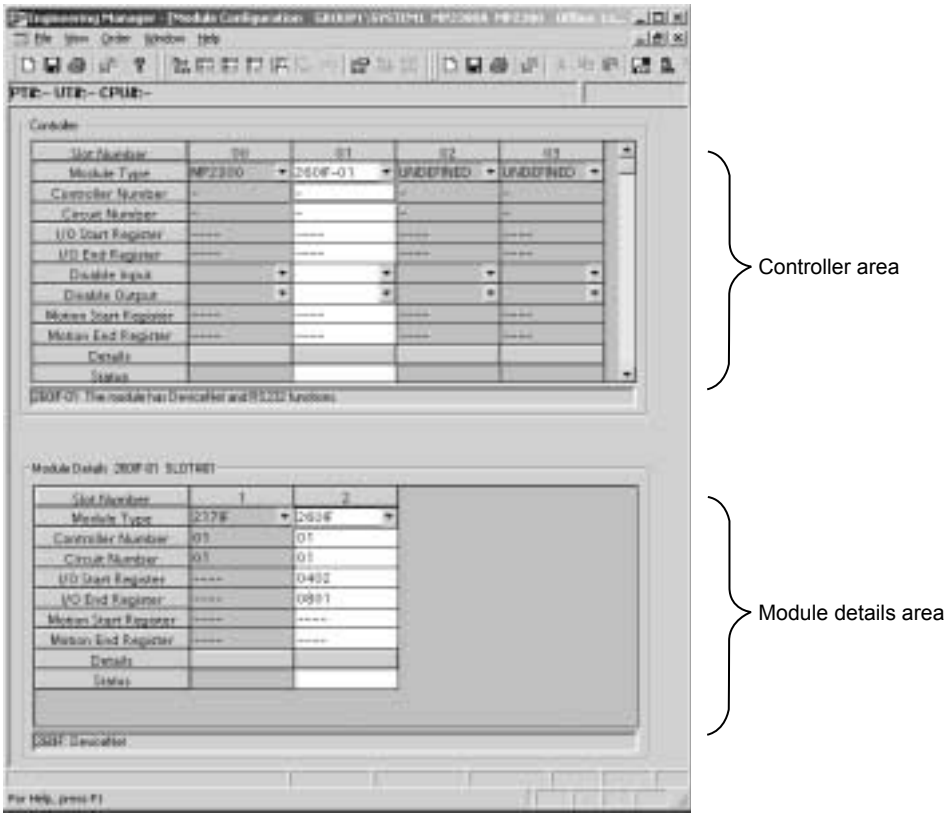
This section describes how to set the 260IF-01 (DeviceNet) Definitions.

(a) Opening the 260IF Definitions Window

Open the 260IF Definitions Window. If the window is opened in Online Mode, the 260IF-01 Transmission Definitions data stored on the MP2300 is opened. In Offline Mode, the data stored on the Programming Device hard disk is opened.

The 260IF Definitions Window is opened from the Module Configuration Window.

The Module Configuration Window for the MP2300 is shown below.



Select ***260IF-01*** in the Controller area to display details in the 260IF-01 in the Module details area. Open the transmission definitions from the Module details area.

INFO

If the 260IF-01 Definitions Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

(b) 260IF Definitions Menu

The following table shows the menu commands and functions displayed in the 260IF Definitions Window.

Menu Commands		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the 260IF Definitions Window.
	Save	Saves the DeviceNet definitions data.
	Delete	Deletes the DeviceNet definitions data.
	Print	Prints a document.
	Exit	Exits the Engineering Manager.
Edit		
	Network Configuration	Loads the I/O allocation information from a Slave.
	Assignment Delete	Deletes the allocated parameters.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange icons	Lines up icons.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(c) Tab Pages

The 260IF Definitions Window is composed of the three tab pages: the Transmission Parameters, I/O Status, and Status Tab Pages.

Tab Page	Details
Transmission Parameters	Sets the 260IF transmission parameters.
I/O Status	Displays the I/O status.
Status	Displays the communication status.

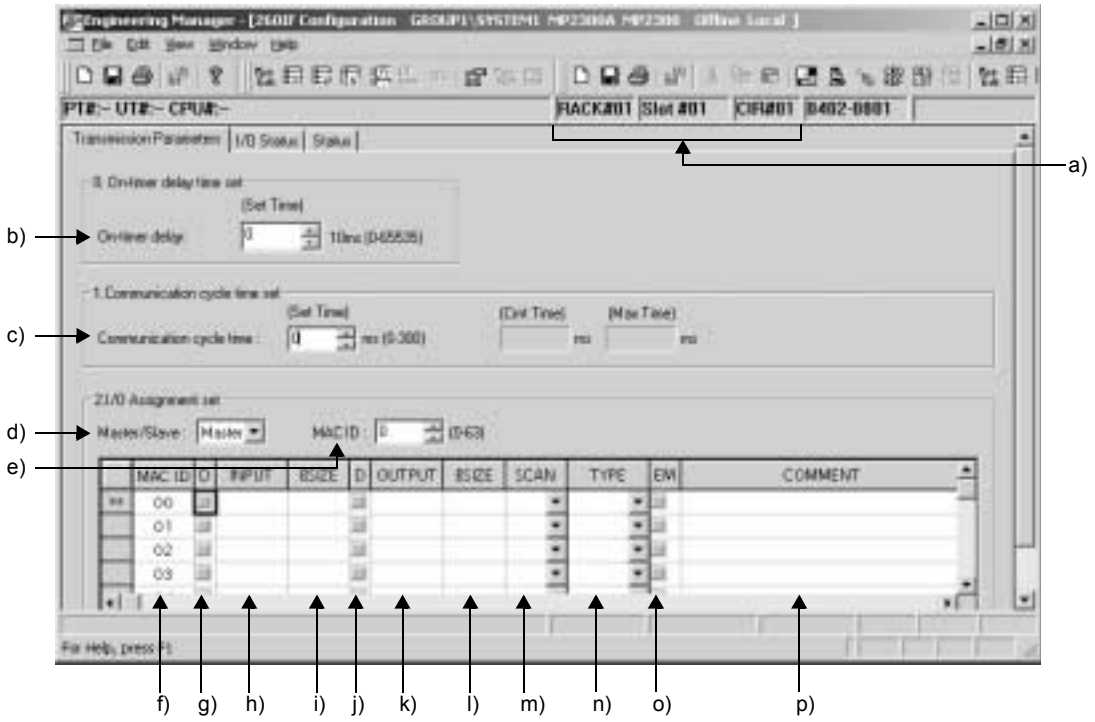
- Transmission Parameters Tab Page

Set the parameters required for using the DeviceNet.

Setting these parameters enables data communication on DeviceNet.

Refer to *(c)* in *(4)* of *8.9.3 Opening Individual Module Definitions Window* for the parameter for serial communication.

Set the communication cycle information and the I/O allocations (I/O Assignment Set) in the Transmission Parameters Tab Page.



a) Configuration Information

The 260IF-01 configuration information that was set in the Module Configuration Window is displayed.

- RACK#: The rack number of the rack in which the 260IF-01 Module is defined.
- SLOT#: The slot number of the slot in which the 260IF-01 Module is defined.
- CIR#: The circuit number of the slot in which the 260IF-01 Module is defined.

0. On-timer Delay Time Set (On-time Delay Set Time)

b) On-timer Delay

Input the setting value (time) for the on-delay timer.

1. Communication Cycle Time Set (Communication Cycle Time Setting)

c) Communication Cycle Time

Set the communication cycle time when a 260IF-01 Module is used as the Master. Setting is not necessary if the Module is used as a Slave.

2. I/O Assignment Set (I/O Allocations Settings)

d) Master/Slave

Set the operating mode of the 260IF-01 Module. The setting here must be the same as the setting on the setting switch (SW4) on the 260IF-01 Module.

e) MAC ID Box

This is the MAC ID of the 260IF-01 Module. Set the same value as the value set by the rotary switch on the 260IF-01 Module.

f) MAC ID Column

This column displays the DeviceNet MAC ID of the devices to which I/O is being allocated. The ID numbers are automatically set in ascending order starting from 00. The symbol "**" is displayed in the left column for the 260IF-01 Module.

g) D (Enable/Disable Inputs)

This setting determines whether the Machine Controller CPU can exchange I/O data with the 260IF-01 Module. Enter a check mark to disable I/O data exchange.

h) INPUT (Leading Input Register)

Set the leading address of the input area (input registers IW□□□□) to be allocated to the corresponding device. Set a hexadecimal word address.

i) BSIZE (Input Area Size)

Set the size of input area (input registers IW□□□□) to be allocated to the corresponding device. Set the byte size in decimal between 1 and 256 bytes per Slave. The byte arrangement is little-endian.

j) D (Enable/Disable Outputs)

This setting determines whether the Machine Controller CPU can exchange I/O data with the 260IF-01 Module. Enter a check mark to disable I/O data exchange.

k) OUTPUT (Leading Output Register)

Set the leading address of the output area (output registers OW□□□□) to be allocated to the corresponding device. Set a hexadecimal word address.

l) BSIZE (Output Area Size)

Set the size of output area (output registers OW□□□□) to be allocated to the corresponding device. Set the byte size in decimal between 1 and 256 bytes per Slave. The byte arrangement is little-endian.

m) SCAN (Data Exchange Cycle)

The data exchange cycle (SCAN) is the timing at which I/O data is exchanged between the Machine Controller CPU and the 260IF-01 Module. At the Machine Controller CPU, the data exchange cycle is not synchronous with I/O data transmissions. If ***High*** is set, the Machine Controller CPU exchanges I/O data at the high-speed scan of the CPU. If ***Low*** is set, the Machine Controller CPU exchanges I/O data at the low-speed scan of the CPU.

n) TYPE (I/O Transmission Type)

Set ***Polled*** or ***Strobed*** for the I/O transmission type.

- Polled: This setting is possible for any DeviceNet Slave device.
- Strobed: This setting is possible for an input DeviceNet Slave that handles the data of 8 bytes or less.

For details on polled and strobed transmissions, refer to the DeviceNet specifications.

o) EM (Explicit Messages)

Enter a check mark in the EM (Explicit Messages) column when the 260IF-01 Module is a DeviceNet Master and performs only message communication with a Slave device.

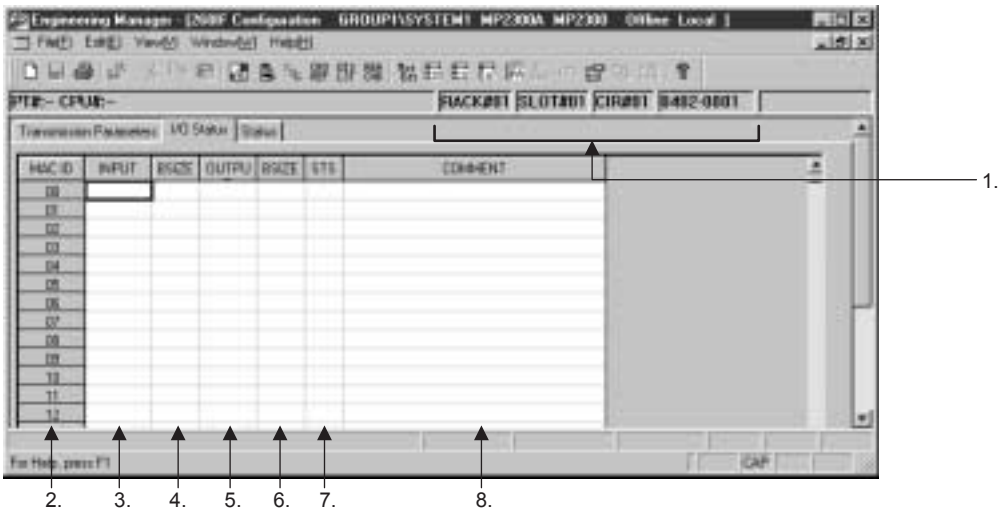
A DeviceNet Slave that transmits I/O data can perform message communication, and does not require the EM setting.

p) COMMENT

A character string, such as a device name or type, can be entered as a comment. Up to 32 characters can be entered.

- I/O Status Tab Page

The I/O Status Tab Page displays the data that the 260IF-01 transmission system is actually transmitting. This page only displays the status; the displayed values cannot be changed here.



1. Configuration Information

   The 260IF-01 configuration information that was set in the Module Configuration Window is displayed.
   - RACK#: The rack number of the rack in which the 260IF-01 is defined.
   - SLOT#: The slot number of the slot in which the 260IF-01 is defined.
   - CIR#: The circuit number of the slot in which the 260IF-01 is defined.

2. MAC ID

   This is the MAC ID (DeviceNet address) that is set for the 260IF-01 Module in DeviceNet communication.

3. INPUT (Leading Input Register)

   Displays the leading address of the input area (Input register IW□□□□) allocated to the corresponding device.

4. BSIZE (Input Area Size)

   Displays the size of the input area (Input register IW□□□□) allocated to the corresponding device in bytes.

5. OUTPUT (Leading Output Register)

   Displays the leading address of the output area (Output register OW□□□□) allocated to the corresponding device.

6. BSIZE (Output Area Size)

   Displays the size of the output area (Output register OW□□□□) allocated to the corresponding device in bytes.

7. STS (I/O Status)

   Displays the I/O status as a code. Codes and their meanings are given below.

   0000H: Communication is not being performed.
   8000H: I/O transmissions are normal.
   4048H: I/O transmission error; communication is stopped.
   404DH: I/O transmission error; I/O size of the Slave device differs from the set value.
   404EH: I/O transmission error; no response was received from the Slave device.
   4056H: I/O transmission error; the Slave device is idle.

8. COMMENT

   Displays the comment set for each device in the *I/O Assignment set* in the Transmission Parameters Tab Page.

- Status Tab Page

The Status Tab Page displays the DeviceNet address, baud rate, and communication status of the 260IF-01 Module. This page only displays the status; the displayed values cannot be changed here.

1. MAC ID

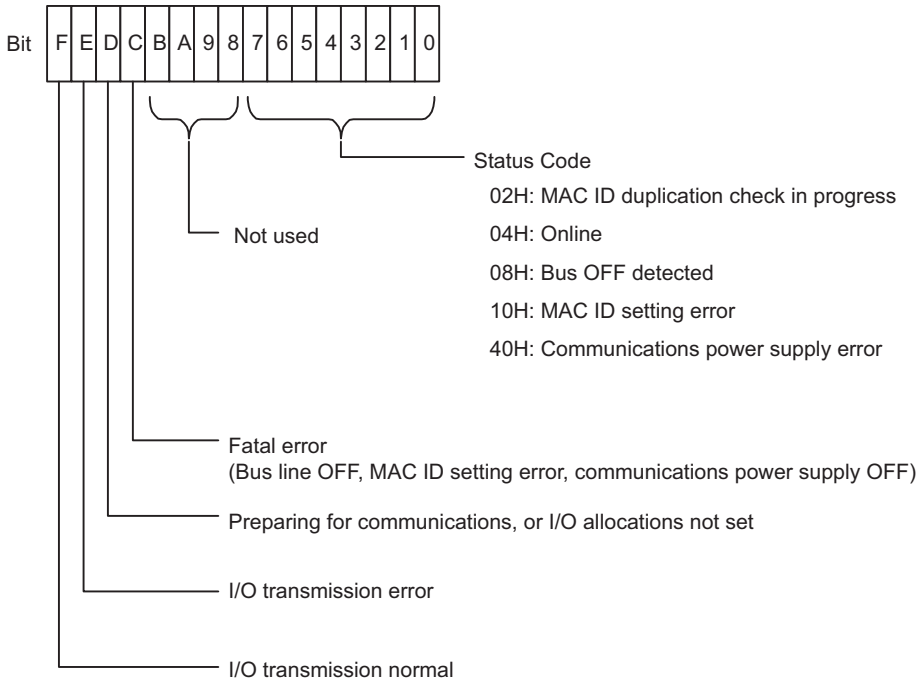
   This is the MAC ID (DeviceNet address) that is set for the 260IF-01 Module.

2. Baud Rate

   Displays the baud rate set for the 260IF-01 Module.

3. Status

   Displays the status of the 260IF-01 Module as a code. Codes and their meanings are given below.



(d) Saving the 260IF Definitions Data

After setting the 260IF transmission definitions data, save the definitions data. In Online Mode, the definitions data is saved in the Machine Controller and on the Programming Device hard disk. In Offline Mode, the definitions data is saved on the Programming Device hard disk.

Save the 260IF transmission definitions data using the following procedure.

1. Select ***File*** – ***Save*** from the 260IF Definitions Menu.
2. Confirm the message in the message box and click the **Yes** Button.
3. Confirm the message in the message box and click the **OK** Button.

(e) Deleting the 260IF Definitions Data

It is possible to delete all of the 260IF transmission definitions data. In Online Mode, the definitions data is deleted from the Machine Controller and the Programming Device hard disk. In Offline Mode, the definitions data is deleted from the Programming Device hard disk.

Delete the 260IF transmission definitions data using the following procedure.

1. Select ***File*** – ***Delete*** from the 260IF Definitions Menu.
2. Confirm the message in the message box and click the **Yes** Button.

(7) 261IF-01 Definitions

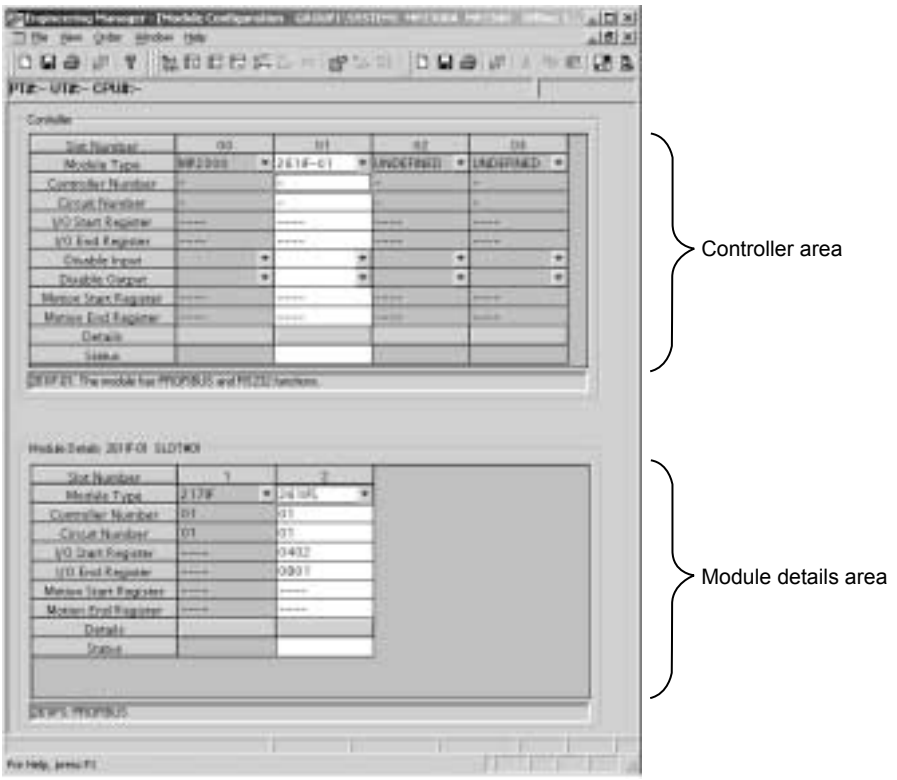
This section describes how to set the 261IF-01 (PROFIBUS) Definitions.

(a) Opening the 261IFS Definitions Window

Open the 261IFS Definitions Window. If the window is opened in Online Mode, the 261IFS Transmission Definitions data stored on the Machine Controller is opened. In Offline Mode, the data stored on the Programming Device hard disk is opened.

The 261IFS Definitions Window is opened from the Module Configuration Window.

The Module Configuration Window for the MP2300 is shown below.



Select ***261IF-01*** in the Controller area to display details for the 261IF in the Module details area. Open the transmission definitions from the Module details area.

INFO

If the 261IFS Definitions Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

(b) 261IF Definitions Menu

The following table shows the menu commands and functions displayed in the 261IF Definitions Window.

Menu Commands		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the 260IFS Definitions Window.
	Save	Saves the PROFIBUS parameter settings.
	Delete	Deletes the PROFIBUS parameter settings.
	Print	Prints a document.
	Exit	Exits the Engineering Manager.

(Cont'd)

Menu Commands		Function
Edit		
	Delete Paste	Deletes the allocated parameters.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange icons	Lines up icons.
Help		
	Contents and Index (F1)	Displays help information.
	About Application	Displays version information.

(c) Tab Pages

The 261IF Definitions Window is composed of the four tab pages: the I/O Assignment, I/O Map, I/O Status, and Status Tab Pages.

Tab Page	Details
I/O Assignment	Sets 260IF transmission parameters.
I/O Map	Sets I/O allocations.
I/O Status	Displays the I/O status.
Status	Displays the communication status.

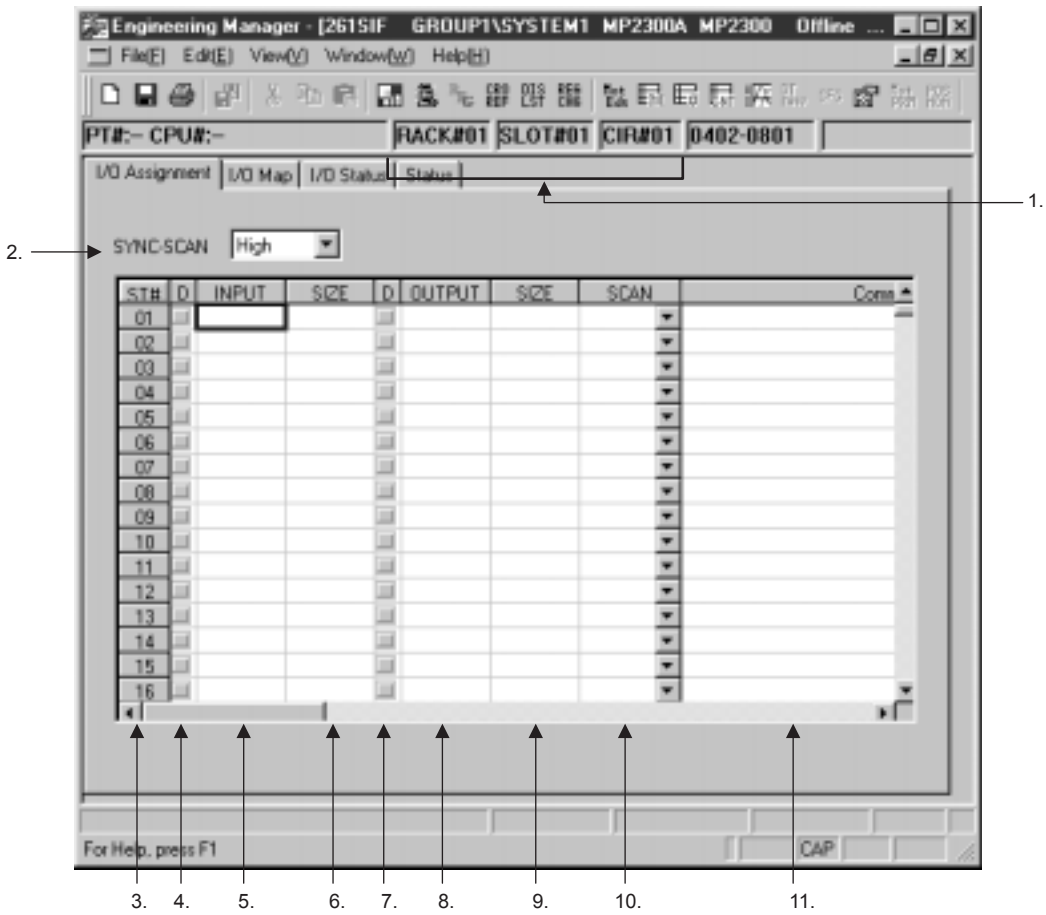
- I/O Assignment Tab Page

Set the parameters required for using the PROFIBUS.

PROFIBUS can be used by setting the parameters below.

For serial communication parameter, refer to *(c)* in *(4)* of *8.9.3 Opening Individual Module Definitions Window*.

Set the I/O allocations at the I/O Assignment Tab Page.



1. Configuration Information

   The 261IF-01 configuration information that was set in the Module Configuration Window is displayed.
   - RACK#: The rack number of the rack in which the 261IF-01 Module is defined.
   - SLOT#: The slot number of the slot in which the 261IF-01 Module is defined.
   - CIR#: The circuit number of the slot in which the 261IF-01 Module is defined.

2. SYNC-SCAN (Updating Scan)

   Select the Machine Controller scan during which data will be updated for the 261IF-01 transmission system.
   - ***High***: High-speed scan
   - ***Low***: Low-speed scan

3. ST# (Station Number)

   This is the PROFIBUS station number of the station for which I/O is being allocated. Although PROFIBUS addresses can be set between 1 and 125, set a number between 1 and 64 for a 261IF-01 Module.

4. D (Enable/Disable Inputs)

   This setting determines whether the Machine Controller CPU can exchange I/O data with the 261IF-01 Module. Enter a check mark to disable I/O data exchange.

5. INPUT (Leading Input Register)

   Set the leading address of the input area (Input register IW□□□□) to be allocated to the corresponding device. Set a hexadecimal word address.

6. SIZE (Input Area Size)

   Set the size of input area (Input register IW□□□□) to be allocated to the corresponding device in word units. The byte arrangement is little-endian.

7. D (Enable/Disable Outputs)

   This setting determines whether the Machine Controller CPU can exchange I/O data with the 261IF-01 Module. Enter a check mark to disable I/O data exchange.

8. OUTPUT (Leading Output Register)

   Set the leading address of the output area (Output register OW□□□□) to be allocated to the corresponding device. Set a hexadecimal word address.

9. SIZE (Output Area Size)

   Set the size of output area (Output register OW□□□□) to be allocated to the corresponding device. Set the byte size in decimal between 1 and 256 bytes per Slave. The byte arrangement is little-endian.

10. SCAN (Data Exchange Cycle)

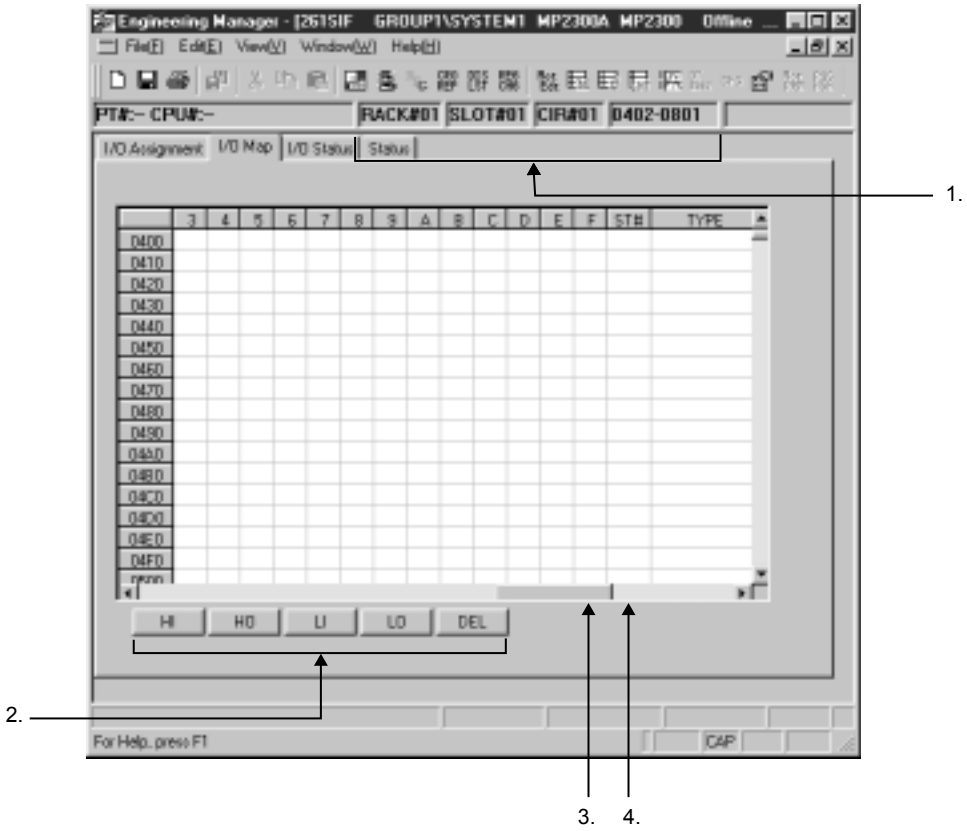
    The data exchange cycle (SCAN) is the timing at which I/O data is exchanged between the Machine Controller CPU and the 261IF-01 Module. At the Machine Controller CPU, the data exchange cycle is not synchronous with I/O data transmissions. If ***High*** is set, the Machine Controller CPU exchanges I/O data at the high-speed scan of the CPU. If ***Low*** is set, the Machine Controller CPU exchanges I/O data at the low-speed scan of the CPU.

11. Comment

    A character string, such as a device name or type, can be entered as a comment. Up to 32 characters can be entered.

- I/O Map Tab Pabe

Set the I/O allocations of the MP2300 on the I/O Map Tab Page. Setting is possible only for the registers for which I/O allocations have been made on the I/O Assignment Tab Page.



1. Configuration Information

   The 261IF-01 configuration information that was set in the Module Configuration Window is displayed.
   - RACK#: The rack number of the rack in which the 261IF-01 Module is defined.
   - SLOT#: The slot number of the slot in which the 261IF-01 Module is defined.
   - CIR#: The circuit number of the slot in which the 261IF-01 Module is defined.

2. Allocation Setting Buttons

   These buttons set the allocations for each register. In this operation, allocation is possible only for the registers that are set on the I/O Assignment Tab Page. Allocations for output settings is not allowed for the registers assigned as the input registers in the I/O allocations. Similarly, it is not possible to assign the input settings to registers allocated for output registers in the I/O allocations. The function of each button is given below.

   HI: Sets a high-speed scan input.
   HO: Set a high-speed scan output.
   LI: Sets a low-speed scan input.
   LO: Sets a low-speed scan output.
   DEL: Deletes the allocatoion.

3. I/O Assignment Area (I/O Allocations Area)

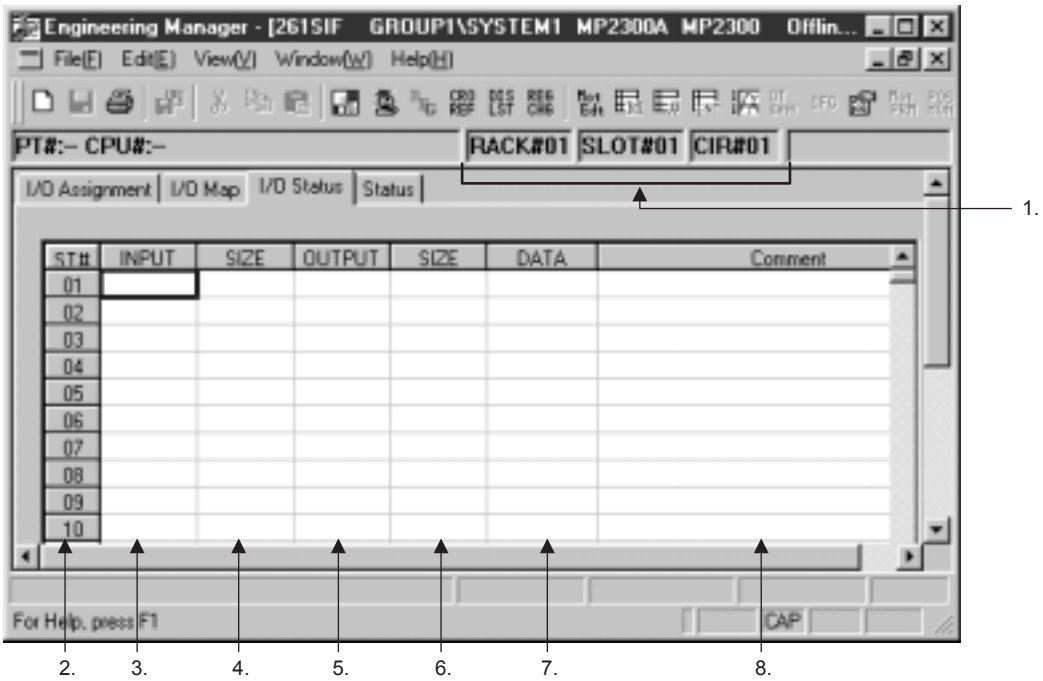
   Displays the input or output allocation on the I/O Assignment Tab Page.

4. ST# (Station Number)

   Displays the station number of the I/O registers set on the I/O Assignment Tab Page.

- I/O Status Tab Page

The I/O Status Tab Page displays the data that the 261IF-01 transmission system is actually transmitting. This page only displays the status; the displayed values cannot be changed here.



1. Configuration Information

   The 261IF-01 configuration information that was set in the Module Configuration Window is displayed.
   - RACK#: The rack number of the rack in which the 261IF-01 Module is defined.
   - SLOT#: The slot number of the slot in which the 261IF-01 Module is defined.
   - CIR#: The circuit number of the slot in which the 261IF-01 Module is defined.

2. ST# (Station Number)

   This is the station number on the PROFIBUS network. Register numbers and sizes will be displayed in the local station address area.

3. INPUT (Leading Input Register)

   Displays the leading address of the allocated input area (input registers IW□□□□).

4. SIZE (Input Area Size)

   Displays the size of the allocated input area (input registers IW□□□□) in word units.

5. OUTPUT (Leading Output Register)

   Displays the leading address of the allocated output area (output registers OW□□□□).

6. SIZE (Output Area Size)

   Displays the size of the allocated output area (output registers OW□□□□) in word units.

7. DATA

   Displays the I/O status as a code. Codes and their meaning are given below.

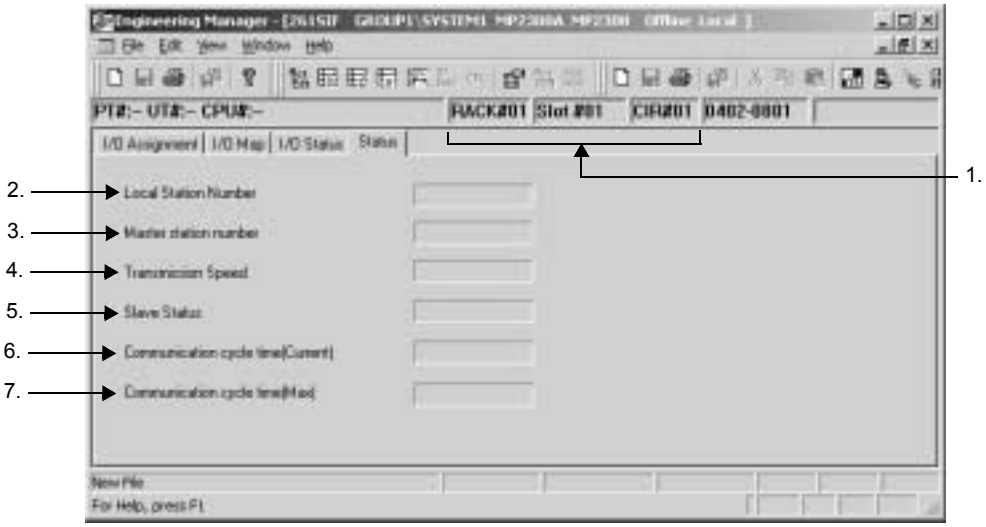
   0000H: I/O transmission is not being performed.
   0001H: I/O transmission is normal.
   0002H: I/O transmission error; communication parameter error
   0004H: I/O transmission error; configuration error
   0008H: I/O transmission error; I/O command from the Master is lost.

8. COMMENT

   Displays the comment set for each device on the I/O Assignment Tab Page.

- Status Tab Page

The Status Tab Page displays the PROFIBUS address, the baud rate, and the communication status of the 261IF-01 Module. This page only displays the status; the displayed values cannot be changed here.



1. Configuration Information

   The 261IF-01 configuration information that was set in the Module Configuration Window is displayed.
   - RACK#: The rack number of the rack in which the 261IF-01 Module is defined.
   - SLOT#: The slot number of the slot in which the 261IF-01 Module is defined.
   - CIR#: The circuit number of the slot in which the 261IF-01 Module is defined.

2. Local Station Number

   Displays the station number set for the 261IF-01 Module.

3. Master Station Number

   Displays the station number of the Master station connected on the PROFIBUS network.

4. Transmission Speed

   Displays the current baud rate. Although the 261IF-01 Module is able to operate up to a baud rate of 12 Mbps, it operates at the baud rate selected by the Master when the transmission system is started.

5. Slave Status

   Displays the status of the 261IF-01 Module using a message. The messages and the corresponding statuses are given below.

   WAIT_PRM: Waiting for the communication parameters to be sent from the Master.*
   WAIT_CFG: Waiting for the configuration information to be sent from the Master.
   DATA_EXCH: I/O transmission in progress

   * If writing output data stops after going to DATA_EXCH status due to an CPU error, the 261IF-01 Module stops cyclic communication 800 ms after the stopping updating outputs to the CPU and then it enters the WAIT_PRM status. Even after going to WAIT_PRM status, the 261IF-01 Module restarts cyclic communication if it normally receives the information necessary for initializing communication from the Master. If, after going to DATA_EXCH status, data is not received for the time set at the initialization of communication by the parameters sent from the Master, the 261IF-01 Module stops cyclic communication and enters WAIT_PRM status (waiting for re-initialization of communication). It restarts cyclic communication when it normally receives the information necessary for initializing communication from the Master.

6. Communication Cycle Time (Current)
   Displays the current communication cycle time of the 261IF-01 Module.
7. Communication Cycle Time (Max.)
   Displays the maximum communication cycle time of the 261IF-01 Module.

(d) Saving the 261IF Definitions Data

After setting the 261IF transmission definitions data, save the definitions data. In Online Mode, the definitions data is saved in the Machine Controller and on the Programming Device hard disk. In Offline Mode, the definitions data is saved on the Programming Device hard disk.

Save the 261IF transmission definitions data using the following procedure.

1. Select ***File*** – ***Save*** from the 261IF Definitions Menu.
2. Confirm the displayed message and click the **Yes** Button.
3. Confirm the displayed message and click the **OK** Button.

(e) Deleting the 261IF Transmission Definitions Data

It is possible to delete all of the 261IF transmission definitions data. In Online Mode, the definitions data is deleted from the Machine Controller and the Programming Device hard disk. In Offline Mode, the definitions data is deleted from the Programming Device hard disk.

Delete the 261IF transmission definitions data using the following procedure.

1. Select ***File*** – ***Delete*** from the 261IF Definitions Menu.
2. Confirm the displayed message and click the **Yes** Button.

9

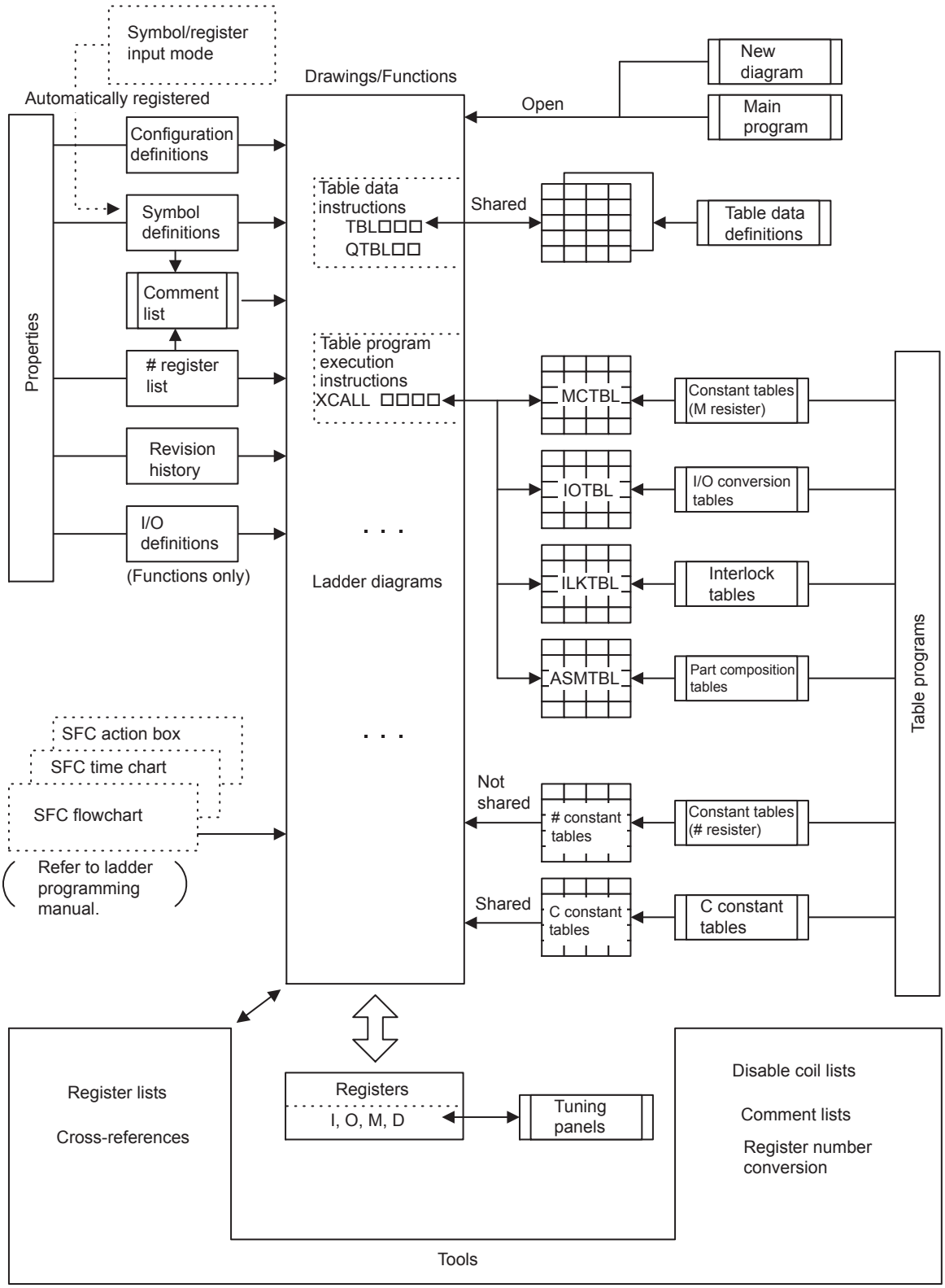
Program Folder 1: Ladder Programming

9.1 Ladder Programming System

This section provides a figure showing the relationships between the various tools provided to create ladder programs for Machine Controllers, including supplemental commands, program editing tools, and other tools.

Refer to the *Machine Controller MP900 Series User's Manual: Ladder Programming* (SIEZ-C887-1.2) for details on specific ladder program instructions and instruction specifications.

The following figure shows the relationships between the supplemental commands, program editing tools, and other tools available for ladder programming.



Based on the figure on *page 9-2*, the following items are described in this chapter.

- Setting properties
- Creating new and main programs
- Creating table programs
- Creating tuning panels
- Creating C registers
- Creating table data
- Tools

9.2 Setting Drawing Properties Window

This section describes the Drawing Properties Windows used to manage the configuration information for individual ladder programs.

Properties are attributes set for each ladder program or function program. The following information can be set.

- Configuration definitions
- I/O definitions (functions only)
- Symbol definitions
- # register lists
- Revision histories

There are default settings for properties. Settings are required, however, for ladder programs that use many registers.

9.2.1 Opening Drawing Properties Windows

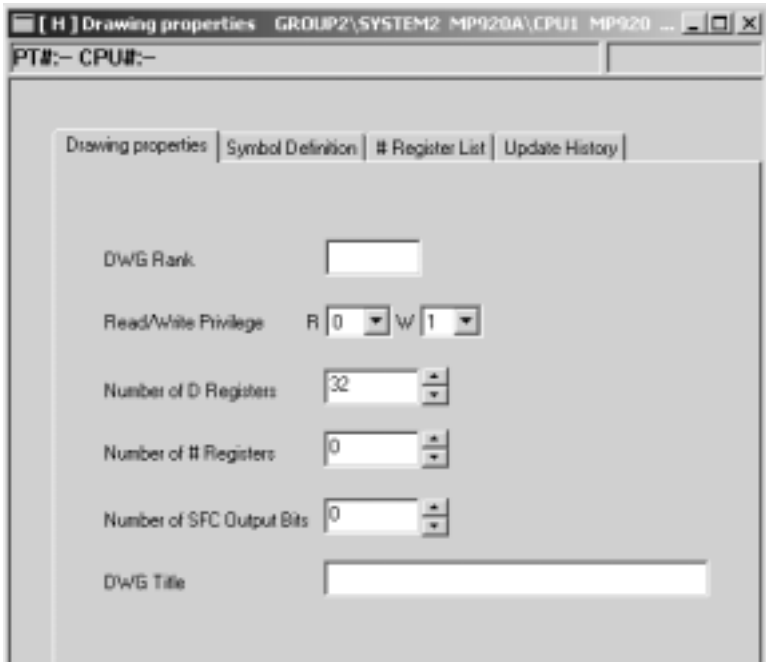
Use one of the following two procedures to open a Drawing Properties Window.

(1) Opening from the Engineering Manager

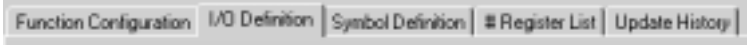
Select ***File*** – ***Open*** – ***Program*** – ***Properties*** from the LADDER Menu.

If the program is not open, an Open DWG Setting Window will be displayed. Select *DWG* for a ladder program or *FUNC* for a function program, enter the drawing name for the *Name*, and click the **OK** Button. The Open DWG Setting Window will not be displayed if the program is open.

The Drawing Properties Window for the program will be opened.



If the properties are for a function program, the following tabs will be displayed instead of the tabs above for a ladder program.



(2) Opening from the File Manager

Select the ladder or function program for which the Drawing Properties Window is to be opened from the Directory Tree, and then select ***File – Open – DWG Properties***.

You can also right-click the ladder or function program for which the Drawing Properties Window is to be opened in the Directory Tree, and then select the command from the pop-up menu.

9.2.2 Drawing Properties Menus

The menus displayed in Drawing Properties Windows are the same as those displayed in the LADDER Window. Refer to *9.3.2 LADDER Menus*.

9.2.3 Tab Pages

There are different tab pages for ladder program and function program Drawing Properties Windows. The functions of tab pages are described in *Table 9.1 Tab Pages for Ladder Program Drawing Properties Windows* and *Table 9.2 Tab Pages for Function Program Drawing Properties Windows*.

Table 9.1 Tab Pages for Ladder Program Drawing Properties Windows

Tab Page	Details
Drawing Properties	Defines configuration information for ladder programs.
Symbol Definition	Defines ladder program symbols.
# Register List	Sets # registers for ladder programs.
Update History	Displays Update History for ladder programs.

Table 9.2 Tab Pages for Function Program Drawing Properties Windows

Tab Page	Details
Function Configuration	Defines configuration information for function programs.
I/O Definition	Defines function program I/O.
Symbol Definition	Defines function program symbols.
# Register List	Sets # registers for function programs.
Update History	Displays Update History for function programs.

- Select ***View – Next Page*** from the LADDER Menu to move through the tab pages in order, starting with the Drawing Properties or Function Configuration Tab Page on the left.
- Select ***View – Back Page*** to move through the tab pages in reverse order.

(1) Drawing Properties Tab Page

Configuration definition details are described in the following table.

Setting	Details
Drawing Rank	Enter one character for the rank of the program. The rank is determined by the user.
Read/Write Privilege	Enter the reading and writing privileges for the program. None of the privilege data can be set to a higher value than the current user's privileges.
Number of D Registers	When D registers are to be used by the programs, enter the number of words for the D registers. D registers cannot be used by the programs if this number is set to 0.
Number of # Registers	When # registers are to be used by the programs, enter the number of words for the # registers. # registers cannot be used by the programs if this number is set to 0.
Number of SFC* Output Bits	When using SFC within the program, enter the number of output bits for each SFC step in 16-bit units (maximum 128 bits.) If 0 is entered, the SFC output bit time chart cannot be displayed, but there is no effect on the operation of the SFC.
DWG Title	Enter a program title of up to 48 characters.

* SFC: SFC is the abbreviation for Sequential Function Chart, which is a programming language.

- The number of D and # registers will differ depending on the type of Machine Controller.
- There are some Machine Controller types that will not support the use of SFC programs. Refer to the relevant User's Manual for the Machine Controller for details.
- The D register numbers that can be used in the program when 10 is entered as the *Number of D Registers* are shown in the following table.

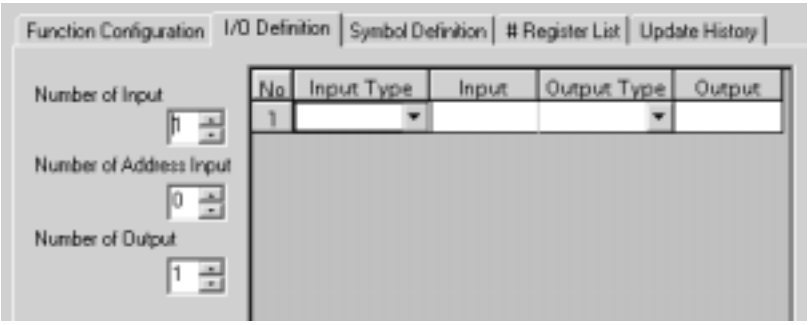
Type	Register Number Range
Integers	DW00000 to DW00009
Double-length integers	DL00000 to DL00008
Real numbers	DF00000 to DF00008
Bits	DB000000 to DB000009F

IMPORTANT

The number of words allocated to D and # registers is used for reserving memory. Therefore, when subscripted registers are used during programming, the programs must be created such that they do not exceed the memory area set within the program. An operating error will occur when data is read from or written to a D or # register beyond the set memory area.

(2) I/O Definition Tab Page

This tab page is used only for function programs. The I/O definition details are described below.



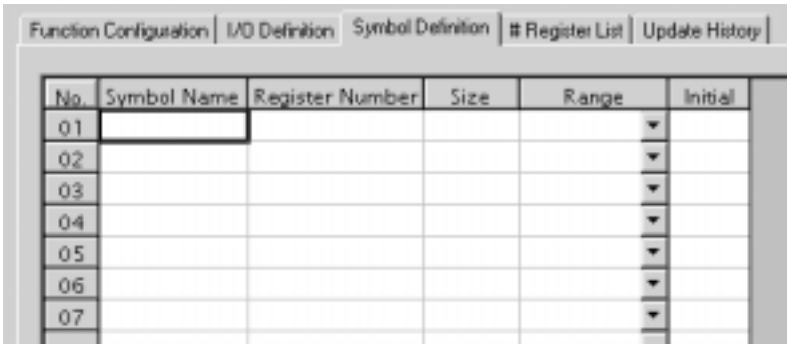
Setting	Details
Number of Inputs	Enter a number between 1 and 16 for the number of function input data items.
Number of Address Inputs	Enter 1 for address input and 0 for no address input.
Number of Outputs	Enter a number between 1 and 16 for the number of function output data items.
Input Type	Select the type of function input data. Refer to the *Data Types** table after this table.
Input (Input Comment)	Enter a function input data comment of up to 8 characters.
Output Type	Select the function output data type. Refer to the *Data Types** table after this table.
Output (Output Comment)	Enter a function output data comment of up to 8 characters.

* Data Types

Selected Item	Meaning
B-VAL	Bits
I-VAL	Integers
I-REG	
L-VAL	Double-length integers
L-REG	
F-VAL	Real numbers
F-REG	

(3) Symbol Definition Tab Page

Symbol names can be used in programs instead of register numbers, for easy understanding.



Setting	Details
Symbol Name	Enter a symbol name of up to 8 characters.
Register Number	Enter the number of the register to which the symbol is allocated.
Size	Enter the number of data items to be allocated to the symbol.
Range	Enter the symbol class.
Initial	This data is not effective in the current version.

1. Symbol Name

   Numbers, dashes, and underscores cannot be used as the first character of symbol names. Symbols beginning with $ have been defined in or automatically allocated by the MPE720. Such symbols are called automatic symbols and are displayed as follows:

   • $AUTO□□□ (□□□ is any number starting with 001.)

   Drawing and function programs cannot be saved if they contain automatic symbols. Change automatic symbols to another symbol name.

2. Register Number

   By defining a symbol for a register number, that number does not have to be entered when entering operands in the program. Enter the symbol only, and the corresponding register number will be displayed automatically.

3. Size

   The default setting is 1. Enter the data in hexadecimal, with an H preceding the hexadecimal value.

   This data is used when symbols are automatically allocated for register numbers. For example, if symbols are automatically allocated to registers starting from MW00001 and the data size is 1, the register number for the second symbol will be MW00002. The symbols will be allocated in order from MW00001 with a size of 1 word. If symbols are automatically allocated with size of 2, the symbols will be allocated from MW00001 and each will have be two words in size. The register number for the second symbol will be MW00003.

   Refer to *(b) Automatically Allocating AUTO Symbols* later in this section.

4. Range

   • AUTO: Shows that the register number has an automatically allocated symbol. This symbol range will be displayed when the symbol has been allocated by the MPE720.
   • MTBL: Shows that the symbol is for the host link. Depending on the host link functions, the host link can be executed and the same symbol definition data can be set for each scan type.
   • USER: Shows that the symbol has been defined by the user. This symbol range will appear when the register number has been allocated by the user.

INFO

The maximum number of symbols that can be defined differs depending on the type of Machine Controller.

(a) Editing Symbols

Symbols can be edited in rows units.

- Deleting Symbols

When a symbol name has been altered in the LADDER Window, the original symbol name is not automatically deleted. These superseded symbol names should be deleted by the user, but they cannot be deleted from the LADDER Window.

Delete symbol names using the following procedure.

1. Move the cursor to the symbol name to be deleted.
2. Select ***Edit*** – ***DEL*** from the LADDER Menu.
   The row selected in step 1 will be deleted.

- Alphabetizing Symbols

Display symbols in alphabetical order using the following procedure.

Select ***View*** – ***Sort*** from the LADDER Menu.

The symbol names will be displayed in alphabetical order.

(b) Automatically Allocating AUTO Symbols

All symbols in the AUTO range will be automatically allocated to register numbers starting with any number.

If a symbol name is entered that has not been allocated to a register number in the LADDER Window, meaning the symbol has not been defined, open the Symbol Definition Tab Page to display the symbols in a table like the one shown below.

No.	Symbol Name	Register Number	Size	Range		Initial	▲
01	DATA1		H0001	AUTO	▼	*	
02	DATA2		H0001	AUTO	▼	*	
03	DATA3		H0001	AUTO	▼	*	
04					▼		

Normally, symbols would be automatically allocated when ***AUTO*** is set for the *Range*. If, however, a register number has already been set for the *Register Number*, either by previous automatic allocation or manual input of register numbers, symbols will not be allocated automatically for those register numbers even if the *Range* column shows ***AUTO***.

- Automatic D and M Register Number Allocation

Symbols can be automatically allocated to D and M registers starting with any number. Allocate D and M registers automatically using the following procedure.

1. Enter the symbol definition data to allocate in the *Symbol Name*, *Register Number* (register type only), and *Size*. Select ***AUTO*** as the *Range*.
2. Select ***Data*** – ***Auto Number*** – ***AUTO*** from the LADDER Menu.
3. The Automatic symbol allocation (D, M) Window will be displayed. Enter the leading register numbers from which to allocate local registers (D) and global registers (M), and then click the **Set** Button.

   The register numbers will be automatically allocated and displayed.

   In this example, DATA1 is set to integer D register data with a data size of 1, DATA2 is set to real number M register data with a data size of 1, and DATA3 is set to integer M register data with a data size of 1. Therefore, the register numbers will be DW00000, MF00002, and MW00001 respectively, if the register numbers are automatically allocated by setting the leading D register number to 0 and the leading M register number to 1.

No.	Symbol Name	Register Number	Size	Range	
01	DATA1	DW00000	H0001	AUTO	▼
02	DATA2	MF00002	H0001	AUTO	▼
03	DATA3	MW00001	H0001	AUTO	▼
04					▼

INFO

- In step 1, enter the register type (DW, MW, etc.) for the *Register Number*. Nothing needs to be entered for the *Register Number* if operands have been specified in symbol input mode in the DWG Window. For the *Size*, enter a decimal value corresponding to the register type (in word units for word type, and bit units for bit type).
- If no data is entered for the *Register Number*, and automatic register number allocation is executed, the result will be the same as if DW was entered. Automatic register number allocation is executed in the order of bit, integer, double-length integer, and real number data.

- Automatic Number Allocation to All Registers

Allocate symbols to S, I, O, M, D, C, and # register numbers starting from any number using the following procedure.

1. Enter the symbol definition data to allocate in the *Symbol Name*, *Register Number* (register type only), and *Size*. Select ***AUTO*** as the *Range*.
2. Select ***Data – Auto Number – AUTO*** from the LADDER Menu.
3. The Automatic symbol assignment (AUTO) Window will be displayed. Enter the leading register number, and click the **Set** Button.

   The register numbers will be automatically allocated and displayed.

   For example, if the data size settings are two words for DATA1, one word for DATA3, and one word for DATA4, DATA1 will take two words and the register numbers will be MW00010, MW00012, and MW00013 respectively.

No.	Symbol Name	Register Number	Size	Range	
01	DATA1	MF00010	H0002	AUTO	▼
02	DATA2	MF	H0001	AUTO	▼
03	DATA3	MW00012	H0001	AUTO	▼
04	DATA4	MW00013	H0001	AUTO	▼
05					▼

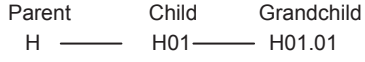
INFO

In step 1, enter the register type for the *Register Number*. Nothing needs to be entered for the *Register Number* if operands have been specified in symbol input mode in the DWG Window. For the *Size*, enter a decimal value corresponding to the register type (in word units for word type, and bit units for bit type).

(c) Upward Linking of Symbols

Symbols are valid only within the DWG or function program in which they are defined. The same symbol can thus be defined in another DWG or function program to refer to a different register number.

Symbols can be defined so that symbol names defined in drawings with different hierarchies can be used to reference the same register number in all DWG and function programs processed in the same scan. This is called symbol linking. If the DWG program executing the upward link is a child drawing, it can search for symbol definitions in the parent drawing to determine the register number. The symbol to which the upward link is being created must be defined in the parent drawing in advance.



For example, if an upward symbol link is used in H01.02.01, links can be used for symbols defined in H01 and H01.02.

Perform upward linking of symbols using the following procedure.

1. Enter the symbol definition data to be linked for the *Symbol Name*. Select ***MTBL*** as the *Range*.
2. Select ***Data – Symbol Link*** from the LADDER Menu.

   Definition data in the same scan as the upward drawing is searched according to the symbol, and the data is displayed.

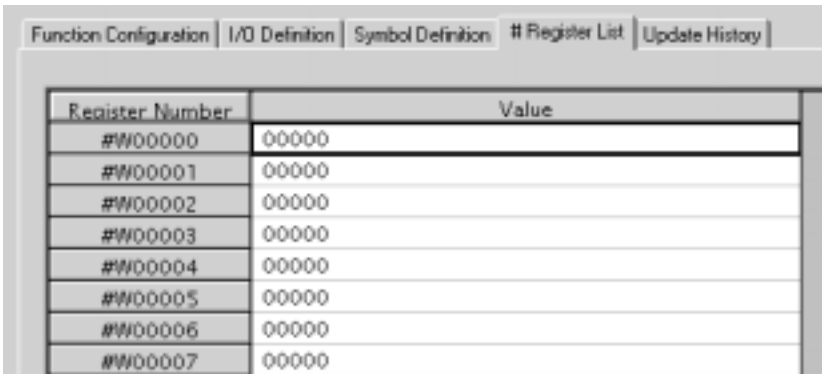
INFO

Do not enter any data in the *Register Number* and *Size*.

(4) # Register List Tab Page

This section explains how to make and alter # register settings.

This tab page cannot be used if the *Number of # Registers* is set to 0 on the Function Configuration Tab Page.



Setting	Details
Register Number	Displays the # register numbers for the number of registers entered on the *Number of # Registers* on the Function Configuration Tab Page.
Value	Enter the # register values.

(a) Changing the Base Number of # Register Values

The display mode base number of the # register values can be changed. Depending on the display mode, # registers can be changed to #W, #L, #F, etc.

- Decimal Integer Display

  Select ***Data*** – ***Cardinal*** – ***DEC*** from the LADDER Menu to display the register values in decimal.

- Hexadecimal Integer Display

  Select ***Data*** – ***Cardinal*** – ***HEX*** from the LADDER Menu to display the register values in hexadecimal.

- Real Number Display

  Select ***Data*** – ***Cardinal*** – ***FLOAT*** from the LADDER Menu to display the register values as real numbers.

- Decimal Double-length Integer Display

  Select ***Data*** – ***Cardinal*** – ***LONG*** from the LADDER Menu to display the register numbers as double-length integers.

- Binary Integer Display

  Select ***Data*** – ***Cardinal*** – ***BIN*** from the LADDER Menu to display the register values in binary.

- ASCII Display

  Select ***Data*** – ***Cardinal*** – ***ASCII*** from the LADDER Menu to change the register numbers to ASCII characters.

INFO

Undefined data will be displayed if register values that cannot be displayed as ASCII characters are set to ASCII display mode.

(b) Changing # Register Values

Change # register values using the following procedure.

1. Move the cursor to the register value to be changed.
2. Enter the new value.

(c) Clearing # Register Values

Clear consecutive registers to a user-defined value using the following procedure

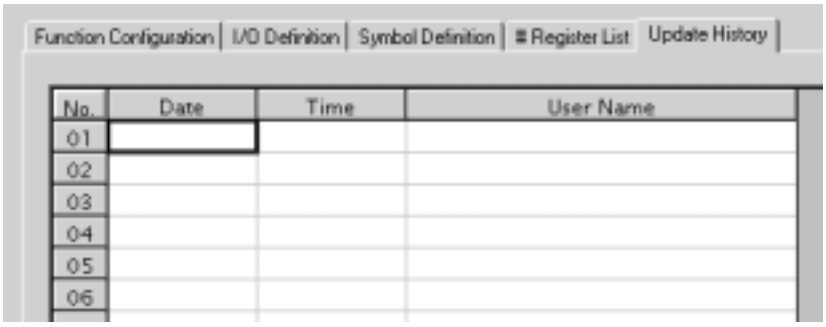
1. Select ***Data*** – ***Set*** from the LADDER Menu.
2. The Register Data Clear Window will be displayed. Enter the leading register number, number of registers to be cleared, and the replacement data, and click the **Set** Button. The data will be cleared to a user-defined value.

(5) Update History Tab Page

This section explains how to display and delete Update History data.

(a) Displaying Update History

Up to 10 Update History records can be created for each drawing in the DWG or function programs. The Update History is displayed in chronological order.



Display	Details
Date	Displays the date the DWG or function program was saved.
Time	Displays the time the DWG or function program was saved.
User Name	Displays the name of the user that saved the DWG or function program.

(b) Deleting Update History

There are two methods for deleting the Update History: All data for a particular DWG or function program can be deleted or individual records in the Update History can be deleted.

- Deleting All Update History Records

Delete all of the Update History records currently displayed using the following procedure.

1. Select ***Edit*** – ***ALLDEL*** from the LADDER Menu to delete all Update History data currently being displayed.
2. All Update History data will be deleted.

- Deleting Individual Update History Records

Delete one Update History record using the following procedure.

1. Move the cursor to the Update History record to be deleted.
2. Select ***Edit*** – ***DEL*** from the LADDER Menu.
3. The Update History record selected in step 1 will be deleted.

9.2.4 Saving Property Information

Property information must be saved at the same time as the DWG or function program is saved. Execute the ***Save*** command from the DWG Window for the DWG number or function symbol for which the property settings were made.

Save property information using the following procedure.

1. Select ***Window*** from the LADDER Menu to display the list of active LADDER Windows, and select the LADDER Window from which the property information is to be saved.
2. Select ***File*** – ***Save*** from the LADDER Menu.
3. Click the **Yes** Button in the message box.
4. Click the **OK** Button in the message box.

The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

9.3 Creating Ladder Programs

This section explains how to create ladder programs (main programs) called drawings (DWGs).

The MPE720 includes a Ladder Editor for inputting ladder programs. The Ladder Editor is automatically opened when a new or existing program is opened, enabling ladder programs to be edited immediately.

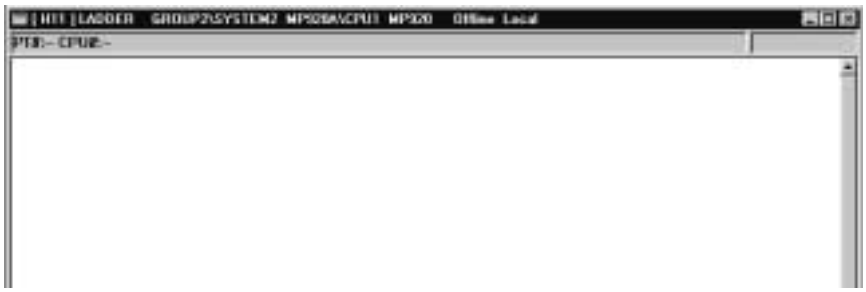
9.3.1 Opening the LADDER Window

The LADDER Window can be opened from the File Manager or Engineering Manager.

(1) Opening New Drawings from the File Manager

1. Click the desired drawing folder in the Directory Tree.
2. Select ***File*** – ***New Drawing*** from the File Manager Menu.
3. The Open DWG setting Window will be opened. Enter the name and type of drawing in the dialog box and click the **OK** Button.

   An empty LADDER Window will be displayed.



(2) Opening Existing Drawings from the File Manager

1. Click the desired drawing number in the Directory Tree.
2. Select ***File*** – ***Open*** – ***Main Program*** from the LADDER Menu.

   The existing program will be displayed and editing will be enabled.

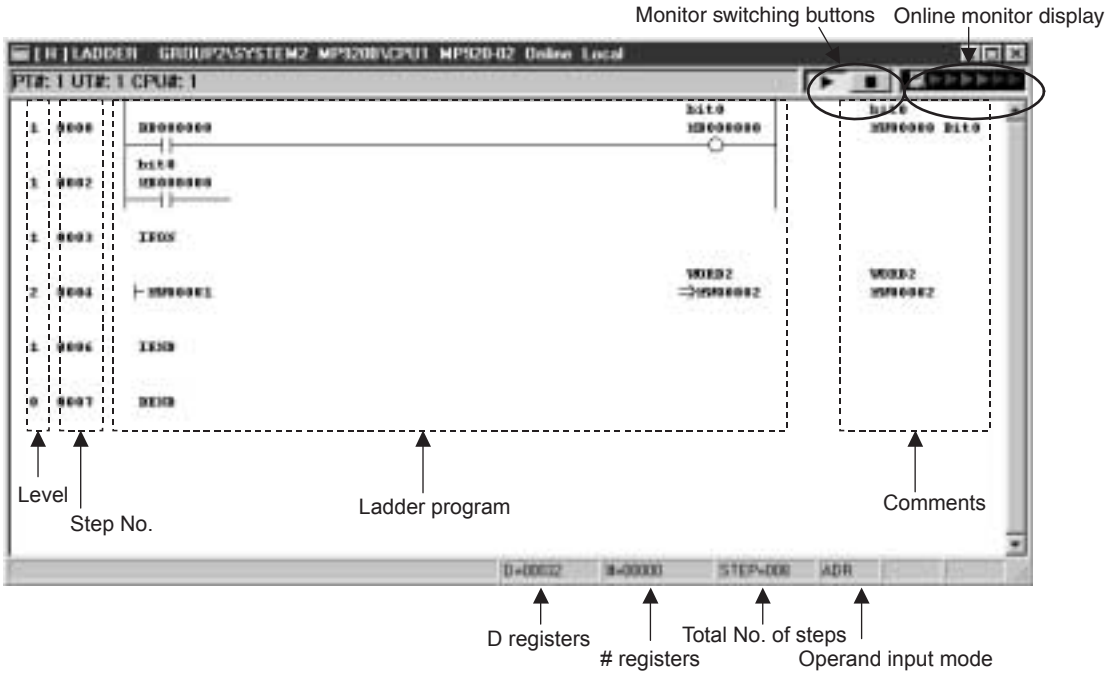
(3) Opening New/Existing Drawings from the Engineering Manager

1. Select ***File*** – ***Open*** – ***Program*** – ***New Drawing*** from the LADDER Menu.
2. The Open DWG setting Window will be displayed. Enter the name and type of drawing in the dialog box and click the **OK** Button.

INFO

- In the dialog box, set ***DWG*** as the *Type* to open the main drawing program, and set ***FUNC*** to open the main function program.
- Up to the number of drawings set in the File Manager configuration can be open at the same time in the LADDER Window.

- LADDER Window Configuration



Display	Details
Monitor Switching Buttons	These buttons are used to select whether or not to obtain the current value while online. This function is stopped with the ■ Button and started with the ▶ Button.
Online monitor display	Operates when monitoring the current value online.
Level	Displays the nesting level of each program.
Step No.	Displays the step number of the instruction.
Ladder Program	For ladder programs, the program executed is displayed. For user functions, the function's internal program is displayed. The current value of each operand is also obtained while online.
Comments	Comments for the program being executed will be displayed. Refer to *9.3.9 Creating Comments* for information on how to create comments.
D registers	Displays the value set in the *Number of D Registers* on the Drawing Properties Tab Page in the Drawing Properties Window.
# registers	Displays the value set in the *Number of # Registers* on the Drawing Properties Tab Page in the Drawing Properties Window.
Total No. of Steps	Displays the total number of steps for the program.
Operand Input Mode	Displays the operand input mode. *ADR*: Register Number Input Mode *SYM*: Symbol Input Mode *S-A*: Register Number + Symbol Input Mode

9.3.2 LADDER Menus

The following table shows the menu commands and functions displayed in the LADDER Window.

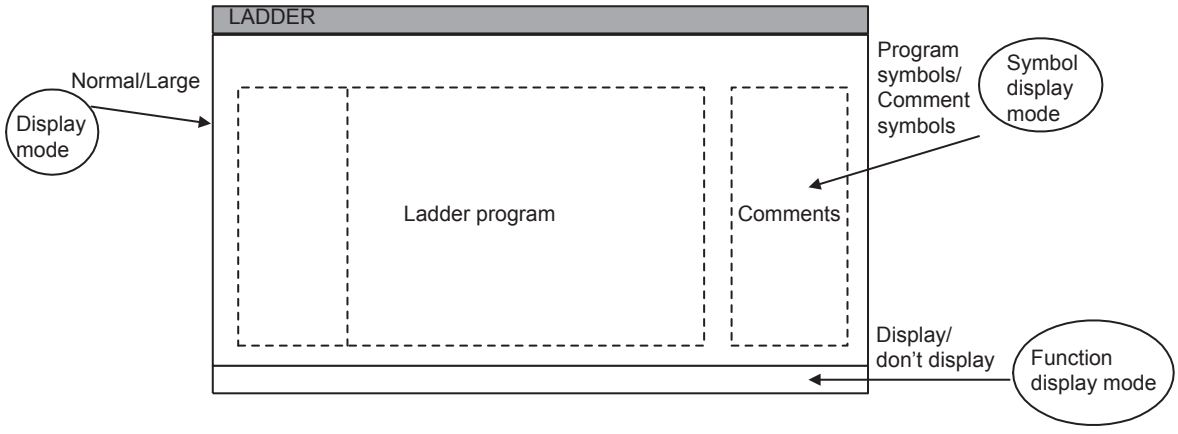
Menu Command			Function
File			
	File Manager		Opens the File Manager.
	Open		Opens windows for individual functions.
	Close		Closes the LADDER Window.
	Remake Comment		Updates comments.
	Remake Cross Info.		Updates cross-reference information.
	Save		Saves programs.
	Save & Save into flash memory		Saves to flash memory.
	Page Setting		Sets the printer paper margins.
	Print Program		Prints the main program.
	Exit		Exits the Engineering Manger.
Edit			
	Cut		Cuts an instruction and places it on the clip-board.
	Copy		Copies an instruction to the clipboard.
	Paste		Pastes the contents of the clipboard.
	INS		Inserts an instruction.
	DEL		Deletes an instruction.
	UNDELETE		Restores deleted data.
	FIND		Searches registers.
	COPYA		Copies the ladder program file.
View			
	Input Mode		
		Address	Sets to Register Number Input Mode.
		Symbol	Sets to Symbol Input Mode.
		Address + Symbol	Sets to Register Number + Symbol Input Mode.
	Normal		Switches to normal display mode.
	Large		Switches to large display mode.
	Symbol		
		Program Symbol	Switches to program symbol display mode.
		Comment	Switches to comment symbol display mode.
	Undefined Name List		
	Tool Bar		Displays the Tool Bar.
	Status Bar		Displays the Status Bar.
	Comment Bar		Displays the Comment Bar.
	Function Bar		Displays the Function Bar.
	Quick Reference		Displays the Quick Reference.

(Cont'd)

Menu Command		Function
Command		
	RELAY	Selects instructions. Refer to *Machine Controller MP900 Series User's Manual: Ladder Programming* (SIEZ-C887-1.2) for details on instructions.
	MATH	
	LOGIC	
	CONTROL	
	FUNCTION	
	MOVE	
	DDC	
	TABLE	
	MOTION	
	SFC	
Debug		
	SYNC	Synchronously updates current values.
	HOLD	Pauses updating current values.
	DIS-ON	Disables the COIL instruction and turns it ON.
	DIS-OFF	Disables the COIL instruction and turns it OFF.
	ENABLE	Releases the COIL instruction from disable status.
	REFER	Opens the LADDER Window being called.
	BACK	Displays the program opened using the REFER command.
Cursor		
	Jump to Line	Moves the cursor to the desired step number.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

9.3.3 LADDER Window Display Mode

This section describes the display modes that are available for the Ladder Editor in the LADDER Window. The display can be changed as required during programming.



(1) Switching Program Display Modes

There are two program display modes: Normal, for displaying characters at normal size and Large, for displaying characters at a larger size.

Program Display Mode	Switching Procedure
Normal (default)	Select ***View – Normal***.
Large	Select ***View– Large***.

(2) Switching Symbol Display Modes

There are two symbol display modes in the LADDER Window: Comment Symbol Display Mode, which displays symbols created using the Create Comment operation and Program Symbol Display Mode, which displays symbols created by symbol definitions. When the LADDER Window is first opened, the display mode is Comment Symbol.

Program Display Mode	Switching Procedure
Program Symbol	Select ***View – Symbol – Program Symbol***.
Comment Symbol	Select ***View – Symbol – Comment***.

(3) Switching Function Bar Display Modes

Pressing function keys when the function bar is displayed will execute the same functions as selecting instructions from LADDER Menu.

Select ***View – Function Bar*** from the LADDER Menu to switch ON and OFF the function bar display. Function keys will not operate if the function bar is not displayed.

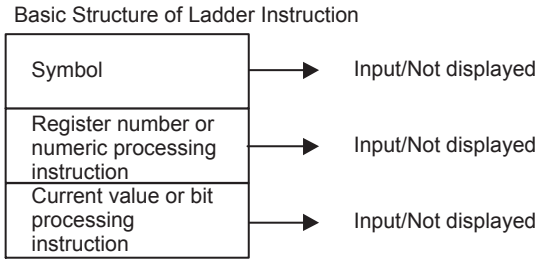
9.3.4 Inputting Ladder Instructions

This section explains how to input and edit ladder instructions and operands.

- Structure of ladder instructions
- Ladder instruction input methods
- Operand input methods
- Inputting instructions

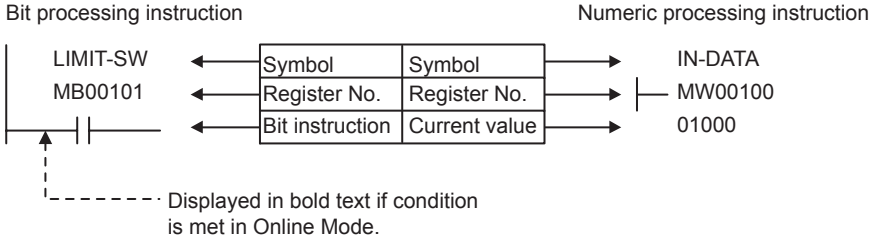
(1) Structure of Ladder Instructions

Basically, ladder instructions consist of three elements: A symbol, a numeric processing instruction or register number, and a bit processing instruction or current value.



For current values expressed as bit processing instructions, the text will be displayed in bold if the condition of the bit processing instruction is met and will be displayed in normal text if the condition is not met.

The register value is displayed for numeric processing instructions. The current value is displayed only in Online Mode.



(2) Input Methods of Ladder Instructions

There are three methods that can be used to input ladder instructions. Use the methods as required to facilitate inputting.

Refer to *Machine Controller MP900 Series User's Manual: Ladder Programming* (SIEZ-C887-1.2) for details on instructions. Refer to *Appendix C Drawing and Function Instructions* for a list of instructions that can be input for the MPE720.

(a) Using Mnemonics

Instructions can be selected easily from the keyboard by entering mnemonics and pressing the **Enter** Key. These mnemonics eliminate the need to search for the instruction on pull-down menus or the function bar. Refer to *Appendix C Drawing and Function Instructions* for lists of mnemonics.

As an example, the procedure to select the N.O. CONTACT instruction (-| |-) is described below.

1. Enter the mnemonic for N.O. CONTACT (][).
2. Press the **Enter** Key. The N.O. CONTACT instruction will be input.

(b) Selecting Instructions from the LADDER Menu

Display the **Command** Pull-down Menu, and select the instruction.

As an example, the procedure to select the N.O. CONTACT instruction (-| |-) is described below.

- Select ***Command – RELAY – N.O. Contact*** from the LADDER Menu. The N.O. CONTACT instruction will be input.

(c) Selecting Instructions from the Function Bar

Instructions displayed on the function bar can be selected using function keys. The function bar display must be activated first. Refer to *Appendix C Drawing and Function Instructions* for lists of function bar commands.

As an example, the procedure to select the N.O. CONTACT instruction (-| |-) is described below.

1. Press the **F11** Key (***F-SEL)*** on the function bar until the N.O. CONTACT instruction (-| |-) is displayed.
2. Press the **F1** Key to select (-| |-) on the function bar. The N.O. CONTACT instruction will be displayed.

(3) Operand Input Methods

There are four methods for inputting operands:

- Using register numbers
- Using symbols
- Using symbols and register numbers
- Using constants

• Changing Input Modes

The input mode can be changed using one of the procedures outlined on the table below.

Input Mode	Procedure	Status
Register Number	Select ***View – Input Mode – Address***.	ADR
Symbol	Select ***View – Input Mode – Symbol***.	SYM
Register Number + Symbol	Select ***View – Input Mode – Address + Symbol***.	S-A

Register Input Mode is the default when the LADDER Window is first displayed.

(a) Register Number Input Mode

TERMS

Operand

An operand is information required by the instruction, such as symbols, register numbers, and constants.

Only register numbers can be entered in Register Number Input Mode. The cursor will not move to the input position for symbols.

1. Change to the Register Number Input Mode (ADR) and enter the instruction.
2. The cursor will appear at the input position for register numbers. Enter the register number.

INFO

If the register number entered in step 2 has a symbol defined for it in the comment bar or comment list, that symbol will also be displayed, assuming Comment Symbol Display Mode has been set.

(b) Symbol Input Mode

Only symbols can be entered in Symbol Input Mode. The cursor will not move to the input position for register numbers.

1. Change to the Symbol Input Mode (SYM) and enter the instruction.
2. The cursor will appear at the input position for symbols. Enter the symbol.

INFO

- If the symbol entered at step 2 is defined on the Symbol Definition Tab Page in the Drawing Properties Window, the register number corresponding to that symbol will also be displayed.
- Symbols must be defined before they can be entered.

(c) Register Number + Symbol Input Mode

Both a symbol and register number can be entered in Register Number + Symbol Input Mode using the following procedure. By entering an undefined symbol, symbols will be defined automatically and do not need to be defined on the Symbol Definition Tab Page in the Drawing Properties Window.

1. Change to the Register Number + Symbol Input Mode (S-A) and enter the instruction.
2. The cursor will then appear at the input position for register numbers. Enter the register number.
3. The cursor will appear at the input position for symbols. Enter the symbol.

(d) Using Constants

Input operands with constants using the following procedure.

1. Change to the Register Number Input Mode (ADR) and enter the instruction.
2. The cursor will appear at the input position for constants. Enter the constant. Constants can be decimal (integer, double-length integer, or real number) or hexadecimal (integer or double-length integer).

INFO

■ Input Format for Constants

The following table shows the input format for constants.

Input Value		Window Display	Input String	Details
Decimal	Integer	00100	100	Use numerals 0 to 9. Place a minus sign (-) in front of negative values.
	Double-length Integer	0000010000	10000L	Use numerals 0 to 9 and enter L at the end of the value. Place a minus sign (-) in front of negative values. If the input value is greater than 32,767 or less than -32,768, the value will become a double-length integer automatically, even without an L at the end of the value.
	Real Number	100.1E	100.1E	Use numerals 0 to 9 and enter E at the end of the value. Place a minus sign (-) in front of negative values. If the input value includes a dot (.), the value will become a real number automatically, even without an E at the end of the value.
Hexadecimal	Integer	H32FF	H32FF	Enter H at the beginning of the value, and use numerals 0 to 9, and A to F.
	Double-length Integer	H000032FF	H32FFL	Enter H at the beginning of the value, and use numerals 0 to 9, and A to F. Enter L at the end of the value. If the input value is longer than 4 digits, the value will become a double-length integer automatically, even without L at the end of the value.

(4) Inputting Instructions

Inputting instructions can be divided into several patterns. This section describes the following basic instructions.

- Math, logic, and comparison instructions
- Conditional instructions
- Functions
- MOVW, XCHG, etc.
- SEE
- END
- Inline comments

(a) Inputting Math, Logic, and Comparison Instructions

The cursor normally moves to the right when the **Enter** Key is pressed after inputting the math, logic, or comparison operation. The cursor will move to the beginning of the next line when window size restrictions do not allow further instruction input to the right or after the STORE instruction appears.

◀ EXAMPLE ▶ As an example, the procedure to input the following instructions is shown below.

1 0000 |- MW01000 ⇒ MW02000

1. Select the INTEGER ENTRY (|-) instruction.
2. Enter the register number, MW01000.
3. Select the STORE (⇒) instruction.
4. Enter the register number, MW02000.

(b) Inputting Conditional Instructions

There are no special instructions provided for conditional instructions. Select the [] instruction to show that an instruction is conditional. The instruction inside the square brackets [] in the following program will be executed if the condition, bit register IB00010, is met. The bit status is checked only to determine whether the condition is met.

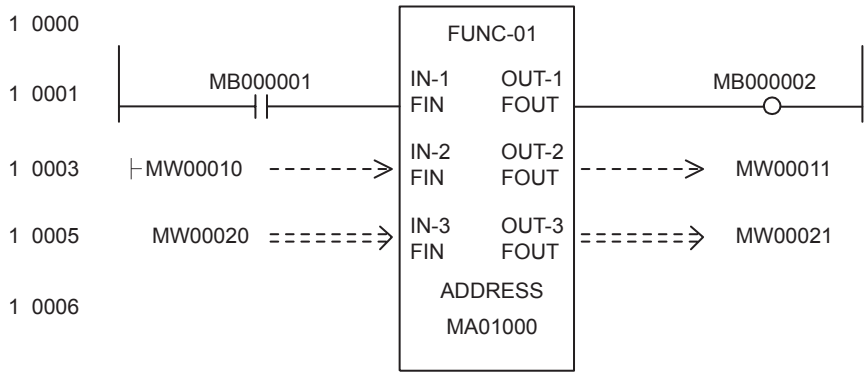
◀ EXAMPLE ▶ As an example, the procedure to input the following program is shown below.

1. Enter the N.O. CONTACT instruction and the register number, IB00010. This instruction will form the condition.
2. Select the INTEGER ENTRY (|-) instruction.
3. Select the CONDITION ([ ])instruction and enter the register number, MW00010.
4. Enter the STORE instruction in the same way as in steps 2 and 3.

(c) Inputting Functions

There are two types of functions: System functions (functions created by the system) and user functions (functions created by the user). The input method is the same for both types of functions. User functions need to be defined before they can be entered.

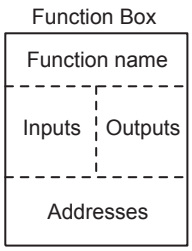
◀ EXAMPLE ▶ As an example, the procedure to input the following instructions is shown below.



Create the function box, and input the function input section, the address input section, and then the output section to input functions.

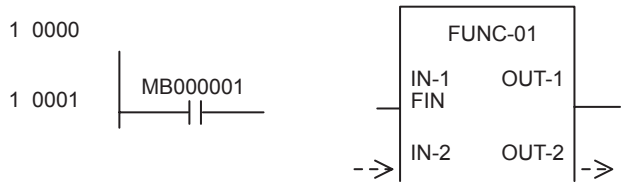
1. Creating the Function Box
   - Select the FSTART instruction and enter the function name, FUNC-01.

     The function box will be displayed.



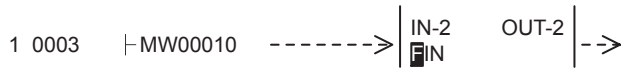
Next, input the function input section, address input section, and output section as described below.

2. Entering the Inputs
   - Input the input section for bit data (defined using B-VAL) as follows:
     i) Enter the N.O. CONTACT instruction and the bit register number MB000001.
     ii) Input the FIN instruction. The function input parameters and the N.O. CONTACT instruction will be connected.



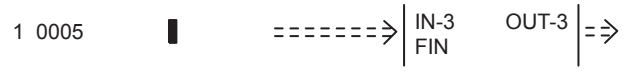
   - Input the input section for integer data (defined using I-VAL), double-length integer data (defined using L-VAL), or real number data (defined using F-VAL) as follows:

     The following example is for integer data.
     i) Enter the INTEGER ENTRY instruction and the register number MW00010.
     ii) Input the FIN instruction. The function input parameters and the INTEGER ENTRY instruction will be connected.

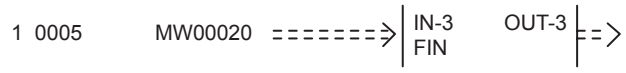


   - Input the input section for integer data (defined using I-REG), double-length integer data (defined using L-REG), or real number data (defined using F-REG) as follows:

     The following example is for integer data.
     i) Select the FIN instruction. The function input parameters and the register number (or constant) will be connected.



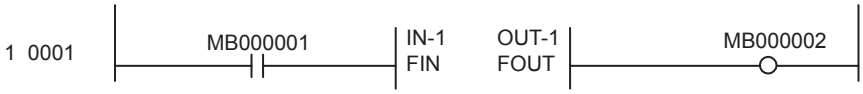
     ii) Enter the register number or constant.



3. Inputting the Addresses

   Input addresses as follows:
   i) Select the FIN instruction.
   ii) Enter the register number, MA01000.

4. Inputting the Outputs
   - Input the output section for bit data (defined using B-VAL) as follows:
     i) Select the FOUT instruction.
     ii) Enter the COIL instruction and the register number MB000002. The function output parameters and the COIL instruction will be connected.

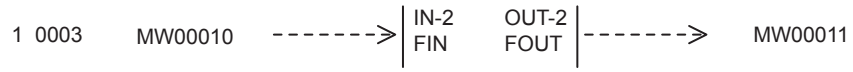


- Input the output section for integer data (defined using I-VAL), double-length integer data (defined using L-VAL), or real number data (defined using F-VAL) as follows:

  The following example is for integer data.

  i) Select the FOUT instruction.

  ii) Enter the STORE instruction and the register number MW00011. The function output parameters and the STORE instruction will be connected.

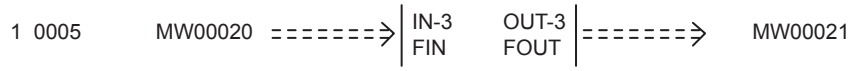


- Input the output section for integer data (defined using I-REG), double-length integer data (defined using L-REG), or real number data (defined using F-REG) as follows:

  The following example is for integer data.

  i) Select the FOUT instruction.

  ii) Enter the register number, MW00021.



(d) Inputting MOVW, XCHG and Other Instructions

MOVW, XCHG and similar instructions require two or more operands. When the instruction is entered, the cursor moves to the input position for the first operand. Enter the required operands to complete the instructions.

◀ EXAMPLE ▶ As an example, the procedure to input the following instructions is shown below.

1 0002 MOVW MW00020 ÆMW00120 W=00010

1.Select the MOVW instruction. The cursor will move to the input position for the first operand. The MOVW instruction will be moved to the next line and displayed at the beginning of the next line.

2.Enter the first operand, MW00020 and press the **Enter** Key.

3.Enter the second operand, MW00120 and press the **Enter** Key.

4.Enter the third operand, 00010 and press the **Enter** Key.

(e) Inputting SEE Instructions

Input the SEE instruction as shown below.

◀ EXAMPLE ▶ As an example, the procedure to input the following instructions is shown below.

1 0002 SEE H01.01

1.Select the SEE instruction. The cursor will move to the input position for the DWG number.

2.Enter the drawing number, H01.01.

(f) Inputting the END Instruction

The END instruction is placed at the end of the IF, WHILE, and FOR statements, and at the end of DWG and function programs. The END instruction will be changed to IEND, WEND, or FEND depending on the statement when it is entered. For DWG and function programs, the END instruction will be changed to DEND when entered.

◀ EXAMPLE ▶ As an example, the procedure to input the following instructions is shown below.

```
1  0000   |- 00000                          ⇒ J
1  0002                                     ⇒ MW02000
1  0003   WHILE
2  0004   |- J          <00100
2  0006   ON
2  0007   |- MW00200    +MW00100j           ⇒ MW02000
2  0010   |- J          +00001              ⇒ J
1  0013   WEND
```

1. Enter the counter (J), the INTEGER ENTRY instruction to clear the work register (MW02000) to zero, and the STORE instruction.
2. Select the WHILE instruction.
3. Enter the WHILE statement (steps 4 to 10 in the figure above.)
4. Enter the END instruction. The type of END instruction will be determined automatically and the appropriate END instruction will be displayed. In this case, WEND will be displayed.

(g) Inputting Inline Comments

Comments can be input at any position in main programs and user function programs. Inline comments do not affect the program execution at all.

Input inline comments using the following procedure.

1. Select the COMMENT instruction.
2. Enter the comment, *MW01000 is motor rotation speed.*
3. Enter double quotation marks (") at the end of the comment.

```
1      0000      "MW01000 is motor rotation speed"
```

IMPORTANT

Up to 70 characters per line can be entered for the inline comment, with a maximum of 180 characters in total if carriage returns are used. Depending on the number of carriage returns, however, the maximum number of characters possible in the character string may be reduced.

9.3.5 Editing Programs

Instructions can be edited. If the user starts to edit programs while online, the current value will not be updated until the edited program is saved normally.

- Insert
- Delete
- Undelete
- Cut
- Copy
- Paste
- Change operand
- Jump to step number
- Opening LADDER Window for SEE and FSTART instructions
- Returning to previous windows

INFO

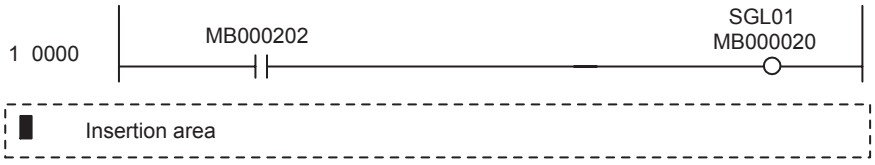
Programs cannot be edited under the following circumstances:

- When the cursor is in a blank position other than at an instruction or operand.
- During the execution of other edit operations.

(1) Inserting

Insert instructions into a string of instructions using the following procedure.

1. Move the cursor to the position where the instruction is to be inserted.
2. Select ***Edit*** – ***INS*** from the LADDER Menu. *INS* will appear at the bottom of the window to indicate that the insert operation is in progress, space to insert instructions will be provided, and the rest of the program below the insertion area will temporarily not be displayed.



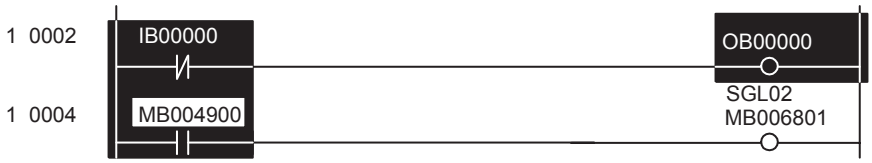
3. Enter the instruction. Further instructions can be entered until step 4 is performed.
4. Select ***Edit*** – ***INS*** from the LADDER Menu.

   The instruction entered in step 3 will be inserted and the portion of the program below the insertion area will be displayed correctly again.

(2) Deleting

Delete a block of instructions using the following procedure.

1. Move the cursor to beginning of the block of instructions to be deleted.
2. Select ***Edit*** – ***DEL*** from the LADDER Menu. *DEL* will appear at the bottom of the window to indicate that the delete operation is in progress.
3. Move the cursor to the end of the block of instructions to be deleted. The section to be deleted will be displayed in reversed color.



4. Select ***Edit*** – ***DEL*** from the LADDER Menu.

   The block of instructions specified in steps 1 and 3 will be deleted.

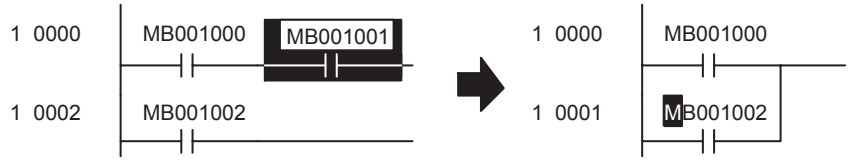
INFO

■ Cancelling Delete Operation

Press the **ESC** Key to cancel the delete operation without deleting any instructions.

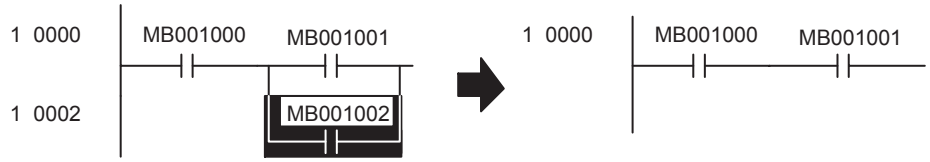
■ Deleting One Instruction in a Relay Circuit

- The power line may be corrected as shown in the following figure if one instruction in a relay circuit is deleted, depending on the connection status of the circuit where the instruction was deleted.



9

• Circuits will be connected after an instruction is deleted if they are connected directly to the deleted element.



Circuits will be open after an instruction is deleted if they are connected parallel to the deleted element.

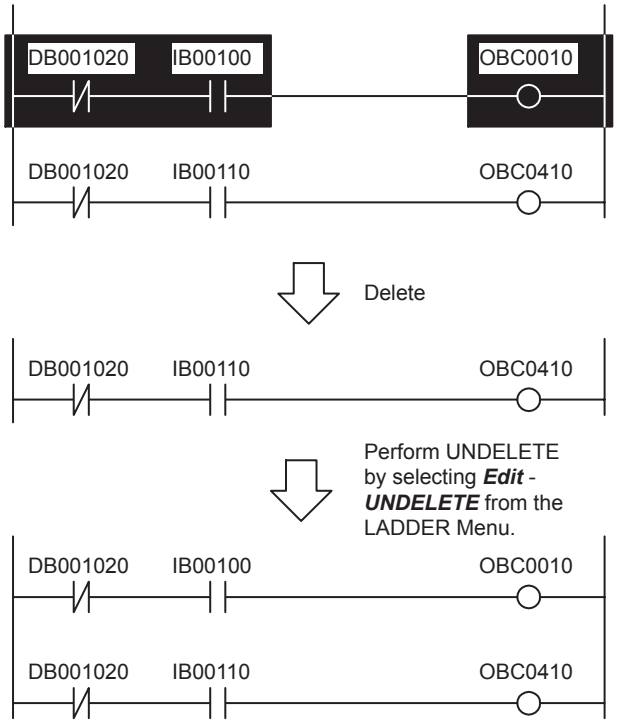
■ Deleting Multiple Instructions Including Relay Circuits

When multiple instructions including relay circuits are to be deleted, select a power connection instruction as the start of the block to be deleted, and select a COIL instruction as the end of the block.

(3) UNDELETE

The UNDELETE can be used to undo one delete, cut, or paste operation.

The following example shows executing UNDELETE after DELETE.



(4) Cutting

Instructions can be cut. Cut data is copied to the clipboard. The contents of the clipboard can be reproduced multiple times using the paste operation.

Cut instructions using the following procedure.

1. Move the cursor to the start of the section to be cut.
2. Select ***Edit*** – ***Cut*** from the LADDER Menu. *CUT* will appear at the bottom of the window to indicate the cut operation is in progress.
3. Move the cursor to the end of the section to be cut. The section to be cut will be displayed in reversed color.
4. Select ***Edit*** – ***Cut*** from the LADDER Menu.

   The section specified in steps 1 and 3 will be cut.

INFO

- Press the **ESC** Key to cancel the cut operation without cutting any instructions.
- Unlike the delete operation, power lines will not be corrected when instructions are cut using the cut operation.

(5) Copying

Instructions can be copied to the clipboard. The contents of the clipboard can be reproduced multiple times using the paste operation.

Copy instructions to the clipboard using the following procedure.

1. Move the cursor to the beginning of the section to be copied.
2. Select ***Edit*** – ***Copy*** from the LADDER Menu. *Copy* will appear at the bottom of the window to indicate that the copy operation is in progress.
3. Move the cursor to the end of the section to be copied. The section to be copied will be displayed in reversed color.
4. Select ***Edit*** – ***Copy*** from the LADDER Menu.
   The section specified in steps 1 and 3 will be copied.

(6) Pasting

The contents of the clipboard can be reproduced. The instructions copied to the clipboard using the cut or copy operations will be reproduced. The data on the clipboard is saved and can be reproduced multiple times.

When the cut or copy operations are executed again, the instructions on the clipboard will be cleared and replaced with the new cut or copied instructions.

Reproduce instructions on the clipboard using the following procedure.

1. Move the cursor to the position where the instruction is to be pasted.
2. Select ***Edit*** – ***Paste*** from the LADDER Menu.
3. The data on the clipboard will be inserted into the position specified in step 1.

(7) Changing Instructions and Operands

Change previously entered instructions or operands using the following procedure.

(a) Changing Relay Numbers

1. Press the Cursor Keys to move the cursor to the relay number to be changed.
2. Enter the new relay number.

(b) Changing Contacts

1. Press the Cursor Keys to move the cursor to the contact instruction to be changed.
2. Enter the new contact instruction.

(c) Changing Operands

1. Press the Cursor Keys to move the cursor to the operand to be changed.
2. Enter the new operand.
   The following operands exist and can be changed. You cannot, however, change to an operands that is not supported by the instruction.
   - Decimal and hexadecimal integer constants, decimal and hexadecimal double-length integer constants, and decimal real number constants.
   - S, I, O, M and D registers, and subscripted S, I, O, M and D registers.
   - C and # registers, and subscripted C and # registers.
   - Registers for X, Y, Z and A functions, and subscripted registers for X, Y, Z and A functions.
   - Subscript registers (I and J).

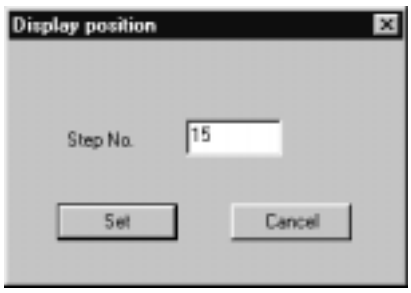
(d) Changing Comments

1. Press the Cursor Keys to move the cursor to the comment to be changed.
2. Select the comment instruction.
3. Enter the new comment.
4. Enter double quotation marks (") at the end of the comment.

(8) Jumping to a Particular Step Number

Move the cursor to a particular step number in the program using the following procedure.

1. Select ***Cursor*** – ***Jump to Line*** from the LADDER Menu.
2. Enter the step number in the Display Position Dialog Box and click the **Set** Button.



3. The cursor will move to the step number designated in step 2.

(9) Opening DWG Windows Used by SEE and FSTART Instructions

When SEE or FSTART instructions are used in the DWG or function program that is currently displayed, the LADDER Window for the DWG or function program that is called by these instructions can be opened.

Open the DWG Window used by SEE and FSTART instructions using the following procedure.

1. Move the cursor to the DWG number or function symbol that the SEE or FSTART instruction is calling.

   1 0000 SEE H01.01

2. Select ***Debug*** – ***REFER*** from the LADDER Menu.
3. The DWG Window called in step 1 will be opened.

INFO

- The refer operation cannot be executed in Offline Mode.
- In Online Mode, the current values when the relevant SEE or FSTART instruction was executed will be displayed in any DWG or function program opened with the refer operation.

(10) Returning to Previous Windows

The window from which the refer operation was used can be returned to in the reverse order.

Select ***Debug*** – ***BACK*** from the LADDER Menu to return to the previous windows in reverse order.

Up to 4 windows that have been previously opened can be returned to in the reverse order.

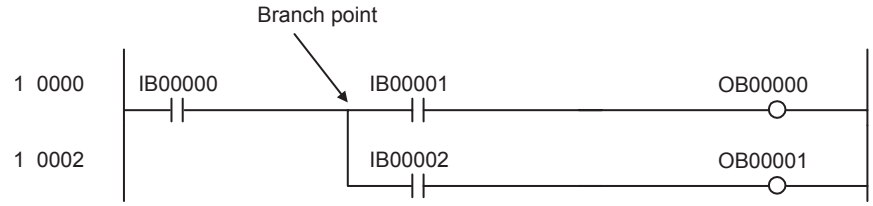
9.3.6 Creating Branch Circuits

When branches and parallel circuits are used in relay circuits, the cursor moves according to branches, connection points, and parallel connections. The cursor position for the next instruction switches for branches, connection points, and parallel connections. The cursor position can be reserved or released by alternately designating branches, connection points and parallel connections. Those designation are found on the Command Menu from the LADDER Menu. Mnemonics can also be used to designate them.

(1) Setting Branch Points

As shown in the following figure, branch points are display to the left of a COIL instruction, and input positions for parallel circuits are reserved starting from the branch point. The branch point will be automatically displayed without setting it if a contact is to be connected to the power line.

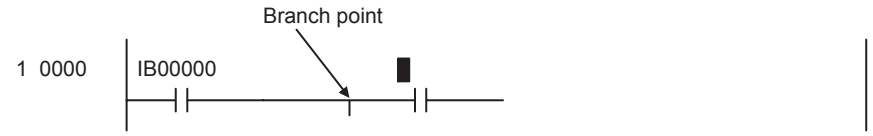
◀ EXAMPLE ▶



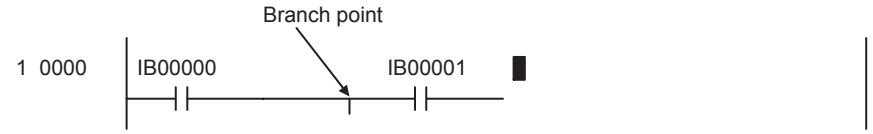
Set the branch point shown in the above figure using the following procedure.

1. Select the N.O. CONTACT instruction.

2. Select ***Command*** – ***RELAY*** – ***Branch*** from the LADDER Menu.
3. A branch point will appear.

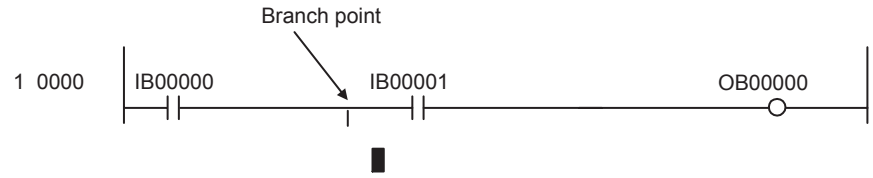


4. Enter the relay number.



INFO

- The mnemonic for a branch point, a comma (,), can be used at step 2 to display a branch point.
- Insert a COIL instruction after completing step 4 to display the cursor at the branch point designated in step 3, rather than at the power line. This enables the next instruction to be entered from this point.

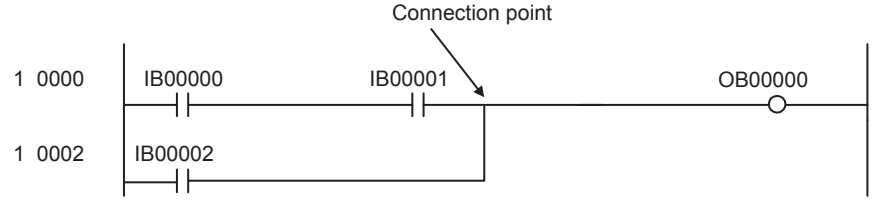


- The cursor will move to the last branch point if several branch points have been designated.

(2) Setting Connection Points

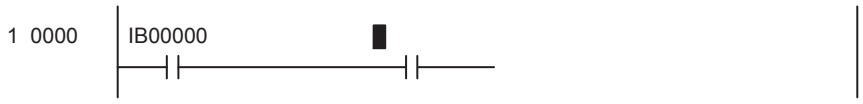
As shown in the following figure, connection points are shown to the right of the contact instruction and the input positions for parallel circuits will be reserved between a branch point and connection point if there is a branch point, and between the power line and the connection point if there is no branch point.

◀ EXAMPLE ▶

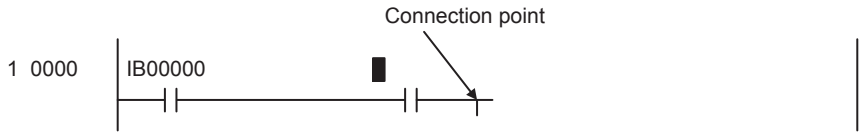


Set the connection point shown in the above figure using the following procedure.

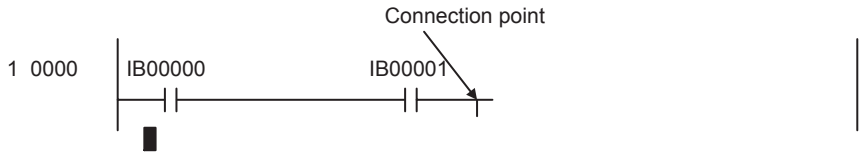
1. Select the N.O. CONTACT instruction.



2. Select ***Command – RELAY – Join*** from the LADDER Menu.
3. A connection point will appear.



4. Enter the relay number.



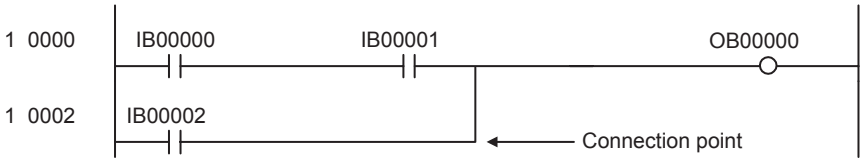
INFO

- The mnemonic for a connection point, a period (.), can be used at step 2 to display a connection point.
- Once step 4 has been completed, the input position for the next instruction will be on the new line after the connection point. If a branch point has been designated previously, the next instruction will be entered from the branch point, and if not, the next instruction will be entered from the power line.

(3) Setting Parallel Connections

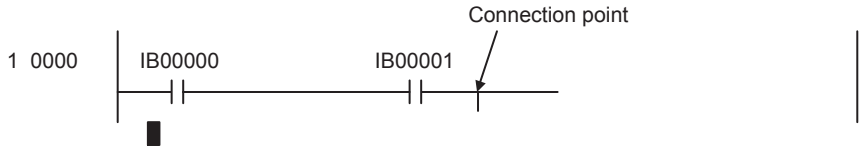
As shown in the following figure, the connection point specified above is connected to the right side of the current instruction input position. A connection point must be specified first to enable connection.

◀ EXAMPLE ▶

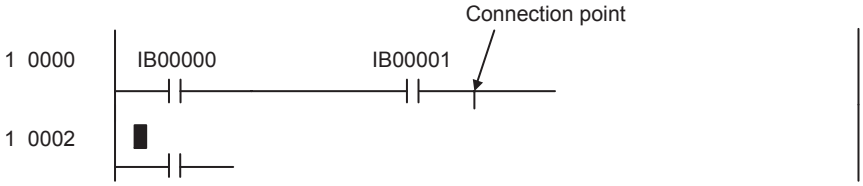


Set the parallel connection shown in the above figure using the following procedure.

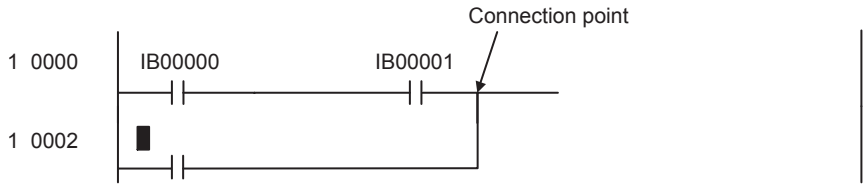
1. Designate the connection point as shown below.



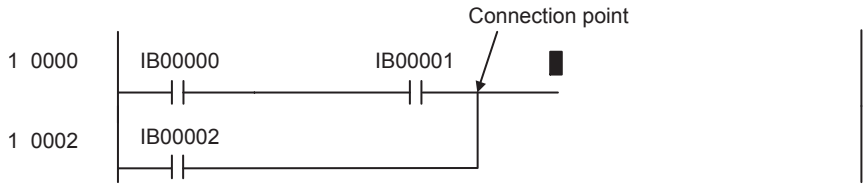
2. Select the N.O. CONTACT instruction.



3. Select ***Command*** – ***Relay*** – ***Connect*** from the LADDER Menu.



4. Enter the relay number.



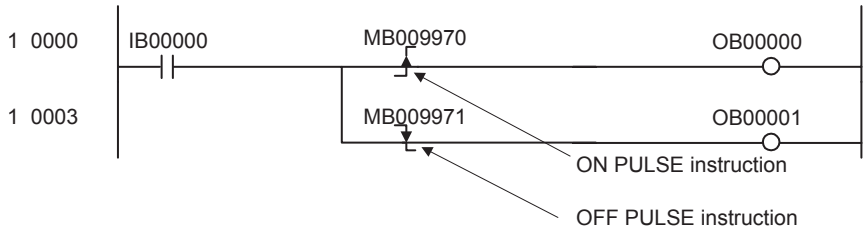
INFO

- The mnemonic for a parallel connection, a comma and a period (, .), can be used at step 3 to display a parallel connection.
- Once step 4 has been completed, the input position for the next instruction will be to the right of the parallel connection.

(4) Creating a Pulse Generation Circuit

Pulse Generation Circuits are programmed the same way as the branching method explained in *(1) Setting Branch Points*, *(2) Setting Connection Points*, and *(3) Setting Parallel Connections*.

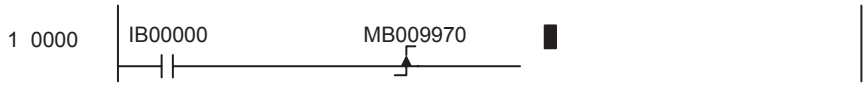
◀ EXAMPLE ▶



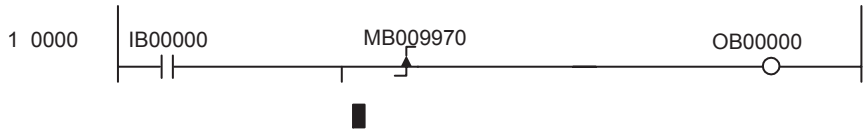
Create the pulse generation circuit shown in the above figure using the following procedure.

1. Enter the N.C. CONTACT instruction.
2. Select the ON PULSE instruction and then enter the branch point.

3. Enter the register number which is the operand for the ON PULSE instruction.

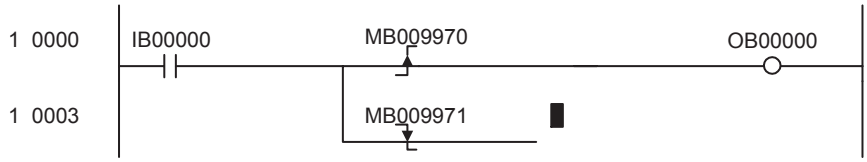


4. Enter the COIL instruction.

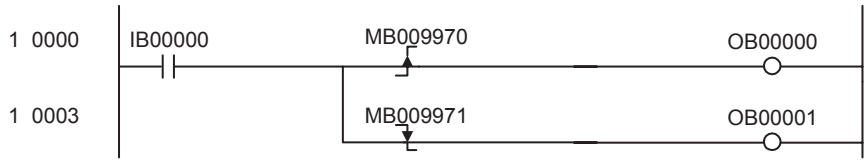


5. Select the OFF PULSE instruction.

6. Enter the register number which is the operand for the OFF PULSE instruction.



7. Enter the COIL instruction.

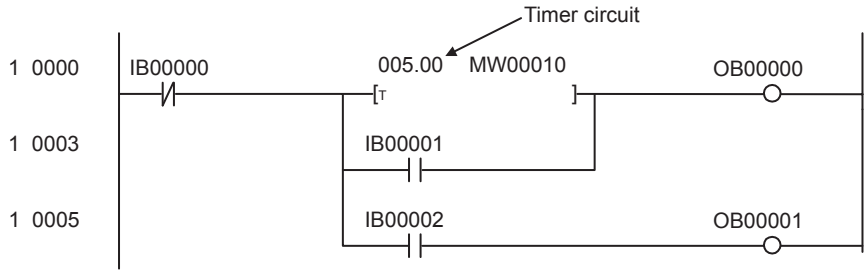


(5) Creating Timer Circuits

Timer circuits are created by setting the following three points:

- Branches, connection points, and parallel connections.
- Time limit setting constants or register numbers for time limit settings.
- Register numbers for counting.

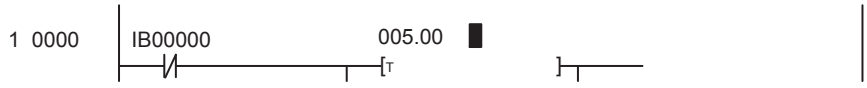
◀ EXAMPLE ▶



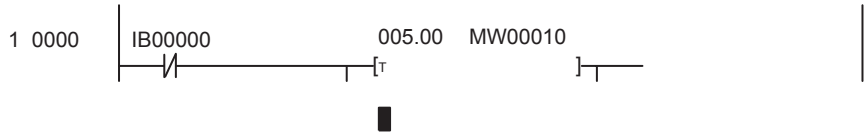
Create the timer circuit shown in the above figure using the following procedure.

1. Enter the N.C. CONTACT instruction.
2. Select the ON-DELAY instruction and then enter the branch points and connection points.

3. Enter the time limit settings (constants or register numbers) which are the operands for the ON-DELAY instruction.

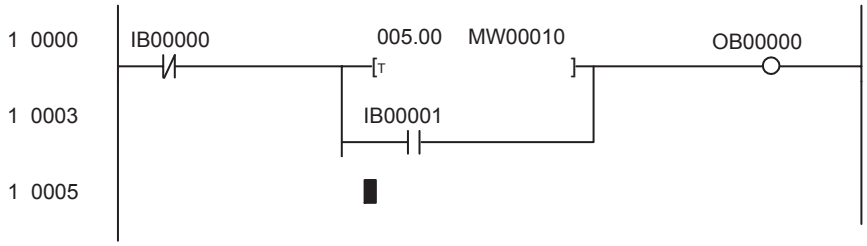


4. Enter the register number for counting as an operand of the ON-DELAY instruction.

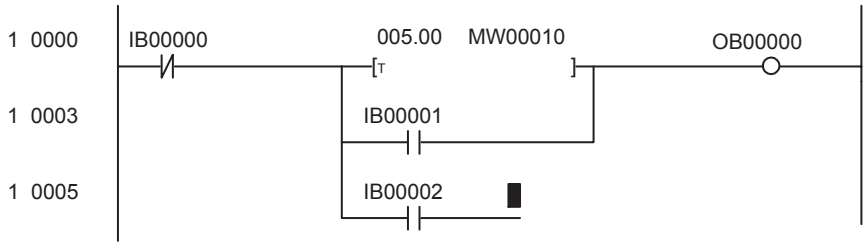


5. Select the N.O. CONTACT instruction and then set the branch points and the parallel connections.

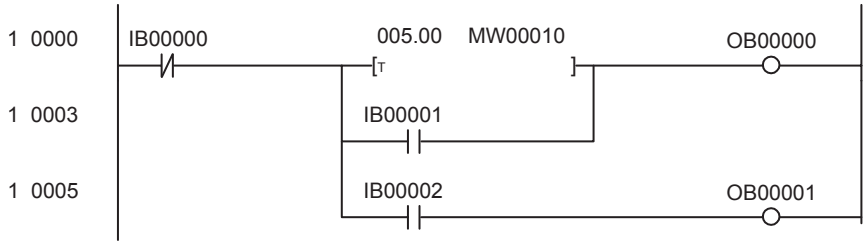
6. Enter a register number as the operand of the N.O. CONTACT instruction.
7. Enter the COIL instruction.



8. Enter the N.O. CONTACT instruction.



9. Enter the COIL instruction.



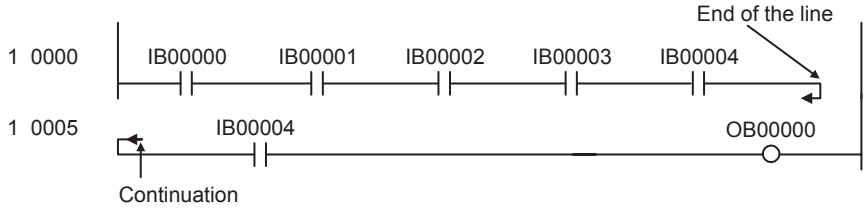
INFO

Branch point, connection point, and parallel connection settings can be made when the cursor is on the time limit setting or the register for counting.

(6) Setting Series Connections

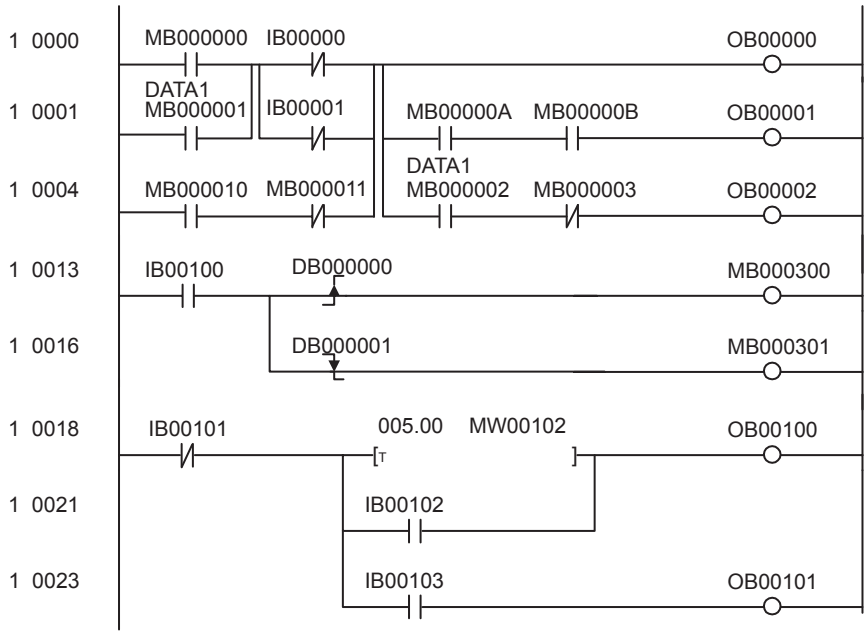
When connection points or parallel connections have not been designated, the next contact will be connected in series and the cursor will move to the right from the current instruction position. Contacts will be connected in series whether or not there is branching. There is no limit to the number of contacts.

When the series connection extends across one line, as shown in the following figure, the input position for the next instruction will automatically appear at the start of the next line.



(7) Creating Complicated Circuits

Complicated sequence circuits, such as the one shown in the following figure, can be created by setting branch points, connection points, and parallel connections.



Create the sequence circuit shown in the above figure using the procedure (steps 1 to 24) in the following table.

Step	Instruction	Branch or Connection Selection	Operand Input	
1	N.O. CONTACT	Connection point	MB000000	
2	N.O. CONTACT	Parallel connection	MB000001	
3	N.C. CONTACT	Branch point, connection point	IB00000	
4	N.C. CONTACT	Connection point, parallel connection	IB00001	
5	N.O. CONTACT	–	MB000010	
6	N.C. CONTACT	Parallel connection	MB000011	
7	COIL	Branch point	OB00000	
8	N.O. CONTACT	Branch point	MB00000A	
9	N.O. CONTACT	–	MB00000B	
10	COIL	–	OB00001	
11	N.O. CONTACT	–	MB000002	
12	N.C. CONTACT	–	MB000003	
13	COIL	–	OB00002	
14	N.O. CONTACT	–	IB00100	
15	ON PULSE	Branch point	DB000000	
16	COIL	–	MB000300	
17	OFF PULSE	–	DB000001	
18	COIL	–	MB000301	
19	N.C. CONTACT	–	IB00101	
20	ON-DELAY	Branch point, connection point	5	MW00102
21	N.O. CONTACT	Branch point, parallel connection	IB00102	
22	COIL	–	OB00100	
23	N.O. CONTACT	–	IB00103	
24	COIL	–	OB00101	

The procedure for step 3 in the table, for example, is outlined below.

1. Select the N.C. CONTACT instruction.
2. Select the BRANCH instruction.
3. Select the connection point.
4. Enter ***I0000*** and press the **Enter** Key.

IMPORTANT

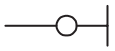
- In step 4, the operand code will determine what type of register is required for the operand. Enter only the register type and number, and IB00000 will be entered automatically.
- When multiple operands are used, press the **Enter** Key after inputting each operand to ensure that each operand is entered correctly.

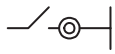
9.3.7 Disabling Coils

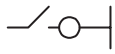
COIL instructions can be forcibly fixed to the energized state (Disabled ON) or to the de-energized state (Disabled OFF), and disable settings for COIL instructions can be cleared.

Coil status will be displayed as shown below depending on the disable ON/OFF status.

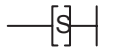
- COIL Instruction Notation


: Disable cleared (normal state).

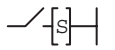

: Disabled ON.


: Disabled OFF.

- SET COIL Instruction Notation


: Disable cleared (normal state).

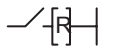

: Disabled ON.


: Disabled OFF.

- RESET COIL Instruction Notation


: Disable cleared (normal).


: Disabled ON.


: Disabled OFF.

IMPORTANT

- Devices may malfunction if the above operations are executed during equipment operation. Execute these operations only after checking that equipment is not being operated.
- In Online Mode, disabled coil settings will be written to the Machine Controller at the same time as the settings are made or cleared.
- When coils are set to Disabled ON or OFF, only the specified coil will be set to ON or OFF. Other coils will not be affected by the disable settings, even if they are the same type of coil. Other instructions using the same relay number, however, such as the N.O. CONTACT instruction, will be affected.

(1) Setting Disabled ON

Force-set and fix a COIL instruction to *Disabled ON* during program execution using the following procedure.

1. Move the cursor to the COIL instruction to be set to Disabled ON.
2. Select ***Debug*** – ***DIS-ON*** from the LADDER Menu. The COIL instruction notation will change to Disabled ON.

(2) Setting Disabled OFF

Force-set and fix a COIL instruction to *Disabled OFF* during program execution using the following procedure.

1. Move the cursor to the COIL instruction to be set to Disabled OFF.
2. Select ***Debug*** – ***DIS-OFF*** from the LADDER Menu. The COIL instruction notation will change to Disabled OFF.

(3) Clearing Disable Settings

Clear Disable Settings for COIL instructions using the following procedure.

1. Move the cursor to the COIL instruction for which the disable setting is to be cleared.
2. Select ***Debug*** – ***ENABLE*** from the LADDER Menu. The COIL instruction notation will return to normal.

9.3.8 Displaying Current Values

In Online Mode, current values can be displayed at the same time as the program.

The current values for instructions are displayed as follows:

Instruction	Current Value Display
Contacts	Contacts will be shown as open or closed on the circuit diagram. Closed contacts appear bolder than open contacts.
Coils	Coils will be shown as ON or OFF on the circuit diagram. ON coils will appear bolder than OFF coils.
Operands	Operand values used for processing are displayed below the expressions.

Current values are updated frequently and the latest data is displayed.

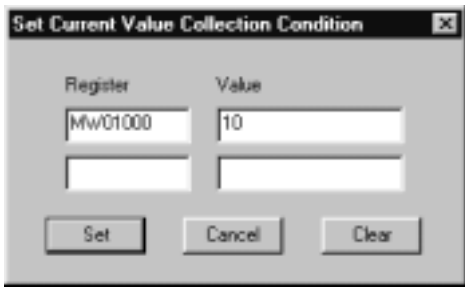
INFO Current values cannot be displayed in Offline Mode.

(1) Synchronously Updating Current Values

The values of designated S, I, O, M, D, C, and # registers, the values of subscript registers I and J, and current program values when ON/OFF condition has been met for a designated relay number will be displayed. The data display will be updated when the condition is met. If the condition is not met, the display will remain at the previous values. Up to two registers can be set at the same time. If two registers are set, an AND of the individual conditions will be used.

Synchronously update current values using the following procedure.

1. Select ***Debug*** – ***SYNC*** from the LADDER Menu.
2. Enter the register numbers and values in the Set Current Value Collection Condition Window and click the **Set** Button.



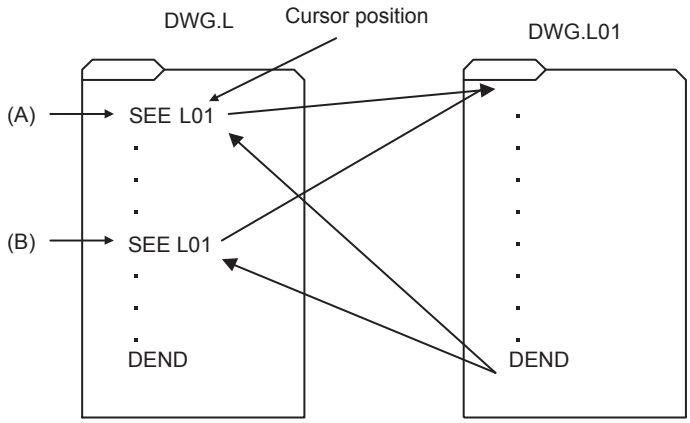
The current values will be updated when the set condition is met.

INFO Click the **Clear** Button in step 2 to clear all the set updating conditions for current values.

(2) Displaying Current Values Using the REFER Command

If the cursor is on the SEE instruction or a user function symbol, the SEE instruction or user function symbol will be expanded into the DWG program or user function program using the REFER command. Accordingly, the current values when the SEE instruction or the FUNCTION CALL instruction (FSTART) is executed can be displayed.

Move the cursor to position (A) in DWG.L in the following figure, and execute the refer operation to open the DWG.L01 Program Window. The current value displayed for DWG.L01 will be the value displayed when the SEE instruction is executed at position (A) in DWG.L. The value when the SEE instruction is executed at position (B) will not be displayed.



Display current values with the REFER command using the following procedure.

1. Move the cursor to the DWG number or function symbol position for the SEE or FSTART instruction.
2. Select ***Debug*** – ***REFER*** from the LADDER Menu.
   The LADDER Window being called will be displayed.

(3) Pausing Updating of Current Values

Select ***Debug*** – ***HOLD*** from the LADDER Menu to pause updating of current values.

Execute the HOLD command again when the updating of current values is paused to restart the updating of current values.

9.3.9 Creating Comments

Create register comments using the following procedure.

1. Select ***View*** – ***Comment Bar*** from the LADDER Menu to open the Comment Window.

2. Enter a register number.
3. Enter a symbol of up to 8 characters.
4. Enter a comment of up to 48 characters.
5. Press the **Enter** Key. The comment will be written simultaneously to a comment file.
6. Repeat steps 2 to 5 to enter the next comment. Select ***View*** – ***Comment Bar*** again to close the Comment Window.

INFO

- If the cursor is moved to a register number before performing step 1, that register number will be displayed as the default in step 2.
- The symbol entered in step 3 is different from the symbol defined on the Symbol Definition Tab Page in the Drawing Properties Window.

9.3.10 Saving Ladder Programs

This section explains how to save ladder programs and the configuration of the Save Error Window.

Ladder programs are saved to the Machine Controller and the Programming Device hard disk in Online Mode, and to the Programming Device hard disk in Offline Mode.

If a LADDER Window for a DWG or function program is open, all related programs such as SFC and table programs will be saved at the same time.

Save ladder programs using the following procedure.

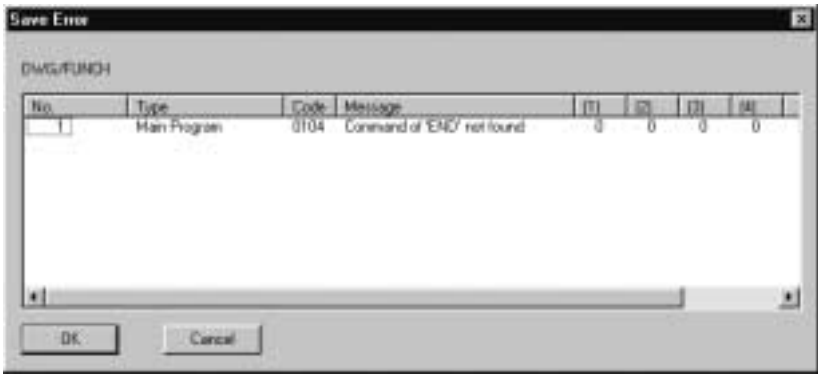
1. Select ***File*** – ***Save*** from the LADDER Menu.
2. Click the **Yes** Button in the message box.
3. Click the **OK** Button in the message box.

IMPORTANT

An insufficient memory error may occur when saving. Refer to *10.4.1 Compile Execution* for details.

- Save Error Window Configuration

The ladder program will be compiled when it is saved. If a compile error is detected, the Save Error Window will be displayed.



Display	Details
Type	Displays the type of program for which an error was detected.
Code	Displays the code number for the error.
Message	Displays the error message.
(1)	The step number for which an error was detected will be displayed for main programs and SFC programs. The line number for which an error was detected will be displayed for table programs and tuning panels.
(2)	This data is disabled for main programs and SFC programs. The row number for which an error was detected is displayed for table programs and tuning panels.
(3)	This data is disabled for main programs, SFC programs, table programs other than interlock tables, and tuning panels. For Create Interlock Table Windows, the subtable number for which the error was detected will be displayed.
(4)	This data is not available in the current version.

Move the cursor to any error in the Save Error Window to highlight it and then click the **OK** Button to move the cursor to the position where the error was detected.

Click the **Cancel** Button to close the Save Error Window.

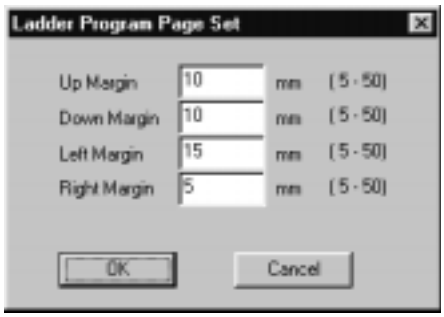
9.3.11 Printing Ladder Programs

Ladder programs can be printed from the LADDER Window without starting up the Print Manager. Only the ladder program that is currently open, however, will be printed.

(1) Page Settings

Set the print page margins using the following procedure.

1. Select ***File*** – ***Page Setting*** from the LADDER Menu.
2. Set each margin in the Ladder Program Page Set Window, and click the **OK** Button.



(2) Printing

Print the ladder program currently displayed using the following procedure.

1. Select ***File*** – ***Print Program*** from the LADDER Menu.
2. The Print Setup Window will be displayed. Set the printer name and click the **OK** Button.

INFO Refer to the relevant printer manual for the print settings in step 2.

9.3.12 Closing Ladder Program Editing

The edit process for ladder programs is exited by closing the LADDER Window.

Select ***File*** – ***Close*** from the LADDER Menu to close the LADDER Window.

9.4 Creating Table Programs

This section explains how to create table programs.

Tables can be used to easily create constant tables or ladder programs by entering register numbers, contact types, interlock information, and other data.

There are six types of tables:

Table 9.3 Table Programs

Table Program	Details
Constant TBL (# REG) [Constant tables (# register)]	Creates tension control parameters, position control parameters, and other constants specific to a DWG or function program.
Constant TBL (M REG) [Constant tables (M register)]	Creates mechanical and electrical equipment specifications and other constants used by all DWG and function programs.
I/O Conversion TBL [I/O conversion tables]	Creates scale conversions for numeric data and signal conversions for bit signals.
Interlock TBL (Interlock tables)	Creates device startup and operating conditions and other interlocks.
Part Composition TBL [Part composition tables]	Simultaneously creates multiple solenoid valve circuits, auxiliary sequence circuits, and other standard circuits.
Constant Table (C Register) (C constant tables)	Creates constant tables used in all DWG and function programs, e.g., items for facilities or products.

9.4.1 Opening Table Program Windows

Except for the Constant Table (C Register) Map Window, the Table Program Windows can be opened from the File Manager and the Engineering Manager.

(1) Opening from the File Manager

1. Click the drawing number in the Directory Tree.
2. Select ***File*** – ***Open*** from the File Manager Menu.
3. Select the type of table from the submenu.

(2) Opening from the Engineering Manager

1. Select ***File*** – ***Open*** – ***Program*** from the File Manager Menu.
2. The submenu will be displayed. Select the type of table from the five types described in *Table 9.3 Table Programs*.

Refer to the following sections to input table program data after opening the Table Program Window.

- *9.4.4 Entering # Register Constant Table Data*
- *9.4.5 Entering M Register Constant Table Data*
- *9.4.6 Entering I/O Conversion Table Data*
- *9.4.7 Entering Interlock Table Data*
- *9.4.8 Entering Part Composition Table Data*

- C constant tables cannot be opened from the File Manager. Select ***File − Open − C Register − C Register Map*** from the Engineering Manager Menu.
- The Open DWG Setting Window will be opened if a Table Program Window is opened when no DWG or function program is open. Enter the DWG name and type, and click the **OK** Button.
- The table program is set for the DWG or function ladder program from which it was opened. Therefore, if different DWG number or function symbol table programs are to be set, the ladder program for that DWG number or function symbol must be opened.

9.4.2 Table Program Menus

The following table shows the menu commands and functions displayed in the Table Program Windows.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the Table Program Windows.
	Save	Saves table programs.
	Delete	The delete function cannot be used with Table Program Windows.
	Page Setting	Sets print paper margins.
	Print Table	Prints table programs.
	Exit	Exits the Engineering Manager.
Edit		
	Cut	Cuts table data.
	Copy	Copies table data to the clipboard.
	Paste	Copies the contents of the clipboard.
	Delete Row	Deletes multiple consecutive rows.
	Insert Row	Inserts a row.
Input		
	Input Setting Data	Switches to settings input mode.
	Input Table Definition	Switches to table definition input mode.
	Input Register	Switches to register input mode.
	Direction of Cursor Movement	Sets the direction for cursor movement.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Display Head Row	Moves the cursor to the first row in the table.
	Display Designated Row	Moves the cursor to a specific row.
	Display Last Row	Moves the cursor to the last row in the table.
	Next Page *	Moves the cursor to the next page of the table.
	Previous Page *	Moves the cursor to the previous page of the table.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

* The Next Page (N) and Back Page (B) operations are displayed for # register constant tables.

9.4.3 Switching Input Modes

The input modes for input table data can be switched to select the most efficient mode. The direction the cursor will move after cell data input can also be specified.

(1) Table Data Input Modes

Input Mode	Details
Settings Input Mode	Only setting cells can be entered in Settings Input Mode. No inputs can be made to other cells. Select ***Input − Input Setting Data*** from the Table Program Menu.
Table Definition Input Mode	Data can be entered into any cell in the table. Select ***Input − Input Table Definition*** from the Table Program Menu.
Register Input Mode	Only register numbers can be entered in Register Input Mode. No inputs can be made to other cells. Select ***Input − Input Register*** from the Table Program Menu.

(2) Switching Cursor Movement Direction

Switch the cursor movement direction after table data has been entered and the **Enter** Key pressed using the following procedure.

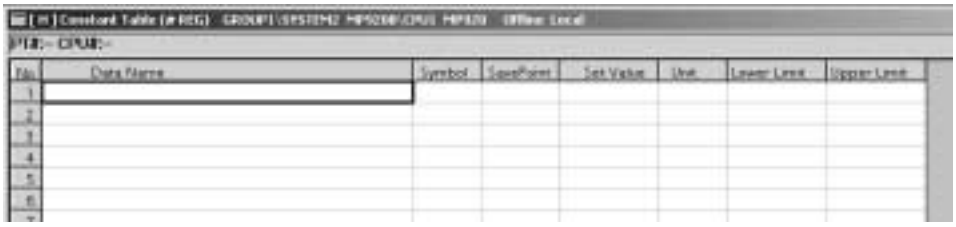
1. Select ***Input – Direction of Cursor Movement*** from the Table Program Menu.
2. The Designate Direction of Cursor Movement Window will be displayed. Specify the direction of movement from ***Horizontal Direction (Right)***, ***Vertical Direction (Down)***, or ***No movement*** and click the **OK** Button.

9.4.4 Entering # Register Constant Table Data

register constant tables are created by entering constants (integer, double-length integer, and real number), symbols, and # register numbers.

When a # register constant table is saved, the constants are automatically converted and the results placed in the # registers after the upper and lower limits of each constant have been checked.

Table data can be created for as many # registers as are set on the Drawing Properties Tab Page in the Drawing Properties Window.



Setting	Details
Data Name	Enter constant names of up to 48 characters.
Symbol	Enter a symbol of up to 8 characters to be used for the destination # register.
Save Point	Enter the # register number to which the constant will be saved.
Set Value	Enter the constant to be saved to the # register. When entering values in hexadecimal, add an H to the beginning of the value, such as H00FF. When entering settings, enter values within the range in the *Lower Limit* and *Upper Limit* columns. The settings will be checked against these limits.
Unit	Enter a unit for the constant of up to 8 characters.
Lower Limit	Enter the lower limit of the constant.
Upper Limit	Enter the upper limit of the constant. The lower limit must be equal to or less than the upper limit.

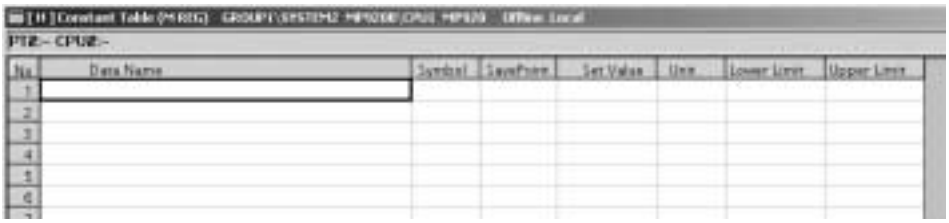
IMPORTANT

- *Save Point, Set Value*, *Lower Limit*, and *Upper Limit* must be set. An error will occur when the table is saved if these are not set.
- # register constant tables cannot be created if the number of # registers is set to 0 on the Drawing Properties Tab Page in the Drawing Properties Window.

9.4.5 Entering M Register Constant Table Data

M register constant tables are created by entering constants (integer, double-length integer, real number, and hexadecimal constants), symbols, and M register numbers. When an M register constant table is saved, it is automatically converted to a subroutine that saves the constants to M registers after the upper and lower limits of each constant have been checked. The subroutines can be called by using the XCALL instruction in the main program.

Up to 200 rows of table data can be entered.



Setting	Details
Data Name	Enter constant names of up to 48 characters.
Symbol	Enter a symbol of up to 8 characters to be used for the destination M register.
Save Point	Enter the M register number to which the constant will be saved.
Set Value	Enter the constant to be saved in the M register. When entering in hexadecimal, add an H to the beginning of the value, such as H00FF. When entering settings, enter values within the range in the *Lower Limit* and *Upper Limit* columns. The settings will be checked against these limits.
Unit	Enter a unit for the constant of up to 8 characters.
Lower Limit	Enter the lower limit of the constant.
Upper Limit	Enter the upper limit of the constant. The lower limit must be equal to or less than the upper limit.

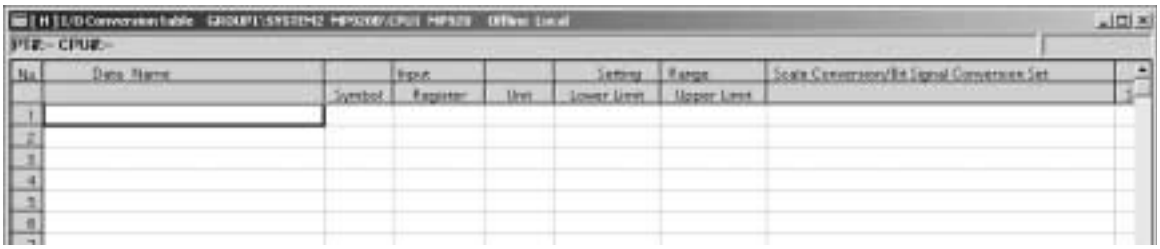
INFO

The *Save Point, Set Value*, *Lower Limit*, and *Upper Limit* must be set. An error will occur when the table is saved if these are not set.

9.4.6 Entering I/O Conversion Table Data

Input registers and conversion equations are designated in I/O conversion tables, and the output register to which the result of the conversion will be saved is defined. When a I/O conversion table is saved, it is automatically converted to a subroutine that converts the values in the input registers according to the conversion equation and saves the results in the output registers. An additional equation that checks the upper and lower limits can be added for the results of the scale conversion. Subroutines can be called by using the XCALL instruction in the main program.

Up to 200 rows of table data can be entered.



Setting		Details
Data Name		Enter a name of up to 36 characters.
Input	Symbol	Enter a symbol of up to 8 characters to be used for the input register.
	Register	Enter the input register number. The current value will be displayed in Online Mode.
	Unit	Enter a unit of up to 8 characters for the input register value.
Setting Range	Lower Limit	Enter the lower limit for the check after scale conversion.
	Upper Limit	Enter the upper limit for the check after scale conversion.
Scale Conversion/Bit Signal Conversion Set		Enter the equation for converting the input register values. Leave a space between the input equation values and the operands. Refer to the *Machine Controller MP900 Series User's Manual: Ladder Programming* (SIEZ-C887-1.2) for information on conversion equations.
Output	Symbol	Enter a symbol of up to 8 characters to be used for the output register.
	Register	Enter the number of the output register to which the scale-converted value from the input register is to be saved.
	Unit	Enter a unit of up to 8 characters for the output register value.

IMPORTANT

- The *Register* in *Input* and *Register* in *Output* must be set. An error will occur when the table is saved if they are not set.
- I/O conversion tables cannot be created for user functions.

9.4.7 Entering Interlock Table Data

Interlock tables define the device startup and operation and other interlock conditions. Interlock conditions are defined by entering symbols, bit register numbers, and signal type (N.O. CONTACT, N.C. CONTACT, or COIL). When an interlock table is saved, it is automatically converted to a subroutine made up of N.O. CONTACTs, N.C. CONTACTs, and COILs. Subroutines can be called by using the XCALL instruction in the main program.

Refer to the following sections.

- Entering table data
- Switching between subtables and main tables
- Splitting and joining blocks
- Registering comments

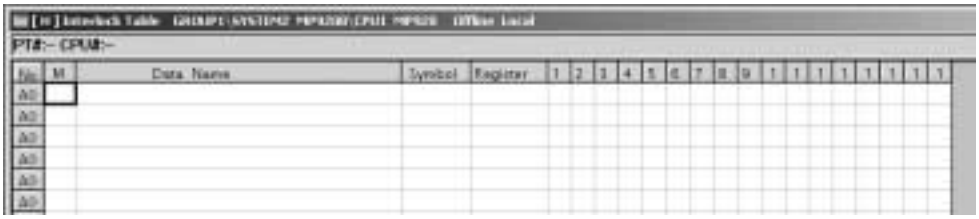
TERMS

Interlock tables

Interlock tables are a type of table program that show device startup and operating conditions.

(1) Entering Table Data

Up to 500 rows and 25 columns of table data can be entered.



Setting	Details
No.	The row number for each block is displayed. The blocks are numbered alphabetically, and are followed by a numeric row number.
M (Mode)	Enter the input mode for interlock conditions as I, S, O, or X. Refer to *Table 9.4 Interlock I/O Modes* given after this table.
Data Name	Enter a name of up to 48 characters.
Symbol	Enter a symbol of up to 8 characters to be used for the register number to be interlocked.
Register	Enter the bit register number that controls the interlock.
Signal (1 to 17)	Enter the interlock condition. Enter ***A*** for N.O. CONTACT, ***B*** for N.C CONTACT, and ***C*** for COIL. ( ) will be displayed for N.O. CONTACT, ( ) for N.C. CONTACT, and ( ) for COIL.

Table 9.4 Interlock I/O Modes

M (Mode)	Details
I	Used when defining input signals. N.O. CONTACT ( ) and N.C. CONTACT ( ) can be input in columns 1 to □□ in rows defined in this mode.
S	Used when entering table data in subtables. This mode is effective only for main tables. The subtable output and the main table input symbols (or registers) must be the same.
O	Used when defining output signals. COIL ( ) can be input in columns 1 to □□ in rows defined in this mode.
X	Used when defining output signals as input signals. Nothing has to be set for the *Register* when this mode has been input. Define the same symbol output within the main table if working with the main table, and within subtable 1 if working within subtable 1.

INFO

■ Deleting Condition Signals

Select the signal to be deleted and press the Space Bar. The column for the deleted signal will be cleared.

IMPORTANT

- The *M* (Mode), *Register*, and Signal must be set. An error will occur when the table is saved if these are not set.
- Interlock tables cannot be created for user functions.

(2) Switching Between Subtables and Main Tables

Interlock tables are made up of one main interlock table and interlock subtables which correspond to rows in the main interlock table.

Subtables are created when interlock conditions are divided into different levels. The subtable numbers are determined by the row number in the main table, with the subtable for row A01 being called subtable A01, and the subtable for row B02 being called subtable B02.

Select ***View – Sub Table/Main Table*** from the Table Program Menu to switch between main tables and subtables.

INFO

When switching from main tables to subtables, the cursor must already be in the row in the main table.

No subtable can be displayed for a row where data other than ***S*** is set in the *M* (Mode).

(3) Splitting and Joining Blocks

Interlocks can be split into a maximum of 26 blocks, to treat each block as an independent interlock.

Split and join blocks using the following procedure.

1. Move the cursor to the block to be split or joined.

2. Select ***View – Block Division*** from the Table Program Menu.

   The block will be split or joined.

INFO

- Each time the split/join operation is executed, splitting and joining blocks will be performed alternately.
- Blocks in subtables cannot be split, and one interlock cannot be extended across multiple blocks. Each interlock must consist of one block only.

(4) Registering Comments

Select whether or not to register the data in the *Data Name* column as the register comment for the same row using the following procedure.

1. Select ***Edit – Entry Comment*** from the Table Program Menu.
2. Select either *Register name as comment* or *Do not register name as comment* in the Comment Registration Selection Window.
3. Click the **OK** Button.

9.4.8 Entering Part Composition Table Data

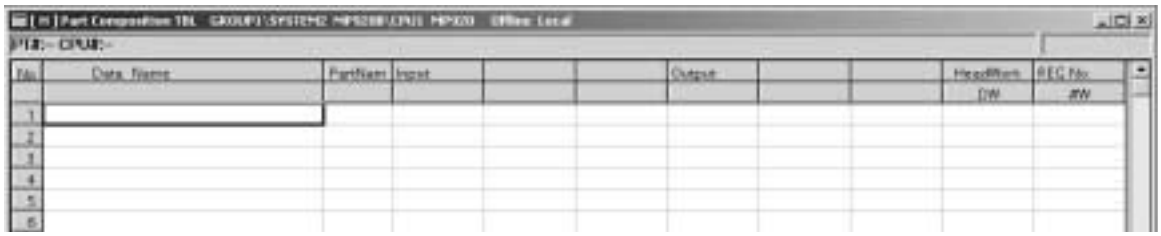
Part composition tables are created by entering I/O register numbers for user functions and work register numbers. When a part composition table is saved, each row of the part composition table is treated as one function program, the register numbers in the user function programs are re-allocated, and a subroutine is created containing the same functions. Subroutines can be called by using the XCALL instruction in the main program.

Refer to the following sections.

- Entering table data
- Switching part units
- Switching table formats

(1) Entering Table Data

Up to 100 rows of table data can be entered. Only 32 columns in total of input and output data, however, can be entered.



Setting	Details
Data Name	Enter a name of up to 36 characters.
Part Name	Enter an existing user function signal. After the signal is input, the I/O signals for user functions will be displayed automatically.
Input	Enter the input register numbers or direct values to be allocated to each user function input. Add an H to the beginning of the values when entering in hexadecimal.
Output	Enter the output register numbers for allocating each user function output.
Head Work, REG No. (DW, #W) (D or # Register No. for Work Register)	Enter the D register number or # register number for allocating the work registers used within the user function.

- Part composition tables cannot be created for user functions.
- The default number of columns for *Input* and *Output* in the part composition table will contain three columns each by default. The number of columns must be increased beforehand when inputting functions with four or more I/Os for the *Part Name*.

(2) Switching Part Units

Switch between single part or multiple part composition tables using the following procedure.

1. Select ***View – Designate Part Unit*** from the Table Program Menu. The Designate Part Unit Window will be displayed.
2. Designate the part unit, *Single Selection* or *Multiple Designation*, in the window and click the **OK** Button. The table unit will be switched and the part composition table will be displayed.

(3) Switching Table Formats

There are two formats for part composition tables: Normal display, which displays register numbers only, and Symbol + Settings display which displays register numbers and user function symbols.

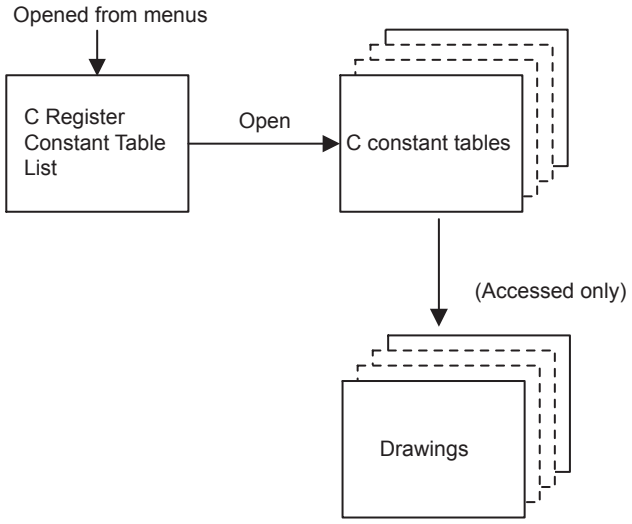
To switch between Normal display and Symbol + Settings display, select ***View – Disp Selection*** from the Table Program Menu.

The table format will be switched and the part composition table displayed.

INFO The table format cannot be switched if *Single Selection* is selected in the Designate Part Unit Window.

9.4.9 Entering Data in C Constant Tables

C registers are registered on C constant tables and can be only accessed from DWG and function programs.
Up to 200 C registers can be registered and are managed as a unit using the C Register Constant Table List.

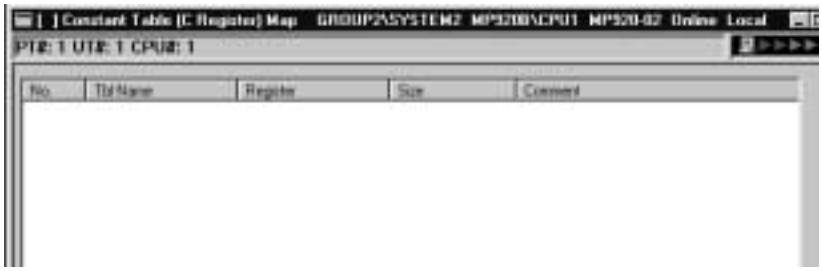


(1) Outline of Creation Procedure

1. Open the C register constant table list. (Refer to *9.4.1 Opening Table Program Windows*.)
2. Select a C constant table or create a new one.
3. Open the C constant table.
4. Edit the C constant table.
5. Save the C constant table.

(2) Configuration of Constant Table (C Register) Map Window (C Register Constant Table List Window)

The C Register Constant Table List Window displays a list of the registered C constant tables in ascending order. The C Constant Table Window can be opened and C register data defined from the C Register Constant Table List Window.



Display	Details
No.	Number within table.
Tbl Name (Table Name)	Displays the C constant table names.
Register	Displays the number of the leading C register.
Size	Displays the number of C registers starting from the leading C register number in words.
Comment	Displays the C constant table comments.

(3) C Register Constant Table List Menu

The following table shows the menu commands and functions displayed in the C Register Constant Table List Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the C Register Constant Table List Window.
	Constant Table	Opens C constant tables.
	New Open	Creates a new C constant table.
	Delete	Deletes C constant tables.
	Update	Modifies C constant tables.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

(4) Operation in the C Register Constant Table List Window

The following operations are possible in the C Register Constant Table List Window.

- Opening C constant tables
- Creating new C constant tables
- Deleting C constant tables
- Modifying C constant table information

(a) Opening C Constant Tables

1. Click the C constant table number in the *No.* column on the C constant table.

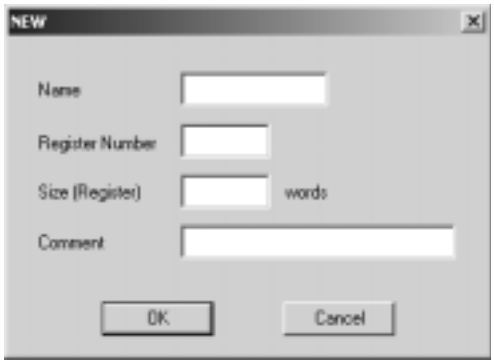
2. Select ***File*** – ***Constant Table (C)*** from the C Register Constant Table List Menu. The C constant table selected in step 1 will be opened.

The C Constant Table Window can also be opened by double-clicking the table number in step 1.

(b) Creating New C Constant Tables

Create new C constant tables using the following procedure. When a new table is created, the C constant table for that table will be opened.

1. Select ***File*** – ***New Open*** from the C Register Constant Table List Menu. The New Window will be displayed.



2. Enter the table name for *Name*, leading register number for *Register Number*, size for *Size C Register*, and comment for *Comment* in the New Window and click the **OK** Button.
3. The C Constant Table Window will be displayed.

INFO

Enter a table name of up to 8 characters. Enter a leading register number between CW0 and CW4095. The sum of the leading register number and number entered for the *Size* must be 4096 or less. Leading register numbers and register sizes that overlap with other C register ranges cannot be input.

(c) Deleting C Constant Tables

Delete C constant tables using the following procedure.

1. Click the *No.* of the C constant table to be deleted.

2. Select ***File*** – ***Delete*** from the C Register Constant Table List Menu.
3. Click the **Yes** Button in the message box.
   The C constant table selected in step 1 will be deleted.

(d) Modifying C Constant Table Information

Modify the register range and other C constant table information using the following procedure. The C Constant Table Window for that C constant table will be displayed after the modifications have been made.

1. Click the *No.* of the C constant table to be modified.

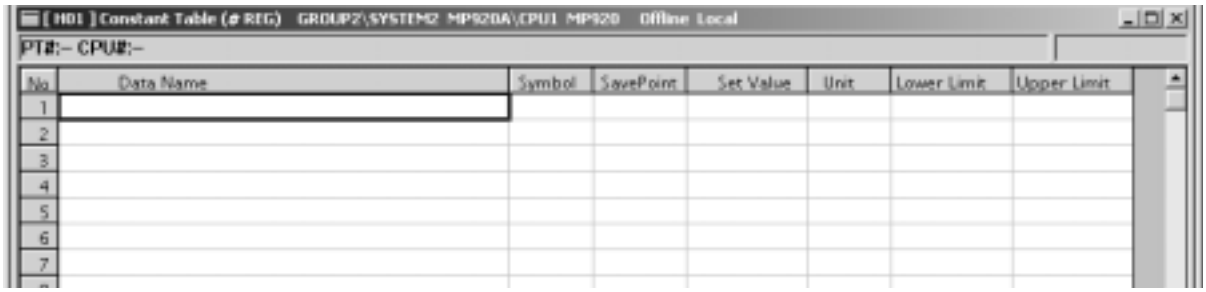
2. Select ***File*** – ***Update*** from the C Register Constant Table List Menu. The Update Window will be displayed.
3. Select the items to be modified in the Update Window and click the **OK** Button. The C Constant Table Window will be displayed.

INFO

The name of the register table cannot be modified. Enter a leading register number between CW0 and CW4095. The sum of the leading register number and the number entered for *Size* must be 4096 or less. Leading register numbers and register sizes that overlap with other C register ranges cannot be input.

(5) Opening C Constant Table Windows

C constant tables are opened by selecting the corresponding C constant table number in the C Register Constant Table List Window and then selecting ***File – Constant Table (C)***. They can also be opened by double-clicking the corresponding C constant table number.



(6) C Constant Table Menu

The following table shows the functions of menu commands in the C Constant Table Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the C Constant Table Window.
	Save & Save to Flash	Saves to flash memory.
	Save	Saves C constant tables.
	Delete	Not used with this window.
	Page Setting	Sets print paper margins.
	Print Table	Prints C constant tables.
	Exit	Exits the Engineering Manager.
Edit		
	Cut	Cuts table data.
	Copy	Copies table data to the clipboard.
	Paste	Reproduces data on the clipboard.
	Delete Row	Deletes multiple consecutive rows.
	Insert Row	Inserts a blank row.
Input		
	Input Setting Data	Switches to Settings input mode.
	Input Table Definition	Switches to Table Definition input mode.
	Input Register	Switches to Register input mode.
	Direction of Cursor Movement	Changes the direction of cursor movement.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Display Head Row	Moves the cursor to the first row of the table.
	Display Designated Row	Moves the cursor to a specific row in the table.
	Display Last Row	Moves the cursor to the last row of the table.

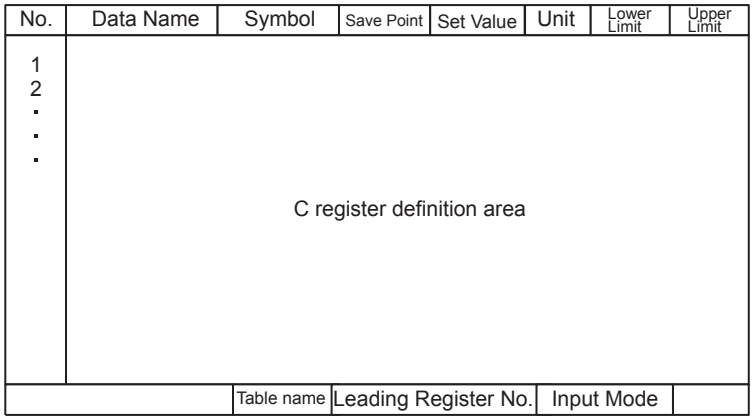
(Cont'd)

Menu Command		Function
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

(7) Setting C Constant Tables

C registers are created by entering constants (integer, double-length integer, real number, and hexadecimal constants), symbols, and C register numbers. When a C register table is saved, the constants are automatically converted to C registers after the upper and lower limits of each constant are checked.

Table data can be created for as many C registers as are currently open.



Setting	Details
Data Name	Enter a name for each constant of up to 48 characters.
Symbol	Enter a symbol of up to 8 characters to be used for the destination C register.
Save Point	Enter the C register number to which the constants will be saved.
Set Value	Enter the constant to be saved to the C register. When entering in hexadecimal, add an H to the beginning of the value, such as H00FF. When entering settings, enter values within the range in the *Lower Limit* and *Upper Limit* columns. The settings will be checked against these limits.
Unit	Enter a unit for the constant of up to 8 characters.
Lower Limit	Enter the lower limit of the constant.
Upper Limit	Enter the upper limit of the constant. The lower limit must be less than or equal to the upper limit.
Table Name	Displays the name of the currently displayed C constant table.
Leading Register No.	Displays the leading C register number in the currently displayed C constant table.
Input Mode	Displays the current input mode.

IMPORTANT

The *Set Value*, *Lower Limit*, *Upper Limit*, and *Save Point* must be set. An error will occur when the table is saved if these are not set.

9.4.10 Editing Table Programs

This section describes the editing functions used for all table programs. Table programs can be edited by row, column, or block.

- Moving the cursor
- Selecting table cells to edit
- Cutting and pasting table data
- Inserting and deleting rows
- Inserting and deleting columns

(1) Moving the Cursor

The cursor is normally moved by pressing the Cursor Keys or clicking a cell in the table. The cursor can also be moved to the first or last row and the previous or next page as required.

(a) To First Row

Select ***View*** – ***Display Head Row*** from the Table Program Menu. The cursor will move to the first row in the table.

(b) To Last Row

Select ***View*** – ***Display Last Row*** from the Table Program Menu. The cursor will move to the last row in the table.

(c) To Specific Row

1. Select ***View*** – ***Display Designated Row*** from the Table Program Menu. The Setting display row Window will be displayed.
2. In the Setting display row Window, enter the row number to which the cursor is to be moved and click the **OK** Button. The cursor will move to the specified row.

(d) To Next Page (Valid only for # Register Constant Tables)

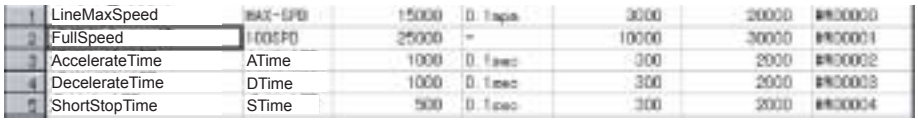
Select ***View*** – ***Next Page*** from the Table Program Menu. The cursor will move to the first row of the next page.

(e) To Previous Page (Valid only for # Register Constant Tables)

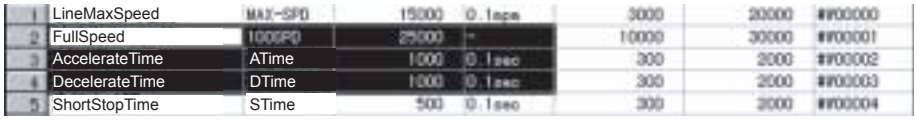
Select ***View*** – ***Back Page*** from the Table Program Menu. The cursor will move to the first row of the previous page.

(2) Selecting Table Cells to Edit

1. Click the top-left cell of the section to be edited.



2. Drag the cursor to the bottom-right cell of the section.



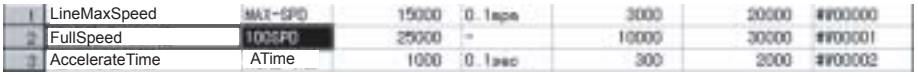
(3) Cutting and Pasting Table Data

Table cells can be cut, copied, and pasted. The table data editing functions can be used only in Table Definition Input Mode. Select ***Input*** – ***Input Table Definition*** from the C Constant Table Menu to enter the Table Definition Input Mode.

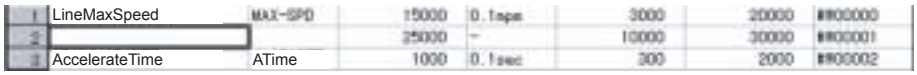
(a) Cutting Table Data

Cut table data within a specified section using the following procedure. Cut data is copied to the clipboard, and this data can be reproduced multiple times by using the paste operation.

1. Select the section to be cut.



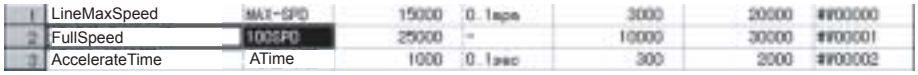
2. Select ***Edit*** – ***Cut*** from the Table Program Menu.
   The data specified in step 1 will be cut.



(b) Copying Table Data

Copy table data within a specified section to the clipboard using the following procedure. This data can be reproduced multiple times by using the paste operation.

1. Select the section to be copied.

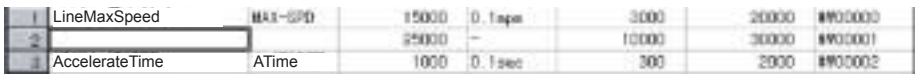


2. Select ***Edit*** – ***Copy*** from the Table Program Menu.
   The section specified in step 1 will be copied to the clipboard.

(c) Pasting Table Data

Paste the contents of the clipboard into a table using the following procedure. The table data that has been previously cut or copied to the clipboard can be pasted. The data on the clipboard can be pasted multiple times, and is cleared and replaced with new data each time the cut or copy operations are used.

1. Move the cursor to the section where the contents of the clipboard is to be pasted.



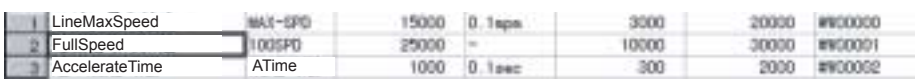
2. Select ***Edit*** – ***Paste*** from the Table Program Menu.
   The data will be reproduced at the position specified in step 1.

(4) Inserting and Deleting Rows

(a) Inserting Rows

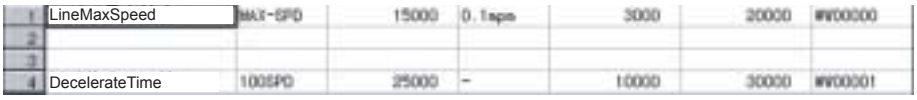
Insert one or more blank rows at any point in the table using the following procedure.

1. Move the cursor to the position where a row is to be inserted.



2. Select ***Edit*** – ***Insert Row*** from the Table Program Menu. The Insert Row Window will be displayed.

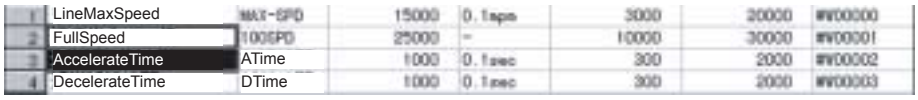
3. Enter the number of rows to be inserted in the Insert Row Window and click the **OK** Button. The number of specified rows will be inserted.



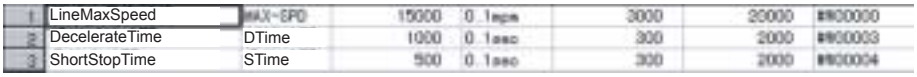
(b) Deleting Rows

Delete one or more consecutive rows using the following procedure.

1. Click the row to be deleted.



2. Select ***Edit*** – ***Delete Row*** from the Table Program Menu.
   The row specified in step 1 will be deleted.



INFO All of the rows currently displayed cannot be deleted.

(5) Inserting and Deleting Columns

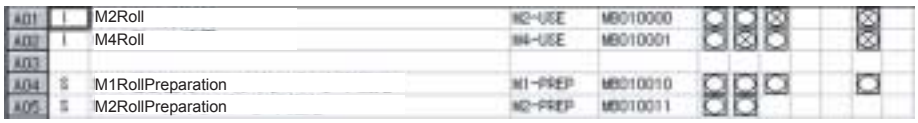
Columns can be inserted or deleted in interlock or part composition tables.

(a) Inserting Columns

Insert one or more column at the cursor position using the following procedure.

1. Move the cursor to the position where the column is to be inserted.

2. Select ***Edit*** – ***Insert Column*** from the Table Program Menu. The Column Insert Window will be displayed.
3. Enter the number of columns to be inserted in the Column Insert Window and click the **OK** Button. The number of specified columns will be inserted.



INFO Columns can be inserted in the *Signal* columns (1 to 17) in interlock tables, and in the *Input* and *Output* columns in part composition tables.

(b) Deleting Columns

Delete one or more consecutive columns using the following procedure.

1. Select part of the column to be deleted.

2. Select ***Edit*** – ***Delete Column*** from the Table Program Menu.
   The column or columns specified in step 1 will be deleted.

INFO

Columns can be inserted in the *Signal* columns (1 to 17) in interlock tables, and in the *Input* and *Output* columns in part composition tables.

9.4.11 Saving and Closing Table Programs

(1) Saving

If a LADDER Window for DWG or function program window is open, all programs, such as main programs, will be saved at the same time.

1. Select ***File*** – ***Save*** from the Table Program Menu.
2. A window to confirm saving will be displayed. Click the **Yes** Button.
3. Click the **OK** Button in the window to inform normal completion of saving.

IMPORTANT

- Interlock tables can be saved even if contact and COIL settings have not been made. This improves the operability of the MPE720 by allowing the user to temporarily interrupt programming. The contact and COIL settings must be made, however, before the program is executed.
- The table programs will be compiled when they are saved. The Save Error Window will be displayed if a compile error is detected.
- Refer to *Save Error Window Configuration* in *9.3.10 Saving Ladder Programs* for information on the Save Error Window.

(2) Closing

The process of creating table programs can be exited by closing the Table Program Window.

Select ***File*** – ***Close*** from the Table Program Menu to close the Table Program Window.

9.4.12 Printing Table Programs

Table programs can be printed from the Table Program Window without starting the Print Manager. Only the table program that is currently open, however, will be printed.

Refer to *9.3.11 Printing Ladder Programs* for information on page settings and printing.

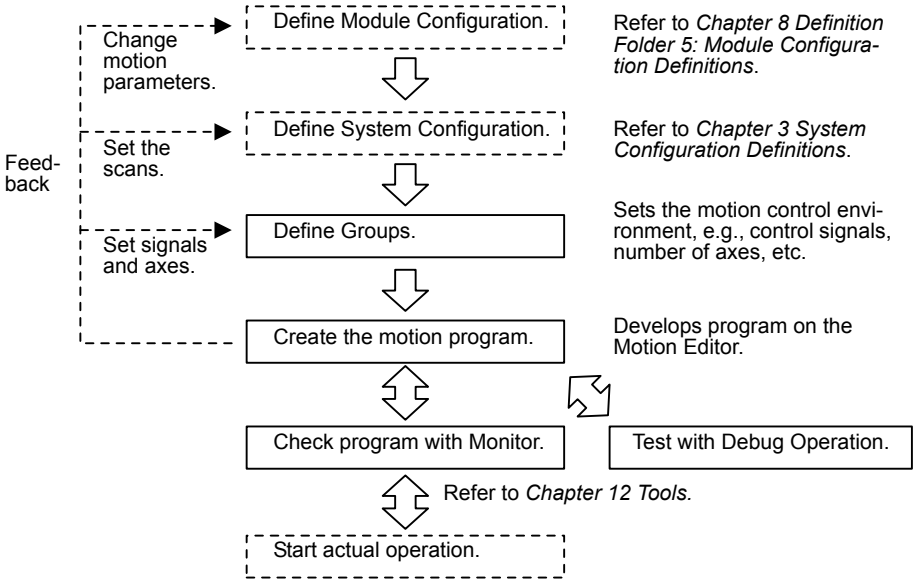
10

Program Folder 2: Motion Programming

This chapter describes the procedure to develop motion programs.

10.1 Developing Motion Programs

The following figure outlines the procedure to develop motion programs. It is assumed that the module configuration and system configuration have already been defined.



10.2 Group Definitions

This section explains how to set definitions for the groups, which are important settings for executing motion programs.

IMPORTANT

Groups can be defined only in offline mode and logging on.

If you are in online mode, log off and then log in again in offline mode to enable defining the group. Group Definitions can be referenced in either online or offline mode.

10.2.1 Outline of Group Definitions

(1) Groups

One group defines all of the axes for managing one set of control signals. The same axis cannot be defined in more than one group.

(2) Group Registration

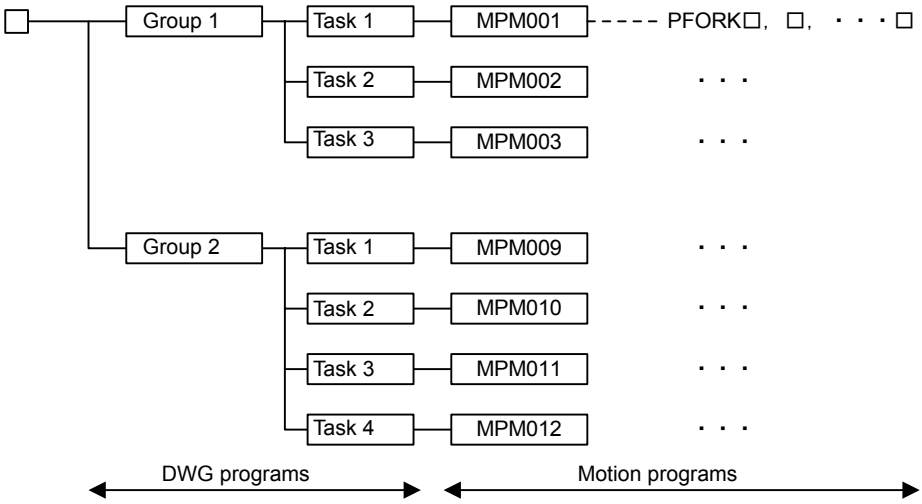
Several groups can be controlled by a Machine Controller. The group is registered mainly by defining the control signals and axis information.

For Machine Controllers for which four groups can be registered, four independent motion programs are executed in parallel by one Machine Controller. At least one group must be registered to execute the motion programs.

(3) Number of Groups and Tasks

With the MP900-series Machine Controllers, the number of groups and the number of tasks is set in the group definitions. The number of motion programs executed in parallel will be the number of groups times the number of tasks in each group.

For example, if there are three tasks in Group 1 and four tasks in Group 2, then seven motion programs will be executed in parallel, as shown in the following figure.



With the MP2000-series Machine Controllers, up to 16 motion programs can be executed in parallel, regardless of the number of groups or the number of tasks.

The maximum number of programs that can be executed in parallel is as follows:

- MP940: 1 group × 4 tasks = 4 programs
- MP930: 4 groups × 4 tasks = 16 programs
- MP920: 8 groups × 8 tasks = 64 programs
- MP2100: 16 programs
- MP2300: 16 programs

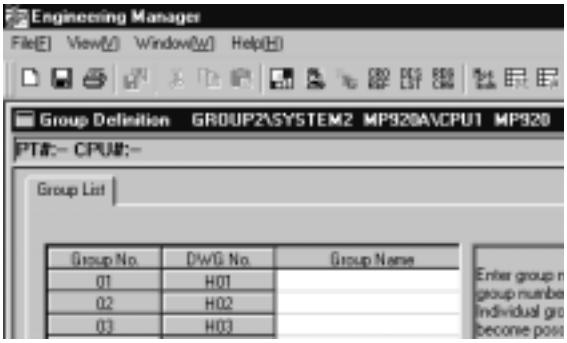
The PFORK command can also be used for executing small tasks, so the number of programs that can be executed in parallel is actually greater than this. Hardware resources are shared, so be sure to consider the effects on overall system performance.

With the MP2100/2300, the maximum number of programs that can be executed in parallel is fixed at 16.

10.2.2 Opening Group Definition Window

To open from the File Manager, double-click the **Group Definition** File Icon.

To open from the Engineering Manager Window, select ***File – Open – Definition – Group Definition***.



(1) Login Information

Login information is displayed below the title bar in the Group Definition Window. Hyphens will be displayed in offline mode.

Login Information	Details
PT#	Displays the communication logical port.
UT#	Displays the unit number of the MP900/MP2000-series Machine Controller.
CPU#	Displays the number of the CPU which was logged onto.

(2) Group Definition Menus

The following table shows the menu commands and functions displayed in the Group Definition Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes the Group Definition Window.
	Save	Saves group definitions.
	Delete	Deletes group definitions.
	Print	Prints group definition contents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Next Page	Displays the next tab page.
	Back Page	Displays the previous tab page.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.

(Cont'd)

Menu Command		Function
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

(3) Tab Pages

The Group Definition Window is composed of several tab pages: the Group List and Group 01 Tab Pages.

Tab Page	Details
Group List	Registers the group names.
Group 01	Sets the detailed group information.

INFO

The tab pages can be scrolled in the following order by selecting ***View − Next Page*** from the menus.

- Group List → Group 01 → Group 02 → ...

To scroll pages in the opposite direction, select ***View − Back Page*** from the menus.

(a) Group List Tab Page

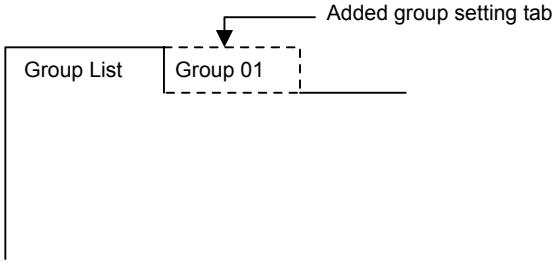
This tab page is used to divide motion programs into multiple groups for processing. Each group has an individual group number, DWG number, and group name. The group number and DWG number are pre-defined, but the user sets the group name on the Group List Tab Page.

Display/Setting	Details
Group No.	Displays the group number. From four to eight groups can be created, depending on the Machine Controller type.
DWG No.	Displays theDWG number that corresponds to the group number. The DWG number cannot be changed. This DWG number indicates the location where the motion program control ladder program is generated when *Create Ladder Dwgs.* (automatic program generation) is specified in the detailed group information. If *Create Ladder Dwgs.* is not specified, the DWG number is not relevant. The contents cannot be changed.
Group Name	Displays and sets the group name with up to 16 characters.
Save Button	Clicking the **Save** Button saves the group name to the Group List.

- Setting Group Names

Set group names using the following procedure.

1. Move the cursor to the position in the *Group Name* column where the group name is to be input.
2. Input the group name and press the **Enter** Key.
3. Click the **Save** Button. A group number tab corresponding to the group name will be added to the window.



(b) Group 01 Tab Page

This tab page is used to define the detailed information for the group.

Detailed group information must be set separately for each group.

Display/Setting	Details	
	MP900 Series	MP2000 Series
Group Name	Displays the name of the group currently being defined.	
Axis (Number of Controlled Axes)	Input the number of axes to be controlled by the group.	
Task (Number of Tasks)	Input the number of main motion programs to be run simultaneously.	This setting is not possible with the MP2000 Series. It is fixed at 16 max.
Group Input Signal	Allocate group input signals for *Create Ladder Dwgs.* (automatic program generation) to I or M registers.	This setting is not possible with the MP2000 Series. *Create Ladder Dwgs.* (automatic program generation) has been removed and so this function has also been removed.
Other (Override Signal)	Define the registers for setting the override signals. The default settings are recommended. If the signals must be changed, use M registers.	This setting is not possible with the MP2000 Series. Set the interpolation override to the third word of the MSEE instruction's work registers.
Create Ladder Dwgs. (Automatic Program Generation)	Specify whether a motion management ladder program is to be generated automatically.	This setting is not possible with the MP2000 Series. This function has been removed.
Program Status/Control (Motion Work Registers)	The MSEE instruction is used to start a motion program from a ladder program for automatically generating motion programs. Define the work registers to be used with the MSEE instruction.	This setting is not possible with the MP2000 Series. *Create Ladder Dwgs.* (automatic program generation) has been removed and so this function has also been removed.
Axis Definition	Allocate a logical axis name, within eight characters, to the physical axis numbers for the number of controlled axes.	
Axis Input Signal	Allocate axis input signals for *Create Ladder Dwgs.* (automatic program generation) to I or M registers.	This setting is not possible with the MP2000 Series. *Create Ladder Dwgs.* (automatic program generation) has been removed and so this function has also been removed.

(Cont'd)

Display/Setting	Details	
	MP900 Series	MP2000 Series
Alarm Out (Alarm Output Register)	Set the leading register number for outputting alarms. M, I, or O integer registers can be specified. The number of continuous alarm registers will be used for the number of parallel processes used for the motion programs in that group. For example, if MW00010 is defined as the leading alarm output register and there are four parallel processes, then MW00010 to MW00013 will be used in order of parallel numbers. MW00010 Parallel process 1 alarm register MW00011 Parallel process 2 alarm register MW00012 Parallel process 3 alarm register MW00013 Parallel process 4 alarm register	With the MP2000 Series, notification of motion program alarms is made to S registers. If motion programs are started individually and there are four parallel processes, notification of alarms will be made to the following registers. SW3268 Parallel process 1 alarm register SW3271 Parallel process 2 alarm register SW3274 Parallel process 3 alarm register SW3277 Parallel process 4 alarm register Refer to *Motion Program Status* on page 10-8 for details on alarm output registers.
Pos Output (Position Output Register)	Define the leading register number for outputting the current position. M, I, or O double-length integer registers can be specified. The number of continuous current position output register will be used for the number of controlled axes. For example, if ML00020 is defined as the leading current position register and there are three controlled axes, then registers ML00020 to ML00024 will be used in order from axis 01. ML00020 Logical axis 01 current position ML00022 Logical axis 02 current position ML00024 Logical axis 03 current position	With the MP2000 Series, notification of the current position is made to S registers. If motion programs are started individually and there are three controlled axes, notification of the current position will be made to the following registers. SL3290 Logical axis 01 current position SL3292 Logical axis 02 current position SL3294 Logical axis 03 current position Refer to *Motion Program Status* on page 10-8 for details on position output registers.
Restart	Sets whether or not to restart from the ABORT status. Consult with your Yaskawa representative before using this feature, for which restrictions exist.	This setting is not possible with the MP2000 Series.

IMPORTANT

The same alarm output registers are used for all tasks. To manage alarms separately for each task when two or more tasks are set, save the contents of the alarm output registers to other registers immediately following the MSEE instruction in the ladder program.

INFO

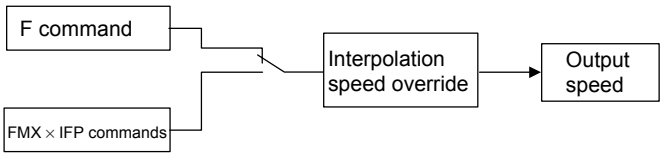
■ Override Signal for MP2000-series Machine Controllers

The interpolation feed speed can be overridden in the range 0% to 327.67%. The override setting is set in the third word of the MSEE instruction's work registers. The interpolation override value depends upon the setting of bit 14 (Interpolation override setting) in the second word of the MSEE instructions's work registers.

Override Enable Bit OFF: Override fixed at 100%.

Override Enable Bit ON: Use preset override.

$$\left(\begin{matrix}\text{F command}\\ \text{FMX} \times \text{IFP commands}\end{matrix}\right) \times \left(\begin{matrix}\text{Interpolation speed over-}\\ \text{ride (100\% = 10,000)}\end{matrix}\right) = \text{Output speed}$$



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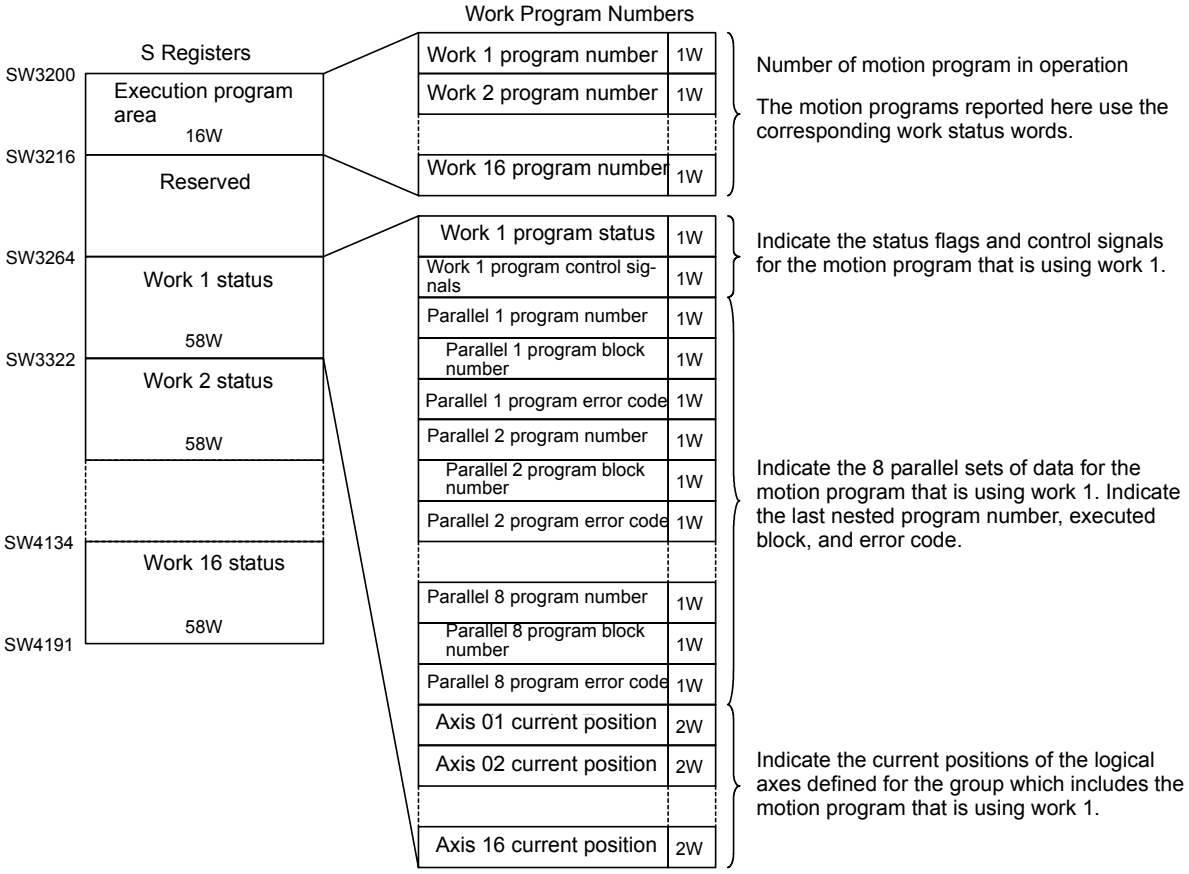
The following move commands are related to the interpolation feed speed:

- F command: F designation in interpolation command
- IFP command: INTERPOLATION FEED SPEED RATIO SETTING
- FMX command: MAXIMUM INTERPOLATION FEED SPEED SETTING
- IAC command: INTERPOLATION ACCELERATION TIME CHANGE
- IDC command: INTERPOLATION DECELERATION TIME CHANGE
- SCC command: S-CURVE TIME CONSTANT CHANGE

■ Motion Program Status

In the MP2000-series Machine Controllers, the status of the motion program is reported in the S registers. The following figure shows the S-registers used by the motion program as well as details on the work status.



1. Work Status used by the Motion Program

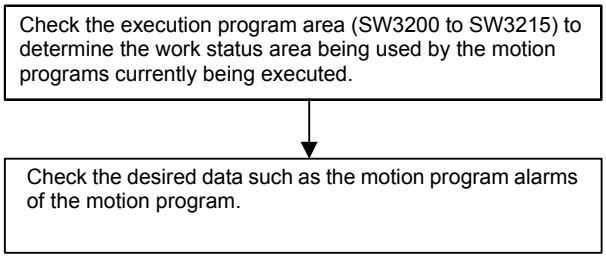
   The main motion program uses a single work status area during operation. The motion program alarms of the motion program and the current positions of the logical axes are displayed in the work status area.

   - Procedure when Specifying the Work Status Area

     To specify the work status area used by the motion program, turn ON bit 13 (System work number setting) in the second word of the MSEE instruction's work registers. When the System work number setting is turned ON, the motion program will used the work status area set in the fourth word (System work number) of the MSEE instruction's work registers. If the specified system work number is out of range or already allocated, bit 14 ("No system work" error) will be turned ON in the first word of the work registers.

   - Procedure when Not Specifying the Work Status Area

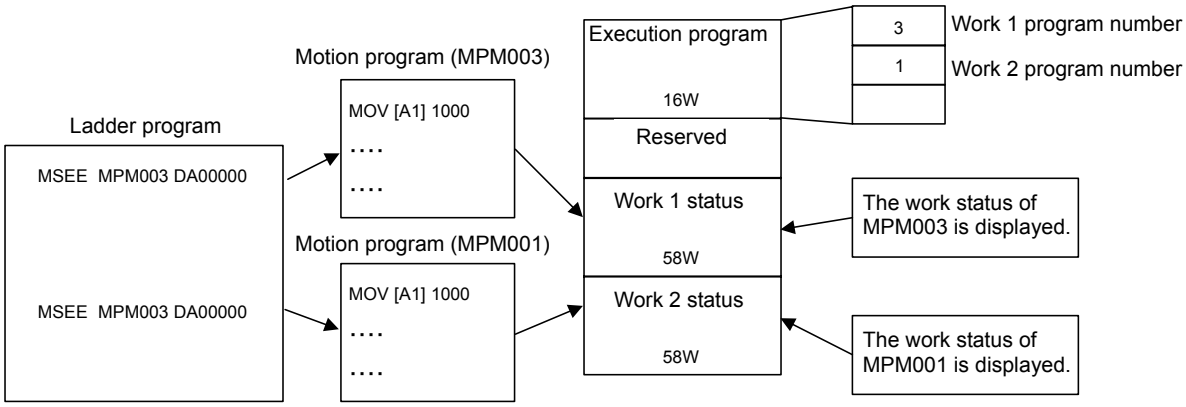
     The work status areas are used in the order that the motion programs are started, beginning from the work 1 status. When two or more motion programs are started in the same scan, the work status areas are used in the order that the MSEE instructions are called. Each work status area is released when the corresponding motion program ends. Follow the steps outlined below to view the motion program alarms of the motion program and the current positions of the logical axes.



◀ EXAMPLE ▶

2. Executing Multiple Motion Programs

In the following example, motion program MPM001 is started after motion program MPM003 is started.



When MPM003 has been started, the number 3 is reported to the work 1 program number (SW3200) in the execution program area and MPM003 uses the work 1 status area. The motion program alarms and current positions of the logical axes can be checked by reading the work 1 status information.

When MPM001 is started after MPM003 has started, the number 1 is reported to the work 2 program number (SW3201) in the execution program area and MPM001 uses the work 2 status area. The motion program alarms and current positions of the logical axes can be checked by reading the work 2 status information.

10.2.3 Saving Group Definitions

Save the group definitions using the following procedure.

1. Select ***File*** – ***Save*** from the Group Definition Menu.
2. Click the **Yes** Button in the Group Definition Message Box.
3. The AUTO EDIT Window will be displayed. Specify the motion program call method, and click the **OK** Button.

4. Click the **OK** Button in the message box.

INFO

- The AUTO EDIT Window is displayed only when the group is defined with automatic program generation enabled when *Create Ladder Dwgs.* is set to *ON* in the Group Definition Window.
- Group definition data can be saved only in offline mode. This data is thus not written to the Machine Controller when it is saved. It is necessary to connect online to the Machine Controller and then transfer the group definition data.

10.2.4 Deleting Group Definitions

Delete group definitions data using the following procedure.

1. Select ***File*** – ***Delete*** from the Group Definition Menu.
2. Click the **Yes** Button in the message box.

When a group is deleted, all of the group definition data will be deleted.

10.2.5 Closing Group Definitions

Defining a group is completed by closing the Group Definition Window.

To exit group definitions, close the Group Definition Window by selecting ***File*** – ***Close***.

10.3 Creating Motion Programs

This section explains the basics of motion programming, from editing to compiling and saving files.

The following flowchart shows the standard steps in developing a motion program. The operations from starting the File Manager on up to the definitions must be performed before beginning the motion programming.

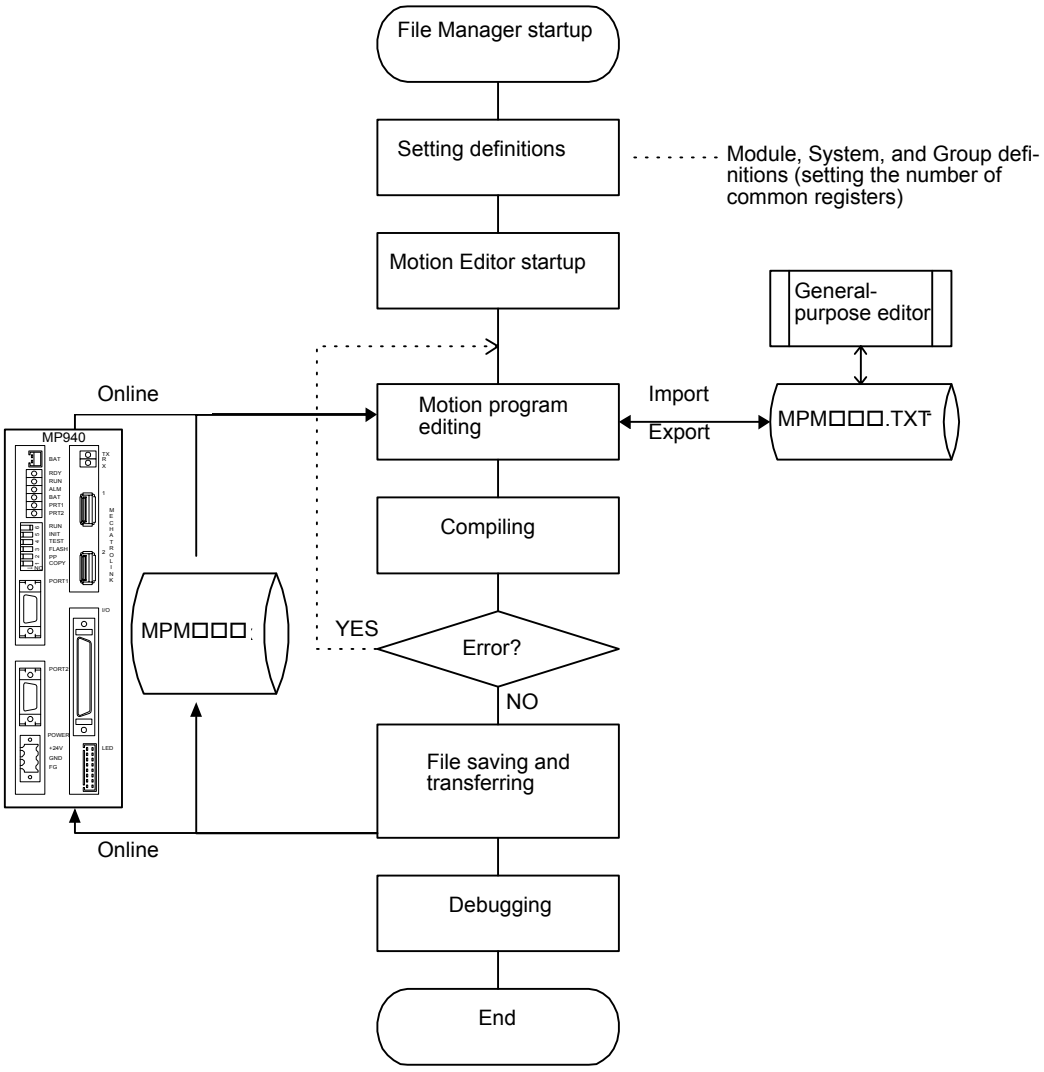


Fig 10.1 Motion Program Development Flow

10.3.1 Setting the Number of Common Registers

Defining common registers can be omitted, but it enables managing the common registers used in ladder programs and motion programs. Make the settings in the Setup of Register Writing Permission Window.

There are limits on the common registers (M and O registers) that can be used in motion programs. Motion programs that use registers that are out of the specified ranges will cause compiler errors to prevent mistakes in programming.

The following figure shows an example of an M register map for the MP900-series Machine Controller. O registers depend on the I/O registers allocated in the Module Configuration Definitions.

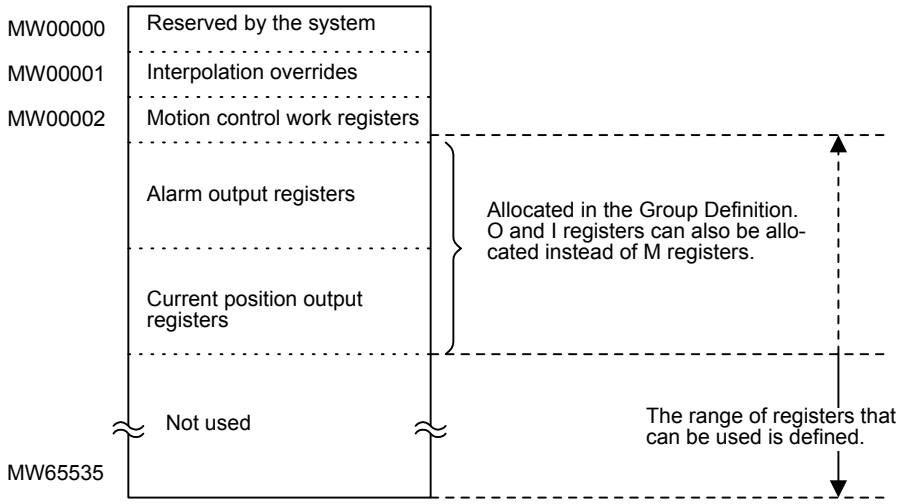
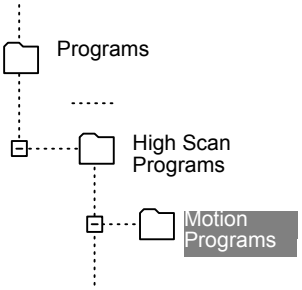


Fig 10.2 M Register Map

(1) Opening the Setup of Register Writing Permission Window

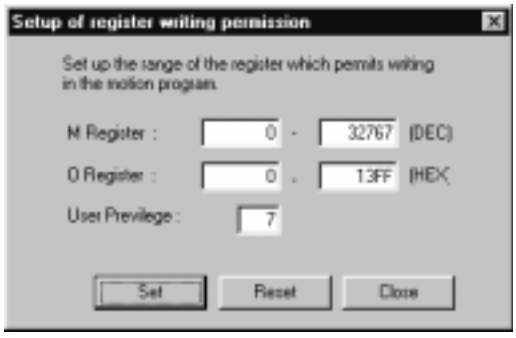
Open the Setup of Register Writing Permission Window using the following procedure.

1. Click the **Motion Programs** Folder in the **Programs** Folder in the File Manager Window.



2. Right-click the **Motion Programs** Folder, and select ***Open – Resister Writing Permission*** from the pop-up menu.

   The Setup of Register Writing Permission Window will be displayed.



INFO

The Setup of Register Writing Permission Window can also be opened by selecting ***File − Open − Register Writing Permission*** from the File Manager Menu.

Setting	Details
M Register, O Register	Input the range of register numbers that can be used in the motion programs. Input M register number in decimal and O register number in hexadecimal. The default range will be from 0 to the maximum register number. The maximum register number depends on the type of Machine Controller.
User Privilege	Set the user privileges required to set the enabled ranges. Any user with privileges lower than the value set here will not be able to set values.
Set Button	Click the **Set** Button to enable the set values.

INFO

- When the Engineering Manager is opened, all values are for display only, i.e., they cannot be changed.
- One register write enable setting parameter file is created in the PLC Folder on the hard disk. The settings in this file are effective for all of the motion programs within the same PLC folder.
- Register write enable ranges are checked only the M and O registers appear on the left side of substitution statements. They are not check elsewhere.
- O registers OWC000 to OWCFFF are reserved by the system and are not checked for write enable ranges.

10.3.2 Setting Motion Properties

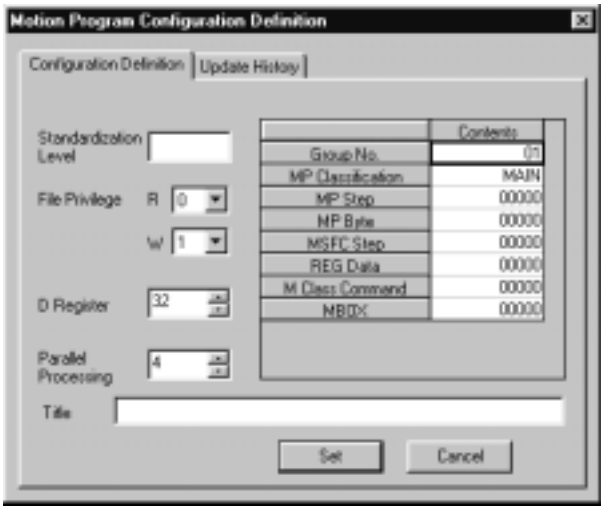
Motion properties consist of the attribute information for a motion program. Although the properties are set to defaults by the system, they must be set according to the program structure, specifications, etc.

Motion properties can be updated at any time. These values are referenced during compiling, and a work area is allocated.

Be sure to check the motion properties before beginning programming, and make settings as required.

(1) Opening the Motion Program Configuration Definition Window (Motion Properties Window)

With the Motion Editor open, select ***File − Motion Properties*** from the Engineering Manager Menu.



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(2) Tab Pages

The Motion Program Configuration Definition Window is composed of two tab pages: the Configuration Definition and Update History Tab Pages.

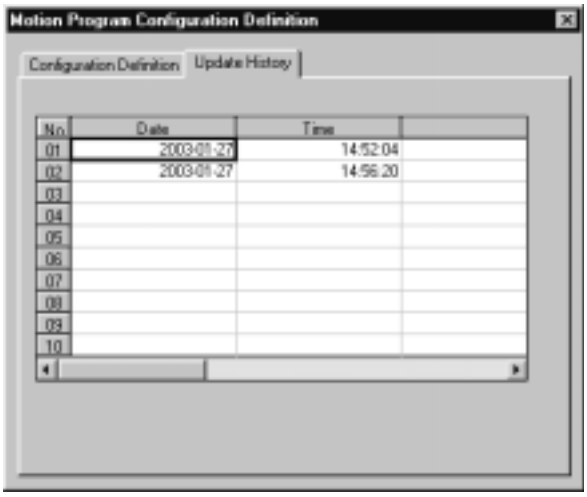
Tab Page	Details
Configuration Definition	Sets the program attributes. Normally, the default values should be used.
Update History	Displays the motion program update history.

(a) Configuration Definition Tab Page

Setting	Details
Standardization Level	This is not supported by the current version. There is no need to input anything here.
File Privileges	Input the read/write privileges for the motion program. For any given data item, it is not possible to set a value higher than the current user privilege. For details on file privileges, refer to *2.2.5 User Management*.
D Register	When using D registers in the motion program, enter the number of words in the D registers. If 0 is input here, D register cannot be accessed from the program. If 10 is input, for example, the D register numbers that can be used in the program are as follows: • Integer registers: DW00000 to DW00009 • Double-length integer registers: DL00000 to DL00008 • Real number registers: DF00000 to DF00008 • Bit registers: DB000000 to DB00009F
Parallel Processing	Set the maximum number of parallel processes to be specified by the PFORK command. • MP910: 8 (maximum number of parallel processes) • MP920: 8 (maximum number of parallel processes) • MP930: 4 (maximum number of parallel processes) • MP940: 8 (maximum number of parallel processes) • MP2100: 4 (maximum number of parallel processes) • MP2300: 4 (maximum number of parallel processes)
Group No. to MBOX	Displays information related to the motion program. It is for reference only and cannot be changed.
Title	This title will be output as a comment in the Print Confirmation Dialog Box when the motion program list is printed.

(b) Update History Tab Page

The time and date at which the motion program was revised are registered automatically, along with the user name that was logged on.



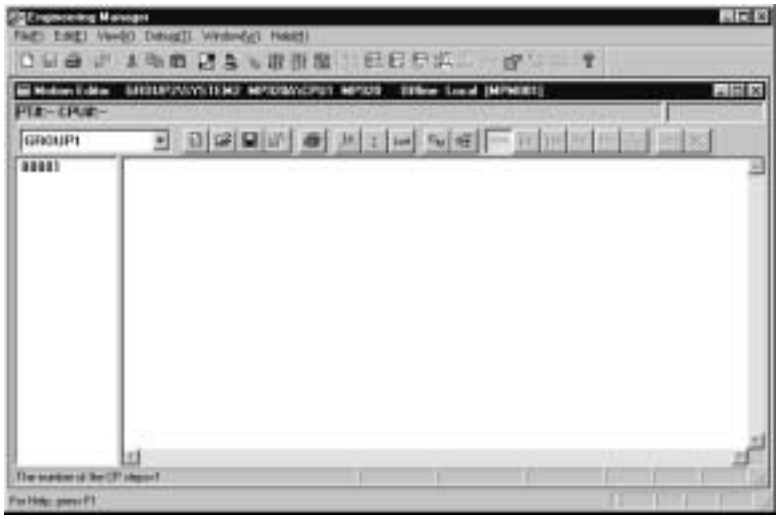
10.3.3 Opening the Motion Editor Window

The Motion Editor is a programming tool required in inputting and editing motion programs. It provides functions such as text editing, compiling, debugging, and monitoring.

(a) Opening from the File Manager

There are three ways to open the Motion Editor.

- Method 1: Double-click the **Motion Programs** Folder in the File Manager.
- Method 2: Click the **Motion Programs** Folder in the File Manager and select ***File – Open – Motion Editor*** from the File Manager Menu.
- Method 3: Alternatively, select an item and then right-click to display the pop-up menu. Then select ***Open***.



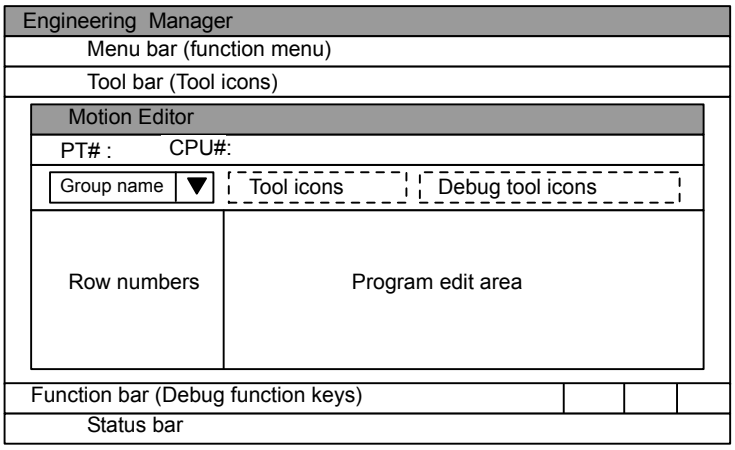
A new motion program can be created by selecting either of the following menu items while a motion-related file or folder is selected.

- Select ***File – Create New Program***.
- Select ***File – Open – Motion Editor***.

(b) Opening from the Engineering Manager

From the Engineering Manager Window, select ***File – Open – Motion Program – Motion Editor***.

(1) Motion Editor Window Configuration



Configuration	Details
Menu Bar	The menu bar which is enabled by the Motion Editor.
Group Name	Displays the name of the group in which the motion program is located.
Tool Icons	Often used commands are available through these icons.
Row Numbers	Row numbers are allocated automatically when the program is input.
Program Edit Area	This is the area where the program is actually input.
Debug Tool Icons	These are icons and function keys to which debugging functions are allocated. For details, refer to *10.5 Debugging Motion Programs*.
Debug Function Keys	

10.3.4 Motion Editor Menus

The following table shows the menu commands and functions when the Motion Editor Window is active.

Menu Command			Function
File			
	File Manager		Opens the File Manager.
	Open		
		Definition	
			Module Configuration — Display the various definition windows.
			System Configuration
			Scan Time Setting
			Application Info.
			Data Trace
			Fault Monitor
			Group Definition
		Program	
			New Drawing — Ladder programming tools
			Properties
			Main Program
			SFC Flow Chart
			SFC Time Chart
			SFC Action Box
			Constant Table (# Reg)
			Constant Table (M Reg)
			I/O Conversion Table
			Interlock Table
			Part Composition Table
			Tuning Panel
		Tool	
			Register List — Displays Machine Controller registers.
			Cross Reference
			Disable Coil List
			Comment List
			Register Replace
		C Register	
			C Register Map
		Table Data Definition	
			Table Data Map
		Motion Program	
			Open New File — Opens a new program.
			Open — Opens an existing program.
			Position Monitor — Displays the position monitor.
			Task Monitor — Displays the task monitor.
			Motion Alarm — Displays the alarm information.
	Close		Closes the Motion Editor.
	Motion Properties		Defines the motion properties.
	Save & Save into flash memory		Saves to flash memory.
	Save		Saves the program.
	Save New File		Saves the program with a new name.

(Cont'd)

Menu Command		Function
	Import	Converts a text file to a motion program file.
	Export	Converts a motion program file to a text file.
	Print	Prints data.
	Exit	Exits the Engineering Manager.
Edit		
	Undo	Cancels the last operation.
	Cut	Standard text editing commands
	Copy	
	Paste	
	Find	Finds a text string.
	Replace	Replaces one text string with another.
	Jump	Jumps to a specified row number.
	Head	Jumps to first row.
	Last	Jumps to last row.
	Semicolon	Adds a semicolon at the last column of a program row.
	Position Teaching	Takes the current position as a command operand.
View		
	Font	Changes the font.
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Function Bar	Displays the Function Bar.
	Quick Reference	Displays the Quick Reference.
	Debug Operation Function Bar	Allocates function keys for debug operation.
	Position Teaching Function Bar	Allocates function keys for teaching positions.
	Error List	Redisplays the error list display.
	Monitor Parallel No.	Refer to *10.5 Debugging Motion Programs*.
	Monitor Regeneration	
Debug		
	Debug ON	Refer to *10.5 Debugging Motion Programs*.
	Hold	
	Abort	
	Multi Step Run	
	Start Point	
	Break Point	
	Step Run	
	Step In	
	Code Generation	
	Current Value Update	
	Debug OFF	
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

10.3.5 Motion Editor Editing Functions

This section explains the commands that are commonly used from the menu bar and tool icons.

(1) Searching for a Character String

Search for a specified character string in a program that is being edited using the following procedure.

1. Select ***Edit*** – ***Find*** to display the Find Window.
2. Enter the character string to be searched for and specify the search direction, and then click the **Find Next** Button.
   a) When a matching character string is found, it will be displayed in reversed color and the search will stop. Either click the **Find Next** Button again to resume the search for the next matching character string or click the **Cancel** Button to stop the search.
   b) If no matching character string is found, a sound will be made. Either enter a different character string to be searched for and execute the search again, or click the **Cancel** Button to close the Find Window.

(2) Replacing a Character String

Replace one specified character string with another in a program that is being edited using the following procedure.

1. Select ***Edit*** – ***Replace*** to display the Replace Window.
2. Enter the character string that is to be replaced and the character string that it is to be replaced with, and click the **Find Next** Button.
   a) When a matching character string is found, it will be displayed in reversed color and the search will stop. Then execute one of the follow operations:
      - Either click the **Replace** Button to replace only that character string and search for the next instance, or click the **Replace All** Button to replace all instances of that character string.
      - Click the **Find Next** Button to leave that character string unchanged and search for the next instance.
      - Click the **Cancel** Button to close the Replace Window.
   b) If no matching character string is found, a sound will be made. Either enter a different character string to be searched for and execute the search again, or click the **Cancel** Button to close the Replace Window.

(3) Jumping to a Specified Row

Move the cursor to a specified row number in the program using the following procedure.

1. Select ***Edit*** – ***Jump***. A window will be displayed for the jump destination.
2. Input the row number and then click the **Execution** Button.
   To cancel the jump operation, click the **Cancel** Button to close the window.

(4) Jumping to the First Row of the Program

Select ***Edit*** – ***Head*** to move the cursor to the first row of the program.

(5) Jumping to the End Row of the Program

Select ***Edit*** – ***Last*** to move the cursor to the last row of the program.

(6) Adding a Semicolon

The motion language specifications require a semicolon in the last column of every program row. With this function enabled, a semicolon is added in the last column of a program row when the **Enter** Key is pressed. The purpose of this function is to lighten the program input load.

The semicolon function can be enabled or disabled by selecting ***Edit*** – ***Semicolon*** from the Motion Editor Menu.

A checkmark will appear in the menu before the Semicolon Command when it is enabled. The Semicolon Button in the tool icon in the Motion Editor Window will also stay in pressed state.

To disable the semicolon function, remove the check mark by again selecting ***Edit*** – ***Semicolon*** or click the **Semicolon Tool** Icon.

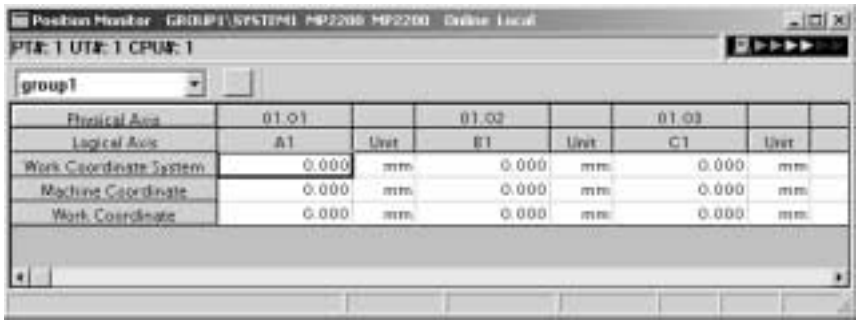
(7) Teaching Positions

Take the current coordinate values for the axes controlled by the MP900/MP2000-series Machine Controllers as the coordinate value operand for a move command using the following procedure.

(a) Opening the Position Monitor Window

Open the Position Monitor Window to display the current coordinate values using the following procedure.

Select ***File*** – ***Open*** – ***Motion Program*** – ***Position Monitor*** from the Engineering Manager Menu. The Position Monitor Window will be displayed.



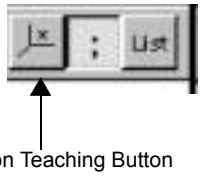
(b) Setting the Teaching Axes

There are two procedures that can be used to set the teaching axis:

- From the Position Teaching Window
- Using the teaching function keys.

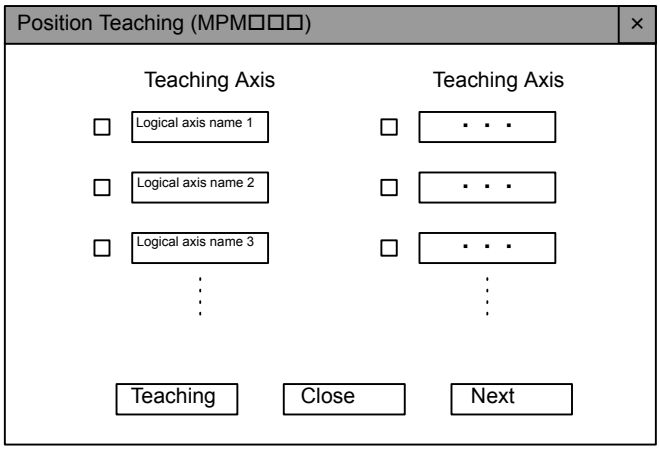
• Setting from the Position Teaching Window

1. Select ***Edit*** – ***Position Teaching***. The Position Teaching Window will be displayed.
   Alternatively, click the **Teaching** Button in the Motion Editor Window.



Position Teaching Button

The logical axis names and check boxes defined in the Group Definitions are displayed as shown below.



2. Set the axes to be taught.

   There are two ways to set the axes to be taught. Use these as required.

   - Using the **Position Teaching** Button

     The current position will be taught for the logical axis whose check boxes have been checked.
   - Using the Logical Axis Name Buttons

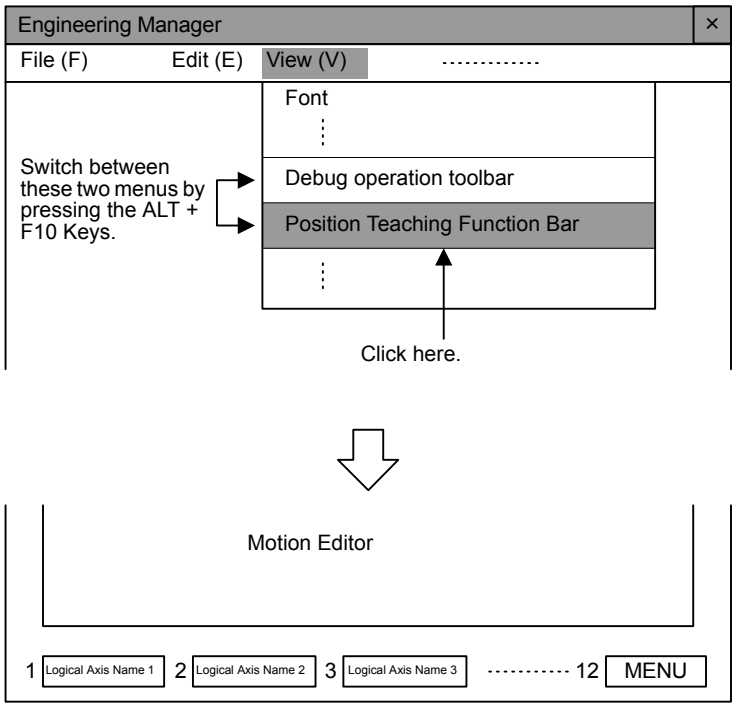
     The current position will be taught for only the logical axis whose button has been pressed.

- Setting with Teaching Function Keys

  Axis value can be taught directly from the function keys without opening the Position Teaching Window.

  Select ***View – Position Teaching Function Bar*** from the Engineering Manager Menu.

  The function keys will be displayed along with the logical axis names.



INFO

■ Function Keys

- Eight logical axis names defined in the Group Definitions are allocated to the function keys from the left (F1 to F8). Press the **F12** (MENU) Key to switch to the next eight axes (i.e., eight axes starting from the 9th). There can be a maximum of 48 axes per group.
  The MENU Key is F10 on non-DOS computers.
- The following shortcut keys can be used when the Motion Editor Window is active.

Alt + F10	Switches between Debug Operation and Position Teaching Function Keys.
Alt + V, D	Switches to Debug Operation Function Keys.
Alt + V, P	Switches to Position Teaching Function Keys.

- When switching between more than one Motion Editor Window, the function keys will be reset to axes 1 to 8.

(c) Obtaining Coordinate Values

The following example shows how to obtain the coordinate values. Assume that the cursor is just after the mov command in the Motion Editor Window.

```
abs;
mov
```

If the **Teaching** Button in the Position Teaching Window is clicked this point, the coordinate values displayed in the Position Monitor Window will be moved into the mov command operand as the A1 and B1 coordinate values.

```
abs;
mov [A1]0.000[B1]0.000
```

The mov command is used in this example, but coordinate values can be obtained in the same way for other commands that have axis information operands.

(8) Specifying Fonts

The font used in the Motion Editor Window can be set.

Select ***View*** – ***Font*** from the Motion Editor Menu. The Font Window will be displayed. Specify the font to be used, the font style, and the size, and then click the **OK** Button.

(9) Error List

The compiling error list can be redisplayed when required.

Select ***View*** – ***Error List*** to display the Error List Window displayed when compiling.

10.3.6 Motion Editor Expansion Commands

This section explains the import and export commands which are associated with external program text files.

The program source files saved by the Motion Editor consist of not only text files but also various types of data, including the operating environment. Accordingly, there is no problem with the operating environment for the Motion Editor, but source files cannot be directly opened by general-purpose editors. For that reason, the Motion Editor is provided with import and export commands to allow general-purpose text editors to be used.

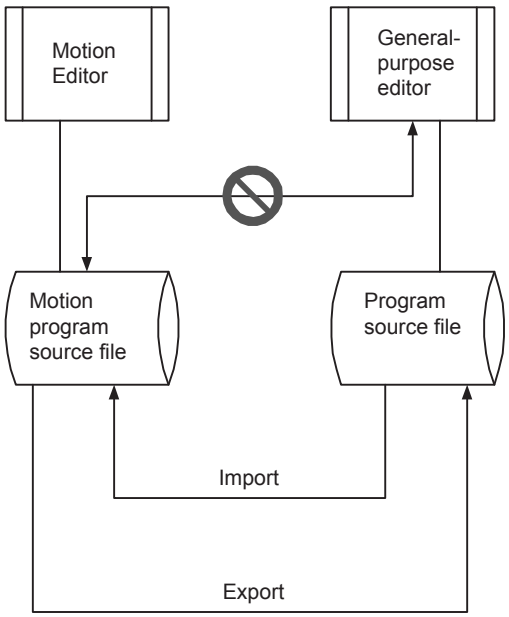


Fig 10.3 Import and Export Commands

(1) Importing

The import function is used for bringing text files created by a general-purpose editor into the Motion Editor. This function converts a text file into a motion program file.

Import a file using the following procedure.

1. Select ***File*** – ***Import*** from the Motion Editor Menu.

   The window for opening the text file to be converted will be displayed.

2. Search for the file by using *Look in* or other method.
3. Select the file by clicking it.
4. Click the **Open** Button.

   The selected text file will be read and a new Motion Editor Window will be displayed. After editing the program, save the file.

(2) Exporting

The export function is used in the following cases:

- To temporarily save a file that is being edited by the Motion Editor.
- To edit an existing program with a standard text editor.

IMPORTANT

If an error, such as a syntax error, will occur in the Motion Editor when programming has not yet been completed, the program cannot be saved in that condition. When there is an error, use the following export procedure to save programs that are in the process of being edited.

The export procedure is as follows:

1. With the edited program open, select ***File*** – ***Export*** from the Motion Editor Menu. A window will be displayed to specify where the text file is to be saved.

2. Select or input the name of the file and the destination folder, and click the **Save** Button. If a file by that name already exists, it will be overwritten when the new file is saved.
3. After the file has been saved, close the Motion Editor Window.

10.3.7 Closing the Motion Editor

To close the Motion Editor and return to the Engineering Manager, select ***File*** – ***Close*** from the Motion Editor Menu.

IMPORTANT

- Motion parameter can be changed or saved while the Motion Editor Window is open. If the number of decimal digits in the fixed parameters is changed and saved, however, a warning message will be displayed. Confirm the safety of the system before proceeding.

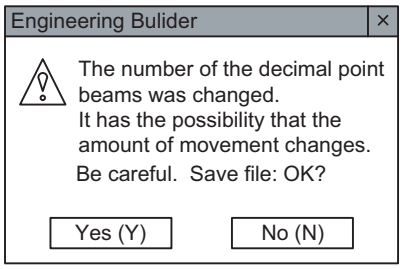


Fig 10.4 Warning Message for Save

- Fixed parameters can be saved only when the servo is OFF. A Controller error message will be displayed if an attempt is made to change or save fixed parameters when the servo is ON.

10.4 Compiling Motion Programs

This section explains the process involved in compiling a motion program.

10.4.1 Compile Execution

The program is compiled automatically when the file is saved.

Execute the compile operation by saving the file using the following procedure.

1. With the motion program open, the program will be compiled when any of the following operations are performed.
   - Select ***File*** – ***Save***.
   - Select ***File*** – ***Save New File***.
   - Click the **Save** Icon.

   While the program is being compiled, the progress of the operation will be displayed by a bar in the Motion Editor Window, as shown in *Compile Execution Steps*.
2. If a file where an object is saved during the compile operation already exists, the Overwrite Confirmation Window will be displayed. To overwrite the existing object, click the **Yes** Button. To save the new object without overwriting the existing one, select ***File*** – ***Save As*** and input a different name.

IMPORTANT

■ Insufficient Memory Errors when Saving Files

The following error messages will be displayed if the object or source areas are insufficient when saving files online.

Error Message	Meaning
CPDH_CPU_0B2 object memory area exceeded. Saving may be possible by using ***MEM COMPACT*** to compress the memory area. Memory compression is executed from within the System Configuration Definition Window.	Object area overflow
Insufficient memory in the CPDH_CPU_0B3 program memory area. Saving may be possible by using ***MEM COMPACT*** to compress the memory area. Memory compression is executed from within the System Configuration Definition Window.	Source storage area overflow

■ Remedy

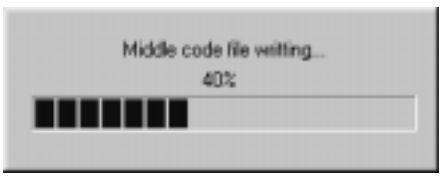
- From the Motion Editor Window, open the System Configuration Definition Window by selecting ***File*** – ***Open*** – ***System configuration*** from the Motion Editor Menu.
- Set the CPU to STOP by selecting ***Control*** – ***CPU STOP*** from the System Configuration Menu.
- Compress memory by selecting ***Control*** – ***MEM COMPACT*** from the System Configuration Menu.
- Set the CPU to RUN by selecting ***Control*** – ***CPU RUN*** from the System Configuration Menu.

If the insufficient memory error occurs again for saving, then the physical memory is insufficient. Delete unneeded programs or other files. The error message will appear more frequently as the amount of memory available decreases. Compressing memory each time will help.

10

- Compile Execution Steps

When the compile operation is started, the status of the compile operation is displayed in the a progress bar.



When the compile operation is completed, the progress bar above will be closed.

10.4.2 Completion of the Compile Operation

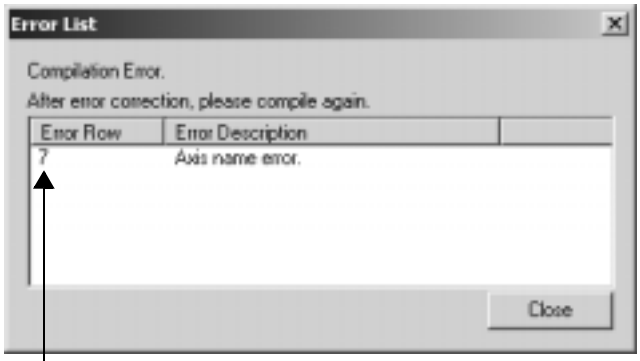
(1) Normal Completion

If the compile operation is completed normally, the file will be saved to the Programming Device hard disk. Then, in Online Mode, the compiled file will be transferred to the Machine Controller.

The window will then be returned to the Motion Editor Window. If there is no need for editing, close the Motion Editor.

(2) Error Completion

If an error occurs during the compile operation, the Error List Window will be displayed. Check the Error Description, correct the program, and execute the compile operation again. Even after this window has been closed, it can be displayed again by selecting ***View*** – ***Error List*** from the Motion Editor Menu.



The cursor can be moved to the relevant place in the Motion Editor by double-clicking the row number displayed in the *Error Row* column.

IMPORTANT

The motion program file cannot be saved as long as there are any compile errors. To save it temporarily, it is necessary to use the export command.

10.5 Debugging Motion Programs

This section describes the Debug Operation used to debug motion programs.

Debug operations are used to debug motion programs. Open the Motion Editor in Online Mode to turn ON and OFF the debug operations.

Debug commands include standard start points and breakpoints, and single-step execution.

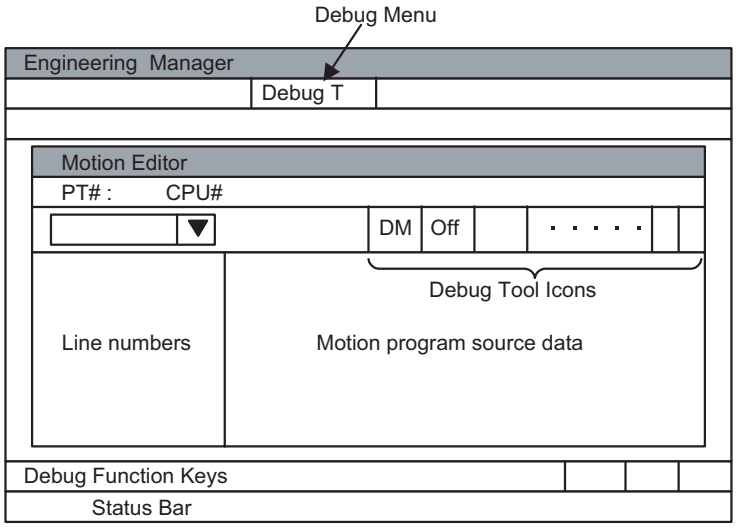
IMPORTANT

The Engineering Builder Window will be displayed if the user tries to enter debug operations in Offline Mode, and the operation will be cancelled.

10.5.1 Opening the Debug Window

The Debug Operation is provided as one of the functions of the Motion Editor. The Motion Editor Window and the Debug Window are the same window. Logging in online, however, is required to use the Debug Operation. It is not possible in Offline Mode.

The portions of the Motion Editor Window that are used for Debug Operation are shown below.



(1) Debug Window Configuration

Configuration	Details
Debug Menu	The commands used in debug operations are displayed under this menu.
Debug Tool Icons	Icons have been created for frequently used debug commands.
Debug Function Keys	Function Keys have been allocated for debug commands.
Status Bar	Displays information on debug operations.

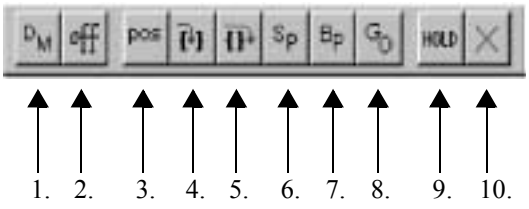
(2) Debug Menu

The following table shows the menu commands and functions displayed in the Debug Window.

Menu Command		Function
File		Refer to *10.3.4 Motion Editor Menus*.
Edit		
View		
	Font	Refer to *10.3.4 Motion Editor Menus*.
	Tool Bar	
	Status Bar	
	Error List	
	Monitor Parallel No.	Refer to *12.10 Position Monitor* for details.
	Monitor Regeneration	
Debug		
	Debug ON	Enables the debug operations.
	Hold	Temporarily stops the move command that is currently being executed.
	Abort	Cancels the debug operations.
	Multi Step Run	Executes rows 1 to n.
	Start Point	Specifies the first row for debugging.
	Break Point	Specifies the last row for debugging.
	Step Run	Executes debugging one step at a time.
	Step In	Hands control to a subroutine.
	Code Generator	Compiles and updates the object.
	Current Value Update	Updates current coordinate value.
	Debug OFF	Disables debug operations.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

(3) Debug Icons

Icons have been created for frequently used debug commands, and these commands can be executed by clicking each of them once.



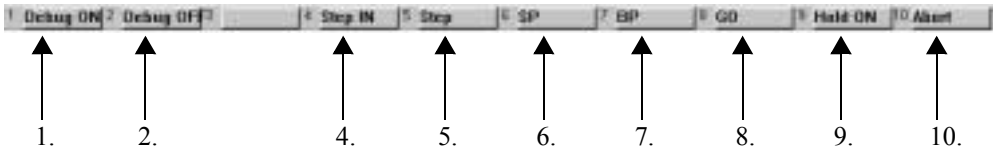
The commands indicated by the above icons are as follows:

1. Debug ON
2. Debug OFF
3. Current Value Update
4. Step In
5. Step Run (Step Over)
6. Start Point Set

7. Break Point Set
8. Multi Step Run.
9. Hold ON/OFF.
10. Abort

(4) Debug Function Keys

Debug commands are also supported by Function Keys.



(5) Debug Status Bar

The debug status bar is displayed at the bottom of the Motion Editor Window and shows the following debug status. More than one status may be displayed.

Status	Meaning
Debug Mode	Debug operations enabled.
Running	Operating normally.
Holding	Move commands remain in hold.
Abort	Resetting debug operations.
Alarm	An operation error has occurred.
Break	Held at the breakpoint.

10.5.2 Debug Operations

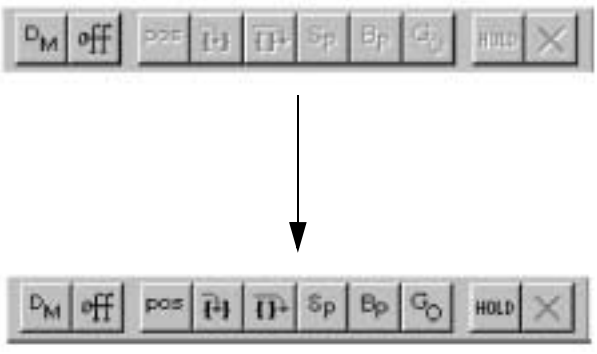
This section explains the actual debug operations.

Debug operations are possible only when there are no compile errors in the program opened in the Motion Editor, which is the program to be debugged.

(1) Starting and Stopping Debug Operations

The first command that must be set when starting debug operations is the Debug ON command. All commands used in debug operations are enabled when the Debug ON command is given and *Debug Mode* will be displayed on the status bar.

1. Click the **DM** Button so that the Debug ON command will enable the tool icons related to debug operations.



Debug Mode will be displayed on the status bar.

2. Click the **off** Button so that the Debug OFF command will disable debug operations, and the display will return to the previous screen.

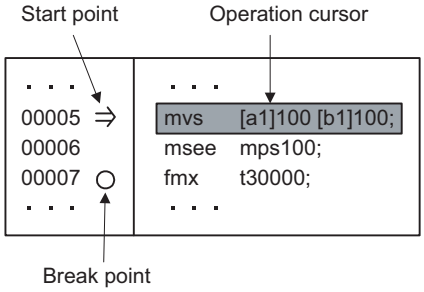
INFO

- Use the Debug ON command when program operation has been stopped.
- The Debug ON command is valid for one main program only. It cannot be set for multiple main programs simultaneously.
- If the MPE720 is exited without using the Debug OFF command to close the debug operations, an error will occur when the user next tries to start debug operations after restart. Execute the Debug OFF command and then the Debug ON command.

(2) Debug Window Configuration during Debug Operations

The following window will be displayed during debug operations. Start points and breakpoints will appear after the row numbers in the row number display section. The entire row that is currently being debugged will be displayed in reversed color as an operation cursor.

The user can confirm which row is being executed by following the operation cursor.



(a) Operation Cursor

The operation cursor displayed in reversed color by row shows the command that is currently being executed.

The operation cursor will automatically scroll through the program and indicate the command currently being executed if the cursor moves from the row currently being displayed in the Motion Editor Window.

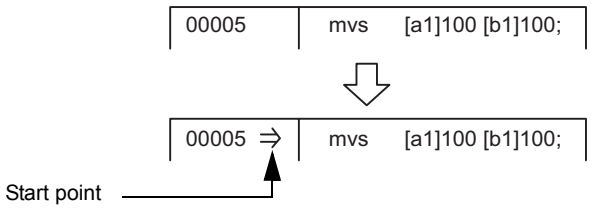
The operation cursor will turn back into the editing cursor when the operation is stopped. The operation cursor will be displayed during normal operation if a program opened using the Motion Editor is being executed.

(b) Setting Start Points

The start point symbol (⇒) is displayed from when it is set and during debugging. The symbol disappears when debugging is stopped.

Select the first row for debugging and click the **SP** Button. The start point symbol will appear at the end of the row number. To release the start point (⇒), repeat the step to set the start point in the same row.

◀ EXAMPLE ▶ The following example shows the editing cursor at row 00005.



During step execution, the (⇒) symbol may not appear for commands with short execution times, because the start point is set and the command executed at the same time.

(c) Setting Break Points

A breakpoint (○) will remain at the same position once it is set until it is cleared. Select the row where the debugging is to be stopped, and click the **BP** Button. The breakpoint symbol (○) will appear at the end of the designated row number.

Break points can be cleared by the following four methods:

- Set a different breakpoint.
- Click the **BP** Button again in the row where a breakpoint is currently set.

- Abort the debug operations.
- Disable the debug operations.

(3) Step Run

Step Run can be used to debug the program one row at a time. Depending on how the subroutine written using the MSEE command is executed, the Step Run command is divided into Step Over and Step In commands. Debugging of the main program, including subroutines, is executed using a combination of these commands.

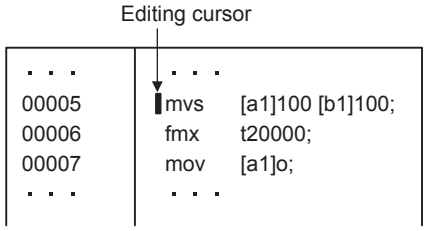
Normally, the Step Run command means Step Over.

(a) Step Over

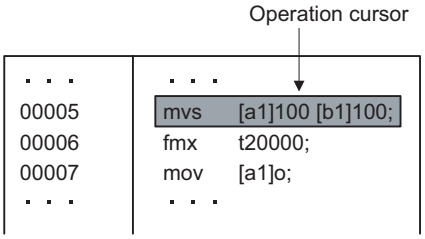
Debugging is executed one row at a time using the Step Run command. The subroutine written using the MSEE command is processed as one execution unit, and stops at the next command after the MSEE command.

◀ EXAMPLE ▶ An example of execution of the Step Over command is shown below.

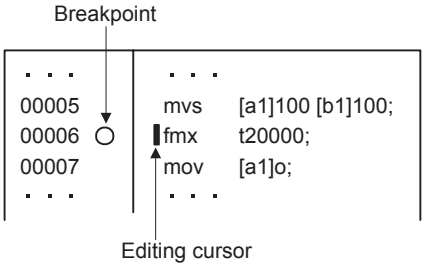
1.Set the cursor in the row for which the Step Run command is to be executed.



2.The execution of a command can be confirmed by the operation cursor during execution. The operation cursor may not be visible, however, for command executions that are completed quickly.



3.A breakpoint and the cursor are automatically set when one row has been debugged.



(b) Step In

The Step In command is used to debug subroutines written using the MSEE command. It is valid for MSEE commands. If it is used for other commands, the function will be the same as if the Step Over command was executed.

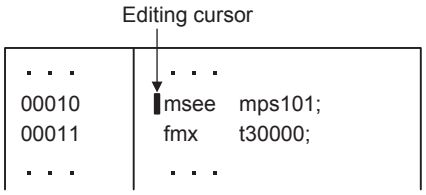
When the Step In command is executed, the Motion Editor Window for the subroutine opened using the MSEE command will be displayed and control transferred. Other debug commands can be used in the subroutine, just as for main programs.

If the RET command is executed during the subroutine, the Motion Editor Window for that subroutine will be closed, and the program will return to the next command after the MSEE command. Up to 8 levels of subroutines can be nested within a subroutine.

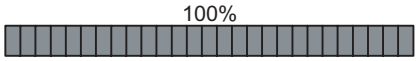
◀ EXAMPLE ▶

An example of execution of the Step In command is shown below.

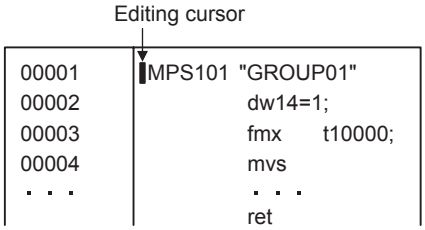
1.The first row has been set in the MSEE command. The mps101 subroutine is about to be executed.



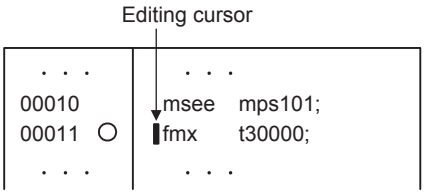
2.When the Step In command is executed, the subroutine is displayed, the debug environment is prepared, and progress is shown in a progress bar.



3.The Motion Editor Window for the subroutine is displayed, and the cursor is set to the first row. Both Step In and Step Over commands can be used.



4.When the subroutine RET command is executed, the subroutine window is closed and the display returns to the main program.



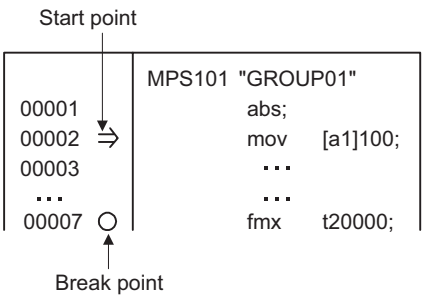
(4) Multi Step Run

One or more rows of commands will be executed for which the start point and breakpoint have been set. Either the start point or breakpoint can be set first. The start point is automatically cleared when execution is stopped, however, breakpoints remain until a new breakpoint is set.

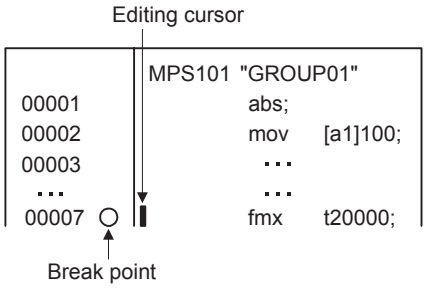
(a) When a Breakpoint is Passed

◀ EXAMPLE ▶

In the following example, the start point has been set in row 2 and the breakpoint in row 7.



When the Multi Step Run command has been executed, debugging is executed for rows 2 through 6, and stops at the breakpoint in row 7.



The operation cursor may not be visible for some commands. Refer to *12.10 Position Monitor* for information on commands for which the operation cursor is displayed.

(b) When the Breakpoint Is Not Passed

If the set breakpoint is not passed and the logic is normal, the following processing will be executed.

- Main Programs

  Debugging will be executed until the END command, where it will stop.

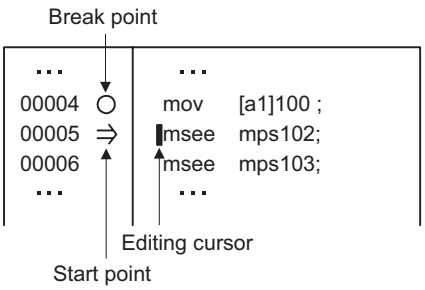
- Subroutines

  The RET command will be executed, the program will return to the MSEE command, and stop at the next command.

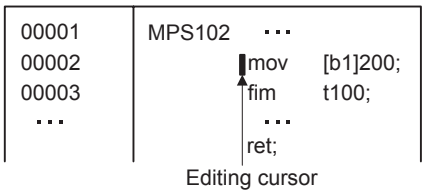
◀ EXAMPLE ▶ In the following example, the breakpoint is set at an earlier row. As a result, the RET command will be executed, the program will return to the MSEE command, and stop at the next command.

The execution process is shown below.

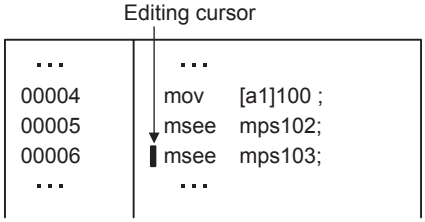
1.Open mps102 using the Step In command.



2.The debug operations enter the subroutine. If the Multi Step Run command is executed with the settings shown on the right of the following figure, the RET command will be executed, and control will return to the main program.



3.Once back at the main program, the process will stop at the next command.



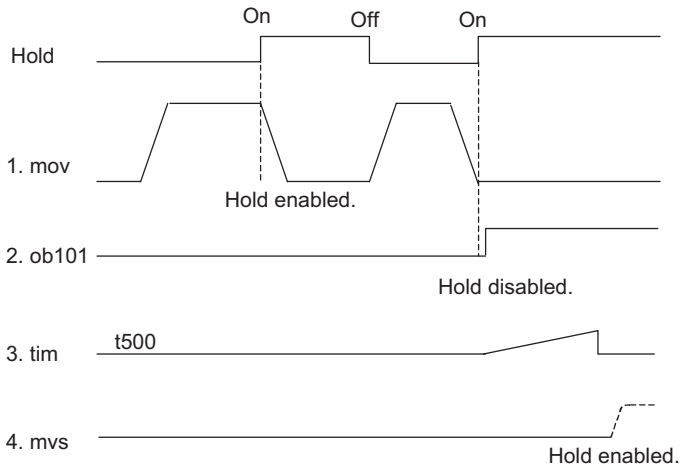
(5) Hold ON/OFF

The Hold command holds the command currently being executed. When the Hold command is executed again, the hold is cleared, and execution of the command is continued.

The Hold command is enabled only for the move commands, however, and is ignored when executed for other commands.

The timing charts for the following commands is outlined below.

```
0010    mov [a1] 100;          Hold enabled.
0011    ob1010=1;              Hold disabled.
0012    tim t 500;             Hold disabled.
0013    mvs [b1] 100. [c1] 200; Hold enabled.
0014    mov [c1] 0;            Hold enabled.
```



(6) Abort

The Abort command aborts the execution of the debug operations. Debugging cannot be resumed once this command has been executed.

(a) Monitor Display after Abort

The monitor display after the Abort command has been executed is outlined below.

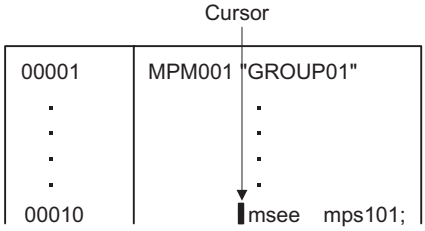
- Start points and breakpoints are cleared, and the corresponding symbols disappear.
- Debug control returns to the main program, even if a subroutine is currently being debugged. The main program window will be the active window, and the editing cursor will point to the first row. As a result, resumption of the debug operations will always be from the main program.
- If the Motion Editor Window for subroutines is open, it will not automatically close. This allows the user not to only check the debug operations, but to also save any subroutines that have been edited during the debug operations to the Machine Controller.

  Refer to *(8) Editing during Debug Operations* later in this chapter.

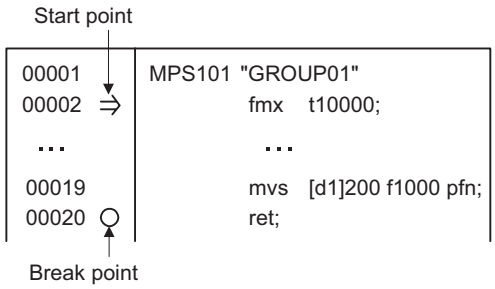
(b) Abort Example

◀ EXAMPLE ▶ An example of the execution of the Abort command is shown below.

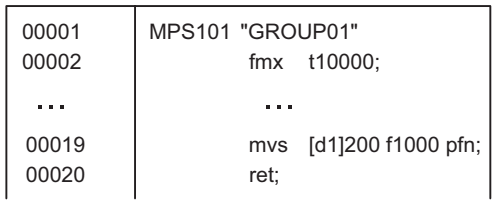
1.Place the cursor on the MSEE command and execute the mps101 subroutine using the Step In command.



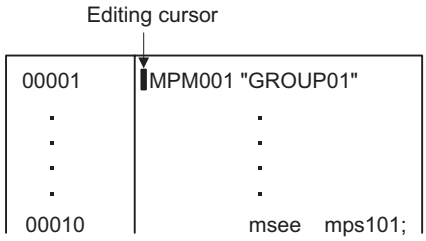
2.Once the subroutine is executed, set the start point and breakpoint as shown below.



3.Then, execute the Abort command instead of the Step Run command. The start point and breakpoint will be cleared, the debug command turned OFF, and the debug operations reset. The window will remain open.



4.As the debug operations were reset, the main program only can be debugged, and the start point is set at the beginning.



(7) Current Value Update

The Current Value Update command is used to correct deviations in current values from axis movement by the motion program when axes are jogged or otherwise moved by the ladder program during the debug operations.

IMPORTANT

Be sure to execute this command when axes have been moved through manual intervention during the debug operations.

(8) Editing during Debug Operations

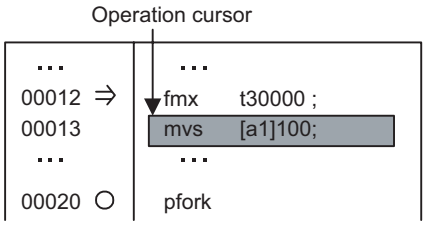
If the program is to be improved or faults in the program is discovered during debug operations, the program can be corrected and re-executed when the operation cursor is not displayed (no commands are being executed).

(a) Editable Programs

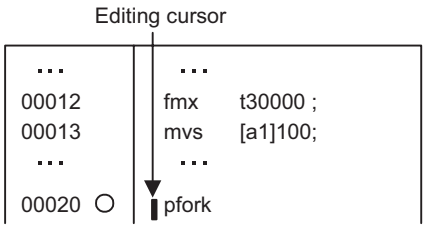
The following limits apply to editing programs:

- Only programs that are displayed in the active window during the debug operations can be displayed.
- Subroutine windows opened during the debug operations cannot be edited. Windows can, however, be switched and scrolled.
- Programs not related to the debug operations can be edited but cannot be saved.

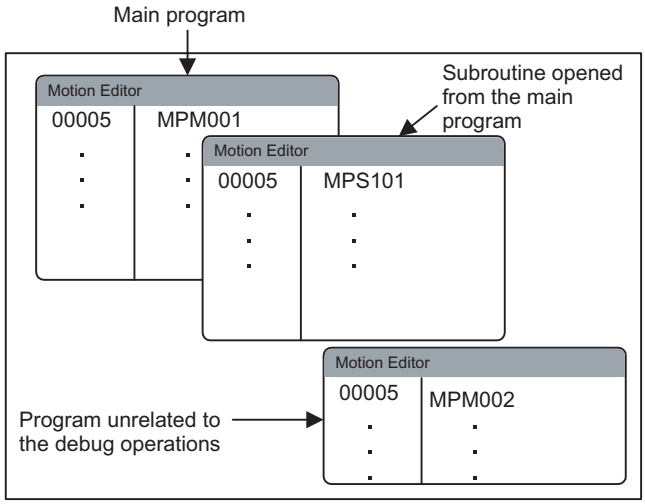
- Programs cannot be edited when the operation cursor is displayed, indicating that the debug operations are being executed.



- The following program can be edited. The debug operations are stopped, and the editing cursor is at the front of the PFORK command.



- In the following program, the MPS101 subroutine, which has been called from the MPM001 main program using the Step In command, is active. In addition, the MPM002 program, which is unrelated to the debug operations, is open.



In this example, MPM002 can be edited because it is unrelated to the debug operation, but MPM001 cannot be edited because it is still in the debug operation. MPM002 cannot be saved.

(b) Editing

The edit operation is based on the Motion Editor edit functions. Press the **SHIFT** + **Enter** Keys or select ***Debug*** – ***Code Generator*** from the Motion Editor Menu to temporarily register changed data on the Machine Controller. To register the data permanently, select ***File*** – ***Save*** from the Motion Editor Menu. Refer to *(d) Updating Files* for details.

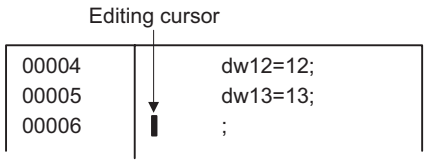
Temporary registration on the Machine Controller is designed to perform a test run for debug operations. Update the file only when there are no problems with the test run.

If the temporary registration step is omitted and editing executed, the steps for temporarily registering the data will be executed automatically. The program will be compiled first and, if no errors occur, the temporary registration step will be executed. The execution is disabled if an error occurs while compiling.

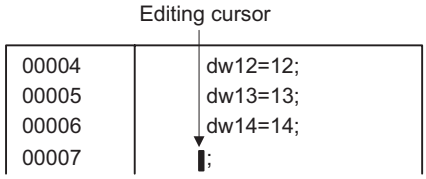
◀ EXAMPLE ▶

An example of the editing operation is shown below.

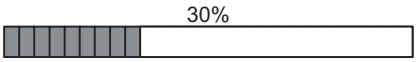
1.Set the editing cursor at row 6 to insert an allocation statement.



2.Input the substitute text dw14=14.



3.Press the **Shift** + **Enter** Keys or select ***Debug*** – ***Code Generator*** from the Motion Editor Menu to compile the changed text. The execution can be performed if no errors occur.



(c) Handling Breakpoints

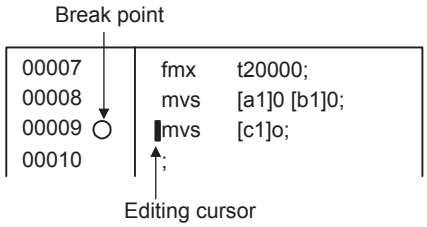
Breakpoints are set for row numbers. Breakpoints are not set for the command allocated to that row number. As a result, breakpoints will be set for different commands when the program has been edited and row numbers have changed.

Take note of the current breakpoint settings during editing.

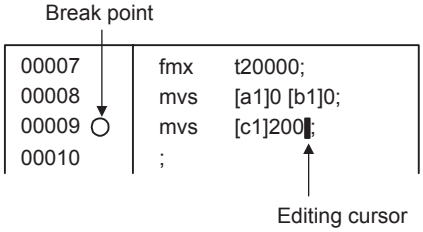
◀ EXAMPLE ▶

An example of editing breakpoints is shown below.

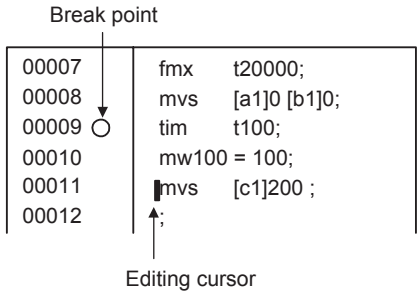
1.Set the breakpoint at row 9.



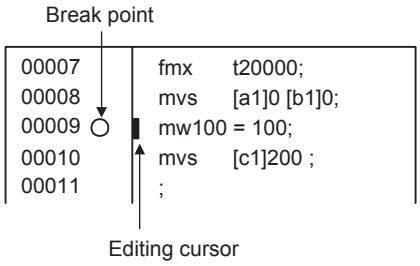
2.Edit the mvs command in row 9. The breakpoint will remain with the same command in this example because the text is being overwritten.



3.Two rows of commands have been added in row 9. The row numbers will move and, as a result, the breakpoint will be located at the tim command.



4.The tim command has been deleted. The row numbers will move up one, and the breakpoint will be located with the substituted text.



(d) Updating Files

The file update process during the debug operations involves temporary registration and permanent registration. The temporary registration command is designed for test runs, and only allows operation results of program changes to be confirmed. If the results of the test run are good, the adjustments can be saved properly to the file. This is called permanent registration.

- Temporary Registration

Changed programs can be temporarily registered on the Machine Controller by pressing the **Shift** + **Enter** Keys, or by selecting ***Debug*** – ***Code Generator*** from the Motion Editor Menu. The original program on the Machine Controller will be overwritten only when the permanent registration command is executed.

- Permanent Registration

Files registered on the Programming Device hard disk and Machine Controller are updated with changed programs. The Motion Editor cannot be closed if permanent registration is not executed. Select ***File*** – ***Save*** before closing the Motion Editor.

- Execute permanent registration in the active Motion Editor Window.
- A message saying that *the program [MPM□□□] is Editing* will be displayed if the debug operations are turned OFF without executing permanent registration. Click the **OK** Button to save the update. This method can be used to execute permanent registration.

INFO

If the RET command is executed in the subroutine after temporary registration but without permanent registration, permanent registration will be automatically executed. If original program that has not been debugged is to be kept, create a PLC folder in the File Manager for copying and saving that program, or use the Export command to save the required program.

10.5.3 Restrictions during Debug Operations

The restrictions that apply to the debug operations are outlined below.

(1) Effective Commands during Debug Operations

As shown on the following table, some commands are enabled when the program is stopped, and some are enabled during the debug operations.

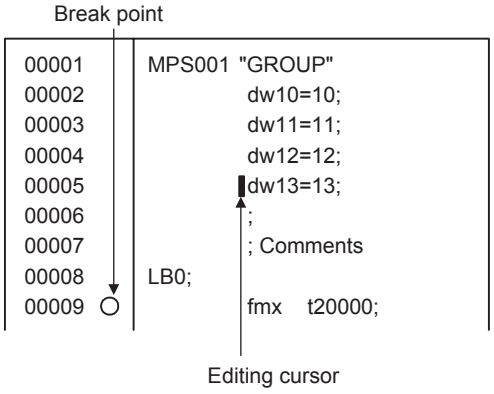
No.	Command	When Stopped	During Operation
1	Debug Mode ON (DM)	Enabled	Disabled
2	Debug Mode OFF (Off)	Enabled	Disabled
3	Current Value Update (POS)	Enabled	Disabled
4	Step Run (Step over)	Enabled	Disabled
5	Step In	Enabled	Disabled
6	Start Point (SP)	Enabled	Disabled
7	Break Point (BP)	Enabled	Disabled
8	Multi Step Run (GO)	Enabled	Disabled
9	Hold ON/OFF (HOLD)	Disabled	Enabled
10	Abort (X)	Disabled	Enabled

(2) Editing Cursors and Breakpoints after Step Run

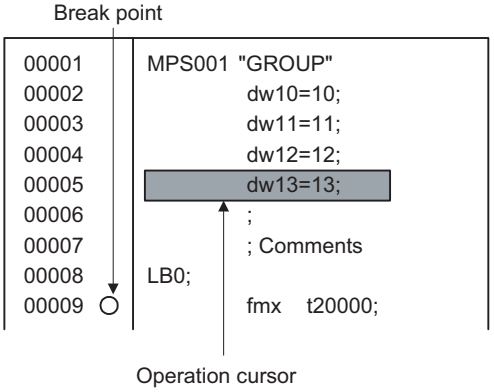
The editing cursor and breakpoint move to the next row after the Step Run command is executed. If there is a nonexecutable command for comments or labels in the next row, however, the cursor and breakpoint will stop at the next executable command that appears.

◀ EXAMPLE ▶ An example of editing cursor and breakpoint movement is shown below.

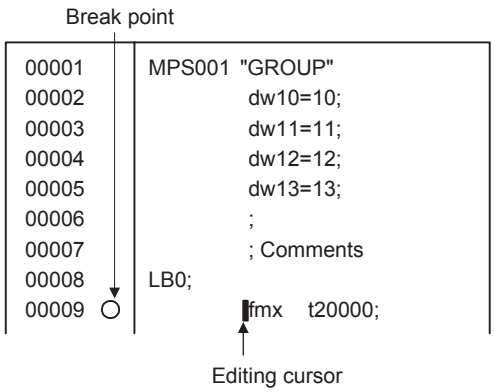
1.Set the cursor in row 5.



2.Execute Step Over.



3.The comment and label rows are passed, and the breakpoint and cursor are set to row 9, which has the fmx command.



(3) Commands that Cannot be Executed with Step Run

The Step Run command cannot be executed for some commands. An error message will be displayed for these commands shown on the following table. Set the start point to the next command that can be executed with the Step Run command.

Command	Code Example	Remarks
IF	if ib01==1;	
ELSE	else;	Start points 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 points cannot be set.

(4) Commands for which Start Points and Breakpoints Cannot be Set

Start points and breakpoints cannot be set for the nonexecutable commands shown in the following table. Error messages will be displayed if start points or breakpoints are set for these commands. Set the start points and breakpoints to commands that can be set.

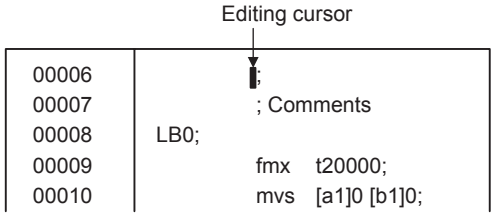
Command	Coding Example	Start Point	Break point	Remarks
ELSE	else;	No	Yes	Step Run is not possible.
END	end;	No	Yes	Step Run is not possible.
;row	;	No	No	
"Comment"; row	"Interpolation speed";	No	No	
Label row	Label;	No	No	

(5) Executing from Command and Label Rows

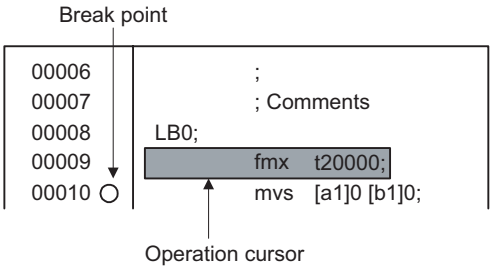
Step Run can be executed from rows with semi-colons (;) only and comment rows that start with semi-colons (;). In such cases, the next subsequent executable command is executed.

◀ EXAMPLE ▶ An example of Step Run execution from command and label rows is shown below.

1.Set the cursor in a comment row.



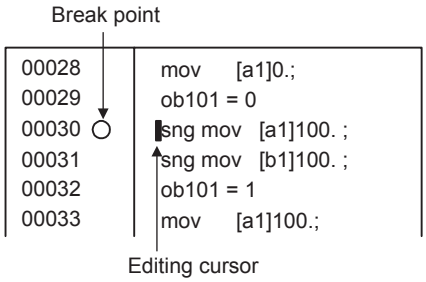
2.When Step Run is executed, the executable commands after row 6 are executed. In this example, the fmx command is executed.



(6) SNG Operation

The SNG command does not function in debug operations.

The sng commands are specified in rows 30 and 31, however these rows will be executed with Step Run.



11

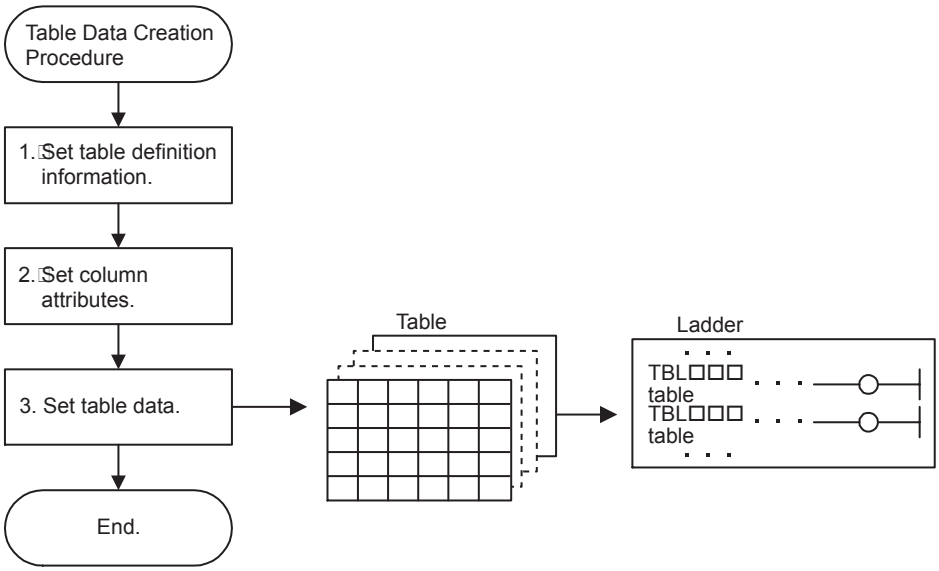
Creating Table Data

This chapter explains how to create data used in table format (arrays) in the main program.

11.1 Outline of Table Data

Table data can be accessed by using the table data manipulation instructions in the ladder program.

The procedure to create table data can be divided into the following 3 procedures. Follow the steps to create table data.



1. Setting Table Definition Information

   Open the Table Data Definition List Window and select creating a new table. The Table Definition Dialog Box will be displayed. Set the table name, table type, number of columns and rows, and table comment.

Setting	Details
Table Name	Sets the table name.
Table Type	Sets either array or record.
Column	Sets the number of columns in the table.
Lines	Sets the number of rows in the table.
Table Comment	Sets the table comment.

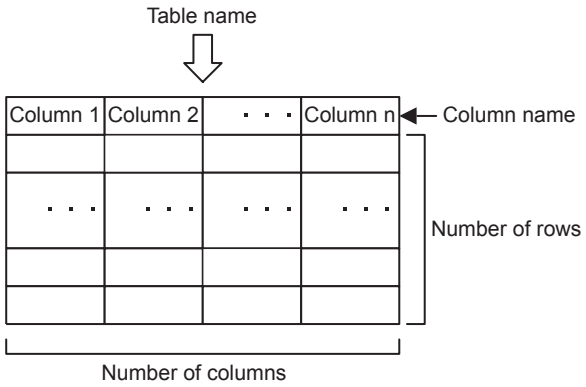
2. Setting Column Attributes

   Open the Data table column attribute Window and set the column attribute. The attributes to be set include column names, data types, sizes, and display types.

Setting	Details
Column Name	Sets the name of the column.
Data	Sets either of integer, double-length integer, real number, or character string.
Size	Sets the length of the data.
Display Type	Sets the display format for the table data.
Column Comment	Sets the column comment.

3. Setting Table Data

   Open the Table data Window and set column data for the number of rows.



   If the table is an array table, there will be only one column name because all of the element data types (integer, real number, etc.) are the same.

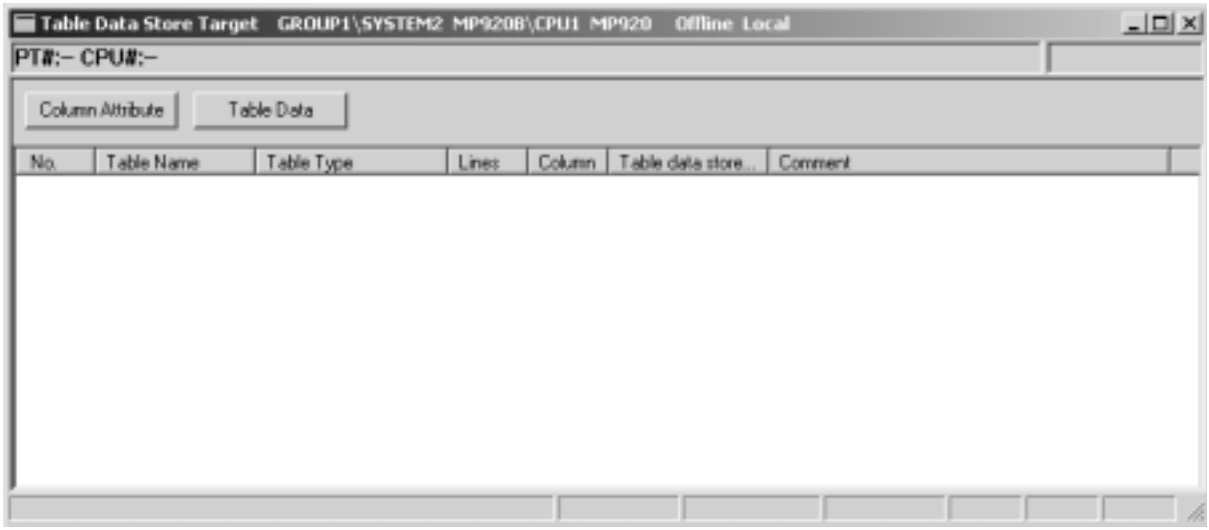
   If the table is a record table, the column name, data type, and other settings must be made for each column.

11.2 Opening Table Data Definition List Windows

- Opening from the File Manager

1. Open the PLC folder in the Directory Tree.
2. Double-click a Table Data List file in the Table Data Folder. The Table Data Definition List Window will be displayed.

   The following window will be displayed when creating a new data table.



- Opening from the Engineering Manager

Select ***File*** – ***Open*** – ***Data Table Definition*** – ***Data Table Map*** from the Engineering Manager Menu.

(1) Configuration of Table Data Definition List Window

A list of registered data tables can be displayed. The data tables in the list are displayed in alphabetic order. The column attributes and table data settings windows are opened from this window to define data tables.

Refer to the window shown in *11.2 Opening Table Data Definition List Windows*.

Display	Details
Table Name	Displays table names.
Table Type	Displays table types.
Lines	Displays the number of rows of table data.
Column	Displays the number of columns of table data.
Table data store target	Displays the place to save the table data.
Comment	Displays the data table comments.

(2) Table Data Definition List Menus

The following table shows the menu commands and functions displayed in the Table Data Definition List Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	New Open	Creates new data tables.
	Delete	Deletes data tables.
	Close	Closes the Table Data Definition List Window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
Edit		
	Copy Table Data Definition	Copies table data.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Column Definition	Opens the Data table column attribute Window.
	Table Data	Opens the Table data Window.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

11.3 Manipulating Tables in Table Data Definition List Windows

The following operations are provided in the Table Data Definition List Window to manipulate the tables.

- Opening Data table column attribute Windows
- Opening Table data Windows
- Creating new data tables
- Deleting data tables

11.3.1 Opening Data Table Column Attribute Windows

Data table column attribute Windows can be opened from the Table Data Definition List Window and Table data Window as follows: Data type and other attributes can be changed for each column name given in the table.

- Opening from the Table Data Definition List Window

1. Click the desired number in the *No.* column of the table.
2. Select ***View*** – ***Column Definition*** from the Table Data Definition List Menu, or click the **Column Attribute** Button.

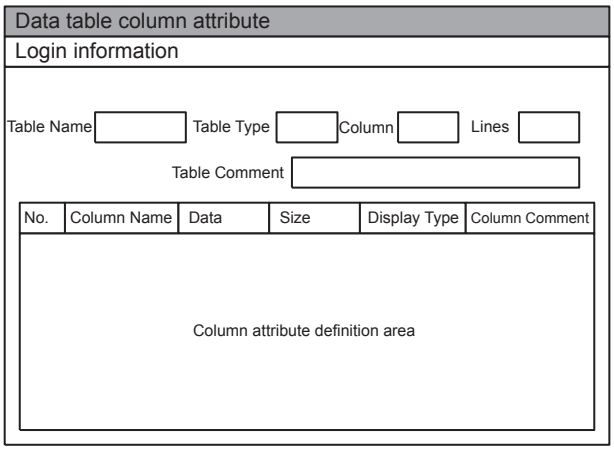
   Data table column attribute Windows can be opened by double-clicking the desired number in the *No.* column of the table.

- Opening from the Table Data Window

Data table column attribute Windows can also be opened by selecting ***File*** – ***Column Attribute*** from the Table Data Menu.

(1) Setting Column Attributes

Column attributes can be set. All columns have the same attributes for array tables, so settings are made for one column only. For record tables, each column has different attributes, and settings are made therefore for each column.



Setting	Details
Table Definition Information	Displays the table name, table type, number of columns, number of rows, and table comments.
No.	Displays column numbers. Only one column will be displayed for array tables. For record tables, columns up to the number of columns in the table will be displayed.
Column Name	Enter a column name of up to 8 characters.
Data	Select the column data type. Select ***Integer***, ***32 Bit integer***, ***Real***, or ***Character***.
Size	Enter the table data size as a number of bytes between 1 and 80. This entry, however, can only be made for ***Character*** data. The data size will be 2 bytes for ***Integer*** data, 4 bytes for ***32 Bit integer*** data, and 4 bytes for ***Real*** data, and these values cannot be changed.
Display Type	Set the data display type. The display type cannot be changed, however, if the *Data* is set to ***Character*** or ***Real***. Select ***BIN***, ***DEC***, ***HEX***, ***Real***, or ***Character***.
Column Comment	Enter a column comment of up to 32 characters.

INFO In Online Mode, only data in the *Display Type* and *Column Comment* can be changed.

(2) Data Table Column Attribute Menu

The following table shows the menu commands and functions displayed in Data table column attribute Windows.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes Data table column attribute Windows.
	Save & Save to Flash	Saves to flash memory.
	Save	Saves column attribute data.
	Table Data	Opens Table data Windows.
	Change	Changes table definitions.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
Edit		
	Copy	Copies row data to the clipboard.
	Cut	Cuts row data.
	Paste	Reproduces data on the clipboard.
	Insert	Inserts a blank row.
	Delete	Deletes data.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Go To	Moves the cursor to a specific row.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

(3) Editing Column Attributes

The following operations can be used to edit column attributes by row.

- Inserting column attributes data rows
- Deleting column attributes data rows
- Cutting column attributes data rows
- Copying column attributes data rows
- Pasting column attributes data rows
- Jumping to column attributes data rows
- Changing table definitions
- Saving column attributes data

(a) Inserting Column Attribute Data Rows

Insert one or more consecutive column attribute data rows using the following procedure.

1. Click the *column number* where the row is to be inserted.
2. Select ***Edit*** – ***Insert*** from the Data Table Column Attribute Menu.
3. The Setting Number of Insert Data Window will be displayed. Input the number of rows to be inserted and click the **OK** Button. The specified number of blank row will be inserted.

- This operation does not increase the actual number of rows, but moves the data down by the number of rows inserted. A message box will be displayed if rows will be deleted as a result of the insertion. Click the **OK** or **Cancel** Button to confirm or cancel the insertion.
- The actual number of rows can be increased by changing the number of columns in the table definitions. Refer to *(g) Changing Table Definitions* later in this section.

(b) Deleting Column Attribute Data Rows

Delete one or more consecutive column attribute data rows using the following procedure.

1. Click the *column number* of the row to be deleted.
   To delete more than one row, drag the cursor on the *column number* to select the range to delete.
2. Select ***Edit*** – ***Delete*** from the Data Table Column Attribute Menu.
3. Click the **Yes** Button in the message box. The specified rows will be deleted.

This operation does not reduce the actual number of rows, but moves the data up by the number of rows deleted. The actual number of rows can be reduced by changing the number of columns in the table definitions. Refer to *(g) Changing Table Definitions* later in this section.

(c) Cutting Column Attribute Data

Cut specified ranges of data using the following procedure. The data cut using the cut operation is copied to the clipboard. The data on the clipboard can be reproduced multiple times by using the paste operation.

1. Drag across the *column numbers* of the rows to be cut.
2. Select ***Edit*** – ***Cut*** from the Data Table Column Attribute Menu. The specified range of data will be cut.

(d) Copying Column Attribute Data

Copy a specified range of data to the clipboard using the following procedure. The data on the clipboard can be reproduced multiple times by using the paste operation.

1. Select the range of data to be copied to the clipboard.
2. Select ***Edit*** – ***Copy*** from the Data Table Column Attribute Menu. The specified range of data in will be copied to the clipboard.

(e) Pasting Column Attribute Data

Paste column attribute data using the following procedure.

1. Click the *column number* where the data is to be pasted.
2. Select ***Edit*** – ***Paste*** from the Data Table Column Attribute Menu. The data on the clipboard will be pasted at the specified position.

(f) Jumping to Column Attribute Rows

Move the cursor to a specific row using the following procedure.

1. Select ***View*** – ***Go To*** from the Data Table Column Attribute Menu.
2. The Setting Display Data No. Window will be displayed. Enter the row number to which the cursor is to be moved and click the **OK** Button. The cursor will be moved to the specified row.

(g) Changing Table Definitions

Change table data type and other table definitions using the following procedure.

1. Select ***File*** – ***Change*** from the Data Table Column Attribute Menu.
2. The Table Definition Window will be displayed. Enter the changes and click the **OK** Button.

Table definitions and table name cannot be changed if the Table data Window is open. The only data that can be changed in Online Mode is the *table comment*. Refer to *11.3.3 Creating Data Tables*.

(4) Saving Column Attributes

Save column attributes using the following procedure.

1. Select ***File*** – ***Save*** from the Data Table Column Attribute Menu.
2. A window will be displayed to confirm the save. Click the **Yes** Button.
3. A window will be displayed showing that the save has been completed normally. Click the **OK** Button.

The Error Detection Message Box is displayed if the data was not saved successfully. Refer to *Appendix A Error Messages*, eliminate the cause of the error, and save the data again.

11.3.2 Opening Table Data Windows

Table data Windows can be opened from the Table Data Definition List Window or the Data table column attribute Window.

- Opening from the Table Data Definition List Window

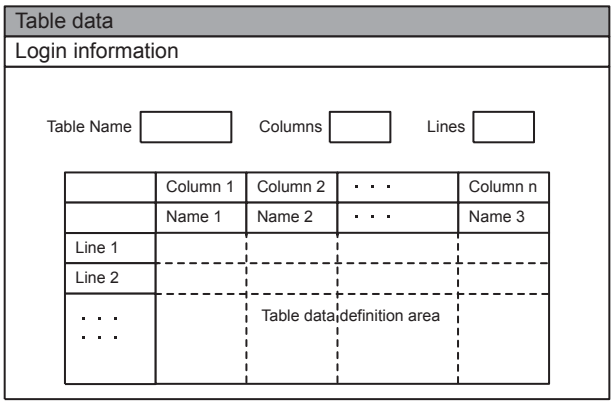
  1. Click the *No.* column in the table.
  2. Select ***View*** – ***Table Data*** from the Table Data Definition List Menu, or click the **Table Data** Button.

- Opening from the Data Table Column Attribute Window

  Table data Windows can also be opened by selecting ***File*** – ***Table Data*** from the Data Table Column Attribute Menu.

(1) Setting Table Data

Table data can be set in the Table data Windows. The data set in the following table is used for the table data manipulation instructions in the main program, such as TBLBR and TBLBW.



Setting	Details
Table Name	Displays the name of the table.
Columns	Displays the number of column set in the table definitions.
Lines	Displays the number of rows set in the table definitions.
Column No.	Displays the column numbers in order from the left.
Column Name	Displays the column names in order from the left.
Line No.	Displays the row numbers in order from the top.
Table Data	Enter table data between 0 and 9 for decimal, between 0 and 9 and A and F for hexadecimal, and 1 and 0 for binary. Enter an H at the beginning of hexadecimal data numerals.

(2) Table Data Menus

The following table shows the menu commands and functions displayed in Table data Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens windows for individual functions.
	Close	Closes Table data Windows.
	Column Definition	Opens the Data table column attribute Window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Go To	Moves the cursor to a specific column.
Edit		
	Copy	Not used with this window.
	Row Insert	
	Row Delete	
	Line Insert	
	Line Delete	
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.

(Cont'd)

Menu Command		Function
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

(3) Editing Table Data

- Jumping the Cursor

Move the cursor to a specific row or column using the following procedure.

1. Select ***View*** – ***Go To*** from the Table Data Menu.
2. The Jump Line and Column Setting Window will be displayed. Enter the row number and column number to which the cursor is to be moved and click the **OK** Button. The cursor will be moved to the specified position.

11.3.3 Creating Data Tables

Create a data table using the following procedure. Once the data table is created, a Data table column attribute Window for that data table will be displayed.

1. Select ***File*** – ***New Open*** from the Table Data Definition List Menu.

2. Enter the table definition information in the Table Definition Window, and click the **OK** Button. The Data table column attribute Window for the data table will be displayed.

Setting	Details
Table Name	Enter a table name of up to 8 characters. Commas (,), question marks (?), asterisks (*), quotation marks (“), and apostrophes (') cannot be used.
Table Type	Select the table type. ***Array Type***: All columns have the same attributes. ***Record Type***: Each column has different attributes.
Column, Lines	Enter the number of columns and rows in the table, between 1 and 10,000. The size of the table data is calculated by multiplying the number of columns by the numbers of rows. Use a table data size of 1 MB or less as a guide. Table data of more than 5 MB cannot be created. An error message box will be displayed if the size exceeds 5 MB. Reduce the number of columns and rows if this error occurs. A message box giving a warning will be displayed when the table data size exceeds 1 MB.
Table Comment	Enter a table comment of up to 32 characters.

11.3.4 Deleting Data Tables

Delete data tables using the following procedure.

1. Click the *No.* column of the data table to be deleted in the Table Data Definition List Window.
2. Select ***File*** – ***Delete*** from the Table Data Definition List Menu.
3. Click the **Yes** Button in the message box. The selected data table will be deleted.

11.4 Saving and Closing Table Data

(1) Saving

Data entered when making table data settings is saved as soon as the **Enter** Key is pressed.

(2) Closing

Close the Table data Window, the Data table column attribute Window, and the Table Data Definition List Window to exit the process for creating table data.

1. Active the Table data Window and select ***File*** – ***Close*** from the menu.
2. Active the Data table column attribute Window and select ***File*** – ***Close*** from the menu.
3. Active the Table Data Definition List Window and select ***File*** – ***Close*** from the menu.

12

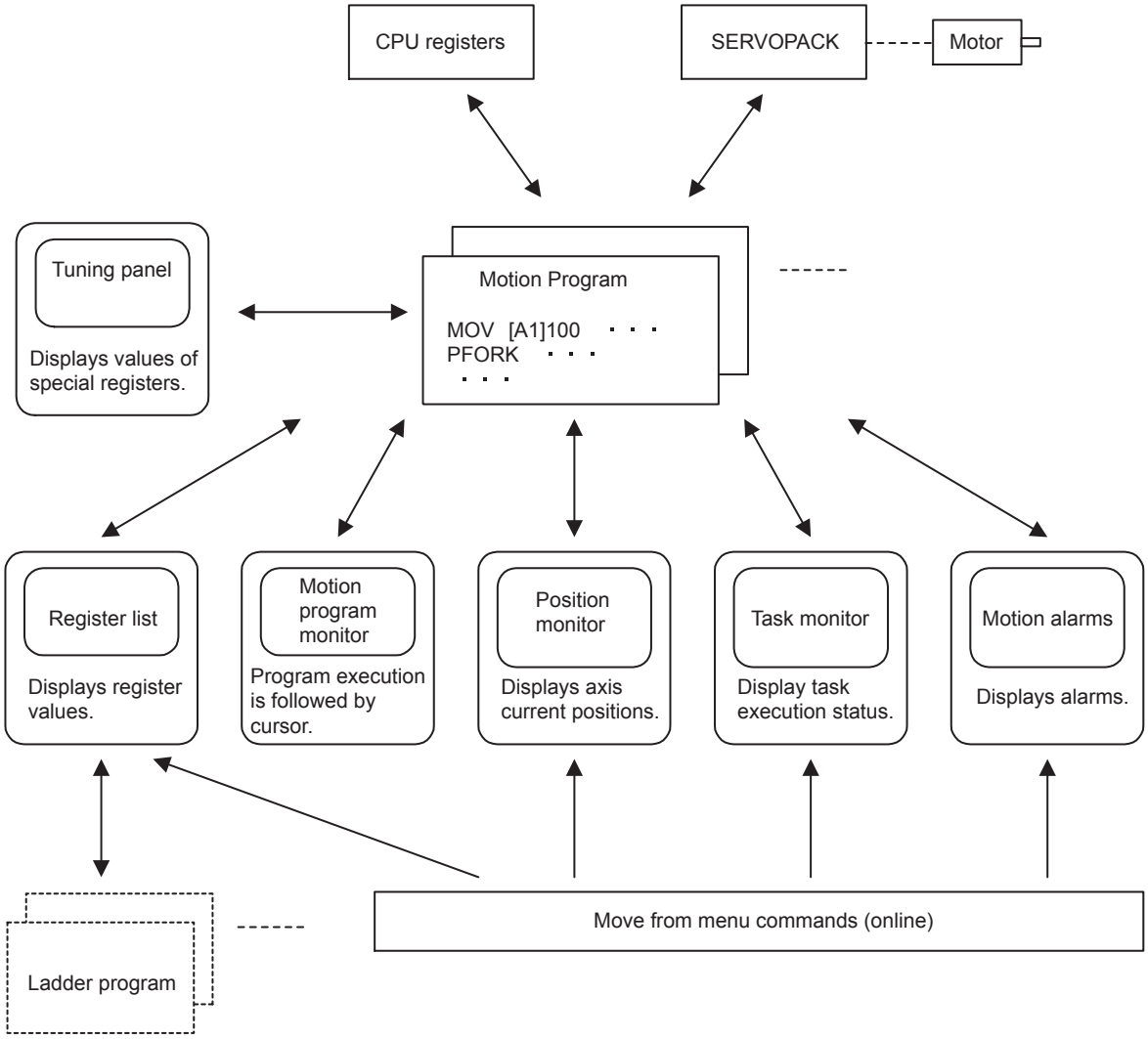
Tools

This chapter explains the monitoring functions that check the Machine Controller's operating conditions and tools that support program debugging.

12.1 Outline of the Tools

The tools support program debugging and confirmation of motion program execution conditions.

The tools display the contents of Machine Controller registers, data related to the servo being controlled, and other data in real time. Logging in online is thus required to use these tools. The menu commands to start the Monitoring Tools will not be displayed in Offline Mode, except for the Register List Tool.



Refer to the following for details.

- Ladder Programming Tool
- Motion Programming Monitor
- Position Monitor
- Task Monitor
- Motion Alarm

12.2 Tuning Panel

This section describes the Tuning Panel for defining registers used in DWG and function programs.

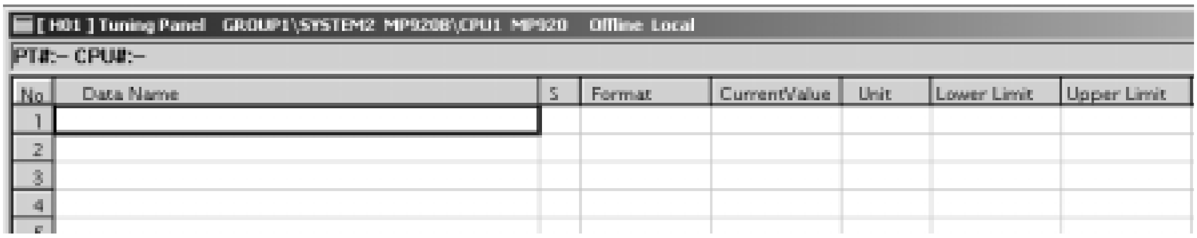
The Tuning Panel is used to define names and units for registers used in DWG and function programs. In Online Mode, the current values of defined registers are displayed and can be changed.

12.2.1 Opening the Tuning Panel Window

The Tuning Panel Window can be opened from the File Manager or the Engineering Manager.

(1) Opening from the File Manager

1. Click a DWG number on the Directory Tree.
2. Select ***File – Open – Tuning Panel*** from the File Manager Menu.
   The Tuning Panel Window will be displayed.



(2) Opening from the Engineering Manager

Select ***File – Open – Program – Tuning Panel*** from the Engineering Manager Menu.

INFO

- The Open DWG Setting Window will be displayed if the Tuning Panel Window is opened when no DWG or function program is open. Enter the DWG name and DWG type, and click the **OK** Button.
- The tuning panel settings are made for the main DWG or function program for which the Tuning Panel Window was opened. If tuning panel settings are to be made for other DWG numbers or function symbols, the main program for that DWG number or function symbol must be opened.

12.2.2 Setting Tuning Panels

All definition data for tuning panels can be entered. Up to 100 definition data items can be created.

No.	Data Name	S	Format	Current Value	Unit	Lower Limit	Upper Limit	REG-No.	DWG
	DWG No.				Input mode				

Setting	Details
Data Name	Enter a data name of up to 48 characters.
S (Setting Permission)	Enter ***S*** to permit current values to be set. If this cell is left blank, the current value cannot be changed.
Format (Display Definition)*	Enter the display format for current values: ***X*** for numerals and . (***period***) for decimal points.
Current Value	Displays current values for the registers. Register data from the Machine Controller is displayed in Online Mode, and data from the Programming Device hard disk will be displayed in Offline Mode. If x.xxx is input in the *Format*, the display will be ***1.000*** even if the actual register value is 1000. The current value can be changed if ***S*** is input in the *S* (Setting permissions). The input value is saved when the **Enter** Key is pressed.
Unit	Enter the unit for the current value of up to 8 characters.
Lower Limit	Enter the lower limit for the current value. Enter upper and lower limits such that the lower limit is equal to or less than the upper limit.
Upper Limit	Enter the upper limit for the current value. Enter upper and lower limits such that the lower limit is equal to or less than the upper limit.
REG-No.	Enter the register number for displaying the current value. I, O, M, and D registers can be entered.
DWG	If a D register number is input in the *REG-No.*, input the D register DWG number.
DWG No.	Displays the number of the DWG that is currently open.
Input Mode	Displays the current input mode.

* Table Formats for Format (Display Definition) are as follows:

Current Value	Display Format	Register Type
Integer signed number	Xx.xxx	Integer, double-length integer
Integer unsigned number	Uxx.xxx	Integer, double-length integer*
Hexadecimal	Hxxxx	Integer, double-length integer*
Real number (with exponent)	x.xxxxxE.xx	Real number
Real number (without exponent)	x.xxxxx	Real number
Bit signal	ON/OFF or 0/1	Bit*

* Negative values cannot be input when the current values are input.

Note: The decimal point will move depending on the current value. If current values have more digits than can be displayed, these values will be converted to real numbers with exponents and displayed.

- Tuning Panel Menu

The following table shows the menu commands and functions displayed in the Tuning Panel Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Tuning Panel Window.
	Close	Closes the Tuning Panel Window.
	Save	Saves the tuning panel.
	Delete	Not used with this window.
	Page Setting	Sets the print paper margins.
	Print Table	Prints tuning panel definition data.
	Exit	Exits the Engineering Manager.
Edit		
	Cut	Cuts data.
	Copy	Copies data to the clipboard.
	Paste	Reproduces the data on the clipboard.
	Delete Row	Deletes multiple consecutive rows.
	Insert Row	Inserts a blank row.
Input		
	Input Settings	Switches to Settings input mode.
	Input Table Definition	Switches to Table Definition input mode.
	Input Register	Switches to Register input mode.
	Direction of Cursor Movement	Sets the direction for cursor movement.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Display Head Row	Moves the cursor to the first row.
	Display Designated Row	Moves the cursor to a specific row.
	Display Last Row	Moves the cursor to the last row.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

12.2.3 Switching Input Modes

There are two input modes for tuning panels: Table Definition Input Mode where entries are made for all cells in the table; and Register Input Mode where only register numbers are input. The cursor position can be set to vertical, horizontal, or no movement after the inputs have been made and the **Enter** Key pressed.

The method for switching input modes is the same as for table programs. Refer to *9.4.3 Switching Input Modes*.

12.2.4 Editing Tuning Panels

The editing methods for tuning panels are the same as for table programs. Refer to *9.4.10 Editing Table Programs*.

12.2.5 Saving Tuning Panels

If a program window with the same DWG number is opened, that program (main or other program) will be saved also.

Save tuning panels using the following procedure.

1. Select ***File*** – ***Save*** from the Tuning Panel Menu.
2. The DWG/FUNC Saving Window will be displayed. Click the **Yes** Button.
3. The Save Normally Completed Window will be displayed. Click the **OK** Button.

IMPORTANT

- When tuning panels are saved, a check of whether or not the definition data is correctly input is performed. The Save Error Window is displayed if an error is detected during this check.
- Refer to *Save Error Window Configuration* under *9.3.10 Saving Ladder Programs* for information on error windows.

12.2.6 Printing Tuning Panels

Tuning panels can be printed from the Tuning Panel Window without starting the Print Manager. Only the tuning panel that is currently open, however, will be printed.

Refer to *9.3.11 Printing Ladder Programs* for information on page settings and printing.

12.2.7 Exiting Tuning Panels

The process of creating tuning panels can be exited by closing the Tuning Panel Window.

Select ***File*** – ***Close*** from the Tuning Panel Menu to close the Tuning Panel Window.

12.3 Quick Reference

This section explains the configuration and operation of the Quick Reference.

The Quick Reference is composed of the following three kinds of pages.

- List Page: Display/set the specified registers.
- Watch Page: Display/add/edit the specified registers.
- Time Chart: Graphically display the specified register data (bit units).

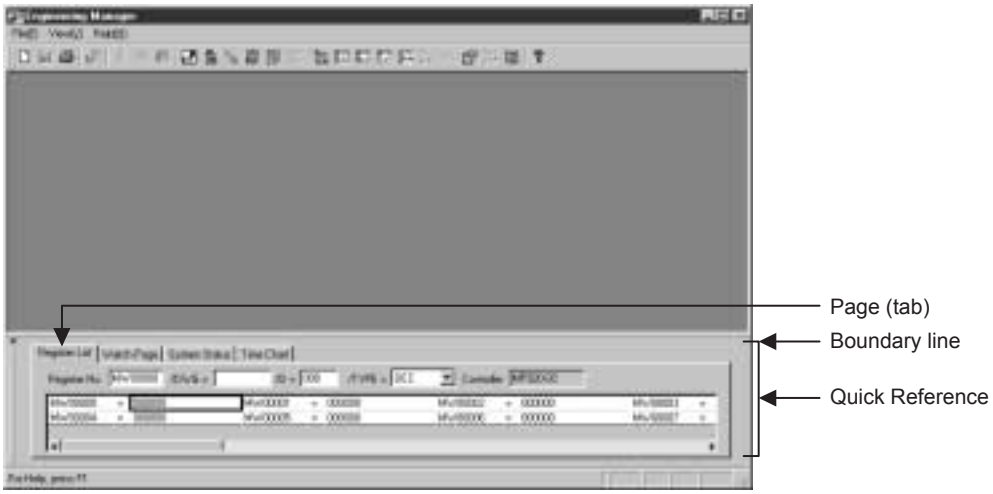
It is possible to add or delete pages for any function. A name up to 32 characters long can be attached as the title of the page.

12.3.1 Opening the Quick Reference

Open the Quick Reference from the Engineering Manager.

- Opening from the Engineering Manager

  Select ***View*** – ***Quick Reference*** from the Engineering Manager Menu.



INFO The Quick Reference Window is a docking window, so the window can be resized by dragging the boundary lines and the window itself can be repositioned by dragging it to the left or right.

12.3.2 Quick Reference Menu

The popup menu can be displayed by right-clicking in the Quick Reference.

(1) Watch Page

Menu Command		Function
View		
	Quick reference	Displays the Quick Reference.
	Select View page	Selects the page to be displayed in the Quick Reference.
Add		Sets a register to be registered in the watch page.
Delete		Deletes the selected register from the watch page.
All Delete		Deletes all of added registers from the watch page.

(Cont'd)

Menu Command		Function
Add page		
	Add List Page	Adds a new register list page.
	Add Watch Page	Adds a new watch page.
	Add Graph Page	Adds a new time chart.
Delete page		Deletes the watch page from the Quick Reference.
Edit page		
	Cut	Cuts the watch page.
	Copy	Copies the watch page.
	Paste	Pastes a cut or copied watch page into the Quick Reference.
Reset all		Returns the Quick Reference to its default status. (All registered pages and data are deleted.)
Property		Changes the title of the watch page.

(2) List and Graph Pages

Menu Command		Function
View		
	Quick reference	Displays the Quick Reference.
	Select View page	Selects the page to be displayed in the Quick Reference.
Add page		
	Add List Page	Adds a new register list page.
	Add Watch Page	Adds a new watch page.
	Add Graph Page	Adds a new time chart page.
Delete page		Deletes the watch page from the Quick Reference.
Edit page		
	Cut	Cut the watch page.
	Copy	Copies the watch page.
	Paste	Pastes a cut or copied watch page into the Quick Reference.
All Reset		Returns the Quick Reference to its default status. (All registered pages and data are deleted.)
Property		Changes the title of the watch page.

12.3.3 Quick Reference Operations

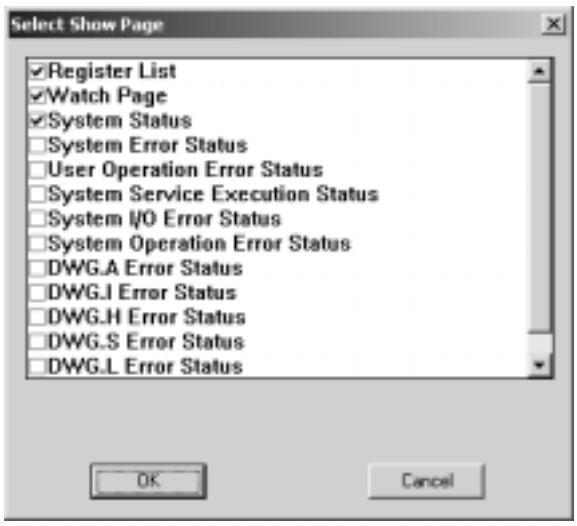
This section explains the operations of the Quick Reference function.

(1) Page Operations

(a) Selecting Pages to Display

Customize the pages that will be displayed in the Quick Reference.

1. Select ***View*** – ***Select View Page*** from the popup menu. The Select Show Page Window will be displayed.



2. Specify which pages will be displayed and which will be hidden.
   - Displaying a Page:
     Select the option next to the page(s) that you want to display.
   - Hiding a Page:
     Clear the option next to the page(s) that you do not want to display.

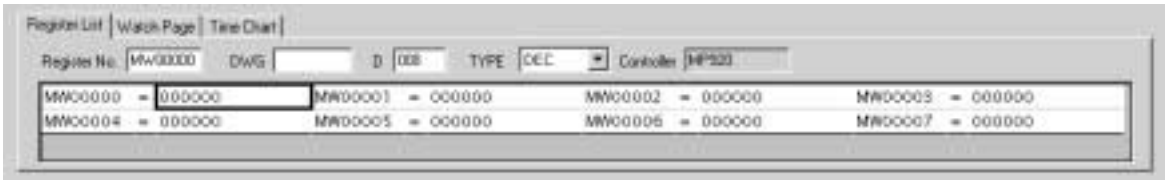
INFO

It is not possible to hide all of the pages. At least one option must be selected.

3. Click the **OK** Button.

   Only the selected pages will be displayed as pages.

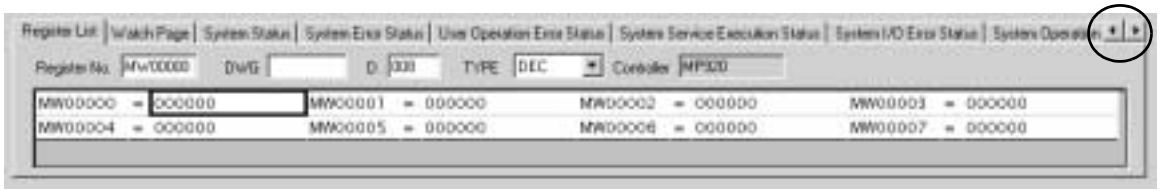
   When the display option is selected for all three pages (as in the example Select Show Page Window of step 1 above), there will be three page tabs displayed.



(b) Moving through Pages

Quick Reference pages can move to the left and right.

If the tabs of the Quick Reference pages cannot be displayed within the window, a scroll button will be displayed at the right side of the Quick Reference as shown in the following diagram (circled in the following diagram).



INFO The scroll button will not be displayed if the entire tab can be displayed within the window.

Click the right scroll button or left scroll button to scroll through the data.

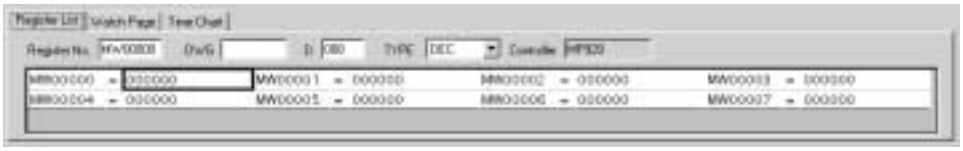
Tabs can be moved in order to the right and left.

(c) Adding a Page

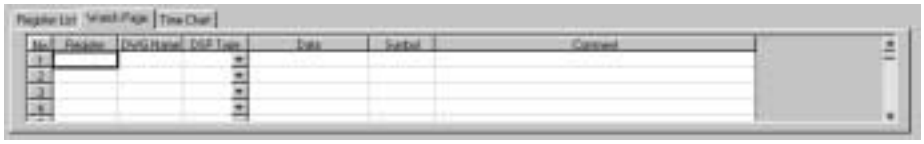
Pages can be added.

The following three kinds of pages can be added.

- Register List Page



- Watch Page



- Time Chart Page

1. Select ***Add Page*** from the popup menu and select ***Add List Page***, ***Add Watch Page***, or ***Add Graph Page*** from the submenu.

   The Property Window will be displayed.

2. Input the title for the page being added and click the **OK** Button.

   The selected kind of page will be inserted into the Quick Reference.

   The title set in the Property Window will be displayed in the tab of the inserted page.

(d) Deleting a Page

Pages can be deleted from the Quick Reference.

1. Select the page to be deleted so that it is active.
2. Select ***Delete Page*** from the popup menu.
   The selected page will be deleted from the Quick Reference.

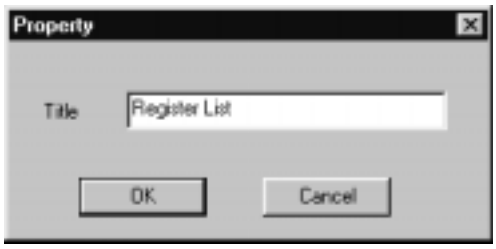
IMPORTANT

When an added page is deleted, there is no way to undo that deletion. Make sure that you want to delete the selected page.

(e) Changing the Title

The titles of pages can be changed.

1. Select the desired page so that it is active.
2. Select ***Property*** from the popup menu.
   The Property Window will be displayed.



Note: The Property Window shown above is displayed when the title of a Register List page is being changed.

3. Input the title and click the **OK** Button.
   The title displayed in the tab of the selected page will be changed to the name that was input in the Property Window.

(f) Cutting a Page

Watch pages can be cut.

The Cut operation is possible only for a Watch Page.

1. Select the Watch page to be deleted so that it is active.
2. Select ***Edit Page*** – ***Cut*** from the popup menu.
   The selected Watch page will be cut.

INFO

- A page deleted by cutting can be pasted.
- When pasting, only the last page that was cut will be pasted.

(g) Copying a Page

The Copy operation is possible only for a Watch Page.

1. Select the Watch page to be copied so that it is active.
2. Select ***Edit Page*** – ***Copy*** from the popup menu.
   The selected Watch page will be copied.

INFO

- A copied page can be pasted.
- When pasting, only the last page that was copied will be pasted.

(h) Pasting a Page

The Paste operation is possible only for a Watch Page.

1. Select the Watch page in the location where the page will be pasted so that it is active.
2. Select ***Edit Page – Paste*** from the popup menu.
   The last page that was cut or copied will be pasted just in front of the active page.

(2) Setting a Register

(a) Adding a Register

The registration of registers is possible only for a Watch Page.

1. Select the Watch page in which the register will be added so that the page is active.
2. Select ***Add*** from the popup menu.
   The Set Number of Register Window will be displayed.

3. Input the register number and DWG name of the register being added to the page and click the **OK** Button.
   The register data for the register number specified in the Set Number of Register Window will be displayed in the last line of the list. When a D register has been set as the register number, the DWG name specified in the Set Number of Register Window will also be displayed in the list.

IMPORTANT

If the input data is invalid, the data will not be accepted.

INFO

Refer to *12.3.4 Editing Data* for details on data editing such as the set values for the data.

(b) Deleting a Register

The deletion of registers is possible only for a Watch Page.

1. Select the row containing the data to be deleted so that the row is active.
2. Select ***Delete*** from the popup menu.
   The selected row will be deleted from the list.

(3) Deleting All Data

The deletion of all data is possible only for a Watch Page.

1. Select the Watch page in which data is to be deleted so that the page is active.
2. Select ***All Delete*** from the popup menu.
   All of the data will be deleted from the list in the selected Watch page.

(4) Resetting All Data

The Quick Reference display and data contents can be reset to their default settings.

1. Select ***All Reset*** from the popup menu.
   A confirmation message will be displayed.

2. Click the **Yes** Button.
   The Quick Reference display and all of the data contents will be reset to their initial settings.

12.3.4 Editing Data

Various operations (such as changing data, changing the page display, and setting data in registers) can be performed by editing data in the Quick Reference.

These functions are detailed below.

(1) Editing a Page

A page displayed in the Quick Reference can be edited.

The following table lists the items that can be edited.

Edit Item	Details
Adding a Page	Adds a new page to the Quick Reference.
Deleting a Page	Deletes a page from the Quick Reference.
Changing the Displayed Page	Specifies the page to display.
Changing the Page Title	Changes the title of the page.
Copying a Page	Copies a page (Watch pages only).
Cutting a Page	Cuts a page (Watch pages only).
Pasting a Page	Pastes a page that was cut or copied (Watch pages only).

Refer to *12.3.3 Quick Reference Operations* for details on editing pages.

(2) Registers That Can Be Input

The following table shows the registers that can be input in the Quick Reference.

Register Variable	Maximum Number				Read/Write
	MP910	MP920	MP930	MP940	
S Register	1024	1024	1024	1024	R/W
I Register	5120	5120	2048	2048	R/W
O Register	5120	5120	2048	2048	R/W
M Register	32768	32768	32768	32768	R/W
D Register	16384	16384	16384	16384	R/W
C Register	16384	16384	16384	16384	Read only

D registers are unique to each drawing, so a DWG name must be set when a D register is specified. The maximum number of D registers that can be used is set with the *Number of D Registers* setting in the DWG Properties Window. (Refer to *9.2.1 Opening Drawing Properties Windows*.) For all other registers, the maximum number is the maximum shown in the table.

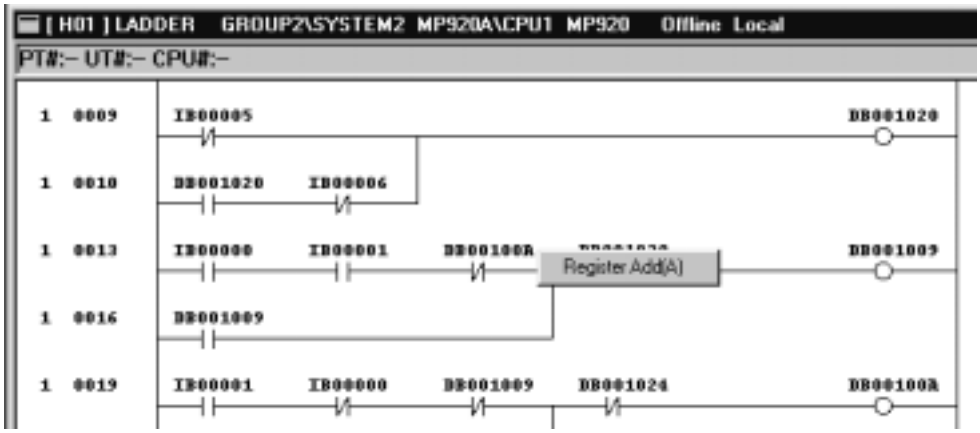
(3) Editing with the DWG

Registers that are being used in a drawing can be registered from the DWG to the Quick Reference. Furthermore, any symbols or comments that are input for a register number in the Quick Reference will be reflected in the DWG.

(a) Registering a Register Number (DWG → Quick Reference)

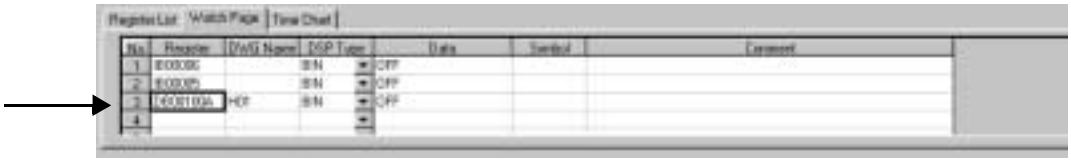
1. Open the DWG file in the Engineering Manager.
2. Move the cursor over that register number in the DWG that you want to register in the Quick Reference to select it so that it is active, and right-click to display the popup menu.
3. Select ***Register Add*** from the popup menu.

   In the following example, register DB00100A has been selected in the DWG.



The above-mentioned operation will register the selected register number (DB00100A in this example) in the active Watch page within the Quick Reference.

The selected register number and corresponding data will be added to the bottom of the list.

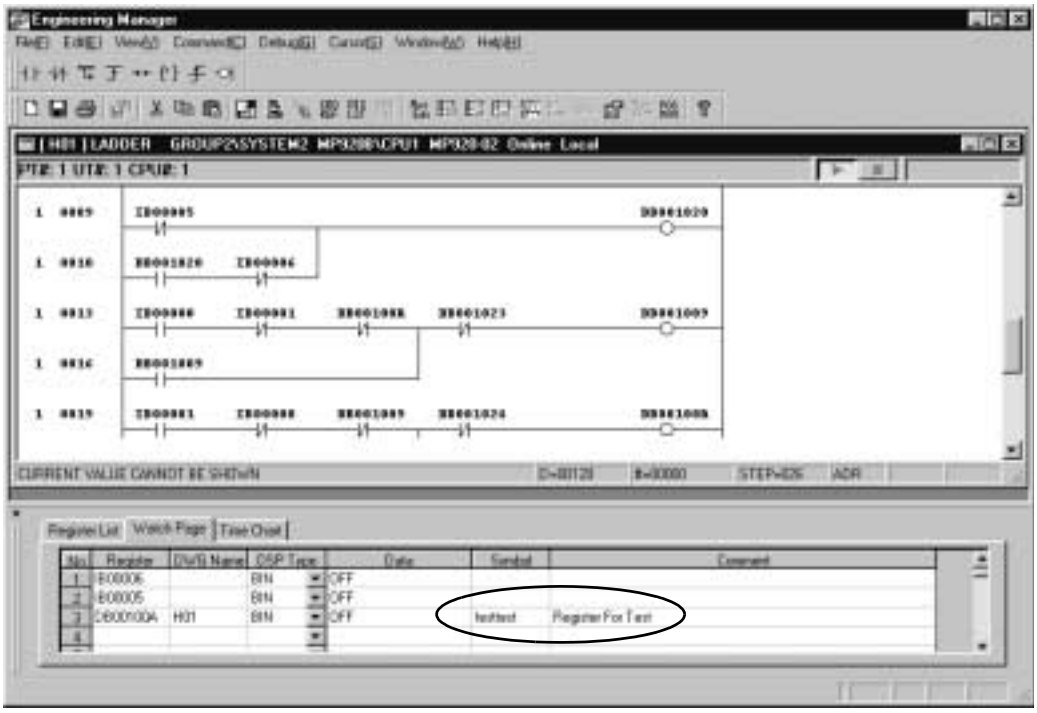


(b) Adding Symbols/Comments (Quick Reference → DWG)

Symbols and comments (circled in the following figure) can be set in a Quick Reference Watch page.

The following symbol and comment are used in this example.

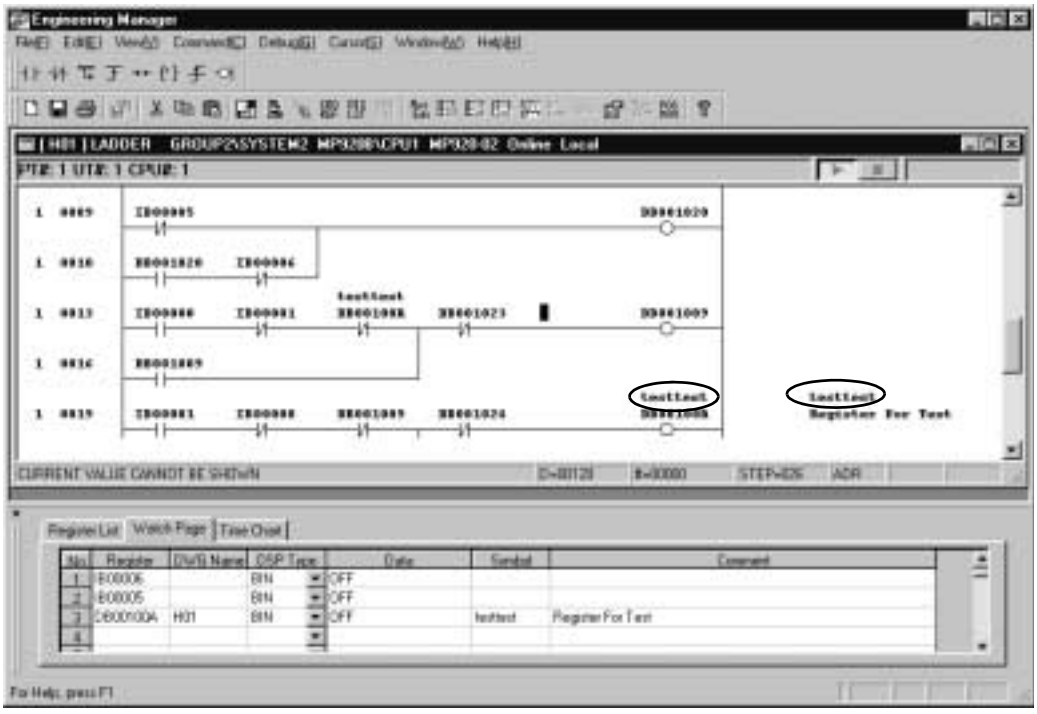
- Symbol: testtest (up to 8 characters)
- Comment: Register For Test (up to 48 characters)



After the symbol or comment is set, the setting will be reflected in the DWG when the DWG is active.

The symbol will be displayed above the register number and the comment will be displayed at the end of the row for last output registers only (circled in the following figure).

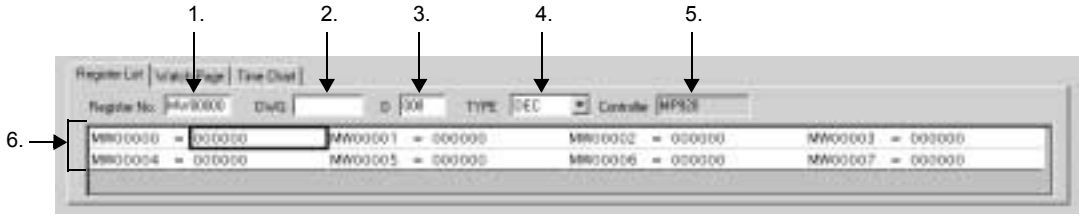
The symbol is displayed above the comment (circled in the following figure).



(c) Editing Register List Page

The various data and settings of the Register List page are shown below.

The following figure shows the Register List Page Window.



1. Register Number
   - Description: Specifies the leading register number of the registers containing the data to display/set.
   - Set value: Input the register number.
2. DWG (DWG Name)
   - Description: DWG name for register numbers that have DWG names.
   - Set value: Input the DWG name.
     When a D register is specified in the *Register No.*, a DWG name must be set because the D registers are unique to the drawing. The *DWG* setting is ignored for all other registers.
3. D (Number of Registers)
   - Description: Specifies the number of the registers containing the data to display/set.
   - Set value: Input the number of registers to display. Input a multiple of 4. If the set value is not a multiple of 4, the input value will automatically be increased to the nearest multiple of 4.
4. TYPE (Display Format)
   - Description: Specifies the register data display format.
   - Set value: Select the desired data display format from the pull-down menu. The following table shows the data formats that can be selected from the list.

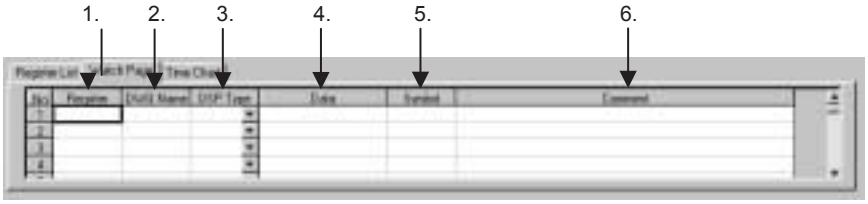
Register Number Setting	Display Formats	
Binary Value set in Register Number	Displays ON or OFF.	
Word, Long Value, or Floating Value set in Register Number	DEC	Decimal display
	HEX	Hexadecimal display
	BIN	Binary display
	FLOAT	Floating-point display
	LONG	Long (4 byte) display
	ASCII	ASCII display

   The register number will be set to the following format automatically based on the selected value.
   - Floating-point value when ***FLOAT*** is selected (for example, MF□□□□)
   - Long value when ***LONG*** is selected (for example, ML□□□□)
   - Word value when any other value is selected (for example, MW□□□□)
5. Controller (Type of Machine Controller)
   - Description: Indicates the type of the Machine Controller.
   - Set value: Display only (The data cannot be set.)
6. Register Data
   - Description: Indicates the current register data.
   - Set value: Input a value in the data format set with *TYPE*. Data set in this field will be reflected as the data of the register.

(4) Editing Watch Page

The various data and settings of the Watch page are shown below.

The following figure shows the Watch Page Window.



1. Register (Register Number)
   - Description: Specifies the register number of the register containing the data to display/set.
   - Set value: Input the register number.
2. DWG Name
   - Description: DWG name for register number that has DWG name.
   - Set value: Input the DWG name.
     When a D register is specified in the *Register*, a DWG name must be set because the D registers are unique to the drawing. The *DWG Name* setting cannot be input for any other registers.
3. DSP Type (Display Format)
   - Description: Specifies the data display format.
   - Set value: Select the desired data display format from the pull-down menu. The following table shows the data formats that can be selected from the list.

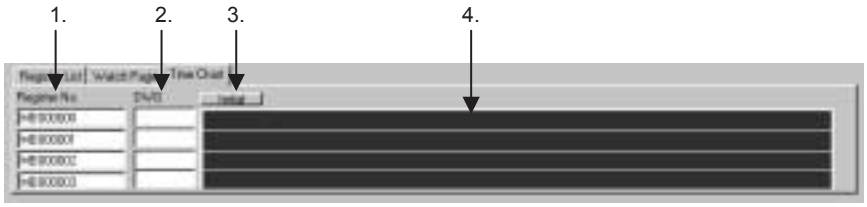
Register Number Setting	Display Formats	
Binary	BIN	Displays ON or OFF.
Word	DEC	Decimal display
	HEX	Hexadecimal display
	BIN	Binary display
Long	LONG	Long (4 byte) display
	HEX	Hexadecimal display
Floating-point	FLOAT	Floating-point display

4. Data (Register Data)
   - Description: Indicates the current register data set in the register number.
   - Set value: Input a value in the data format set with *DSP Type*. Data set in this field will be reflected as the data of the register.
5. Symbol
   - Description: Indicates the name (symbol) corresponding to the register number.
   - Set value: Input the name (symbol) that you want to correspond to the register data. The name set in this field will be displayed above the register number in the drawing specified by the *DWG name*.
6. Comment
   - Description: Indicates the data comment.
   - Set value: Input the comment corresponding to the register data. A comment up to 48 characters long can be input.

(5) Editing Time Chart Page

The various data and settings of the Time Chart Page are shown below.

The following figure shows the Time Chart Page Window.



1. Register Number
   - Description: Specifies the register number of the register containing the data to chart.
   - Set value: Input the register number. Only bit data can be input.
2. DWG (DWG Name)
   - Description: DWG name for register number that has DWG name.
   - Set value: Input the DWG name.
     When a D register is specified in the *Register No.*, a DWG name must be set because the D registers are unique to the drawing. The DWG setting cannot be input for any other registers.
3. **Initial** Button

   Click this button to clear (erase) the chart that is being displayed.

   This operation does not clear the register number or DWG name.
4. Chart Display

   A chart is displayed based on the data of the register specified by the *Register No.* and *DWG.*

12.3.5 Closing the Quick Reference

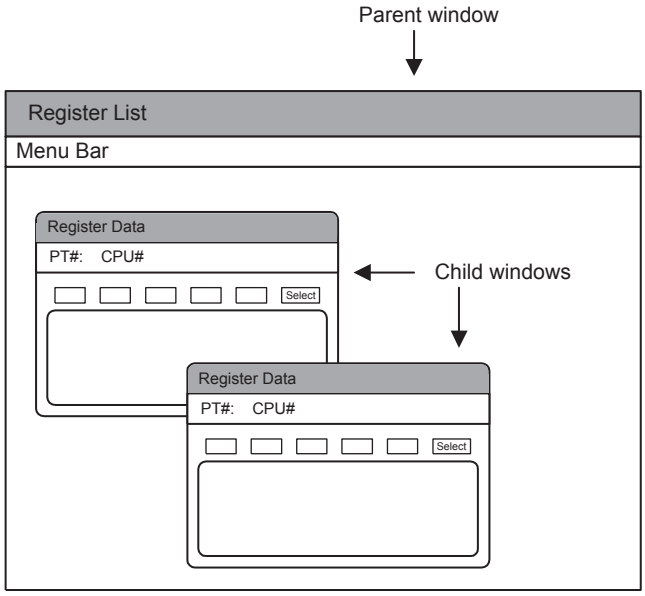
To close the Quick Reference, select ***View*** – ***Quick Reference*** from the Quick Reference Menu and clear the *Quick Reference* Option.

12.4 Register Lists

This section describes the register list structure and operations.

The current values of the Machine Controller's internal registers, the S, I, O, M, D, and C registers, can be displayed or changed on a Register List Window.

A separate Register List Window is opened for each register display parameters that is set. More than one Register List Window can be open at the same time. Select ***File*** – ***Open Register List*** from the Register List Menu, a child window is opened to show the contents of the registers.



12.4.1 Opening a Register List Window

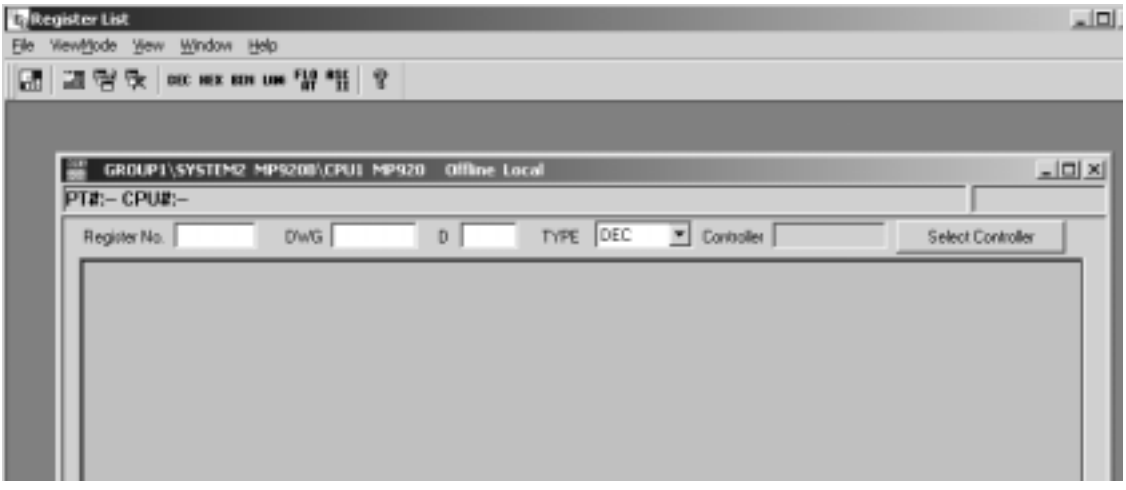
A Register List Window can be opened as a separate window such as a File Manager or an Engineering Manager Window.

(1) Register List Window

The Register List Window can be opened from either the File Manager or the Engineering Manager. Both of these procedures are explained below.

- Opening From the File Manager

  Select ***Tool*** – ***Register List*** from the File Manager Menu.



- Opening From the Engineering Manager

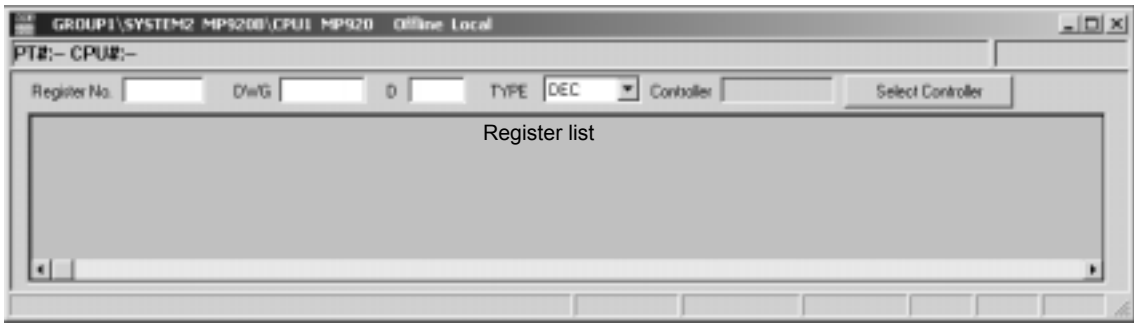
  Select ***File*** – ***Open*** – ***Tool*** – ***Register List*** from the Engineering Manager Menu.

(2) Two or More Register Data Windows

One Register Data Window is opened automatically when the Register List Window is opened. Open another Register Data Window when necessary using the following procedure.

Register contents can be displayed as integer, double-length integer, real number, or bit data. The displayed data is from the Machine Controller in Online Mode and from the Programming Device hard disk in Offline Mode.

To create a new Register Data Window, select ***File – Open Register List*** from the Register List Menu. A new Register Data Window will be displayed in the Register List Window.



12.4.2 Configuration of the Register Data Window

(1) Window Configuration

When the (parent) Register List Window is opened, one child window, the Register Data Window is also opened.

Child Window	Details
Register Data Window	Displays the register contents.

(2) Displaying Registers

Set the following parameters in the Register Data Window and then click anywhere in the display area. The contents of the registers will be displayed.

Setting	Details
Register Number	Sets the register number to start the display.
DWG	Sets the DWG or function name for local registers.
D	Sets the number of registers to display.
TYPE	Sets the display type: Binary, decimal, hexadecimal, or ASCII.
Controller (Type of Machine Controller)	Displays the type of the Machine Controller. (Setting is not possible.)

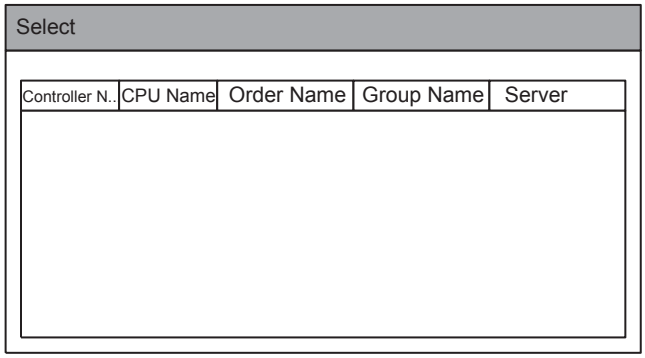
(3) **Select Controller** Button

The **Select Controller** Button is used to check registers from another Machine Controller. When the button is clicked, a list of the PLC Folders registered in the File Manager will be displayed. Select the desired PLC (Machine Controller).

The default will normally be the PLC Folder that was the source of starting the register list. If the register list is started from the Engineering Manager, for example, the default will be the Machine Controller from which the Engineering Manager was started.

Normally, only register data from the PLC Folder that is currently logged on to is displayed, and there is no need to click the **Select Controller** Button.

Click the **Select Controller** Button to display the Select Window.



- If a register number other than for a D register is input for the *Register Number* setting, there is no need to input a DWG number.
- For a *Register Number* setting, the motion program number can be input for the *DWG* = Box.
- A register list cannot be displayed for X, Y, A, or # registers.
- In Offline Mode, a register list can be displayed for only the M register, and not for other registers. However, if the register data is saved on the Programming Device hard disk or a floppy disk using the Transfer function, the register list can be displayed.

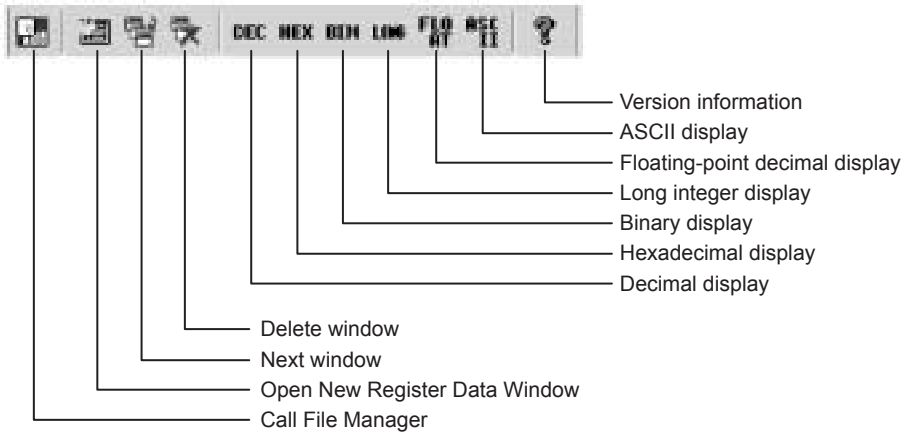
(4) Register List Menus

The following table shows the menu commands and functions displayed in the Register List Window.

Menu Command		Function
File		
	File Manager	Displays the File Manager.
	Open Register List	Displays the Register Data Window.
	Close	Closes the Register Data Window.
	Exit	Exits the Register List Window.
View Mode		
	DEC	Displays register list in decimal.
	HEX	Displays register list in hexadecimal.
	FLOAT	Displays register list in real numbers.
	BIN	Displays register list in binary.
	LONG	Displays register list in double-length integers.
	ASCII	Displays register list in ASCII.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Function Bar	Displays the Function Bar.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Next Window	Displays the next window.
	Delete Window	Deletes the window.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

- Tool Icons in Register List Window

Among the various menu items, most commonly used items are available through tool icons as shown in the following illustration.



12.4.3 Changing the Register Lists

(1) Changing the Display Format

The numeric display mode and register type can be changed for the displayed register list.

(a) Changing the Numeric Display Format

The display format for the register's numeric values can be changed to decimal, hexadecimal, binary, or ASCII.

- Decimal Display

  Register values can be displayed in decimal by selecting ***View Mode – DEC*** from the Register List Menu.

- Hexadecimal Display

  Register values can be displayed in hexadecimal by selecting ***View Mode – HEX*** from the Register List Menu

- Binary Display

  Register values can be displayed in binary by selecting ***View Mode – BIN*** from the Register List Menu.

- ASCII Display

  Register values can be displayed in ASCII by selecting ***View Mode – ASCII*** from the Register List Menu.

INFO If register values that cannot be displayed as ASCII characters are set for ASCII display, undefined data will be displayed.

(b) Changing the Register Type

The register type can be changed to integer, double-length integer, or real number.

- Integers

  The register number and register values can be displayed as integers by selecting either ***View Mode – DEC*** or ***View Mode – HEX*** from the Register List Menu.

INFO If ***DEC*** is selected, the integer register will be displayed in decimal. If ***HEX*** is selected, the integer register will be displayed in hexadecimal.

- Double-length Integers

  The register number and register values can be displayed as double-length integers by selecting ***View Mode – LONG*** from the Register List Menu.

- Real Numbers

  The register number and register values can be displayed as real numbers by selecting ***View Mode*** – ***FLOAT*** from the Register List Menu.

(2) Changing Register Values

Change register values using the following procedure.

1. Move the cursor to the register value to be changed.
2. Input the value and then press the **Enter** Key.

- For integer, double-length integer, or real number register lists, input values from 0 to 9 in decimal, 0 to 9 or A to F in hexadecimal, or either 1 or 0 in binary. A negative value can be input if the register values are displayed in decimal.
- The values that are input will be immediately saved to the Machine Controller when the **Enter** Key is pressed.

12.4.4 Exiting the Register List

Exit the register list by closing the Register List Window and the Register Data Window using the following procedure.

- To close the Register Data Window, select ***File*** – ***Close*** from the Register List Menu.
- To close the Register List Window, select ***File*** – ***Exit*** from the Register List Menu.

12.5 Cross References

This section describes the cross reference function for registers used in programs.

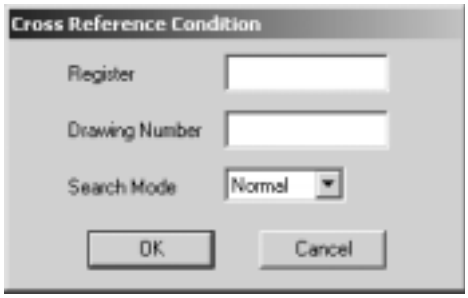
The cross reference function will search programs to find out which registers are used in which programs and how the registers are used.

12.5.1 Opening the Cross Reference Window

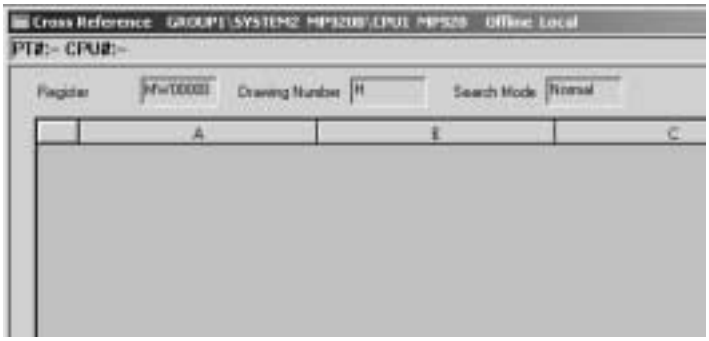
The Cross Reference Window is opened from the Engineering Manager.

- Opening from the Engineering Manager

1. Select ***File*** – ***Open*** – ***Tool*** – ***Cross References*** from the Engineering Manager Menu. The Cross Reference Condition Window will be displayed.



2. Set the conditions in the Cross Reference Condition Window and then click the **OK** Button. The Cross Reference Window will be opened.



INFO If step 1. is executed when a DWG or function program is open, the Cross Reference Window will open directly based on the leading register used in the program. This will apply to all the programs that are open.

12.5.2 Configuration of the Cross Reference Condition Window

Setting	Details	
Register (Register Number)	Input the register number to search for.	
Drawing Number	Input the DWG number of function symbol to search for. Wildcards can be used as shown below.	
	*	Searches all drawings.
	L	Searches the parent low-speed drawing.
	L*	Searches all low-speed drawings.
	L10*	Searches drawing L10 and all grandchild drawings of L10.
	L10.*	Searches all grandchild drawings of L10.
	L10.01	Searches the specified drawing.
	F*	Searches all user functions.
	FUNC001	Searches the specified function.
Search Mode	Select the search mode from ***Normal***, ***High Speed***, or ***Option***. Refer to *Details of Search Mode* on the next page.	

- Details of *Search Mode*

1. Normal Search Mode

   Select ***Option*** – ***Normal*** from the Cross Reference Menu.

   In Online Mode, the Machine Controller will be searched; in Offline Mode, the Programming Device hard disk will be searched. Table programs and tuning panels will not be searched in Offline Mode.

2. High-speed Search Mode

   Select ***Option*** – ***High-speed*** from the Cross Reference Menu.

   The cross reference information created by the cross reference information update function will be searched. High-speed searching is possible because the cross reference information is searched instead of the programs. Always update the cross reference information before performing the search using the following procedure.

   The cross reference information must be updated before executing a high-speed search.

   a) Select ***File*** – ***Remake Cross Info.*** from the Cross Reference Menu.

   b) The Remake Cross Information Window will be displayed. Click the **OK** Button. The most recent cross reference information will be saved on the Programming Device hard disk.

3. Option (Expanded) Search Mode

   Select ***Option*** – ***Option*** from the Cross Reference Menu.

   In Online Mode, the Machine Controller will be searched; in Offline Mode, the Programming Device hard disk will be searched. In both cases, the table programs and tuning panels on the Programming Device hard disk will be searched.

- Cross Reference Menu

The following table shows the menu commands and functions displayed in the Cross Reference Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Cross Reference Window.
	Close	Closes the Cross Reference Window.
	Register Set	Sets the cross reference conditions.
	Remake Cross Info.	Updates the cross reference information.
	Save	Not used with this window.
	Delete	Not used with this window.
	Print	Prints the cross reference data.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the Status Bar.
	Quick Reference	Displays the Quick Reference.
Option		
	Normal	Displays the Normal Mode.
	High-speed	Displays the High-speed Mode.
	Option	Displays the Expanded Mode.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

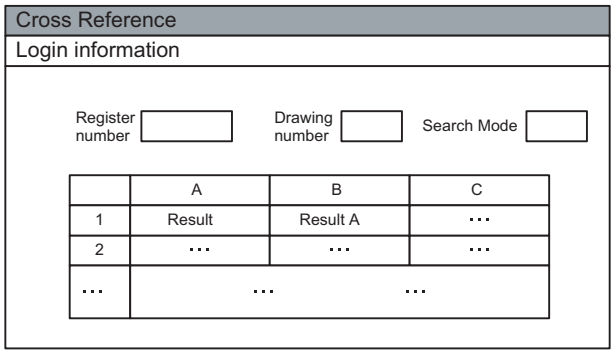
12.5.3 Executing Cross References

The cross reference conditions can be reset while the Cross Reference Window is open.

Select ***File*** – ***Open*** – ***Tools*** – ***Cross Reference*** from the Engineering Manager Menu. The Cross Reference Condition Window will be displayed.

12.5.4 Configuration of the Cross Reference Window (Search Results)

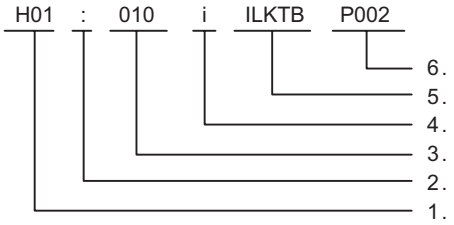
The Cross Reference Window is displayed as follows:



Setting	Details
Login Information	Displays the port number and other information when logged in online.
Register Number	Displays the register number that was searched for.
Drawing Number	Displays the DWG number or function symbol that was searched.
Search Mode	Displays the search mode that was used (normal, high-speed, or expanded).
Results	Refer to *Display of Search Results* following this table.

- Display of Search Results

Search results are displayed in the following form.



1. DWG Number or Function Symbol

   The DWG number or function symbol using the search register.

2. Program Type

   The type of program using the search register.

   - /: Main program
   - |: SFC flowchart
   - -: SFC action box
   - =: Symbol definition
   - :: Table program
   - !: Tuning panel
   - %: FBD

3. Position

   The position of the search register. The step number is given for DWG or function programs, SFC flowcharts, and SFC action boxes. The row number is given for table programs.

4. Index Type

   The type of index is given if the register is used as an indexed register.

   - i: i register
   - j: j register

5. Instruction Type

   The type of instruction or program is displayed.

   - #CTBL: # register constant table
   - MCTBL: M register constant table
   - OTBL: Interlock table
   - ASMTBL: Part composition table
   - TUNPNL: Tuning panel
   - SYMBOL: Symbol definition

6. Table Number

   The table number is displayed for interlock tables.

   - P000: Tuning panel
   - From P001: Symbol definition

12.5.5 Closing Cross References

Close the Cross Reference Window to exit cross references.

Select ***File*** – ***Close*** from the Cross Reference Menu to close the window.

12.6 Disable Coil Lists

This section explains the function for searching for disabled coils.

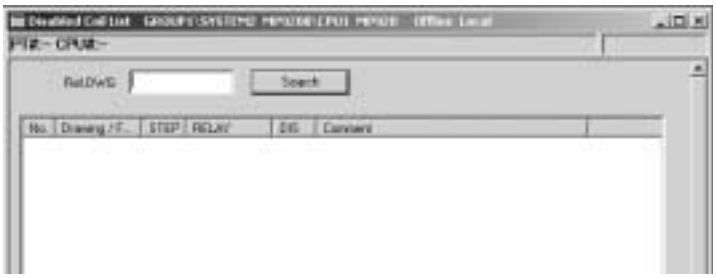
Disable Coils Lists searches for disabled coils in the program and display information on them.

12.6.1 Opening the Disable Coil List Window

The Disable Coil List Window is opened from the Engineering Manager.

- Opening from the Engineering Manager

  Select ***File*** – ***Open*** – ***Tool*** – ***Disable Coil List*** from the Engineering Manager Menu. The Disable Coil List Window will be displayed.



12.6.2 Configuration of the Disable Coil List Window

Setting/Display	Details
Ref. DWG	Specify the range of programs to search for.*1
Search Button	Executes the search.
No.	Displays the row number.
Drawing/Function	Displays the DWG number or function symbol using the disabled coil.
STEP	Displays the step number*2 with the disabled coil.
RELAY	Displays the relay number of the disabled coil.
DIS	Displays the status of the disabled coil. ON: Disabled coil is ON OFF: Disabled coil is OFF
Comment	Displays the relay number comment.

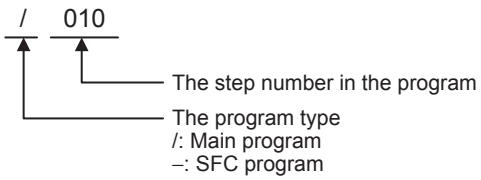
* 1. The following table shows details of specifying search program ranges.

DWG and function main programs, as well as SFC action boxes (offline only) can be searched.

Search Range	Details
*	Searches all drawings.
L	Searches the parent low-speed drawing.
L*	Searches all low-speed drawings.
L10*	Searches drawing L10 and all grandchild drawings of L10.
L10.*	Searches all grandchild drawings of L10.
L10.01	Searches the specified drawing.
F*	Searches all user functions.
FUNC001	Searches the specified function.

* 2. The following figure shows details of step numbers.

Step numbers and program types are displayed as follows:



- Disable Coil List Menu

The following table shows the menu commands and functions displayed in the Disable Coil List Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Disable Coil List Window.
	Close	Closes the Disable Coil List Window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

12.6.3 Exiting Disable Coil Lists

Close the Disable Coil List Window to exit disabled coil lists.

Select ***File*** – ***Close*** from the Disable Coil List Menu to close the window.

12.7 Comment Lists

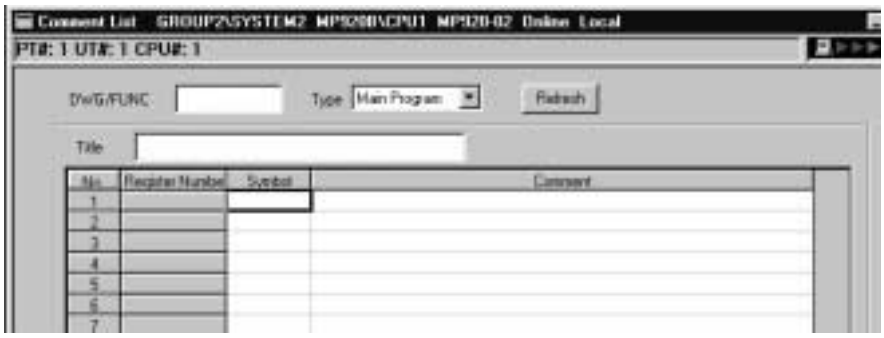
This section describes the creation of comments for registers in programs.

DWG and function program titles and comments for registers in currently displayed programs can be created at the same time.

12.7.1 Opening Comment List Window

- Opening from the Engineering Manager

Select ***File*** – ***Open*** – ***Tool*** – ***Comment List*** from the Engineering Manager Menu.



12.7.2 Configuration of the Comment List Window

The symbols and comments defined for register numbers are displayed in the Comment List Window.

Display	Details
DWG/FUNC	Enter the DWG number or function symbol for which comments are to be created.
Type	Select the type of comment display. ***Main Program***: DWG, function, or table programs ***SFC Flow Chart***: SFC flowcharts ***SFC Time Chart***: SFC timecharts ***SFC ABOX***: SFC action boxes
Refresh Button	Click the **Refresh** Button to display the register numbers, symbols, and comments used in the program set in the *DWG/FUNC* and *Type* input fields.
Title	Enter a DWG or function program title of up to 48 characters.
Register Number	Displays the register numbers used in the program set in the *DWG/FUNC* and *Type* input fields.
Symbol	Enter a symbol of up to 16 characters to be used for the register number.
Comment	Enter a comment of up to 48 characters for the register number.

- Comment List Menu

The following table shows the menu commands and functions displayed in the Comment List Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Comment List Window.
	Close	Closes the Comment List Window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
Edit		
	Cut	Cuts symbols and comments for registers.
	Copy	Copies symbols and comments for registers.
	Paste	Pastes symbols and comments that have been cut or copied.
	Del (Delete)	Deletes symbols and comments for registers.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

12.7.3 Creating Comments

Create register comments using the following procedure.

1. Set the DWG number or function symbol and the display type.
2. Click the **Refresh** Button to display the register numbers used within the specified program.
3. Enter the title, symbols, and comments corresponding to the displayed register numbers.

Comments are saved when the **Enter** Key is pressed after the comment has been entered in step 3.

12.7.4 Editing Comments

Comment rows can be edited by selecting cut, copy, paste, and delete from the Edit menu.

Both the symbol and the comment in the selected row will be edited together.

To edit only the symbol or comment, double-click the cell, select the data with the cursor, and then edit it.

12.7.5 Exiting the Comment Creation

Close the Comment List Window to exit comment lists.

Click the  Button in upper right corner to close the window.

12.8 Replacing Register Numbers

This section describes the function for replacing a register number with another number.

The register number replacement function can be used to search for and replace any register number used in a program.

IMPORTANT

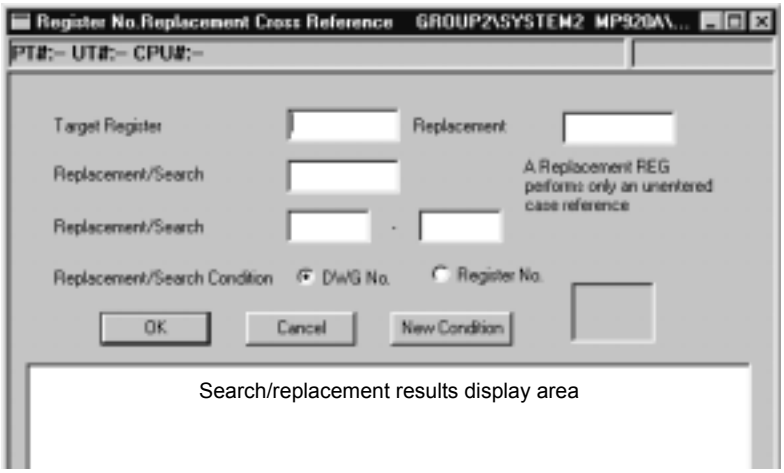
- Searching and replacing are not possible in Online Mode.
- When register numbers are replaced, cross reference information is automatically updated. To reflect the results of register number replacement in the Machine Controller, transfer the DWG or function program that was changed to the Machine Controller using the Transfer function.

12.8.1 Opening the Register No. Replacement Cross Reference Window

The Register No. Replacement Corss Reference Window is opened from the Engineering Manager.

- Opening from the Engineering Manager

  Select ***File*** – ***Open*** – ***Tool*** – ***Register Replace*** from the Engineering Manager Menu. The Register No. Replacement Cross Reference Window will be displayed.



12.8.2 Configuration of the Register Number Replacement Cross Reference Window

The register numbers that can be used depend on the type of Machine Controller. Refer to the relevant Machine Controller User's Manual: Design and Maintenance for details.

Searches and replacements can be executed for DWG and function programs, SFC program, # register constant tables, M register constant tables, I/O conversion tables, interlock tables, and part composition tables.

Input the following items and click the **OK** Button to search and replace the register numbers.

Setting	Details
Target Register	Input the register number to search for. Register type: S, I, O, M, D, C, #, X, Y, Z Data type of register: Integer, Double-length integer, Real number, Bit
Replacement (Replacement Register)	To replace the register, input the register number to use after replacement. S, M, D, C, #, X, Y, and Z registers cannot be replaced with I or O registers or visa versa. Input the register data type of the leading register. If no replacement register is specified, the target register will be search for but not replaced.
Replacement/Search (Number of Registers to be Replaced or Searched)	Input the number of registers to search for or replace. Specify the number of words for integer registers and the number of bits for bit registers. With bit registers, bits between 1 and 30,000 can be searched for or replaced in one operation.
Replacement/Search (Replacement/Search Range)	Input the leading and ending drawing numbers to search or replace. To search or replace only one drawing, specify just the leading drawing number.
Replacement/Search Condition	Specify the order of displaying the search/replacement results as in order of DWG numbers or in order of register numbers.
OK Button	Starts the search/replacement operation.
Cancel Button	Closes the Register Number Replacement Cross Reference Window.
New Condition Button	Clears the search/replacement data to the default.
Search/replacement results display area	Display the results of the search/replacement operation. Refer to *Search/Replacement Results Display Format* following this table.

- Search/Replacement Results Display Format

1. Search Results Display Window

	DWG No.	Register	1	2	3	···
1			Result	Result	···	···
2			Result	Result	···	···
···						

Display	Details
DWG No.	Displays search drawing number.
Register	Displays target register.
1, 2, 3, etc.	Refer to *(2) Specifying Search/Replacement Ranges* in *12.8.3 Register Number Replacement.*

2. Search/Replacement Results Display Window

	DWG No.	Previous	After	1	2	···
1				Results	Results	···
2						···
···						

Display	Details
DWG No.	Displays searched or replaced DWG number or function symbol.
Previous	Displays register number before replacement.
After	Displays register number after replacement.
1, 2, 3, etc.	Refer to *(2) Specifying Search/Replacement Ranges* in *12.8.3 Register Number Replacement.*

- Register Number Replacement Cross Reference Menu

The following table shows the menu commands and functions displayed in the Register Number Replacement Cross Reference Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Register Number Replacement Cross Reference Window.
	Close	Closes the Register Number Replacement Cross Reference Window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

12.8.3 Register Number Replacement

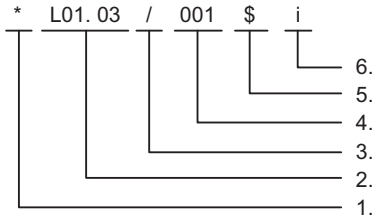
(1) Specifying Search/Replacement Ranges

The following type of wildcards can be used to specify search/replacement ranges. Wildcards cannot be used in both the start and end specifications.

Search/Replacement Range	Details
*	Searches/replaces all drawings. Search/replacement is executed in the following order: drawings A, I, H, and L, and then user functions.
L	Searches/replaces the parent low-speed drawing.
L*	Searches/replaces all low-speed drawings.
L10*	Searches/replaces drawing L10 and all grandchild drawings of L10.
L10.*	Searches/replaces all grandchild drawings of L10.
L10.01	Searches/replaces the specified drawing.
F*	Searches/replaces all user functions beginning with F.
FUNC001	Searches/replaces the specified user function.

(2) Display of Search/Replacement Results

Search and replacement results are displayed in the following form when a search/replacement operation is executed.



1. Replacement Result

   An asterisk (*) is displayed when the replacement is successful. Nothing is displayed if only a search was performed.

2. DWG Number or Function Symbol

   The DWG number or function symbol is displayed. The page number is displayed for table programs and other programs with multiple pages. For example, L01.02P01 indicates page 01 in L01.02.

3. Program Type

   The type of program using the search register.
   - /: Main program
   - |: SFC flowchart
   - -: SFC action box
   - =: Symbol definition
   - :: Table program
   - !: Tuning panel
   - %: FBD

4. Position

   The position of the search/replace register. The step number is given for DWG or function programs, SFC flowcharts, and SFC action boxes. The row number is given for table programs.

5. Application

   The application of the search/replace register.

   - Blank: Read
   - $: Storage or coil
   - &: Transfer (bit or word)
   - @: Other (e.g., timer)

6. Index Type

   The type of index is given if the register is used as an indexed register.

   - i: i register
   - j: j register

12.8.4 Closing Register Number Replacement

Close the Register Number Replacement Cross Reference Window to exit register number replacement.

Select ***File*** – ***Close*** from the Register Number Replacement Cross Reference Menu to close the window.

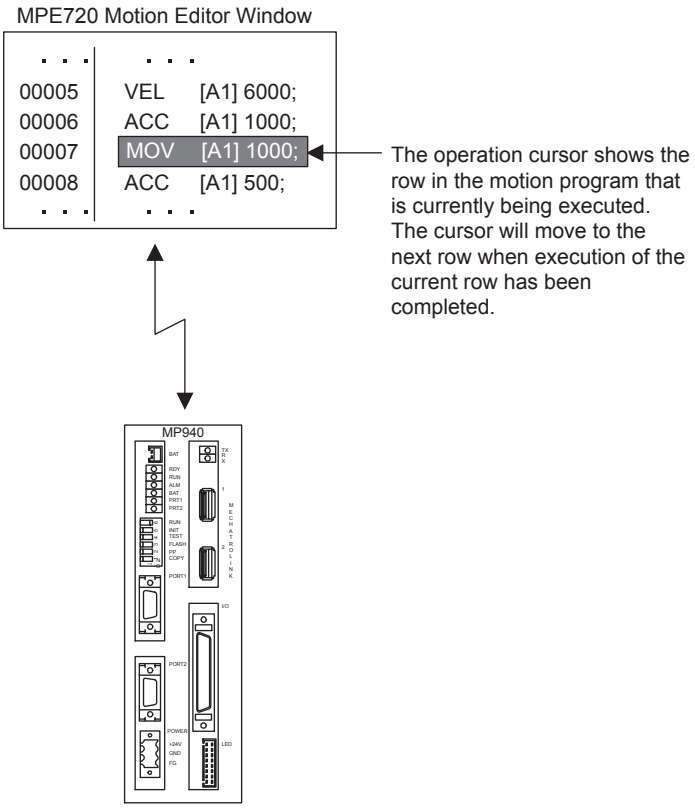
12.9 Motion Program Monitoring

This section how to follow motion program execution conditions one step at a time with an operation cursor.

The motion program monitor function is built into the Motion Editor to follow program execution. It works together with the Motion Editor.

Motion program monitoring is performed automatically when the Motion Editor is opened with the MPE720 connected to the Machine Controller in Online Mode. If an open motion program is running, the currently executed program statement row will be displayed in reversed color with an operation cursor.

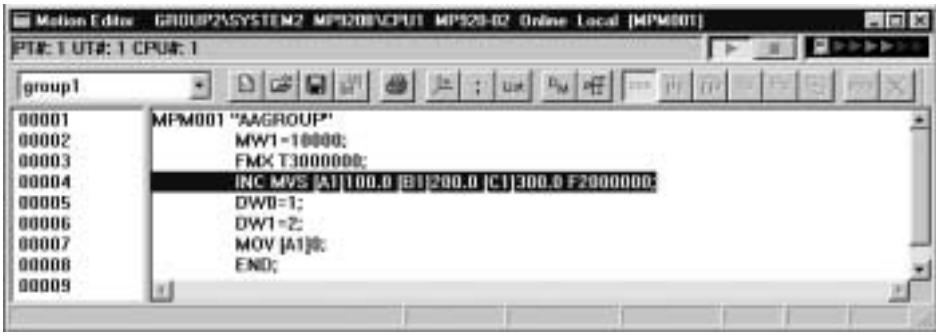
For details on opening the window and menu configuration, refer to *Chapter 10 Program Folder 2: Motion Programming*.



12.9.1 Opening the Motion Program Monitor

When a motion program that is being executed is opened from the Motion Editor, it is displayed in the program monitor mode.

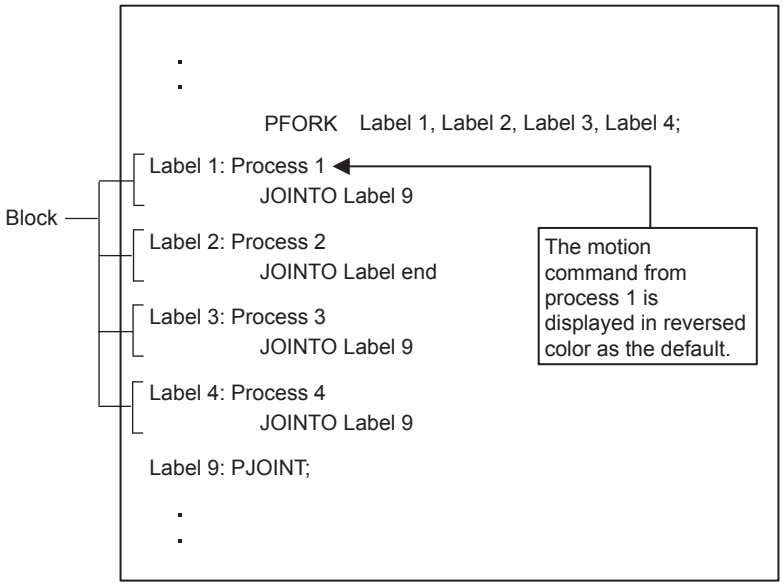
In the program monitor mode, the move command currently being executed is displayed in reversed color as shown in the following illustration. The area moves according to the program execution.



(1) Monitor Display for PFORK Command

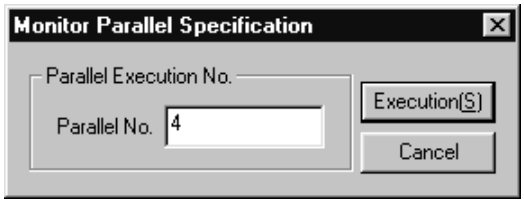
The PFORK command is used to execute up to four processes in parallel based on the operands of the command. The process number to be monitored must be specified.

When monitoring is performed, the move command in process 1 specified by label 1 is monitored by default.



Change the block that is to be displayed for monitoring using the following procedure.

1. Select ***View – Monitor Parallel No.*** from the Motion Editor Menu.
2. Input the parallel number (block number) in the Monitor Parallel Specification Dialog Box, and then click the **Execution** Button. For the parallel number, input a number from 1 to 4.



(2) Commands Displayed for Monitoring

The following table shows the commands that are displayed in reversed color in the monitor mode.

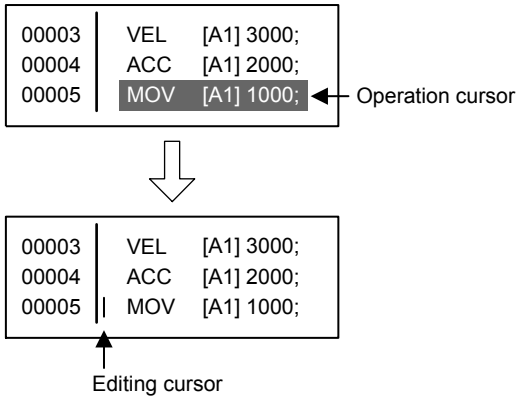
Command	Details	Command	Details
MOV	Positioning	MVS	Linear interpolation
MCW	Circular interpolation	SPH	Spherical interpolation
MCC	Helical interpolation	ZRN	Zero point return
SKP	Skip	MVT	Set time positioning
SPL	Spline path compensation	EXM	External positioning
PFN	In-position check	UFC	User function call
ACC	Acceleration time change	DCC	Deceleration time change
SCC	S-curve time constant change	TIM	Dwell time
IOW	I/O variable wait	MSEE	Subroutine call

12.9.2 Stopping and Restarting the Monitoring Display

This section explains how to stop and restart the monitoring display.

(1) Stopping the Monitoring Display

To stop the monitoring display, press the Space Key while the Motion Editor Window is active. The cursor will be changed from the operation cursor (in reversed color) to the editing cursor. The program can be edited while the monitoring display is stopped.



IMPORTANT

If an attempt is made to edit and save a program that is being executed while the monitoring display is stopped, the program may not run normally.

(2) Restarting the Monitoring Display

Restart a monitoring display that has been stopped using the following procedure.

Select ***View*** – ***Monitor Regeneration*** from the Motion Editor Menu while the Motion Editor Window is active.

INFO

If a motion program is saved while the monitoring display is stopped, the monitoring display will be restarted.

12.10 Position Monitor

This section explains how to use position monitoring to display the current positions of the axes.

The Position Monitor Window displays and periodically updates the current positions of the axes controlled by the Machine Controller.

The current positions are displayed for both the work coordinate system and the machine coordinate system.

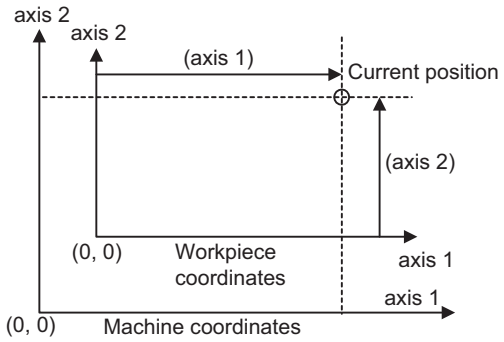
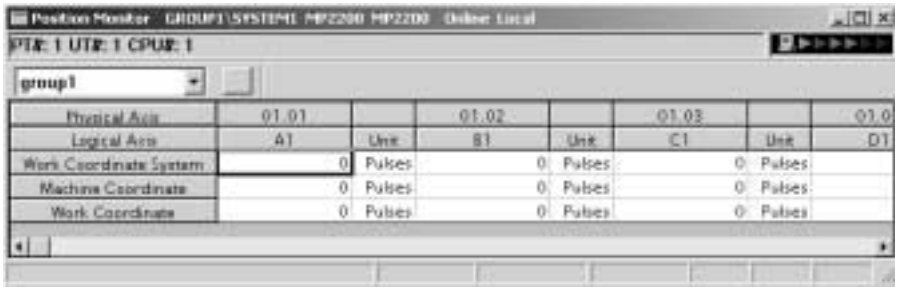


Fig 12.1 Coordinate System Example

12.10.1 Opening the Position Monitor Window

The Position Monitor Window can be opened from the Engineering Manager. Select ***File*** – ***Open*** – ***Motion Program*** – ***Position Monitor*** from the Engineering Manager Menu.

The Position Monitor Window will be displayed.



12.10.2 Configuration of the Position Monitor Window

The items displayed in the Position Monitor Window include the work coordinates for axes defined by groups, machine coordinates, and work coordinate system feedback positions.

(1) Login Information

Login information is displayed below the title bar in the Position Monitor Window. Hyphens will be displayed in Offline Mode.

Login Information	Details
PT#	Displays the communication logical port.
UT#	Displays the unit number of the Machine Controller.
CPU#	Displays the number of the CPU which was logged onto.

(2) Position Information

Display	Details
Group Name	Select a group name defined in the group definitions from the list in the box below the login information. The current positions will be shown for the axes defined for the selected group. If ***All Group*** is selected, the current positions will be shown for the axes for all groups.
Physical Axis	Displays the physical axis numbers for axes defined by the selected group.
Logical Axis	Displays the logical axis names for the physical axes in the group definitions.
Work Coordinate System	Displays the work coordinates for each axis. The work coordinates are shown with the work coordinates offset added to the target position monitor.
Machine Coordinate	Displays the machine coordinates for each axis. The machine coordinates use the target position monitor values.
Work Coordinate	Displays the work coordinate system feedback positions for each axis. These positions are shown with the work coordinate offset added to the position monitor.
Unit	This is the unit for the coordinates. It is defined by a Servo Module Function Selection Flag.

INFO

- The Servo Module Function Selection Flags are in a fixed parameter.
- The work coordinate offset is a setting parameter.
- The target position monitor and position monitor are monitoring parameter.

(3) Position Monitor Menus

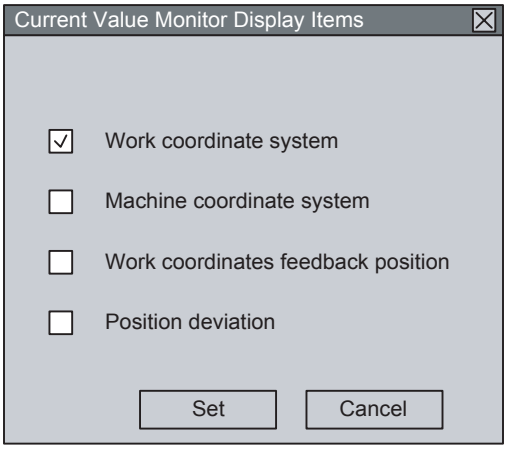
The following table shows the menu commands and functions displayed in the Position Monitor Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Position Monitor Window.
	Close	Closes the Position Monitor Window.
	Save	Not used with this window.
	Delete	Not used with this window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Display Item	Selects a display item.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

12.10.3 Selecting Display Items

The work coordinates, machine coordinates, and the work coordinate system feedback positions are all displayed when the Position Monitor Window is displayed. Any of these items can also be selected for display. Select one of them using the following procedure.

1. Select ***View*** – ***Display Item*** from the Position Monitor Menu.
2. The Current Value Monitor Display Items Dialog Box will be displayed. Select the item to be displayed, and then click the **Set** Button.



The item selected in step 2 will be displayed.

Physical Axis	01.01	
Logical Axis	A1	Unit
Work coordinate system	480	mm

INFO

Position deviations cannot be displayed with MP-series Machine Controllers. It can only be selected as a display item.

12.10.4 Closing Position Monitoring

Exit position monitoring by closing the Position Monitor Window.

To close the Position Monitor Window, select ***File*** – ***Close*** from the Position Monitor Menu.

12.11 Task Monitor

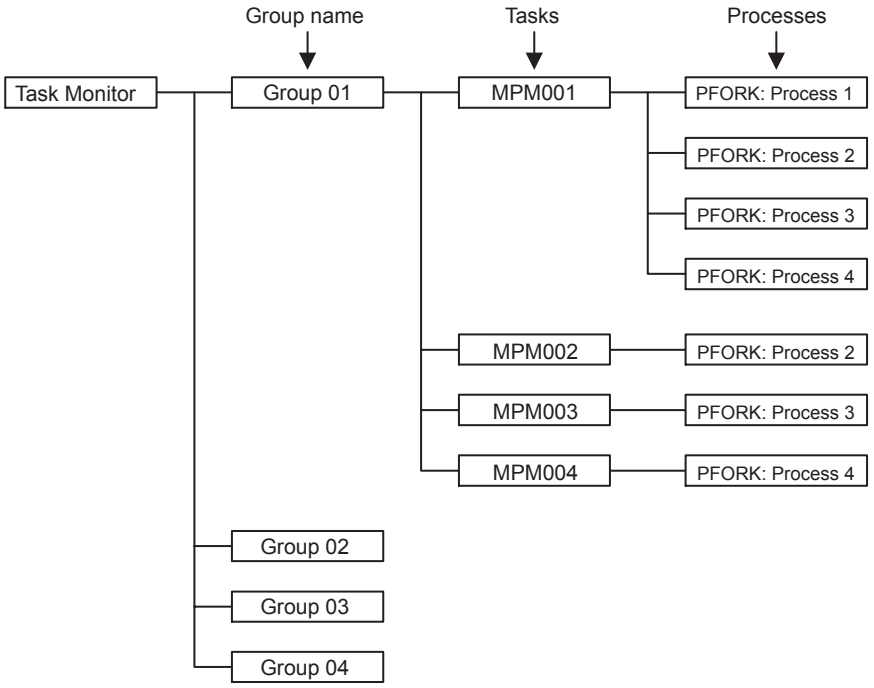
This section explains how to display motion program execution conditions in the Task Monitor.

IMPORTANT

The Task Monitor will work properly only when PGM automatic generation is enabled in the Group Definitions. Do not use the Task Monitor otherwise.

With task monitoring, the Machine Controller displays the name of program currently being executed for each task, and shows their execution status.

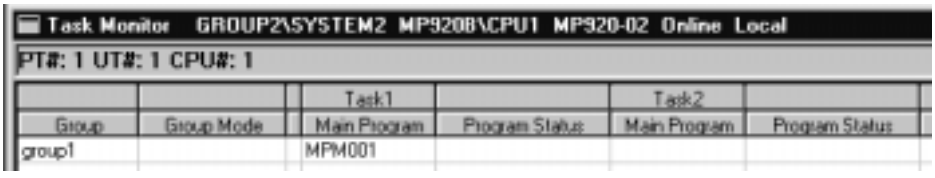
The following figure shows four groups with four tasks under the first group, and four processes under the first task. The execution status for all tasks and processes under any one group can be monitored in the Task Monitor at the same time. Machine Controllers, however, support only one group.



12.11.1 Opening the Task Monitor Window

Open the Task Monitor Window from the Engineering Manager. Select ***File – Open – Motion Program – Task Monitor*** from the Engineering Manager Menu.

The Task Monitor Window will be displayed.



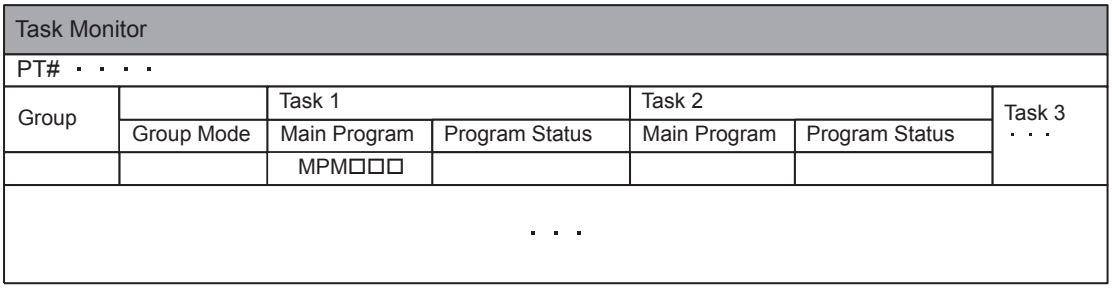
12.11.2 Task Monitor Display Modes

Task monitoring can be displayed in either of the following two modes.

Display Mode	Details
Standard	Displays the motion program's groups and the execution conditions of the tasks (motion programs) executed in parallel within those groups. This is the default mode.
Detailed	Displays the PFORK command operating conditions and the program's execution step numbers in addition to the information displayed in the Standard Display Mode.

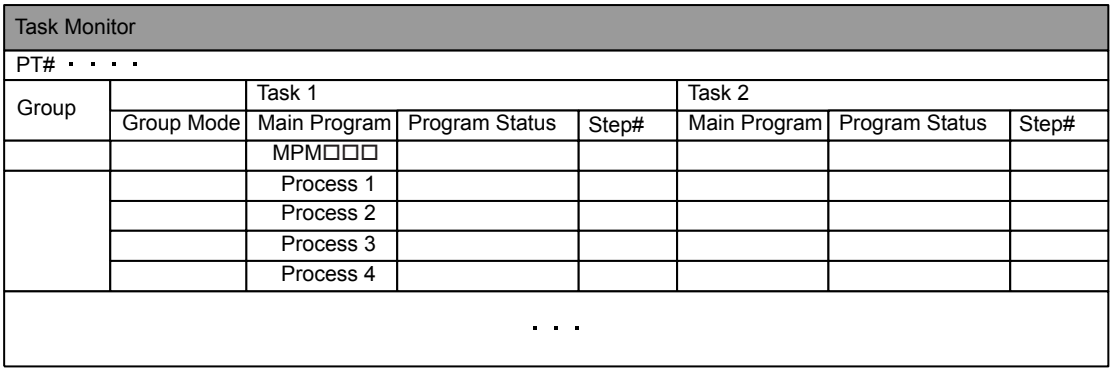
(1) Standard Display Mode

When the Task Monitor Window is opened, it appears in the Standard Display Mode as shown in the following illustration.



(2) Detailed Display Mode

To switch from the Standard Display Mode to the Detailed Display Mode, select ***View – Detailed Mode*** from the Task Manager Menu. To return to the Standard Display Mode, select ***View – Detailed Mode*** again.



12.11.3 Task Monitor Configuration

- Login Information

Login information is displayed below the title bar in the Task Monitor Window. Hyphens will be displayed in Offline Mode.

Login Information	Details
PT#	Displays the communication logical port.
UT#	Displays the unit number of the Machine Controller.
CPU#	Displays the number of the CPU which was logged onto.

The items displayed by the Task Monitor in both Standard and Detailed Display Mode are listed in the following table.

Display	Details
Group Name	Displays the group name set in the group definitions.
Group Mode*1	Displays the group execution status.
Task n Main Program	Displays the number of the motion program running for Task n. In Detailed Display Mode, the process number is displayed below the motion program number.
Task n Program Status*2	Displays the execution status of the motion program running for Task n. In Detailed Display Mode, the process status*3 for each process executed in parallel for PFORK is displayed.
Step #	Displays the step number being executed in the program (Detailed Display Mode only).

* 1. The following group mode messages are displayed in the *Group Mode*.

Group Mode Messages
Group running
Group paused
Group stopped for debugging
Group alarm
Auto mode
Manual mode

* 2. The following program status messages are displayed in the *Program Status*.

Program Status Messages
Program running
Program paused
Program aborted
Program stopped for debugging
Program alarm
Program break
Program debug mode
Main program duplication error
Main program number overflow

* 3. In the Detailed Display Mode, the following process status messages are displayed in the *Program Status*.

Process Status Messages
Motion function running
Holding
Aborted
Stopped for debugging
Alarm
Break
Returning
Debug mode
Skip signal latch

- Task Monitor Menu

The following table shows menu commands and functions displayed in the Task Monitor Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Task Monitor Window.
	Close	Closes the Task Monitor Window.
	Save	Not used with this window.
	Delete	Not used with this window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
	Detail Mode	Displays monitoring in detail.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

12.11.4 Closing Task Monitoring

Close this program by closing the Task Monitor Window.

To close the Task Monitor Window, select ***File*** – ***Close*** from the Task Monitor Menu.

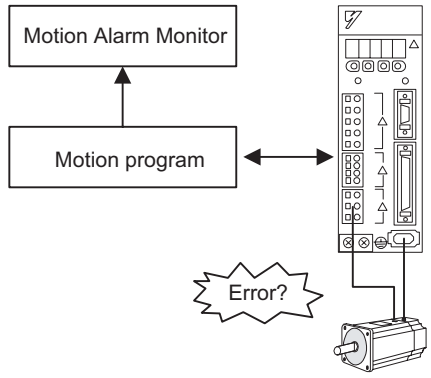
12.12 Motion Alarm Monitor

This section describes the Motion Alarm Monitor, which displays detailed information when alarms occur in the motion system.

IMPORTANT

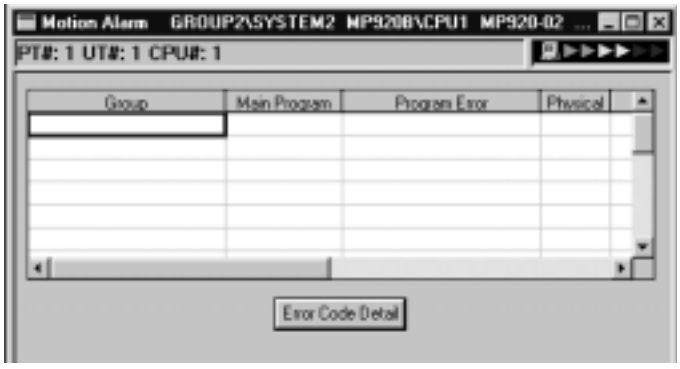
The Motion Alarm Monitor will work properly only when PGM automatic generation is enabled in the group definitions. Do not use the Motion Alarm Monitor otherwise.

This function can be used to check whether or not a motion alarm has occurred at the Machine Controller using the Motion Alarm Monitor.



12.12.1 Opening the Motion Alarm Window

Open the Motion Alarm Window from the Engineering Manager. Select ***File*** – ***Open*** – ***Motion Program*** – ***Motion Alarm*** from the Engineering Manager Menu.



12.12.2 Configuration of the Motion Alarm Window

- Login Information

Login information is displayed below the title bar in the Motion Alarm Window. Hyphens will be displayed in Offline Mode.

Login Information	Details
PT#	Displays the communication logical port.
UT#	Displays the unit number of the Machine Controller.
CPU#	Displays the number of the CPU which was logged onto.

When an alarm occurs, this function displays the name of the group and the program where the error occurred, a program error message, the physical axis number, and the servo error code.

Display	Details
Group (Group Name)	Displays the name of the group where the alarm occurred.
Main Program	Displays the name of the program where the alarm occurred.
Program Error	If an alarm occurs in the program, a message will be displayed to indicate that an alarm has occurred.
Physical (Physical Axis)	Displays the number of the physical axis where the error occurred.
Servo (Servo Error Code)	Displays the servo error code. Refer to the relevant Machine Controller User's Manual: Design and Maintenance for information on error codes.
Error Code Detail Button	When this button is clicked, an Motion Alarm Error Code Detail Dialog Box is displayed for the error in the row where the cursor is placed. The Motion Alarm Error Code Detail Dialog Box can also be displayed by double-clicking a cell displaying an error code in the *Servo*. No details will be displayed, however, for program errors.

- Motion Alarm Menu

The following table shows the menu commands and functions displayed in the Motion Alarm Window.

Menu Command		Function
File		
	File Manager	Opens the File Manager.
	Open	Opens the Motion Alarm Window.
	Close	Closes the Motion Alarm Window.
	Save	Not used with this window.
	Delete	Not used with this window.
	Print	Prints documents.
	Exit	Exits the Engineering Manager.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Quick Reference	Displays the Quick Reference.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

12.12.3 Motion Alarm Example

(1) Motion Alarm Error Code Detail Dialog Box

Servo error codes in the Motion Alarm Window are displayed in hexadecimal. Errors are allocated to each bit in hexadecimal. The Motion Alarm Error Code Detail Dialog Box shows the ON/OFF status and the meaning of each bit.

The current status is indicated by the filled circles (●).

◀ EXAMPLE ▶

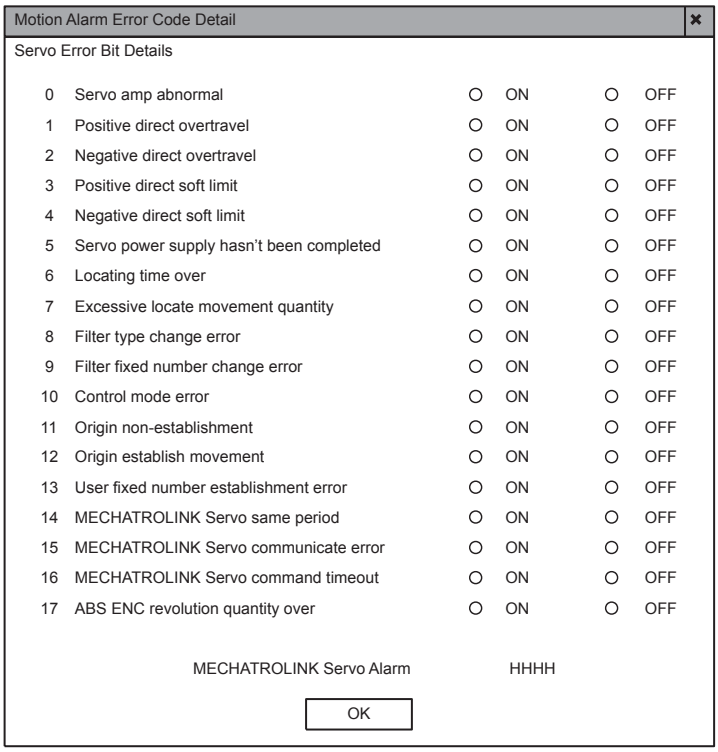


Fig 12.2 Example of Motion Alarm Error Code Detail Dialog Box for MP930 MECHATROLINK Servo Module

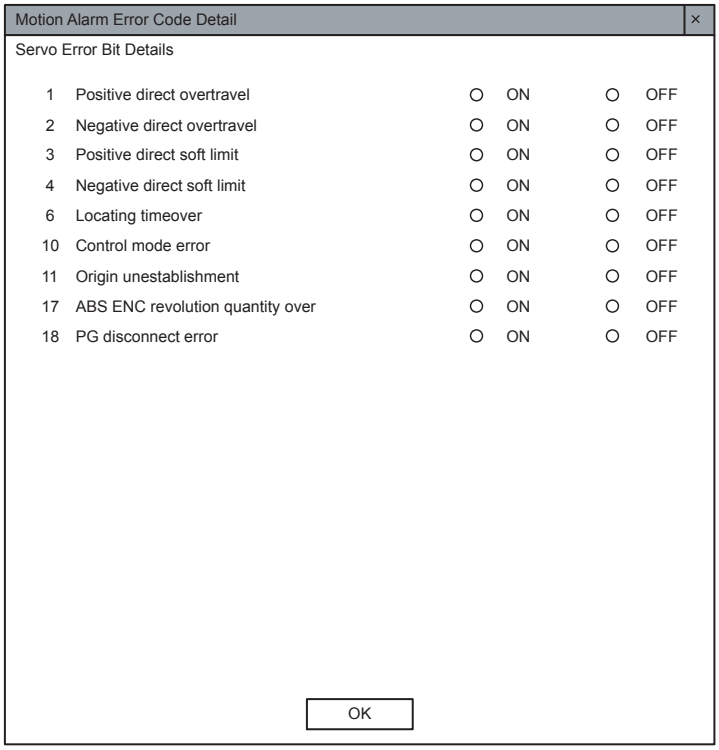


Fig 12.3 Example of Motion Alarm Error Code Detail Dialog Box for MP920 SVA Module

IMPORTANT

- Servo alarm error codes show the motion monitoring parameter alarms.
- MECHATROLINK servo alarm codes are displayed only for the MECHATROLINK Interface Servo Module.
- Servo driver alarm codes for motion monitoring parameter are shown.
- The Motion Alarm Error Code Detail Dialog Box is not updated.
- The Motion Alarm Window is updated every 0.5 second.

(2) Effective Module Error Bits

Displays in the Motion Alarm Error Code Detail Dialog Box are displayed as shown in the following table. ***Yes*** indicates the Modules for which the status is displayed.

Bit	Name	MP920 SVA	MP920 SVB	MP920 PO-01	MP910	MP930	MP940	MP2100	MP2300
0	Servo Error		Yes		Yes	Yes	Yes	Yes	Yes
1	Positive Overtravel	Yes	Yes		Yes	Yes	Yes	Yes	Yes
2	Negative Overtravel	Yes	Yes		Yes	Yes	Yes	Yes	Yes
3	Positive Software Limit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Negative Software Limit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Servo Off		Yes		Yes	Yes		Yes	Yes
	Excitation OFF			Yes					
6	Positioning time exceeded	Yes	Yes		Yes	Yes	Yes	Yes	Yes
7	Excessive Locate Movement Quantity		Yes		Yes	Yes	Yes	Yes	Yes
	Excessive speed			Yes				Yes	Yes
8	Filter type change error		Yes		Yes	Yes		Yes	Yes
9	Filter fixed number change error		Yes		Yes	Yes		Yes	Yes
10	Control mode error	Yes	Yes	Yes	Yes	Yes	Yes		
11	Origin non-establishment	Yes	Yes		Yes	Yes	Yes	Yes	Yes
12	Origin establish movement		Yes		Yes	Yes		Yes	Yes
13	User fixed number establishment error		Yes		Yes	Yes		Yes	Yes
14	MECHATROLINK Servo same period		Yes		Yes	Yes		Yes	Yes
15	MECHATROLINK Servo communicate error		Yes		Yes	Yes		Yes	Yes
16	MECHATROLINK Servo command timeout		Yes		Yes	Yes		Yes	Yes
17	ABS ENC revolution quantity error	Yes	Yes		Yes	Yes	Yes	Yes	Yes
18	PG disconnect error	Yes					Yes	Yes	Yes
	MECHATROLINK Servo Alarm Code Displays		Yes		Yes	Yes		Yes	Yes

12.12.4 Closing Motion Alarms

Close this program by closing the Motion Alarm Window.

To close the Motion Alarm Window, select ***File*** – ***Close*** from the Motion Alarm Menu.

Appendices

A

A Error Messages

A.1 System Error Messages

The following tables show the messages with error codes of the form CPDH_□□□_ΔΔΔ.

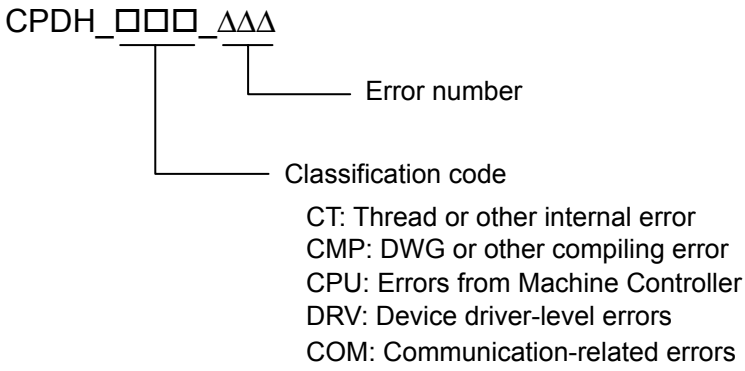


Table A.1 CPDH_CT_ΔΔΔ

Error Message	Cause	Correction
Reception buffer release error (CPDH_CT_010)	An error has occurred in the Windows memory area.	Shutdown and restart Windows. Contact your Yaskawa representative if the error persists.
Queuing failure (CPDH_CT_011)	An error has occurred in shared Windows resources.	Shutdown and restart Windows. Contact your Yaskawa representative if the error persists.
Source file write error (CPDH_CT_013)	An error has occurred in shared Windows resources.	Shutdown and restart Windows. Contact your Yaskawa representative if the error persists.
Reception buffer obtainment error (CPDH_CT_00F)	An error has occurred in the Windows memory area.	Shutdown and restart Windows. Contact your Yaskawa representative if the error persists.
Required port not initialized (CPDH_CT_02B)	Inconsistency between system and 215IF I/F card definitions.	Make 215IF I/F card and System Configuration Window data consistent.
Designated port error (CPDH_CT_02F)	The selected port cannot be used.	Change the 215IF settings in the System Configuration Window.

Table A.2 CPDH_CMP_ΔΔΔ

Error Message	Cause	Correction
Undefined instruction code detected (CPDH_CMP_001)	An undefined instruction code has been detected.	Execute the instruction again. Contact your Yaskawa representative if the error persists.
IF instruction structure incorrect (CPDH_CMP_002)	The IF instruction structure is incorrect.	Match the number of IF and IEND instructions. Reduce the number of nesting levels.
WHILE instruction structure incorrect (CPDH_CMP_003)	The WHILE instruction structure is incorrect.	Match the number of WHILE and WEND instructions. Reduce the number of nesting levels.
FOR instruction structure incorrect (CPDH_CMP_004)	The FOR instruction structure is incorrect.	Match the number of FOR and FEND instructions. Reduce the number of nesting levels.
No END instruction (CPDH_CMP_005)	There is no END instruction.	Add an END instruction.
Too many registered drawings (CPDH_CMP_006)	The maximum number of registered drawings has been exceeded.	Reduce the number of drawings.
AEND instruction structure incorrect (CPDH_CMP_007)	The AEND instruction structure is incorrect.	Match the number of ABOX or SBOX instructions and AEND instructions in the SFC Action Box Window.
Too many SFC flowchart steps (CPDH_CMP_008)	The maximum number of steps in the SFC flowchart has been exceeded.	Reduce the number of SFC flowchart steps.
Too many SFC output bits (CPDH_CMP_009)	The maximum number of SFC output bits has been exceeded.	Reduce the number of SFC output bits to within the allowable range.

Table A.2 CPDH_CMP_ΔΔΔ (Cont'd)

Error Message	Cause	Correction
ABOX instruction structure incorrect (CPDH_CMP_010)	The ABOX instruction structure is incorrect.	Correct the ABOX instruction and the relationship between ABOX and SBOX instructions.
SFC flowchart branches exceeded (CPDH_CMP_012)	The number of SFC flowchart branches has been exceeded.	Reduce the number of SFC flowchart branches.
SFC flowchart structure incorrect (CPDH_CMP_013)	The SFC flowchart structure is incorrect.	Check the SFC flowchart for incorrect start, end, or branch settings.
Too many SFC flowchart step boxes (CPDH_CMP_014)	The number of SFC flowchart step boxes has been exceeded.	Reduce the number of SFC flowchart step boxes.
Expansion program (table or other program) structure incorrect (CPDH_CMP_015)	The table or other type expansion program structure is incorrect.	Check the expansion program for incorrect expansion program conversions in the MPE720. Contact your Yaskawa representative if the error persists.

Table A.3 CPDH_CPU_ΔΔΔ

Error Message	Cause	Correction
1 DWG/FN object too large (CPDH_CPU_021)	The size of one DWG or function object is too large.	Reduce the size of the DWG or function objects.
Source memory control error (CPDH_CPU_040)	A source memory control error has occurred.	Execute loading again.
1 DWG/FN object too large (CPDH_CPU_0B1)	The size of one DWG or function object file is too large.	Reduce the size of the DWG or function objects. Reduce the number of steps. Reduce the number of # registers.
Machine Controller cannot run due to program memory error or watchdog time out (CPDH_CPU_041)	The Machine Controller cannot run due to a program memory error or a watchdog time out.	Execute loading.
Cannot use this function because Machine Controller is online (CPDH_CPU_04D)	Transfer To Controller operation cannot be performed because the Machine Controllers CPU in run state.	Stop CPU operation in the System Configuration Window.
Transmission error (CPDH_CPU_090)	A transmission error has occurred.	• Repeat the operation. • Check if the connectors are set properly. • Check that there is no noise interference.
Incorrect processing request from MPE720 (CPDH_CPU_091)	There is an error in the processing request from the MPE720.	Repeat the operation. Replace the Machine Controller or MPE720 if the error persists.
Incorrect processing request from MPE720 (CPDH_CPU_092)	There is an error in the processing request from the MPE720.	Repeat the operation. Replace the Machine Controller or MPE720 if the error persists.
Inappropriate file name (CPDH_CPU_093)	• The file name is inappropriate. • The DWG number is incorrect. • A system function symbol has been used for the user function symbol. • The DWG number or function symbol called using the SEE and FSTART instructions is incorrect.	Enter an appropriate file name.
File does not exist (CPDH_CPU_094)	• The file does not exist. • A new DWG or function program has been created. • An illegal program number was used by an indirect specification for MSEE.	Check the registration status of the program file.

Table A.3 CPDH_CPU_ΔΔΔ (Cont'd)

Error Message	Cause	Correction
Register number exceeds range (CPDH_CPU_096)	The register number exceeds the range for register numbers.	Enter an appropriate register number.
Relay instruction executed when it is disabled. (CPDH_CPU_099)	The relay instruction was executed when it is disabled.	• Check the 215IF settings. • Check the specifications at the communication destination.
Machine Controller busy (CPDH_CPU_09A)	The Machine Controller is executing processing and cannot, therefore, receive messages.	Repeat the operation.
Long Machine Controller processing time (CPDH_CPU_09B)	Processing at the Machine Controller will take some time.	This is not an error. Wait until the processing is finished.
File altered by different device (CPDH_CPU_09C)	The file has been altered by a different device.	Read the file again.
Module not operating normally (CPDH_CPU_09E)	The module is not operating normally.	_
MPE720 response wait time exceeded (CPDH_CPU_09F)	• The MPE720 response wait time has been exceeded. • The transmission cable is not connected. • The Machine Controller does not have enough processing time for MPE720 message services.	• Check that the connector is connected properly. • Check that the Unit number is set properly. • Check that there is no noise interference. • Make the Machine Controller into stop mode and set a longer scan time.
Object memory area exceeded (CPDH_CPU_0B2)	The object memory area has been exceeded.	Reduce the size of all DWG and function objects.
No free program memory space (CPDH_CPU_0B3)	There is no free program memory space.	• Compress memory in the System Definition Window. • Reduce the size of all DWG and program memory areas. • Delete unused DWGs or functions. • Reduce the number of steps in each DWG and function. • Reduce the number of # registers in each DWG and function. • Reduce the number of symbols in each DWG and function. • Reduce the number of comments in each DWG and function.
Another drawing or function calling the function to be deleted (CPDH_CPU_0C0)	Another DWG or function calls the function that is being deleted.	Delete the instruction that is calling the function to be deleted, and then delete the function.
Data trace cannot be executed because trace definition data number set to 0 (CPDH_CPU_0C1)	Data trace cannot be executed because the trace definition data number is set to 0.	Reset the trace definitions.
Disable coil number exceeded maximum (100) (CPDH_CPU_0C2)	The maximum number of disabled coils (100) has been exceeded.	Reduce the number of disabled coils.
Flash memory write failure (CPDH_CPU_0C3)	The write to flash memory processing failed.	Repeat the operation. Replace the Machine Controller if the error persists.
Program write-protected (CPDH_CPU_0F0)	The program is currently write-protected.	Set the program to write-enabled mode in the System Definition Window.
Program memory not initialized (CPDH_CPU_0F1)	The program memory has not been initialized.	Clear the memory or perform batch Transfer To Controller operation.

Table A.4 CPHD_DRV_ΔΔΔ

Error Message	Cause	Correction
Interrupt level exceeds 0x0f. (CPDH_DRV_002)	The designated interrupt level range of 0 to 16 in the systems definition file has been exceeded.	Set the interrupt level to between 0 and 16.
215IF I/F DIP switch 2 error (CPDH_DRV_003)	There is an shared memory address error in the system definitions file.	Set a correct shared memory address.
Designated port number exceeds 1 to 6 range (CPDH_DRV_005)	The designated port number is greater than the range of 1 to 6.	Designate a correct port number.
215IF I/F DIP switch 3 error (CPDH_DRV_007)	There is an shared memory address error in the system definitions file.	Set a correct shared memory address.

Table A.5 CPDH_COM_ΔΔΔ

Error Message	Cause	Correction
Transfer handle could not be obtained. Start the communication process. (CPDH_COM_012)	Communication has not been enabled.	• Start the communication process. • Correct the communication setting to match the current communication device. • Correct the settings in the personal computer for the current communication device. • Check the cable connection between the communication device and the Machine Controller.
CP-213 transmission error. (CPDH_COM_043)	An error related to the CP-213 connection has occurred.	• Check the CP-213 transmission settings. • Check the devices connected to the CP-213.
Inverter is busy. (CPDH_COM_044)	The Inverter is busy and cannot receive messages.	Retry sending.
Transmission error (CPDH_COM_0A0)	A transmission error has occurred.	• Repeat the operation. • Check if the connectors are set properly. • Check that there is no noise interference.
PLC is not running. (CPDH_COM_0D0)	An attempt was made to enter debug mode with the CPU stopped.	Start the CPU and then enter debug mode.
Currently in debug mode. (CPDH_COM_0D1)	• An attempt was made to enter debug mode when the debug mode was already entered. • A normal mode source write (save) was attempted in debug mode.	• To debug a different program, turn OFF debug mode for the main motion programs currently in debug mode. • Repeat the operation. If the error persists, replace the MPE720 or Machine Controller.
Not in debug mode. (CPDH_COM_0D2)	The following operations were attempted when not in debug mode. • Execution of a source open command. Step or GO was executed. • A diff transfer.	Repeat the operation. If the error persists, replace the MPE720 or Machine Controller.
The motion program is disabled. (CPDH_COM_0D3)	• An attempt was made to enter debug mode for a motion program that has been disabled. • A step-in was attempted to a motion subroutine that has been disabled.	• Enable the motion program before entering debug mode. • Enable the motion subroutine before stepping in.
Motion program is running. (CPDH_COM_0D4)	An attempt was made to enter debug mode for a motion program that is being executed.	Enter debug mode after stopping the motion program.

Table A.5 CPDH_COM_ΔΔΔ (Cont'd)

Error Message	Cause	Correction
No main motion program. (CPDH_COM_0D5)	An attempt was made to open the source for a motion subroutine when the main motion program does not exist during debugging.	Repeat the operation. If the error persists, replace the MPE720 or Machine Controller.
No such file. (CPDH_COM_0D6)	A diff transfer was attempted with illegal data.	Repeat the operation. If the error persists, replace the MPE720 or Machine Controller..
Error in SB/BP signal. (CPDH_COM_0D7)	• A step was executed for a row with no command. • A GO command was executed with SP or PB set for an illegal row.	Repeat the operation. If the error persists, replace the MPE720 or Machine Controller..
Execution not possible. (CPDH_COM_0D8)	A compiling error occurred in the Machine Controller. The following may cause the compiling error. • Debug mode was entered for an illegal main motion program. • Step or GO command was executed when there was a save error. • An attempt was made to send illegal data in a diff transfer. • Program in CPU memory is corrupted.	Clear CPU memory, Transfer the motion program, and repeat the operation. If the error persists, replace the MPE720 or Machine Controller..
D register size change. (CPDH_COM_0D9)	The number of D registers in the motion properties for debug mode changed and execution or diff transfer was attempted.	Change the number of D registers in the motion properties back to its original value.
Debug buffer area exceeded. (CPDH_COM_0DA)	Instructions were added that caused the debug buffer to be exceeded and saving or diff transfer were attempted.	Delete the added instructions before saving or diff transfer. (Turn OFF the debug mode once and allocate some of the program to subroutines.)

Table A.6 Other Error Messages

Error Message	Cause	Correction
215IF set value error in system definition file.	A 215IF settings error has occurred in the system definitions.	Change the 215IF settings in the system definitions.
Error in network access (1425)	Master server power supply interrupted or LAN cable disconnected when master was shared.	Start the master server. Connect the LAN cable correctly.
Transfer not possible. Use a file. (FMR001)	A required file is being used by another application (e.g., Engineering Manager), preventing execution.	Stop the other application and repeat the operation.
Memory could not be acquired. (FMR007)	A required memory cannot be acquired.	Stop all applications not required for the current operation and repeat the operation.
No read permission. PKT007	The file could not be read with the current user permissions.	Check the read permissions from the program map in the File Manager and log on as a user with the required permissions.
No write permission. PKT008	The file could not be written with the current user permissions.	Check the read permissions from the program map in the File Manager and log on as a user with the required permissions.

Table A.6 Other Error Messages (Cont'd)

Error Message	Cause	Correction
Selected environment does not match PLC. Check the connected PLC. PKT026	An attempt was made to log onto a Machine Controller that is not the connected Machine Controller.	Select the correct Machine Controller and PLC folder.
Monitoring/debug information file/error- file not saved or does not match. Resave.	An attempt was made to open a motion program online when the motion program does not exist on the Programming Device hard disk.	This message is just a warning, but to be safe, transfer the motion program to the Programming Device.

A.2 Motion Compile Error Messages

Table A.7 shows a list of compile error messages in motion programs. All error messages and their causes are outlined in the table. If an error occurs, refer to Table A.7 and correct the motion program.

Table A.7 Compile Error Messages

Error Message	Cause
Syntax error	• Illegal command or no command. • Illegal = (substitution operator). • Inappropriate operator designation. • Illegal comparison operator or inappropriate position. • An odd number of parentheses. • Undefined characters used. • Excessive number of items in an equation. • WHILE and WEND commands do not match. • IF and IEND commands do not match. • Other syntax error
Incorrect address designation	• Illegal address designation for command or no address.
Variable range exceeded	• The register (variable) range has been exceeded.
Arithmetic expression contains unusable variable type	• Illegal data type of register. • Illegal register type.
Cannot load arithmetic expression	When an arithmetic expression is loaded, a maximum of 10 words of local variables (D variables) are used as the work area during one parallel execution. This error will occur if this maximum is exceeded. Local variables as work areas are used in the manner outlined below, and are released and can be reused when one block of processing has been completed. Local Variables Used as Work Areas 1. When arithmetic expressions are loaded in order of priority, work areas are used to temporarily store the results of operations that are calculated first. Multiple words are used depending on the complexity of the expression. 2. Work areas are used to temporarily store function results when functions have been used in arithmetic expressions. Two words are used for each function. 3. Work areas are used to temporarily store operation results when arithmetic expressions have been used for coordinate designation in move commands. Two words are used for each coordinate command in which arithmetic expressions are specified.
Too many decimal places	• The decimal point position is incorrect. (The limit for the number of digits designated to a value following decimal point has been exceeded.) • The limit for the number of digits designated to a value has been exceeded. • The range designated to a value has been exceeded.
Integer size exceeded	• The limit for the number of digits designated to a value has been exceeded. • The range designated to a value has been exceeded.

Table A.7 Compile Error Messages (Cont'd)

Error Message	Cause
Axis name error	• The physical or logical axis name has not been registered in the group definitions. • The same axis name has been used multiple times in one move command statement.
Maximum number of axes exceeded	The maximum number of axes to be simultaneously used has been exceeded.
Division by zero error	Division by zero has been included in the arithmetic expression.
Maximum characters per block exceeded	The number of characters set for one block has exceeded the maximum.
Command duplication error	A command that cannot be duplicated has been duplicated in the expression.
Unusable instruction	• The END command has been used in a subroutine. • The RET command has been used in the main program. • The RET command position is incorrect. • The GOTO command position is incorrect. • The position of a command that uses an axis as an argument is incorrect in a subroutine.
No END command	There is no END or RET command.
Maximum nesting level exceeded	• Nesting in IF statements is too deep. • Nesting in WHILE statements is too deep. • Nesting in SFORK statements is too deep.
Number of branches exceeds range	• The number of labels designated in PFORK statements exceeds the range. • The number of labels designated in SFORK statements exceeds the range.
Duplicate labels used	• Labels designated in PFORK duplicate SJOINT labels. • Labels designated in SFORK duplicate PJOINT labels.
No label	• Label designated in PFORK does not exist. • JOINTO label for PFORK does not exist. • Label designated in SFORK does not exist. • JOINTO label for SFORK does not exist. • Label designated in GOTO does not exist.
Max. number of parallel executions exceeded	The maximum number of parallel executions has been exceeded.
Label order incorrect	• The label order in PFORK statements is incorrect. • The label order in SFORK statements is incorrect.
Program name incorrect	The program name does not match MPM□□□ or MPS□□□ formats.
Duplicate label definitions	Label definitions are duplicated at another position.
Jump destination incorrect	The destination for the GOTO command is inside a parallel execution or at another incorrect position.
Illegal character string defined	• Characters other than alphanumerics are included in a label. • There are too many characters in a label.

B File Manager Menus

B.1 Common Menus

This section explains the common items on the pull-down menus under the menu bar in the File Manager Window. These common items do not change regardless of where the cursor is in the Directory Tree.

Unless otherwise specified, the following submenu will be displayed under ***File*** – ***Transfer***, ***View***, ***Tool***, and ***Help***.

Menu Command		Function
File – Transfer		
	All Files	Transfers all files together.
	Selected Files	Transfers files separately.
	Continuous File Transfer	Transfer files to several Machine Controllers.
	Other	Saves data to and then compares with flash memory.
View		
	Tool Bar	Displays the Tool Bar.
	Status Bar	Displays the status bar.
	Detail Window	Displays the Detail Display Section.
	Large Icons	Displays large icons in the List Display Section.
	Small Icons	Displays small icons in the List Display Section.
	List	Displays a list of small icons in the List Display Section.
	Detail	Displays a list of detailed data in the List Display Section.
	Refresh	Displays the latest information.
	Configuration	Displays system environment information for the MPE720.
Tool		
	User Menu Manager	Displays the User Menu Manager.
	PLC Import Tool	Displays the PLC Import Tool.
Help		
	Contents and Index	Displays help information.
	About Application	Displays version information.

B.2 Individual Menus

(1) Root Folder and Group Folder Menus

This section explains the pull-down and pop-up menus that are displayed when the root folder or a group folder is selected.

(a) Pull-down Menus

Menu Command			Function
File			
	New		
		Group Folder	Creates a new group folder.
		Order Folder	Creates a new order folder.
	Delete		Deletes the group folder and its subdirectories.
	Rename		Changes the name of the group folder.
	Exit		Exits the File Manager.
Edit			
	Set Default User		Sets the default user.
View			Refer to *B.1 Common Menus*.
Tool			Refer to *B.1 Common Menus*.
Help			Refer to *B.1 Common Menus*.

(b) Pop-up Menus

Menu Command		Function
New		
	Group Folder	Creates a new group folder.
	Order Folder	Creates a new order folder.
Rename		Changes the name of the group folder.
Delete		Deletes the group folder and its subdirectories.

(2) Order Folder Menus

This section explains the pull-down and pop-up menus that are displayed when an order folder is selected.

(a) Pull-down Menus

Menu Command			Function
File			
	New		
		Controller Folder	Creates a new PLC folder.
	Delete		Deletes the order folder and its subdirectories.
	Rename		Changes the name of the order folder.
	Exit		Exits the File Manager.
Edit			
	Set Default User		Sets the default user.
View			Refer to *B.1 Common Menus*.
Tool			Refer to *B.1 Common Menus*.
Help			Refer to *B.1 Common Menus*.

(b) Pop-up Menus

Menu Command		Function
New		
	Controller Folder	Creates a new PLC folder.
Rename		Changes the name of the order folder.
Delete		Deletes the order folder and its subdirectories.

(3) PLC Folder Menus

This section explains the pull-down and pop-up menus that are displayed when a PLC folder is selected.

(a) Pull-down Menus

Menu Command		Function
File		
	Log On	Logs on to the Machine Controller.
	Delete	Deletes the PLC folder and its subdirectories.
	Properties	Changes Machine Controller information.
	Log Off	Logs off from the Machine Controller.
	Transfer	Refer to *B.1 Common Menus*.
	Print	Opens the Print Manager.
	Exit	Exits the File Manager.
Edit		
	Set Default User	Sets the default user.
	User Manager	Used to manage users.
	Controller Operation	Changes the CPU status.*
View		Refer to *B.1 Common Menus*.
Tool		Refer to *B.1 Common Menus*.
Help		Refer to *B.1 Common Menus*.

* Valid only in online mode.

(b) Pop-up Menus

Menu Command		Function
Online		Switches between online and offline modes.
Log On		Logs on to the Machine Controller.
Properties		Changes the Machine Controller information.
Log Off		Logs off from the Machine Controller.
File Transfer		Refer to *B.1 Common Menus*.
Application Converter		
	Convert Wizard	Starts the Application Converter.
	Multi-register Replace	Performs register replacement.
Delete		Deletes the PLC folder and its subdirectories.
CPU Control		Changes the CPU status.*
Ladder Converter Tool		Converts ladder programs to ladder programs by Ladder Works.

* Valid only in online mode.

(4) C Register, Program, Definition, and Table Data Folder Menus

This section explains the pull-down and pop-up menus that are displayed when a C register, program, definition, or table data folder is selected.

(a) Pull-down Menu

Menu Command		Function
File		
	Log Off	Logs off from the Machine Controller.
	Transfer	Refer to *B.1 Common Menus*.
	Print	Opens the Print Manager.
	Exit	Exits the File Manager.
Edit		
	Set Default User	Sets the default user.
	User Manager	Used to manage users.
	Controller Operation	Changes the CPU status.*
View		Refer to *B.1 Common Menus*.
Tool		Refer to *B.1 Common Menus*.
Help		Refer to *B.1 Common Menus*.

* Valid only in online mode.

(b) Pop-up Menus

Menu Command		Function
Transfer		Refer to *B.1 Common Menus*.
Application Converter		
	Conversion Wizard	Starts the Application Converter.
	Multi-register Replace	Performs register replacement.
Controller Operation		Changes the CPU status.*
Log Off		Logs off from the Machine Controller.

* Valid only in online mode.

(5) Program Folder Menus

This section explains the pull-down and pop-up menus that are displayed when a function program, interrupt program, high-speed scan program, initialization program, or low-speed scan program folder is selected.

(a) Pull-down Menus

Menu Command			Function
File			
	New Drawing		Opens a new drawing.
	Log Off		Logs off from the Machine Controller.
	Print		Opens the Print Manager.
	Exit		Exits the File Manager.
Edit			
	Set Default User		Sets the default user.
	User Manager		Used to manage users.
	Verify All Programs		Performs verification of programs.
View			
	List Display		
		Display All Drawings	Sets the data files to be displayed in the List Display Section.
		SFC Flow Chart	
		Constant Table (# Reg)	
		Constant Table (M Reg)	
		I/O Conversion Table	
		Interlock Table	
		Part Composition Table	
		Tuning Panel	
	Tool Bar		Refer to *B.1 Common Menus*.
	. . .		Refer to *B.1 Common Menus*.
Tool			Refer to *B.1 Common Menus*.
Help			Refer to *B.1 Common Menus*.

(b) Pop-up Menu

Menu Command		Function
New Drawing		Opens a new drawing.
List Display		
	Display All Drawings	Selects the data file type to be displayed in the List Display Section.
	. . .	
Application Converter		
	Conversion Wizard	Starts the Application Converter.
	Multi-register Replace	Performs register replacement.
Controller Operation		Changes the CPU status.*
Log Off		Logs off from the Machine Controller.

* Valid only in online mode.

(6) Program File Menus

This section explains the pull-down and pop-up menus that are displayed when a program file is selected.

(a) Pull-down Menu

Menu Command			Function
File			
	New Drawing		Opens a new program.
	Open as new window		Opens the program in a new window.
	Open as new sheet		Opens the program in a new sheet.
	Open		
		DWG Properties	Opens the DWG Properties Window.
		Main Program	Opens the Main Program Window.
		SFC Flow Chart	Opens the SFC Flowchart Window.
		Constant Table (# Reg)	Opens the # Constant Table Window.
		Constant Table (M Reg)	Opens the M Constant Table Window.
		I/O Conversion Table	Opens the I/O Conversion Table Window.
		Interlock Table	Opens the Interlock Table Window.
		Part Composition Table	Opens the Part Composition Table Window.
		Tuning Panel	Opens the Tuning Panel Window.
	Delete		Deletes the program file.
	Log Off		Logs off from the Machine Controller.
	Print		Opens the Print Manager.
	Exit		Exits the File Manager.
Edit			
	Set Default User		Sets the default user.
	User Manager		Used to manage users.
	Enable/Disable		Enables or disables the program.
View			
	List Display		
		Display All Drawings	Sets the data files to be displayed in the List Display Section.
		SFC Flow Chart	
		Constant Table (# Reg)	
		Constant Table (M Reg)	
		I/O Conversion Table	
		Interlock Table	
		Part Composition Table	
		Tuning Panel	
	Tool Bar		Refer to *B.1 Common Menus*.
	. . .		Refer to *B.1 Common Menus*.
Tool			Refer to *B.1 Common Menus*.
Help			Refer to *B.1 Common Menus*.

(b) Pop-up Menus

Menu Command		Function
New Drawing		Opens a new program.
Open		
	DWG Properties	Opens the DWG Properties Window.
	Main Program	Opens the Main Program Window.
	SFC Flow Chart	Opens the SFC Flowchart Window.
	Constant Table (# Reg)	Opens the # Constant Table Window.
	Constant Table (M Reg)	Opens the M Constant Table Window.
	I/O Conversion Table	Opens the I/O Conversion Table Window.
	Interlock Table	Opens the Interlock Table Window.
	Part Composition Table	Opens the Part Composition Table Window.
	Tuning Panel	Opens the Tuning Panel Window.
List Display		
	Display All Drawings	Sets the data files to be displayed in the List Display Section.
	SFC Flow Chart	
	Constant Table (# Reg)	
	Constant Table (M Reg)	
	I/O Conversion Table	
	Interlock Table	
	Part Composition Table	
	Tuning Panel	
Delete DWG		Deletes the program file.
Enable/Disable		Enables and disables programs.
Copy DWG		Copies the program.
Application Converter		
Controller Operation		Changes the CPU status.*
Log Off		Logs off from the Machine Controller.

* Valid only in online mode.

(7) Motion Program Folder Menus

This section explains the pull-down and pop-up menus that are displayed when a motion program folder is selected.

(a) Pull-down Menus

Menu Command			Function
File			
	Open		
		Group Definition	Defines group information.
		Motion Parameter	Defines and displays the motion parameters.
		Motion Editor	Edits the motion program.
		Register Writing Permission	Sets the number of M and O registers.
	Log Off		Logs off from the Machine Controller.
	Transfer		Refer to *B.1 Common Menus*.
	Print		Opens the Print Manager.
	Exit		Exits the File Manager.
Edit			
	Set Default User		Sets the default user.
	User Manager		Used to manage users.
	Controller Operation		Changes the CPU status.*
View			Refer to *B.1 Common Menus*.
Tool			Refer to *B.1 Common Menus*.
Help			Refer to *B.1 Common Menus*.

* Valid only in online mode.

(b) Pop-up Menus

Menu Command		Function
Open		
	Group Definition	Defines group information.
	Motion Parameter	Defines and displays the motion parameters.*1
	Motion Editor	Edits the motion program.
	Register Writing Permission	Sets the number of M an O registers.
Transfer		Refer to *B.1 Common Menus*.
Application Converter		
	Conversion Wizard	Starts the Application Converter.
	Multi-register Replace	Performs register replacement.
Controller Operation		Changes the CPU status.*2
Log Off		Logs off from the Machine Controller.

* 1. Displayed only with the MP930.

* 2. Valid only in online mode.

(8) Motion Group Folder Menus

This section explains the pull-down and pop-up menus that are displayed when a motion group folder is selected.

(a) Pull-down Menus

Menu Command	Function
File	
Create New Program	Opens a new motion program.
Open	
Motion Editor	Edits motion programs.
Position Monitor	Displays the current position.*
Motion Alarm	Displays alarm information.*
Log Off	Logs off from the Machine Controller.
Print	Opens the Print Manager.
Exit	Exits the File Manager.
Edit	
Set Default User	Sets the default user.
User Manager	Used to manage users.
View	Refer to *B.1 Common Menus*.
Tool	Refer to *B.1 Common Menus*.
Help	Refer to *B.1 Common Menus*.

* Valid only in online mode.

(b) Pop-up Menus

Menu Command	Function
Create New Program	Opens a new motion program.
Open	
Motion Editor	Edits motion programs.
Position Monitor	Displays the current position.*
Motion Alarm	Displays alarm information.*
Application Converter	
Conversion Wizard	Starts the Application Converter.
Multi-register Replace	Performs register replacement.
Controller Operation	Changes the CPU status.*
Log Off	Logs off from the Machine Controller.

* Valid only in online mode.

(9) Motion Program File Menus

This section explains the pull-down and pop-up menus that are displayed when a motion program file is selected.

(a) Pull-down Menus

Menu Command	Function
File	
Create New Program	Opens a new motion program.
Open	
Motion Editor	Edits the motion program.
Position Monitor	Displays the current position.*
Motion Alarm	Displays alarm information.*
Delete	Deletes motion program files.
Log Off	Logs off from the Machine Controller.
Copy to	Copies a motion program file.
Print	Opens the Print Manager.
Exit	Exits the File Manager.
Edit	
Set Default User	Sets the default user.
User Manager	Used to manage users.
View	Refer to *B.1 Common Menus*.
Tool	Refer to *B.1 Common Menus*.
Help	Refer to *B.1 Common Menus*.

* Valid only in online mode.

(b) Pop-up Menus

Menu Command	Function
Create New Program	Opens a new motion program.
Open	
Motion Editor	Edits the motion program.
Position Monitor	Displays the current position.*
Motion Alarm	Displays alarm information.*
Delete	Deletes the motion program file.
Copy to	Copies the motion program file.
Application Converter	
Conversion Wizard	Starts the Application Converter.
Multi-register Replace	Performs register replacement.
Controller Operation	Changes the CPU status.*
Log Off	Logs off from the Machine Controller.

* Valid only in online mode.

(10) Group Definition File Menus

This section explains the pull-down and pop-up menus that are displayed when a group definition file is selected.

(a) Pull-down Menus

Menu Command		Function
File		
	Log Off	Logs off from the Machine Controller.
	Transfer	Refer to *B.1 Common Menus*.
	Print	Prints the contents of the selected file.
	Exit	Exits the File Manager.
Edit		
	Set Default User	Sets the default user.
	User Manager	Used to manage users.
	Controller Operation	Changes the CPU status.*
View		Refer to *B.1 Common Menus*.
Tool		Refer to *B.1 Common Menus*.
Help		Refer to *B.1 Common Menus*.

* Valid only in online mode.

(b) Pop-up Menus

Menu Command		Function
Transfer		Refer to *B.1 Common Menus*.
Application Converter		
	Conversion Wizard	Starts the Application Converter.
	Multi-register Replace	Performs register replacement.
Controller Operation		Changes the CPU status.*
Log Off		Logs off from the Machine Controller.

* Valid only in online mode.

C Drawing and Function Instructions

The following tables list the instructions used when creating drawings and functions. The instructions are grouped by function. Each of these commands has an auxiliary input key allocated to it.

Programs can be input more effectively by using the shortcut command keys allocated to the following sequence control instructions.

- Program control instructions
- Direct input instructions
- Sequence circuit instructions
- Logic operation instructions
- Numeric math instructions
- Numeric conversions instructions
- Numeric comparison instructions
- Data manipulation instructions
- Basic function instructions
- DDC instructions
- Table data manipulation instructions
- Program control instructions

(1) Program Control Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
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 CALL (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]
INLINE COMMENT	"‘	"‘	[CONTROL(C)]-[COMMENT]	10[CMT]
EXTENSION PROGRAM CALL	XCALL	XCALL	[CONTROL(C)]-[XCALL]	2[XCALL]
SFC PROGRAM EXECUTION	SFC	SFC	[SFC(S)]-[SFC]	8[SFC]
SFC STEP NUMBER	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]

(2) Direct I/O Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
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]
INPUT STRAIGHT	INS	INS	[CONTROL(C)]-[INS]	7[INS]
OUTPUT STRAIGHT	OUTS	OUTS	[CONTROL(C)]-[OUTS]	8[OUTS]

(3) Sequence Program Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	
NO CONTACT	⊣⊢	][	[RELAY(R)]-[NO CONTACT(A)]	1[⊣⊢]
NC CONTACT	⊣/⊢	]/	[RELAY(R)]-[NC CONTACT(B)]	2[⊣/⊢]
COIL	-○⊣	@	[RELAY(R)]-[COIL(O) . COIL(C)]	10[-○⊣]
SET COIL	-[S]-	@s	[RELAY(R)]-[COIL(O) . SET COIL(S)]	9[-[S]-]
RESET COIL	-[R]-	@R	[RELAY(R)]-[COIL(O) . RESET COIL(R)]	10[-[R]-]
ON PULSE	-┌┘-	]P	[RELAY(R)]-[ONPULSE(P)]	8[-┌┘-]
OFF PULSE	-└┐-	]N	[RELAY(R)]-[OFFPULSE(Q)]	9[-└┐-]
10-MS ON-DELAY	-[T]-	[ON	[RELAY(R)]-[ONDELAY[10MS](N)]	6[ONDLY]
10-MS OFF-DELAY	-[T]-	[OFF	[RELAY(R)]-[OFFDELAY[10MS](F)]	7[OFFDLY]
1-S ON-DELAY	-[TS]-	[SON	[RELAY(R)]-[ONDELAY[1S](S)]	6[ONSDL]
1-S OFF-DELAY	-[TS]-	[SOFF	[RELAY(R)]-[OFFDELAY[1S](R)]	7[OFFSDL]
BRANCH	⊤	, (comma)	[RELAY(R)]-[BRANCH(T)]	3[⊤]
JOIN	⊥	. (period)	[RELAY(R)]-[JOIN(J)]	4[⊥]
CONNECT	┗	,.(comma and period)	[RELAY(R)]-[CONNECT(C)]	5[┗]

(4) Logic Operation Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	
AND	^	&	[LOGIC(L)]-[AND]	2[^]
OR	v	|	[LOGIC(L)]-[OR]	3[v]
XOR	⊕	^	[LOGIC(L)]-[XOR]	4[⊕]

(5) Numeric Operation Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	
INTEGER ENTRY	⊢	;	[ART(A)]-[ENTRY (I) . INTEGER (I)]	1[⊢]
REAL NUMBER ENTRY	⊩	;;	[ART(A)]-[ENTRY (I) . REAL NUMBER (F)]	1[⊩]
STORE	⇒	:	[ART(A)]-[STORE(S)]	10[⇒]
ADDITION	+	+	[ART(A)]-[+]	2[+]
SUBTRACTION	-	-	[ART(A)]-[-]	3[-]
EXTENDED ADDITION	++	++	[ART(A)]-[++]	2[++]
EXTENDED SUBTRACTION	--	--	[ART(A)]-[- -]	3[--]
MULTIPLICATION	×	*	[ART(A)]-[×]	4[×]

(Cont'd)

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
DIVISION	÷	/	[ART(A)]-[÷]	5[÷]
MOD	MOD	MOD	[ART(A)]-[MOD]	6[MOD]
REM	REM	REM	[ART(A)]-[REM]	6[REM]
INCREMENT	INC	INC	[ART(A)]-[INC]	4[INC]
DECREMENT	DEC	DEC	[ART(A)]-[DEC]	5[DEC]
ADD TIME	TMADD	TMADD	[ART(A)]-[TMADD]	6[TMADD]
SUBTRACT TIME	TMSUB	TMSUB	[ART(A)]-[TMSUB]	7[TMSUB]
SPEND TIME	SPEND	SPEND	[ART(A)]-[SPEND]	8[SPEND]

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(6) Numeric Conversion Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
SIGN INVERSION	INV	INV	[ART(A)]-[INV]	7[INV]
1'S COMPLEMENT	COM	COM	[ART(A)]-[COM]	8[COM]
ABSOLUTE VALUE CONVERSION	ABS	ABS	[ART(A)]-[ABS]	1[ABS]
BINARY 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]

(7) Numeric Comparison Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
COMPARE (<)	<	<	[LOGIC(L)]-[<]	5[<]
COMPARE (≤)	≤	<=	[LOGIC(L)]-[<=]	6[≤]
COMPARE (=)	=	=	[LOGIC(L)]-[=]	7[=]
COMPARE (≠)	≠	<>	[LOGIC(L)]-[!=]	8[≠]
COMPARE (≥)	≥	>=	[LOGIC(L)]-[>=]	9[≥]
COMPARE (>)	>	>	[LOGIC(L)]-[>]	10[>]
RANGE CHECK	RCHK	RCHK	[LOGIC(L)]-[RCHK]	5[RCHK]

(8) Data Operation Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
BIT ROTATION LEFT	ROTL	ROTL	[MOVE(M)]-[ROTL]	6[ROTL]
BIT ROTATION RIGHT	ROTR	ROTR	[MOVE(M)]-[ROTR]	7[ROTR]
MOVE BITS	MOVB	MOVB	[MOVE(M)]-[MOVB]	2[MOVB]
MOVE WORD	MOVW	MOVW	[MOVE(M)]-[MOVW]	1[MOVW]
EXCHANGE	XCHG	XCHG	[MOVE(M)]-[XCHG]	3[XCHG]
SET WORDS	SETW	SETW	[MOVE(M)]-[SETW]	4[SETW]

(Cont'd)

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
BYTE-TO-WORD EXPANSION	BEXTD	BEXTD	[MOVE(M)]-[BEXTD]	5[BEXTD]
WORD-TO-BYTE COMPRES-SION	BPRESS	BPRESS	[MOVE(M)]-[BPRESS]	6[BPRESS]
BINARY SEARCH	BSRCH	BSRCH	[MOVE(M)]-[BSRCH]	7[BSRCH]
SORT	SORT	SORT	[MOVE(M)]-[SORT]	8[SORT]
BIT SHIFT LEFT	SHFTL	SHFTL	[MOVE(M)]-[SHFTL]	8[SHFTL]
BIT SHIFT RIGHT	SHFTR	SHFTR	[MOVE(M)]-[SHFTR]	9[SHFTR]
COPY WORD	COPYW	COPYW	[MOVE(M)]-[COPYW]	5[COPYW]
BYTE SWAP	BSWAP	BSWAP	[MOVE(M)]-[BSWAP]	4[BSWAP]

(9) Basic Function Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
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]
ARC SINE	ASIN	ASIN	[FUNCTION(F)]-[ASIN]	6[ASIN]
ARC COSINE	ACOS	ACOS	[FUNCTION(F)]-[ACOS]	7[ACOS]
ARC 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]

(10) DDC Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
DEAD ZONE A	DZ_A	DZA	[DDC(D)]-[DZA]	2[DZA]
DEAD ZONE B	DZ_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]
FIRST-ORDER LAG	LAG	LAG	[DDC(D)]-[LAG]	5[LAG]
PHASE LEAD/LAG	LLAG	LLAG	[DDC(D)]-[LLAG]	6[LLAG]
FUNCTION GENERATOR	FGN	FGN	[DDC(D)]-[FGN]	6[FGN]
INVERSE FUNCTION GENERA-TOR	IFGN	IFGN	[DDC(D)]-[IFGN]	7[IFGN]
LINEAR ACCELERATOR/DE-CELERATOR 1	LAU	LAU	[DDC(D)]-[LAU]	7[LAU]
LINEAR ACCELERATOR/DE-CELERATOR 2	SLAU	SLAU	[DDC(D)]-[SLAU]	8[SLAU]
PULSE WIDTH MODULATION	PWM	PWM	[DDC(D)]-[PWM]	9[PWM]

(11) Table Data Operation Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
TABLE READ	TBLBR	TBLBR	[TABLE(T)]-[TBLBR]	1[TBLBR]
TABLE WRITE	TBLBW	TBLBW	[TABLE(T)]-[TBLBW]	2[TBLBW]
ROW SEARCH	TBLSRL	TBLSRL	[TABLE(T)]-[TBLSRL]	3[TBLSRL]
COLUMN SEARCH	TBLSRC	TBLSRC	[TABLE(T)]-[TBLSRC]	4[TBLSRC]
TABLE CLEAR	TBLCL	TBLCL	[TABLE(T)]-[TBLCL]	5[TBLCL]
TABLE BLOCK MOVE	TBLMV	TBLMV	[TABLE(T)]-[TBLMV]	6[TBLMV]
QUEUE TABLE READ	QTBLR	QTBLR	[TABLE(T)]-[QTBLR]	1[QTBLR]
QUEUE TABLE READ AND INCREMENT	QTBLRI	QTBLRI	[TABLE(T)]-[QTBLRI]	2[QTBLRI]
QUEUE TABLE WRITE	QTBLW	QTBLW	[TABLE(T)]-[QTBLW]	3[QTBLW]
QUEUE TABLE WRITE AND INCREMENT	QTBLWI	QTBLWI	[TABLE(T)]-[QTBLWI]	4[QTBLWI]
QUEUE TABLE WRITE POINTER CLEAR	QTBLCL	QTBLCL	[TABLE(T)]-[QTBLCL]	5[QTBLCL]

A

D MECHATROLINK Devices

Classification	Model	Description	MP910	MP920	MP930	MP940	MP2000	
							M-I	M-II
SERVOPACKs	SGD-□□□N, SGDB-□□AN	AC SERVOPACK for MECHATROLINK	Y	Y	Y	N	Y	N
	SGDH-□□□E, JUSP-NS100	SGDH SERVOPACK, NS100 MECHATROLINK Interface Module	Y	Y	Y	N	Y	N
	SGDH-□□□E, JUSP-NS115	SGDH SERVOPACK, NS115 MECHATROLINK-II Interface Module	N	N	N	N	Y	Y
	SGDS-□□□1□□	SGDS SERVOPACK	N	N	N	N	Y	Y
Distributed I/O Modules	JAMSC-120DRA83030	Relay Module Wide voltage range relay contacts, 8 contact outputs	Y	Y	Y	Y	Y	N
	JAMSC-120DAI53330	AC Input Module 100 VAC, 8 inputs	Y	Y	Y	Y	Y	N
	JAMSC-120DAI73330	AC Input Module 200 VAC, 8 inputs	Y	Y	Y	Y	Y	N
	JAMSC-120DAO83330	AC Output Module 100/200 VAC, 8 outputs	Y	Y	Y	Y	Y	N
	JAMSC-120DDI34330	DC Input Module 12/24 VDC, 16 inputs	Y	Y	Y	Y	Y	N
	JAMSC-120DDO34330	DC Output Module 12/24 VDC, 16 outputs	Y	Y	Y	Y	Y	N
	JAMSC-120AVI02030	A/D Module Analog input, −10 to 10 V, 4 channels	Y	Y	Y	Y	Y	N
	JAMSC-120AVO01030	D/A Module Analog output, −10 to 10 V, 2 channels	Y	Y	Y	Y	Y	N
I/O Modules	JEPMC-IO350	64-point I/O Module 24 VDC, 64 inputs, 64 outputs	Y	Y	Y	Y	Y	N
	JEPMC-IO2310	64-point I/O Module 24 VDC, 64 inputs, 64 outputs	N	N	N	N	Y	Y
	87816-11000	16-point I/O Module RIO-01	Y	Y	Y	Y	Y	N
Counter Modules	JAMSC-120EHC21140	Counter Module Reversible counter, 2 channels	Y	Y	Y	N	Y	N
	JEPMC-PL2900	Counter Module Reversible counter, 2 channels	N	N	N	N	Y	Y
Pulse Output Modules	JAMSC-120MMB20230	Pulse Output Module Pulse output, 2 channels	Y	Y	Y	N	Y	N
	JEPMC-PL2910	Pulse Output Module Pulse output, 2 channels	N	N	N	N	Y	Y
PLC Module	JEPMC-MC400	PLC Module MP940	Y	Y	Y	Y	Y	N

Note: Y = Connection possible, N = Connection not possible.

Refer to *Machine Controller MP900/MP2000 Series User's Manual: MECHATROLINK System* (SIEZ-C887-5.1) for details.

E Remote Operation Function

The Remote Operation function connects two MPE720s at a distance through modems and allows the receiving MPE720 to be operated remotely from the transmitting MPE720.

The same operations can be performed from a transmitting MPE720 Setup in a remote location as the operations in a receiving MPE720 connected to a Machine Controller.

The modem setting and the MPE720 communication process settings must be set properly to use the Remote Operation function.

E.1 Modem Setup

Connect a modem to the Programming Device (personal computer in which the MPE720 is installed) and Setup the modem. Refer to your modem's User's Guide for details on setting up the modem. Once the modem is Setup when configuring the system, it will not be necessary to Setup the modem again.

If command echo is enabled in the modem settings, change the settings to disable the command echo. Refer to your modem's User's Guide for details on disabling the command echo.

E.2 Communication Process Setup

Before performing remote operations, make the necessary communication process settings.

Once the communication process settings are made when configuring the system, it will not be necessary to make the settings again.

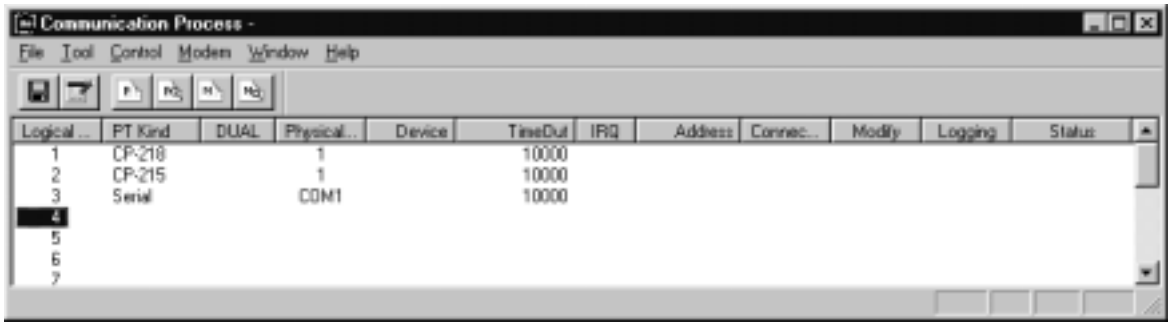
(1) Settings in the Receiving MPE720

Make the Communication Process settings in the receiving MPE720.

(a) Opening the Communication Process Window

1. Double-click the **Communication Manager** Icon.

2. The Communication Process Window will be displayed.

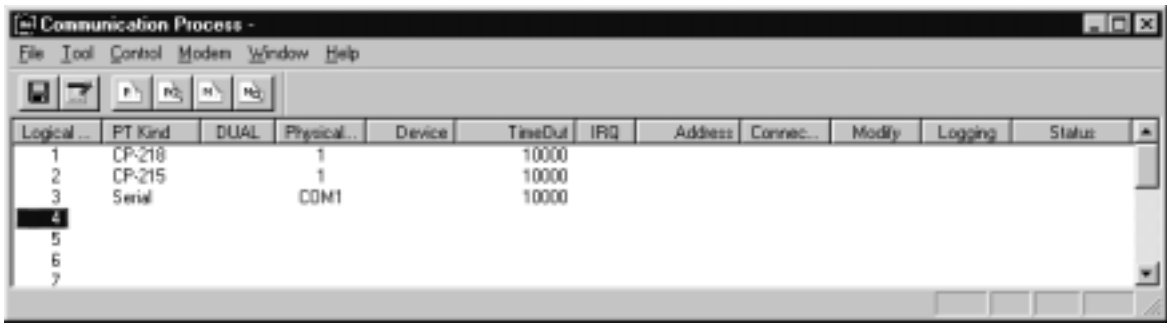


In this case, the *CP-218* (218IF), *CP-215* (215IF), and *Serial* (serial port) have already been set as devices connected to the Machine Controller. Refer to *2.1 Communication Manager* for details on setting devices.

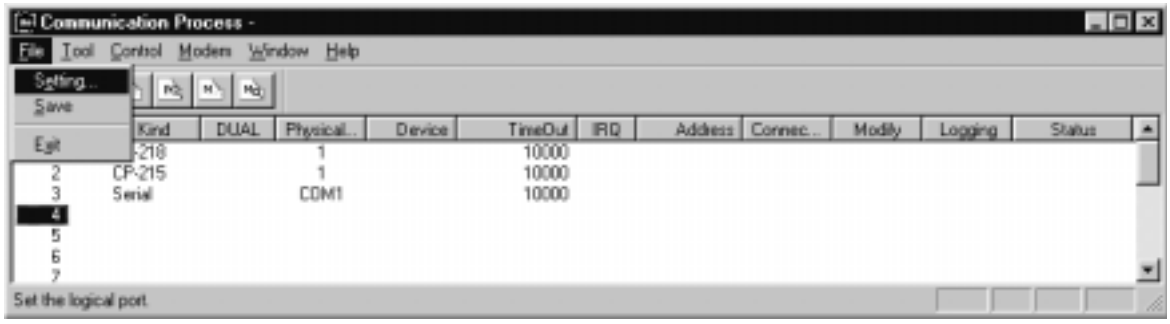
(b) Communication Process Settings (Modem)

Make the following settings to enable modem communication in the communication process.

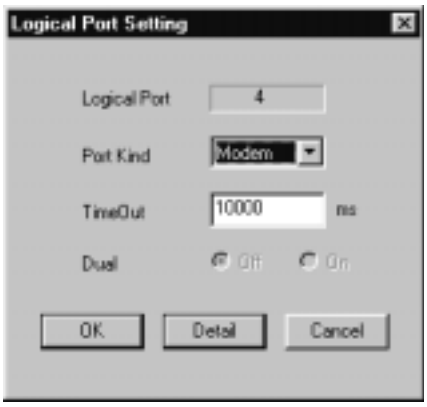
1. Click an unused logical port number (logical port 4 in this example).



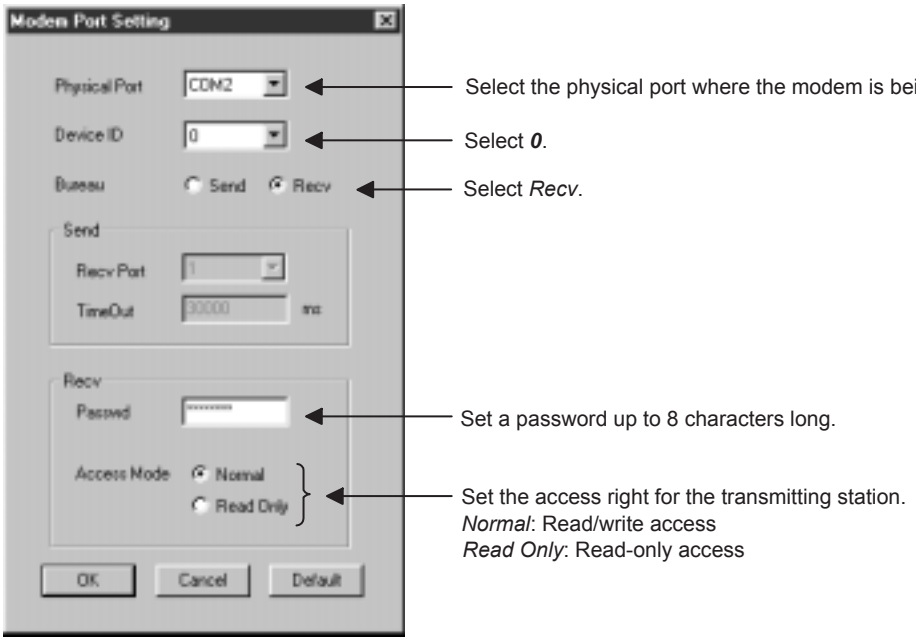
2. Select ***File*** – ***Setting...*** from the menus.



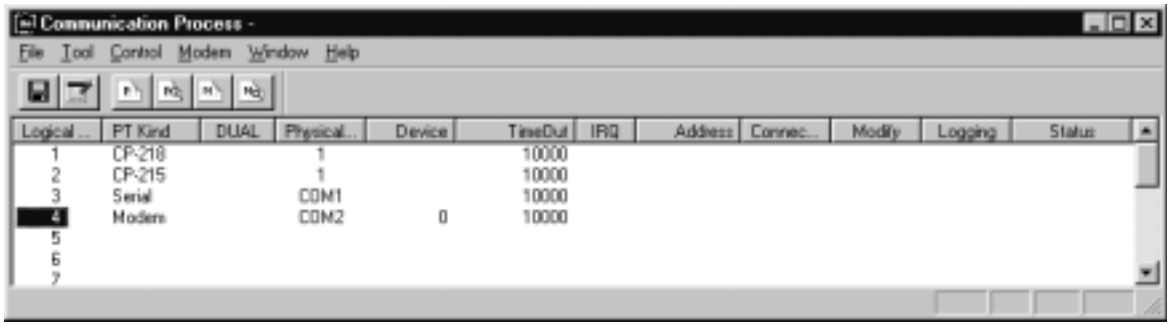
3. In the Logical Port Setting WIndow, set the *Port Kind* to ***Modem*** and then click the **Detail** Button.



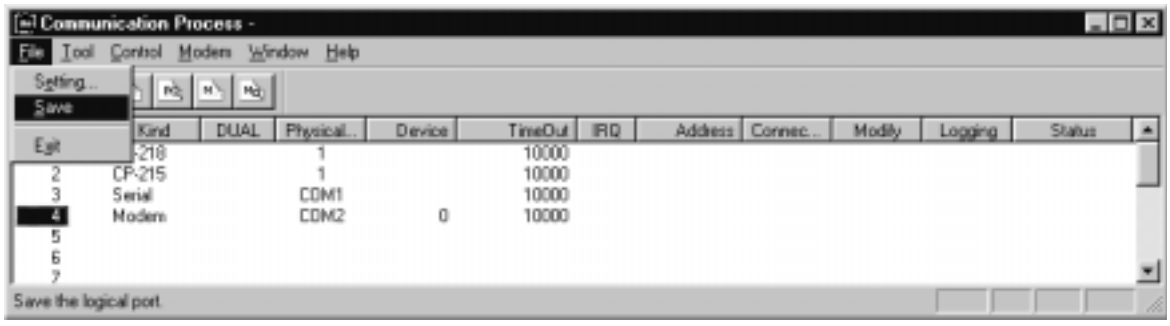
4. Make the modem settings as shown below in the Modem Port Settings Window and click the **OK** Button.



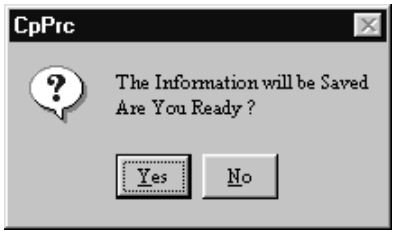
5. Click the **OK** Button in the Logical Port Setting Window.
6. The modem information will be set in the Communication Process Window.



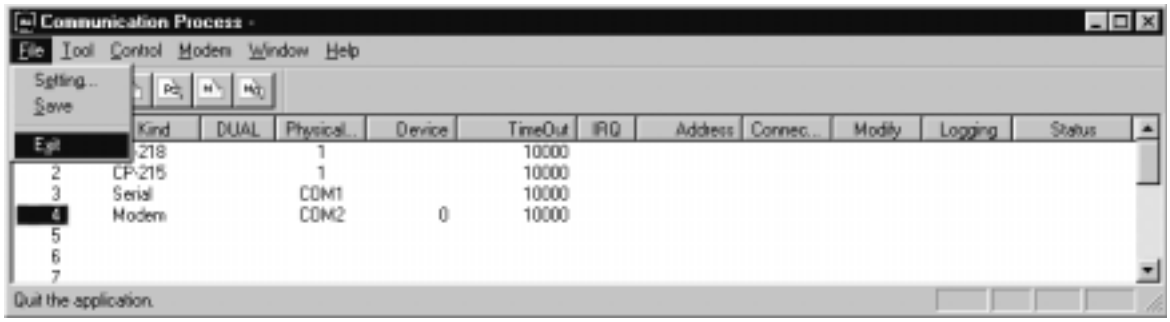
7. Select ***File*** – ***Save*** from the menus.



8. The following confirmation message will be displayed. Click the **Yes** Button to save the settings.



9. Select ***File*** – ***Exit*** from the menus.



10. The following confirmation message will be displayed. Click the **Yes** Button to close.

After the Communication Process Window is closed, the new Communication Process settings will become effective the next time that the Communication Process is started.

When the MPE720 is started, the Communication Process is started at the same time so it is not necessary to restart the Communication Process before starting the MPE720.

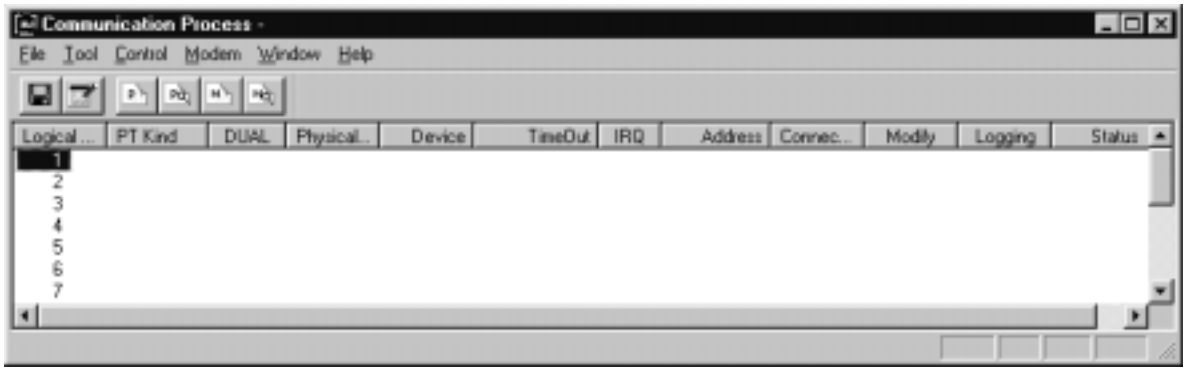
(2) Settings in the Transmitting MPE720

Make the Communication Process settings in the transmitting MPE720.

(a) Opening the Communication Process Window

1. Double-click the **Communication Manager** Icon.

2. The Communication Process Window will be displayed.

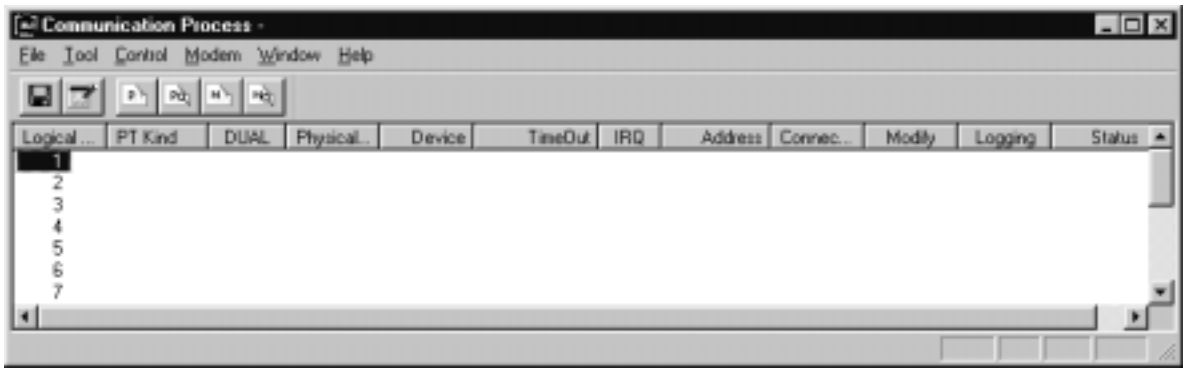


In this case, no devices have been set as devices connected to the Machine Controller.

(b) Communication Process Settings (Modem)

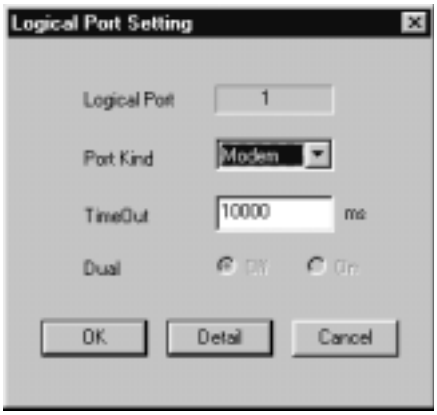
Make the following settings to enable modem communication in the communication process.

1. Click an unused logical port number (logical port 1 in this example).

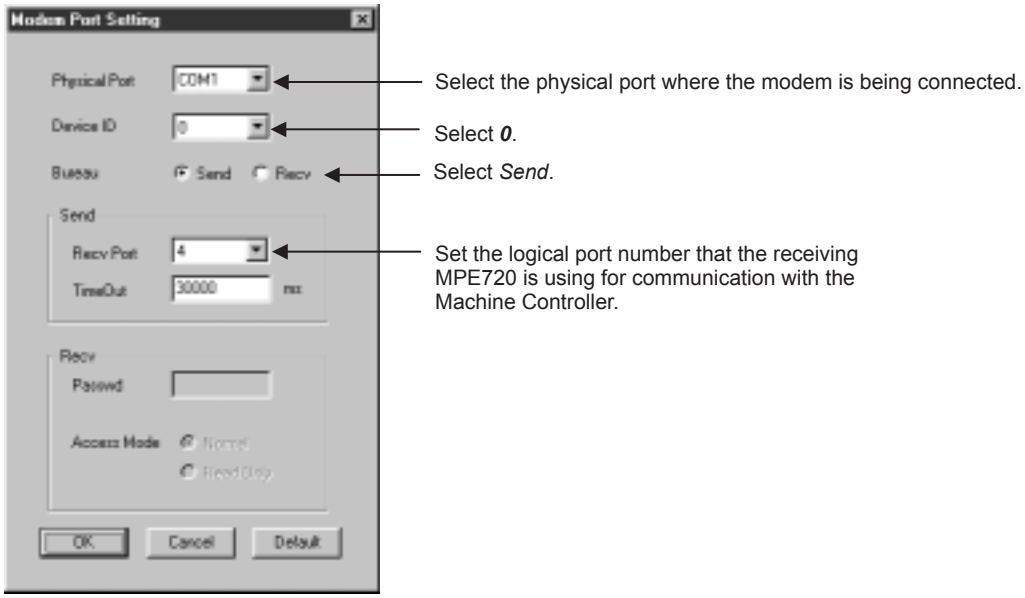


2. Select ***File – Setting...*** from the menus.

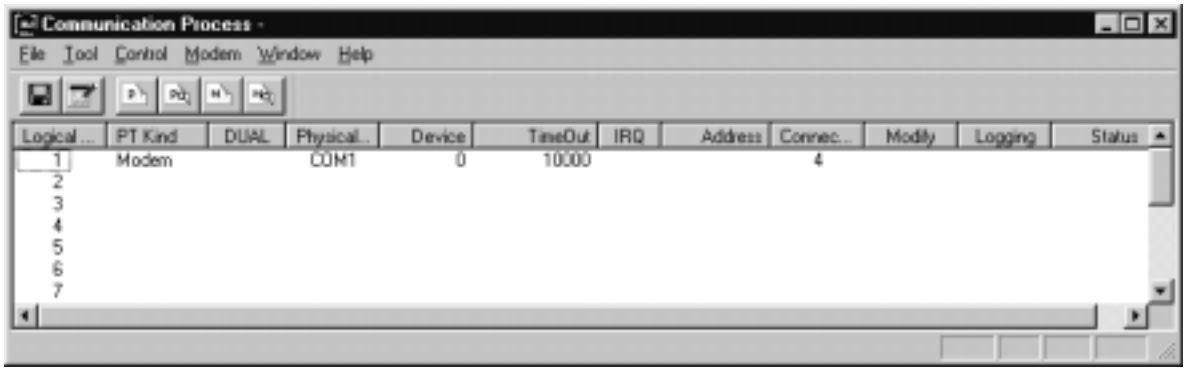
3. In the Logical Port Setting WIndow, set the *Port Kind* to ***Modem*** and then click the **Detail** Button.



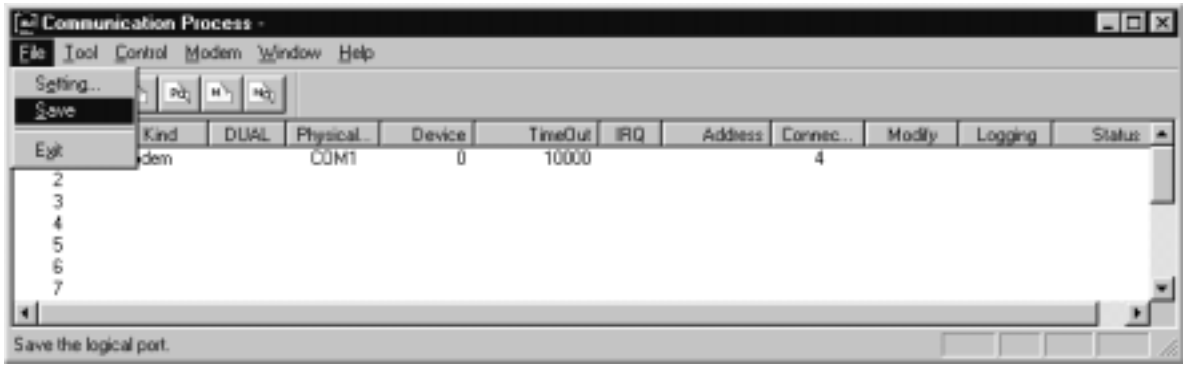
4. Make the modem settings as shown below in the Modem Port Settings Window and click the **OK** Button.



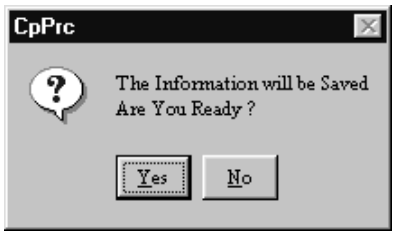
5. Click the **OK** Button in the Logical Port Setting Window.
6. The modem information will be set in the Communication Process Window.



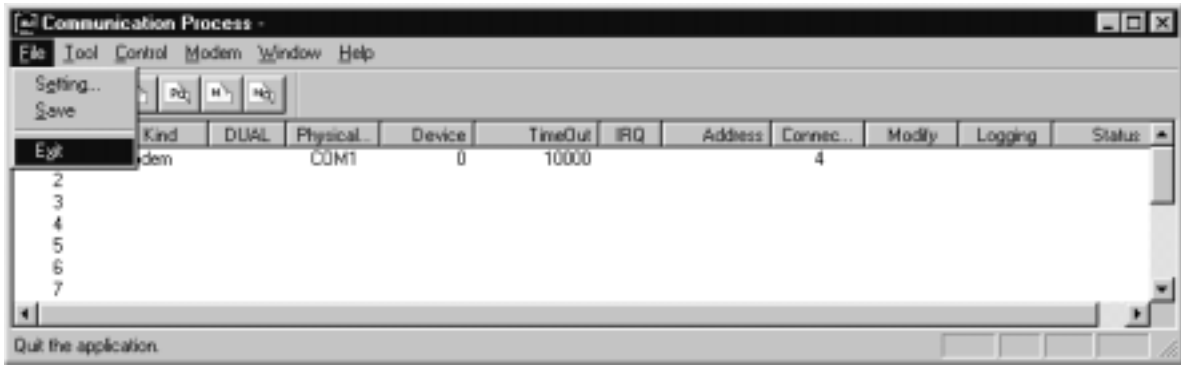
7. Select ***File*** – ***Save*** from the menus.



8. The following confirmation message will be displayed. Click the **Yes** Button to save the settings.



9. Select ***File*** – ***Exit*** from the menus.



10. The following confirmation message will be displayed. Click the **Yes** Button to close.

After the Communication Process Window is closed, the new Communication Process settings will become effective the next time that the Communication Process is started.

When the MPE720 is started, the Communication Process is started at the same time so it is not necessary to restart the Communication Process before starting the MPE720.

E.3 Remote Operations

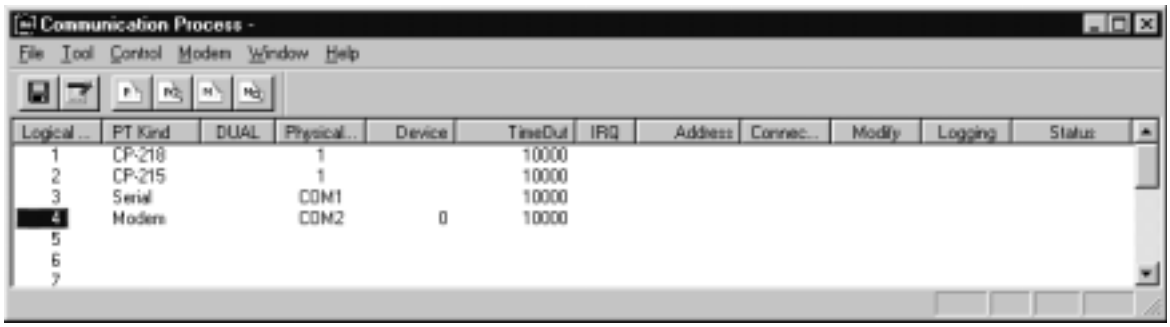
(1) Connecting the Circuit

When connecting the communication circuit, perform the following operations in the receiving MPE720 and then the transmitting MPE720.

(a) Operations for the Receiving MPE720

1. Double-click the **Communication Manager** Icon.

2. The Communication Process Window will be displayed.

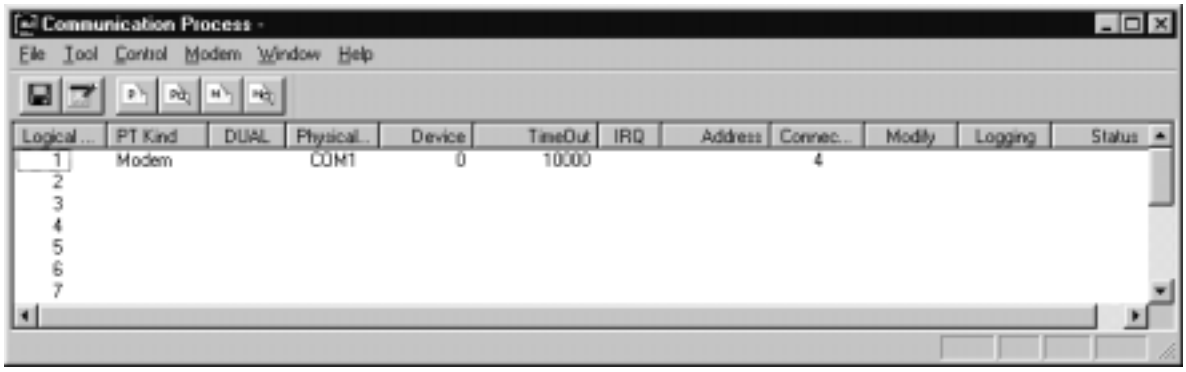


This completes the receiving MPE720 settings.

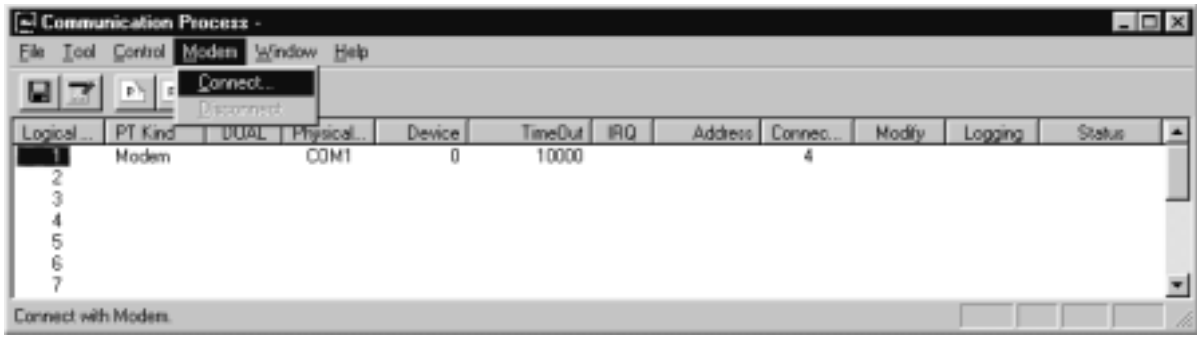
(b) Operations for the Transmitting MPE720

1. Double-click the **Communication Manager** Icon.

2. The Communication Process Window will be displayed.

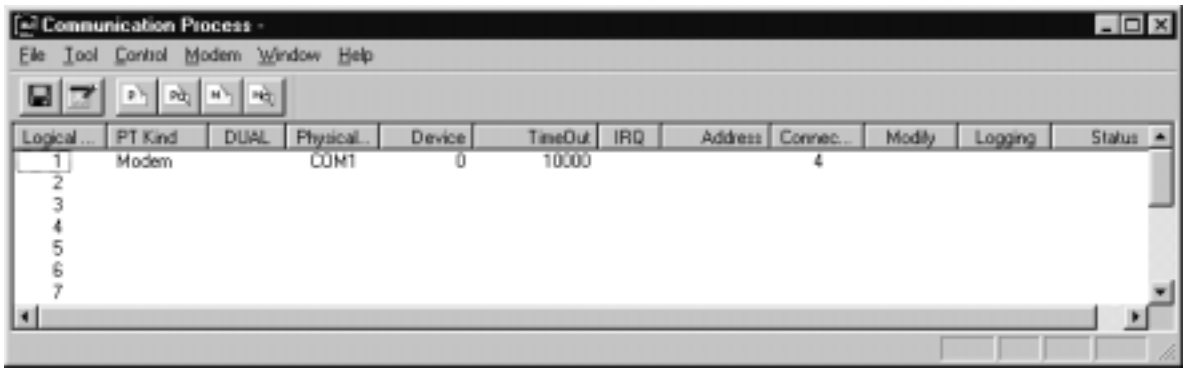


3. Click the logical port number allocated to the modem (logical port 1 in this example) and select ***Modem*** – ***Connect...*** from the menus.



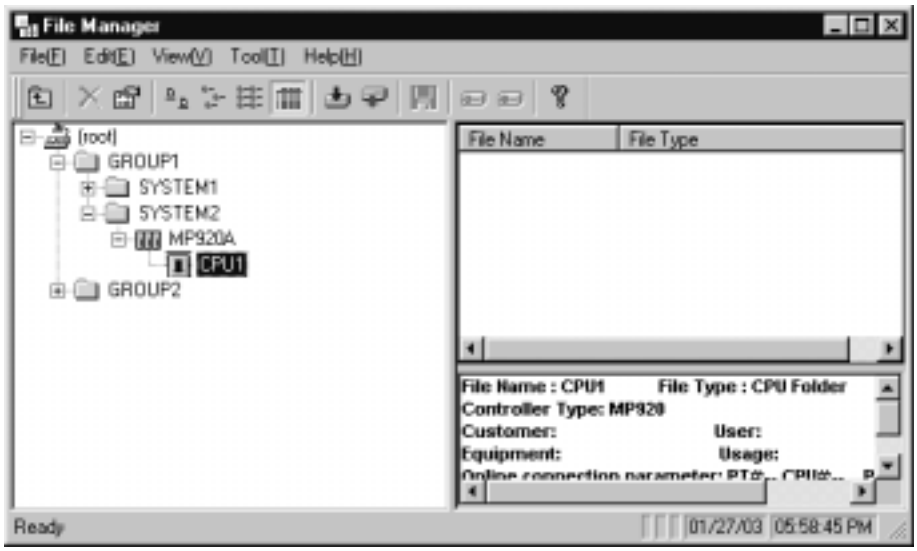
4. In the Dialing Window, input the receiving MPE720's phone number (Dial Number) and the password set for the receiving MPE720, and click the **OK** Button.

5. The Communication Process Window will be displayed. The modem will start dialing the receiving MPE720. The *Status* display will change from ***PROCEED*** to ***CONNECTED*** when the connection is established.

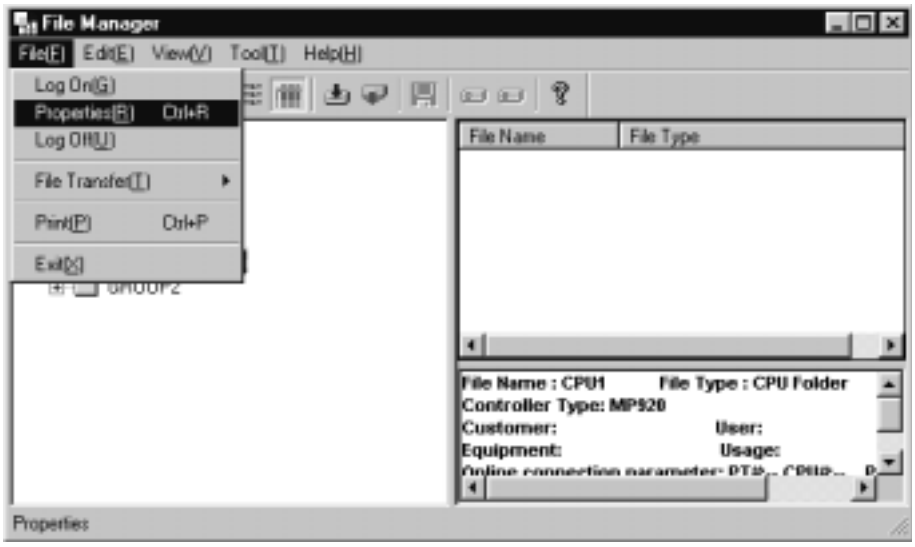


6. Double-click the **MPE720** Icon and start the MPE720.

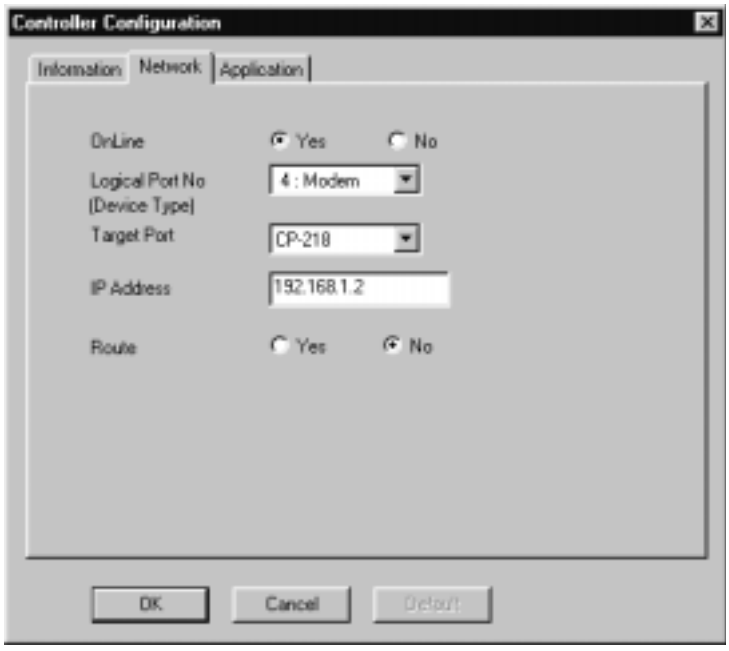
7. The File Manager Window will be displayed. Click the PLC folder of the Machine Controller that will perform remote operations.



8. Select ***File*** – ***Properties*** from the menus.



9. Click the **Network** Tab in the Controller Configuration Window, make the settings shown below, and click the **OK** Button.



10. Logon from the File Manager. After logging on, the same operations as the MPE720 can be performed.

(2) Disconnecting the Circuit

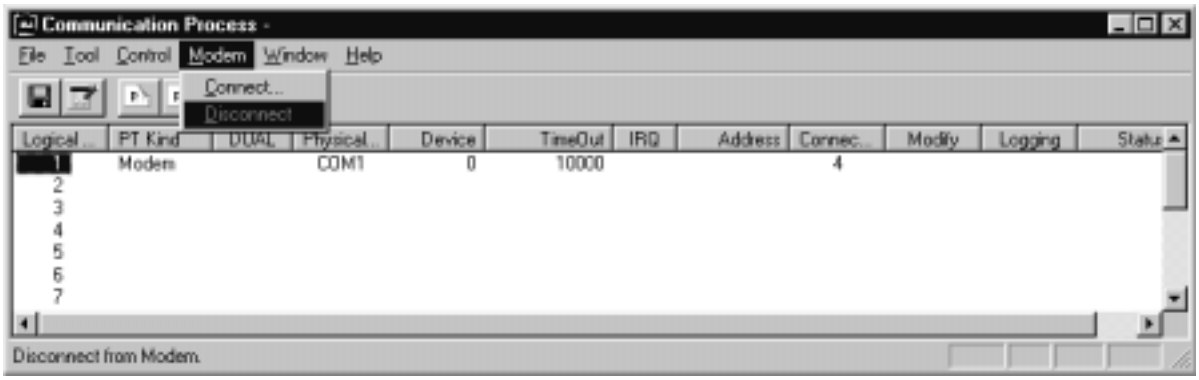
When disconnecting the communication circuit, perform the following operations in the transmitting MPE720 and then the receiving MPE720.

Furthermore, when communication has been disconnected in the transmitting MPE720, always disconnect communication in the receiving MPE720 as well.

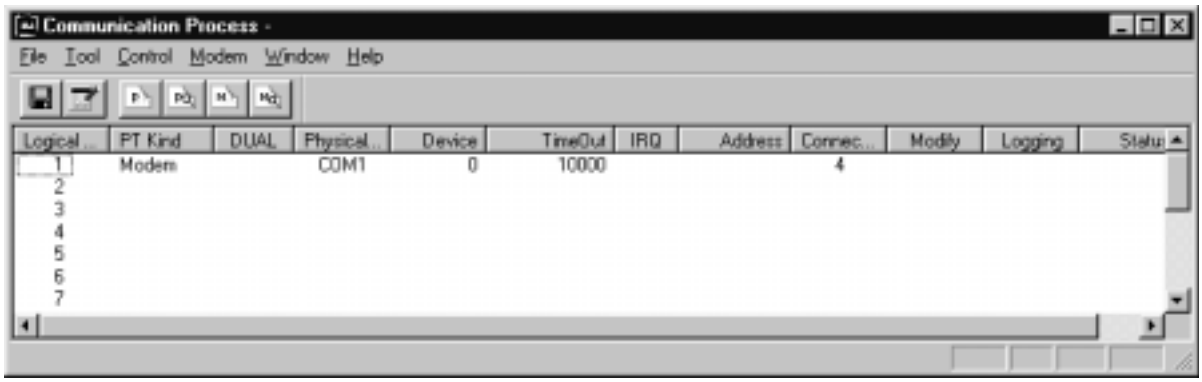
(a) Operations for the Transmitting MPE720

1. Exit the MPE720.
2. Open the Communication Process Window.

3. Click the logical port number allocated to the modem (logical port 1 in this example), and select ***Modem*** – ***Disconnect*** from the menus.



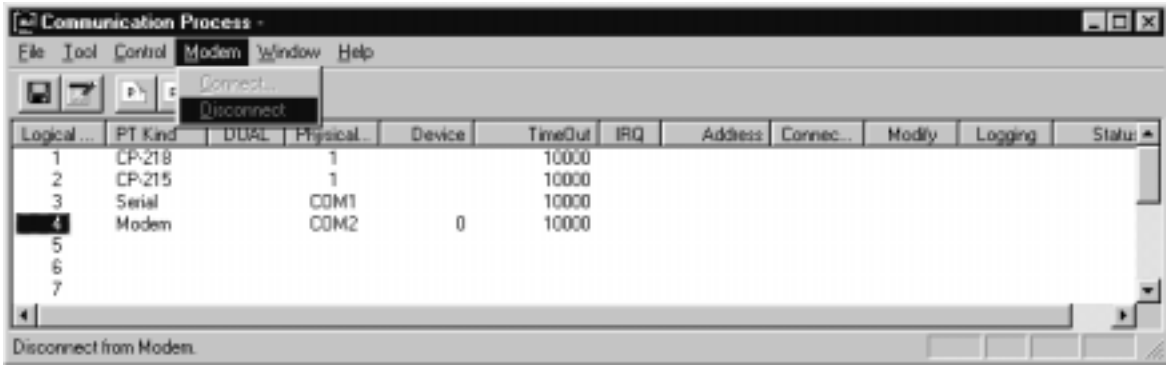
4. The *Status* display will change from ***CONNECTED*** to ***IDLE*** and the circuit will be disconnected.



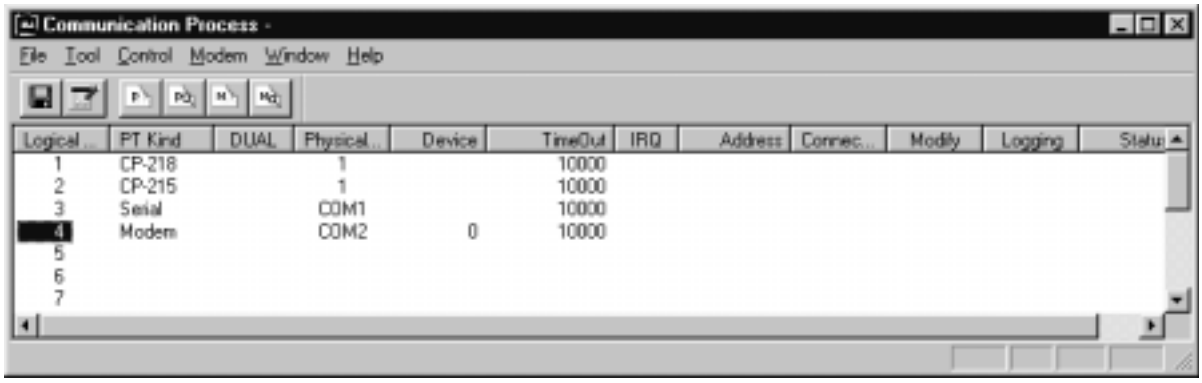
At this point, the *Status* display in the receiving MPE720's Communication Process Window will change from ***CONNECTED*** to ***DISCONNECTED***.

(b) Operations for the Receiving MPE720

1. Open the Communication Process Window.
2. Click the logical port number allocated to the modem (logical port 4 in this example) and select ***Modem*** – ***Disconnect*** from the menus.



3. The *Status* display will change from ***DISCONNECTED*** to ***IDLE*** and the circuit will be disconnected.



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Revision History

The revision dates and numbers of the revised manuals are given on the bottom of the back cover.

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		Back cover	Revision: Address
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Machine Controller MP900/MP2000 Series

MPE720 Software for Programming Device

USER'S MANUAL

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