YASKAWA
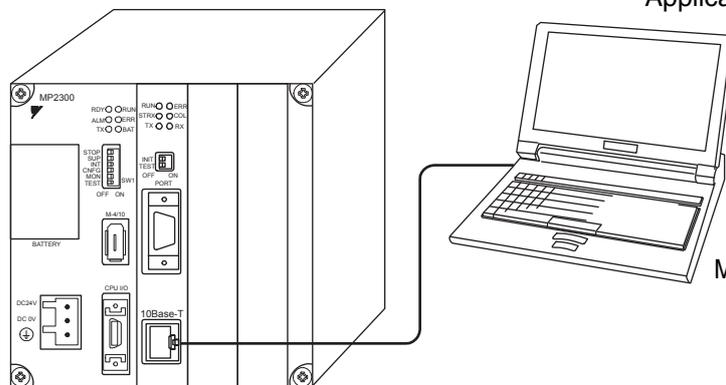
Machine Controller MP900/MP2000 Series

MPE720
Software for Programming Device
USER'S MANUAL

Model CPMC-MPE720

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 2000, XP, or Vista. 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.

■ Basic Terms

MP series: Four models of MP900 series, MP910, MP920, MP930, MP940 and six models of MP2000 series MP2100, MP2200, MP2300, MP2300S, MP2310, and MP2400

■ Abbreviations

In this manual, the following terms are defined as follows:
- **PLC** = Machine Controller
- **MPE720** = MPE720 software

■ 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.

INFO Indicates supplemental information.

◀ EXAMPLE ▶ Indicates application examples.

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

■ Related Manuals

Refer to the following related manuals as required.

Manual Name	Manual Number	Contents
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 MP900/ MP2000 Series User's Manual Ladder Programming	SIEZ-C887-1.2	Describes the instructions used in MP900/ MP2000 ladder programming.
Machine Controller MP900/ MP2000 Series User's Manual Motion Programming	SIEZ-C887-1.3	Describes the instructions used in MP900/ MP2000 motion programming.
Machine Controller MP900 Series Teach Pendant User's Manual	SIEZ-C887-1.6	Describes the details of the teach pendant for MP900 Machine Controllers.
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 MP9□□ Programming Panel Software User's Manual for Simple Operation Version	SIEZ-C887-2.3	Describes the simple operation methods of the software for the MP900-series programming device (CP-717).
MP900 Series Machine Controller User's Manual: Programming Panel Software (for standard operation)	SIEZ-C887-2.4	Describes the installation and operating procedures for the CP-717 Programming Panel Software used 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-01A, 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 Communication Modules (217IF, 215IF, and 218IFA).
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 MP900/ MP2000 Series User's Manual MECHATROLINK System	SIEZ-C887-5.1	Describes the functions, specifications, and application methods of the MECHATROLINK Modules for MP900/MP2000 Machine Controllers.
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 MP900/ MP2000 Series New Ladder Editor User's Manual Programming Manual	SIEZ-C887-13.1	Describes the programming instructions of the New Ladder Editor, which assists MP900/MP2000-series design and maintenance.
Machine Controller MP900/ MP2000 Series New Ladder Editor User's Manual Operation	SIEZ-C887-13.2	Describes the operating methods of the New Ladder Editor, which assists MP900/ MP2000-series design and maintenance.
Machine Controller MP2100/ MP2100M User's Manual Design and Maintenance	SIEPC88070001	Describes the design and maintenance of the MP2100/MP2100M Machine Controller.

Manual Name	Manual Number	Contents
Machine Controller MP2300 Basic Module User's Manual	SIEPC88070003	Describes how to use the MP2300 Basic Module and the modules that can be connected.
Machine Controller MP2000 Series Communication Module User's Manual	SIEPC88070004	Provides the information on the Communication Module that can be connected to MP2000 series Machine Controller and the communication methods.
Machine Controller MP900/ MP2000 Series Linear Servomotor Manual	SIEP C880700 06	Describes the connection methods, setting methods, and other information for Linear Servomotors.
Machine Controller MP2200 User's Manual	SIEPC88070014	Describes how to use the MP2200 Machine Controller and the modules that can be connected.
Machine Controller MP900/ MP2000 Series Electronic Cam Data Preparation Tool Operation Manual	SIEPC88070018	Describes how to use the electronic cam data creating tool.
Machine Controller MP2000 Series Analog Input/Analog Output Module AI-01/AO-01 User's Manual	SIEP C880700 26	Describes the functions, specifications, and application methods of the Analog Input Module AI-01 and Analog Output Module AO-01 for the MP2000 Series.
Machine Controller MP2000 Series Counter Module CNTR-01 User's Manual	SIEP C880700 27	Describes the functions, specifications, and application methods of the Counter Module CNTR-01 for the MP2000 Series.
Machine Controller MP2000 Series Pulse Output Motion Module PO-01 User's Manual	SIEP C880700 28	Describes the functions, specifications, and application methods of the PO-01, Pulse Output Motion Module for the MP2000 Series.
Machine Controller MP2000 Series Built-in SVA-01 Motion Module User's Manual	SIEP C880700 32	Describes the functions, specifications, and application methods of the SVA-01, SVA Motion Module for the MP2000 Series.
Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual	SIEP C880700 33	Describes the functions, specifications, and application methods of the MP2000 Series Motion Module that is built into the SVB, SVB-01, and SVR Module.
Machine Controller MP2000 Series I/O Module User's Manual	SIEP C880700 34	Describes the functions, specifications, and application methods of the I/O Module for the MP2000 Series.
Machine Controller MP2000 Series User's Manual for Motion Programming	SIEPC88070038	Describes the instructions used in MP2000 motion programming.
Machine Controller MP2300S Basic Module User's Manual	SIEPC88073200	Describes the application methods and connectable modules of the MP2300S basic modules.
Machine Controller MP2310 Basic Module User's Manual	SIEPC88073201	Describes the application methods and connectable modules of the MP2310 basic modules.

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Ladder Programming

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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 2000, XP, or Vista. 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.
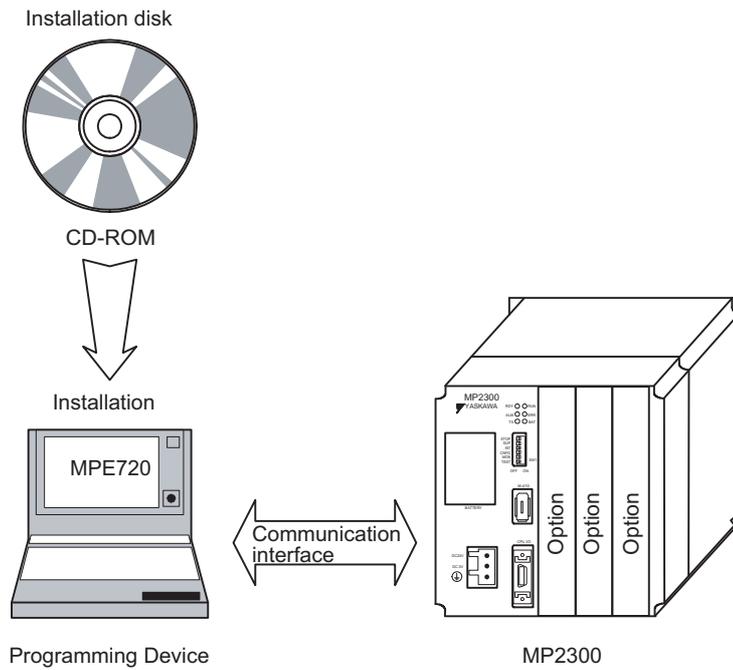
1.1.1 Recommended PC

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.
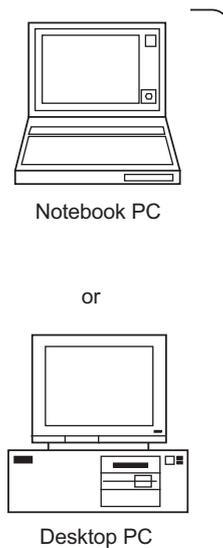
Item	Specifications
CPU	Pentium 800 MHz min. or equivalent. (1 GHz or faster is recommended.)
Memory Capacity	128 MB min. (256 MB or larger is recommended.)
Display	Resolution: 1,024 x 768 min., 16-bit High Color
Available HDD Space	200 MB min.
CD Drive	One CD drive (Required only for installation.)
Communication Ports	Serial, Ethernet, MP2100 bus, or USB
Operating System	Windows 2000 (service pack 1 or later) Windows XP Windows Vista Windows 7 (32 bit version)
Other	Adobe Reader version 6.00 or later (Required for help displays.) Internet Explorer version 5.5 or later (Required for displaying online help for ladder instructions.)

1.1.2 Version Applicability

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

MPE720 Version	Applicable Machine Controllers		Applicable OS				
	MP900 Series	MP2000 Series	Windows 2000	Windows XP or SP1	Windows XP or SP2	Windows Vista	Windows 7
Ver.4.50A or later	Applicable	Applicable	Applicable	Applicable	Not Applicable	Not Applicable	Not Applicable
Ver.5.30 or later	Applicable	Applicable	Applicable	Applicable	Applicable	Not Applicable	Not Applicable
Ver.5.40A or later	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable	Not Applicable
Ver.5.60 or later	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable

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.

- CP-717: 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.

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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.
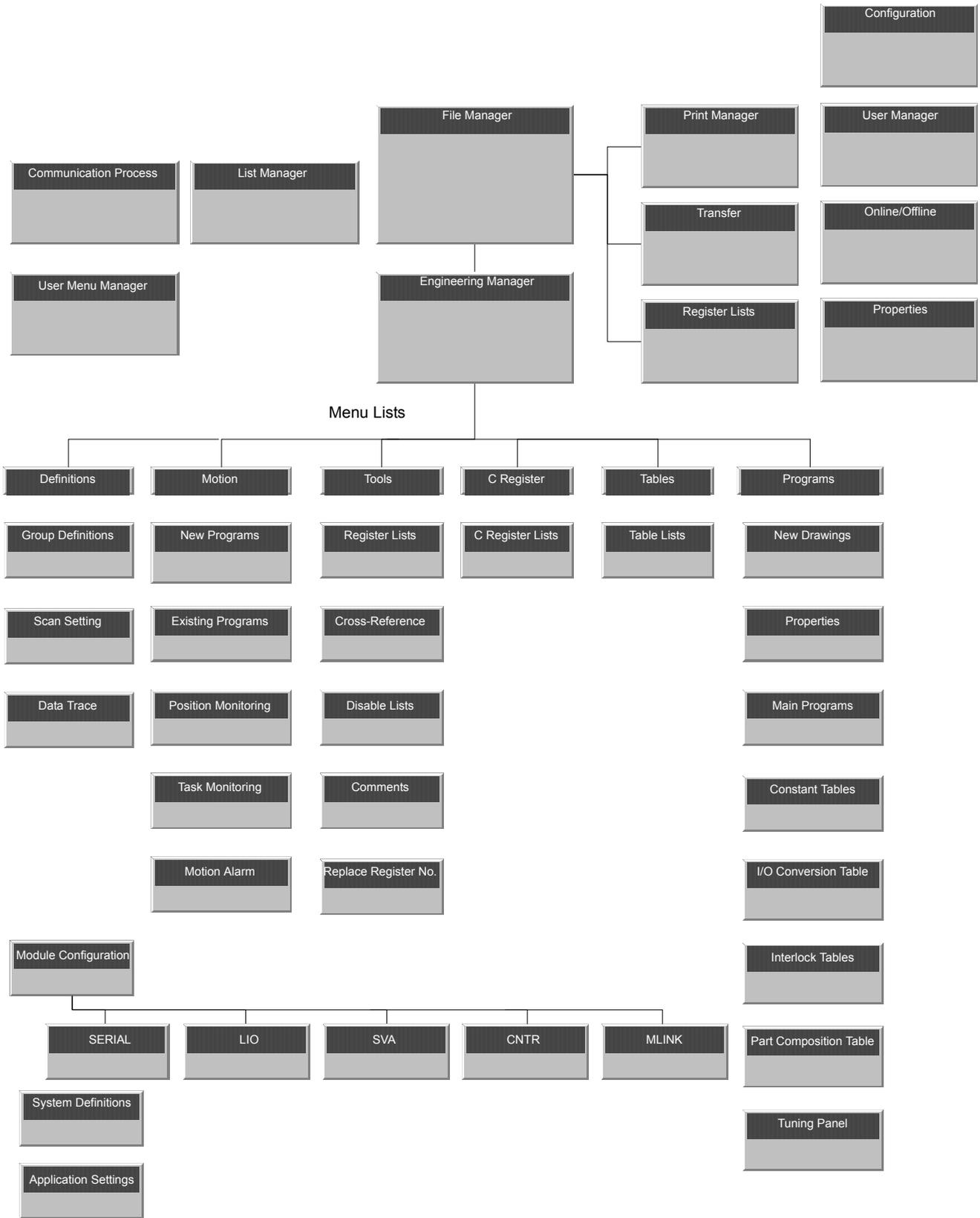
1.1.5 System Configuration Example

The following figure shows the system configuration.
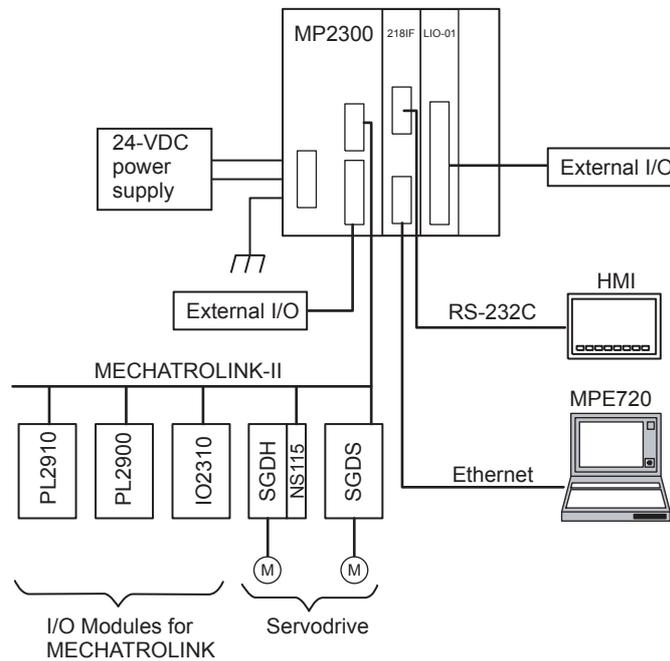
Note: 1. Up to 21 devices can be connected to MECHATROLINK-II (The SERVOPACKs can be connected up to 16 axes).
2. Up to 32 I/O points (16 inputs and 16 outputs) can be used with the LIO-01 Module and up to 12 I/O points (8 inputs and 4 outputs) can be used with the CPU I/O Module.
3. Communication Modules 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.

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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.

Step	Reference	Details
Make environment settings.	(See 1.2.2.)	• Set up hardware. • Install the MPE720. • Make communication settings.
Create PLC folder.	(See 1.2.5.)	• Create group folder. • Create order folder. • Create PLC folder.
Create definition data.	(See 1.2.6.)	• Log offline. • Define module configuration. • Define group. • Define scan time. • Define motion parameters.
Create program.	(See 1.2.7.)	• Create motion control ladder programs. • Create motion programs.
Transfer files.*	(See 1.2.8.)	• Log online. • Stop the CPU. • Transfer files.
Run the program.*	(See 1.2.9.)	• Start the CPU.
Debug.*	(See 1.2.7.)	• Monitoring tool

* 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.

Make environment settings. — (See 1.2.2.)
- Set up hardware.
- Install the MPE720.
- Make communication settings.

↓

Self-configuration — (See 1.2.3.)
- Self-configuration
- Save to flash memory (see 1.2.10).
- Turn OFF and then ON power supply.

↓

Create PLC folder. — (See 1.2.5.)
- Create group folder.
- Create order folder.
- Create PLC folder.

↓

Transfer files.* — (See 1.2.8.)
- Log online.
- Stop the CPU.
- Dump files.

↓

Create definition data. — (See 1.2.6.)
- Log offline.
- Define module configuration.
- Define scan time.
- Define group.
- Define motion parameters.

↓

Create program. — (See 1.2.7.)
- Create motion control ladder programs.
- Create motion programs.

↓

Transfer files.* — (See 1.2.8.)
- Log online.
- Stop the CPU.
- Transfer files.

↓

Run the program.* — (See 1.2.9.)
- Start the CPU.

↓

Debug.* — (See 1.2.7.)
- Monitoring tool

* These are online operations.

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(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.

```
┌─────────────────┐
│ Make environment│  (See 1.2.2.) ─┬─ • Set up hardware.
│ settings.       │                ├─ • Install the MPE720.
└────────┬────────┘                └─ • Make communication settings.
         │
         ▼
┌─────────────────┐
│ Create PLC folder.│ (See 1.2.5.) ─┬─ • Create group folder.
│                 │                 ├─ • Create order folder.
└────────┬────────┘                 └─ • Create PLC folder.
         │
         ▼
┌─────────────────┐
│ Application     │  (See 1.2.4.) ─┬─ • Prepare PLC data for conversion.
│ Converter       │                ├─ • Log offline.
│                 │                ├─ • Convert application program.
└────────┬────────┘                └─ • Confirm.
         │
         ▼
┌─────────────────┐
│ Edit program.*1 │  (See 1.2.7.) ─┬─ • Edit motion control ladder programs.
│                 │                └─ • Edit motion programs.
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│ Transfer files.*2│ (See 1.2.8.) ─┬─ • Log online.
│                 │                ├─ • Stop the CPU.
└────────┬────────┘                └─ • Transfer files.
         │
         ▼
┌─────────────────┐
│ Run the program.*2│(See 1.2.9.) ─── • Start the CPU.
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│ Debug.*2        │  (See 1.2.7.) ─── • Monitoring tool
└─────────────────┘
```

* 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.

Programming Device   MP2300
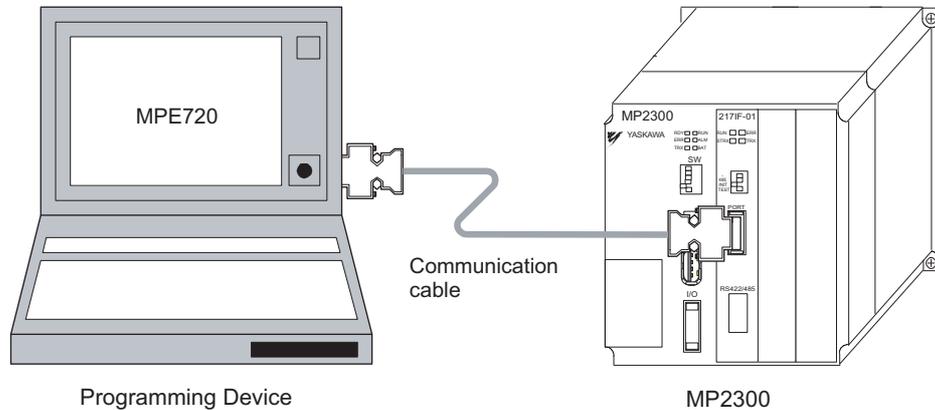
The following example shows the connection using the 218IF Module and an Ethernet cross-over cable.

Programming Device   MP2300
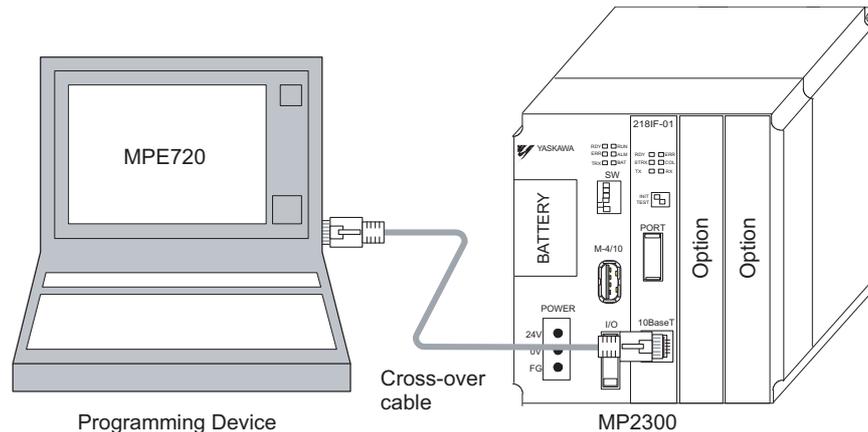
For details, refer to *2.1 Communication Manager*.

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.

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The following figure shows the layout of the DIP switches and LED indicators on the MP2300 Machine Controller.

DIP switch   LED indicators

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.

1.2.4 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.
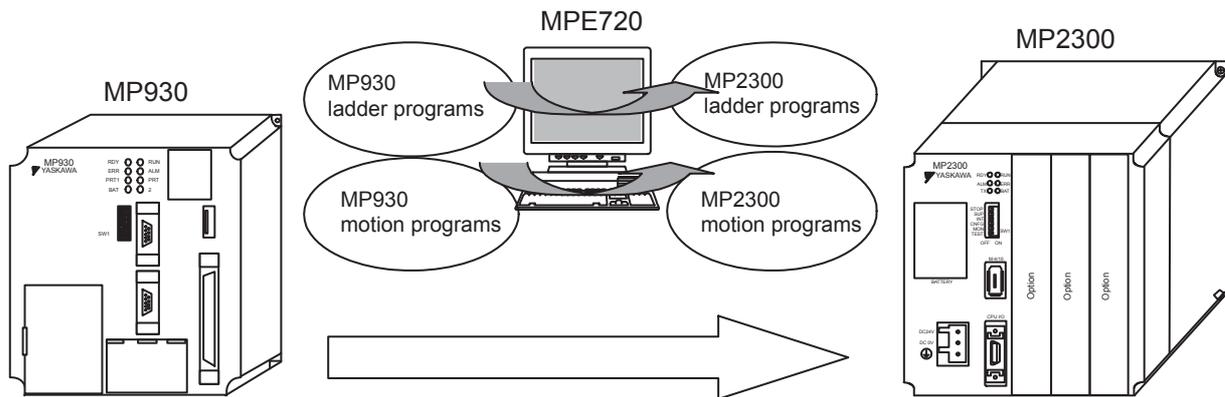
• Self-configuration from the MPE720

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.
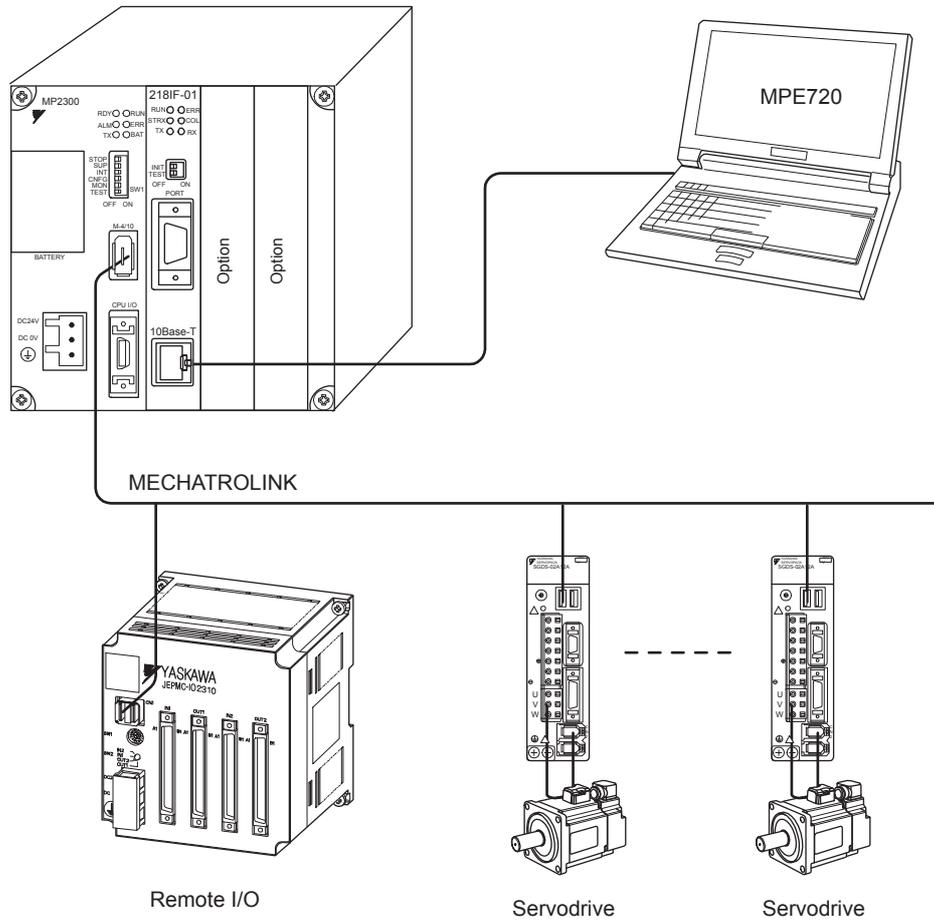
If self-configuration is executed from the Order Menu in the Module Configuration Window, self-configuration will start after a confirmation message is displayed. The RUN indicator will blink while self-configuration is being executed. If the self-configuration has been completed normally, the LED indicators 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*.

1.2.5 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 File Manager* for details.
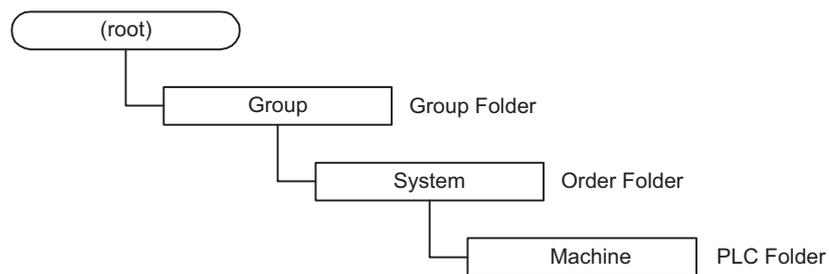
(1) Creating a Group Folder

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.

1.2.6 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) 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.

(2) 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.

(3) 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.

Group name

Machine 1	Definition	Machine 2
Operation control signal		Operation control signal
Axis allocation		Axis allocation
Axis input signal allocation		Axis input signal allocation
Override signal		Override signal
No. of parallel processes		No. of parallel processes
Automatic generation		Automatic generation
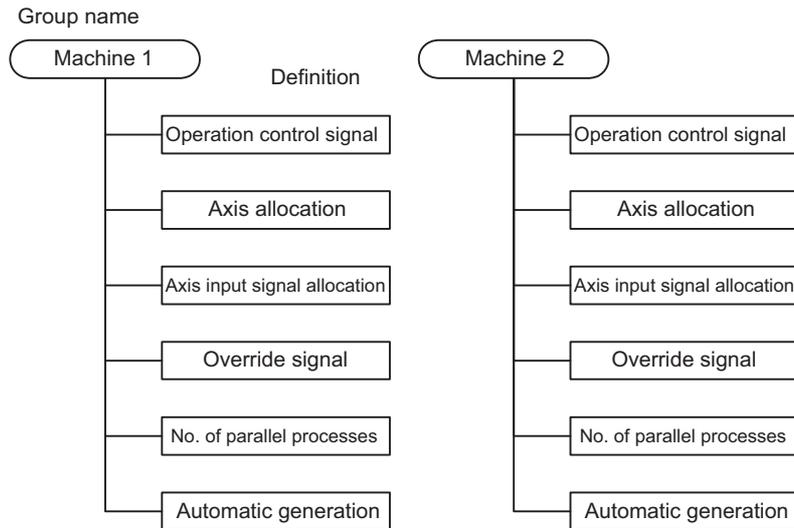
One machine is usually operated by one group.

(4) 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.

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■ 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.

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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.

```
┌─────────────────────────────────────┐
│ Create motion control ladder program │
└─────────────────────────────────────┘
                 │
                 ▼
     ┌───────────────────────┐
     │ Create motion program  │
     └───────────────────────┘
                 │
                 ▼
     ┌───────────────────┐
     │ Debug online       │
     └───────────────────┘
                 │
                 ▼
         ┌───────────┐
         │ Log off    │
         └───────────┘
```
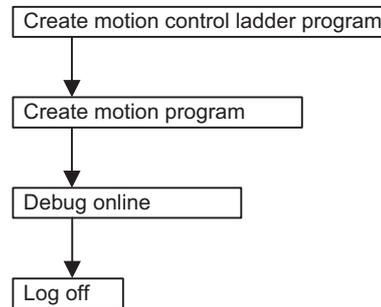
(1) Creating Motion Control Ladder Programs

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/MP2000 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/MP2000 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.

```
┌─────────────────┐
│ Log online      │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│ Transfer files  │
└─────────────────┘
```
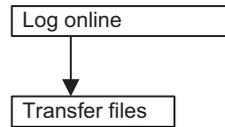
(1) Logging Online

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.

Be sure to edit the group definition in offline mode for MP900 Machine Controllers. Other Machine Controllers can be edited in online mode.

Refer to *2.2.10 Transferring Files* for the operations required.
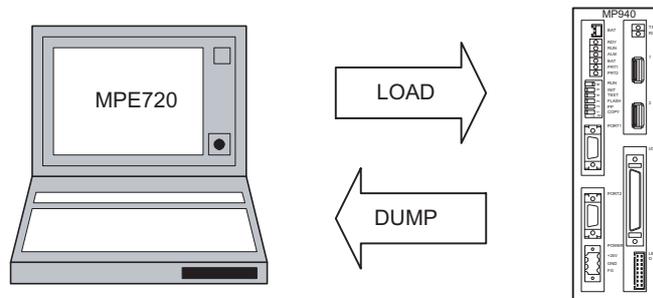
1.2.9 Starting the Operation

The Machine Controller is now ready to operate machines.

1.2.10 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.

Outline of the MPE720

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1.3 Installing the MPE720

This section explains the procedure for installing the MPE720.

1.3.1 Installation Disk

The MPE720 installation disk is provided on a CD-ROM.

1.3.2 Starting the Installer

1. Insert the CD-ROM into the CD-ROM drive. The following window will appear.
   Click the **Install** button.
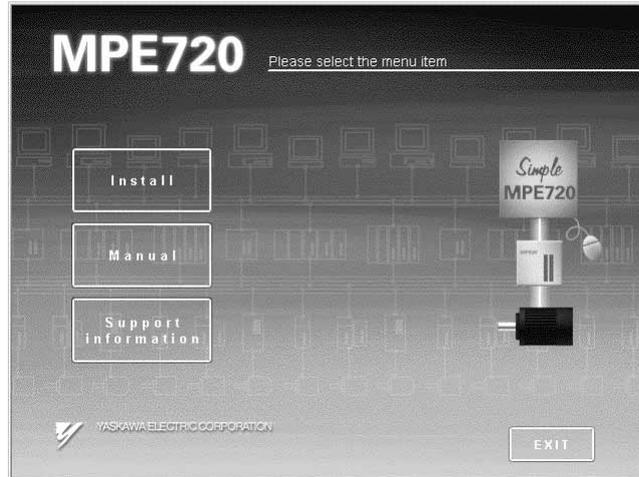
2. Click the **MPE720** button to start the Installer.
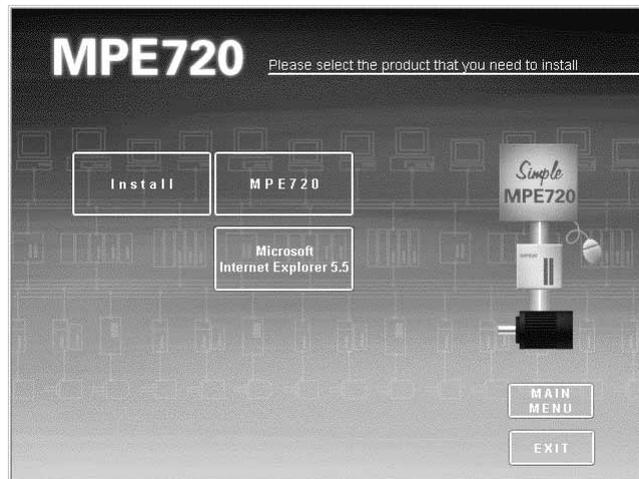
INFO
- Double-clicking **Launch.exe** in the CD-ROM drive on Explorer can also start the Installer.
- Unless Microsoft Internet Explorer 5.5 or later is installed on the PC, the following error message will appear when Installer starts.

Click the **OK** button and install Microsoft Internet Explorer 5.5 or later, then install MPE720 again.
- Microsoft Internet Explorer 5.5 can be installed from the CD-ROM for the MPE720.

1.3.3 Preparing Setup

The window for setup preparation will appear as shown below. While this window is shown, installation is being prepared.
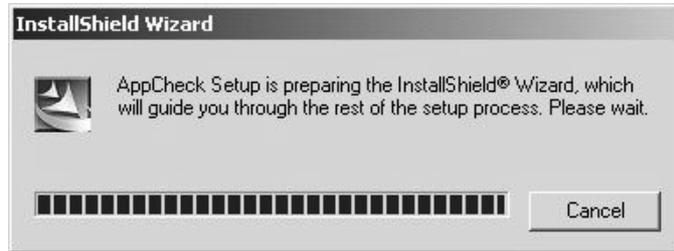
1. When installation preparations have been completed, the following window will appear. Click the **Next** Button after verifying the message.
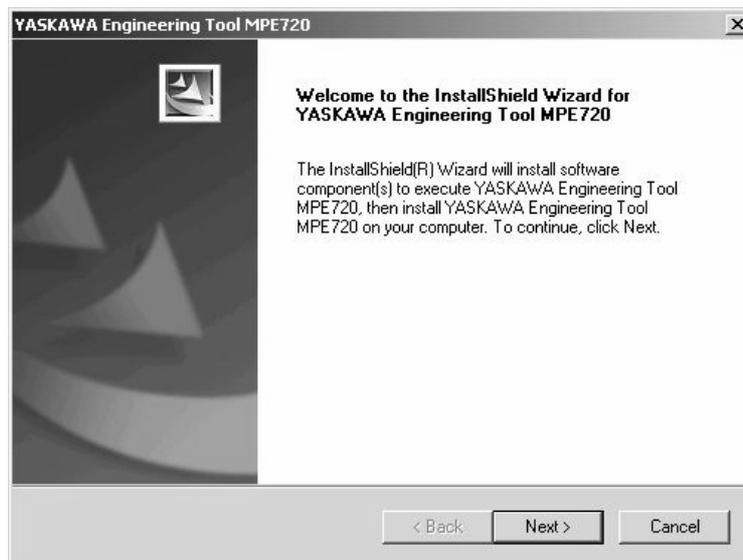
2. Click the **Finish** button after checking the message.

Outline of the MPE720

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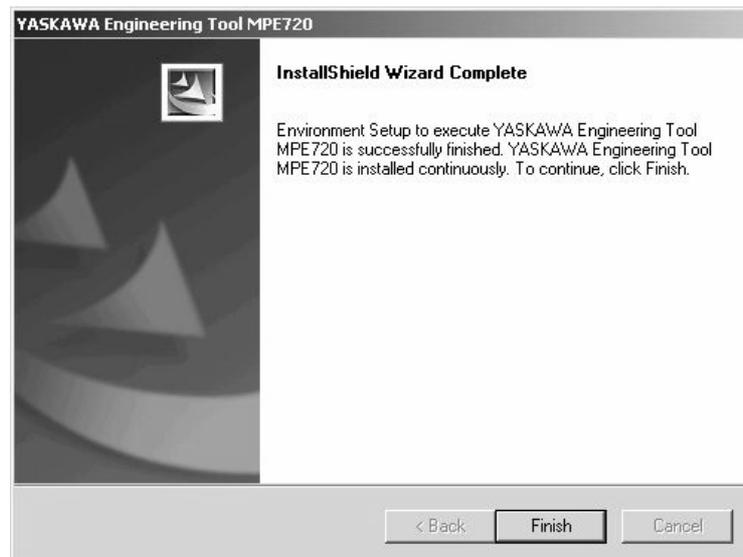
3. Check the installation environment.

> Now, check environments for installing YASKAWA Communication Manager.
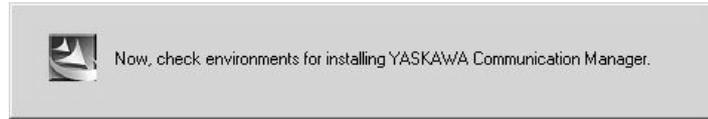
1.3.4 Starting Setup

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

MPE720 Setup

Welcome to the InstallShield Wizard for
YASKAWA Engineering Tool MPE720

The InstallShield® Wizard will install YASKAWA
Engineering Tool MPE720 on your computer. To continue,
click Next.

< Back   Next >   Cancel
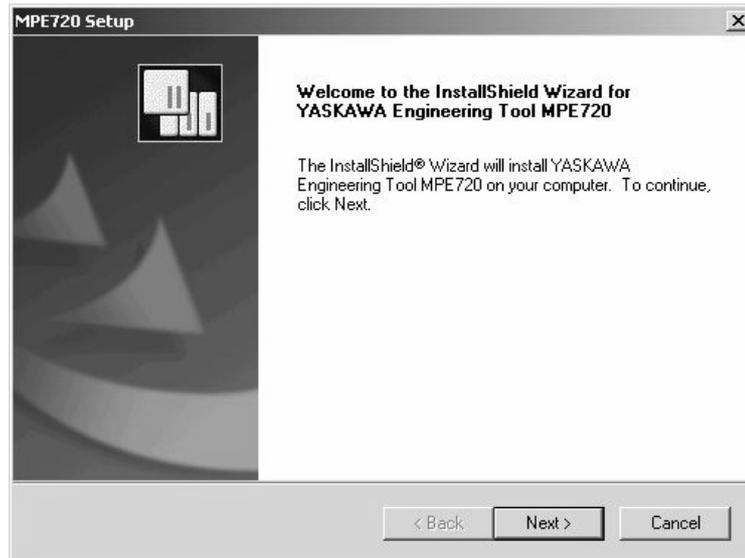
1. Click the **Next** button after verifying the message. The following window will appear.

MPE720 Setup

License Agreement
Please read the following license agreement carefully.

Press the PAGE DOWN key to see the rest of the agreement.

Name of the software: YASKAWA Engineering Tool MPE720

Software License Agreement

Yaskawa Electric Corporation (hereinafter referred to as " YEC ") shall license the
non-transferable and non-exclusive right to use this software provided with this Agreement
to the customers (hereinafter referred to as " Recipient ") who bought this software,
under the condition that Recipient consents the following terms and conditions.

Do you accept all the terms of the preceding License Agreement? If you choose No, the
setup will close. To install YASKAWA Engineering Tool MPE720, you must accept this
agreement.

InstallShield

< Back   Yes   No

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.

1.3.5 Entering Customer Information

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

After entering the data, click the **Next** button.

1.3.6 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.

Outline of the MPE720

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1.3.7 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 Electronic Cam Tool as MPE720 standard options.
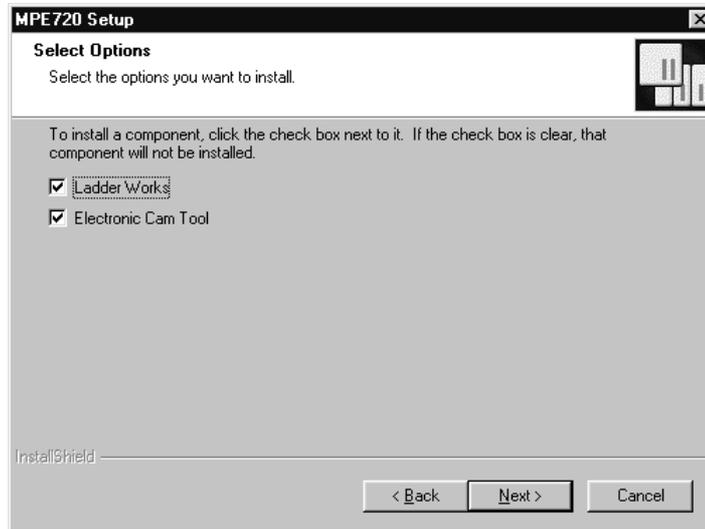
After selecting the options, click the **Next** button.

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

1.3.8 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.

1.3.9 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.
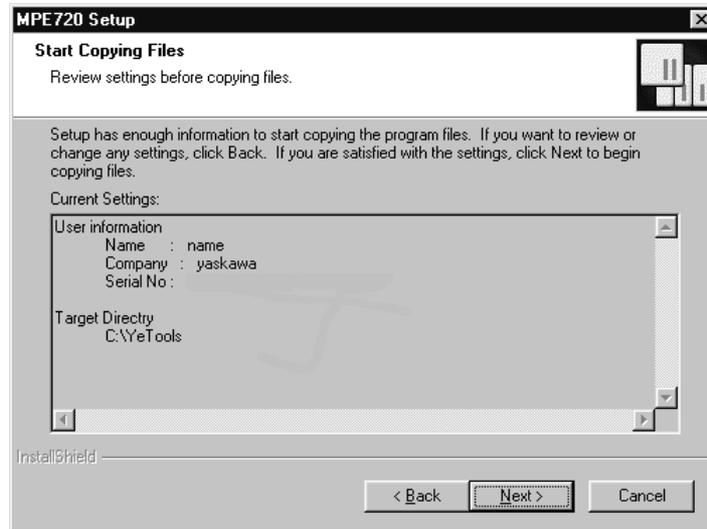
After setting has been completed, click the **Next** button to start copying a file.
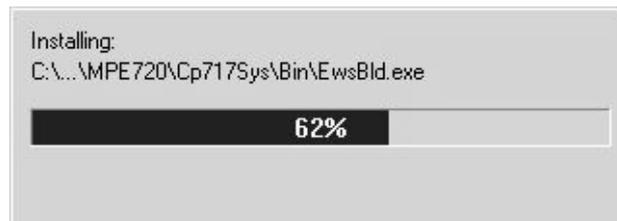
2. File copying will start. The following windows will appear in order.

   The copy progress status can be checked in the progress bar dialog box.

   Wait until copying has been completed.

Outline of the MPE720

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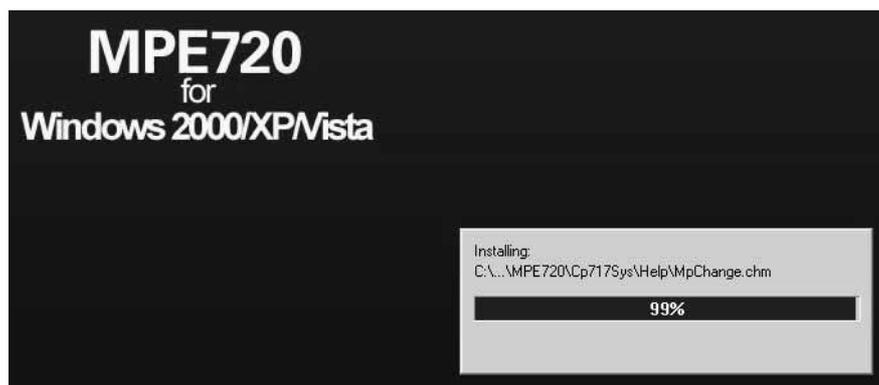
The following messages may appear when installing the MPE720.

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.
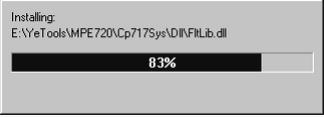
1.3.10 Completing Setup

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 **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 **Start the application program right away**, the application will start after completion of the setup.
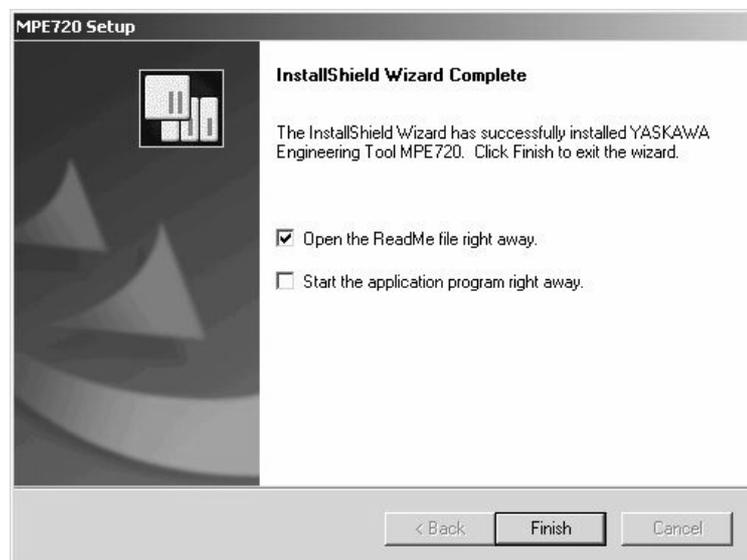
1.3.11 Verifying Setup Contents

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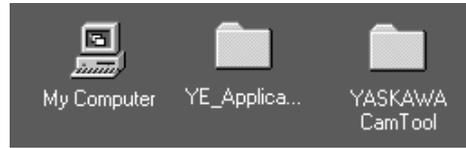
Perform the following steps to verify that installation and setup were completed successfully.

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.

1.3.12 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

Outline of the MPE720

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2

Manager Functions

This chapter explains each manager window in the MPE720.

Manager Functions

2

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 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.
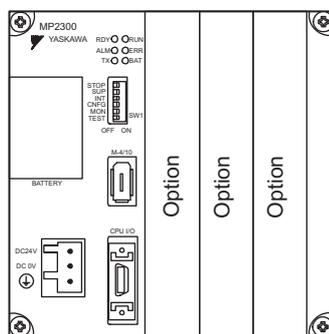
MP2300
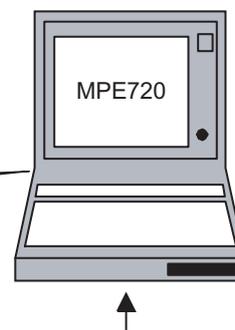
Set the communication port of the Programming Device.

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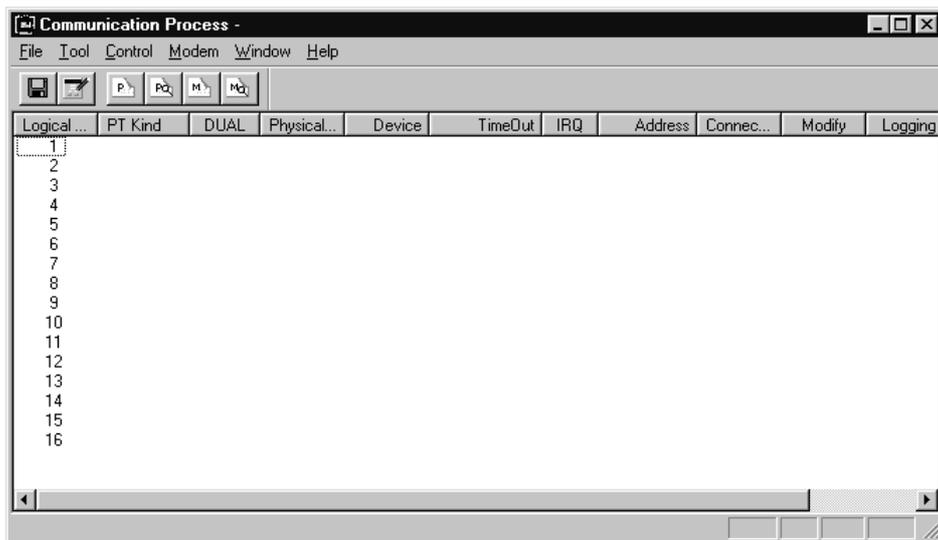
3. Double-click the relevant logical port number, or select relevant logical port number and then select *File - Setting*. When logical port number 1 has been selected, the window will be as follows:

Manager Functions
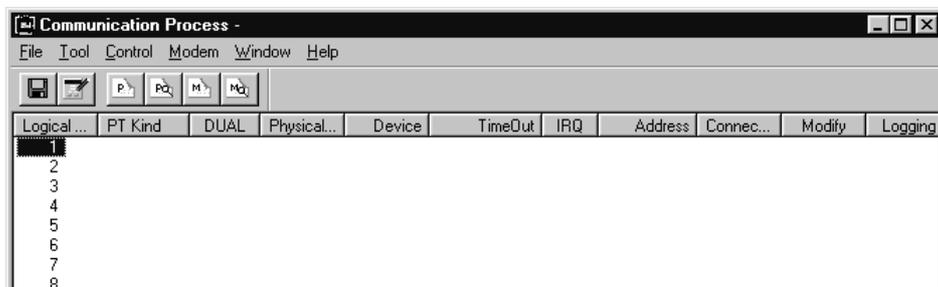
4. The **Logical Port Setting** window will appear.

Select the relevant communication interface for the **Port Kind** and click the **OK** button.
When **Serial, CP218, or Ethernet (LP)** is selected, proceed to *(3)* or *(4)* respectively.
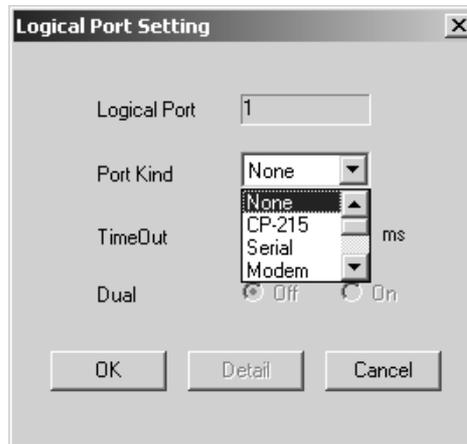
IMPORTANT   Do not set the logical port to any communication device (e.g., CP-215) that is not connected to the
Programming Device. Failure to observe this precaution may make hardware operations unstable.

(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.
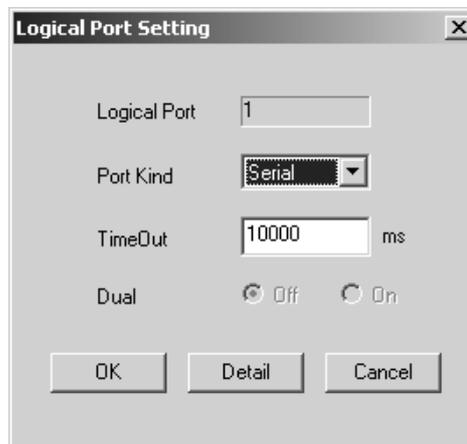
2. Clicking the **Detail** button to display the **Serial Port Setting** window showing the setting information. Click the **OK** button after setting the serial port parameters. Normally, the following defaults are entered.
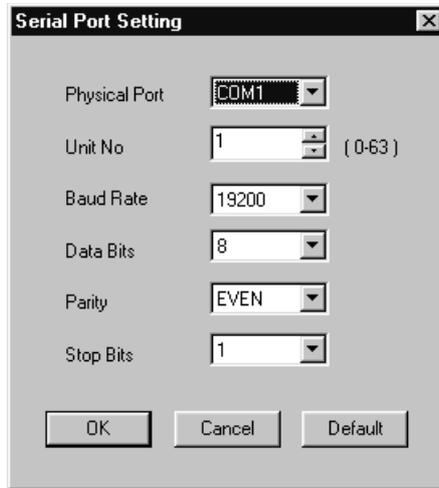
3. The **Logical Port Setting** window will appear again. Click the **OK** button again. The **Communication Process** window will appear again, so that you can verify that **Serial** has been assigned to logical port 1.
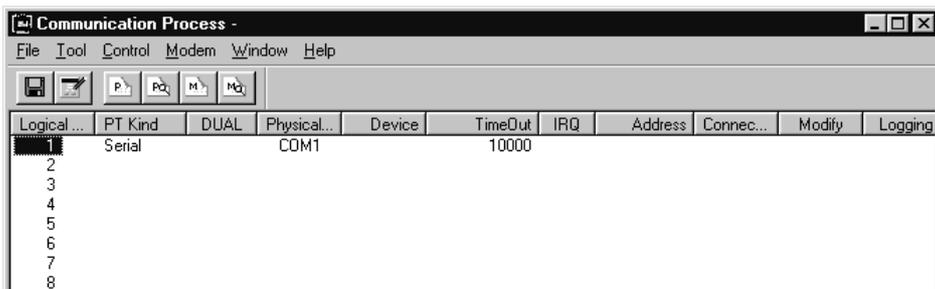
This completes setting the serial communication port. The setting contents must be saved in a file.

(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.
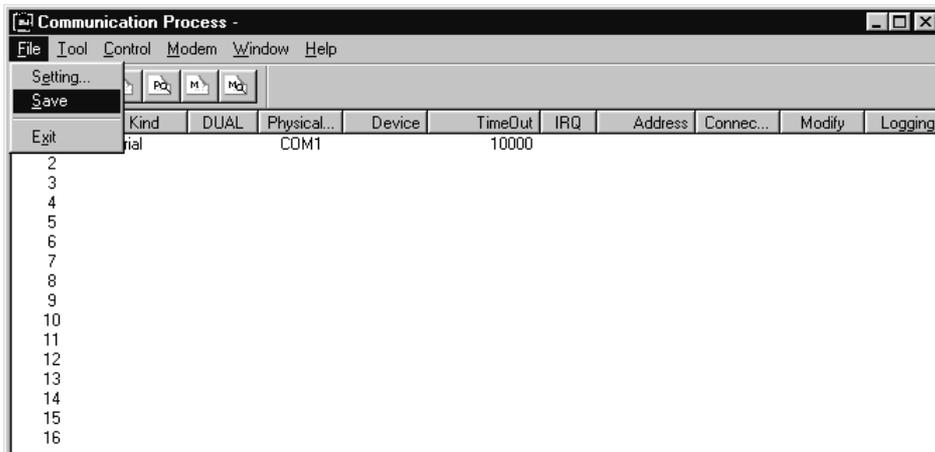
1. Select *File - Save*.

2. A confirmation message will appear to verify whether the information is to be saved. Click the **Yes** button to save the information.
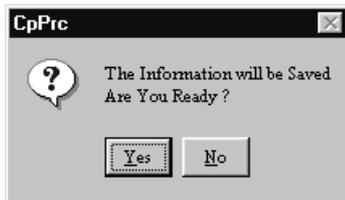
(c) Completing Communication Process

Select *File - Exit* to close the **Communication Process** window.
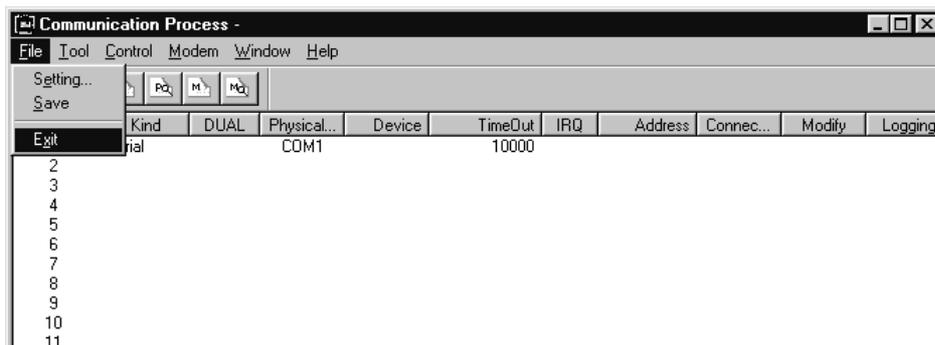
IMPORTANT | The communication port settings will be valid when the communication process is restarted after the setting have been saved in a file.

(4) Setting the CP-218/Ethernet (LP) Communication Port

Ethernet is used for communication via the 218IF-02 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/Ethernet (LP) communication port using the following procedure.

1. Select **Ethernet (LP)** as the **Port Kind** in the **Logical Port Setting** window.
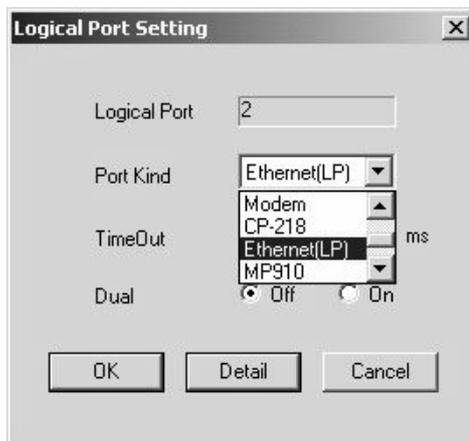
2. Click the **Detail** button to display the **CP-218/Ethernet (LP) Port Setting** window. Set only the **IP Address (First)**.

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.

```
┌─────────────────────────────────────────────┐
│ CP-218/Ethernet(LP) Port Setting            │
│                                              │
│  IP Addres(First)    [192.168.1.2      ▼]   │
│                                              │
│  IP Addres(Second)   [              ]        │
│                                              │
│  Default           (•) ON   ( ) OFF          │
│                                              │
│  Engineering Port    [    9999] ( 256 - 65535 ) │
│                                              │
│  ┌─ □ Message Received ──────────────────┐  │
│  │                                        │  │
│  │  TCP Port Count     [    10] (0 - 16) │  │
│  │                                        │  │
│  │  TCP Top Port    [20000] (20000 - 65535) │  │
│  │                                        │  │
│  │  UDP Port Count     [    10] (0 - 16) │  │
│  │                                        │  │
│  │  UDP Top Port    [20000] (20000 - 65535) │  │
│  └────────────────────────────────────────┘  │
│                                              │
│        [   OK   ]        [  Cancel  ]         │
│                                              │
└─────────────────────────────────────────────┘
```

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 3.

Logica...	PT Kind	DUAL	Physica...	Device	TimeOut	IRQ	Address	Connec...	Modify	Logging	Status
1	Serial		COM1		10000						Ready
2	Ethernet(LP)		1		10000						Ready
3	CP-218		1		10000						Ready
4											

This completes setting the CP-218/Ethernet (LP) 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*.

Manager Functions

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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.
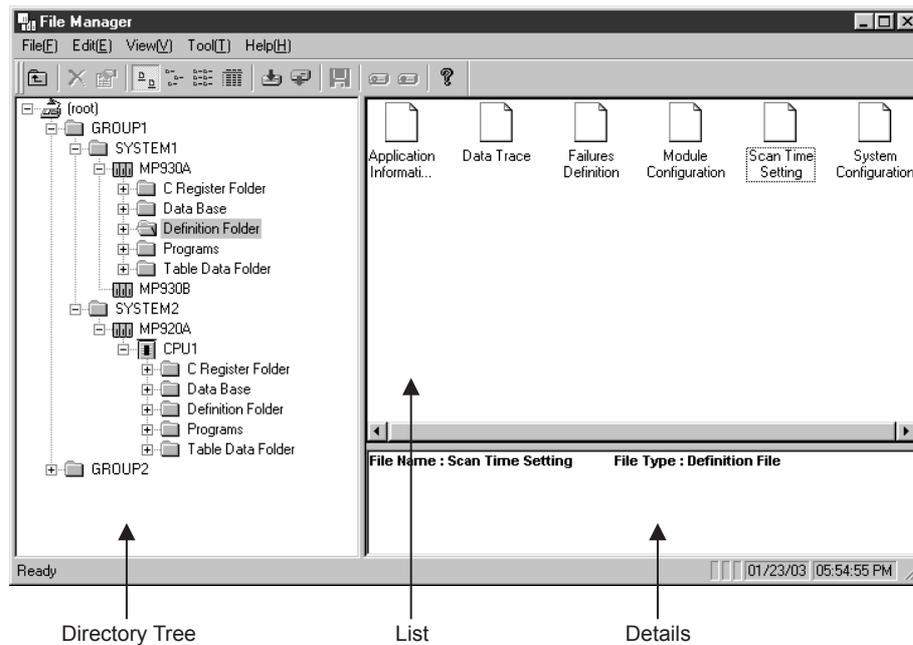
Fig 2.1 File Manager Window

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 pro-grams 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.

Manager Functions

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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.
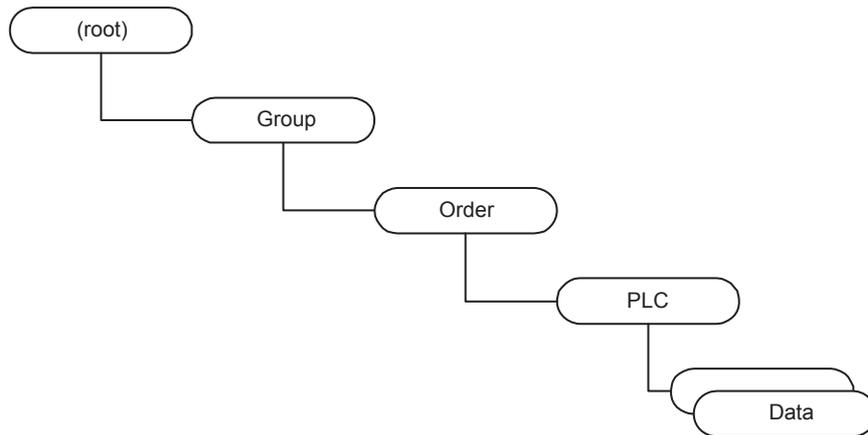
Fig 2.2 Folder Tree Branches

(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.

```
(root)                                          Root folder

    Project1                                    Group folder name

        System10                                Order folder name

            Machine1                            PLC folder name
            Machine2                            PLC folder name

        System11                                Order folder name

            Machine3                            PLC folder name
            Machine4                            PLC folder name

    Project2                                    Group folder name

        System20                                Order folder name

            Machine5                            PLC folder name

    System30                    Basic           Order folder name
                                configuration   (group folder omitted)
        Machine6                                PLC folder name

    Project4                                    Group folder name
                                                (with branching)

        Proj40                                  Group folder name

            Proj400                             Group folder name

                System40                        Order folder name

                    Machine7                    PLC folder name

        Proj41                                  Group folder name

            System41                            Order folder name

                Machine8                        PLC folder name
```

Manager Functions

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2-11

(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.
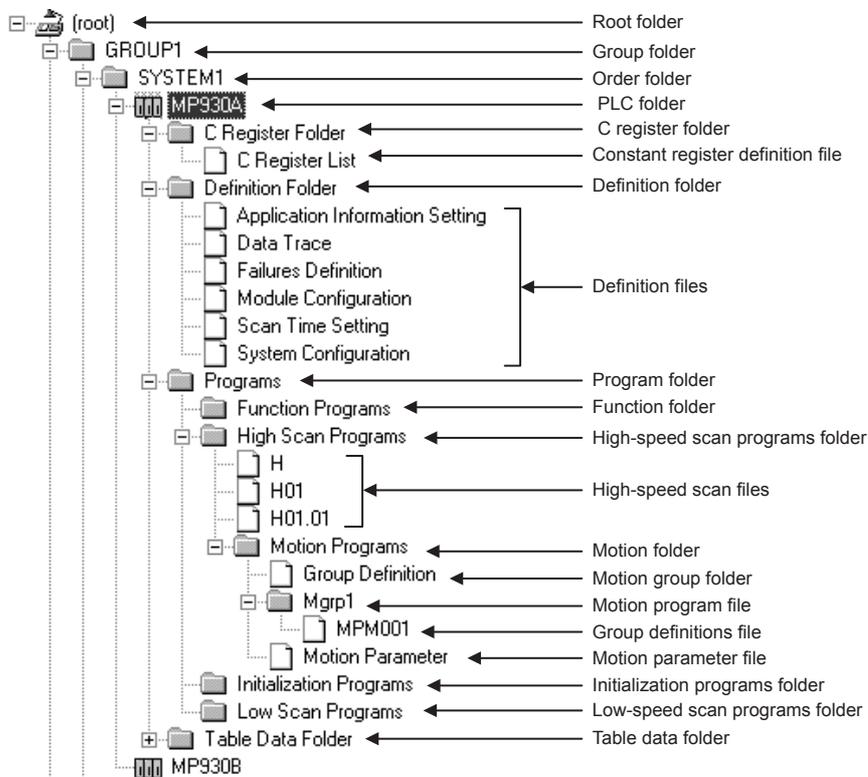
2.2.3 Command Menus

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.

(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.
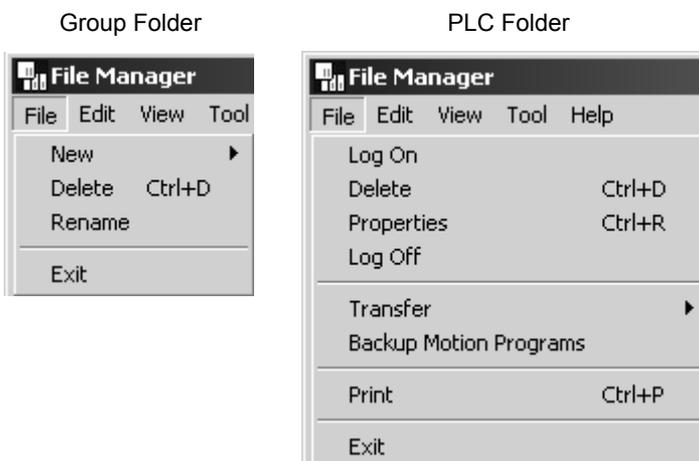
(2) Selecting from the Pop-up Menus

Right-click a folder or file to display the pop-up menu.
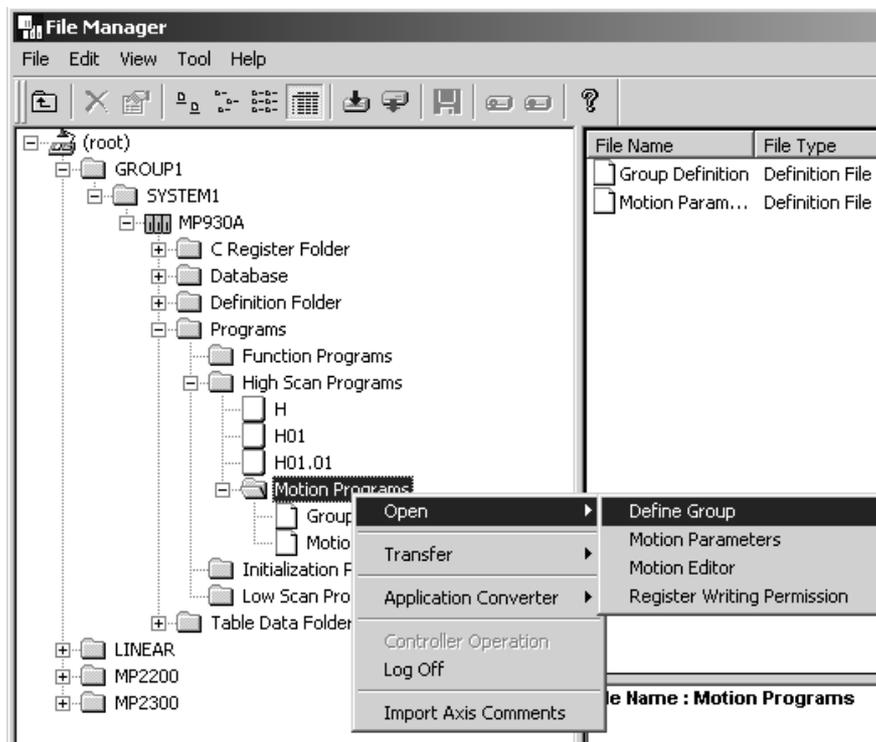
Fig 2.3 Pop-up Menus

For details regarding these menus, refer to *B File Manager 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) Creating New Group 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.

3. Alternatively, right-click the root folder and make the selection from the pop-up menu.

4. Enter the group folder 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.

5. A new group folder will be created.

INFO

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\

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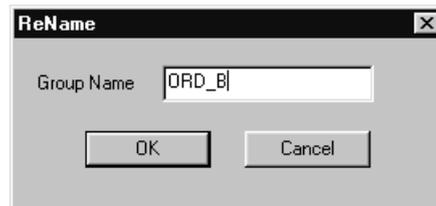
4. A confirmation message will be displayed. Click the **Yes** button. The file name will be changed.

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

(2) 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.

(3) Order 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.

(4) Changing and Deleting Folders

Refer to *(1)* and *(2)*.

(5) Creating New PLC 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.

4. The new PLC folder will be created.

(a) 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.

(b) 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.

(c) 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.

(6) Changing PLC 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.

(a) Information Tab Page

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

(b) Network Tab Page

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

(c) Application Tab Page
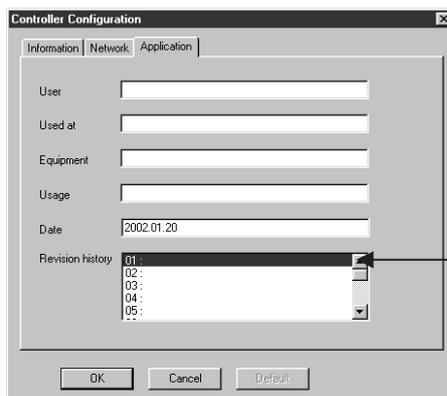
Double-click a number entered in the revision history to display the **Controller Configuration** window. Next, enter the revision history information up to 50 characters maximum, and click the **OK** button to set the revised data of the **Application** tab page.

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.

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.

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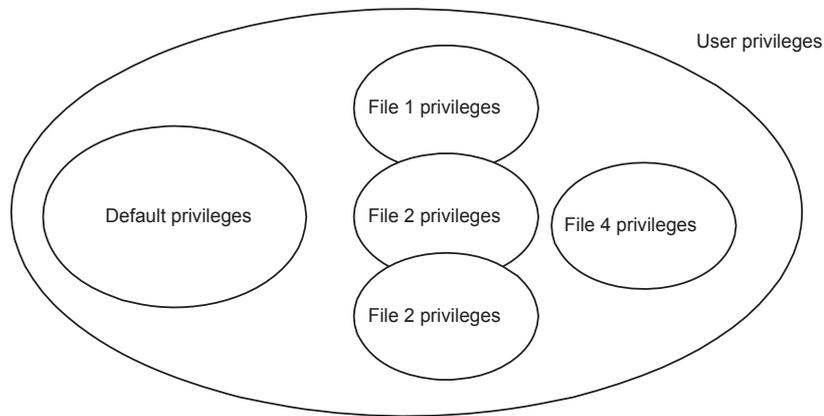
The read (R) and write (W) privilege values in the user privileges are the maximum values that the user can allocate as file privileges.

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.
- 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.

(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	R0W0	R0W1	For operators

(4) Changing User Information

The registered user information can be changed from the **User Managemen**t 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.

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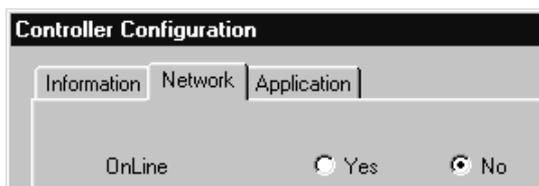
The user cannot switch between online and offline mode when logged on to the CPU. Set whether to use online or offline mode before logging on.

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.

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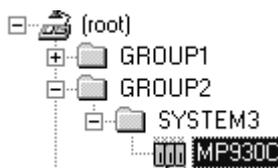
Online Mode

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.
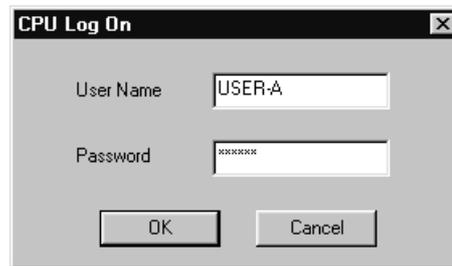
3. A plus (+) mark will appear in front of the PLC folder. The logon process has now been completed.

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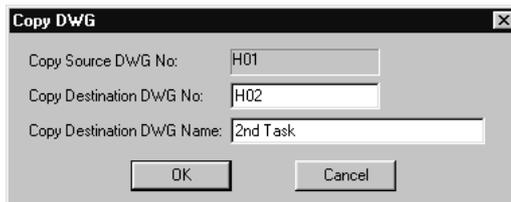
4. The specified program will be saved as a new program under **Copy Destination DWG No**.

INFO
- If the copied drawing file has a child drawing, the child drawing number will be converted in accordance with the copy destination drawing number.
- 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.

(2) Enabling and Disabling DWG Programs

The DWG program can be set to enable or disable in online/offline 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.
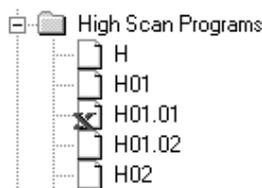
INFO
- If the selected program is already disabled, the disable setting will be cancelled. If the selected program is not disabled, it will be disabled.
- Only DWG or function programs can be enabled or disabled.

(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.

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(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.

```
⊟─🗀 Motion Programs
   ┊────🗋 Group Definition
   ⊟─🗀 Mgrp1
      ┊────🗋 MPM001
```
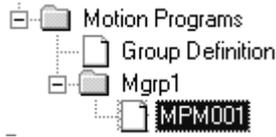
2. Select *File - Copy to* from the File Manager Menu. Alternatively, right-click the motion program file to be copied and make the selection from the pop-up menu.

3. Input the name of the copy destination motion program and click the **OK** button.

```
Copy Motion Program                    ⊠
  Copy Source :        MPM001
  Copy Destination :   MPM002
         OK              Cancel
```
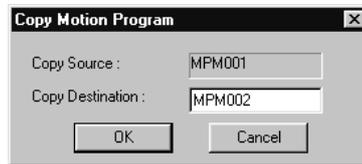
4. A program will be correctly created at the copy destination.

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. 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.
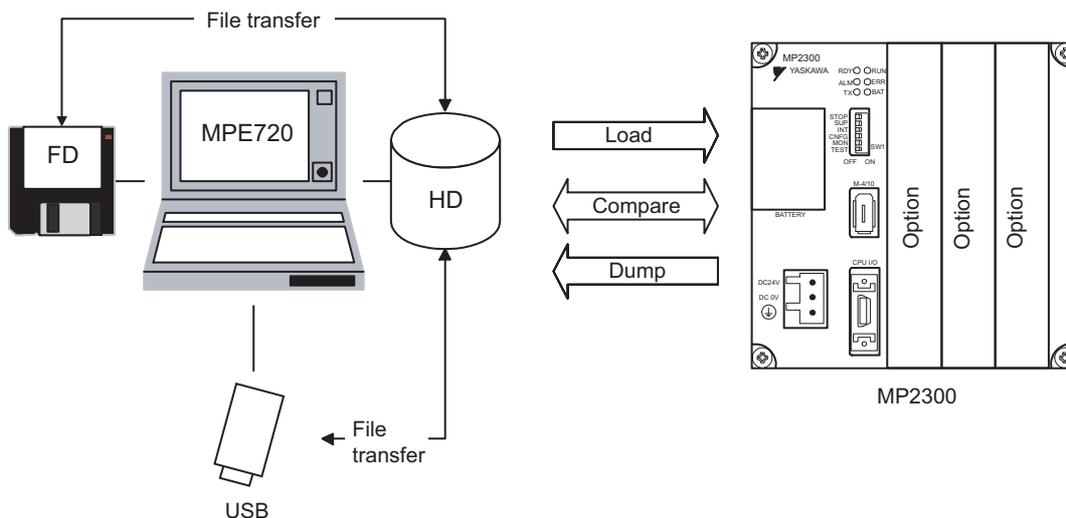
Generally, the Load[1] Function is used to register or update data or programs that have been defined or developed using the MPE720 on the Machine Controller. The Dump[2] Function is used when Machine Controller data is to be saved in the MPE720. The Compare[3] Function is used to compare data stored 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 Programming Device using USB.

TERMS

[1] Load

Function to transfer data from the MPE720 to the Machine Controller.

[2] Dump

Function to transfer data from the Machine Controller to the MPE720.

[3] Compare

Function to compare data of the MPE720 and the Machine Controller.

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The following table outlines the transfer functions.

Transfer Type	Transfer Function	Function
All Files	Transfer to Controller [MPE720 to CPU]	Transfers all programs or definition data.
	Transfer from Controller [CPU to MPE720]	
	Compare [between CPU and MPE720]	
	File Transfer [MPE720 to Media]	
	File Transfer [Media to MPE720]	
	Compare [between Media and MPE720]	
Selected Files	Transfer to Controller [MPE720 to CPU]	Transfers individual designated programs or definition data.
	Transfer from Controller [CPU to MPE720]	
	Compare [between CPU and MPE720]	
	File Transfer [MPE720 to Media]	
	File Transfer [Media to MPE720]	
	Compare [between Media and MPE720]	
Continuous File Transfer	Transfer to Controller [MPE720 to CPU]	Transfers multiple Machine Controller programs or definition data.
	Transfer from Controller [CPU to MPE720]	
Others	Save to Flash	Transfers programs or definition data between flash memory and the Machine Controller.
	Flash Compare	
	Card Write [MPE720 to Card]	Transfers programs or definition data between a CF card and the Machine Controller. (Only when using MP2200 CPU-02)
	Card Read [Card to MPE720]	
	Card Compare [between Card and MPE720]	

(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.

(3) Transferring All Files

All files, including programs and definition data, are transferred.

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

(a) Switching the CPU Status

Switch the CPU status to RUN or STOP by using the following procedure.

1. Select *Edit - Controller Operation* from the File Manager menu.

2. In the **Controller running status** dialog box, click either the **Run** button to start operation or the **Stop** button to stop operation.
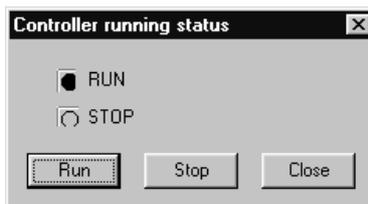
3. The Machine Controller status will be switched.

INFO
> The active Machine Controller status is indicated by a black dot. The Machine Controller status cannot be switched in offline mode or if the user has not logged onto to the Machine Controller.

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

(b) Opening the Execute Window for Transferring the All Files

Open the **Execute** window to start to transfer the All Files.

1. Select *File − Transfer − All Files* from the File Manager menu, then the following **Execute** window will be displayed. Make the required settings.

Setting	Details
Source	If the transfer source is media, the path name of the transfer source is 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 media, the path name of the transfer destination is 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	Select the type of file to be transferred. Program and register files are already specified for transfer. These specifications can be cancelled. Refer to *Table 2.1 Transfer File List* in *(5) (e)Starting Transfer* to see specifically which file is transferred. Normally, the default settings should be used.
Compression Transmission	Select this option to transfer compressed data. When transferring compressed files (***.MAL), be sure to check this checkbox. Use the **Detail** button when using MAL files for the MPLoader. (Effective only between MPE720 and media)

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.

(4) All Files Windows

The title of the **Load All** window will change depending on the function to be performed: loading, dumping, or file transferring. The procedure, however, is the same.
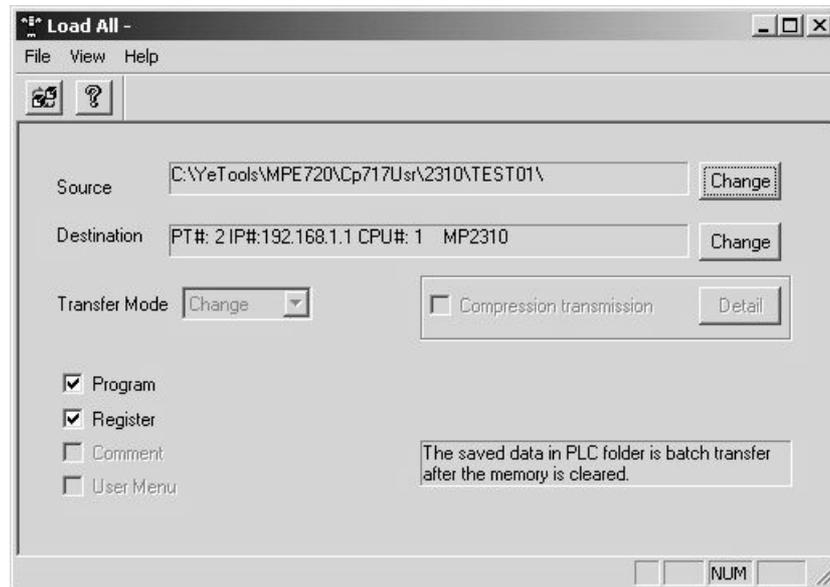
The process of transferring all files can be continued or stopped on the **Load All** window. To stop Transfer, select *File − Exit* and return to the **File Manager** window.

To continue Transfer, perform the procedures explained below.

(a) 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	
About Application	Displays version information.

(b) 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.
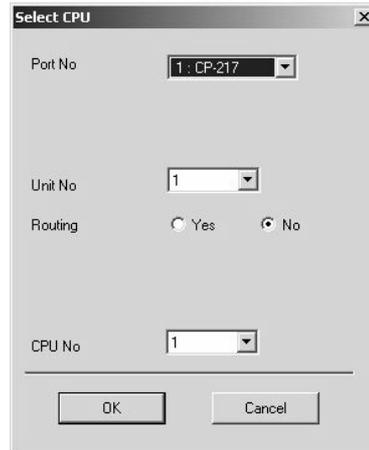
2. Changing Transfer Directories

   If the transfer source or destination is a device such as a USB drive, the drive number and the PLC folder name can be changed.

   a) Select *View − Change Source* or *Change Destination* on 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. Enter the driver number and PLC name, and click the **OK** button. Enter the directory name (max. 8 alphanumeric characters) as the PLC name.

(c) 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.

INFO   The screen display will return to the **Transfer** window when the Transfer has been completed.

(d) Stopping Transfers

The **Execute Status** window will be displayed while files are being transferred. Click the **Cancel** button to stop the transfer.
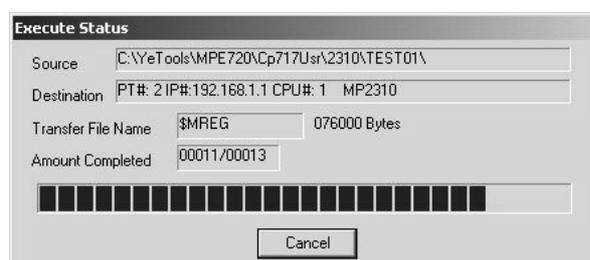
(e) Transfer Errors

The **Error List** window will be displayed if an error is generated after 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.

(5) 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 media, the path name of the transfer source is 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 media, the path name of the transfer destination is 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 (DWG to C Language Function)	Selects the type of file to be transferred.
	Select *File - Clear* from the Selected Files menu to clear all the transfer file type settings.
Compression transmission	Select this option to transfer compressed data.
	When transferring compressed files (***.MAL), be sure to check this checkbox.
	Use the **Detail** button when using MAL files for the MPLoader.
	(Effective only between MPE720 and media)

Manager Functions

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(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	
About Application	Displays version information.

(c) Changing Transfer Source and Destination

The Machine Controller or media 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.

2. FUNC

   Select the function programs to be transferred.

   Select the **Select All** check box to select 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.

   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.

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.

6. Motion Sub Program

   Select the motion subroutines to be transferred.

   Select the **Select All** check box to select all motion subprograms for transfer.

7. Sequence Program (MP2300S, MP2310 only)

   Select the sequence program to be transferred.

   Select the **Select All** check box to select all sequence 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.

Manager Functions

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Table 2.1 Transfer File List

Transfer File	All Files			Individual File		
	Transfer to Controller	Transfer from Controller	File Transfer	Transfer to Controller	Transfer from Controller	File Transfer
DWG (Program)	Yes		Yes	(Yes)		(Yes)
FUNC (Program)	Yes		Yes	(Yes)		(Yes)
Table Data	Yes		Yes	(Yes)		(Yes)
Constant Table (C Register)	Yes		Yes	(Yes)		(Yes)
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)
Fault Monitor Definitions (MP900 Series Only)	Yes		Yes	(Yes)		(Yes)
Group Definition	Yes		Yes	(Yes)		(Yes)
Motion Parameters (MP930 Only)	Yes		Yes	(Yes)		(Yes)
Motion Main Program	Yes		Yes	(Yes)		(Yes)
Motion Subprogram	Yes		Yes	(Yes)		(Yes)
Sequence Program (MP2300S and MP2310 Only)	Yes		Yes	(Yes)		(Yes)
Symbol Database (When New Ladder Selected Only)	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)
C Register	Yes		Yes	(Yes)		(Yes)
DWG (Comments)	No		(Yes)	No		(Yes)
FUNC (Comments)	No		(Yes)	No		(Yes)
User Menu	−		−	−		−

Note: Yes : Selected from the start, but selection by the user is possible.

(Yes) : Selection is necessary.

No : Transfer is not possible.

- : Cannot be used with the current version.

(6) 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.
Help		
	About Application	Displays version information.

(c) 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.

Manager Functions

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(7) Saving in and Comparing with Flash Memory

(a) Save/Compare Flash Memory Content Window

The window used to transfer files between the Machine Controller RAM and the flash memory is shown below.
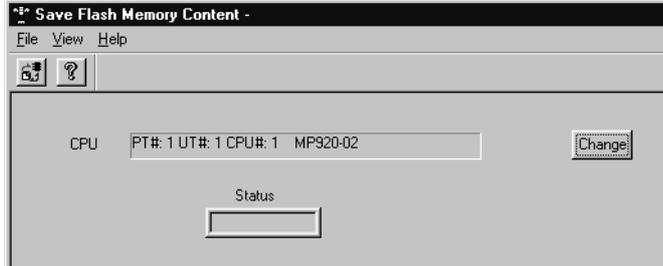
Setting	Details
CPU	The communication information for the transfer CPU and the type of Machine Controller is displayed.
Status	When transfer is being executed, the status will be *Running*. When transfer has been completed, the status will be *Completed Normally.*

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	
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.

(8) CF Card Transfer (Only Supported by MP2200, CPU-02 Module)

Start CF card transfer using the following procedure.

    1. Click *File - Transfer - Other - Card Write [MPE720->CARD]*. The **Execute** window will be displayed.
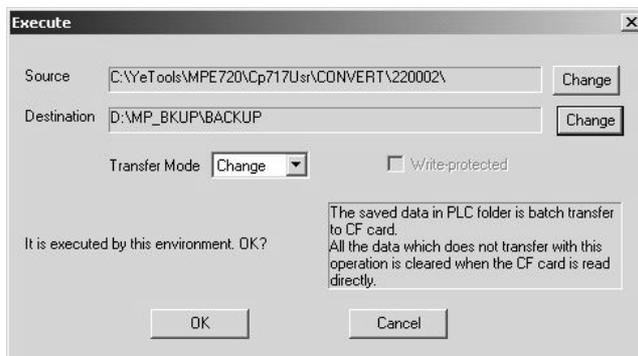
Setting	Meaning
Source	If the transfer source is the CF card, the drive name of the transfer source is displayed.
Destination	If the transfer destination is the CF card, the drive name of the transfer destination is displayed.
Transfer Mode	Select the write mode for the destination. **Change**: If a 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.

    2. After checking the details of the operation to be performed, click the **OK** button. Transfer will start.

On completion of transfer, the transfer completion message box will be displayed. Click the **OK** button in this message box.
On clicking the **OK** button, the **MPE720 to CF Card** window will be displayed.
Note that this transition to the **MPE720 to CF Card** window will still take place even if the transfer is cancelled part-way through or if an error occurs.
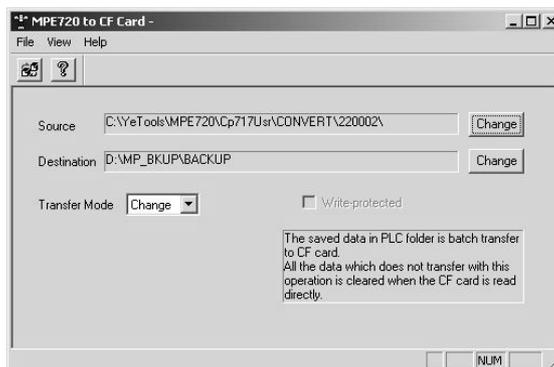
When this window is displayed, you can continue CF card transfer processing or end it. To end it, close the window and return to the File Manager.

To continue Transfer, perform the procedures explained below.

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(a) Menus of the MPE720 to CF Card Window

The following table shows the menu commands and functions displayed in the **MPE720 to CF Card** window.

Menu Command	Function
File	
Execute	Starts transfer to the CF card.
Exit	Closes the file transfer 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	
About Application	Displays version information.

(b) Changing Transfer Source and Destination

Change the CF card that is the transfer destination using the following procedure.

1. 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.

2. Select the drive from the **Select Drive** dialog box and click the **OK** button.

(c) 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.

INFO

The screen display will return to the **MPE720 to CF Card** window when the transfer has been completed.

(9) 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.
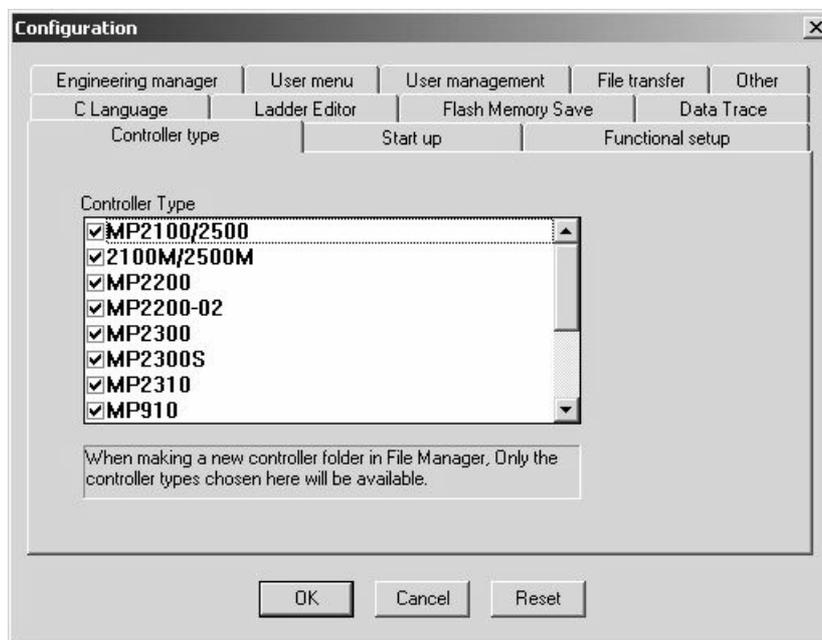
(2) Configuration of the Configuration Window

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

Tab Page	Details
Controller type	Displays the types of Machine Controller compatible with the MPE720.
Start up	Sets the operating environment.
Functional setup	Sets functions such as write protect.
Engineering manager	Sets the conditions for the Engineering Manager.
User menu	Sets the method for registering User Menu Manager functions.
User management	Enables you to register the default user name and password at logon.
File transfer	Sets the default drive letter for other transfer destinations.
Other	Sets the communication process timeout value.
C Language	Sets the C language environment.
Ladder Editor	Sets the selection of the new or former Ladder Editor.
Flash Memory Save	Sets whether the data is to be saved to flash memory or not at log-off.
Data Trace	Sets the selection of the new or former trace function.

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.

Manager Functions

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(3) Controller Type Tab Page

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

(4) Start up Tab Page

Sets whether the CAM tool is used or not used.

(5) 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

(6) 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).	16

INFO

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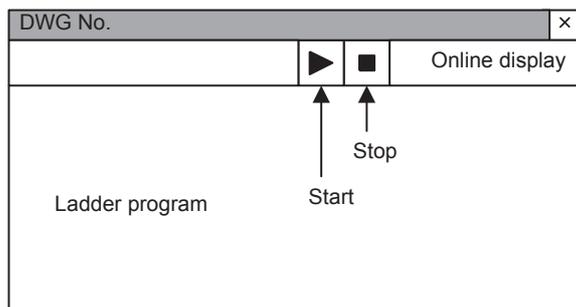
When the ladder program is open, the ON/OFF function can be specified using *Monitor ON/OFF*.

■ 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.

(7) User menu Tab Page

Sets the method for registering User Menu Manager functions and the creation of shortcuts for them.

The default settings are as follows.

- Registration method: Insert at Head
- User menu operation at registration: No Change
- Shortcut creation: No

(8) 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.

(9) Transfer Tab Page

(a) Alternative Default Drive for All Transfers

Set the drive letter for other transfer destinations, such as a magneto-optical disk.

(b) 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.

(c) Overwrite Message

Set whether to enable or disable the *Overwrite* message when transferring files.

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(10) Other Tab Page

(a) Hard Disc Capacity Monitor

Sets the check value for monitoring the computer's available hard disc capacity. The unit for the setting is MB.

(b) Communication Timeout

Set the communication process timeout value in milliseconds.

(c) Logon Timeout

Set the logon communication timeout value in milliseconds.

(d) 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.

(11) C Language Tab Page

Sets whether the C language environment is *used* or *not used* here.
The default setting is *not used*.

(12) Ladder Editor Tab Page

Set whether the new or former Ladder Editor is to be used.
The default setting is *new ladder.*

(13) Flash Memory Save Tab Page

Set **On** or **Off** for the operation to save data into flash memory when logging off.
The default setting is **Off**.

(14) Data Trace Tab Page

Set whether the new or former trace function is to be used.
The default setting is *Trace Manager (New Trace)*.

2.2.12 Application Converter

This section describes the Application Converter.

(1) Outline

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.

Automatic Conversion Wizard	This wizard batch converts the MP900-series application data for use by the MP2000 series. It enables conversion with the minimum effort in terms of operation. Note: Normally, you should use the Automatic Conversion Wizard for conversion. However, when using a Machine Controller that doesn't support the Automatic Conversion Wizard, use the Manual Conversion Wizard.
Manual Conversion Wizard	This wizard converts all data, excluding the module configuration, from the MP900-series format to the MP2000-series format.
Multi-register Replace	This function enables you to batch replace registers in MP900-series PLC folders before conversion with the Conversion Wizard, and to batch replace registers in MP2000-series PLC folders after conversion by a conversion wizard. This is a function that can be widely applied during operation of MPE720 Ver. 5. Apart from operations before and after conversions, it can also be used to replace registers in ordinary operation. Note: The PLC folder where the multi-register replace function has been started and the folders below it will be the replace source and replace target.

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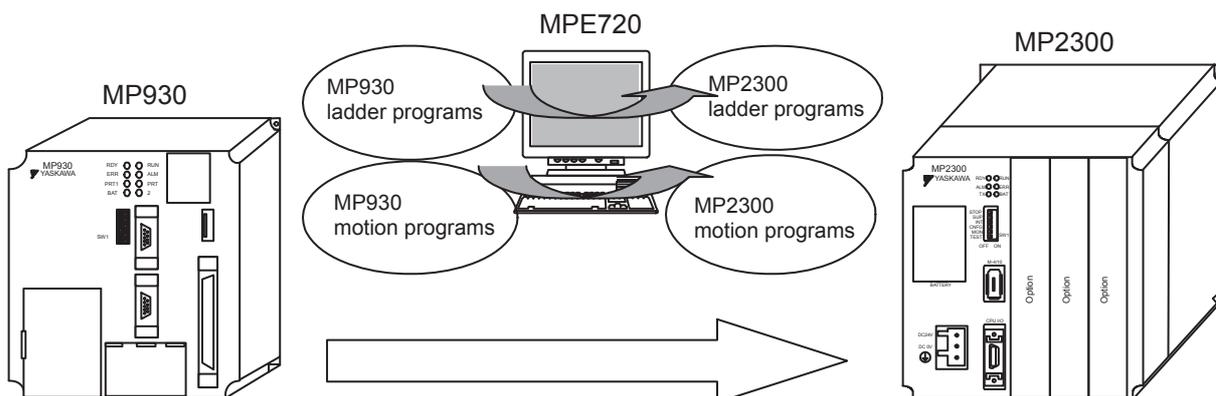
(2) Before Using the Application Converter

Pay attention to the following points when using the application converter.

- The conversion source/target selection screen in the Automatic Conversion Wizard and Manual Conversion Wizard displays only offline PLC folders.
- The function can only be used if the ladder editor modes of the conversion source and conversion target PLC folders are the same.

Conversion Source	Conversion Target	
	New Ladder Mode	Former Ladder Mode
New ladder	Enable	Disable
Former ladder	Disable	Enable

- The symbols and comments set in the MP900-series program can be passed on to MP2000 series unchanged.
- S registers are not subject to conversion either by the Automatic Conversion Wizard or the Manual Conversion Wizard.
- The multi-register replace function can only be used with offline PLC folders.

IMPORTANT | Conversion of application data using the Automatic Conversion Wizard or Manual Conversion Wizard is not guaranteed to achieve 100% conversion.

(3) Automatic Conversion Wizard

(a) Compatible Machine Controllers

The MP900-series Machine Controller models that can be used to convert application data using the Automatic Conversion Wizard are listed in the following table.

The MP2000-series models that can be selected as the conversion target differ depending on the source model.

MP900 Series Machine Controller	MP2000 Series Machine Controller	Default Selection
MP920 MP920-02	MP2200	✓
	MP2200-02	−
	MP2300	−
	MP2310	−
MP930 MP930-02 MP930-03	MP2300	✓
	MP2310	−
	MP2300S	−
MP940 MP940M	MP2300	−
	MP2310	−
	MP2300S	✓
MP940D	MP2300	−
	MP2310	✓

✓: Conversion possible   −: Conversion not possible

Note: The MP910 Machine Controller doesn't support the Automatic Conversion Wizard. Use the Manual Conversion Wizard with it.

(b) Operation Sequence for the Automatic Conversion Wizard

When the Automatic Conversion Wizard is used, the application data is converted in accordance with the operation sequence indicated below.

1. Select the model of machine controller that is to be the conversion target.
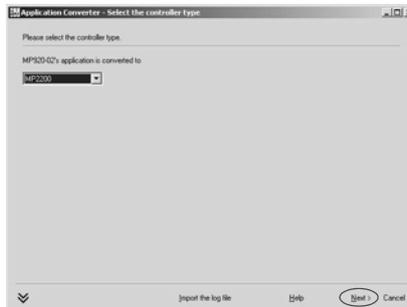
2. Create a new PLC folder.

Right-click the conversion target order folder and select **New** from the pop-up menu.

Note: If you are using an existing PLC folder, select a PLC folder from among those displayed in the Conversion target pane.
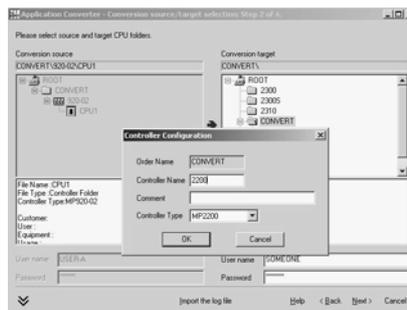
3. Check the configuration and start conversion.

↓ Conversion in progress

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4. This completes the conversion.

(c) Operating procedure for the Automatic Conversion Wizard

Using the Automatic Conversion Wizard, MP900-series application data is converted to MP2000-series data.

1. In offline mode, log on to the MP900-series PLC folder whose application data you want to convert.

2. Select *Tool* - *Automatic Conversion Wizard* from the main menu. Alternatively, right-click the PLC folder and select *Application Converter* - *Automatic Conversion Wizard* from the pop-up menu. The Machine Controller type selection screen will be displayed.

3. Select the type of the Machine Controller that you want to specify as the conversion target, then click **Next**.
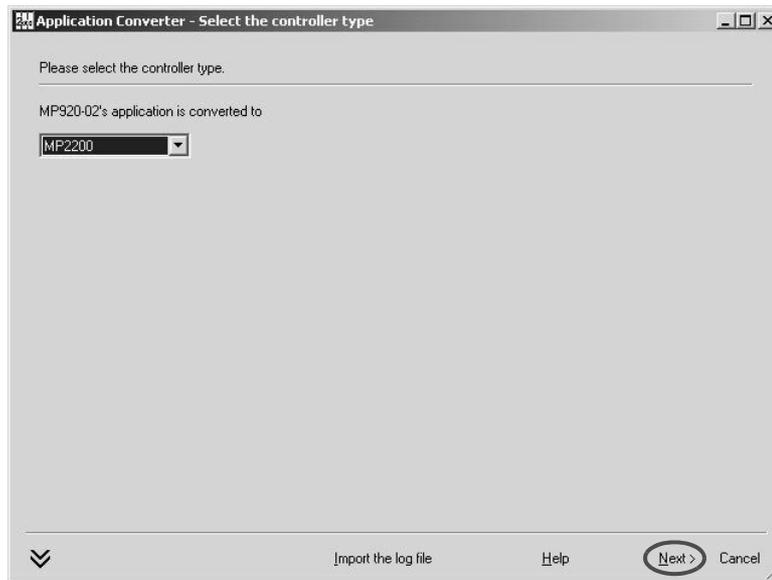
Import the log file	Reads log data that has been saved under an assigned name, and displays the log.
Help	Displays the help information for the application converter.
Next >	Displays the Conversion source/target selection screen.
Cancel	Stops the Automatic Conversion Wizard and closes the Application Converter screen. The Conversion source/target selection screen will be displayed.

4. Right-click the order folder. Select *New* - *Controller Folder* from the pop-up menu and create a new PLC folder.

    Note: Only the type of Machine Controller selected on the Machine Controller type selection screen is displayed for the PLC folder.
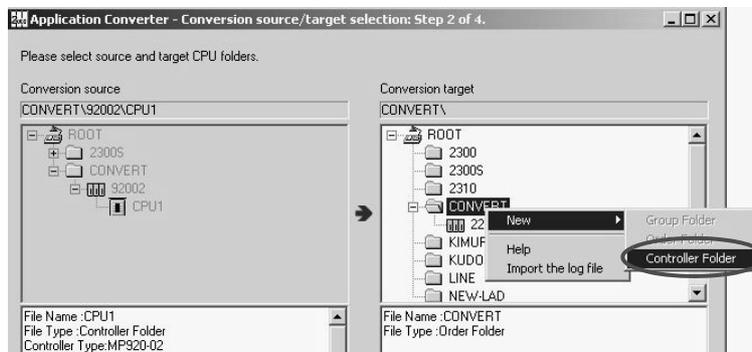
5. Enter the PLC name and comment (when necessary), and click the **OK** button.
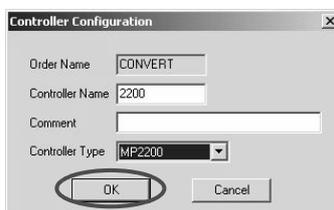
    A new PLC folder will be created in the order folder specified in the Conversion target pane.

6. Select the newly created PLC folder and click **Next**.
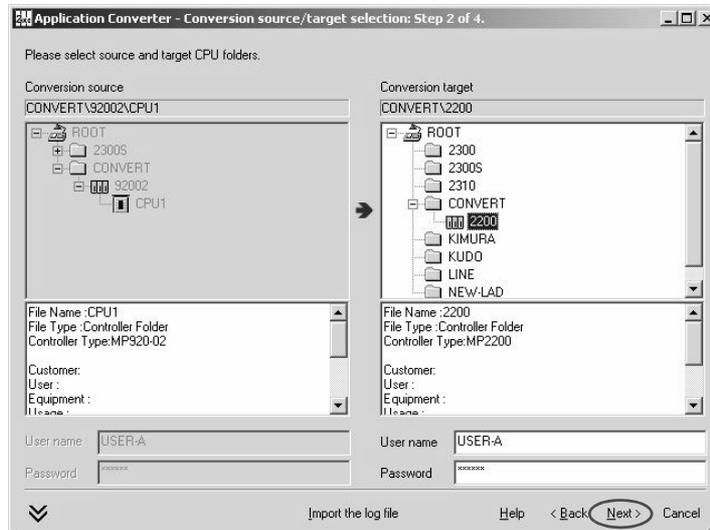
    Note: You can select an existing PLC folder as the conversion target. However, care is required since data such as programs will be merged.

Manager Functions

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7. A screen for confirming the conversion configuration will be displayed.
   The information for the conversion source will be displayed on this screen: check this information and
   click **Execute**.
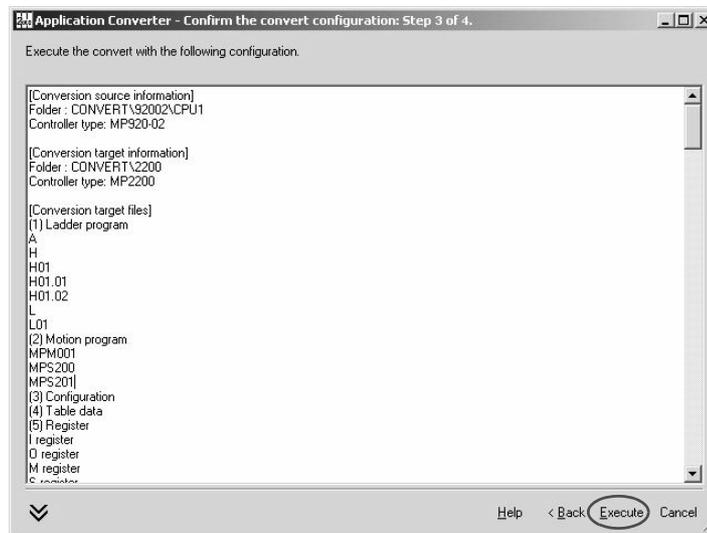
8. A dialog box to confirm that you want to execute automatic conversion is displayed. Check the details and
   click the **Yes** button.
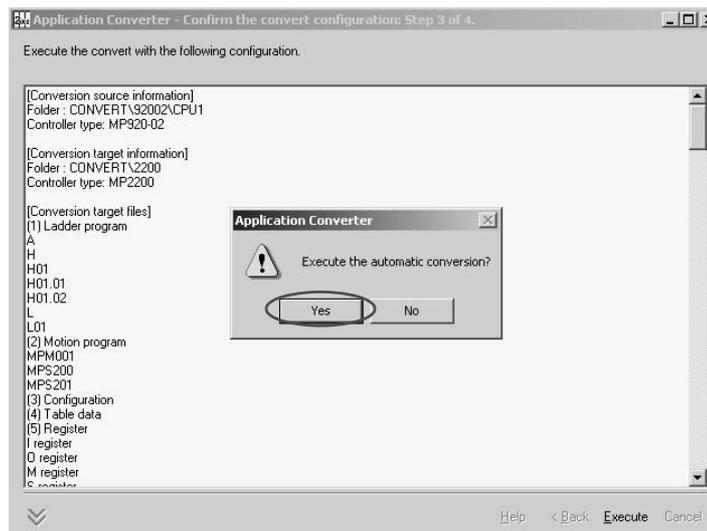
Automatic conversion starts.

9. During conversion, the status is indicated on the **Status** tab page.
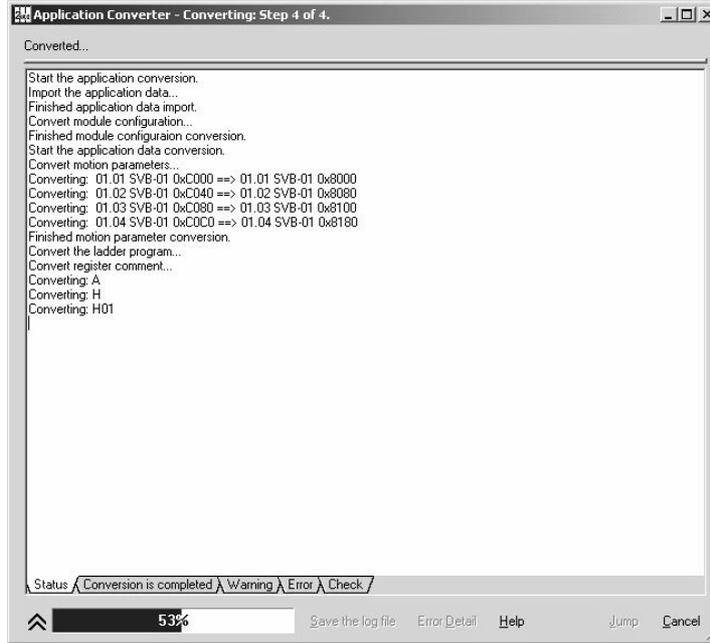
Status	Shows the execution status of the Automatic Conversion Wizard.
Conversion is completed	Displays the log of the Automatic Conversion Wizard.
Warning	Displays the warning log. This is data that has been automatically converted by MP720 Ver. 5 and is to be checked by the user.
Error	Displays a log of the errors that have occurred in the Automatic Conversion Wizard. This is data that has been automatically converted by MP720 Ver. 5, and comprises errors that are more serious than warnings and need to be checked and corrected.
Check	Shows the locations where motion registers are used.

10. Check the information in the **Error** tab and **Warning** tab pages, which are displayed on top.

If the same error has occurred at multiple locations, the instances are presented in a hierarchical format.

Manager Functions

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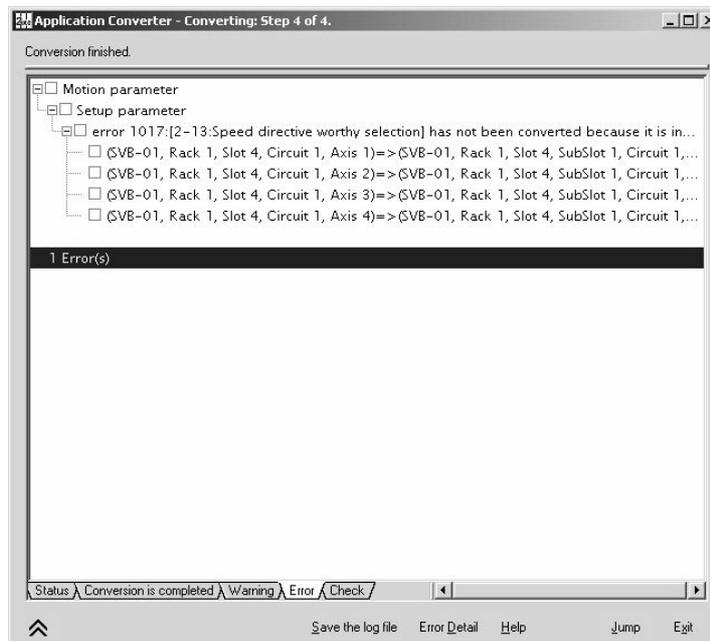
11. To save the converted log, click **Save the log file**.

Note: On assigning the file name of your choice and clicking the **Save** button, the log is saved at the specified location in the .ycl file format.

This enables you to read the log file, which means that you can suspend the correction of errors or warnings and then continue it later.
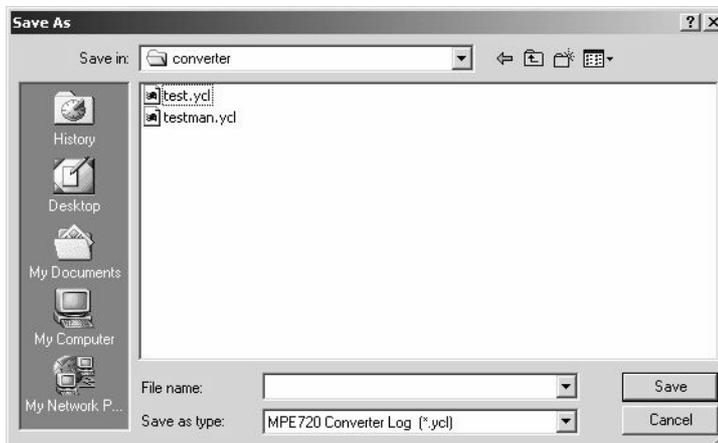
Be sure to follow up with the *Mandatory procedure after automatic conversion*, set out on the next page.

IMPORTANT

■ Mandatory procedure after automatic conversion

On completion of automatic conversion, an error or warning may be displayed.

This happens because the configuration of the Machine Controller application is different for the MP900 series and the MP2000 series.

If an error or warning is displayed, check the details and correct it if necessary.

The difference between errors and warnings is explained in the following table.

Error	Points that must be corrected are displayed. Correct errors by referring to ■Checking the locations where errors and warnings have occurred. Note: Errors are only displayed if motion parameters have been saved.
Warning	Points where the data after conversion should be checked are displayed. Only correct those points where you judge that correction is necessary.

Check the locations where errors have occurred in the log on the **Error** tab page and the locations where warnings have occurred in the log on the **Warning** tab page.

Errors and warnings occur in the module configuration, motion parameters, ladder program, and motion program.

The information displayed is as shown below.

<Example Error Display>

<Example Warning Display>
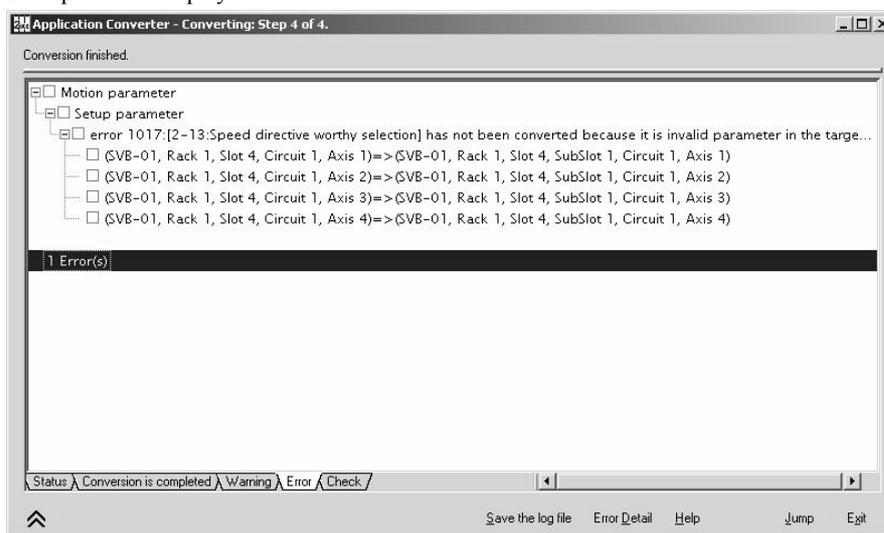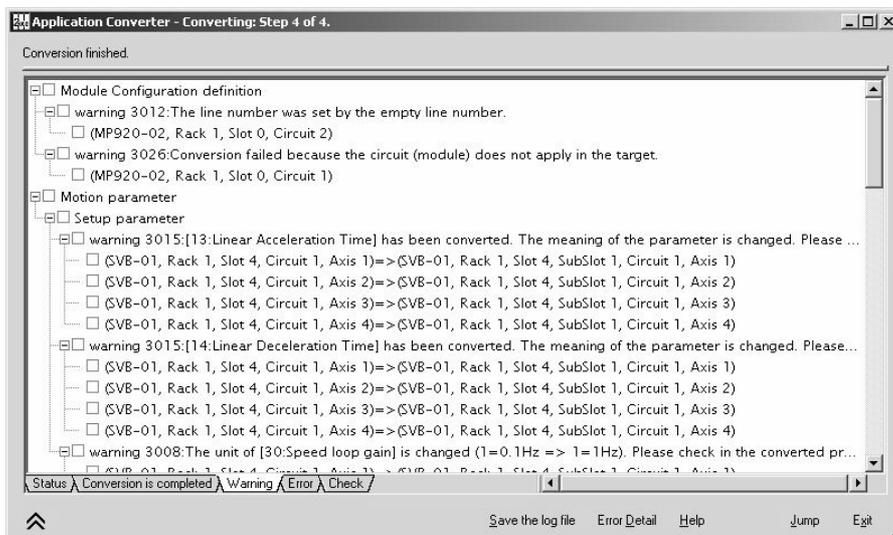
■ Checking the locations where errors and warnings have occurred

Check the details of the errors and warnings and correct them.

- For details on module configuration, refer to *(a) Module Configuration*.
- For details on motion parameters, refer to *(b) Motion Parameters*.
- For details on ladder programs, refer to *(c) Ladder Programs and Motion Programs*.
- For details on motion programs, refer to *(c) Ladder Programs and Motion Programs*.

(a) Module Configuration

Check these if a warning has occurred in relation to the module configuration.

For details on warnings, refer to *Appendix F Error and Warning List for the Application Converter*.

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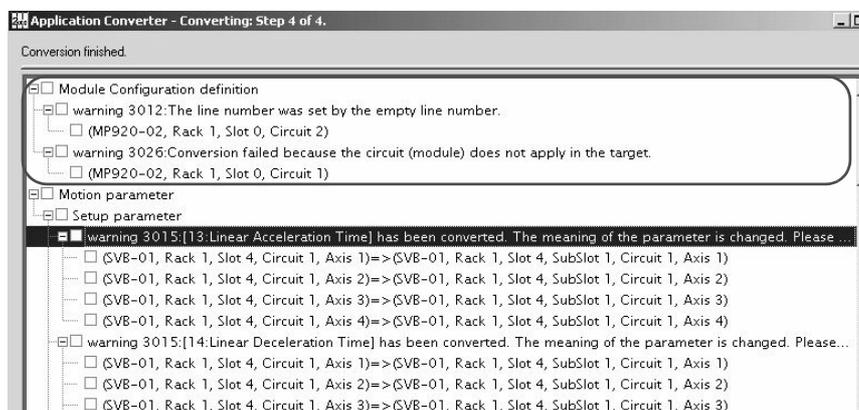
(b) Motion Parameters

Check these if an error or warning has occurred in relation to the motion parameters that are set in the module configuration definitions.

For details on errors and warnings, refer to the error list on the Application Converter help screen, and to *Appendix F Error and Warning List for the Application Converter*.
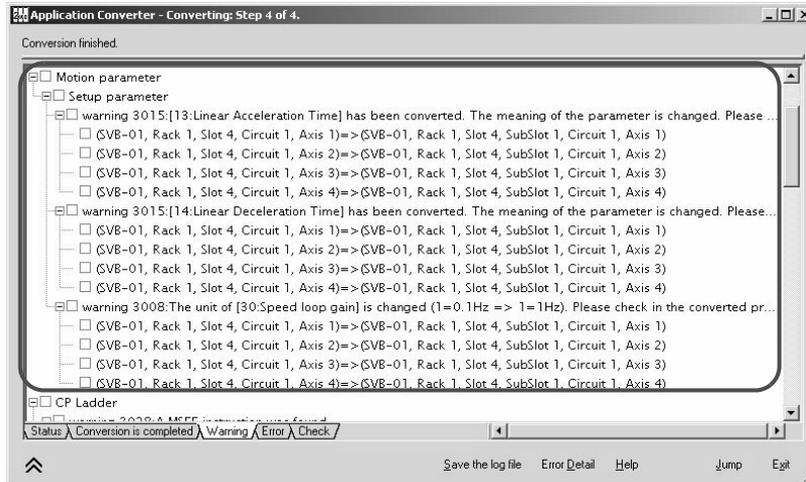
Errors and warnings that relate to motion parameters are displayed in either of the following orders:

- Module classification, rack number, slot number, circuit number, axis number for the conversion source axis
- Module classification, rack number, slot number, circuit number, axis number for the conversion target axis

1. Double-click the log record that you want to check.

   The cursor jumps to the relevant parameter (fixed parameter or setup parameter).

2. Check the details. Correct the parameters that need to be corrected and save the data.

3. Check the checkboxes of parameters whose details have been checked and corrected in the Application Converter log.

   Striking-out lines are drawn to make it easy to see at a glance that the checking of a log record has been completed.

   Note: You can choose to collectively display either all log records with striking-out lines or all log records without striking-out lines by selection from the pop-up menu.

Display All Drawings	Displays all conversion error log records.
Checked	Displays log records with striking-out lines only.
Not checked	Displays log records without striking-out lines only.

4. Repeat steps 1 through 3.

(c) Ladder Programs and Motion Programs

Check these if an error or warning has occurred in relation to the motion registers used with the conversion source ladder program or motion program.

For details on errors and warnings, refer to *Appendix F Error and Warning List for the Application Converter*.
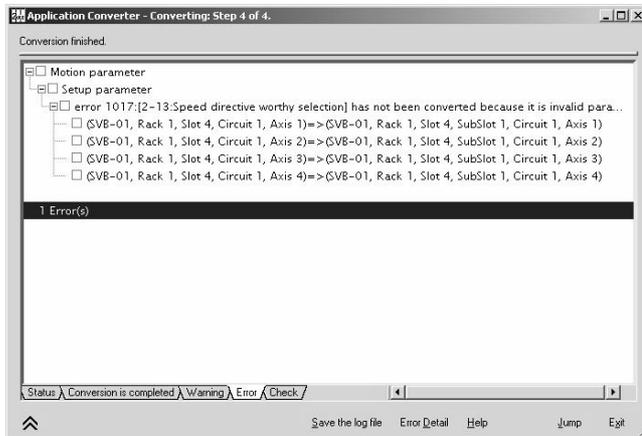
Motion registers that are subject to an error are automatically replaced with M registers. Replaced registers are shown in red. Correct these registers and save them.

Note that the range of M registers used is the range that has not been used for MP900-series W addresses (32768 to 65535).

Note: Registers that are subject to a warning are not shown in red.

With a new ladder:
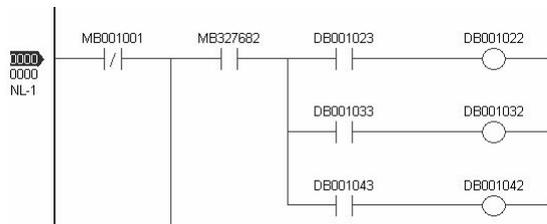
With a CP ladder:
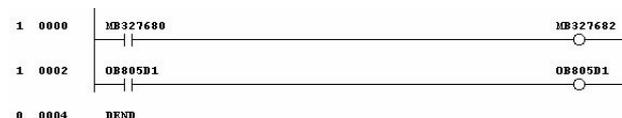
With a motion program:
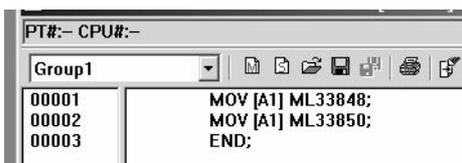
Check the motion registers where errors or warnings have occurred.

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1. Double-click the log record that you want to check.

   The cursor jumps to the relevant program (ladder program or motion program).

Ladder program	The step where the error occurred and the register names before and after conversion are displayed. The ladder program that uses the relevant register opens and the cursor moves to the step concerned.
Motion program	The line number where the error occurred, the register name before conversion and the register name after conversion are displayed. The motion program that uses the relevant register opens and the cursor moves to the line concerned.

2. Check the data. Correct any program that needs to be corrected, and save or compile it.

   Registers that have been displayed in red will turn black.
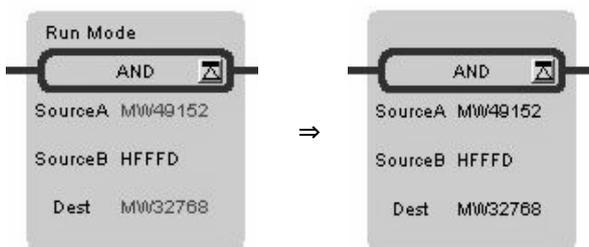
3. Check the checkboxes of programs that have been checked and corrected in the Application Converter log.

   Striking-out lines are drawn to make it easy to see at a glance that the checking of a log record has been completed.

   Note: You can choose to collectively display either all log records with striking-out lines or all log records without striking-out lines by selection from the pop-up menu.

Display All Drawings	Displays all conversion error log records.
Checked	Displays log records with striking-out lines only.
Not checked	Displays log records without striking-out lines only.

4. Repeat steps 1 through 3.

• Saving the Log

   If you stop the correction work part way through, you can save the conversion log to a file at a partway point. You can then resume the correction work by reading the log next time.

   1. After automatic conversion is completed, click **Save the log file**.

      The **Save As** dialog box will be displayed.

   2. Enter the filename of your choice and click the **Save** button.
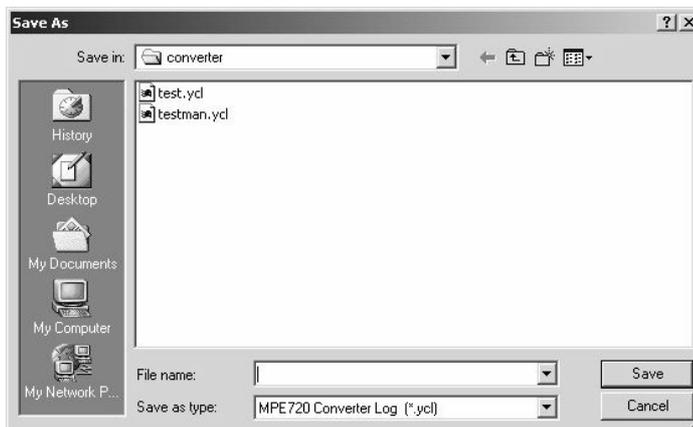
   The file is saved at the specified location in the .ycl format.

• Reading an Existing Log

Log data that has been output to a file can be read again with the Application Converter. This means that you can resume conversion work from the status at the point when the log was saved in the file.

The procedure is as follows.

1. In offline mode, log on to the MP900-series PLC folder whose application data you want to convert.

2. Select *Tool* - *Automatic Conversion Wizard* from the main menu. Alternatively, right-click the PLC folder and select *Application Converter* - *Automatic Conversion Wizard* from the pop-up menu.

3. Click **Import the log file** on the Machine Controller type selection screen or conversion source/target selection screen to display the **Open** dialog box.
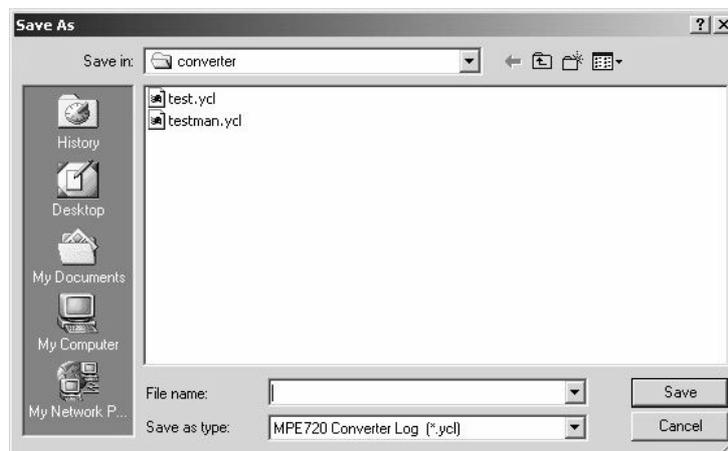
4. Select the log file that was saved (*.ycl) and click the **Open** button.

    The log information in the selected log file is read into the Application Converter.

    Note: 1. Log files that have been created using MPE720 Ver. 5.38 or earlier versions cannot be read and the following message dialog box is displayed.
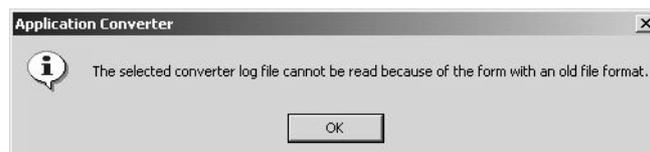
    2. Log files that have been created with the Manual Conversion Wizard cannot be read and the following message dialog box is displayed. Note also that log files created with the Automatic Conversion Wizard cannot be read while the Manual Conversion Wizard is running.

Manager Functions

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(4) Manual Conversion Wizard

IMPORTANT	With the previous MPE720 Ver. 5, the Manual Conversion Wizard was called the "Conversion Wizard." Due to the addition of the Automatic Conversion Wizard, the name was changed from "Conversion Wizard" to "Manual Conversion Wizard" from this version.

The procedure for starting the Manual Conversion Wizard is given below.

1. In offline mode, log on to the MP900-series PLC folder whose application data you want to convert.

2. Create the conversion target MP2000-series PLC folder.

3. Select *Tool - Manual Conversion Wizard* from the main menu. Alternatively, right-click the PLC folder and select *Application Converter - Manual Conversion Wizard* from the pop-up menu.

The **Conversion source/target selection** screen will be displayed.
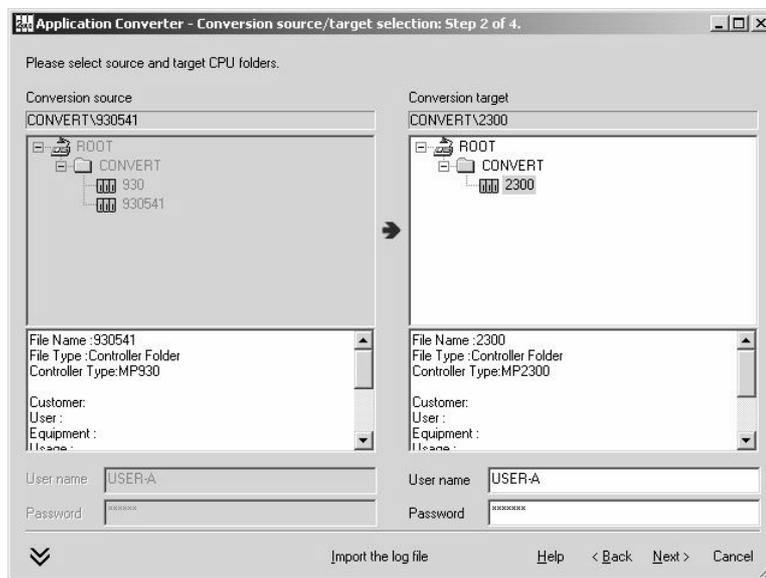
For details on the method of operation of the Manual Conversion Wizard, refer to the Application Converter help screen.

4. Click **Help** on the **Conversion source/target selection** screen. The help information for the Manual Conversion Wizard will be displayed.
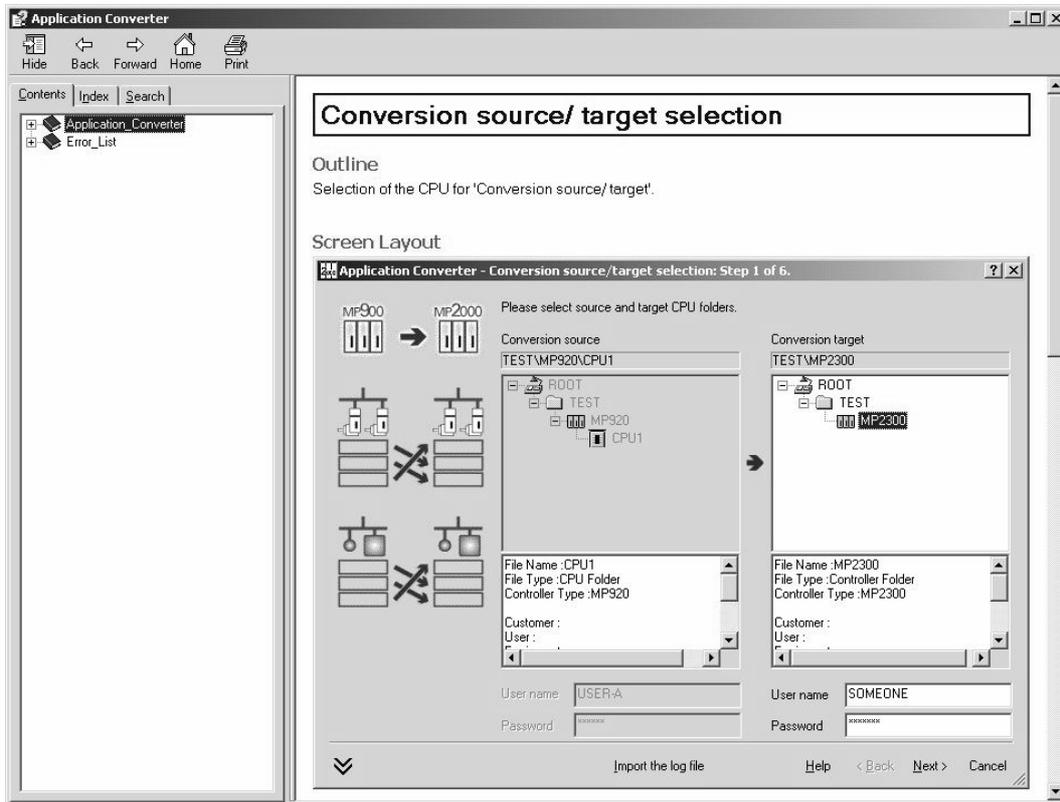
(5) Multi-register Replace

The procedure for starting the multi-register replace function is given below.

1. In offline mode, log on to the MP900-series PLC folder whose application data you want to convert.

2. Create the conversion target MP2000-series PLC folder.

3. Select **Tool** - **Multi-Register Replace** from the main menu. Alternatively, right-click the PLC folder and select **Application Converter** - **Multi-Register Replace** from the pop-up menu.

4. The **Register replace set** screen will be displayed.
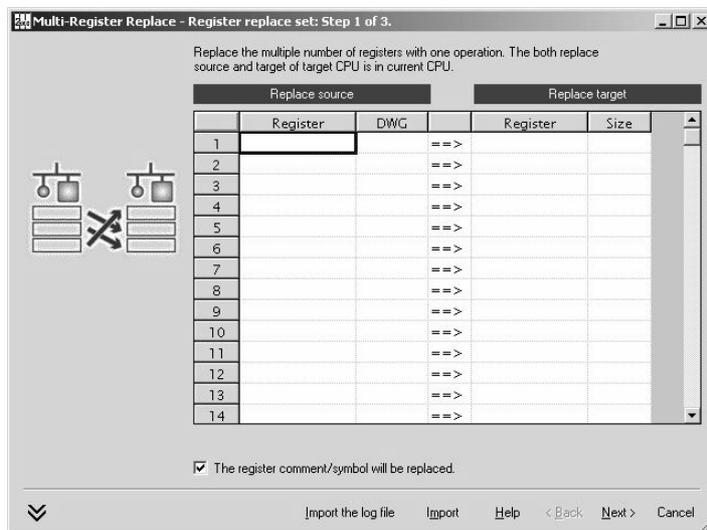
For details on the method of operation for the multi-register replace function, refer to Application Converter help.

5. Click **Help** on the **Register replace set** screen. The multi-register replace help information will be displayed.
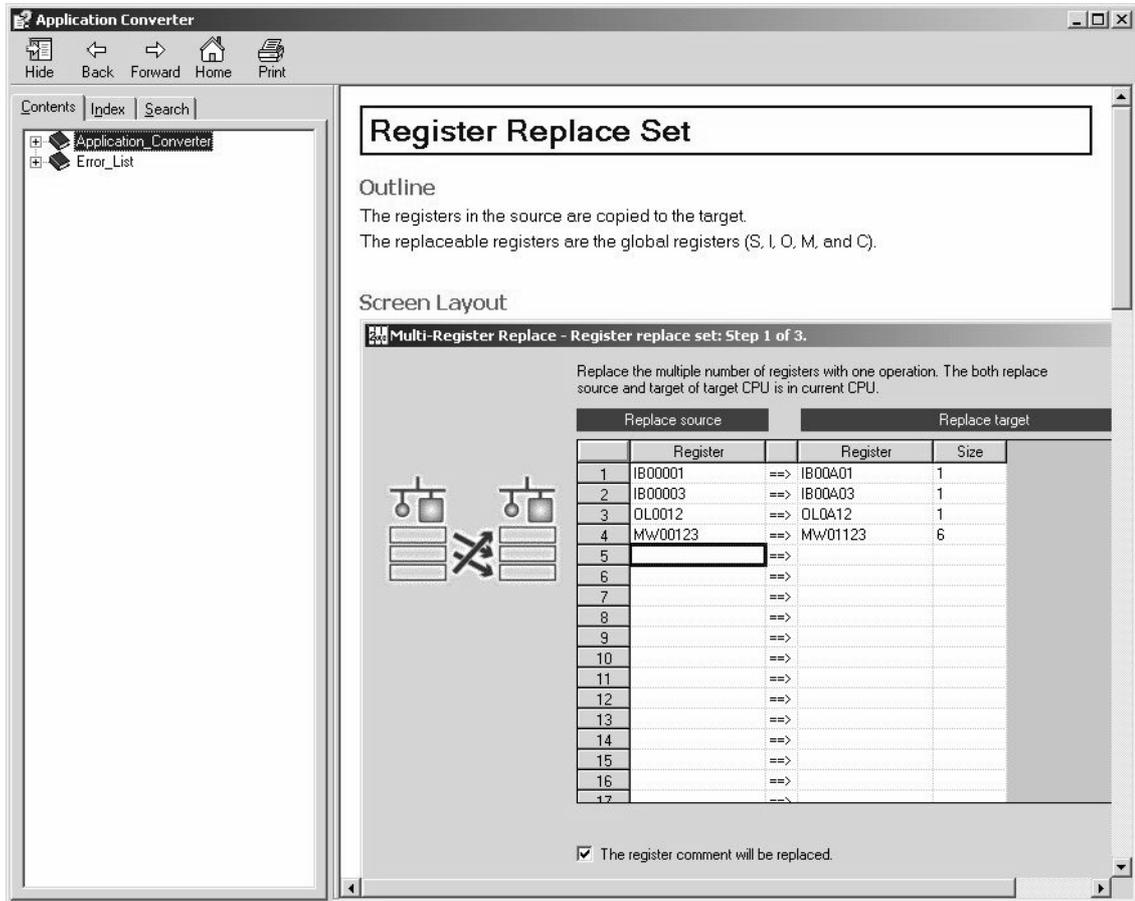
2.2.13 PLC Import Tool

This section describes the PLC Import Tool.

(1) PLC Import Tool Window

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.

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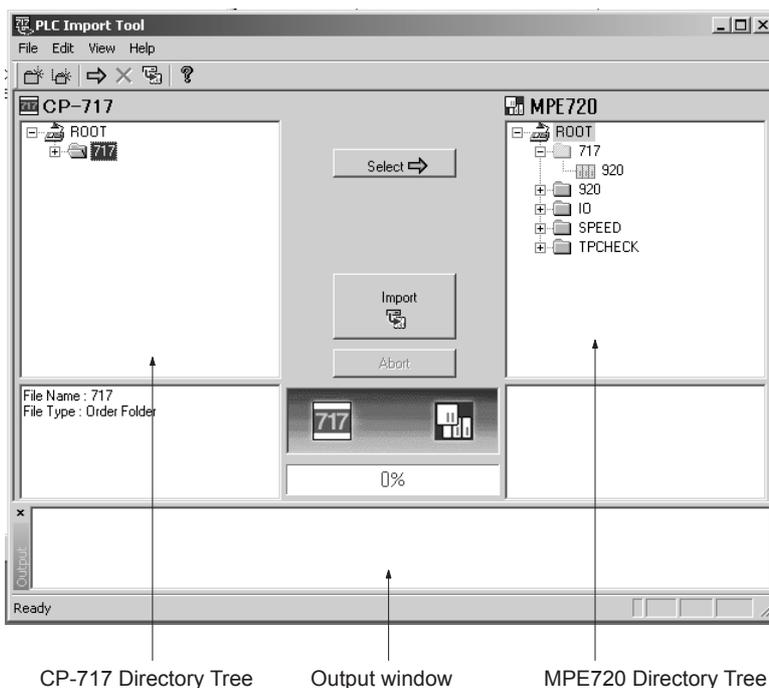
Setting	Details
CP-717 Directory Tree	Displays the user folders in the CP-717.
MPE720 Directory Tree	Displays the user folders in the MPE720.
Output window	Displays the import completion status and error status.
Select	Pre-imports* the group folder, order folder, or PLC folder selected in the CP-717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

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(2) 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.
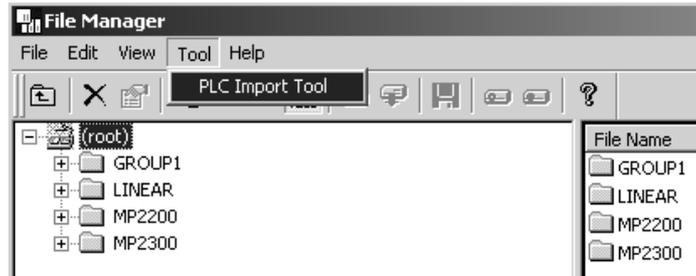
The following message will be displayed. Click the **Yes** button to continue.
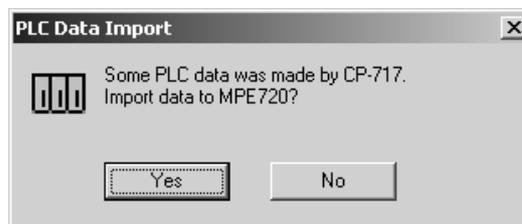
(b) Automatic Start

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

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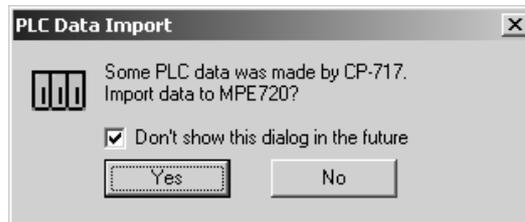
This message will be displayed the first time that the MPE720 is started after installation.

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

(3) 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	Displays help information.
	About Application	Displays the version information.

(4) 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."
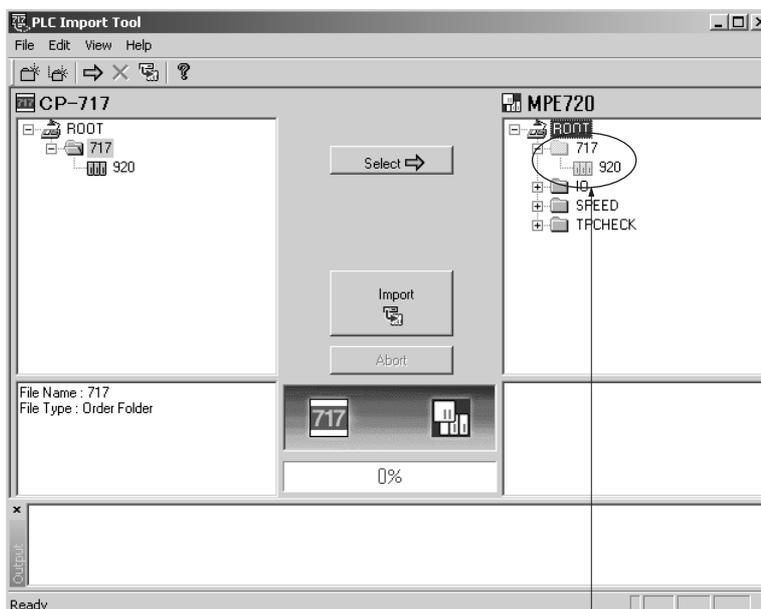
The pre-imported folder is displayed in a light color.

INFO
- 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.
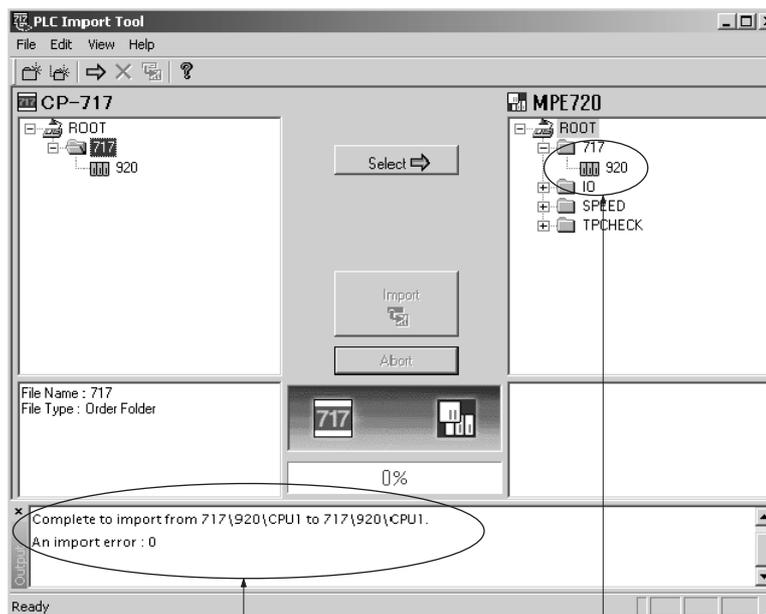
The import status is displayed.　　The display of the imported folder will change from a light color to normal text.

(5) Exiting the PLC Import Tool

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

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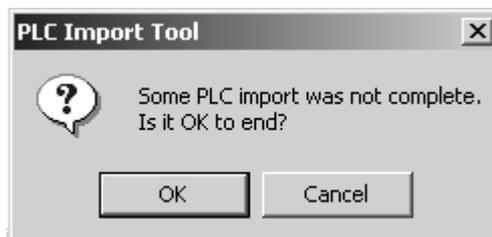
2.3 Engineering Manager

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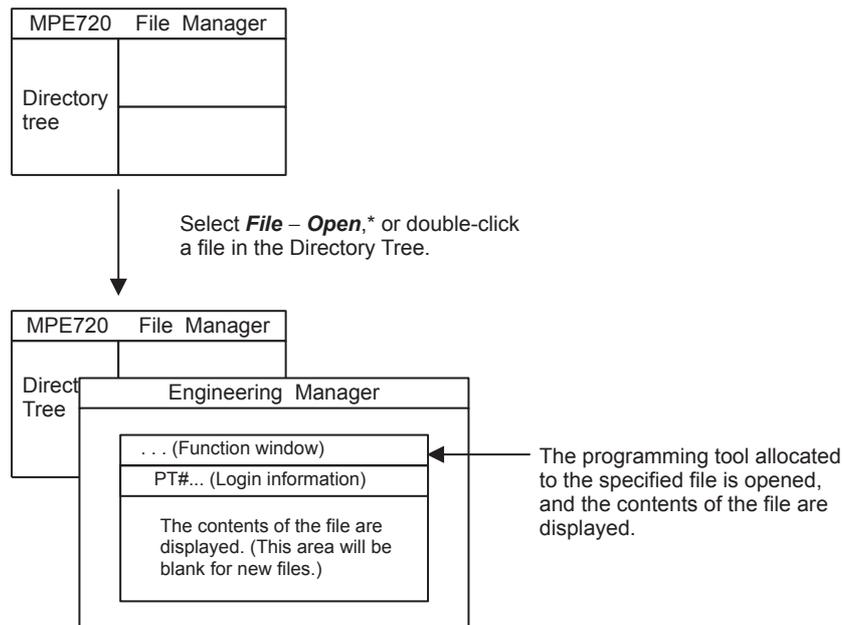
* The file program that is opened from the File Manager Menu will depend on the type of file or folder that was selected.

◀ 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.

Manager Functions

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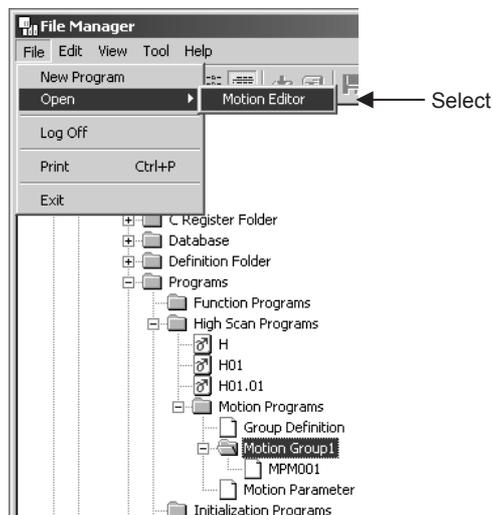
2. The **Motion Editor** window will open in the **Engineering Manager** window as shown below.
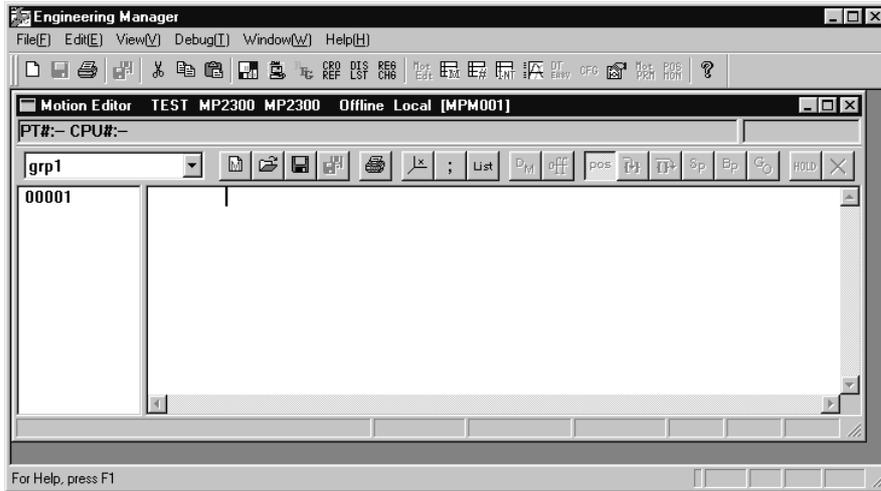
3. If the **Motion Editor** is closed at this stage, only the **Engineering Manager** window will be displayed.
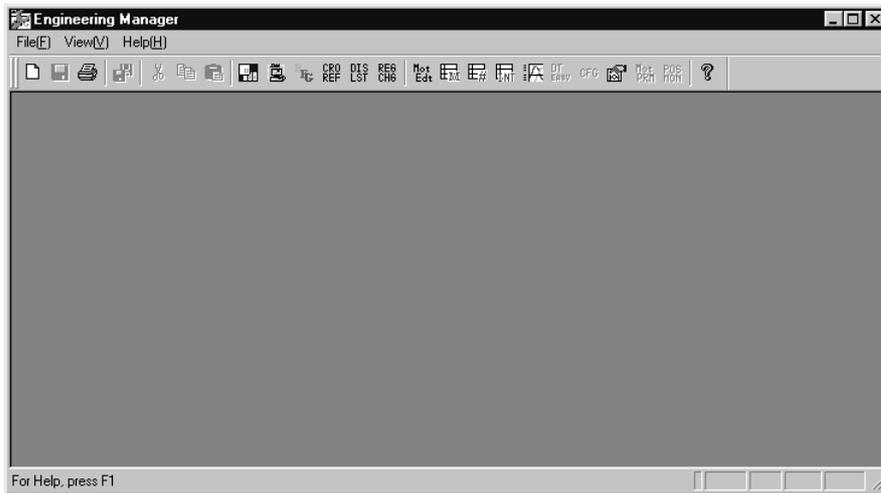
2.3.2 Basic Functions

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

Position Monitor is displayed only when online.
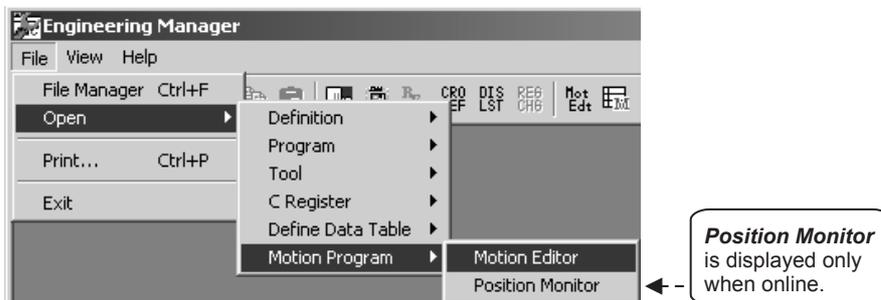
Several function windows can be open at once, and the window to be used can be activated as needed.

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				
	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.

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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.

Currently displaying the main menu for the Motion Editor.

The Motion Editor is active function window.
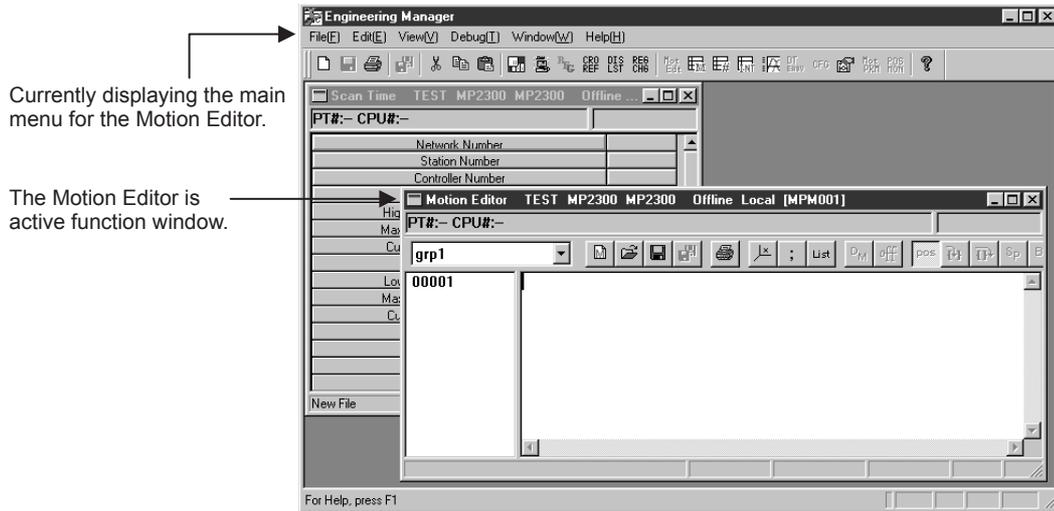
(1) Window Configuration

This section explains the basic configuration of function windows.
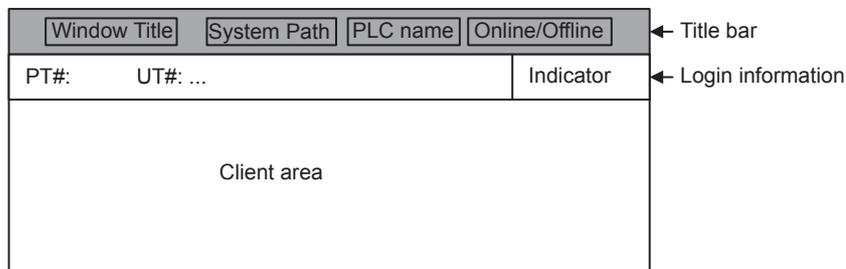
(a) Title Bar

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.

If you log off while the Engineering Manager is open, the Engineering Manager automatically closes and logs off.

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2.4 List and Print Managers

2.4.1 Outline

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.
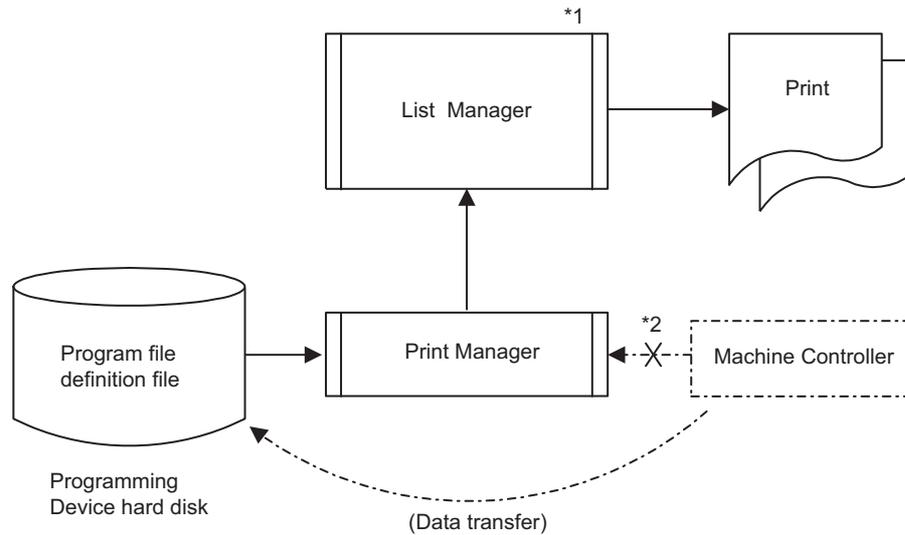
* 1. The List Manager starts when the Print Manager Window is opened. The List Manager is an independent window, as print jobs can also be requested from applications other than the MPE720. Consequently, when the MPE720 finishes, the List Manager must be closed manually.
The Print Manager edits data selected via the user interface and requests print jobs to the List Manager.
* 2. 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.

2.4.2 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 Manager icon

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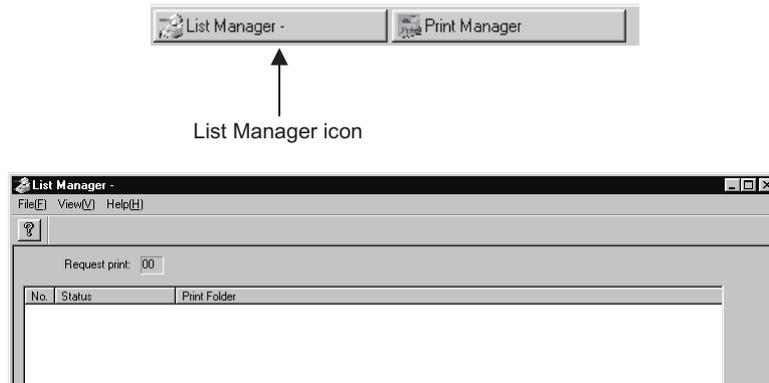
The List Manager is started automatically when the Print Manager is opened. If the Print Manager has never been opened, the List Manager will not have been started, and so will not be registered on the task bar. The List Manager cannot be started independently.

(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	
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.

Manager Functions

2

(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.

2.4.3 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.
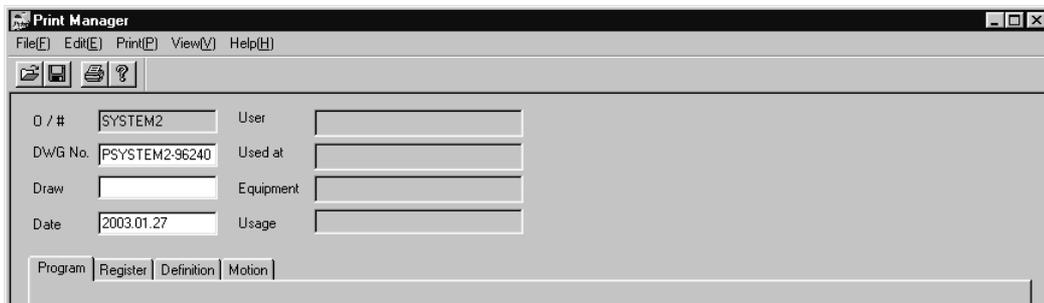
(b) Opening from the Engineering Manager

Select *File – Print* from the Engineering Manager menu. The Print Manager will start and the Print Manager window will open.

INFO

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.
	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		
	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.

Manager Functions

2

(4) Program Tab Page

(a) Program Print Settings

Setting	Details
O/#	Displays the data from the *Order No.* column in 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. 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. 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. 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. This data cannot be changed. This data is printed in the *Usage* column on the document cover page.
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.

Setting	Details
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.

(b) 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.
Print All	Print all drawing programs in the list box.
Cancel All	Cancel all drawing program settings in 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.

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.

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.

Manager Functions

2

(5) Register Tab Page

(a) Register Printing Settings
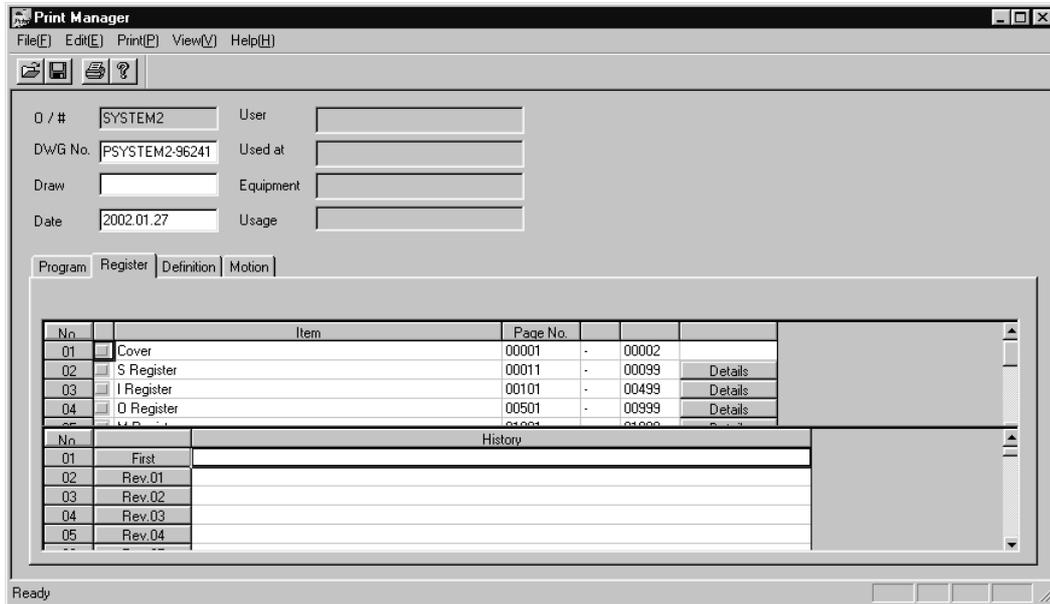
Window displays are the same as those for program print settings. For program print settings, refer to *(a) Program Print Settings* in *(4) Program Tab Page*.

(b) 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.

Setting	Details
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.

(6) Definitions Tab Page

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

(a) Definition Printing Settings
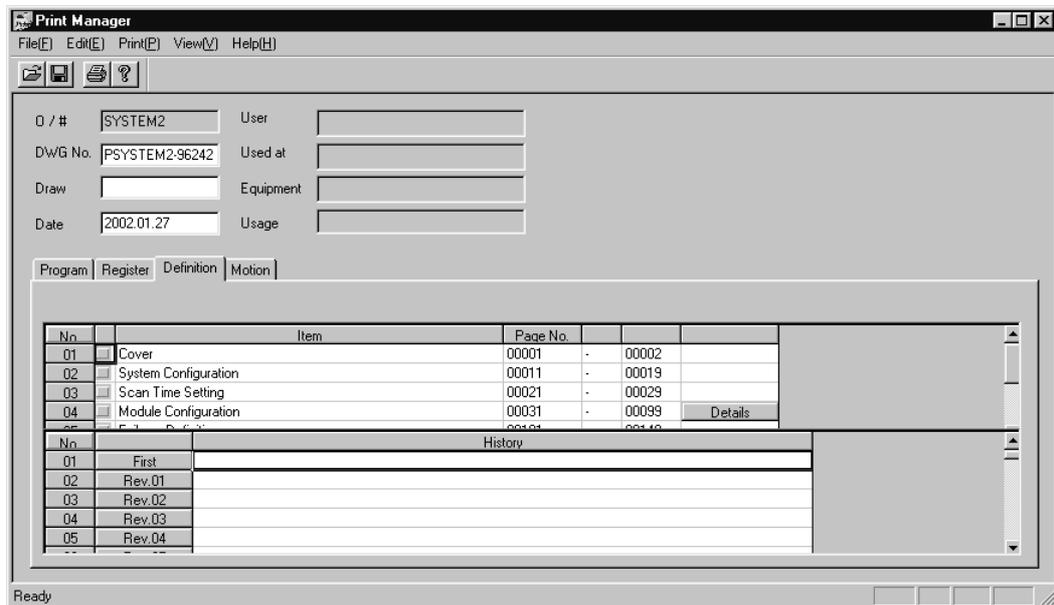
Window displays are the same as those for program print settings. For program print settings, refer to *(a) Program Print Settings* in *(4) Program Tab Page*.

(b) 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.

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

Manager Functions

2

(7) Motion Tab Page

Motion program and motion parameter printing data can be selected.

(a) 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.

(b) 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.

(8) 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.
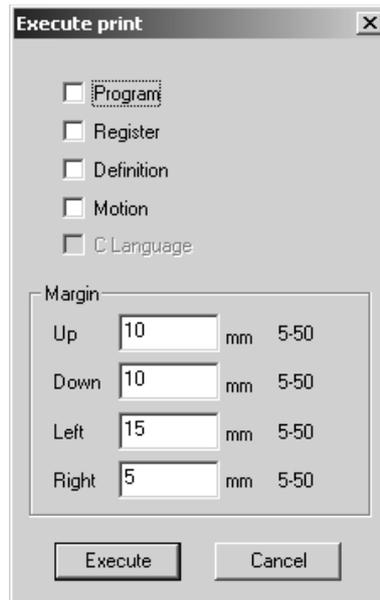
3. Set the printer in the Print window and click the **OK** button.

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

(9) 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.

Manager Functions

2

2.5 User Menu Manager

The User Menu Manager is a function for registering shortcut icons to be used to call up the various function windows on the desktop. After registration, you can call up a function window simply by clicking its icon, and you can then execute that function (logon is necessary). This means that you go straight to processing that you want to execute without having to go through the normal startup sequence.

2.5.1 Registering Shortcut Icons

To register a user menu, select the menu incorporated in the file menu for each function menu as shown below. The shortcut icon for the currently active window will be registered.
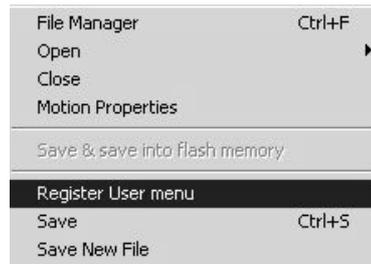
Click **Register User menu** to display the dialog box shown below, then make the necessary entries in this dialog box. Currently, you can register a shortcut icon by entering just a title.
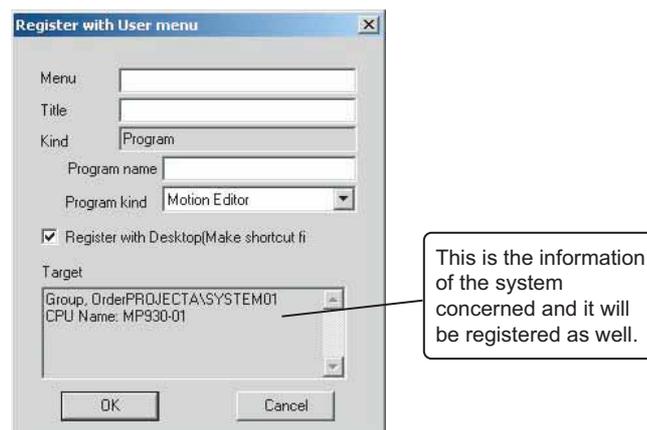
This dialog box is displayed when the **Motion Editor** window is active, and you can register a shortcut for this window on the desktop by entering *MotionEditor* for the title and then pressing the **OK** button.

2.5.2 Starting Up from a Shortcut Icon

Double-click a registered shortcut icon. The **Log on to the controller** window shown below will be displayed.
Enter your *User Name* and *Password* on this window.

When you have successfully logged on the function window registered for the icon is displayed, so you can start
using the function immediately. This example assumes that you are starting up the Motion Editor.
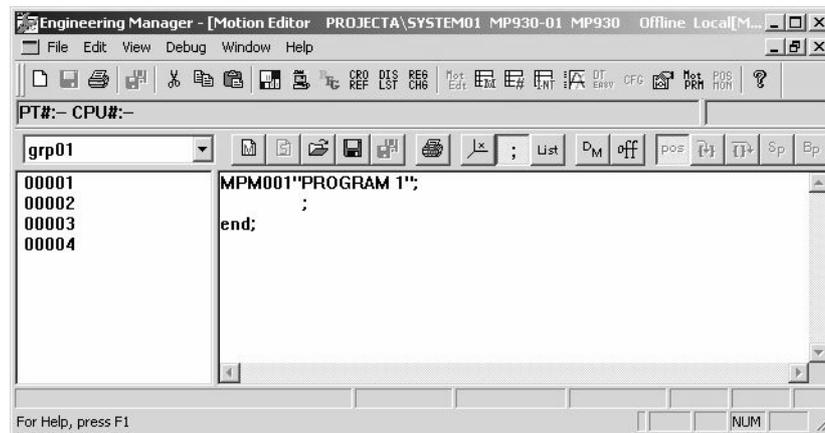
As shown above, this function allows you to proceed right to startup of the Motion Editor by following the steps
of clicking the shortcut icon and logging on rather than following the conventional startup sequence. You can
greatly improve operating convenience by using this function for the function windows of the system that you
often use.

Manager Functions

2

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*.

System Configuration Definitions

3

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.

System Configuration Definitions

3

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.

```
              ┌──────────────────┐
              │ Data and file    │
              │ designation      │
              └──────────────────┘
                       │
                       ▼
                    ◇ Online ◇ ──── NO ────┐
                       │ YES              │
                       ▼                  ▼
              ┌──────────────────┐  ┌──────────────────┐
              │ Only Machine     │  │ Only HDD data    │
              │ Controller data  │  │ read             │
              │ read             │  └──────────────────┘
              └──────────────────┘         │
                       │◄───────────────────┘
                       ▼
              ┌──────────────────┐
              │ Data or file     │
              │ created or       │
              │ updated          │
              └──────────────────┘
                       │
                       ▼
                    ◇ Online ◇ ──── NO ────┐
                       │ YES              │
                       ▼                  │
              ┌──────────────────┐        │
              │ Machine          │        │
              │ Controller       │        │
              │ data updated     │        │
              └──────────────────┘        │
                       │◄───────────────────┘
                       ▼
              ┌──────────────────┐
              │ HDD data updated │
              └──────────────────┘
```
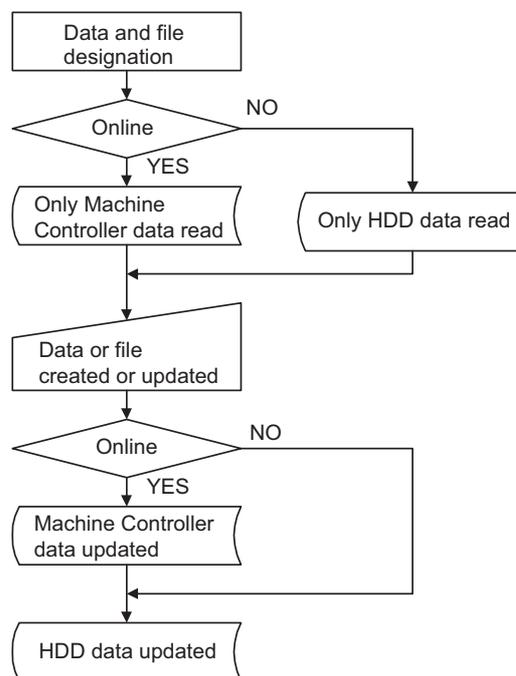
IMPORTANT	The creation and modification of all data and files is managed by the Programming Device.

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

4.1 Opening the Application Information Window

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

4.2 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.
Register in User Menu	Registers a shortcut for the application information.
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.
Motion Task Manager	Displays the operating status of the motion program.
Window	
Cascade	Stacks windows in the display.
Tile	Lines up windows in the display.
Arrange Icons	Lines up icons.
Help	
About Application	Displays version information.

4.3 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.

4.4 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.

4.5 Closing Application Information

Exit the application information settings by closing the **Application Information** window.
To close the window, select *File − Close* from the menus.

Definition Folder 1: Application Information Definitions

4

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.

Definition Folder 2: System Configuration

5

5.1 Opening the System Configuration Window

Open the **System Configuration** window according to instructions in *3.2 Opening System Configuration Definitions Windows*.
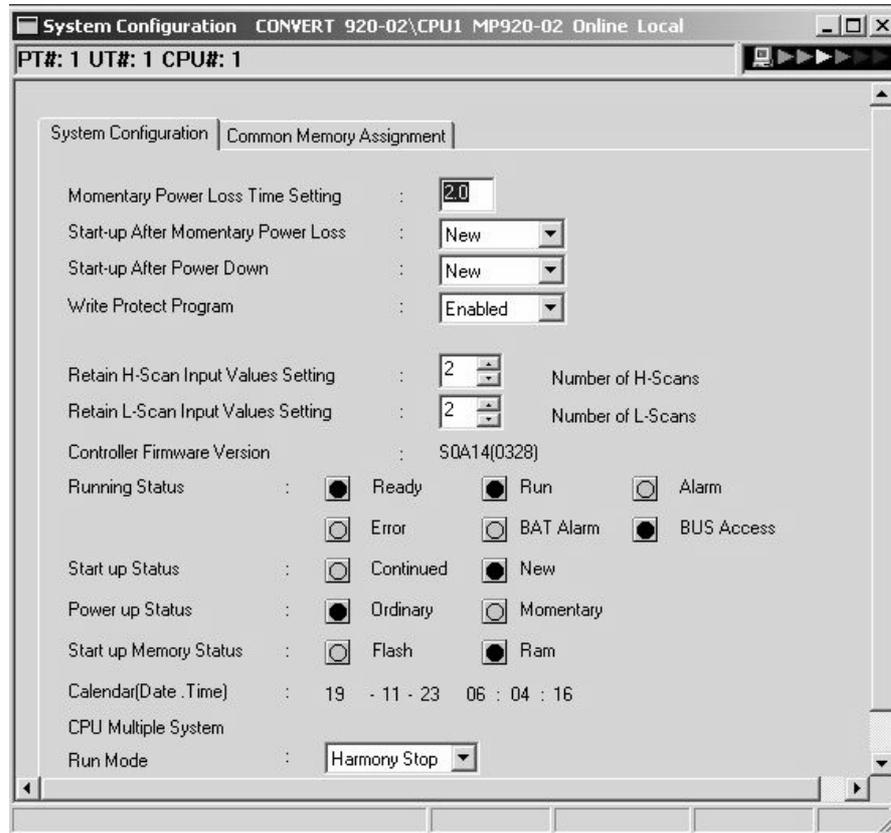
(1) Login Information

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) Tab Pages

The System Configuration Window has one tab page.

Tab Page	Details
System Configuration	Sets the Machine Controller status and calendar values.

5.2 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.
Register in User Menu	Registers a shortcut for the application information.
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.
Motion Task Manager	Displays the operating status of the motion program.
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	
About Application	Displays version information.

Definition Folder 2: System Configuration

5

5.3 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: Normal 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: Normal	Lit when an alarm has occurred. Not lit when normal.
Error	Lit: Error Not lit: Normal	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

(a) 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.

(b) 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.*

5.4 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 *5.4 Changing Machine Controller Status*.

5.5 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.

INFO

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.

5.6 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.

6.2 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 & Save to Flash	Saves to flash memory.
Register in User Menu	Registers a shortcut for the application information.
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.
Motion Task Manager	Displays the operating status of the motion program.
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	
About Application	Displays version information.

Definition Folder 3: Scan Time Definitions

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6.3 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.

6.4 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.

INFO
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.

6.5 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.

6.6 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.

Definition Folder 3: Scan Time Definitions

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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 Data Trace

7.1.1 Opening the Data Trace Window

Open the Data Trace Window according to instructions in *3.2 Opening System Configuration Definitions Windows*.
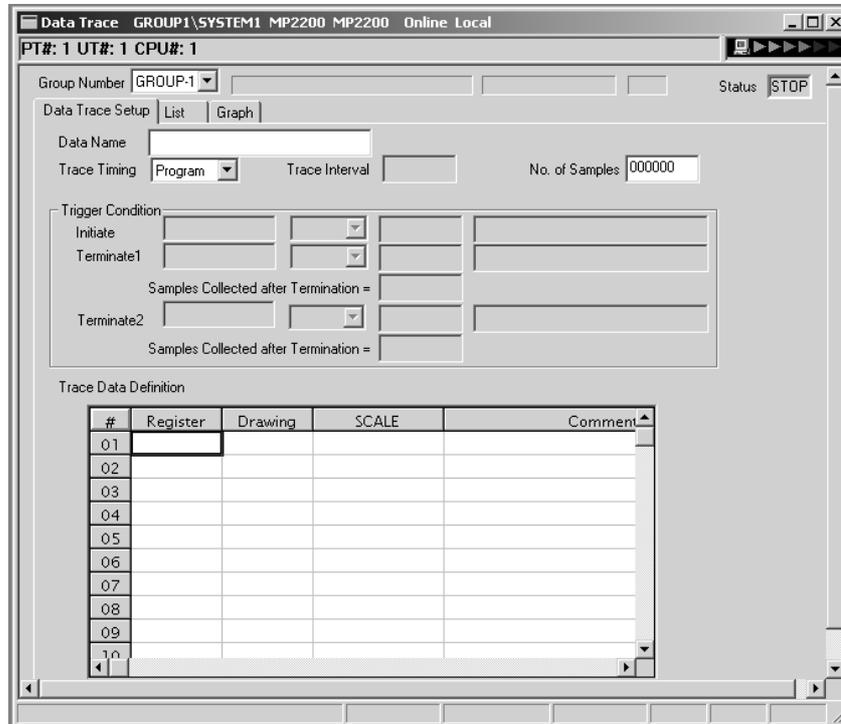
(1) Login Information

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	Displays 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.

7.1.2 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.
	Register in User Menu	Registers a shortcut for the trace definition.
	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.
	Motion Task Manager	Displays the operating status of the motion program.
	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		

Definition Folder 4: Data Trace Definitions

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Menu Command	Function
About Application	Displays version information.

7.1.3 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.

Trace Definitions

List Display

Graph Display
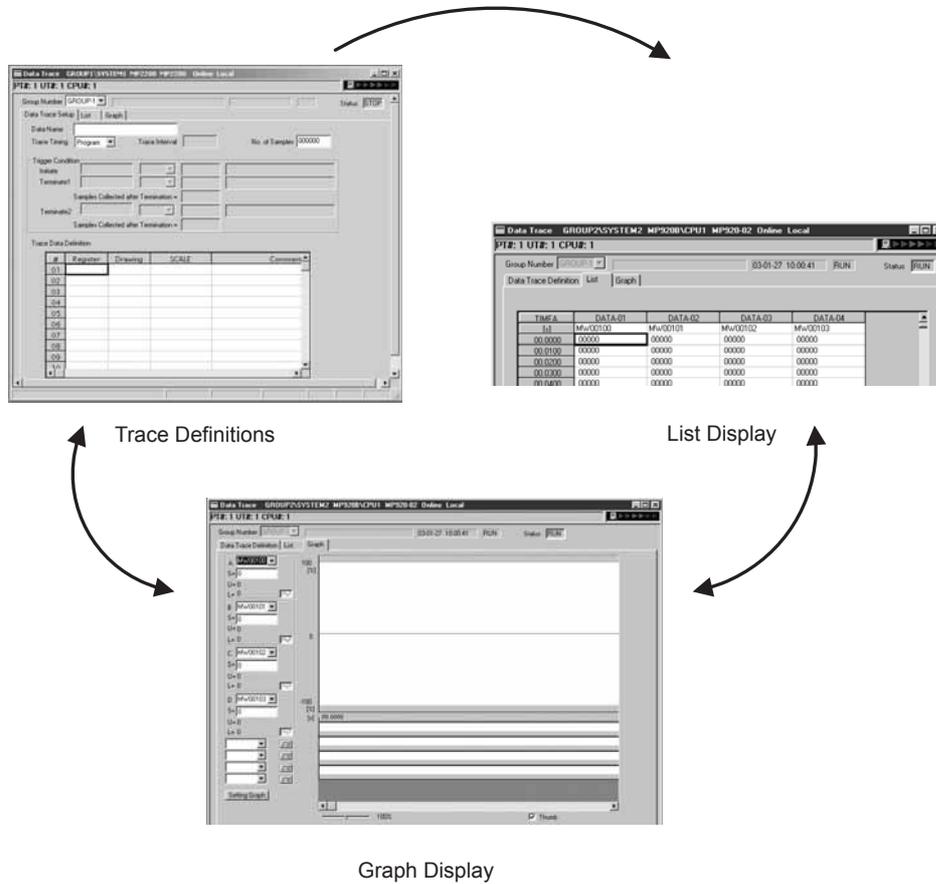
7.1.4 Data Trace Setup Tab Page

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 *7.1.1 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.

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.

- ■ Tracing D register

  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.

Data Trace Definition	×
The scan level of the designated DWG does not match.	
OK	
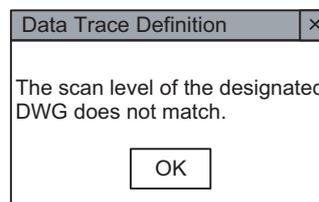
  An error will be detected at the Machine Controller when online if the motion program or drawing is not registered or if the upper limit of D register numbers is exceeded.

Error Message	×
Error in processing request from DPDH, CPU092 system.	
OK	
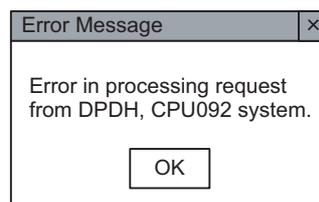
  Error checks are not performed in offline mode.

Definition Folder 4: Data Trace Definitions

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(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.

■ 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

Select *File − Trace Data − Write* from the Data Trace menu. The **Write File** window will be displayed.
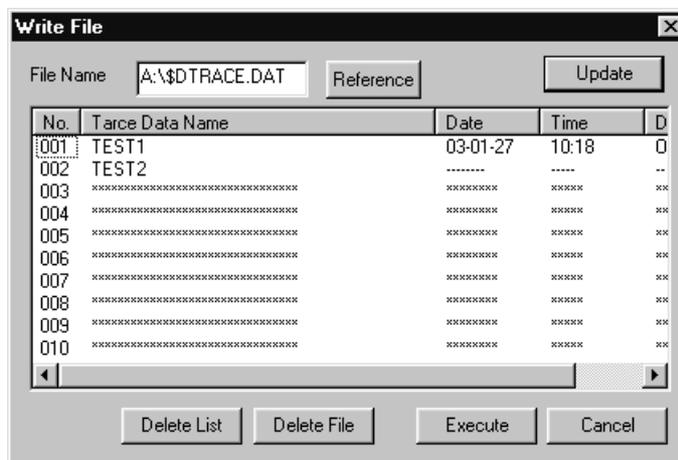
Display	Details
File Name	Input the file name and the drive letter of the floppy disk where the trace data is to be saved. The default file name is $DTRACE.DAT. After inputting the file name, click the **Update** button. The trace data saved to the file that was input will then be displayed under *No.001* 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. Select *File – Trace Data – Write* from the Data Trace menu. The **Write File** window will be displayed.

2. 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.

3. Click on the *No.* column at which to write the trace data.

4. Click the **Execute** 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.

1. Deleting Trace Data Files

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

   a) Select *File – Trace Data – Write* from the Data Trace menu. The **Write File** window will be displayed.

   b) For the *File Name*, input the name of the file to be deleted, and then click the **Update** button.

   c) Click the **Delete File** button.

   d) Click the **Yes** button in the message box.

   e) The trace data file specified in step 1 will be deleted.

   f) Click the **Cancel** button to complete the deletion of the trace data file.

2. Deleting Individual Trace Data

   Delete trace data for specific trace data numbers.

   a) Select *File – Trace Data – Write* from the Data Trace menu. The **Write File** window will be displayed.

   b) For the *File Name*, input the name of the file containing the data to be deleted. Then click the **Update** button.

   c) Select the number of the data that is to be deleted.

   d) Click the **Delete List** button.

   e) Click the **Yes** button in the message box.

   f) The trace data item specified in step 2 will be deleted.

   g) 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.

(a) Reading the Trace Data

Select *File − Trace Data − Read* from the Data Trace menu. The **Read File** window will be displayed.
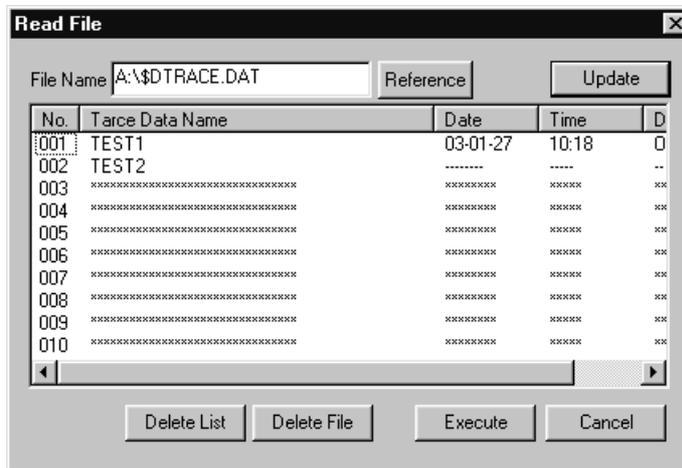
(b) Reading Trace Data

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.
   The trace data will be written successfully.

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

7.1.5 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.

- Setting 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
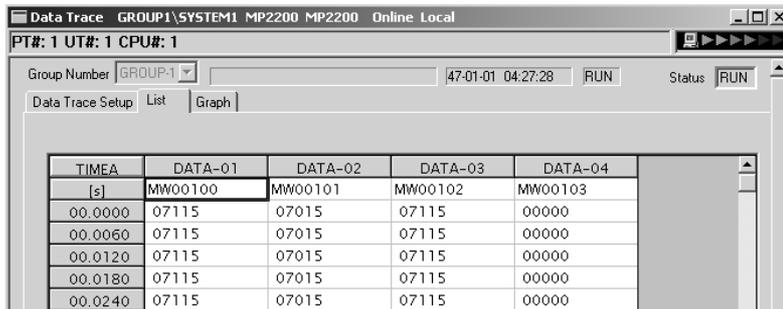
(a) Group and Status Information

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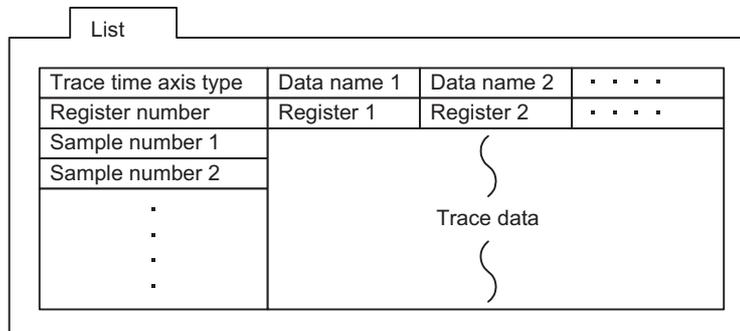
- The trace time axis type is determined by the trace time axis setting.
- The register number is displayed first in the column under the trace time axis type, and then the sample numbers are displayed.
- The registers set for the *Trace Data Definition* on the **Data Trace Setup** tab page are displayed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

• 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.

(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.

```
Select Trace Time Axis Display                        [x]

   (•) Time Display A (start-of-trace basis) : TIMEA [s]

   ( ) Time Display B (end-of-trace basis)  : TIMEB [s]

   ( ) Sampling No.  Display A (start-of-trace basis) : SNOA [#]

   ( ) Sampling No.  Display B (end-of-trace basis) : SNOB [#]


         Sampling Interval    [ 1.0 ]    [ms]


              [   OK   ]        [  Cancel  ]
```
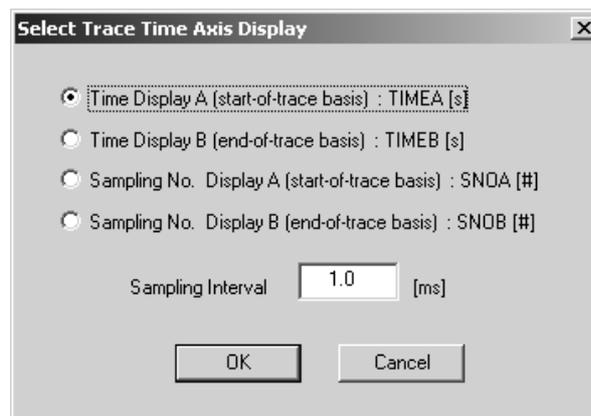
INFO If the *Trace Timing* on the **Data Trace Setup** tab page is set to *Program* and the time axis is changed to either Time Display A or Time Display B, the sampling interval must be input in the window in step 2 of the above procedure.

(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.
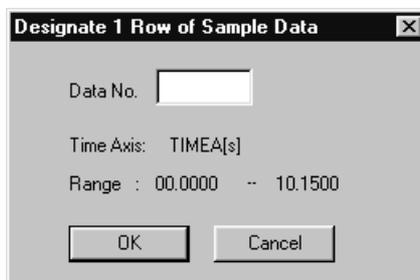
(7) Setting the Amount of Data to Be Read

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.
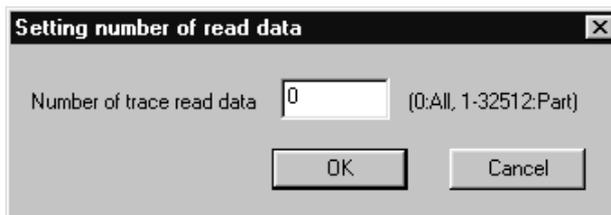
INFO
Specify the number of data items to be read as the number of frames. A frame is the number of registers set on the Data Trace Setup tab page.

7.1.6 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.

- Opening the **Graph** tab page
- Setting 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) Opening the Graph Tab Page

Click the **Graph** tab in the **Data Trace** window.
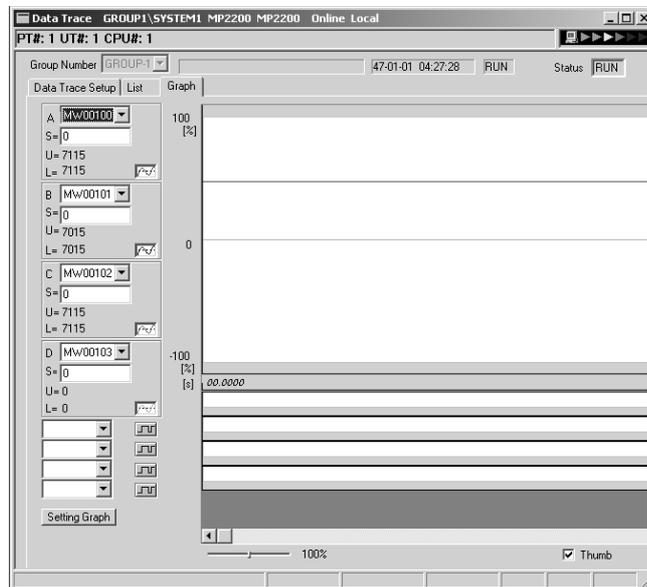
(2) Setting the Graph Tab Page

(a) Group and Status Information

Refer to *(1) Setting the List Tab Page* in *7.1.5 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.

(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.
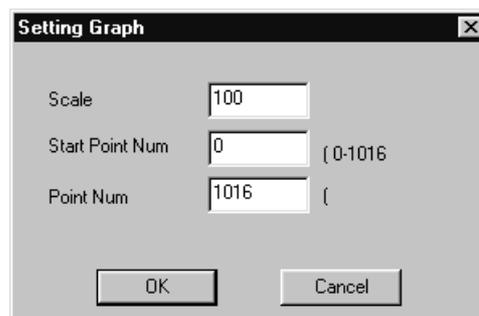
(3) Updating Display Data

The most recent trace data can be displayed.
For details, refer to *(2) Updating Display Data* in *7.1.5 List Tab Page*.

(4) 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 *7.1.5 List Tab Page*.

(5) Changing the Trace Time Axis

The trace time axis can be changed.
For details, refer to *(5) Changing the Trace Time Axis* in *7.1.5 List Tab Page*.

(6) 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 *7.1.5 List Tab Page*.

(7) 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 *7.1.5 List Tab Page*.

7.1.7 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.

Definition Folder 4: Data Trace Definitions

7

7.2 Trace Manager

7.2.1 Before Using the Trace Manager

Before using the Trace Manager, change the settings by following the procedure below.

1. Select *View - Configuration* from the pull-down menus on the **File Manager** window to open the **Configuration** window.
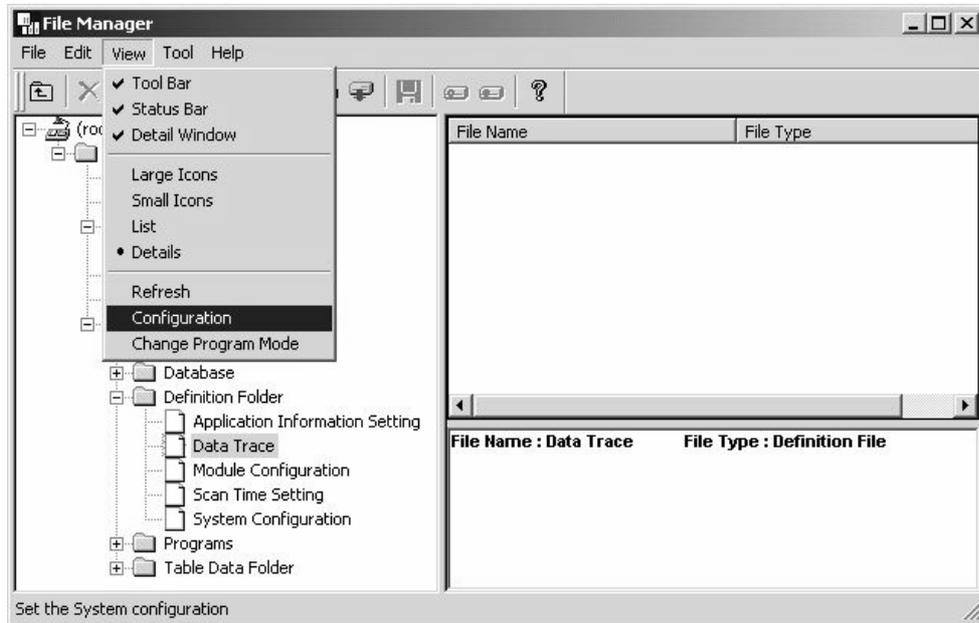
2. Select the **Data Trace** tab in the **Configuration** window.

3. Select **On** for **Use the trace manager**, then click the **OK** button.
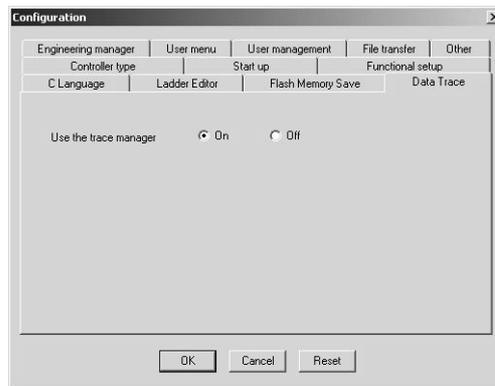
If you change the **On** or **Off** setting for **Use the trace manager**, it is necessary to restart MPE720. Note that the **On** or **Off** setting is retained, so this operation is not required from the next start-up.

7.2.2 Starting the Trace Manager

The Trace Manager can be started by using any of the following five methods.

- In the tree on the **File Manager** window, double-click **Data Trace** under the **Definition Folder**.
- Select *File - Open - Definition - Data trace definition* from the pull-down menus in the **Engineering Manager** window.
- Click the **Data Trace Definition** icon ![icon] on the Engineering Manager window.
- Select *Tool - Trace Manager* from the pull-down menus in the New Ladder Editor.
- Click the **Trace Manager** icon ![icon] on the New Ladder Editor.

(1) Layout of the Trace Manager Window

The **Trace Manager** window comprises three areas: the operation panel, graph and list.
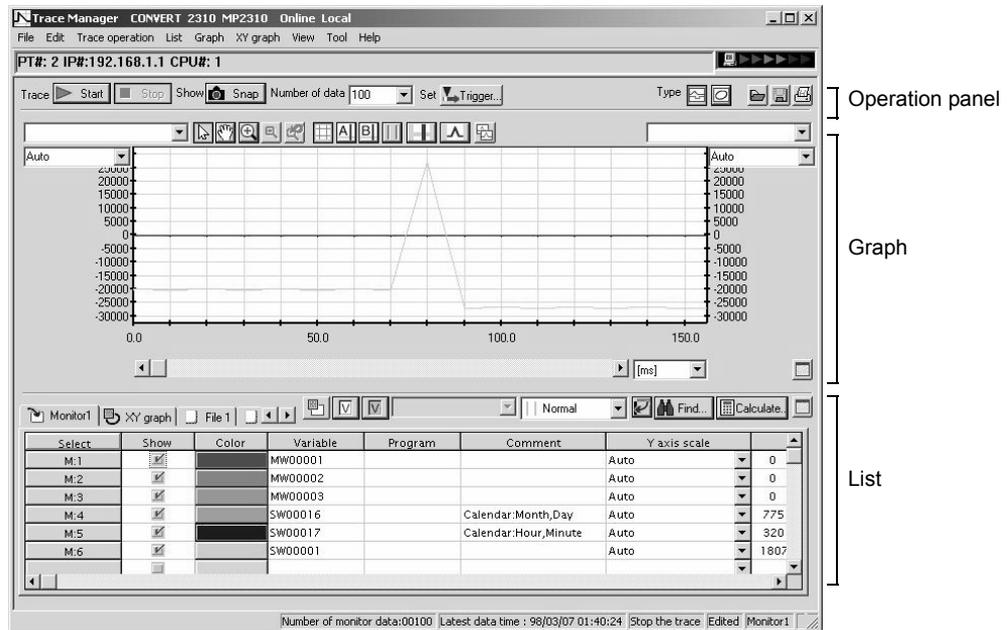
- **Operation Panel Area**

  This area is used for general data trace operations, such as starting and stopping a trace, trigger settings, etc. It is always displayed, regardless of the graph or list display mode.

- **Graph Area**

  This area displays trace data. Either a trend graph or an X-Y graph can be selected. The graph area is not displayed when the list area display is maximized.

- **List Area**

  This area is used for operations such as assigning and deleting monitor variables. Monitor variables are displayed in list format. The list area is not displayed when the graph area display is maximized.

7.2.3 Trace Operations

The main operations of the data trace functions are performed from the operation panel or the pull-down menus.

(1) Trace Execution

The functions relating to trace execution are trace initialization, trace termination, snapshot, and number of monitor data setting.

Symbol	Name	Meaning	Remarks
▷ Start	Initialize Trace	Starts the data trace. If an initiate trigger has been set, the system waits for the trigger.	This function doesn't work in offline mode.
■ Stop	Terminate Trace	Stops the data trace. When a trace is stopped, all the trace buffer data is acquired.	This icon can only be clicked when a data trace is being executed.
📷 Snap	Snapshot	Acquires the data in the trace buffer during execution of a data trace. Clicking the icon again restores to the normal trace execution status.	Monitoring stops. There is no effect on the trace execution status.
100 ▼ / All Data / 100 / 1000	Number of Monitor Data	Sets the maximum number of monitor data that can be acquired on stopping or taking a snapshot. It is possible to select from **All Data**, **100** or **1000**, or you can enter a number drectly.	When entering a number directly, the maximum value that can be entered is 32158. One bit of data is counted as one word.
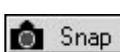
(2) Trigger Setting

Set the initiate trigger and terminate trigger for a data trace as follows.
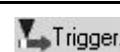
Symbol	Name	Meaning	Remarks
📍Trigger...	Trigger and Configuration	Displays the **Trigger and configuration** window.	–

When the **Trigger and configuration** window is first displayed, it appears as the simple setting screen.
Clicking the **Extend set** button changes its appearance to the detailed setting screen.
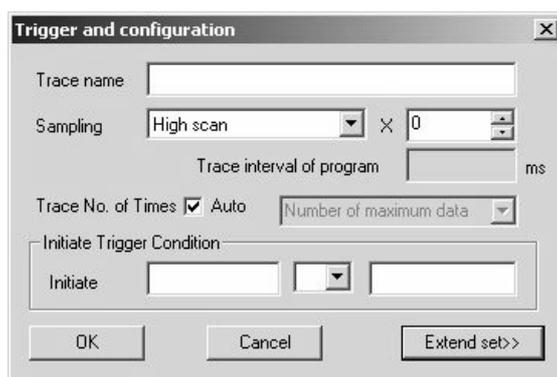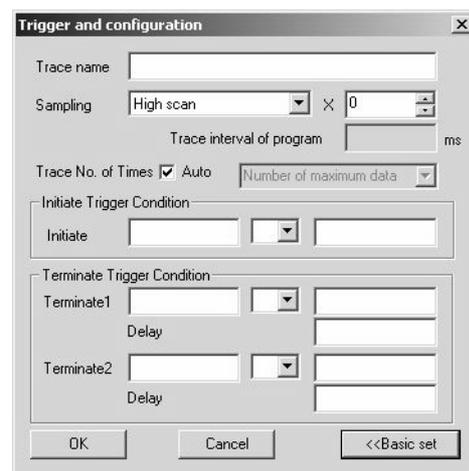
Simple setting screen   Detailed setting screen

Each of the items in the **Trigger and configuration** window is explained in the following table.

Item	Sim-ple	De-tail	Setting	Description
Trace Name	✓	✓	Text String	Any character string comprising up to 32 single byte characters or 16 double byte characters can be specified.
Sampling	✓	✓	**High Scan**, **Low Scan**, **Super High Scan**, **Specified by Program**	Specifies the data sampling condition. The **Super High Scan** setting is only available with MP940.
Sampling Interval	✓	✓	0 to 32767	Specifies the data sampling interval. When 0 is set, traces are performed every time.
Trace Interval of Program	✓	✓	0.1 to 999.9	Specifies the time in ms. The value set here is used for the time axis. This setting is valid only when the sampling condition is for specification by program.
Trace No. of Times (Data Size)	✓	✓	**Auto** **Number of maximum data**, **100**, **1000** 1 to 999999	Specifies the number of data traces. When **Auto** is selected, data tracing continues until the terminate trigger condition is met or until the **Stop** button is clicked.
Initiate Trigger Condition	✓	✓	[Register number] [> / < / = / <> / >= / <=] [Number]	Specifies the trigger for initiating the trace operation. If nothing is specified, tracing will start at the same time as sampling starts.
Terminate Trigger Conditions 1 and 2	–	✓	[Register number] [> / < / = / <> / >= / <=] [Number]	Specifies the trigger for terminating the trace operation. One or two terminate triggers can be set. If nothing is specified, tracing will be executed until sampling stops.
Number of Terminate Delays	–	✓	0 to 65534	Specifies how many times sampling is to be executed and tracing terminated after the termination condition is met.

✓: Item available –: Item not available

(3) Graph Type Selection

Select the type of graph to be displayed in the graph display area (the display mode). You can select either of two types of graph: the trend graph and the X-Y graph.

Symbol	Name	Meaning	Remarks
	Trend Graphs	Displays trend gaphs.	–
	X-Y Graphs	Displays X-Y gaphs.	–

(4) File Operations

Import/export files and print data.

Symbol	Name	Meaning	Remarks
	Import	Reads trace data and definitions from the selected file.	–
	Export	Outputs the trace data and definitions to the selected file.	–
	Print	Prints trace settings, graphs, lists, etc.	–

7.2.4 Graph

You can select the type of graph to be displayed as either a trend graph or an X-Y graph.

(1) Trend Graphs

In the trend graph display mode, the set monitor variables are indicated on the graph in time series.
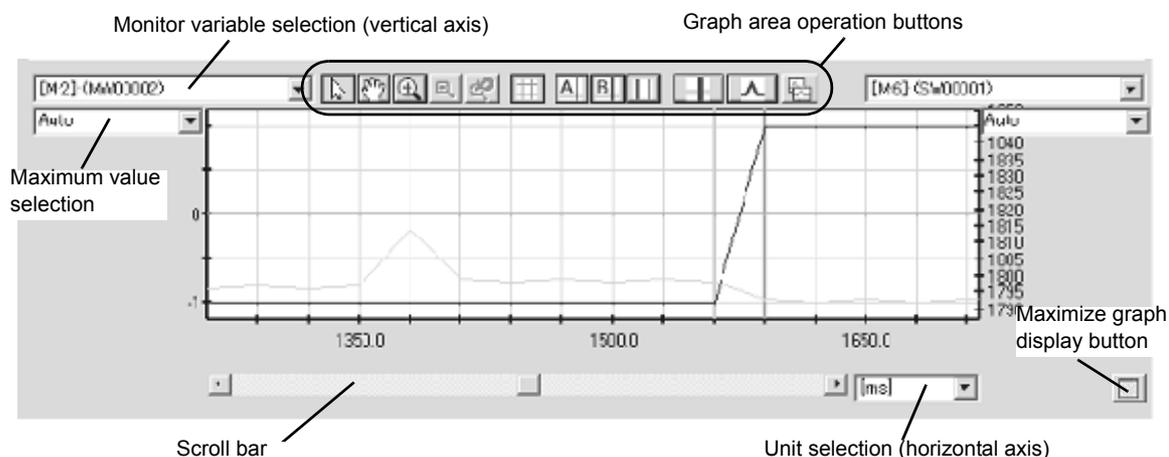
The horizontal axis of the graph represents the time at which trace data is sampled. The units can be selected from ms, sec, min, and data. Scrolling on the horizontal axis can be done either by using the scroll bar or by using the pointer scroll mode.

The vertical axis of the graph represents the value of the trace data, and you can make two settings, at the left and right of the graph, for both the monitor variable name and maximum value. Monitor variables can only be set during a trace termination or during a snapshot. In addition to during a trace termination and during a snapshot, the maximum value for the graph can also be set during execution of a trace. When the maximum value is changed, the display position of the variable set for the Y1 axis or the Y2 axis as the Y-axis scale in the list display changes.
Refer to • *Monitor Page in 7.2.5 (1) Changing Pages* or Y-axis scale.

Operations such as pointer settings, cursor settings, scale adjustments, and graph copying can be performed in this mode.

• Pointer Settings

By switching the pointer (mouse cursor) mode, you can perform operations such as scrolling the graph and zooming in and out.

Symbol	Name	Meaning	Remarks
	Select	Sets the pointer for adjusting the graph offset.	Graph data for which **Auto** is set as the Y-axis scale in the list cannot be moved by dragging.
	Scroll	Sets the cursor for scrolling the graph.	–
	Zoom In	Sets the cursor for zooming into the graph. The area that is selected by dragging is displayed enlarged.	–
	Zoom Out	Sets the cursor for zooming out of the graph. On clicking this icon, the graph is reduced to the next smaller size.	This icon functions when you have zoomed into the graph.
	Reset	Returns the graph to its original scale.	This icon functions when you have zoomed into the graph.

- Grid

You can set whether to display or hide the grid in the graph.

Symbol	Name	Meaning	Remarks
	Grid	Toggles between displaying and hiding the grid.	−

- Cursor Operations

The sampling time and data at the point specified with the cursor are displayed. Two cursors, A and B, are provided, and you can select whether to display or hide each of them. You can also use these operations to change the display positions of the two cursors, either independently or in a linked manner, and to compare data and ascertain wave forms.

Symbol	Name	Meaning	Remarks
A	Cursor A	Selects the display or hide state for cursor A.	−
B	Cursor B	Selects the display or hide state for cursor B.	−
	Cursor A/B with Fixed Interval	Displays cursors A and B so that they are moved in a linked manner, maintaining a fixed interval between them.	This icon is active when both cursors A and B are displayed.
	Cursor Setting	Selects whether the **A/B Cursor** window is displayed or not.	−

The **A/B Cursor** window is shown below.
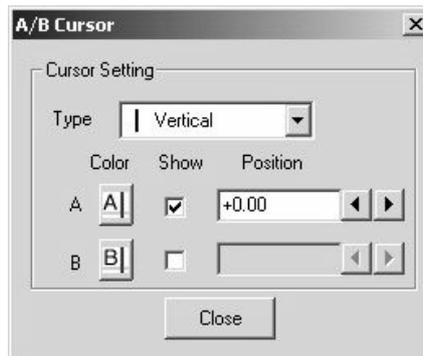
The following items can be set in the **A/B Cursor** window.

Symbol	Name	Meaning	Remarks
Vertical / Vertical / Cross	Type	Selects either the **Vertical** (|) or **Cross** (+) cursor shape.	The cross cursor is displayed when a monitor variable is activated in the select field of the list display. The center of the cross cursor will move over the selected monitor variable.
A B	Color	Selects the cursor color.	When the icon is clicked, the **Color Setting** window will be displayed.
☑ ☐	Show	Selects whether to display or hide the cursors.	The cursors are displayed by selecting their respective checkboxes.
+0.00	Position	Adjusts the display positions of the cursors. You can either enter a value directly or use the spin buttons.	When a value is entered directly, it is adjusted to the grid position.

On left-clicking within the graph area, the cursors move in accordance with the conditions, as follows.

- When only Cursor A (or only Cursor B) is Displayed
  Cursor A (or B) moves to the clicked location.
- When Cursors A and B are Both Displayed and Linked
  Cursor A will move to the location that was clicked and cursor B will move with it at a fixed interval.

- When Cursors A and B are Both Displayed but Not Linked
  If the cursor mode in the list area is either **Normal** or **Cursor as A**, cursor A moves to the point that is clicked while cursor B doesn't move. If the cursor mode in the list area is **Cursor as B**, cursor B moves to the point that is clicked while cursor A doesn't move.
  Note: When **Cursor A/B with same interval** is not selected, **Cursor A/B** cannot be selected as the cursor mode in the list area. Conversely, when **Cursor A/B with same interval** is selected, neither **Cursor as A** nor **Cursor as B** can be selected as the cursor mode in the list area.

- Scale Offset Adjust

  The **Scale offset adjust** window allows you to adjust the scale and offset of each axis in the graph.

Symbol	Name	Meaning	Remarks
	Scale Offset Adjust	Selects whether to display or hide the **Scale offset adjust** window.	–

The **Scale offset adjust** window is shown below.
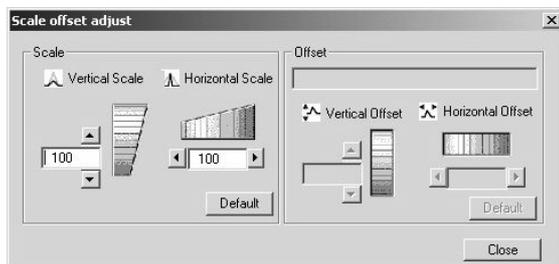
Scale adjustment doesn't require the selection of an object. Offset adjustment is effective when the object of offset adjustment has been selected in the Select field of the list area. It cannot be used without selecting the object of offset adjustment. Note that it cannot be used if the selection is cancelled after displaying the window either. In such cases you can use the function by selecting offset adjustment in the list area to activate it.

Note: Use the Select field in the list to select the offset adjustment object. On the Monitor Page and File Pages, the selected object will be a monitor variable. The offset adjustment horizontal axis will be the sampling time, and the vertical axis will be the data value of the selected monitor variable. On an the XY graph Page, the monitor variables set for the vertical and horizontal axes become the objects. The offset adjustment horizontal and vertical axes will be the data values for the variables that are set. For details on pages, refer to *(1) Changing Pages*.

The icons in the **Scale offset adjust** window are explained in the table below.

Symbol	Name	Meaning	Remarks
100	Vertical Scale Set Value	Sets the vertical scale. Enter a value directly or use the spin buttons.	The setting range is 100 to 1000.
	Vertical Scale Adjustment Bar	Adjusts the vertical scale. Drag up and down using the mouse.	–
100	Horizontal Scale Set Value	Sets the horizontal scale. Enter a value directly or use the spin buttons.	The setting range is 10 to 1000.
	Horizontal Scale Adjustment Bar	Adjusts the horizontal scale. Drag up and down using the mouse.	–
[M:1]-<MW00001>	Offset Adjustment Variable	Displays the variable name for the offset adjustment object.	–
0.00	Vertical Offset Position Set Value	Sets the vertical offset position. Enter a value directly or use the spin buttons.	The setting range is −100.00 to 100.00.
	Vertical Offset Adjustment Bar	Adjusts the vertical offset position. Drag up and down using the mouse.	–
0	Horizontal Offset Position Set Value	Sets the vertical offset position. Enter a value directly or use the spin buttons.	If an object (sampling time) has been selected at the **Monitor** page or **File** pages, the setting range is −99 to 99, and if an object (variable value) has been selected at the **XY graph** page, the setting range is −100.00 to 100.00.
	Horizontal Offset Adjustment Bar	Adjusts the horizontal offset position. Drag up and down using the mouse.	–
Default	Default	Returns the scale or offset to their default values. Vertical scale: 100 Horizontal scale: 100 Vertical offset: 0.00 Horizontal offset: 0	The default value for the horizontal offset is 0.00 when an object is selected at the **XY graph** page.
Close	Close	Closes the **Scale offset adjust** window.	–

• Copy Graph

This is a function for copying a graph to a clipboard. This makes it possible to paste the graph as a graph image into other Windows applications (e.g. Microsoft Word, Excel, PowerPoint).

Symbol	Name	Meaning	Remarks
	Copy Graph	Copies the graph to the clipboard.	–

Definition Folder 4: Data Trace Definitions

7

• Maximum Graph Display

Usually, the **Trace Manager** window shows the operation panel, the graph area and the list area, but on clicking the maximum graph display icon, the list area disappears and the graph area is maximized.

Symbol	Name	Meaning	Remarks
	Maximum Graph Display (Set)	Hides the list and maximizes the graph display.	This icon is effective only during normal graph display.
	Maximum Graph Display (Cancel)	Displays the list and returns the graph to its normal display.	This icon is effective only during maximum graph display.

The **Trace Manager** window with maximum graph display set is shown in the figure below.
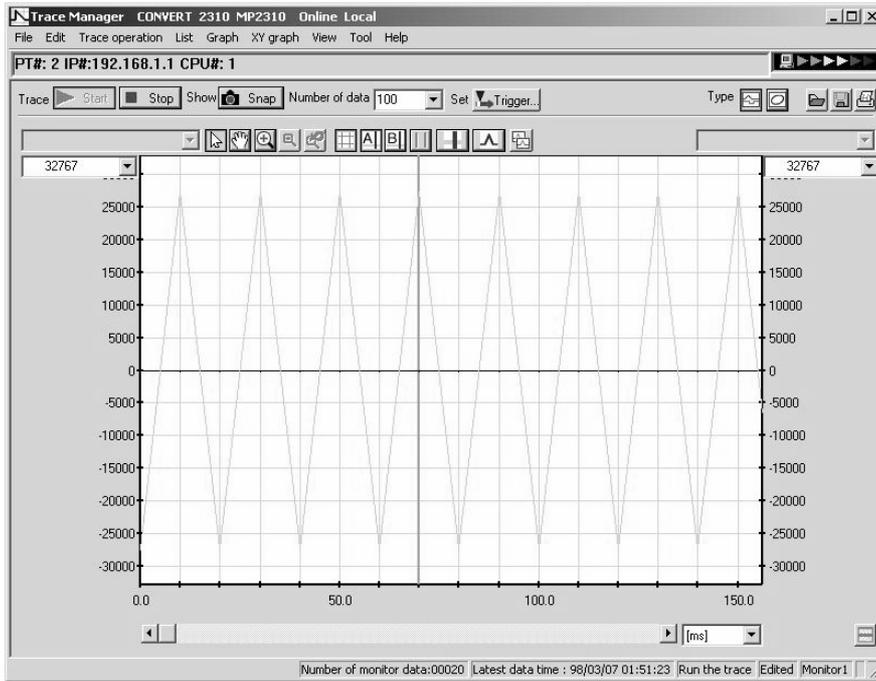
(2) X-Y Graphs

This is a graph that, by plotting two specified monitor variables (variable X and variable Y) on the horizontal axis and vertical axis, shows the relationship between these variables over a certain time.
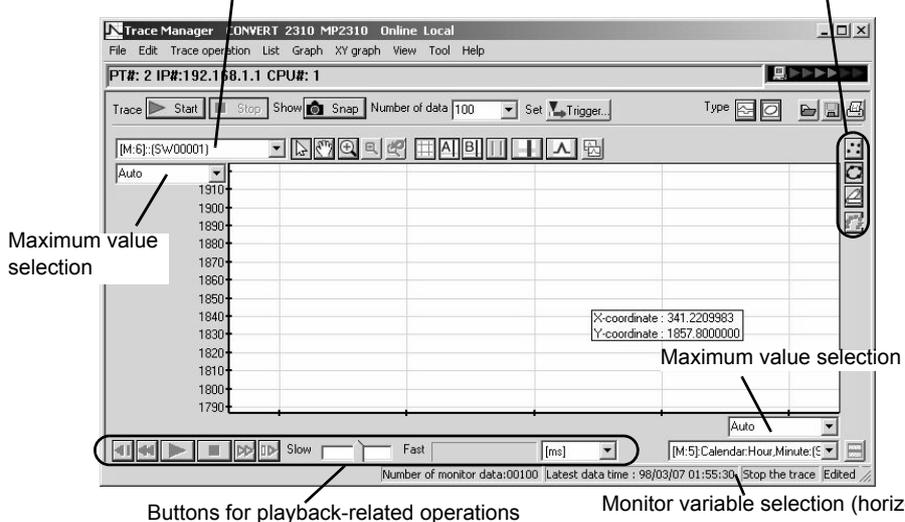
In the same way as for the vertical axis of a trend graph, a variable name and maximum value can be set for the horizontal and vertical axes of the X-Y graph. While an X-Y graph is being displayed, display settings and playback operations are possible in addition to all of the operations available during trend graph display.

• Display Settings

The display settings for an X-Y graph can be changed.

Symbol	Name	Meaning	Remarks
	Point Display	Displays coordinates as points.	–
	Line Display	Displays coordinates connected by lines.	–
	Model Display	Displays coordinates connected by lines according to connected point data.	For details on connected points, refer to *7.2.5 (1) • XY Graph Page*.
	Tracks	Selects whether to leave tracks or not.	This icon is effective only during point display.

• Playback

The playback function reproduces displays of data captured before tracing is stopped, or data captured for snapshots. Operations such as playback, stop, fast forward, fast return, slow-motion forward, and slow-motion return can be performed.

Playback can be executed when an X-Y graph is displayed. There is no time information included in an X-Y graph, so this function is provided to display changes in data with the elapsed time.

Symbol	Name	Meaning	Remarks
	Playback	Replays an X-Y graph from the beginning of the traced data.	–
	Stop	Stops the replaying of an X-Y graph at the point where this button is clicked.	–
	Fast Forward Fast Return	Executes fast forward/fast return at the specified rate. On cancellation, replay is automatically resumed.	Can be used only during playback.
	Slow-motion Forward Slow-motion Return	Executes slow-motion forward or return.	–
–	Return to Beginning	Returns you to the beginning of the traced data.	*XY graph - Return to Beginning*, from the pull-down menus
–	Forward to End	Takes you forward to the end of the traced data.	*XY graph - Forward to End*, from the pull-down menus
Slow ⌐ ⌐ Fast	Rate Setting	Sets the fast forward and fast return rate.	–
270.00 [ms]	Execution Time	Displays the execution time for the playback display.	The unit can be set to **ms**, *sec*, **min**, or **data**.

(3) Pop-up Menu

Right-clicking within the graph area displays the pop-up menu shown in the figure below.
The operations that you can perform from this menu are the same as those covered by the icon buttons, so refer to the icon operations already described for details.

Refer to • *Pointer Settings* in *7.2.4 (1) Trend Graphs*.

Refer to • *Cursor Operations* in *7.2.4 (1) Trend Graphs*.

Refer to • *Scale Offset Adjust* in *7.2.4 (1) Trend Graphs*.
Refer to • *Cursor Operations* in *7.2.4 (1) Trend Graphs*.
Refer to *7.2.3 (2) Trigger Setting*.
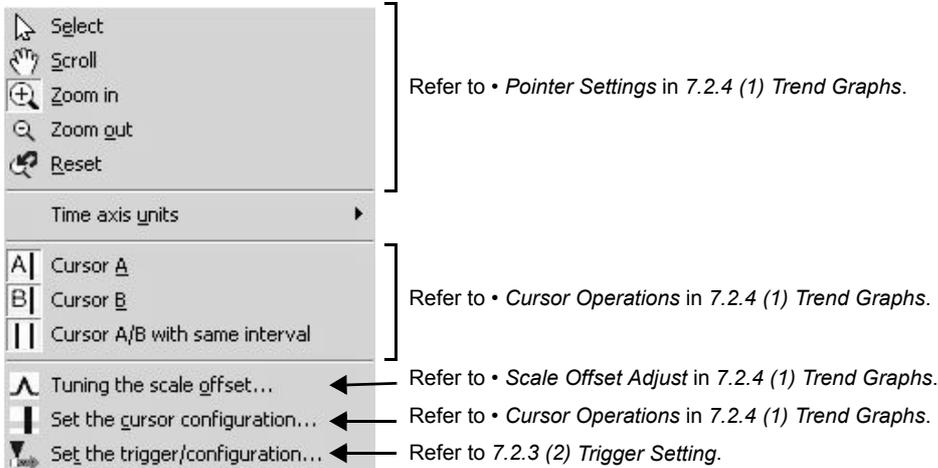
7.2.5 List

In the list area you can perform management operations such as assigning and deleting monitor variables for data traces and displaying trace data in list form.

Changing pages   List operation buttons
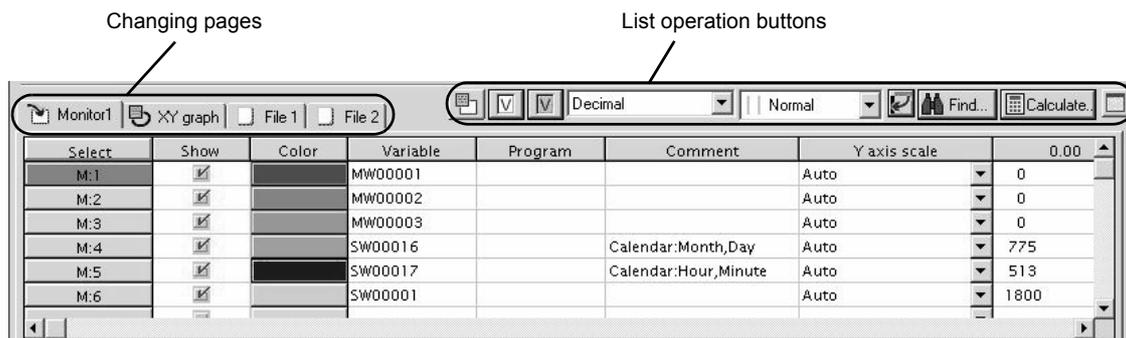
(1) Changing Pages

Three types of page are displayed in the list area: **Monitor** page, **XY graph** page and **File** pages. Switch among these pages by selecting the respective tabs.

• Monitor Page

You can display, assign, delete and edit monitor variables on this page. An example of the **Monitor** page display is shown below.

Item (Field)	Meaning	Editing (Setting)	Remarks
Select	Select the monitor variable to be activated here.	Possible	You can change the data view, find, calculate, adjust the offset and display the cross-shaped cursor. The following rules apply to displayed items. M:y : No.y for monitoring Fx:y : No.y for file x SUB : Difference between two variables ADD : Sum of two variables REF : Reference variable
Show	Select whether to display or hide the graph here.	Possible	☑ : displaying a graph ☐ : hiding a graph
Color	Select the color of the graph.	Possible	−
Variable	The variable name of the trace object is indicated here.	Possible	−
Program	For a D register, enter the name of the program in which the D register is used.	Possible	−
Comment	Set and display comments here.	Possible	You can display or hide comments.
Y axis scale	Set the scale for the Y-axis, selecting from *Auto*, *Y1 axis* and *Y2 axis*.	Possible	When *Auto* is set, the scale is automatically adjusted and displayed for each monitor variable. When *Y1 axis* is selected, the data is displayed according to the scale at the left side of the graph; and when *Y2 axis* is selected, the data is displayed according to the scale at the right side of the graph. You can select whether the scale data is displayed or hidden.
Maximum value	The maximum value for trace data is displayed here.	Not possible	You can display or hide the value.
Minimum value	The minimum value for trace data is displayed here.	Not possible	You can display or hide the value.
Cursor A	Values for cursor A are displayed.	Not possible	You can display or hide the value.
Cursor B	Values for cursor B are displayed.	Not possible	You can display or hide the value.
Difference (A - B)	The difference between the values for cursors A and B is displayed.	Not possible	You can display or hide the value.
Convert unit (xN)	The value for unit conversion is displayed as a magnification. Data is displayed in the form "conversion value × magnification." This item is used, for example, when converting to the machine coordinate system.	Possible	You can display or hide the value.
Data	The trace data values are displayed here.	Not possible	−

Note: For details on how to select the display or hide status, refer to *7.2.4 (3) Pop-up Menu*.

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- XY Graph Page

On the **XY graph** page, you can assign, delete, edit and display the monitor variables for displaying an X-Y graph as the graph. The appearance of the list area when the **XY graph** page is displayed is shown below.
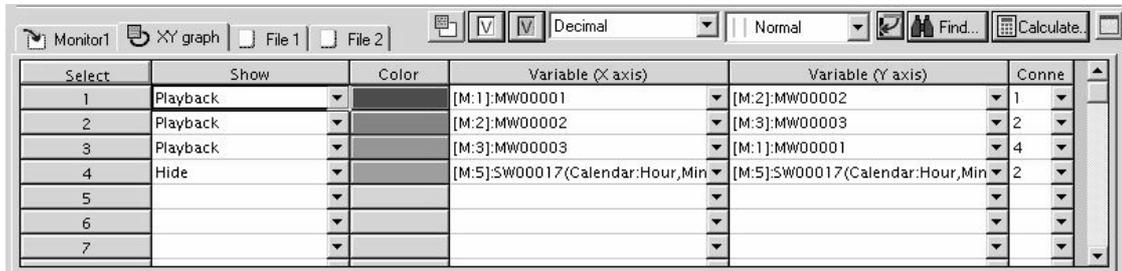
The items indicated in the table below are displayed on the **XY graph** page.

Item (Field)	Meaning	Editing (Setting)	Remarks
Select	Select the object to be activated here.	Possible	Once the object is activated, offset adjustment and displaying the cross cursor is enabled.
Show	Select the display method for the graph here. *Hide*, *Fixed display*, or *Playback* can be selected.	Possible	*Hide*: Data is not displayed on a graph. *Fixed display*: Data is displayed on a graph when tracing is executed. *Playback*: data is displayed on a graph when playback is executed.
Color	The color selection window is displayed, allowing you to select a color.	Possible	–
Variable (X axis)	The variable name of the trace object on the X axis (horizontal axis) is indicated here. You can set these variables by selecting from the variables that have been set on the Monitor Page.	Possible	–
Variable (Y axis)	The variable name of the trace object on the Y axis (vertical axis) is indicated here. You can set these variables by selecting from the variables that have been set on the monitor page.	Possible	–
Connection Point	Set the connection target number in the model display. Either *Nothing* or the *Select* number set for the XY graph Page can be selected.	Possible	–
Cursor A	When cursor A is displayed, the cursor A data value is indicated here.	Not possible	You can display or hide the value.
Cursor B	When cursor B is displayed, the cursor B data value is indicated here.	Not possible	You can display or hide the value.
Difference (A - B)	When cursor A and B are displayed, the difference between the values for cursors A and B is displayed.	Not possible	You can display or hide the value.

Note: For details on how to select the display or hide status, refer to *7.2.4 (3) Pop-up Menu*.

- File Pages

File pages display monitor variable data that has been imported from a file. On displaying the **File** page by selecting the respective tab and importing a file, the information in that file is displayed.

The items displayed on **File** pages are the same as those displayed on the **Monitor** page. However, since the *Variable*, *Program* and *Comment* items display the information imported from a file, their information cannot be edited.

The default setting for the number of **File** pages displayed is two, but the number can be set to a maximum of eight.

Note: For details on setting the number of File pages displayed, refer to *7.2.6 (2) Option Functions*.

(2) Assigning Monitor Variables

In order to use the data trace function, monitor variables have to be assigned. Up to 16 monitor variables can be assigned.

Note: When using monitor setting selection, a maximum of 64 variables can be assigned. However, the maximum number that can be displayed at one time is 16. Refer to • *Monitor Setting* in *7.2.5 (3) List Operations*.

• Procedure for Assigning Monitor Variables

Assign monitor variables from the **Trace Manager** window by following the procedure below.

1. Directly enter a variable (register) name in the **Variable** field on the **Monitor** page in the list area of the **Trace Manager** window to assign the variable with that name as a monitor variable.

2. Click the select variable icon [V] in the **Trace Manager** window to display the **Select variable** window. Make entries for the necessary items and the variable will be assigned with the entered information.
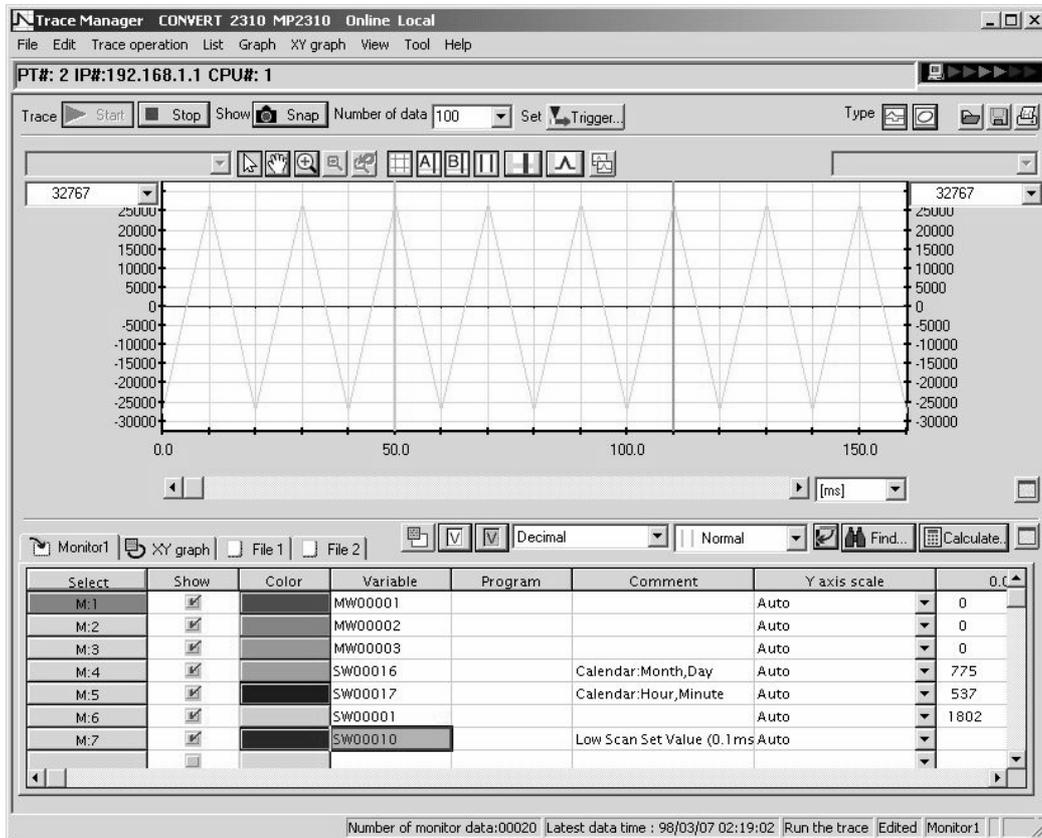
3. Click *View* - *Select variable* from the pull-down menus in the **Trace Manager** window to display the **Select variable** window. Make entries for the necessary items and the variable will be assigned with the entered information.
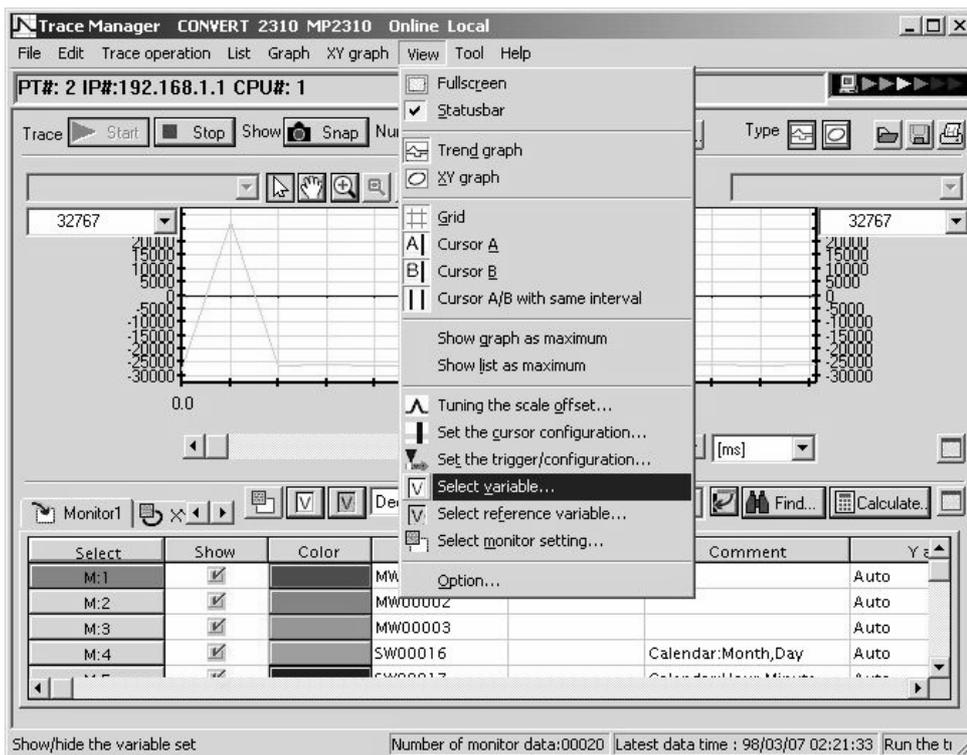
Performing the operations in steps 2 and 3 displays the **Select variable** window. For details on how to set monitor variables in the **Select variable** window, refer to in • *Variable Selection* in *7.2.5 (3) List Operations*.

Monitor variables can also be assigned by using the following methods.

- Right-click the variable name of the motion program to display its pop-up menu and then click **Assign to trace** to assign the selected variable to the Trace Manager as a monitor object.
- Right-click the variable name of the motion parameters to display its pop-up menu and then click **Assign to trace** to assign the selected variable to the Trace Manager as a monitor object.
- Right-click the variable name of the New Ladder Editor to display its pop-up menu and then click **Assign to trace** to assign the selected variable to the Trace Manager as a monitor object.
- Right-click the variable name of the Former Ladder Editor to display its pop-up menu and then click **Assign to trace** to assign the selected variable to the Trace Manager as a monitor object.

When a variable is assigned by a method other than direct entry, the variable is assigned to the line in which the selected cell on the **Monitor** page lies. If a variable has already been assigned to the line in question, it is over-written.

(3) List Operations

The operations that are possible in the list area are monitor setting, variable selection, reference variable selection, data display setting, cursor mode selection, list display direction selection, find, calculation and list maximization. These operations can be performed in any list display mode (page).

• Monitor Setting

This is a function for selecting the monitor settings for trace display. Since the maximum number of trace items that can be monitored at the same time is 16, it is easy to change the trace object by making multiple settings.

Symbol	Name	Meaning	Remarks
	Monitor Setting	Displays the **Select the monitor configuration** window.	–

Clicking the monitor setting icon displays the window shown below. You can select the monitor setting from among **Monitor1**, **Monitor2**, **Monitor3** and **Monitor4**.
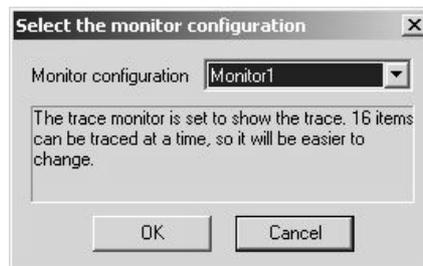
• Variable Selection

Variable selection is a function for selecting and assigning monitor variables on the **Monitor** page.

Symbol	Name	Meaning	Remarks
	Variable Selection	Displays the **Select variable** window.	–

Clicking the variable selection icon displays the **Select variable** window. By selecting different tabs in the **Select variable** window you can assign axes, I/Os, variables or system variables as monitor variables.

In order to assign monitor variables from the **Select variable** window, it is a prerequisite that a parameter name (variable comment, register comment) has been set for the register. Only registers for which a comment has been set in the area allocated to a module are displayed in the **Select variable** window, and can be assigned as monitor variables.

> Note: When a register comment is set, this comment is automatically set even when a monitor variable has been set by directly entering a register number in the list area.

Comments are registered as the default only for system variables. When the **System Variable** tab has been selected, the **Select variable** window is displayed as shown below.
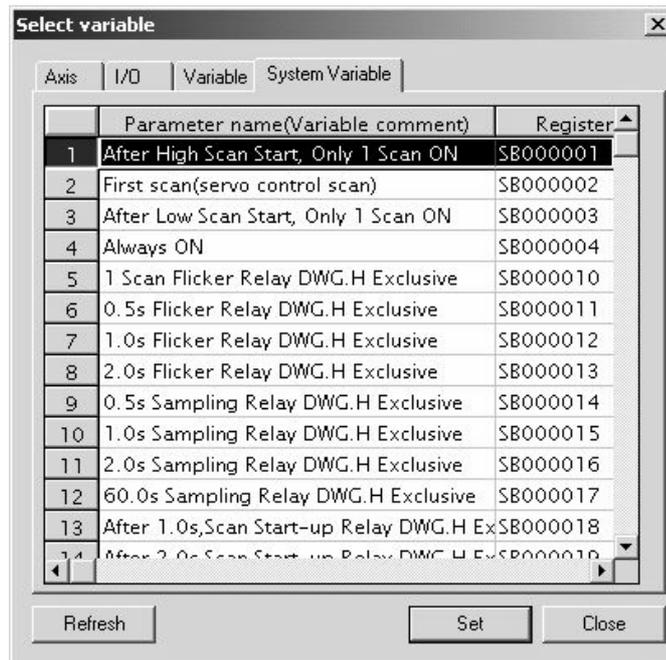
To assign a system variable as a monitor variable, select the system variable in question from the list and click the **Set** button.

Since comments are not set by default for the registers of axes, I/Os or variables, other than system variables, they cannot be displayed in the **Select variable** window and for this reason it is not possible to set them as monitor variables from the **Select variable** window without making a change. In order to set them as monitor variables from the **Select variable** window you must set comments for the registers in a separate operation.

Comments are set by manually entering a comment for the register number of each register using the **Engineering Manager** window (comment list, quick reference, etc.). Note that automatic setting with the Import Axis Comments function is only possible for axis registers.

Note: For details on how to enter comments manually, refer to the separate documentation on the
Engineering Manager. For details on the Import Axis Comments function, refer to *7.2.6 (3) Import Axis Comments*.

The following figure shows the **Select variable** window with the **I/O** tab selected, and with comments entered for some of the I/O registers of the local I/O module. In the following figure, the IW0500, OW0500 and OW0501 registers, for which comments have been set, are displayed, while the IW0501 register, for which no comment has been set, is not displayed.
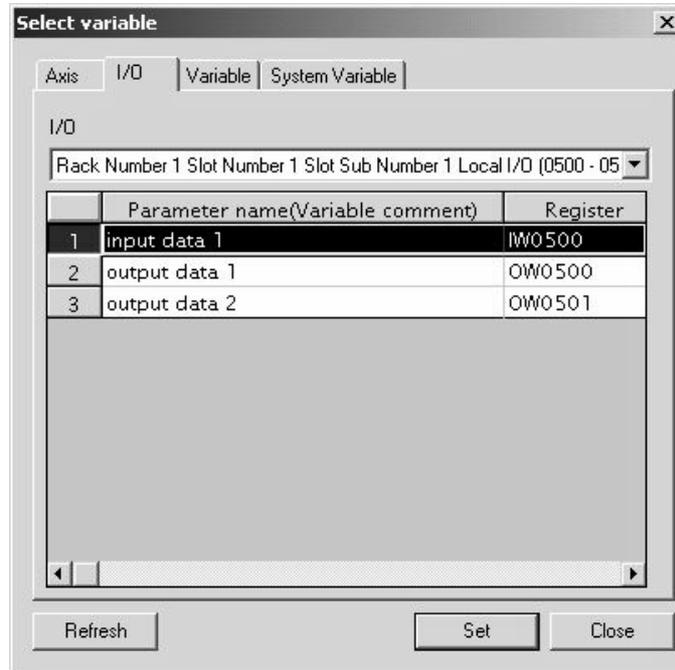
The following operations are common to all variable setting.

Symbol	Name	Meaning	Remarks
Refresh	Refresh	Updates the display with the latest information.	–
Set	Variable Setting	Sets the selected variable as a monitor variable.	This button becomes effective after the variable to be set and the location where it is to be set (displayed) have been selected. It is only effective on the **Monitor** page.
Close	Close	Closes the **Select variable** window.	–

• Reference Variable Selection

Reference variable selection is a function used to refer to the variables on the **File n** page from the **Monitor** page.

Symbol	Name	Meaning	Remarks
[V]	Reference Variable Selection	Displays the **Select reference variable** window.	–

Clicking the reference variable selection icon displays the **Select reference variable** window shown below.
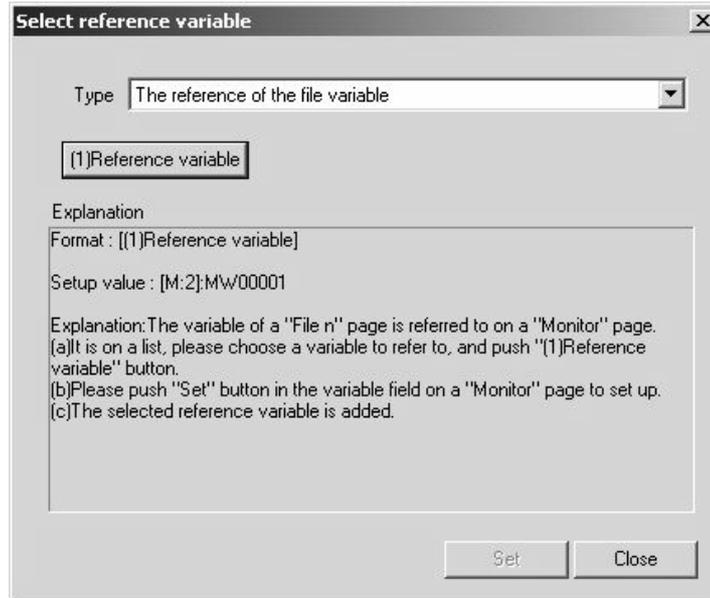
Use the following procedure to set a reference variable.

1. Select the variable that you want to refer to in the list and click the **(1)Reference variable** button.
   The selected variable name will be displayed at *Setup value*.

2. Select, from the list, the **Variable** field on the **Monitor** page that you want to set, and click the **Set** button in the **Select reference variable** window.

3. The operation above adds the selected reference variable to the selected **Variable** field.

Besides file variable, you can also select the difference with respect to the reference variable or the sum with respect to the reference variable as the reference variable type. When **The result of the subtraction of the reference variable** has been selected, the appearance of the **Select reference variable** window is as shown below. In this case, in step of the operation described above, the operation assigned to the **(2)Reference variable** button must be executed in addition to the **(1)Reference variable** button.
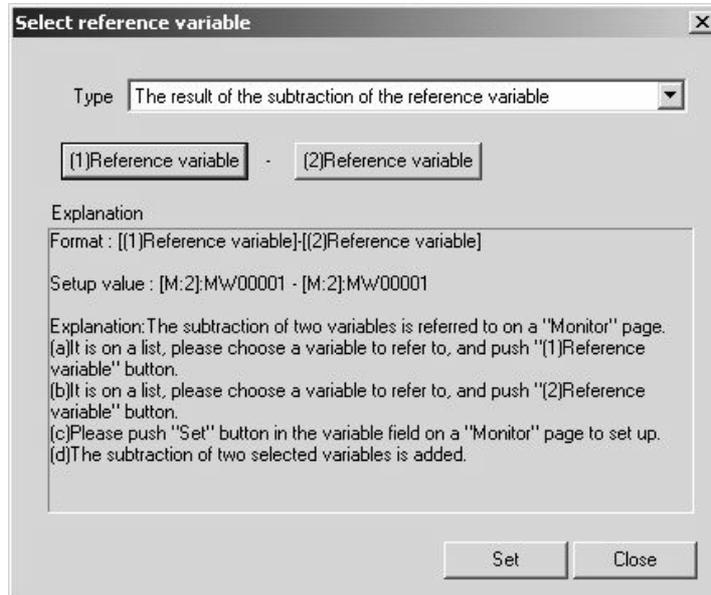
The operations in the **Select reference variable** window are summarized in the following table.

Symbol	Name	Meaning	Remarks
	Reference Variable Type	Sets the type of reference variable. **The reference of the file variable**, **The result of the subtraction of the reference variable** or **The result of the addition of the reference variable** can be selected.	–
	Reference Variable Selection	Selects the variable selected in the list as the reference variable.	The selected reference variable remains effective even after the window has been closed.
	Reference Variable Setting	Sets the selected reference variable in the list.	This button becomes effective when the necessary number of reference variables and the variable field where they are to be set have been selected.
	Close	Closes the **Select reference variable** window.	–

• Data Display Setting

This is a function for changing the data display type for the variables selected from the list

Symbol	Name	Meaning	Remarks
	Data Display	Changes the data display type for the variables selected from the list. **Decimal**, **Unsigned Decimal**, **Hexadecimal**, or **Binary** can be selected.	If no variable has been selected this function is disabled.

• Cursor Mode Selection

This is a function for scrolling the position of the list data display in a linkage with the positions of cursors A and B on the graph.

Symbol	Name	Meaning	Remarks
Normal Cursor as A/B Cursor as A Cursor as B Normal	Cursor Mode	Sets the cursor to which the data display position is to be linked. **Cursor as A/B**, **Cursor as A**, **Cursor as B**, or **Normal** can be selected. When **Cursor as A** has been selected, the data display position in the list is scrolled in a linkage with cursor A on the graph.	If cursor A (or cursor B) is not displayed, you cannot select **Cursor as A** or **Cursor as B**. When **Cursor as A/B with same interval** is not set in the graph area, **Cursor as A/B** cannot be selected. If an option that cannot be implemented is selected, the status doesn't change.

If a cursor linkage mode (**Cursor as A**, **Cursor as B**, or **Cursor as A/B**) is set, the display on the **Monitor** page and **File** pages in the list area automatically shifts to the data corresponding to the cursor position (if **Cursor as A/B** has been set, the cursor A position) to which it is linked in the settings linked to the motion of the cursor(s) on the graph. Conversely, if data is selected on the **Monitor** page or a **File** page (by clicking in a data field), the cursor that is linked in the settings moves to the position of the selected data in the graph area.

• List Display Direction Selection

This is a function for selecting the vertical or horizontal display direction for the list

Symbol	Name	Meaning	Remarks
[icon]	List Display Direction	Switches the list display direction between vertical and horizontal.	When this function is OFF, the data of each variable is displayed in the horizontal direction. When it is ON, the data of each variable is displayed in the vertical direction.

When vertical display has been selected for the list, the **Trace Manager** window is displayed as shown below.
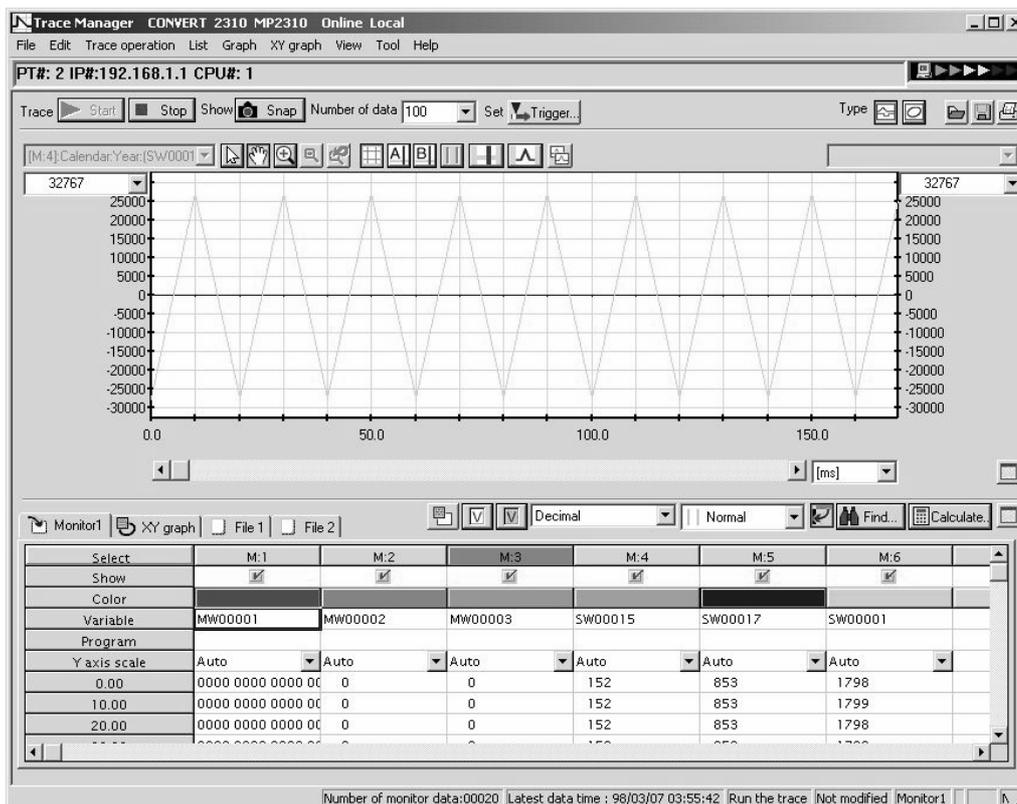
• Find

This is a function for searching for and jumping to the selected (active) variable.

Symbol	Name	Meaning	Remarks
🔍 Find...	Find	Displays the **Find** window.	−

On selecting and activating a monitor variable in the list and then clicking the find icon, the **Find** window shown below is displayed.
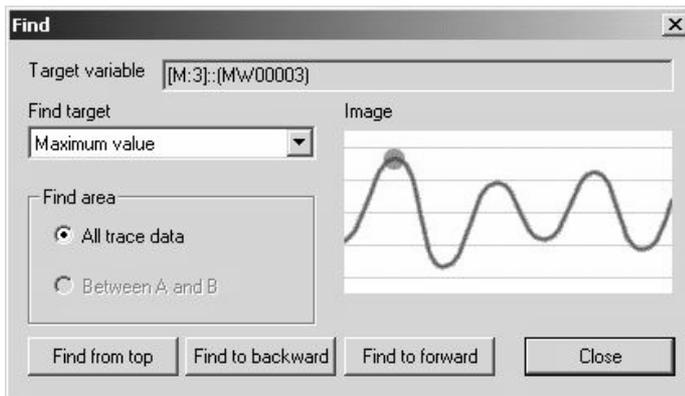
If the **Find** icon is clicked without having selected a monitor variable, or if the monitor variable selection is cancelled after the **Find** window has been displayed, the displayed **Find** window will change its appearance as shown below and it is not possible to use the find function. If this happens, select a monitor variable in the list to activate it and you will be able to use the find function.
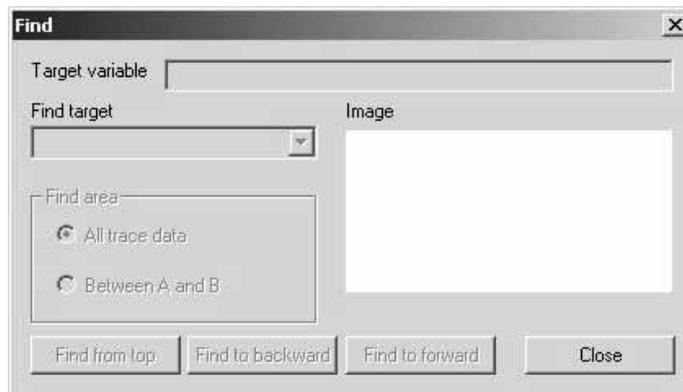
If **Time axis** is selected as the **Find target**, the **Find** window will change its appearance as shown below.
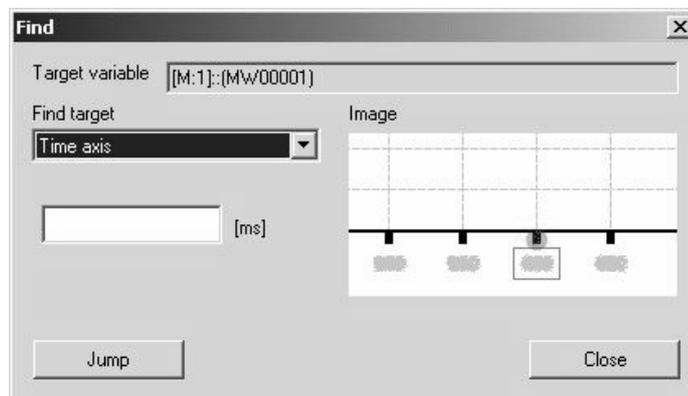
You can perform the operations listed in the table below in the **Find** window.

Symbol	Name	Meaning	Remarks
[M:1]::(MW00001)	Target Variable	Displays the variable name selected as the find target.	–
Maximum value / Minimum value / Maximum value in an area / Minimum value in an area / Time axis	Find Target	Sets the target to be found. **Maximum value**, **Minimum value**, **Maximum value in an area**, **Minimum value in an area**, or **Time axis** can be selected.	–
Find area — All trace data / Between A and B	Search Range	Selects either **All trace data** or **Between A and B** as the find area.	**Between A and B** cannot be selected when cursors A and B are hidden.
Find from top	Find from top	Searches from the top of the find area.	–
Find to backward	Find to backward	Searches backward from the present position.	–
Find to forward	Find to forward	Searches forward from the present position.	–
Close	Close	Closes the **Find** window.	–
[ms]	Time Setting	Sets the jump (find) time in units of ms.	Displayed only when **Time axis** is set as the find target.
Jump	Jump	Jumps to the data for the set time (proximity).	Displayed only when **Time axis** is set as the find target.
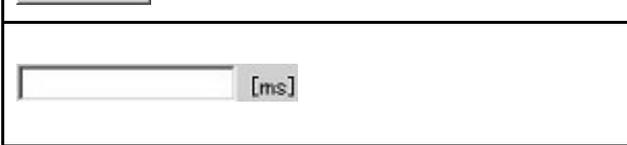
- Calculate

This is a function for performing calculations to determine the area, average value, or other value for the selected (active) variable.
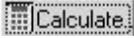
Symbol	Name	Meaning	Remarks
Calculate	Calculate	Displays the **Calculate** window.	–

Selecting a monitor variable in the list and clicking the calculate icon displays the **Calculate** window shown below.
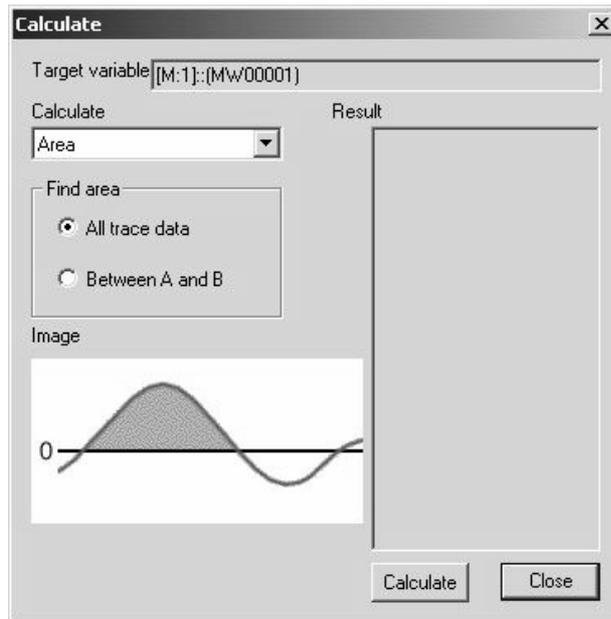
If the calculate icon is clicked without having selected a monitor variable, or if the monitor variable selection is cancelled after displaying the **Calculate** window, the displayed **Calculate** window will change its appearance as shown below and it is not possible to use the calculate function. If this happens, select a monitor variable in the list to activate it and you will be able to use the calculate function
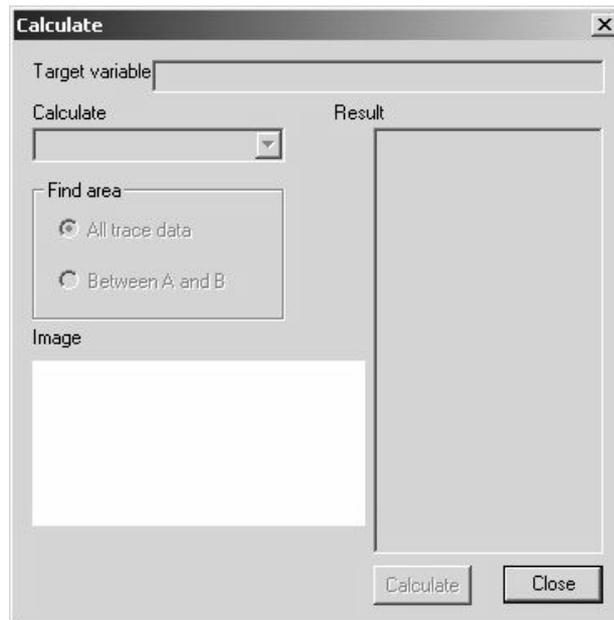
You can perform the operations listed in the table below in the Calculate Window.

Symbol	Name	Meaning	Remarks
[M:1]::(MW00001)	Target Variable	Displays the variable name for which a calculation is to be performed.	–
Area / Area / Average / Absolute average	Calculation Type	Sets the type of calculation. **Area**, **Average**, or **Absolute average** can be selected.	–
Find area / All trace data / Between A and B	Find Area	Selects either *All trace data* or **Between A and B** as the find area.	**Between A and B** cannot be selected when cursors A and B are hidden.
Calculate	Calculate	Executes the calculation.	The result is displayed in the **Result** area.
Close	Close	Closes the **Calculate** window.	–
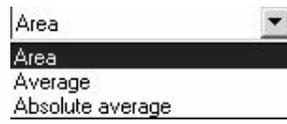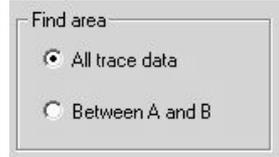
• Maximum List Display

This is a function for hiding the graph area and maximizing the list display.

Symbol	Name	Meaning	Remarks
	Maximum List Display (Set)	Hides the graph and maximizes the list display.	This icon is effective only during normal list display.
	Maximum List Display (Cancel)	Displays the graph and returns the list to its normal display.	This icon is effective only during maximum list display.

The appearance of the **Trace Manager** window when the list has been maximized is shown below.
The list is displayed in the normal format (horizontal).
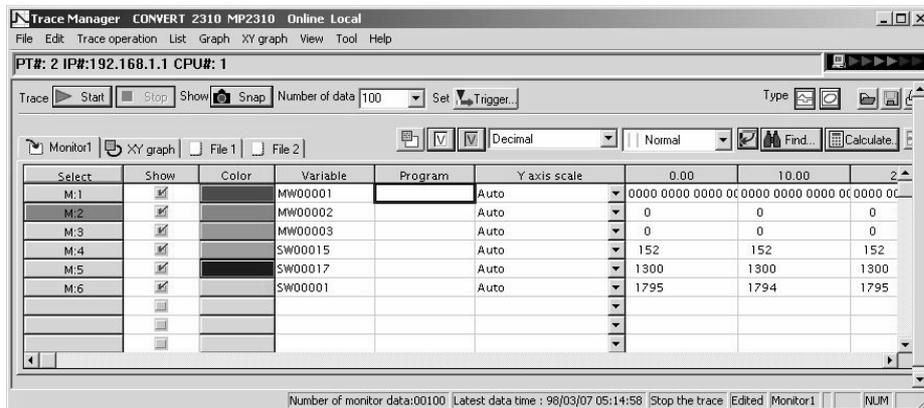
• Pop-up Menu

The following pop-up menu is displayed by right-clicking in the list area.

🗁 Import...	Ctrl+I	
🖼 Export...	Ctrl+E	
✖ Delete	Delete	
🔍 Find...	Ctrl+F	
🖩 Calculate...		
Cursor mode	▶	
▮▮ Minimum/Maximum value		
🖼 Variable comment		
▮ Cursor position		
✔ Y axis scale		
Convert unit		
Adjust cell width		
🖼 Show list vertically		
Show the data	▶	
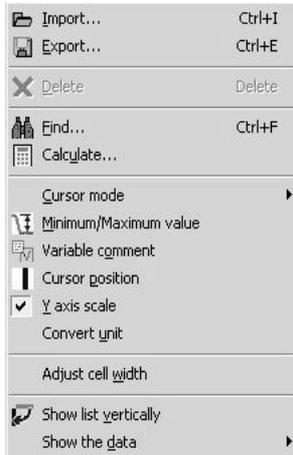
The list area's pop-up menu includes functions that cannot be executed by operating the icons.
Outline explanations of the functions other than those that can be executed by operating the icons are given in the following table.

Symbol	Item	Meaning	Remarks
✖	Delete	Deletes the selected variable from the monitor.	This function is effective when the **Variable** field has been selected on the **Monitor** page or the **XY graph** page. When a deletion is executed on the **Monitor** page, the same deletion is reflected on the **XY graph** page.
▮▮	Maximum/Minimum Value	Toggles between displaying and hiding the maximum and minimum values in the list area.	–
🖼	Variable Comment	Toggles between displaying and hiding variable comments in the list area.	–
▮	Cursor Position	Toggles between displaying and hiding **Cursor A, Cursor B**, and **Difference A-B** in the list area.	–
–	Convert Unit	Toggles between displaying and hiding **Convert Unit** in the list area.	–
–	Adjust Cell Width	Adjusts the cell width in the trace data display.	–

• Record Operation

This is a function for inserting and deleting* records. It is only effective on the Menu page and cannot be executed on the **XY graph** page or a **File** page. It can be executed from the **Edit** pull-down menu.

   * The difference between the **Delete** and **Delete the record** functions is that **Delete** just deletes the selected variable, whereas with **Delete the record** the monitor variables move upward to fill in the gap after deletion.
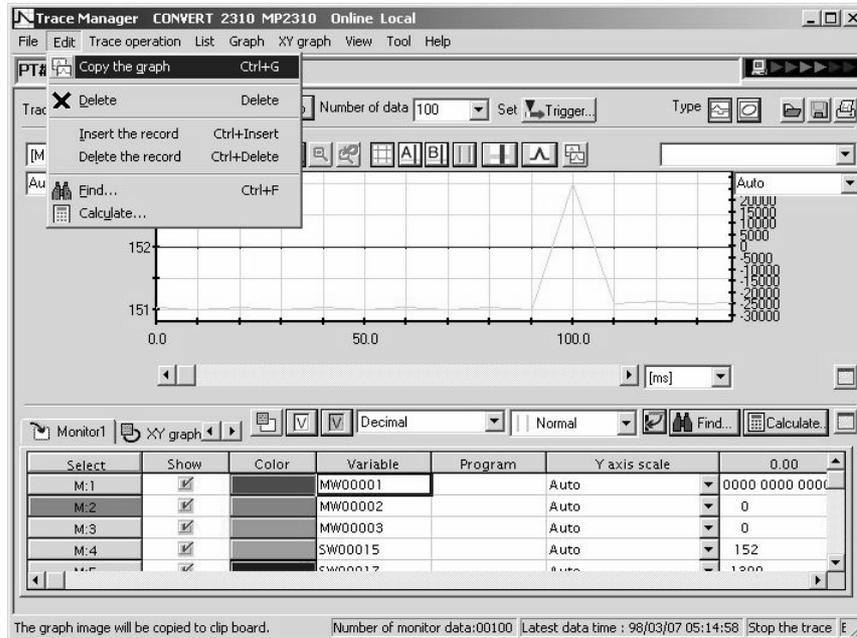
Item	Operations	Meaning	Remarks
Insert Record	**Edit** - **Insert the record**	Inserts a blank record at the selected location.	−
Delete Record	**Edit** - **Delete the record**	Deletes the selected record.	−

7.2.6 Other Functions

The other functions described here are those that can only be executed from the pull-down menus.

(1) Trace Definition

These functions are used to save, delete, etc. trace definitions. They can be executed from the **File** menu.
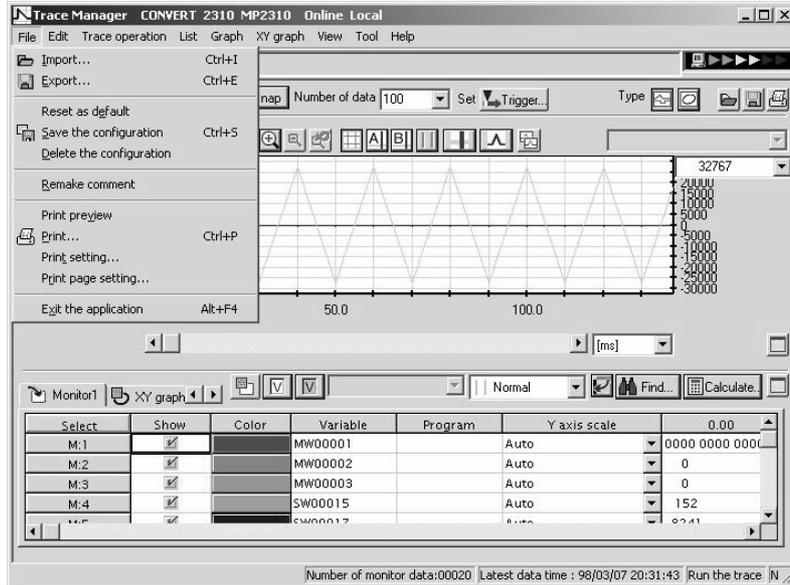
Item	Operations	Meaning	Remarks
Default Setting	**File** - **Reset as default**	Returns the trace definitions to the default status.	All monitor variables that have been assigned will be deleted.
Save Configuration	**File** - **Save the configuration**	Saves the trace definitions.	–
Delete Configuration	**File** - **Delete the configuration**	Deletes the trace definitions.	–

(2) Option Functions

The option functions can be executed from the **View** menu.
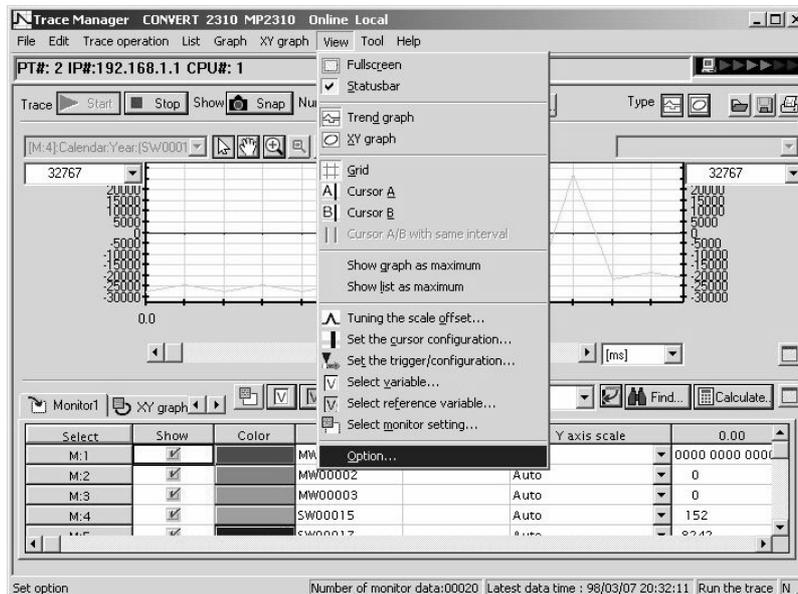
Item	Operations	Meaning	Remarks
Option	*View* - *Option*	Displays the **Option** window.	−

By selecting different tabs in the **Option** window, you can make settings relating to settings, graphs, X-Y graphs, lists and printing.

On a screen with the **Set** tab selected, you can set the default directory for CSV files to be imported/exported.

With the **Graph** tab selected you can make settings relating to graph display as listed in the following table.

Item	Settings
Background	Background color
X axis	Default unit, graduation width, scale value display interval, line type, thickness, color, font (type, size, style)
Y axis, Y1 axis, Y2 axis	Scale value display interval, line type, thickness, color, font (type, size, style)
File variable	Line type, thickness, color
Points	Thickness, color
A and B cursors	Line type, thickness, color
Grid	Line type, thickness, color
Reference variables Monitor variables	Line type, thickness, color Note: Separate settings can be made for monitor variables from 1 through 16.

With the **XY graph** tab selected, you can make settings relating to the display of X-Y graphs. The settings that you can make are playback speed (standard, minimum, maximum), fast forward rate, and default unit.

With the **List** tab selected, you can make settings relating to the display of the list. The items that can be set include *Number of file pages*. The default value for this item is 2, but values up to 8 can be set. You can also make settings relating to data display such as font (type, size, style), the colors used for the background, editing in progress, errors, and link break variables, and the number of monitor data.

With the **Print** tab selected you can select whether or not each of the trace settings, graph and list are to be printed as the information when the data trace print function is used.

(3) Import Axis Comments

The import axis comments function is a function for automatically assigning servo system (axis)-related information and monitor parameter comment information as register comments.

The import axis comments function is executed by following the procedure below.

1. Select *Tool - Import Axis Comments* from the pull-down menus in the **File Manager** window.
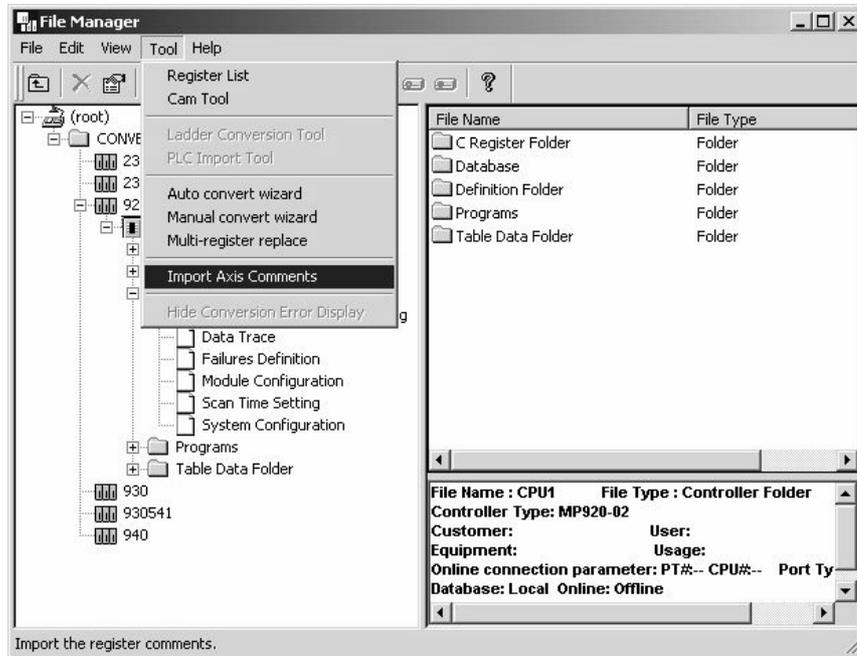
2. Select a PLC folder* or folder under a PLC folder in the tree display area or list area in the **File Manager** window, then right-click in the tree display area or list area and select **Import Axis Comments** from the pop-up menu that appears.

   Note: With MP920, this is a CPU folder or folder under a CPU folder. This is because it is possible to specify multiple CPU modules with MP920, which means that you have to specify the CPU where register comments are to be automatically assigned. If you select a PLC folder and right-click, the **Import Axis Comments** pop-up menu option is disabled.

3. Select *File - Open - Tool - Import Axis Comments* from the pull-down menus in the **Engineering Manager** window.
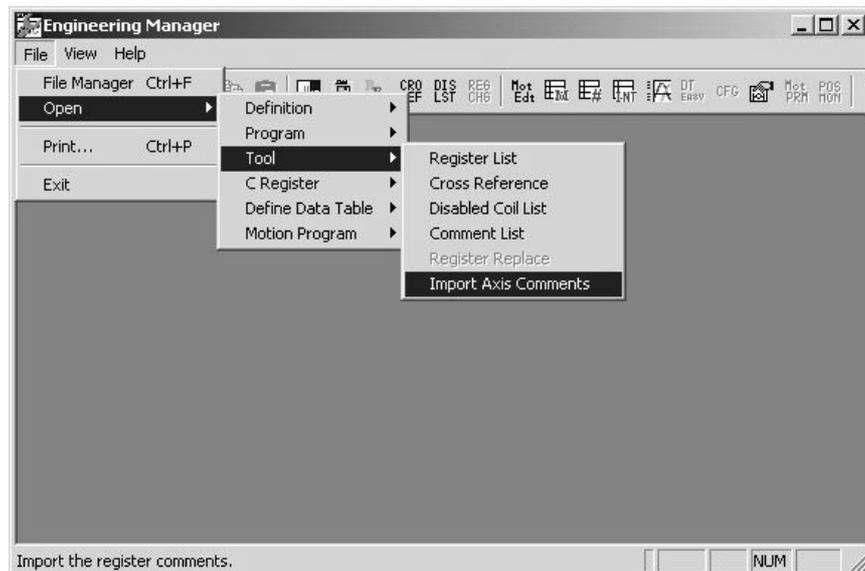
The import axis comments function is only effective when using the Trace Manager. On executing the import axis comments function, the following window is displayed.
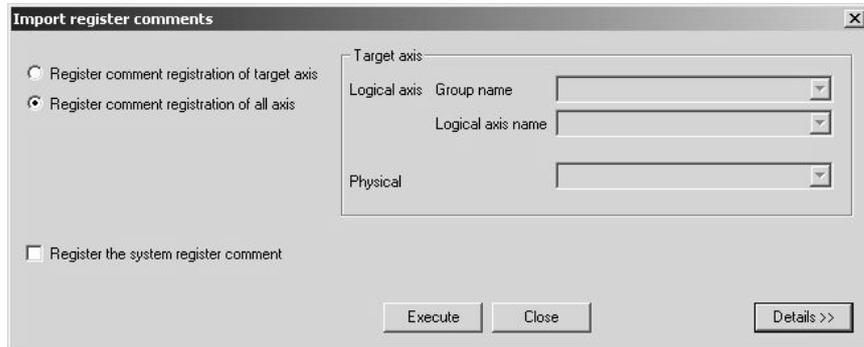
By making a selection using radio buttons, you can also use the import axis comments function to assign register comments for a specified axis (target axis) only.
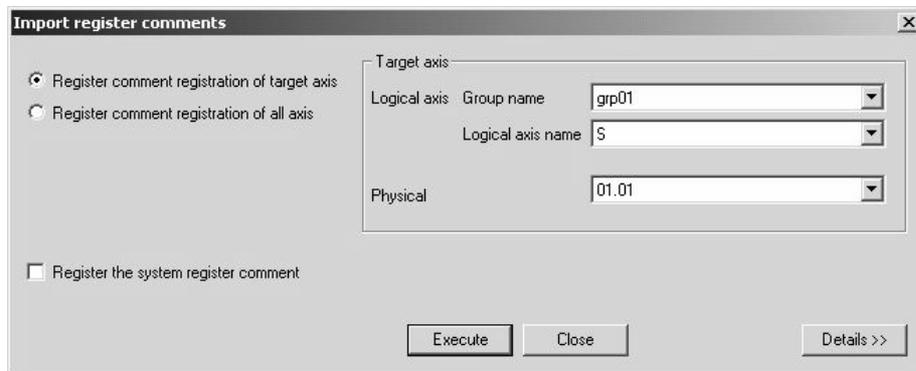
Note also that clicking the **Details** button displays the window with more detail and enables you to set comment formats.
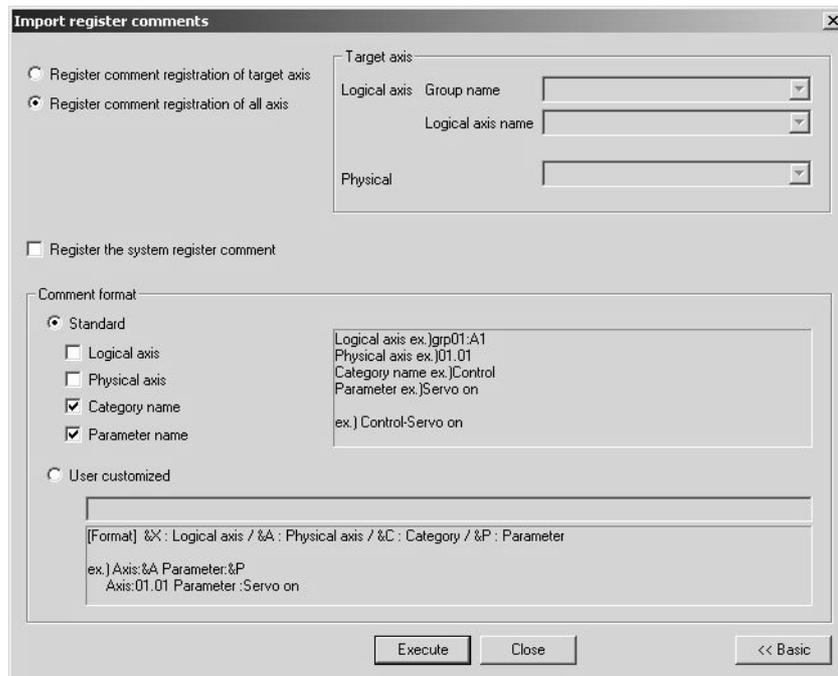
On clicking the **Set** button in the **Import register comments** window, the servo settings/monitor parameters of all axes or the target axis are assigned as register comments.

When the **Axis** tab is selected in the **Select variable** window, the appearance of the tab page changes in the way shown below before and after the execution of the import axis comments function. And after the function has been executed, it becomes possible to assign axis registers as monitor variables in the **Select variable** window.
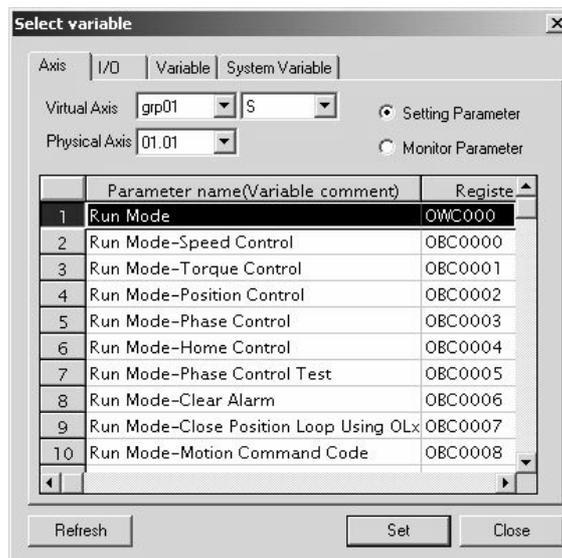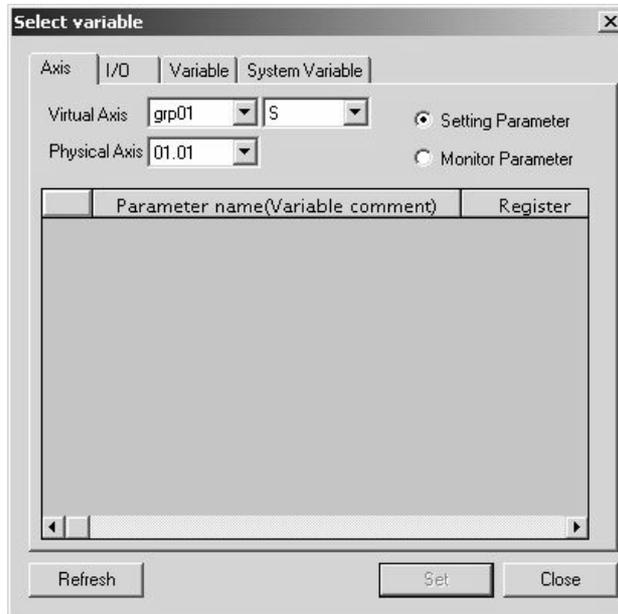
Definition Folder 4: Data Trace Definitions

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8

Definition Folder 5:
Module Configuration Definitions

This chapter explains how to set the module configuration definitions for each Machine Controller. For details, refer to the user's manual for each Machine Controller.

8.1 Machine Controller Module Configurations

8.1.1 Machine Controller MP Series 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)
MP2200	CPU-01	Block type for freely selecting optional modules.
	CPU-02	
MP2300		Block type for freely selecting optional modules.
MP2300S		Compact, all-in-one type that has a base module equipped with MECHA-TROLINK and Ethernet (100 Base-TX) ports as standard and one option slot.
MP2310		MP2300S with two option slots.

* 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 ≤ 4) in the Module configuration definitions.

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

MP910
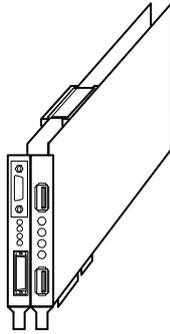
MP920
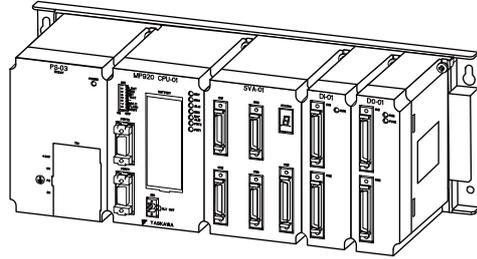
MP930
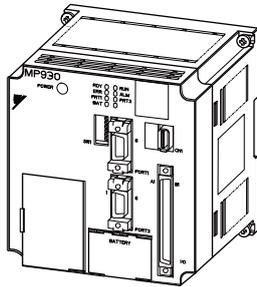
MP940
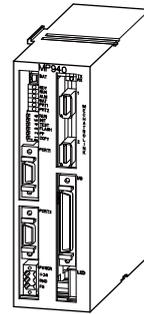
MP2100
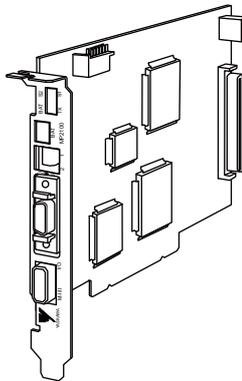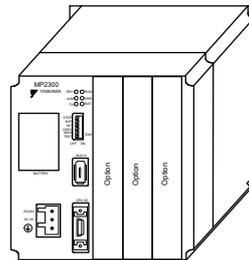
MP2300

MP2200
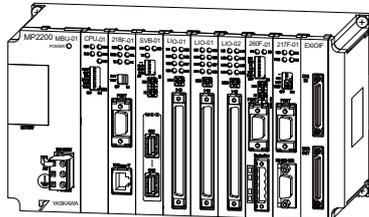
MP2300S
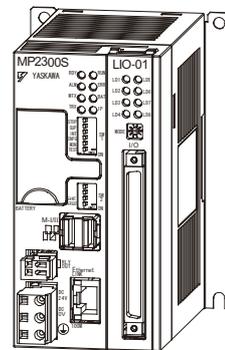
MP2310
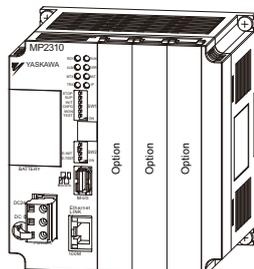
8.2 Basic Operation of Module Configuration Definitions

8.2.1 Outline

(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.
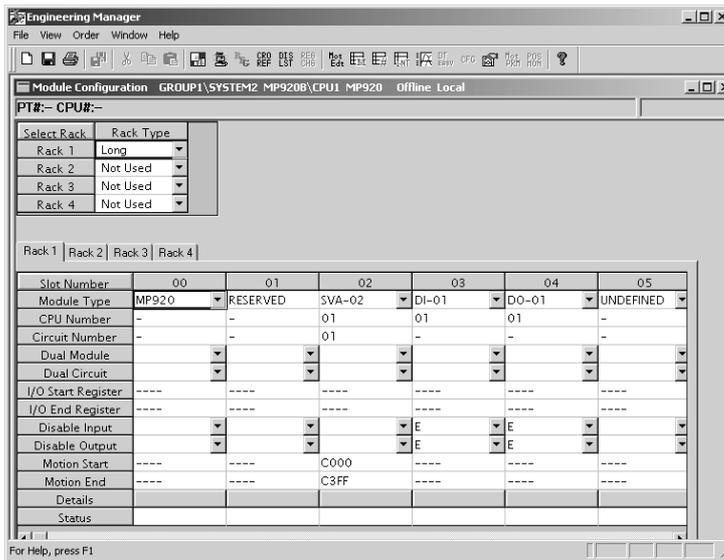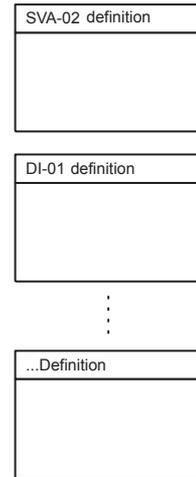
Module Configuration Window   Individual Module Definitions Windows

(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.
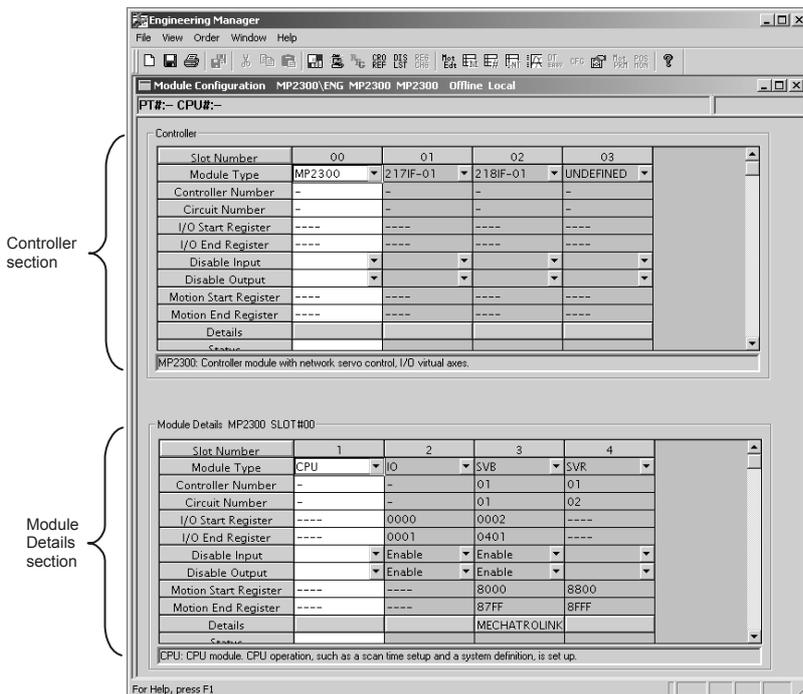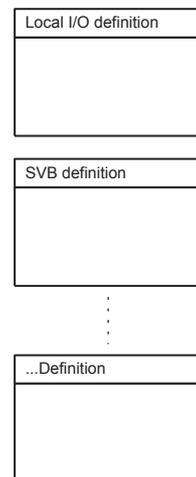
Module Configuration Window   Individual Module Definitions Windows

8.2.2 Basic Flowchart

(1) MP900 Series

```
        ┌────────────────────────────────────┐
        │  Open Module Configuration Window.  │
        └────────────────────────────────────┘
                          │
        ┌────────────────────────────────────┐
        │  Set and save Module configuration  │
        │  definition data.                    │
        └────────────────────────────────────┘
                          │
        ┌────────────────────────────────────┐
        │  Open Individual Module Definitions │
        │  Window.                             │
        └────────────────────────────────────┘
                          │
        ┌────────────────────────────────────┐
        │  Set and save individual Module      │
        │  definition data.                    │
        └────────────────────────────────────┘
                          │
      NO          ◇  All Modules defined?  ◇
                          │ YES
        ┌────────────────────────────────────┐
        │  Close Module Configuration Window. │
        └────────────────────────────────────┘
```

(2) MP2000 Series

```
        ┌────────────────────────────────────┐
        │  Open Module Configuration Window.  │
        └────────────────────────────────────┘
                          │
        ┌────────────────────────────────────┐
        │  Allocate the module definition data │
        │  in the Controller section.          │
        └────────────────────────────────────┘
                          │
        ┌────────────────────────────────────┐
        │  Set and save the module definition  │
        │  data for the allocated Module in the│
        │  Module Details section.             │
        └────────────────────────────────────┘
                          │
        ┌────────────────────────────────────┐
        │  Open Individual Module Definitions │
        │  Window.                             │
        └────────────────────────────────────┘
                          │
        ┌────────────────────────────────────┐
        │  Set and save individual Module      │
        │  definition data.                    │
        └────────────────────────────────────┘
                          │
      NO          ◇  All Modules defined?  ◇
                          │ YES
        ┌────────────────────────────────────┐
        │  Close Module Configuration Window. │
        └────────────────────────────────────┘
```

8.2.3 Opening the Module Configuration Window

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

(1) Opening from the File Manager

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

(2) Opening from the Engineering Manager

Select *File – Open – Definition – Module Configuration*.
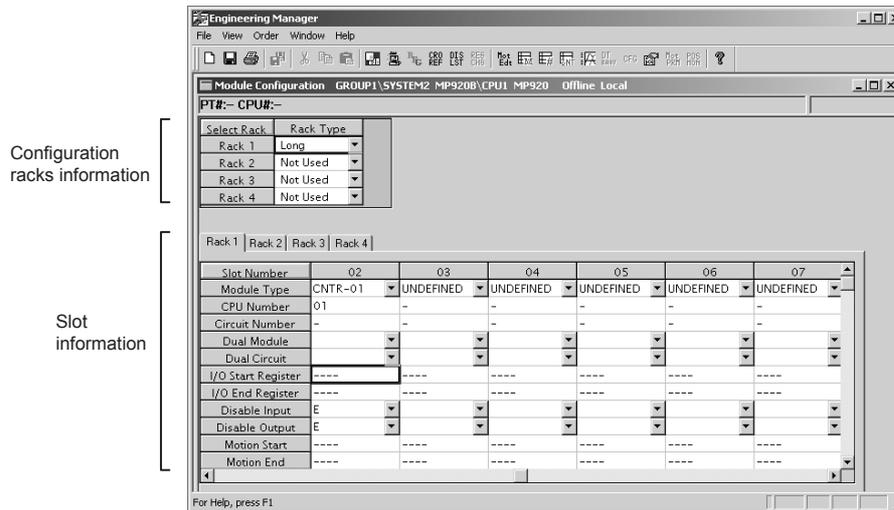
Module combinations depend on the Machine Controller.

8.2.4 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 in User Menu	Registers a shortcut for the Module configuration definition 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.
Motion Task Manager	Displays the operating status of the motion program.
Next Page	Displays the next tab page.
Back Page	Displays the previous tab page.
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	
About Application	Displays version information.

8.2.5 Setting Items for Module Configuration Definition Data

The following table shows the setting items for module configuration definition data.

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.

(1) 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.

(2) 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.

(3) Ending the Module Configuration Definitions

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

8.3 Basic Operation of Individual Module Definitions

8.3.1 Opening Individual Module Definitions Windows

(1) 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.

Rack 1				
No.	00	01	02	· · ·
Module	MP920	RESERVED	217IF	· · ·
· · ·				

For example, click *217IF*, and then select *File* - *Open Slot*.

(2) 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.

For example, double-click *02*.

Rack 1				
No.	00	01	02	· · ·
Module	MP920	RESERVED	217IF	· · ·
· · ·				

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.

(3) Configurations of Individual Module Definitions Window

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

Module name							
PT#...	UT# ...	CPU# ...	Rack #	Slot #	Cir. #	I/O address	

Definition Folder 5: Module Configuration Definitions

8

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.
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.

(4) 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.

(5) 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.

(6) Closing Individual Module Definitions

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

9

Program Folder 1:
Ladder Programming

Program Folder 1: Ladder Programming

9

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.

9.1.1 Ladder Programming System

The following figure shows the relationships between the supplemental commands, program editing tools, and other tools available for ladder programming.

Program Folder 1: Ladder Programming

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Based on the figure above, 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** window used to manage the configuration information for individual ladder programs.

9.2.1 Outline of Properties Window

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.

9.2.2 Opening Drawing Properties Windows

(1) Opening Procedures

Use one of the following two procedures to open a **Drawing properties** window.

(a) 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.
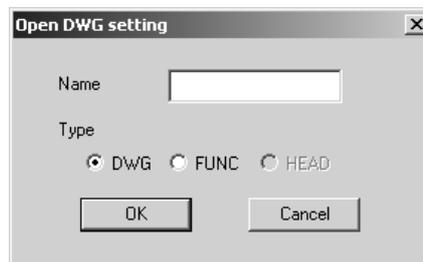
The **Drawing properties** window for the program will be opened.
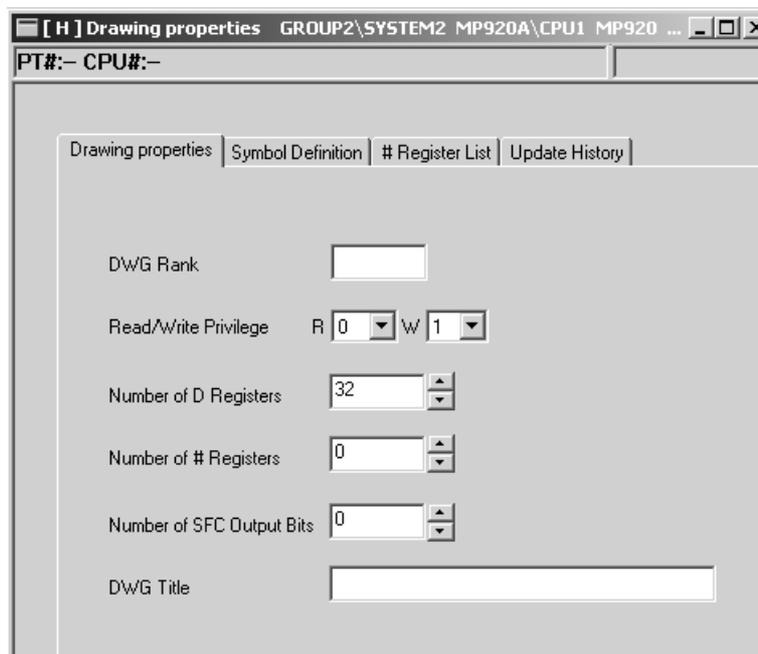
If the properties are for a function program, the following tabs will be displayed instead of the tabs above for a ladder program.

| Function Configuration | I/O Definition | Symbol Definition | # Register List | Update History |

(b) 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.

(2) Tab Pages

There are different tab pages for ladder program and function program **Drawing properties** window. Refer to the following tables for details.

(a) 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.

(b) 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.

INFO
- 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.

9.2.3 Drawing Properties Menus

The menus displayed in **Drawing properties** window are the same as those displayed in the LADDER window. Refer to *9.3.4 LADDER Window Display Mode*.

9.2.4 Drawing Properties Tab Page

The following table shows the configuration definition.

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.

9.2.5 I/O Definition Tab Page

This tab page is used only for function programs. The I/O definition details are described below.
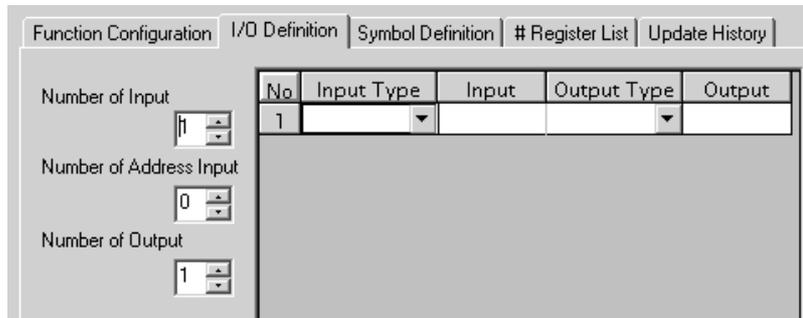
Setting	Details
Number of Inputs	Enter a number between 1 and 16 for the number of function input data items.
Number of Address Inputs	Enter 1 for address input and 0 for no address input.
Number of Outputs	Enter a number between 1 and 16 for the number of function output data items.
Input Type	Select 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	

9.2.6 Symbol Definition Tab Page

Symbol names can be used in programs instead of register numbers, for easy understanding.

This section describes the allocations of symbols.

(1) Setting the Symbol Definition Data

Click the **Symbol Definition** tab in the **Properties** window.

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 *(3) 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.

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(2) Editing Symbols

Symbols can be edited in rows units.

(a) 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.

(b) 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.

(3) 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*.

(a) 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). For the **Range**, enter *AUTO*.
- 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.

(b) 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). For the **Range**, enter *AUTO*.

(4) 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.

```
Parent        Child        Grandchild
  H ─────── H01 ─────── H01.01
```

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.

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INFO ▸ Do not enter any data in the *Register Number* and *Size*. For the **Range**, enter *MTBL*.

9.2.7 # Register List Tab Page

This section explains how to make and alter # register settings.

(1) Setting the # Register Values

Click the **# Register List** tab in the **Properties** window to display the following tab page. Set the details of the # Register in this window.

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.

(2) 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.

(a) Decimal Integer Display

Select **Data – Cardinal – DEC** from the LADDER menu to display the register values in decimal.

(b) Hexadecimal Integer Display

Select **Data – Cardinal – HEX** from the LADDER menu to display the register values in hexadecimal.

(c) Real Number Display

Select **Data – Cardinal – FLOAT** from the LADDER menu to display the register values as real numbers.

(d) Decimal Double-length Integer Display

Select **Data – Cardinal – LONG** from the LADDER menu to display the register numbers as double-length integers.

(e) Binary Integer Display

Select **Data – Cardinal – BIN** from the LADDER menu to display the register values in binary.

(f) 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.

(3) 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.

(4) 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.

9.2.8 Update History Tab Page

This section explains how to display and delete Update History data.

(1) 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.

(2) 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.

(a) 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.

(b) 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.

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9.2.9 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.

INFO

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).

- Outline of creating ladder programs
- Opening the LADDER window
- Ladder menus
- LADDER window display mode
- Inputting ladder instructions
- Editing programs
- Creating branch circuits
- Disabling coils
- Jump
- Displaying current values
- Creating comments
- Saving ladder programs
- Printing ladder programs
- Closing ladder program editing

9.3.1 Outline of Creating Ladder Programs

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.

9.3.2 LADDER Window

(1) Opening the LADDER Window

The LADDER window can be opened from the File Manager or Engineering Manager.

(a) Opening New Drawings from the File Manager

1. Select *File − New Drawing* from the File Manager menu.

2. The Input DWG Name 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.
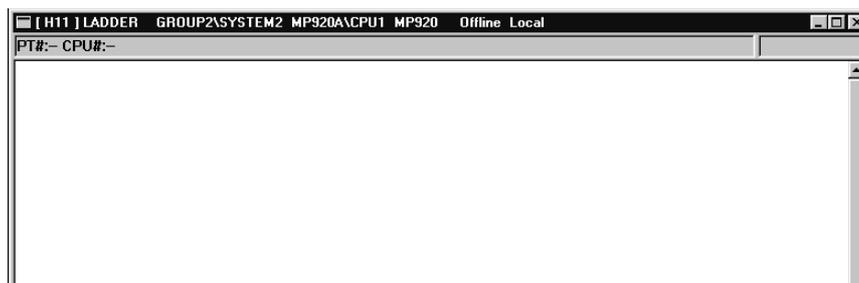
(b) Opening Existing Drawings from the File Manager

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.

(c) Opening New/Existing Drawings from the Engineering Manager

1. Select *File – Open – Program – New Drawing* from the LADDER menu.

2. Enter the name and type of drawing in the dialog box, and click the **OK** button.

3. The Input DWG Name 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.

(2) LADDER Window Configuration

Monitor switching buttons   Online monitor display

Level

Step No.

Ladder program

Comments

D registers

registers

Total No. of steps

Operand input mode

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 *9.3.10 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

9.3.3 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.
	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.
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		

(Cont'd)

Menu Command		Function
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		
	About Application	Displays version information.

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9.3.4 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.
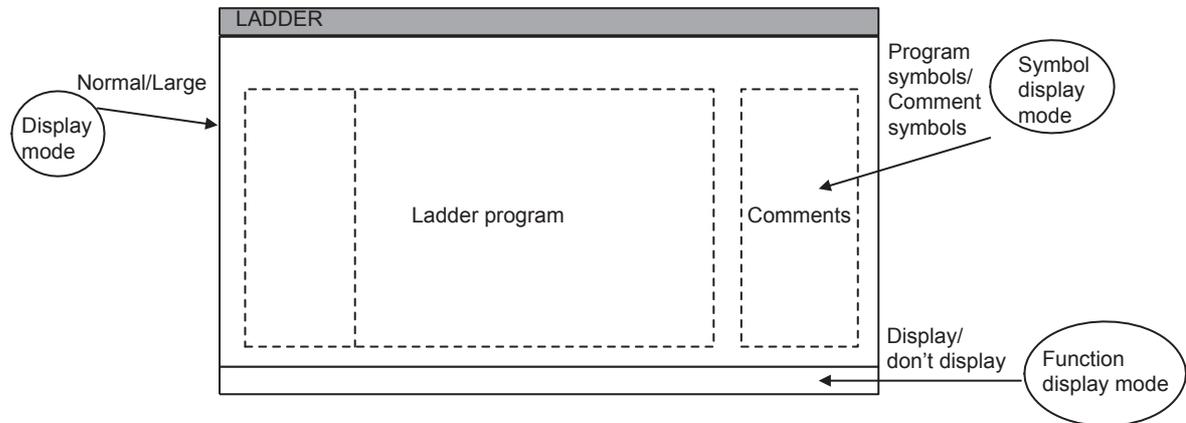
(1) Switching Program Display Modes

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.

9.3.5 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.

Basic Structure of Ladder Instruction

Symbol	→ Input/Not displayed
Register number or numeric processing instruction	→ Input/Not displayed
Current value or bit processing instruction	→ Input/Not displayed
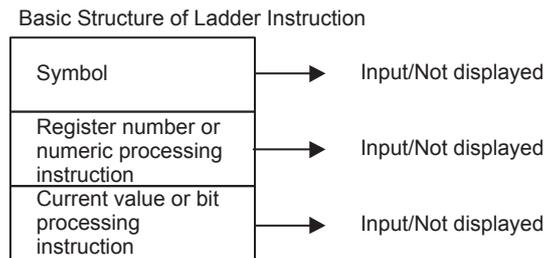
For current values expressed as bit processing instructions, the text will be displayed in bold if the condition of the bit processing instruction is met and will be displayed in normal text if the condition is not met.

The register value is displayed for numeric processing instructions. The current value is displayed only in Online Mode.

Bit processing instruction   Numeric processing instruction

LIMIT-SW	←	Symbol	Symbol	→	IN-DATA
MB00101	←	Register No.	Register No.	→	MW00100
	←	Bit instruction	Current value	→	01000

Displayed in bold text if condition is met in Online Mode.
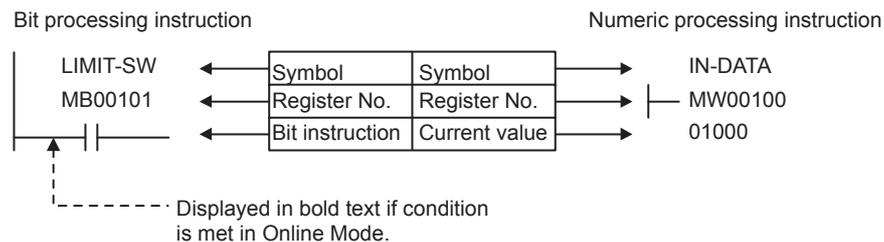
(2) Input Methods of Ladder Instructions

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

(a) 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.

(b) Register Number Input Mode

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.

(c) 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.

> **TERMS**
>
> Operand
>
> An operand is information required by the instruction, such as symbols, register numbers, and constants.

(d) 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.

(e) 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 0000   IB00010

    1 0001   [⊢MW00010]   [⇒ MW02000]

    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.

    1 0000   FUNC-01

    1 0001   MB000001   IN-1   OUT-1   MB000002
                                    FIN   FOUT

    1 0003   ⊢MW00010 - - - - - ➢ IN-2   OUT-2 - - - - - ➢ MW00011
                                    FIN   FOUT

    1 0005   MW00020 =======➢ IN-3   OUT-3 =======➢ MW00021
                                    FIN   FOUT

    1 0006   ADDRESS

                                        MA01000

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.

Function Box

Function name
Inputs ¦ Outputs
Addresses

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.
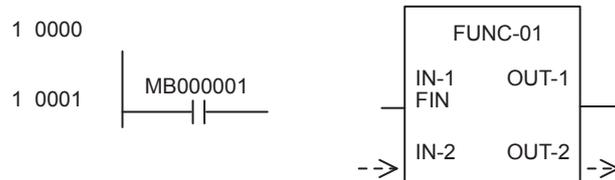
```
1 0000                                          ┌─────────────────┐
                                                │     FUNC-01     │
1 0001       │ MB000001                         │ IN-1     OUT-1  │
             ┤├─────────                         │ FIN             │
                                                 │                 │
                                          --->   │ IN-2     OUT-2  │-->
                                                 └─────────────────┘
```

   - 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.

```
1 0003    ├MW00010   ------->│ IN-2     OUT-2 │-->
                             │ FIN            │
```

   - 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.

```
1 0005        █       =======>│ IN-3    OUT-3 │=>
                              │ FIN           │
```

     ii) Enter the register number or constant.

```
1 0005      MW00020  =======>│ IN-3    OUT-3 │==>
                             │ FIN           │
```
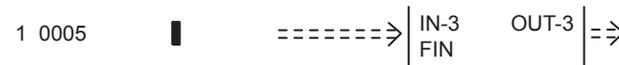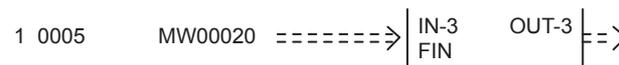
3. Inputting the Addresses
   Input addresses as follows:
     i)   Select the FIN instruction.
     ii) Enter the register number, MA01000.

```
1 0006                                    │ ADDRESS  │
                                          │ 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.
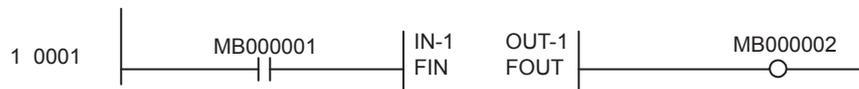
```
1  0001        │          MB000001         │ IN-1    OUT-1 │        MB000002        │
               │               ┤├          │ FIN     FOUT  │            ○           │
```

• 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.

```
1  0003      MW00010    ------->│ IN-2    OUT-2 │------->    MW00011
                                │ FIN     FOUT  │
```

• 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.

```
1  0005      MW00020 =======>│ IN-3    OUT-3 │=======>    MW00021
                             │ FIN     FOUT  │
```

(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.

9.3.6 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

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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.
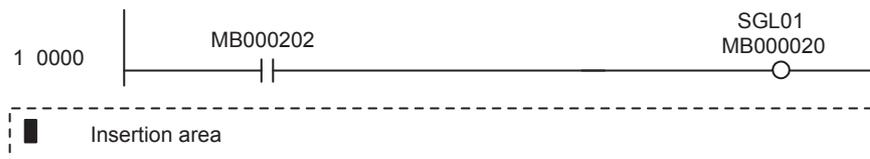
3. Enter the instruction. Further instructions can be entered until step 4 is performed.

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.
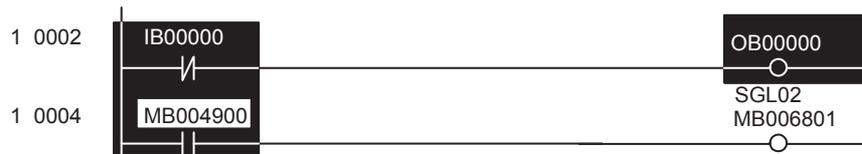
4. Select *Edit − DEL* from the LADDER menu.

   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.
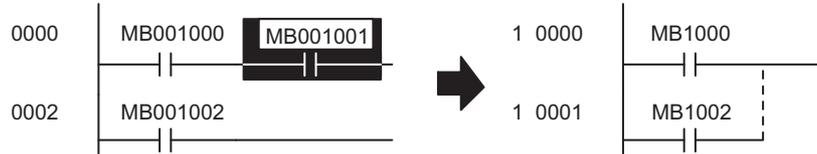
• Circuits will be connected after an instruction is deleted if they are connected directly to the deleted element.
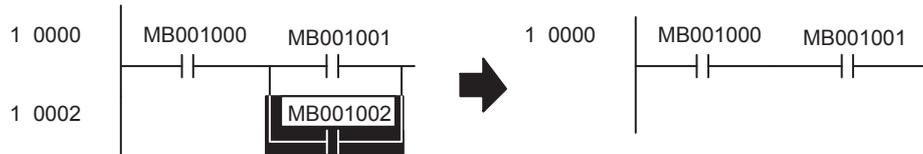
Circuits will be open after an instruction is deleted if they are connected parallel to the deleted element.

■ 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.
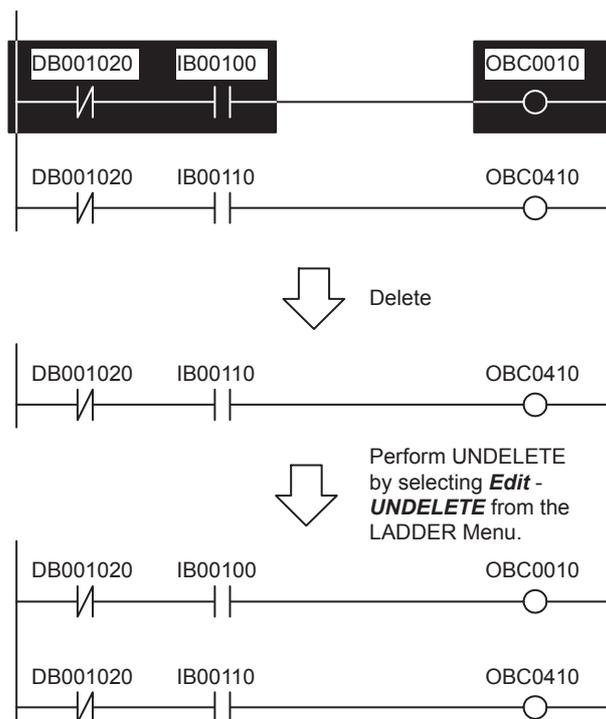
(4) Cutting

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 Relay Numbers and Contacts

1. Press the cursor keys to move the cursor to the operand to be changed.

2. Enter the new operand.

3. Enter the new relay number.

(d) 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).

(e) 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.
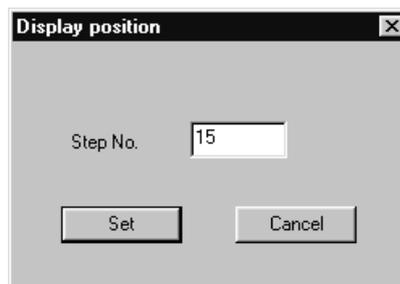
3. The cursor will move to the step number designated in step 2.

(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   01.01

2. Select *Debug – REFER* from the LADDER menu.

3. The DWG window called in step 1 will be opened.

INFO
   • 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.

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(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.

9.3.7 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 ▶
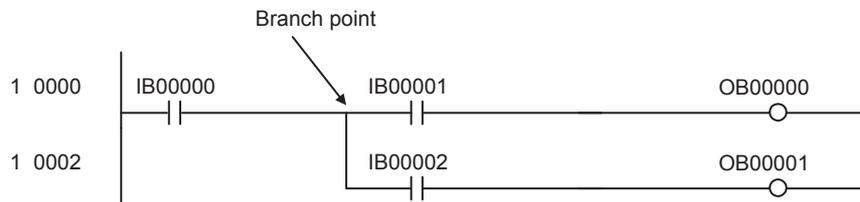
Set the branch point shown in the above figure using the following procedure.

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
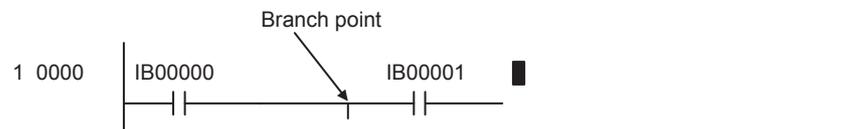
- The mnemonic for a branch point, a comma (,), can be used at step 2 to display a branch point.
- Insert a COIL instruction after completing step 4 to display the cursor at the branch point designated in step 3, rather than at the power line. This enables the next instruction to be entered from this 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 ▶

Connection point

```
1 0000    IB00000              IB00001                          OB00000
           ─┤├─                 ─┤├─                               ─○─
1 0002    IB00002
           ─┤├─
```
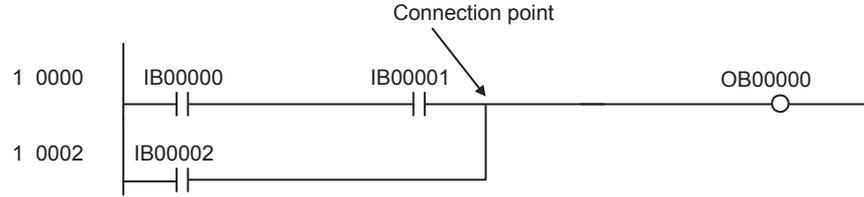
Set the connection point shown in the above figure using the following procedure.

1. Select the N.O. CONTACT instruction.

```
1 0000    IB00000              ▮
           ─┤├─                   ─┤├─
```

2. Select **Command − RELAY − Join** from the LADDER Menu.

3. A connection point will appear.

Connection point

```
1 0000    IB00000              ▮
           ─┤├─                   ─┤├─
```

4. Enter the relay number.

Connection point

```
1 0000    IB00000              IB00001
           ─┤├─                 ─┤├─
           ▮
```
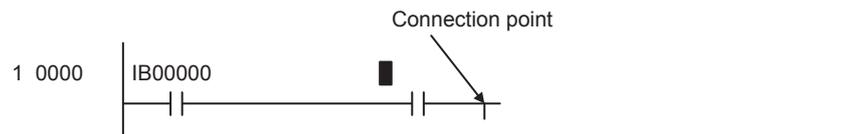
INFO
- The mnemonic for a connection point, a period (.), can be used at step 2 to display a connection point.
- Once step 4 has been completed, the input position for the next instruction will be on the new line after the connection point. If a branch point has been designated previously, the next instruction 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 ▶

```
1 0000    IB00000              IB00001                          OB00000
           ─┤├─                 ─┤├─                               ─○─
1 0002    IB00002
           ─┤├─                                    ← Connection point
```
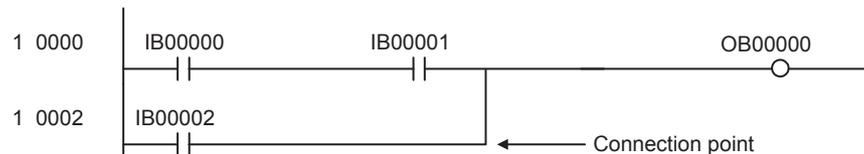
Set the parallel connection shown in the above figure using the following procedure.

1. Designate the connection point as shown below.

Connection point

```
1 0000    IB00000              IB00001
           ─┤├─                 ─┤├─
           ▮
```

2. Select the N.O. CONTACT instruction.

Connection point

```
1  0000      IB00000              IB00001        ↙
             ─┤├─                 ─┤├─

1  0002      ▮
             ─┤├──
```
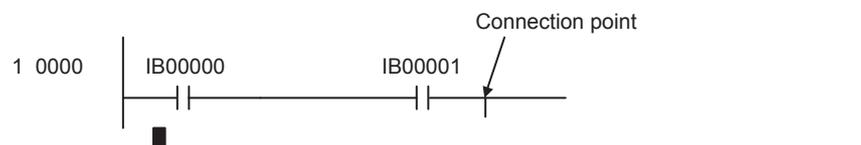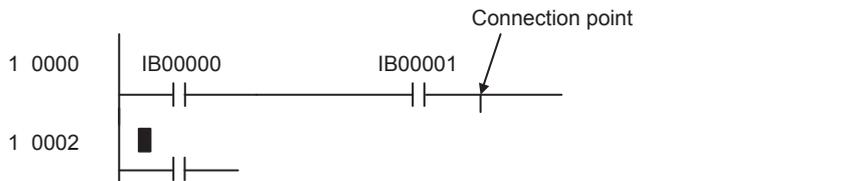
3. Select *Command – Relay – Connect* from the LADDER Menu.

Connection point

```
1  0000      IB00000              IB00001        ↙
             ─┤├─                 ─┤├─

1  0002      ▮
             ─┤├─
```

4. Enter the relay number.

Connection point

```
1  0000      IB00000              IB00001    ↙   ▮
             ─┤├─                 ─┤├─

1  0002      IB00002
             ─┤├─
```

INFO
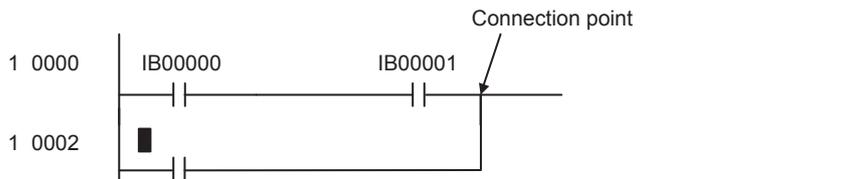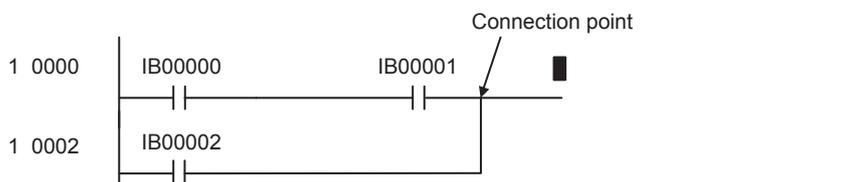
• The mnemonic for a parallel connection, a comma and a period (, .), can be used at step 3 to display a parallel connection.
• Once step 4 has been completed, the input position for the next instruction will be to the right of the parallel connection.

(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 ▶

```
1  0000    IB00000          MB009970              OB00000
           ─┤├─               ┘                     ─○─

1  0003                     MB009971              OB00001
                              ┐                     ─○─
                                        ON PULSE instruction

                                        OFF PULSE instruction
```
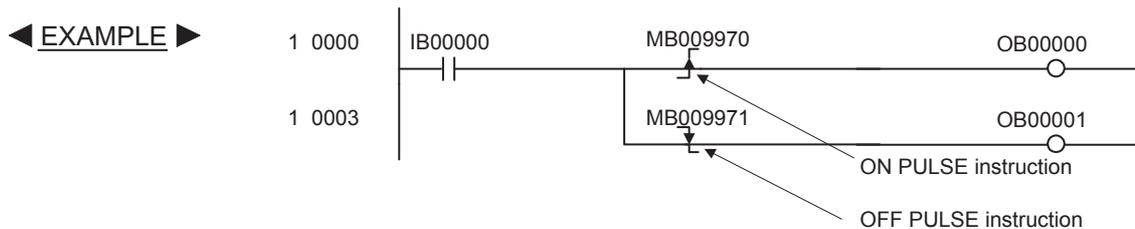
Create the pulse generation circuit shown in the above figure using the following procedure.

1. Enter the N.C. CONTACT instruction.

2. Select the ON PULSE instruction and then enter the branch point.

```
1  0000    IB00000          ▮
           ─┤├─              ┘
```

3. Enter the register number which is the operand for the ON PULSE instruction.

```
1  0000    IB00000          MB009970    ▮
           ─┤├─               ┘
```

4. Enter the COIL instruction.

```
1  0000  | IB00000          MB009970              OB00000
         |--| |----------------|^|------------------( )--------
                                ▮
```
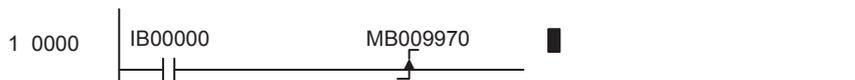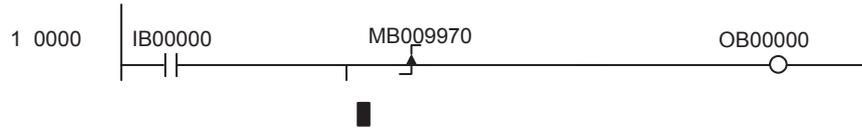
5. Select the OFF PULSE instruction.

6. Enter the register number which is the operand for the OFF PULSE instruction.

```
1  0000  | IB00000          MB009970              OB00000
         |--| |----------------|^|------------------( )--------
1  0003  |                   MB009971        ▮
                               |↓|
```

7. Enter the COIL instruction.

```
1  0000  | IB00000          MB009970              OB00000
         |--| |----------------|^|------------------( )--------
1  0003  |                   MB009971              OB00001
                               |↓|------------------( )--------
```
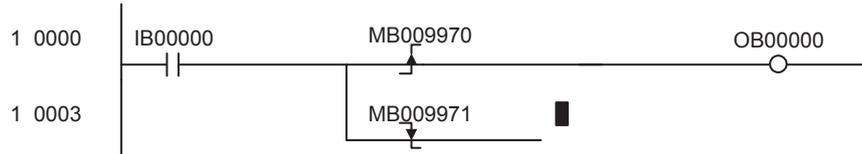
(5) Creating Timer Circuits

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 ▶

Timer circuit

```
1  0000  | IB00000        005.00  MW00010         OB00000
         |--|/|-------------[T              ]--------( )------
1  0003  |                 IB00001
                            --| |--
1  0005  |                 IB00002            OB00001
                            --| |--------------( )------
```
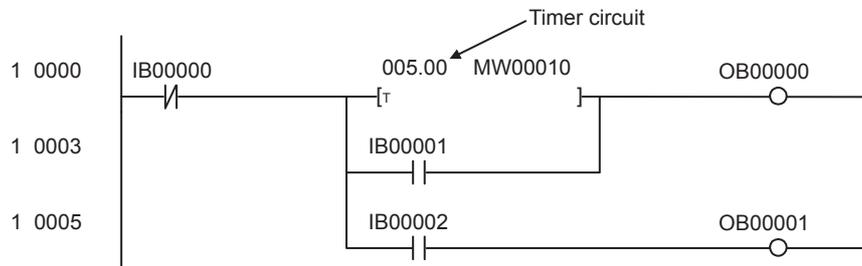
Create the timer circuit shown in the above figure using the following procedure.

1. Enter the N.C. CONTACT instruction.

2. Select the ON-DELAY instruction and then enter the branch points and connection points.

```
1  0000  | IB00000              ▮
         |--|/|----------------[T        --| |--
```

3. Enter the time limit settings (constants or register numbers) which are the operands for the ON-DELAY instruction.

```
1  0000  | IB00000          005.00  ▮
         |--|/|----------------[T        --| |--
```

4. Enter the register number for counting as an operand of the ON-DELAY instruction.

```
1  0000  | IB00000          005.00  MW00010
         |--|/|----------------[T        --| |--
                                ▮
```
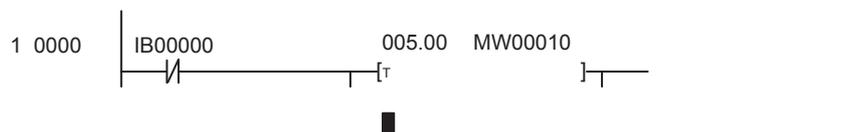
5. Select the N.O. CONTACT instruction and then set the branch points and the parallel connections.
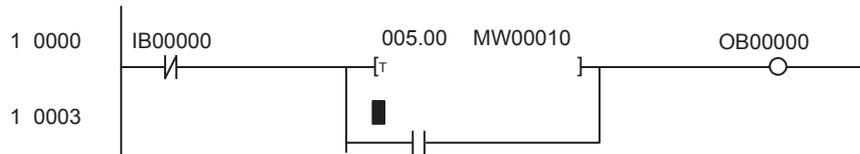
6. Enter a register number as the operand of the N.O. CONTACT instruction.

7. Enter the COIL instruction.
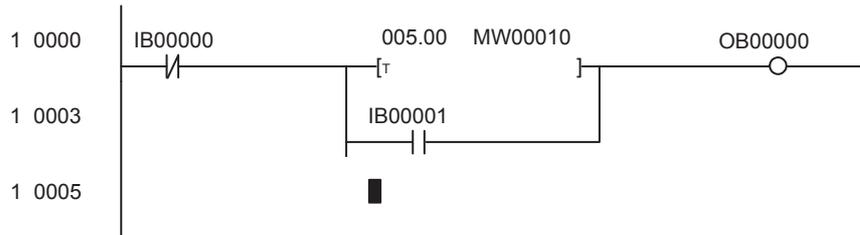
8. Enter the N.O. CONTACT instruction.
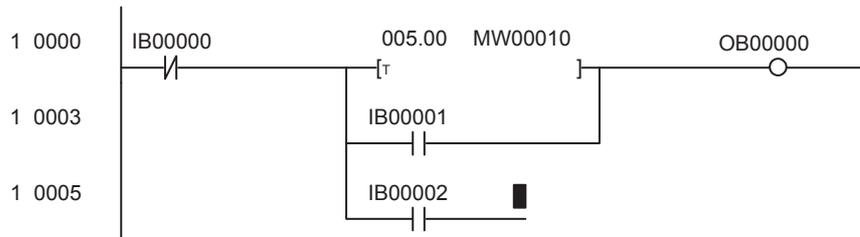
9. Enter the COIL instruction.
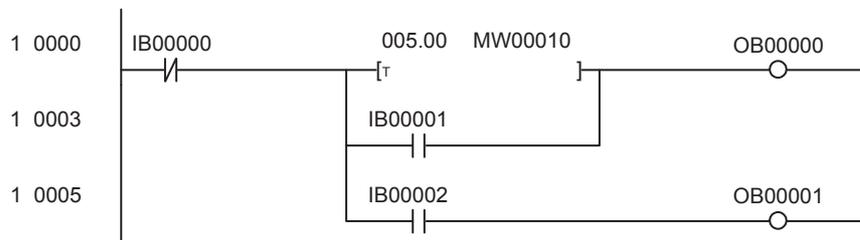
INFO Branch point, connection point, and parallel connection settings can be made when the cursor is on the time limit setting or the register for counting.

(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.
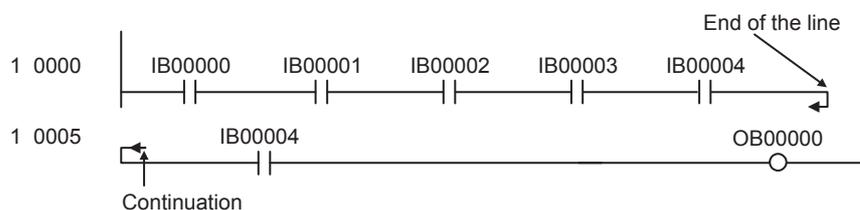
(7) Creating Complicated Circuits

Complicated sequence circuits, such as the one shown in the following figure, can be created by setting branch points, connection points, and parallel connections.
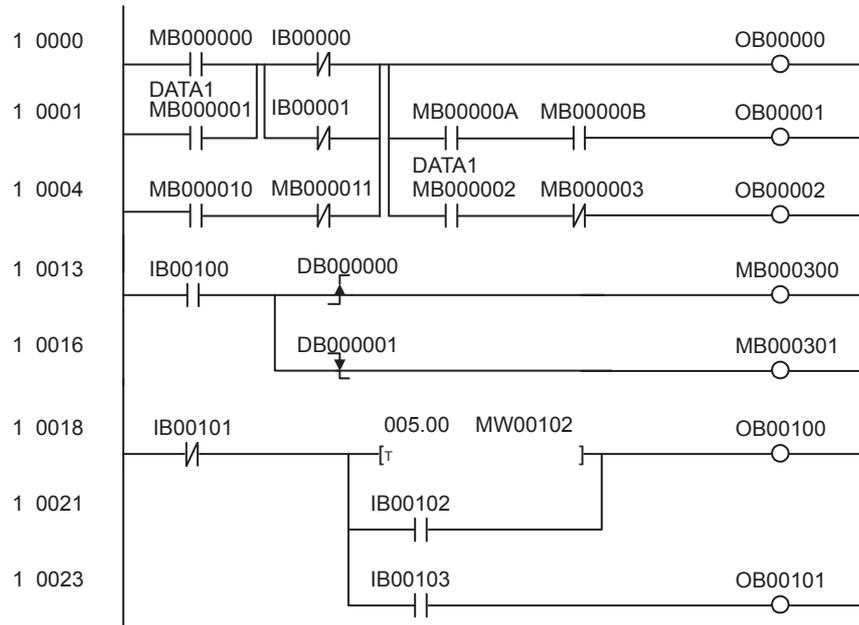
Create the sequence circuit shown in the above figure using the procedure (steps 1 to 24) in the following table.

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 *IB0000* 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.

9.3.8 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
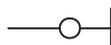
  ────○─┤   : Disable cleared (normal state).
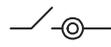
  ─／─◎─┤   : Disabled ON.
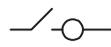
  ─／─○─┤   : Disabled OFF.

- SET COIL Instruction Notation

  ───[S]─┤   : Disable cleared (normal state).

  ─／[S]─┤   : Disabled ON.

  ─／[S]─┤   : Disabled OFF.

- RESET COIL Instruction Notation

  ───[R]─┤   : Disable cleared (normal).
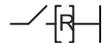
  ─／[R]─┤   : Disabled ON.

  ─／[R]─┤   : 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.

9.3.9 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.
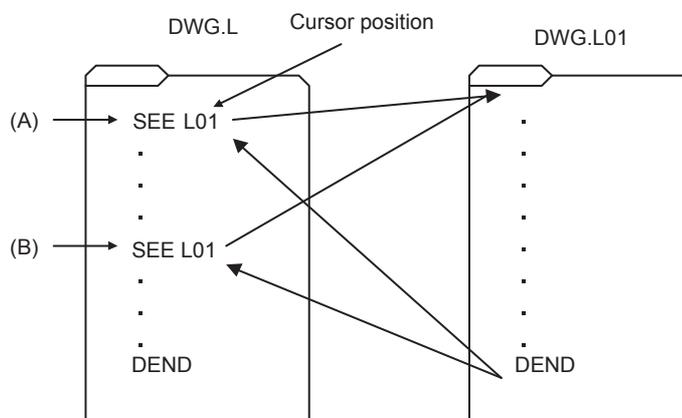
Display current values with the REFER command using the following procedure.

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.

9.3.10 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.

9.3.11 Saving Ladder Programs

This section explains how to save ladder programs and the configuration of the **Save Error** window.

(1) How to Save Ladder Programs

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.

(2) 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.
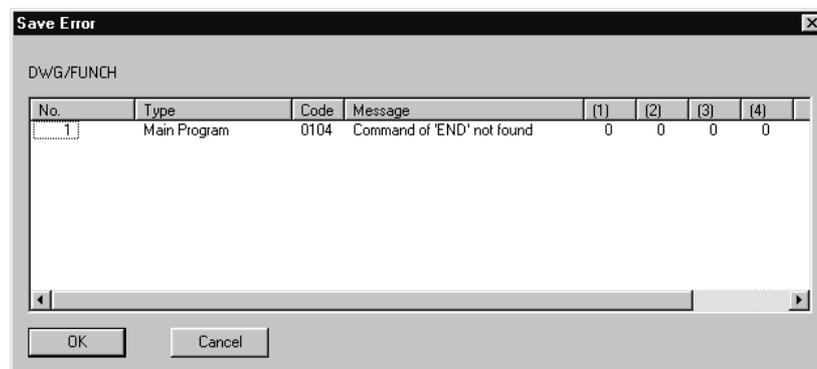
Display	Details
Type	Displays the type of program for which an error was detected.
Code	Displays the code number for the error.
Message	Displays the error message.
(1)	The step number for which an error was detected will be displayed for main programs and SFC programs. The line number for which an error 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.

9.3.12 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.
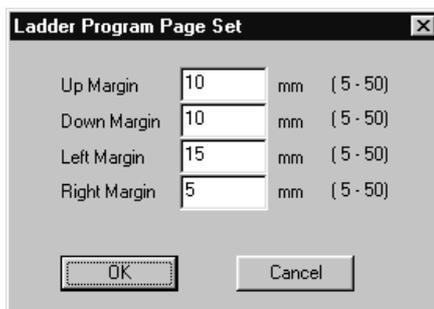
(2) Printing

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.

9.3.13 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.

9.4.1 Outline of 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 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.

9.4.2 Table Program Windows

(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.

(a) 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.

(b) 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 *9.4.1 Outline of Table Programs*.

Refer to the following sections to input table program data after opening the Table Program Window.

- *9.4.5 Entering # Register Constant Table Data*
- *9.4.6 Entering M Register Constant Table Data*
- *9.4.7 Entering I/O Conversion Table Data*
- *9.4.8 Entering Interlock Table Data*
- *9.4.9 Entering Part Composition Table Data*

INFO
- C constant tables cannot be opened from the File Manager. Select *File – Open – C Register* 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.

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9.4.3 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 & Save to Flash	Saves to flash memory.
Register in User Menu	Registers a shortcut for 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.
Motion Task Manager	Displays the operating status of the motion program.
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	
About Application	Displays version information.

* The Next Page (<u>N</u>) and Back Page (<u>B</u>) operations are displayed for # register constant tables.

9.4.4 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.

9.4.5 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.

9.4.6 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.

9.4.7 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 Change/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.

9.4.8 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.

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(1) Entering Table Data

Up to 500 rows and 25 columns of table data can be entered.
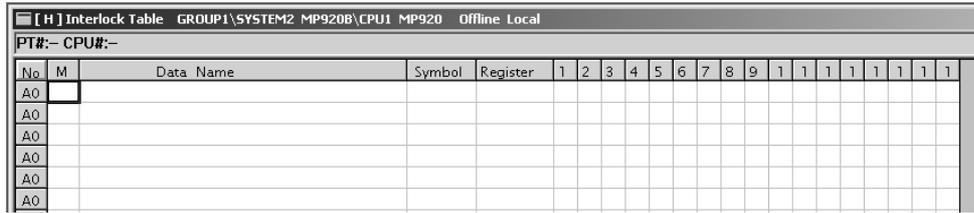
Setting	Details
No.	The row number for each block is displayed. The blocks are numbered alphabetically, and are followed by a numeric row number.
M (Mode)	Enter the input mode for interlock conditions as I, S, O, or X. Refer to *Table 9.1 Interlock I/O Modes* given after this table.
Data Name	Enter a 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 9.1 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.

9.4.9 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

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(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.

9.4.10 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.
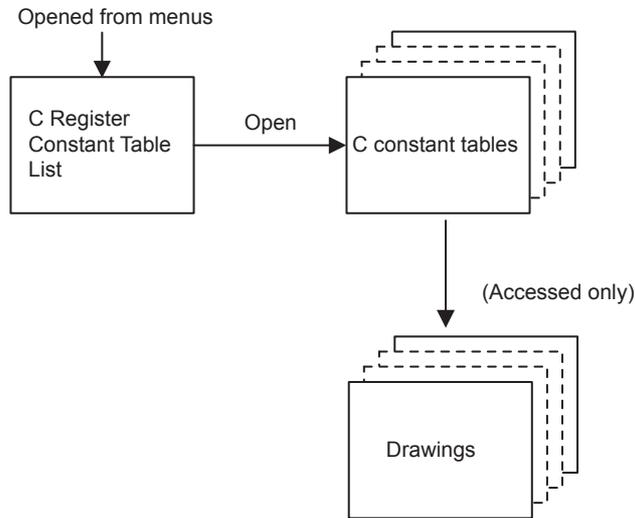
(1) Outline of Creation Procedure

1. Open the C register constant table list. (Refer to *9.4.2 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.
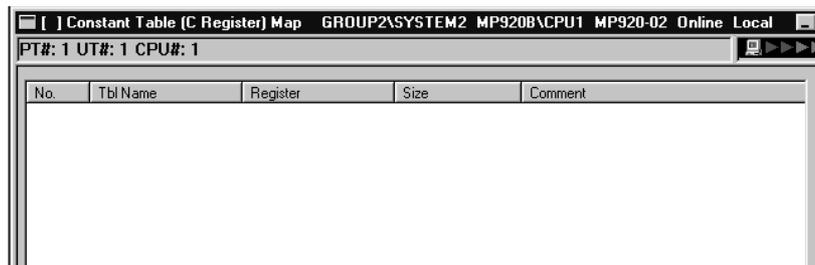
Display	Details
No.	Number within table.
Tbl Name (Table Name)	Displays the C constant table names.
Register	Displays the number of the leading C register.
Size	Displays the number of C registers starting from the leading C register number in words.
Comment	Displays the C constant table comments.

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(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.
	Register in User Menu	Registers a shortcut for 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		
	Motion Task Manager	Displays the operating status of the motion program.
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	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.

```
00001   PRODUCT      CW01000      00500      Product Info.
00002   LINECNST     CW00000      00200      Line Constant
00003   PROCNPRM     CW02000      00100      Procon
```

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.
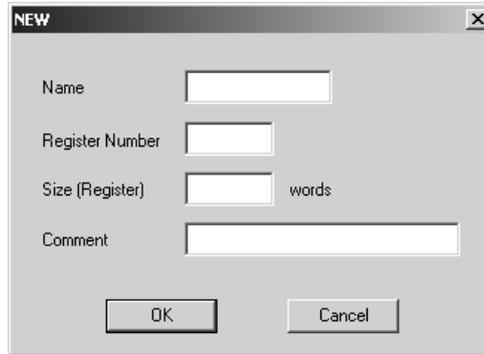
2. Enter the table name for *Name*, leading register number for *Register Number*, size for *Size C Register*, and comment for *Comment* in the New Window and click the **OK** Button.

3. The C Constant Table Window will be displayed.

> • 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.

(5) Deleting C Constant Tables

Delete C constant tables using the following procedure.

1. Click the *No.* of the C constant table to be deleted.

00001	PRODUCT	CW01000	00500	Product Info.
00002	LINECNST	CW00000	00200	Line Constant
00003	PROCNPRM	CW02000	00100	Procon

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.

| 00001 | PRODUCT | CW01000 | 00500 | Product Info. |
| 00002 | PROCNPRM | CW02000 | 00100 | Procon |

(6) 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.

| 00001 | PRODUCT | CW01000 | 00500 | Product Info. |
| 00002 | PROCNPRM | CW02000 | 00100 | Procon |

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.

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> **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.

(7) 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.

No	Data Name	Symbol	SavePoint	Set Value	Unit	Lower Limit	Upper Limit
1							
2							
3							
4							
5							
6							
7							

[H01] Constant Table (# REG)   GROUP2\SYSTEM2 MP920A\CPU1 MP920   Offline Local

PT#:– CPU#:–

(8) 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.
	Motion Task Manager	Displays the operating status of the motion program.
	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.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	About Application	Displays version information.

(9) 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.

No.	Data Name	Symbol	Save Point	Set Value	Unit	Lower Limit	Upper Limit
1 2 . . .							
				C register definition area			
			Table name	Leading Register No.	Input Mode		

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.

9.4.11 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.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2	FullSpeed	100SPD	25000	-	10000	30000	#W00001
3	AccelerateTime	ATime	1000	0.1sec	300	2000	#W00002

2. Select *Edit – Cut* from the Table Program Menu.

The data specified in step 1 will be cut.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2			25000	-	10000	30000	#W00001
3	AccelerateTime	ATime	1000	0.1sec	300	2000	#W00002

(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.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2	FullSpeed	100SPD	25000	-	10000	30000	#W00001
3	AccelerateTime	ATime	1000	0.1sec	300	2000	#W00002

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.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2			25000	-	10000	30000	#W00001
3	AccelerateTime	ATime	1000	0.1sec	300	2000	#W00002

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.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2	FullSpeed	100SPD	25000	-	10000	30000	#W00001
3	AccelerateTime	ATime	1000	0.1sec	300	2000	#W00002

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.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2							
3							
4	DecelerateTime	100SPD	25000	-	10000	30000	#W00001

(b) Deleting Rows

Delete one or more consecutive rows using the following procedure.

1. Click the row to be deleted.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2	FullSpeed	100SPD	25000	-	10000	30000	#W00001
3	AccelerateTime	ATime	1000	0.1sec	300	2000	#W00002
4	DecelerateTime	DTime	1000	0.1sec	300	2000	#W00003

2. Select *Edit − Delete Row* from the Table Program Menu.

   The row specified in step 1 will be deleted.

1	LineMaxSpeed	MAX-SPD	15000	0.1mpm	3000	20000	#W00000
2	DecelerateTime	DTime	1000	0.1sec	300	2000	#W00003
3	ShortStopTime	STime	500	0.1sec	300	2000	#W00004

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.

9.4.12 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 *9.3.11 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.

9.4.13 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 *9.3.12 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

10.1.1 Outline of 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.
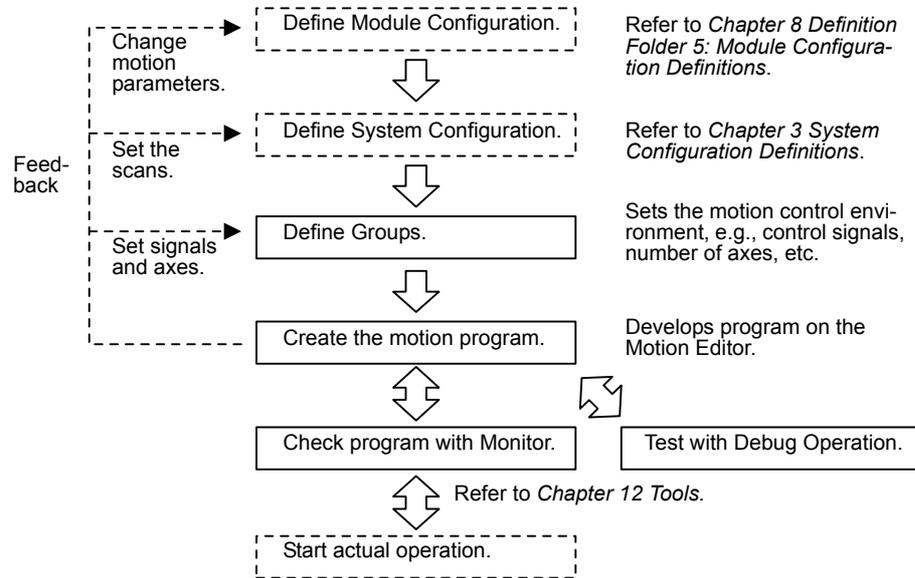
10.2 Group Definitions

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.
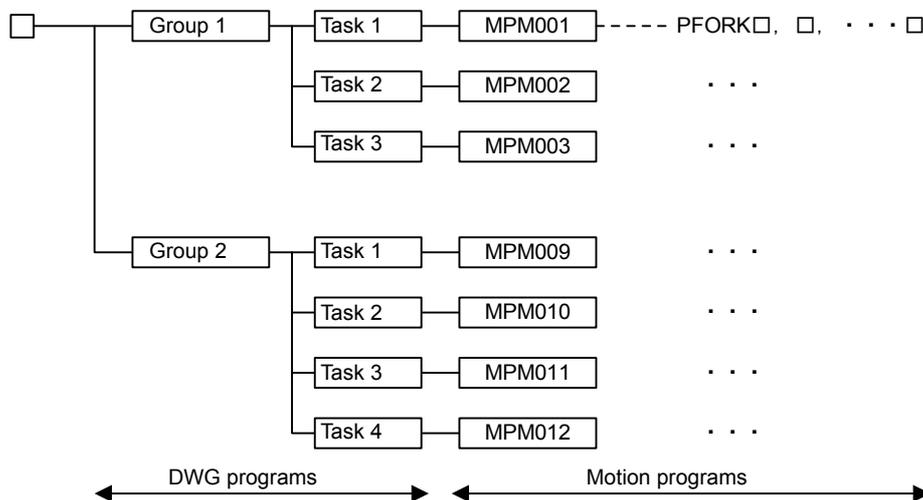
With the MP2000-series Machine Controllers, up to 16 motion programs can be executed in parallel, regardless of the number of groups or the number of tasks.

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

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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*.
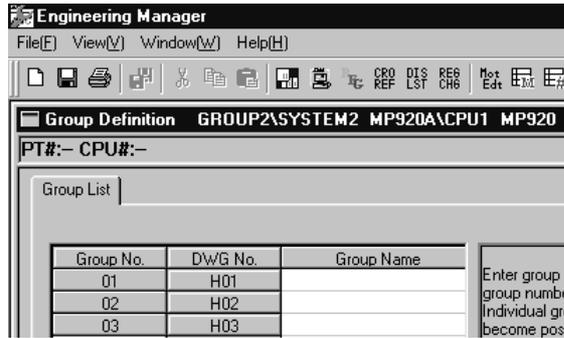
(1) Login Information

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) 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.

10.2.3 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.
Register in User Menu	Registers a shortcut for the group definitions.
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.
Help	
About Application	Displays version information.

10.2.4 Setting Group Definitions

Set the group name first, and then define the operation of each group.

(1) 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 the DWG 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.

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Added group setting tab

Group List   Group 01
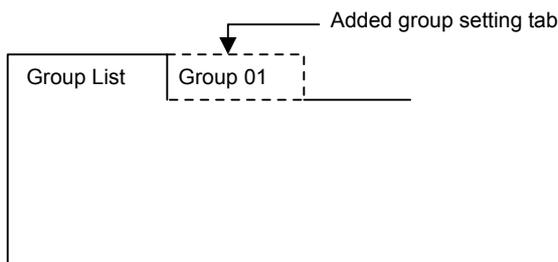
(2) Group 01 Tab Page

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.
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.

$$\left(\begin{array}{c} \text{F command} \\ \text{FMX} \times \text{IFP commands} \end{array} \right) \times \left(\begin{array}{c} \text{Interpolation speed over-} \\ \text{ride (100\% = 10,000)} \end{array} \right) = \text{Output speed}$$

F command		
	Interpolation speed override	Output speed
FMX × IFP commands		
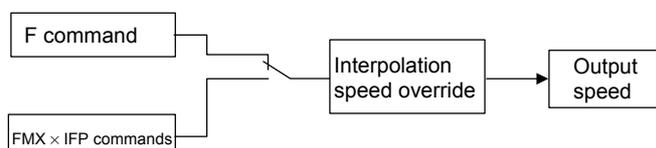
The following move commands are related to the interpolation feed speed:

- 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.
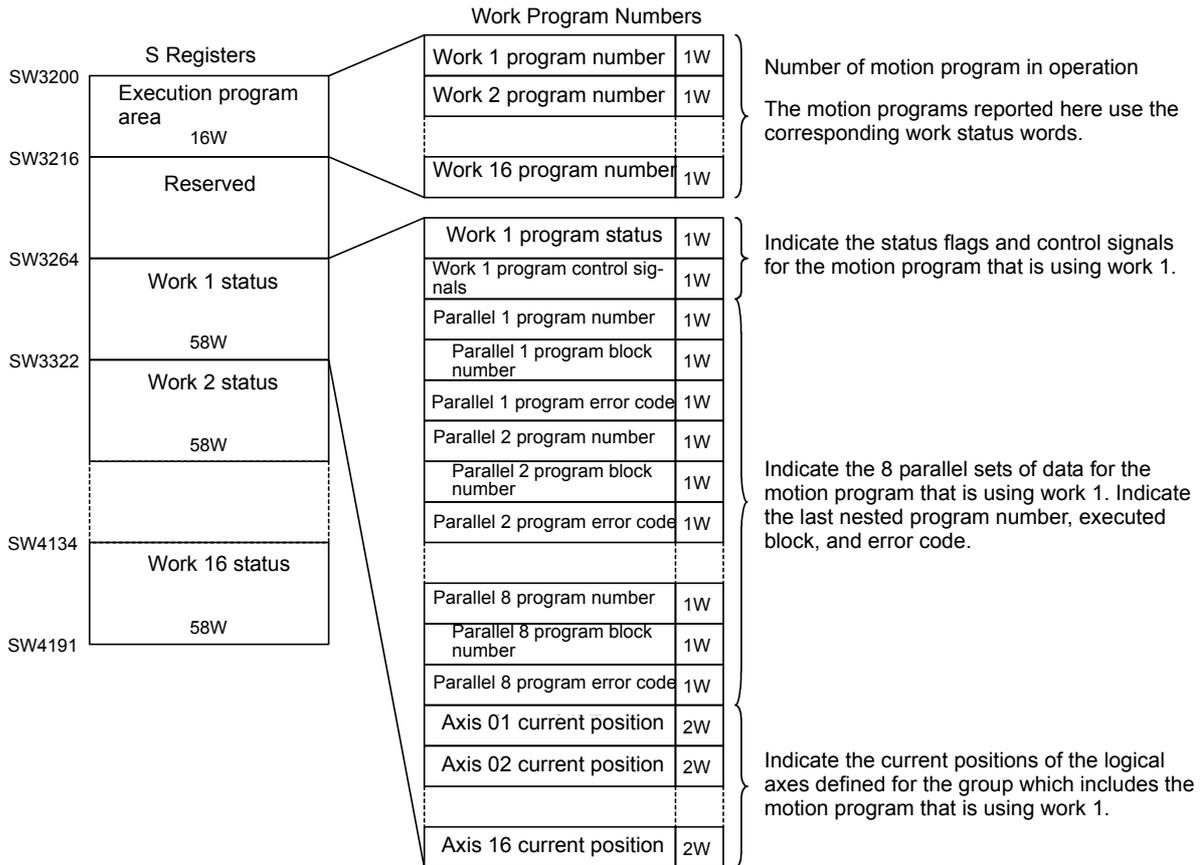
1. Work Status used by the Motion Program

   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.

```
┌─────────────────────────────────────────────────┐
│ Check the execution program area (SW3200 to     │
│ SW3215) to determine the work status area being │
│ used by the motion programs currently being     │
│ executed.                                       │
└─────────────────────────────────────────────────┘
                        │
                        ▼
┌─────────────────────────────────────────────────┐
│ Check the desired data such as the motion        │
│ program alarms of the motion program.           │
└─────────────────────────────────────────────────┘
```

◀ EXAMPLE ▶   2. Executing Multiple Motion Programs

In the following example, motion program MPM001 is started after motion program MPM003 is started.
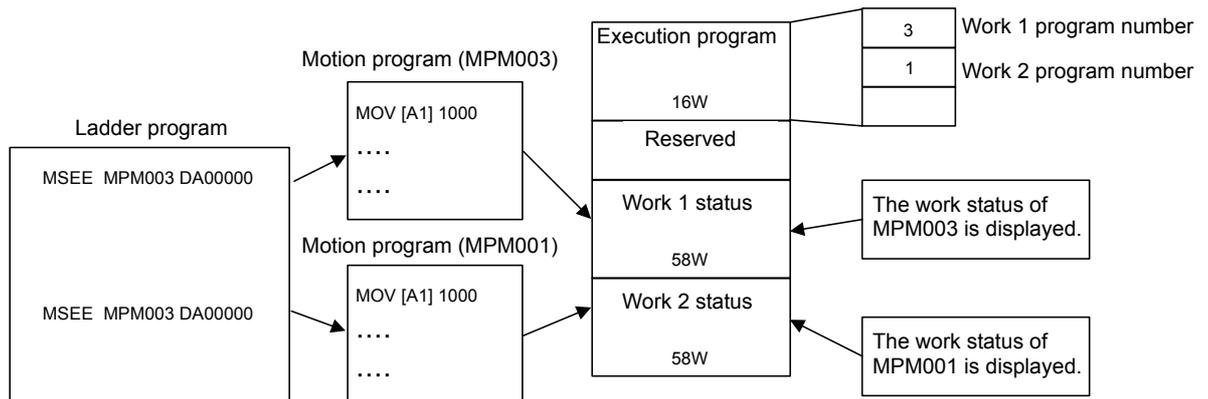
When MPM003 has been started, the number 3 is reported to the work 1 program number (SW3200) in the execution program area and MPM003 uses the work 1 status area. The motion program alarms and current positions of the logical axes can be checked by reading the work 1 status information.

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.

10.2.5 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.
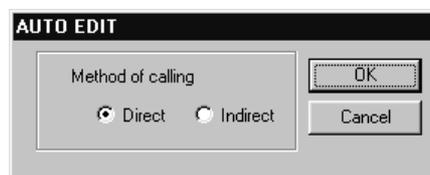
4. Click the **OK** Button in the message box.

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.

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10.2.6 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.

INFO

When a group is deleted, all of the group definition data will be deleted.

10.2.7 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.

10.3.1 Outline of Creating Motion Programs

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.
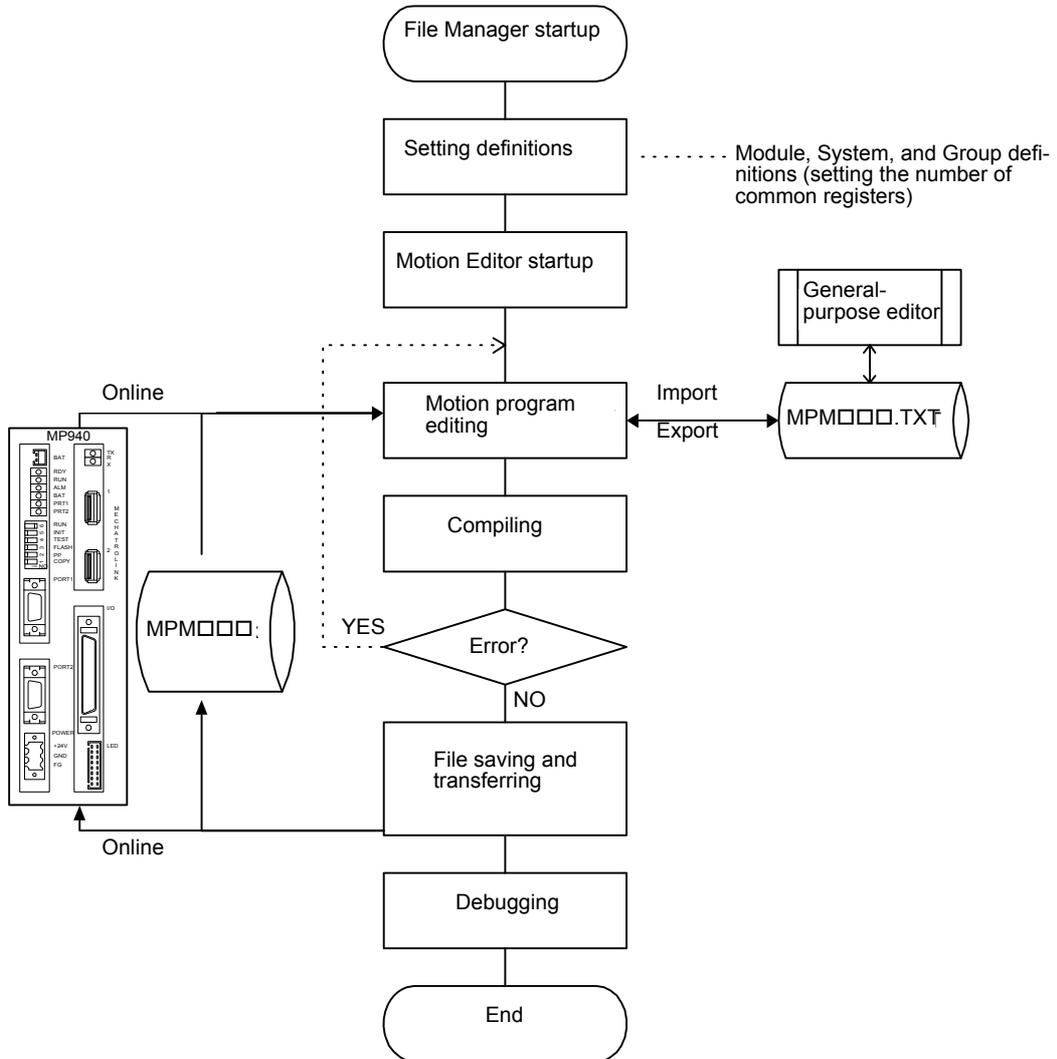
Fig 10.1 Motion Program Development Flow

10.3.2 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.
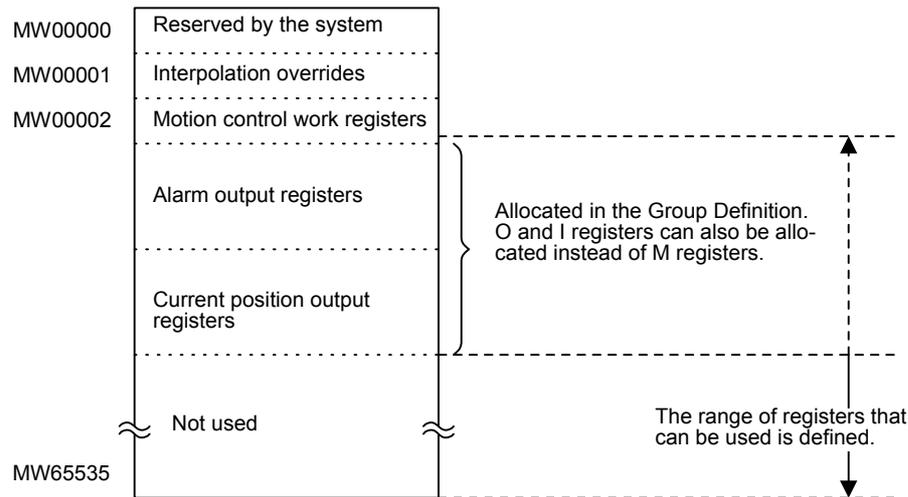
Fig 10.2 M Register Map

(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.
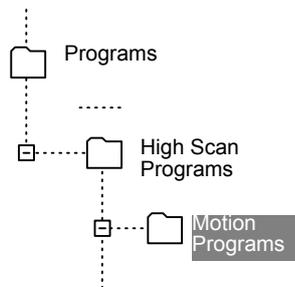
2. Right-click the **Motion Programs** Folder, and select *Open − Resister Writing Permission* from the pop-up menu.

   The **Setup of Register Writing Permission** window will be displayed.
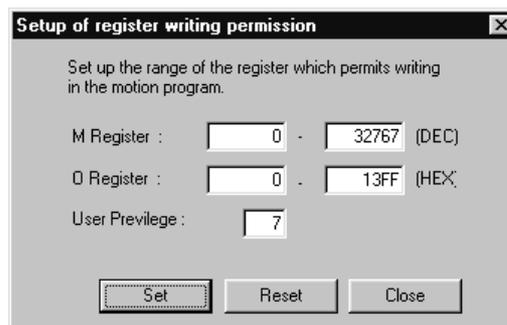
INFO The Setup of Register Writing Permission Window can also be opened by selecting *File − Open − Register Writing Permission* from the File Manager Menu.

(2) Setting the Register Writing Permission Properties

(a) M Register and 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.

(b) 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.

(c) 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.

10.3.3 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.
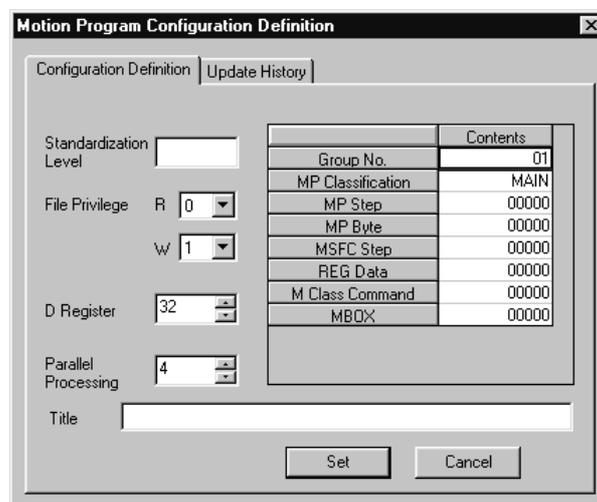
Fig 10.3 Motion Properties Window

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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.

(3) 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.

(4) 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.

10.3.4 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: Right-click with the cursor on the **Motion program file** folder to display the pop-up menu. Then select *Open*.
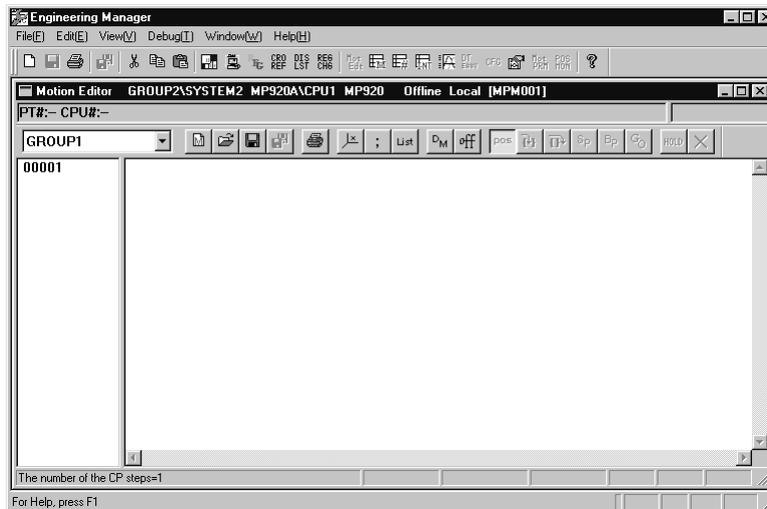
A new motion program can be created by selecting either of the following menu items while a motion-related file or folder is selected.

- 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

The Motion Editor is displayed as a single child window within its parent window, the **Engineering Manager** window. Function windows other than the Motion Editor are also displayed in the **Engineering Manager** window. When the Motion Editor is active, the Engineering Manager's menu bar will show the Motion Editor's menu.

```
┌─────────────────────────────────────────────────────────────┐
│ Engineering  Manager                                          │
├─────────────────────────────────────────────────────────────┤
│                 Menu bar (function menu)                      │
├─────────────────────────────────────────────────────────────┤
│                 Tool bar (Tool icons)                         │
├─────────────────────────────────────────────────────────────┤
│  ┌──────────────────────────────────────────────────────┐   │
│  │  Motion Editor                                         │   │
│  ├──────────────────────────────────────────────────────┤   │
│  │  PT# :        CPU#:                                    │   │
│  │  ┌────────────┬──┐ ┌────────────┐ ┌────────────────┐ │   │
│  │  │ Group name │▼ │ │ Tool icons │ │ Debug tool icons│ │   │
│  │  └────────────┴──┘ └────────────┘ └────────────────┘ │   │
│  │  ┌──────────────┬─────────────────────────────────┐  │   │
│  │  │              │                                  │  │   │
│  │  │ Row numbers  │       Program edit area          │  │   │
│  │  │              │                                  │  │   │
│  │  └──────────────┴─────────────────────────────────┘  │   │
│  └──────────────────────────────────────────────────────┘   │
├───────────────────────────────────────────┬───┬───┬───┬──────┤
│  Function bar (Debug function keys)        │   │   │   │      │
├───────────────────────────────────────────┴───┴───┴───┴──────┤
│                 Status bar                                    │
└───────────────────────────────────────────────────────────────┘
```
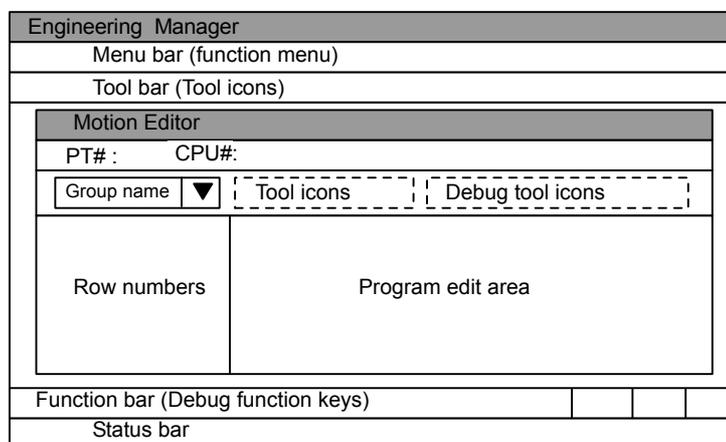
Fig 10.4 Motion Editor Window Configuration

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	

10.3.5 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.

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(Cont'd)

Menu Command		Function
	Close	Closes the Motion Editor.
	Motion Properties	Defines the motion properties.
	Save & Save into flash memory	Saves to flash memory.
	Register in User Menu	Registers a shortcut icon for the motion editor.
	Save	Saves the program.
	Save New File	Saves the program with a new name.
	Delete	Deletes a program.
	Import	Converts a text file to a motion program file.
	Export	Converts a motion program file to a text file.
	Print	Prints data.
	Print Program	Prints the active program.
	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.
	Motion task manager	Displays the operating status of the motion program.
	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	
	Auto scrolling	Automatically scrolls so that the operation cursor is always in view.

(Cont'd)

Menu Command	Function
Debug	
Debug ON	
Hold	
Abort	
Multi Step Run	
Start Point	
Break Point	Refer to *10.5 Debugging Motion Programs*.
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	
About Application	Displays version information.

10.3.6 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 in online mode. The Position Monitor Window will open.
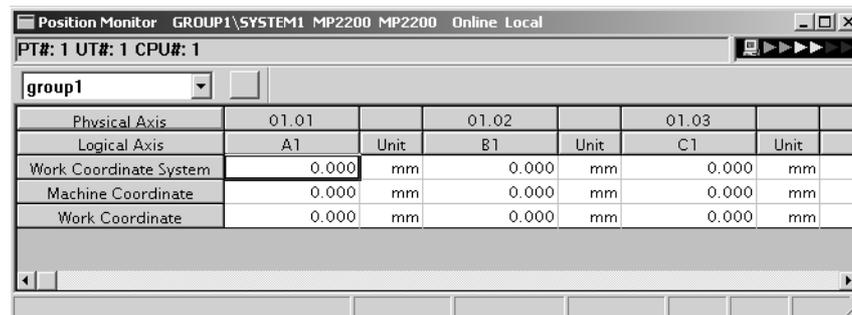
(b) Setting the Teaching Axes

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.
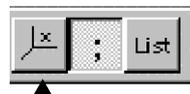
Position Teaching Button

The logical axis names and check boxes defined in the Group Definitions are displayed as shown below.
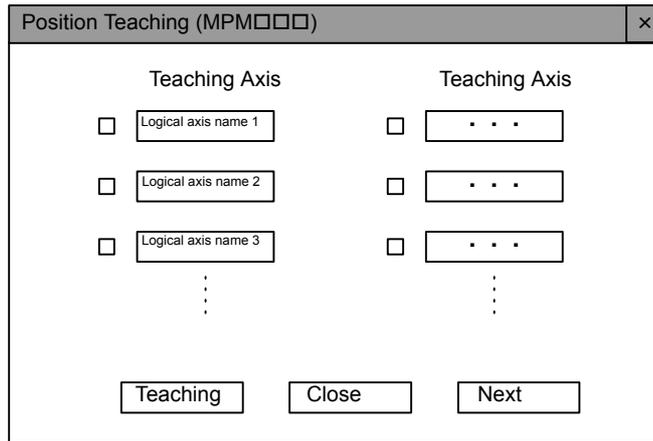
Fig 10.5 Position Teaching Window

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
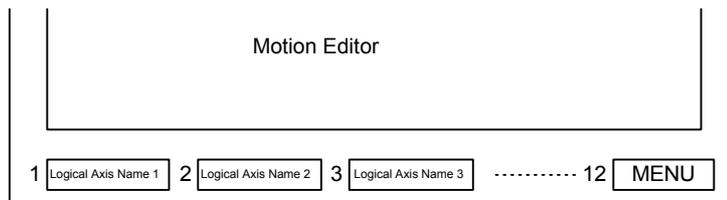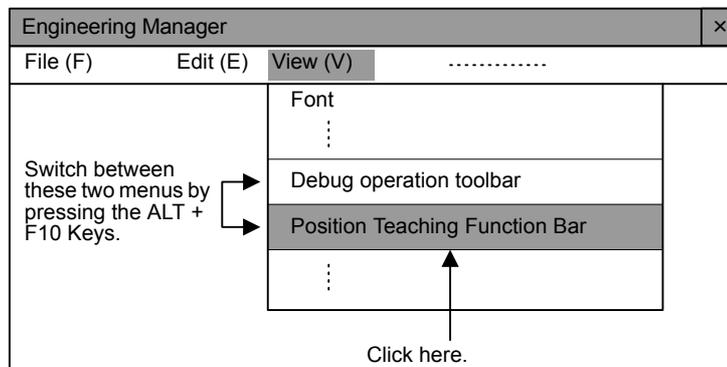
■ Function Keys
- Eight logical axis names defined in the Group Definitions are allocated to the function keys from the left (F1 to F8). Press the **F12** (MENU) Key to switch to the next eight axes (i.e., eight axes starting from the 9th). There can be a maximum of 48 axes per group.
  The MENU Key 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.

Alternatively, click the **List** tool icon.

Click the **Close** button to close the window.

10.3.7 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.
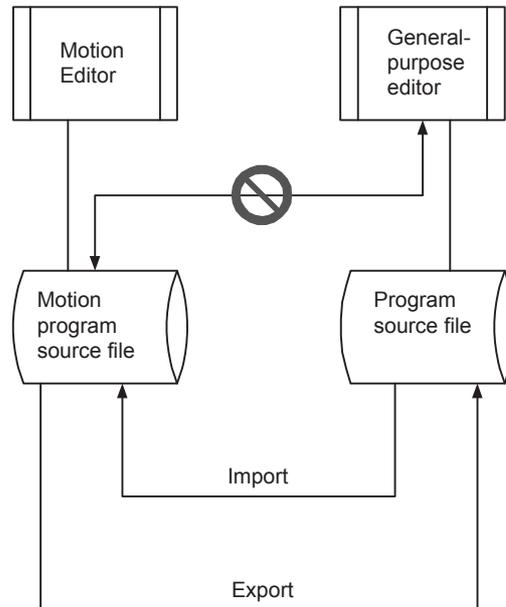
Fig 10.6 Import and Export Commands

(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.
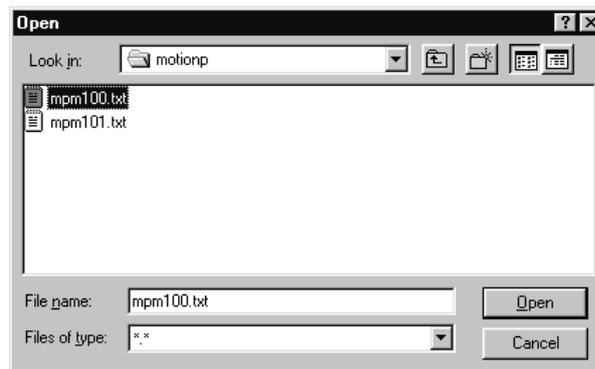
2. Search for the file by using *Look in* or other method.

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.
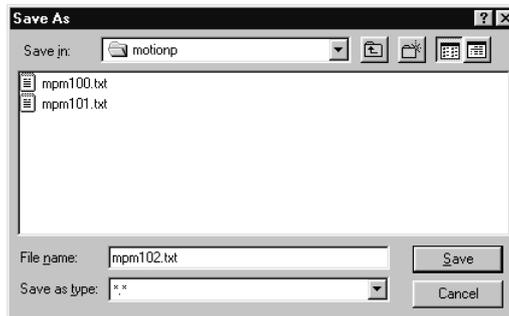
2. Select or input the name of the file and the destination folder, and click the **Save** Button. If a file by that name already exists, it will be overwritten when the new file is saved.

3. After the file has been saved, close the Motion Editor Window.

10.3.8 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.
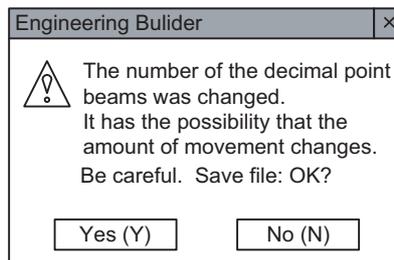
Fig 10.7 Warning Message for Save

- 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.

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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.

10.4.2 Compile Execution Steps

When the compile operation is started, the status of the compile operation is displayed in the a progress bar.
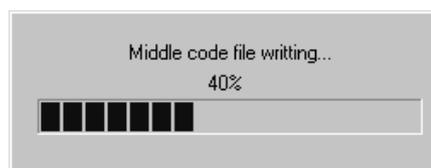
When the compile operation is completed, the progress bar above will be closed.

10.4.3 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.

10.4.4 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.

Error Row	Error Description	
7	Axis name error.	
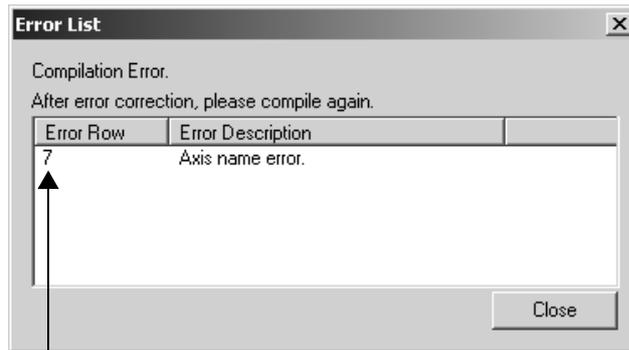
The cursor can be moved to the relevant place in the Motion Editor by double-clicking the row number displayed in the *Error Row* column.

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.

This section describes the details of debug operations for MP900-series Machine Controllers. For debug operations for MP2000-series Machine Controllers, refer to *Machine Controller MP2000 Series User's Manual for Motion Programming* (manual No.: SIEP C880700 38).

10.5.1 Outline of Debug Operations

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. |
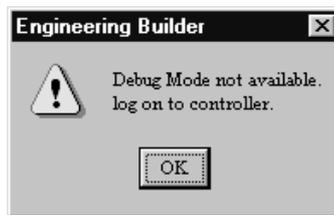
10.5.2 Opening the Debug Window

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.
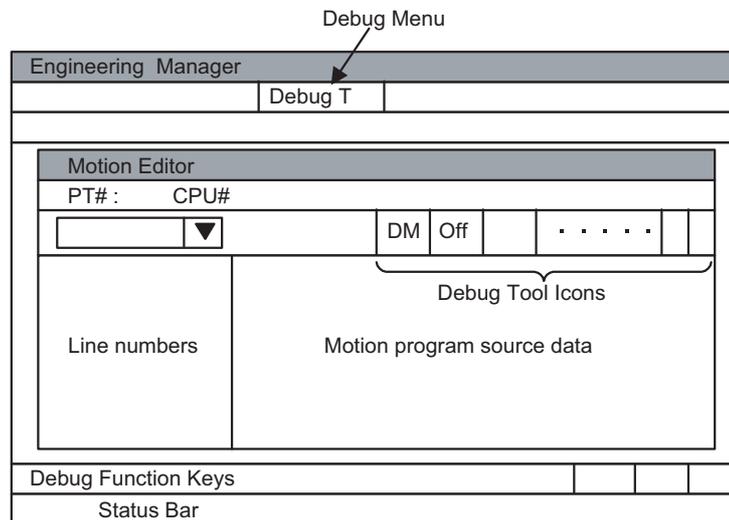
The following table shows the configuration of the Debug Window.

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.

(1) Debug Menu

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

Menu Command		Function
File		Refer to *10.3.5 Motion Editor Menus*.
Edit		
View		
	Font	Refer to *10.3.5 Motion Editor Menus*.
	Tool Bar	
	Status Bar	
	Function Bar	Displays the Function Bar.
	Quick Reference	Displays the Quick Reference.
	Debug Operation Function Bar	Allocates function keys for a debug operation.
	Position Teaching Function Bar	Allocates function keys for teaching positions.
	Error List	Refer to *10.3.5 Motion Editor Menus*.
	Monitor Parallel No.	Refer to *12.10 Position Monitor* for details.
	Monitor Regeneration	
	Auto scrolling	Automatically scrolls so that the operation cursor is always in view.
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		
	About Application	Displays version information.

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(2) Debug Icons

Icons have been created for frequently used debug commands, and these commands can be executed by clicking each of them once.
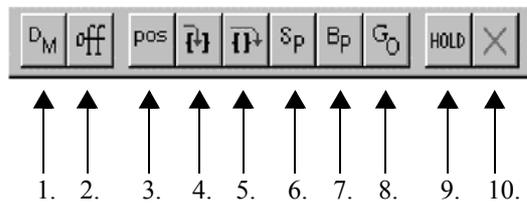
The commands indicated by the above icons are as follows:

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

(3) Debug Function Keys

Debug commands are also supported by Function Keys.
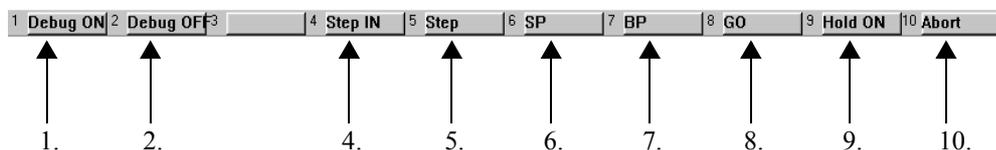
(4) Debug Status Bar

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.

10.5.3 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.
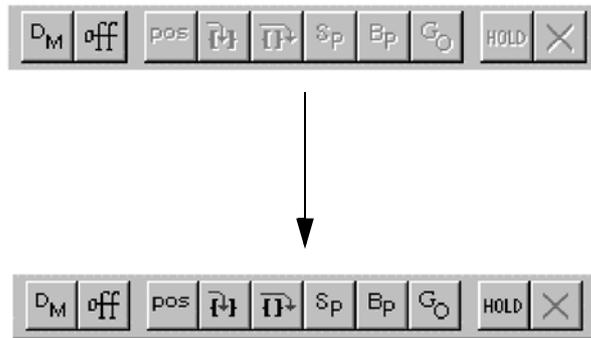
Debug Mode will be displayed on the status bar.

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.
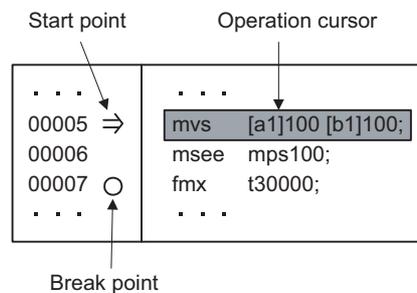
(a) Setting Start Points

The start point symbol ($\Rightarrow$) 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 ($\Rightarrow$), repeat the step to set the start point in the same row.

◀ EXAMPLE ▶

The following example shows the editing cursor at row 00005.

| 00005 | | mvs | [a1]100 [b1]100; |

⇩

| 00005 ⇒ | | mvs | [a1]100 [b1]100; |
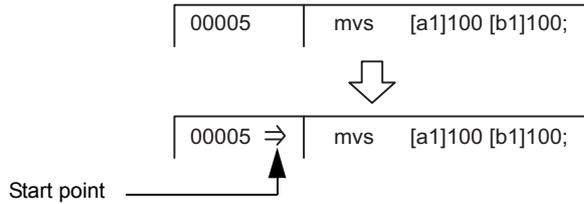
Start point

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.

(b) 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.

(c) 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.

(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.

Editing cursor

. . .	. . .
00005	mvs [a1]100 [b1]100;
00006	fmx t20000;
00007	mov [a1]o;
. . .	. . .
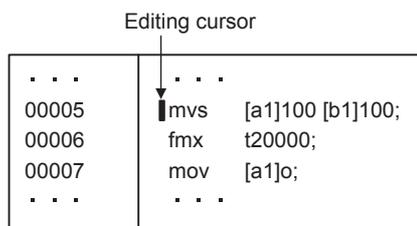
2.The execution of a command can be confirmed by the operation cursor during execution. The operation cursor may not be visible, however, for command executions that are completed quickly.

Operation cursor

```
. . .         . . .
00005         mvs   [a1]100 [b1]100;
00006         fmx   t20000;
00007         mov   [a1]o;
. . .         . . .
```
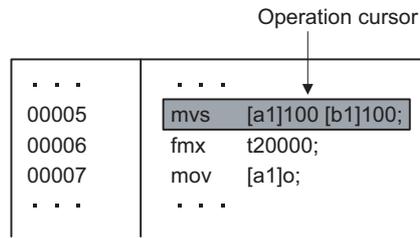
3.A breakpoint and the cursor are automatically set when one row has been debugged.

Breakpoint

```
. . .         . . .
00005         mvs   [a1]100 [b1]100;
00006  ○     ▌fmx  t20000;
00007         mov   [a1]o;
. . .         . . .
```

Editing cursor
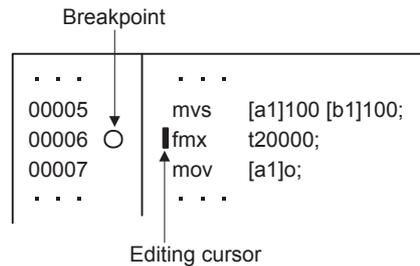
(b) Step In

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 sub-routine, 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 subrou-tines 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.

Editing cursor

```
. . .         . . .
00010        ▌msee  mps101;
00011         fmx    t30000;
. . .         . . .
```
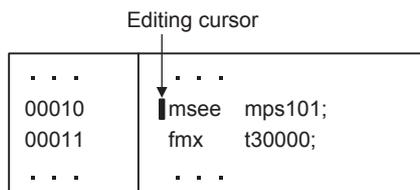
2.When the Step In command is executed, the subroutine is displayed, the debug environment is prepared, and progress is shown in a progress bar.

100%

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10-33
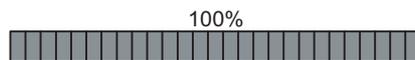
3. The Motion Editor Window for the subroutine is displayed, and the cursor is set to the first row. Both Step In and Step Over commands can be used.

Editing cursor

```
00001        MPS101  "GROUP01"
00002                dw14=1;
00003                fmx     t10000;
00004                mvs
 . . .               . . .
                     ret
```
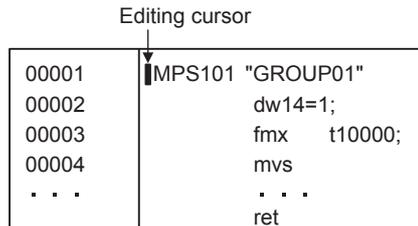
4. When the subroutine RET command is executed, the subroutine window is closed and the display returns to the main program.

Editing cursor

```
 . . .         . . .
00010          msee   mps101;
00011  ○       fmx    t30000;
 . . .         . . .
```
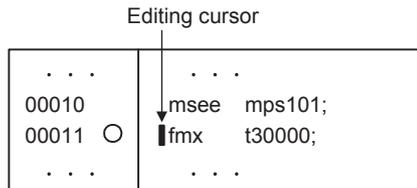
(4) Multi Step Run

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.

Start point

```
              MPS101  "GROUP01"
00001                abs;
00002  ⇒            mov     [a1]100;
00003                . . .
. . .                . . .
00007  ○            fmx     t20000;
```
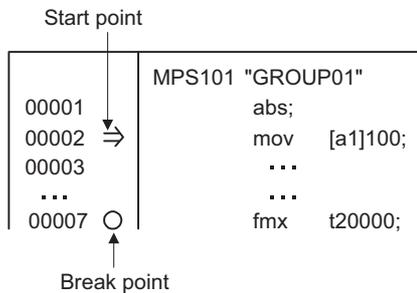
Break point

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.

Editing cursor

```
              MPS101  "GROUP01"
00001                abs;
00002                mov     [a1]100;
00003                . . .
. . .                . . .
00007  ○            fmx     t20000;
```
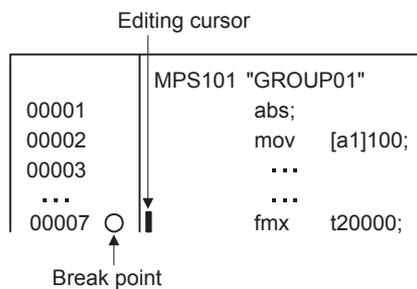
Break point

The operation cursor may not be visible for some commands. Refer to *12.9 Motion Program Monitoring* 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.

```
                Break point
      ┌─────────────┬──────────────────┐
      │  ・・・      │  ・・・            │
      │ 00004  ○   │   mov   [a1]100 ; │
      │ 00005  ⇒   │  ▌msee   mps102;  │
      │ 00006       │   msee   mps103;  │
      │  ・・・      │  ・・・            │
      └─────────────┴──────────────────┘
                 Editing cursor
            Start point
```
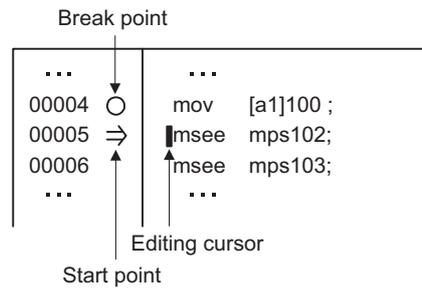
2.The debug operations enter the subroutine. If the Multi Step Run command is executed with the settings shown on the right of the following figure, the RET command will be executed, and control will return to the main program.

```
      ┌─────────────┬──────────────────┐
      │ 00001       │ MPS102  ・・・     │
      │ 00002       │    ▌mov   [b1]200;│
      │ 00003       │     fim   t100;   │
      │  ・・・      │      ・・・         │
      │             │     ret;          │
      └─────────────┴──────────────────┘
                    Editing cursor
```
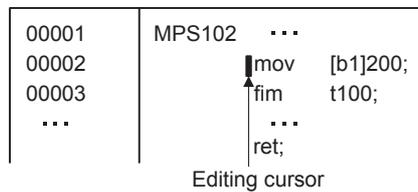
3.Once back at the main program, the process will stop at the next command.

```
                Editing cursor
      ┌─────────────┬──────────────────┐
      │  ・・・      │  ・・・            │
      │ 00004       │   mov   [a1]100 ; │
      │ 00005       │   msee  mps102;   │
      │ 00006       │  ▌msee  mps103;   │
      │  ・・・      │  ・・・            │
      └─────────────┴──────────────────┘
```
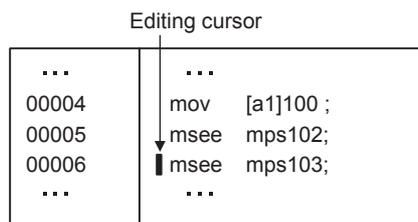
(5) Hold ON/OFF

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.
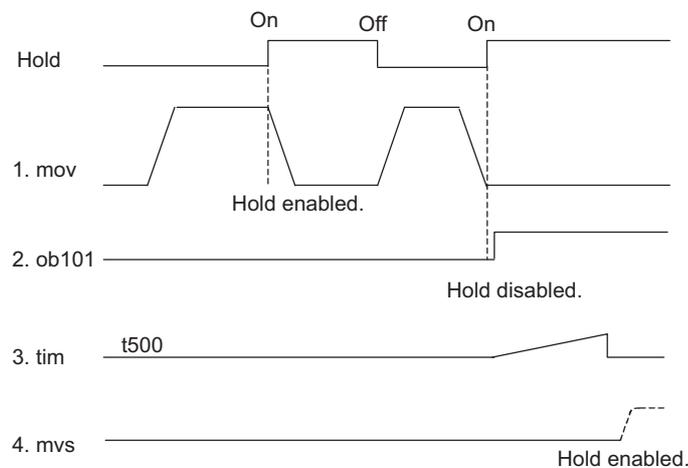
(6) Abort

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.

1. Start points and breakpoints are cleared, and the corresponding symbols disappear.

2. 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.

3. 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

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.

Cursor

00001	MPM001 "GROUP01"
.	.
.	.
.	.
.	.
00010	▌msee mps101;

2. Once the subroutine is executed, set the start point and breakpoint as shown below.

Start point

00001	MPS101 "GROUP01"
00002 ⇒	fmx t10000;
...	...
00019	mvs [d1]200 f1000 pfn;
00020 ○	ret;

Break point

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.

00001	MPS101 "GROUP01"
00002	fmx t10000;
...	...
00019	mvs [d1]200 f1000 pfn;
00020	ret;

4. As the debug operations were reset, the main program only can be debugged, and the start point is set at the beginning.

Editing cursor

00001	▌MPM001 "GROUP01"
.	.
.	.
.	.
.	.
00010	msee mps101;

(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.

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(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.

INFO
- Programs cannot be edited when the operation cursor is displayed, indicating that the debug operations are being executed.

Operation cursor

```
   ...          ...
00012  ⇒    ↓ fmx    t30000 ;
00013         mvs    [a1]100;
   ...          ...
00020  ○      pfork
```
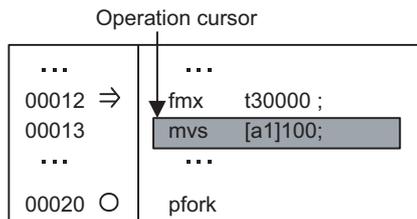
- The following program can be edited. The debug operations are stopped, and the editing cursor is at the front of the PFORK command.

Editing cursor

```
   ...          ...
00012         fmx    t30000 ;
00013         mvs    [a1]100;
   ...          ...
00020  ○    ❘ pfork
```
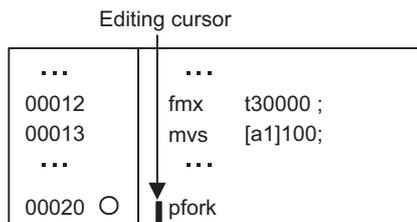
- In the following program, the MPS101 subroutine, which has been called from the MPM001 main program using the Step In command, is active. In addition, the MPM002 program, which is unrelated to the debug operations, is open.

Main program

Subroutine opened from the main program

```
Motion Editor
00005    MPM001
  .         .
  .         .      Motion Editor
  .         .      00005    MPS101
                     .         .
                     .         .
                     .         .
                           Motion Editor
                           00005    MPM002
Program unrelated to         .         .
the debug operations         .         .
```
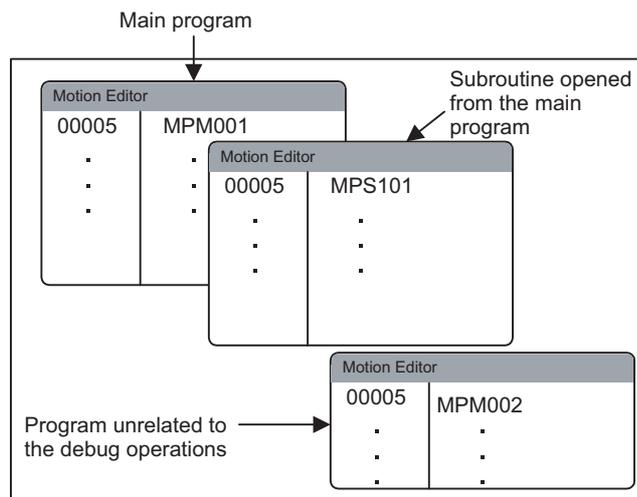
In this example, MPM002 can be edited because it is unrelated to the debug operation, but MPM001 cannot be edited because it is still in the debug operation. MPM002 cannot be saved.

(9) Editing

(a) Editing and Temporary Registration

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 *(c) 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.

Editing cursor

```
00004          dw12=12;
00005          dw13=13;
00006      ▮   ;
```

2.Input the substitute text dw14=14.

Editing cursor

```
00004      dw12=12;
00005      dw13=13;
00006      dw14=14;
00007    ▮;
```

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.

30%
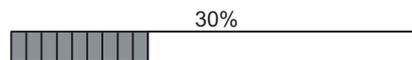
(b) Handling Breakpoints

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.

```
                        Break point
                            │
        ┌──────────┬──────────────────────┐
        │ 00007    │ fmx    t20000;        │
        │ 00008  ↓ │ mvs    [a1]0 [b1]0;   │
        │ 00009  ○ │ ▌mvs   [c1]o;         │
        │ 00010    │ ↑;                    │
        └──────────┴──────────────────────┘
                        │
                  Editing cursor
```
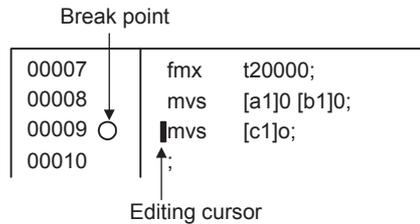
2.Edit the mvs command in row 9. The breakpoint will remain with the same command in this example because the text is being overwritten.

```
                        Break point
                            │
        ┌──────────┬──────────────────────┐
        │ 00007    │ fmx    t20000;        │
        │ 00008  ↓ │ mvs    [a1]0 [b1]0;   │
        │ 00009  ○ │ mvs    [c1]200▌;      │
        │ 00010    │ ;                     │
        └──────────┴──────────────────────┘
                                 │
                          Editing cursor
```
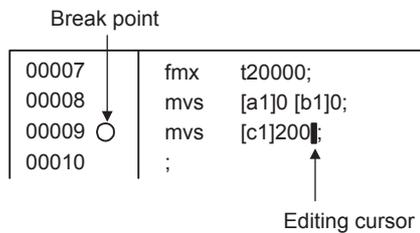
3.Two rows of commands have been added in row 9. The row numbers will move and, as a result, the breakpoint will be located at the tim command.

```
                        Break point
                            │
        ┌──────────┬──────────────────────┐
        │ 00007    │ fmx    t20000;        │
        │ 00008  ↓ │ mvs    [a1]0 [b1]0;   │
        │ 00009  ○ │ tim    t100;          │
        │ 00010    │ mw100 = 100;          │
        │ 00011    │ ▌mvs   [c1]200 ;      │
        │ 00012    │ ↑;                    │
        └──────────┴──────────────────────┘
                        │
                  Editing cursor
```
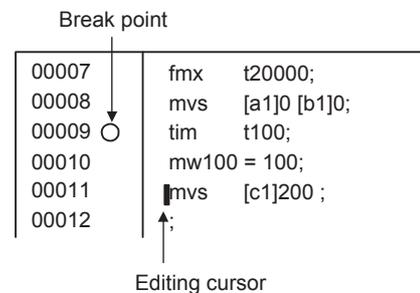
4.The tim command has been deleted. The row numbers will move up one, and the breakpoint will be located with the substituted text.

```
                        Break point
                            │
        ┌──────────┬──────────────────────┐
        │ 00007    │ fmx    t20000;        │
        │ 00008  ↓ │ mvs    [a1]0 [b1]0;   │
        │ 00009  ○ │ ▌ mw100 = 100;        │
        │ 00010    │ ↑ mvs    [c1]200 ;    │
        │ 00011    │ ;                     │
        └──────────┴──────────────────────┘
                        │
                  Editing cursor
```
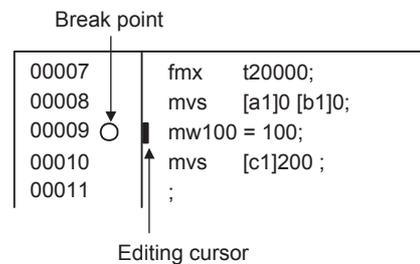
(c) Updating Files

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.

(d) 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.

(e) 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) Restrictions during Debug Operations

The restrictions that apply to the debug operations are outlined below.

(a) 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

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(b) 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.

```
                   Break point

00001            MPS001 "GROUP"
00002                    dw10=10;
00003                    dw11=11;
00004                    dw12=12;
00005                   ▌dw13=13;
00006                    ;
00007                    ; Comments
00008     ↓   LB0;
00009     ○            fmx    t20000;

                   Editing cursor
```

2.Execute Step Over.
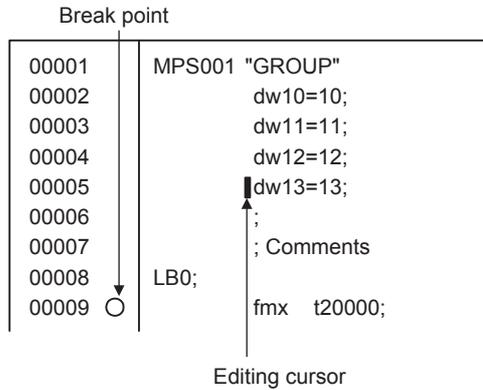
```
                   Break point

00001            MPS001 "GROUP"
00002                    dw10=10;
00003                    dw11=11;
00004                    dw12=12;
00005            ▐  dw13=13;  ▌
00006                    ;
00007                    ; Comments
00008     ↓   LB0;
00009     ○            fmx    t20000;

                   Operation cursor
```
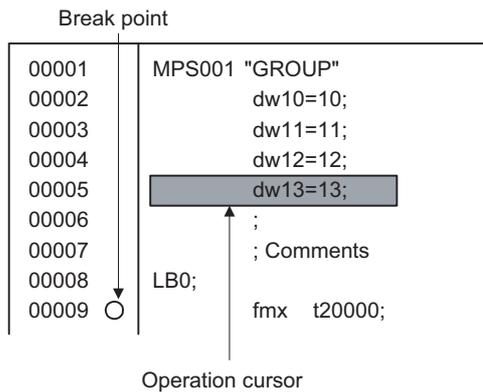
3.The comment and label rows are passed, and the breakpoint and cursor are set to row 9, which has the fmx command.

```
                   Break point

00001            MPS001 "GROUP"
00002                    dw10=10;
00003                    dw11=11;
00004                    dw12=12;
00005                    dw13=13;
00006                    ;
00007                    ; Comments
00008     ↓   LB0;
00009     ○            ▌fmx    t20000;

                   Editing cursor
```
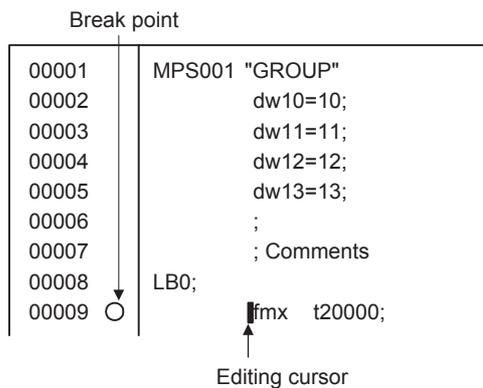
(c) Commands that Cannot be Executed with Step Run

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.

(d) 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	

(e) 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.

Editing cursor

```
00006              ;
00007              ; Comments
00008    LB0;
00009              fmx    t20000;
00010              mvs    [a1]0 [b1]0;
```
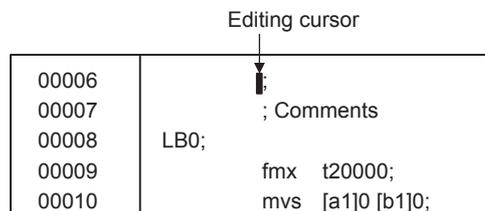
2. When Step Run is executed, the executable commands after row 6 are executed. In this example, the fmx command is executed.

Break point

```
00006              ;
00007              ; Comments
00008    LB0;
00009              fmx    t20000;
00010  ○          mvs    [a1]0 [b1]0;
```

Operation cursor

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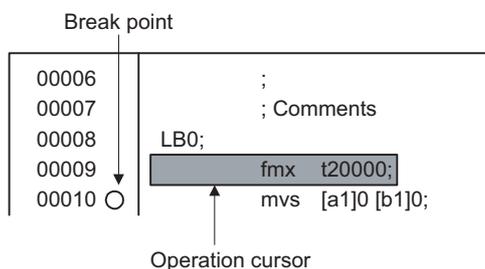
(f) SNG Operation

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.

Break point

```
00028          mov    [a1]0.;
00029          ob101 = 0
00030  ○       sng mov   [a1]100. ;
00031          sng mov   [b1]100. ;
00032          ob101 = 1
00033          mov    [a1]100.;
```

Editing cursor

11
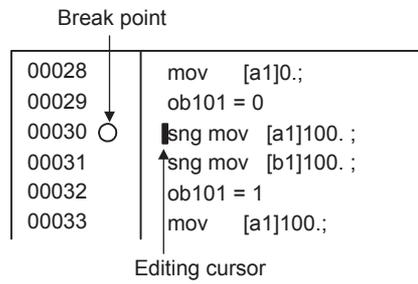
Creating Table Data

This chapter explains how to create data used in table format (arrays) in the main program.

Creating Table Data

11

11.1 Creating Table Data

This section describes how to create the array data used in the main program.

11.1.1 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.
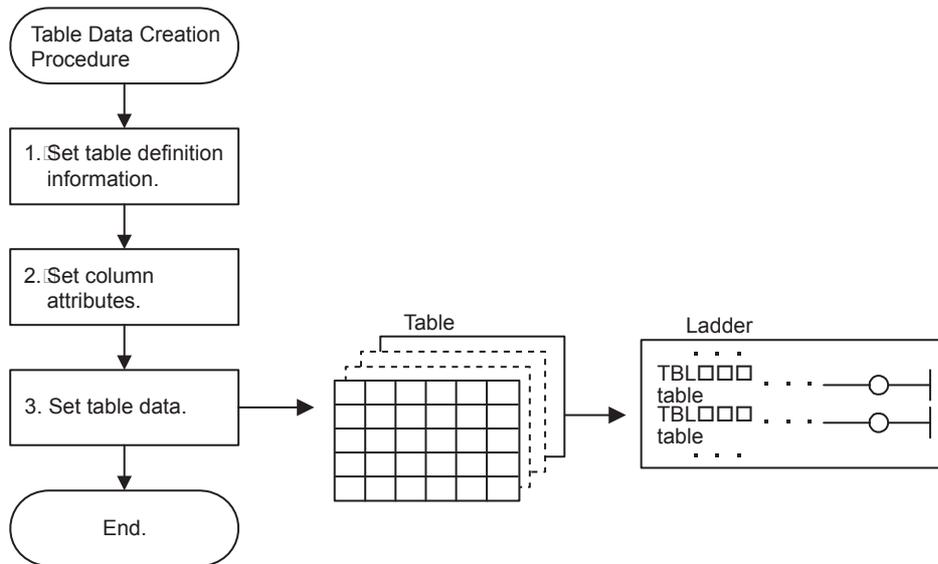
1. Setting Table Definition Information

   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.
Table data store target	Selects either *Normal* or *Battery back-up*. (Available only for the CPU-02 Module in the MP2200 Machine Controller.)

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.

Table name

| Column 1 | Column 2 | · · · | Column n | ← Column name |

Number of rows

Number of columns
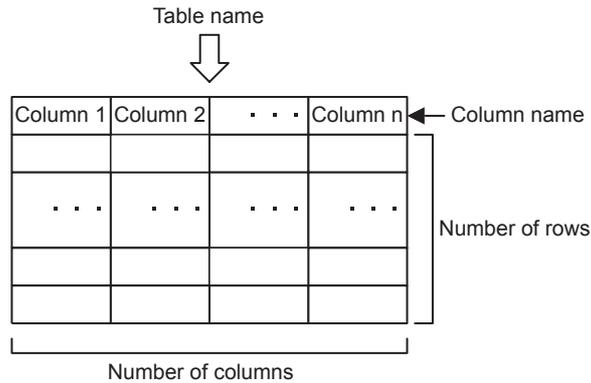
If the table is an array table, there will be only one column name because all of the element data types (integer, real number, etc.) are the same.

If the table is a record table, the column name, data type, and other settings must be made for each column.

11.1.2 Table Data Definition List Window

This section describes how to open the list window, and the configurations of windows and menus.

(1) Opening Table Data Definition List Windows

(a) 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.
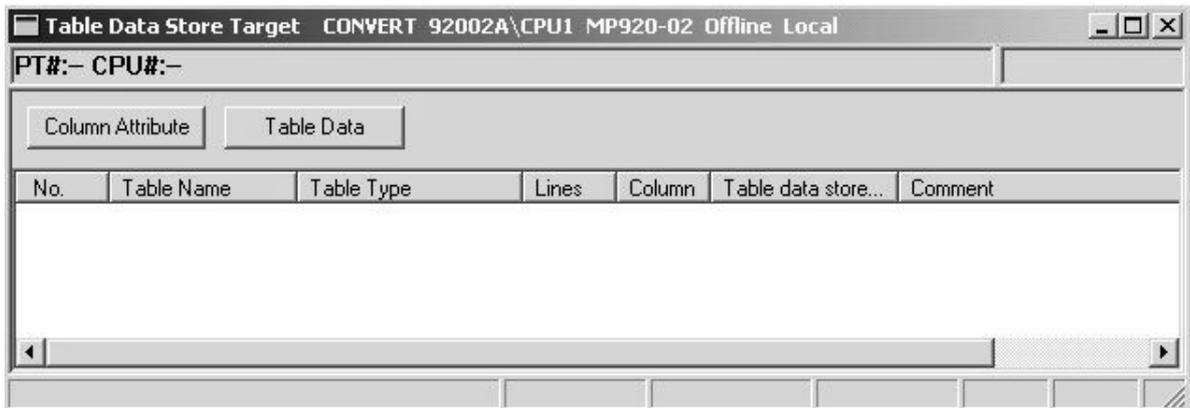
(b) Opening from the Engineering Manager

Select *File – Open – Data Table Definition – Data Table Map* from the Engineering Manager Menu.

(2) 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 *11.1.2 Table Data Definition List Window*.

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 storage destination for the table data.
Comment	Displays the data table comments.
Column Attribute Button	Opens the **Column Attribute** window.
Table Data Button	Opens the **Table Data** window.

11.1.3 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.
	Register in User Menu	Registers a shortcut for the **Table Data Definition** window.
	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		
	About Application	Displays version information.

11.1.4 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

(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.

(a) 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.

(b) 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.

(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.

(a) 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.

(b) 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.

(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.

(a) Setting a Table Definition

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.

(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.

Click the **Yes** Button in the message box. The selected data table will be deleted.

11.1.5 Opening Column Attribute Windows

For details, refer to *(1) Opening Data Table Column Attribute Windows* in *11.1.4 Manipulating Tables in Table Data Definition List Windows*.

11.1.6 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.
Insert column	Inserts a column.
Delete column	Deletes a column.
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	
About Application	Displays version information.

11.1.7 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.

11.1.8 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

(1) 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.

INFO
- 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 *(7) Changing Table Definitions* later in this section.

(2) 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.

INFO
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 *(7) Changing Table Definitions* later in this section.

(3) 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.

(4) 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.

(5) 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.

(6) 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.

(7) 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.

11.1.9 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.

INFO | 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.

11.1.10 Opening Table Data Windows

For details, refer to *(2) Opening Table Data Windows* in *11.1.4 Manipulating Tables in Table Data Definition List Windows*.

11.1.11 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.
	Save	Saves the table data.
	Column Definition	Opens the Data table column attribute Window.
	Import	Imports table data.
	Export	Exports table 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.
	Go To	Moves the cursor to a specific column.
Edit		
	Insert	Not used with this window.
	Delete	
	Line Insert	Inserts a line.
	Line Delete	Deletes a line.
Window		
	Cascade	Stacks windows in the display.
	Tile	Lines up windows in the display.
	Arrange Icons	Lines up icons.
Help		
	About Application	Displays version information.

11.1.12 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.
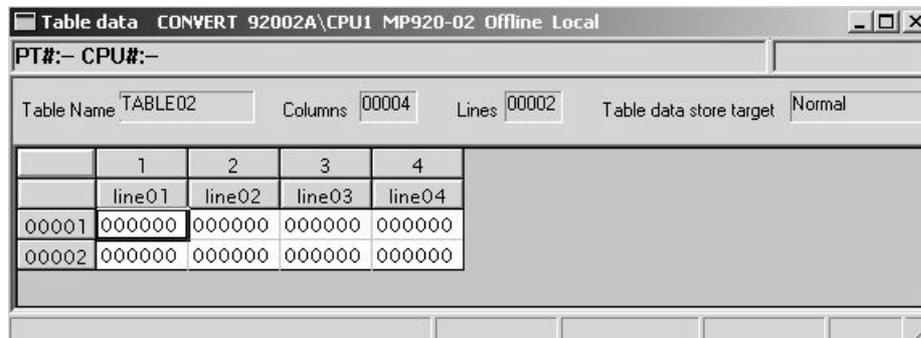
Setting	Details
Table Name	Displays the name of the table.
Columns	Displays the number of column set in the table definitions.
Lines	Displays the number of rows set in the table definitions.
Table data store target	Displays the storage destination for the table data.
Column No.	Displays the column numbers 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.

11.1.13 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.

11.1.14 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.

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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.
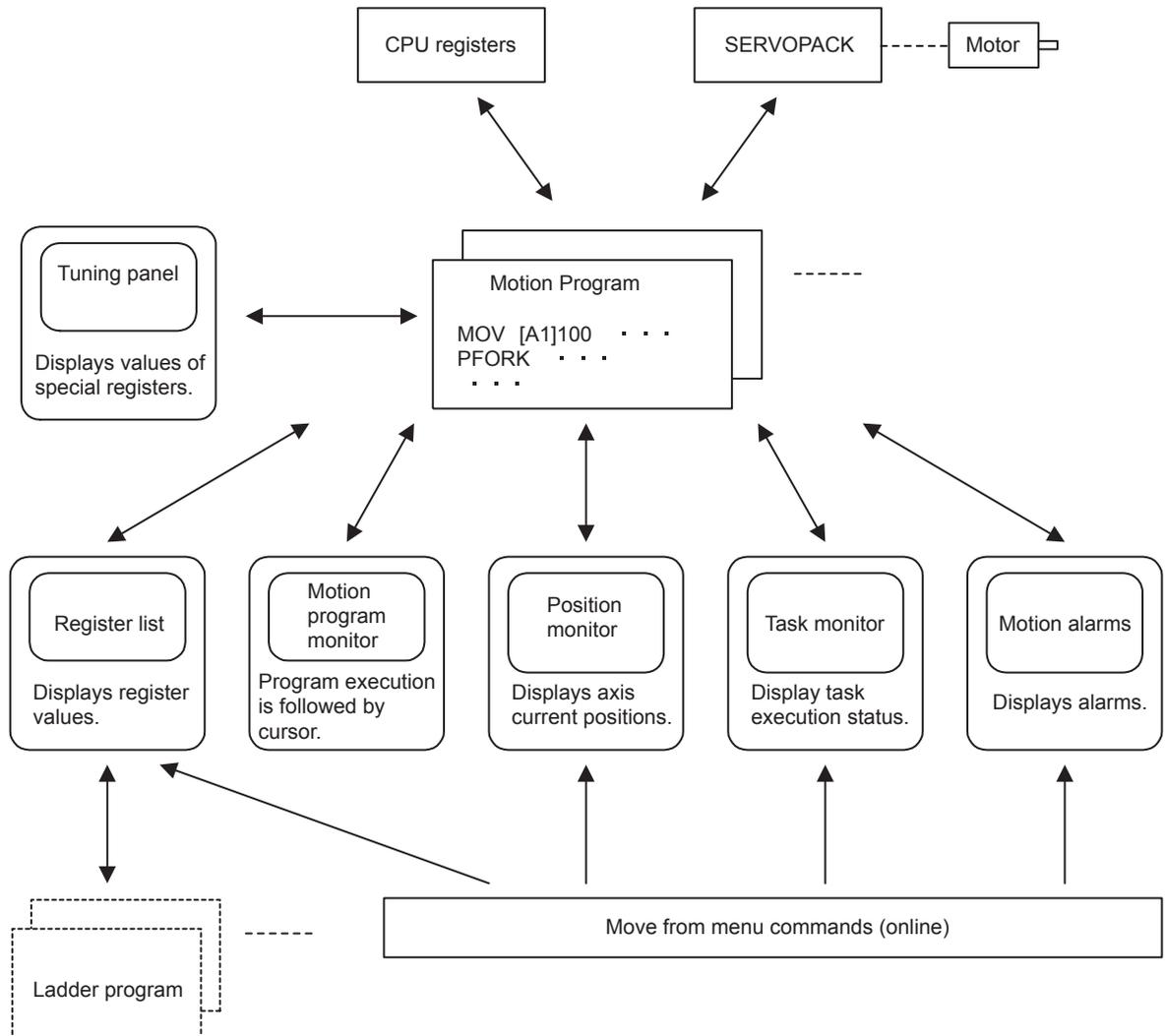
Refer to the following for details.

- 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.

12.2.1 Outline

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.

(1) Tuning Panel Window

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			

12.2.2 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.

[H01] Tuning Panel GROUP1\SYSTEM2 MP920B\CPU1 MP920 Offline Local								
PT#:– CPU#:–								
No	Data Name		S	Format	CurrentValue	Unit	Lower Limit	Upper Limit
1								
2								
3								
4								
5								

(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.

12.2.3 Tuning Panel Menus

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.
Register in User Menu	Registers a shortcut for 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	
About Application	Displays version information.

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12.2.4 Configuration and Operation of the Tuning Panel Window

(1) 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 *9.4.4 Switching Input Modes*.

(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.

(3) Editing Tuning Panels

The editing methods for tuning panels are the same as for table programs. Refer to *9.4.11 Editing Table Programs*.

(4) 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 *9.3.11 Saving Ladder Programs* for information on error windows.

---

(5) 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 *9.3.12 Printing Ladder Programs* for information on page settings and printing.

12.2.5 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.

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12.3 Quick Reference

This section explains the configuration and operation of the Quick Reference.

12.3.1 Outline

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.

12.3.2 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.

Page (tab)
Boundary line
Quick Reference
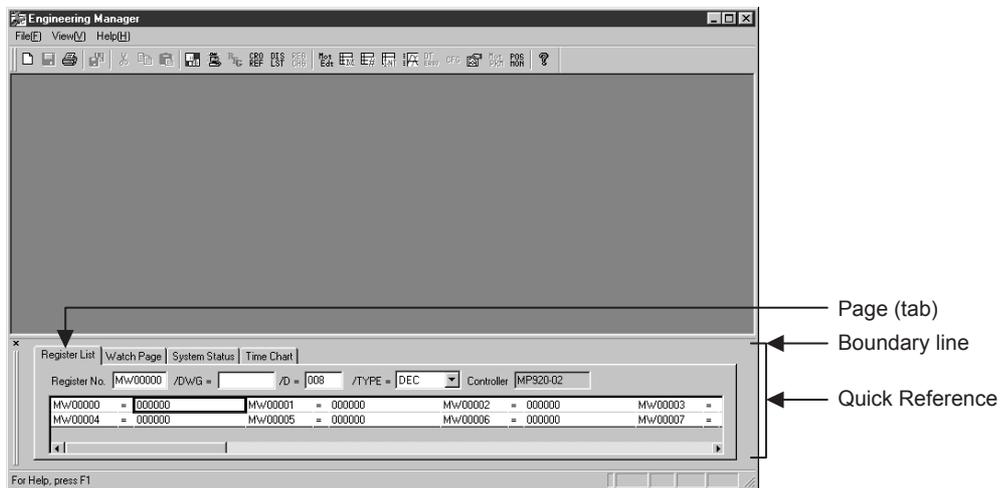
INFO The Quick Reference Window is a docking window, so the window can be resized by dragging the boundary lines and the window itself can be repositioned by dragging it to the left or right.

12.3.3 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.
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.
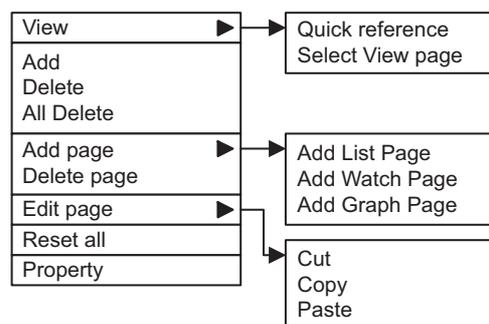
(2) List and Graph Pages

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.
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.

```
┌─────────────────────┐      ┌─────────────────────┐
│ View            ▶───┼────▶ │ Quick reference     │
├─────────────────────┤   │  │ Select View page    │
│ Add page        ▶───┼───┤  └─────────────────────┘
│ Delete page         │   │  ┌─────────────────────┐
├─────────────────────┤   └─▶│ Add List Page       │
│ All Reset           │      │ Add Watch Page      │
├─────────────────────┤      │ Add Graph Page      │
│ Property            │      └─────────────────────┘
└─────────────────────┘
```
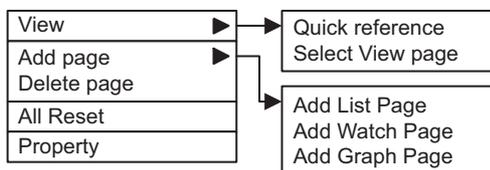
12.3.4 Quick Reference Operations

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.
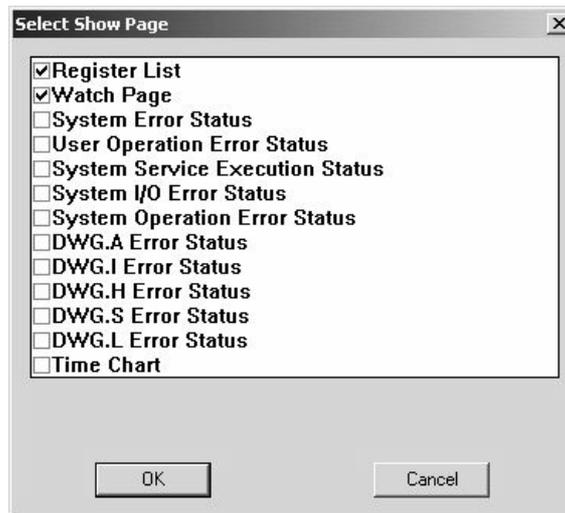
Fig 12.1 Select Show Page Window

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.

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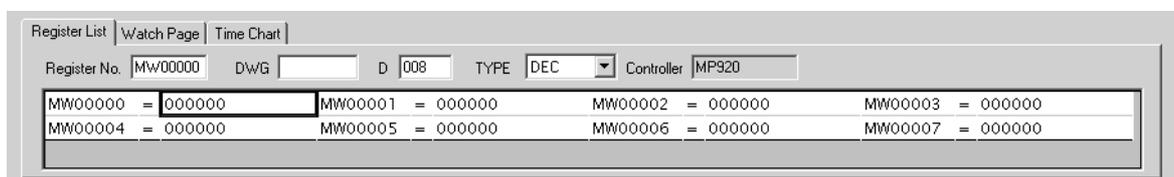
(b) Moving through Pages

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 as shown below (The scroll button is circled).
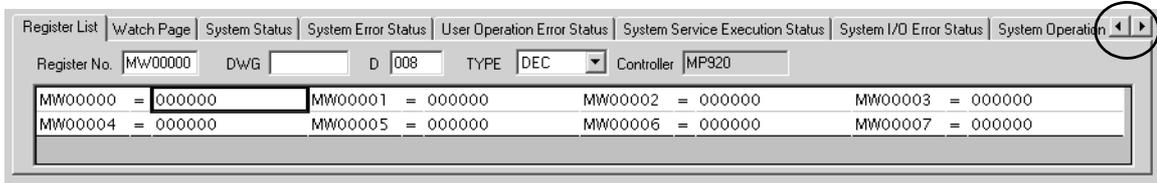
INFO The scroll button will not be displayed if the entire tab can be displayed within the window.

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
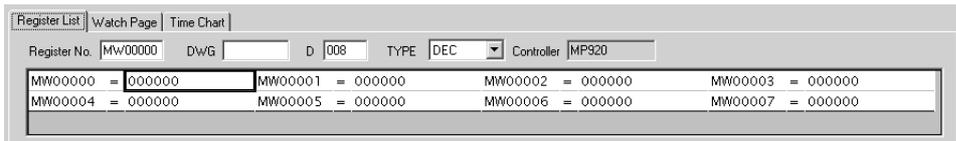
• Watch Page
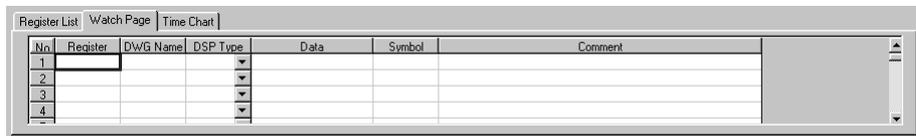
• Time Chart Page
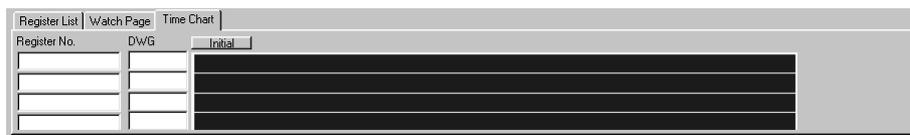
1. Select *Add Page* from the popup menu and select *Add List Page*, *Add Watch Page*, or *Add Graph Page* from the submenu.

   The **Property** window will be displayed.
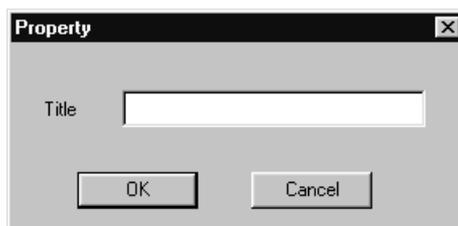
2. Input the title for the page being added and click the **OK** button.

   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.
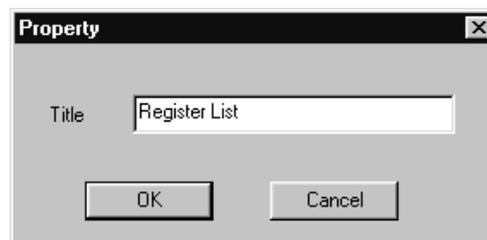
Note: The Property Window shown above is displayed when the title of a Register List page is being changed.

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.

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(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.

```
┌─────────────────────────────────────────┐
│ Set Number of Register              [ × ]│
│                                          │
│                                          │
│   Number of Register    [          ]     │
│                                          │
│                                          │
│   DWG Name              [          ]     │
│                                          │
│                                          │
│      [    OK    ]      [   Cancel   ]     │
│                                          │
└─────────────────────────────────────────┘
```

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 *12.3.5 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 and Resetting All Data

(a) 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 pop-up menu.

   All of the data will be deleted from the list in the selected Watch page.

(b) 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.

12.3.5 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 *12.3.4 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. For all other registers, the maximum number is the maximum shown in the table.

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(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.
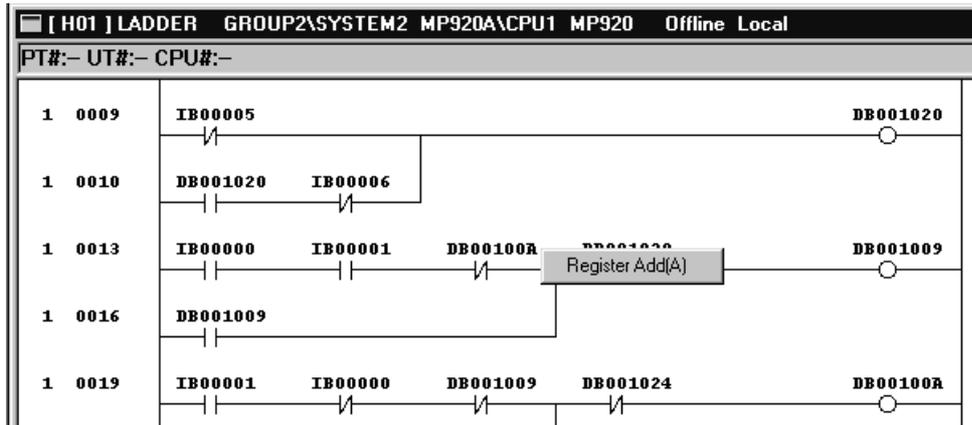
The above-mentioned operation will register the selected register number (DB00100A in this example) in the active Watch page within the Quick Reference.

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)
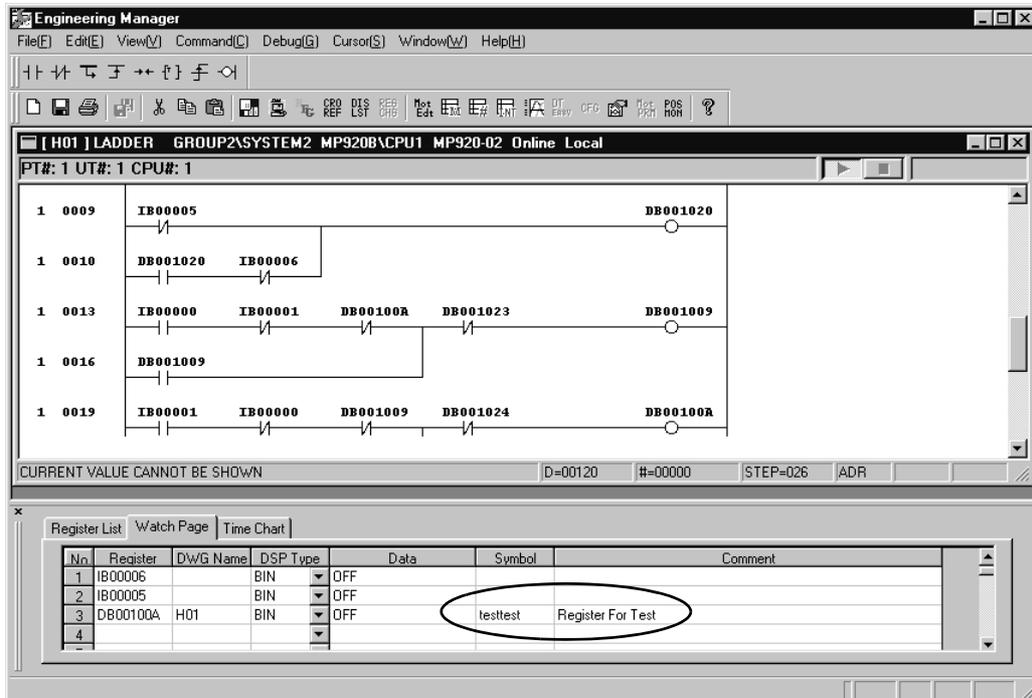
After the symbol or comment is set, the setting will be reflected in the DWG when the DWG is active.

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).
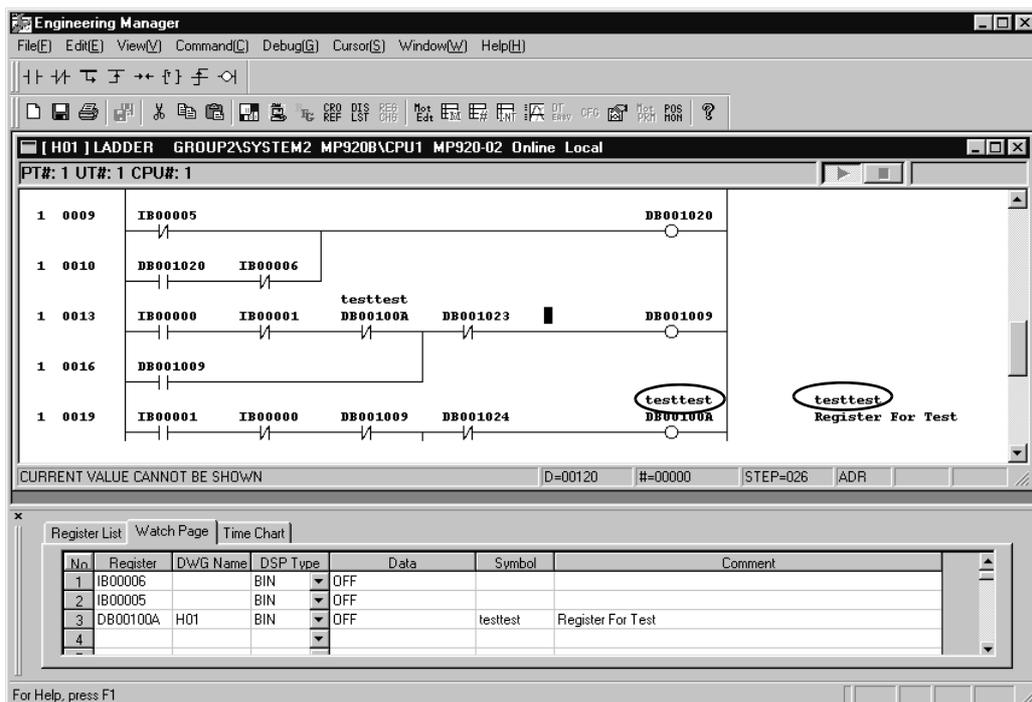
(c) Editing Register List Page

The various data and settings of the Register List page are shown below.

The following figure shows the Register List Page Window.
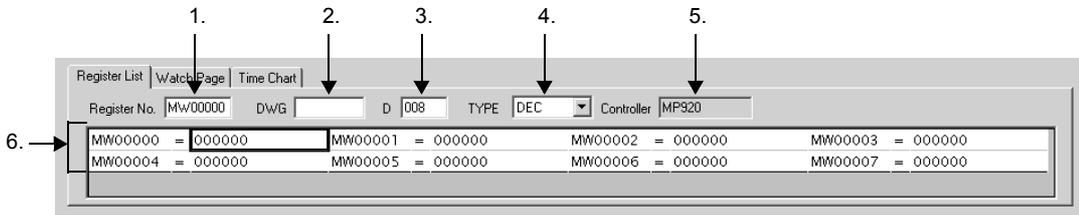
1. Register Number
   - Description: Specifies the leading register number of the registers containing the data to display/set.
   - Set value: Input the register number.

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.
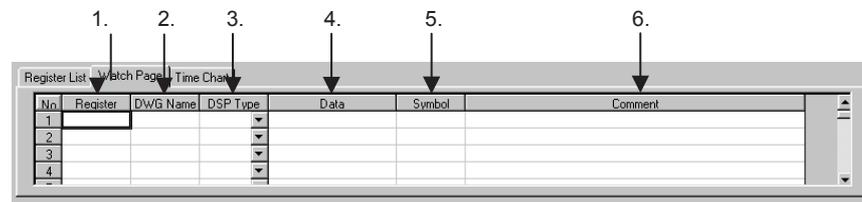
1. Register (Register Number)

    • 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.

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(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.
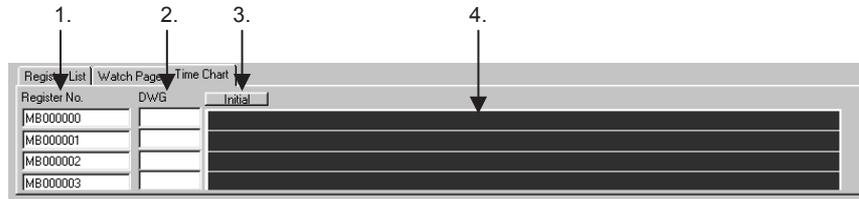
1. Register Number

   • 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*.

12.3.6 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.

12.4.1 Outline

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.
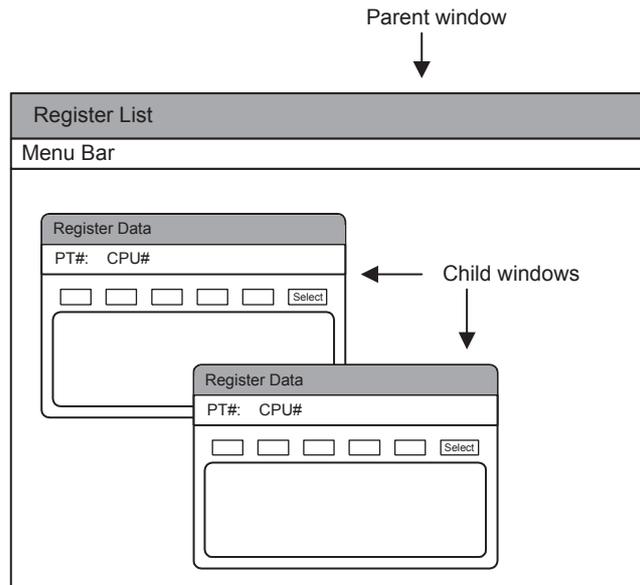
12.4.2 Opening a Register List Window

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.

1. Opening From the File Manager
   Select *Tool – Register List* from the File Manager Menu.
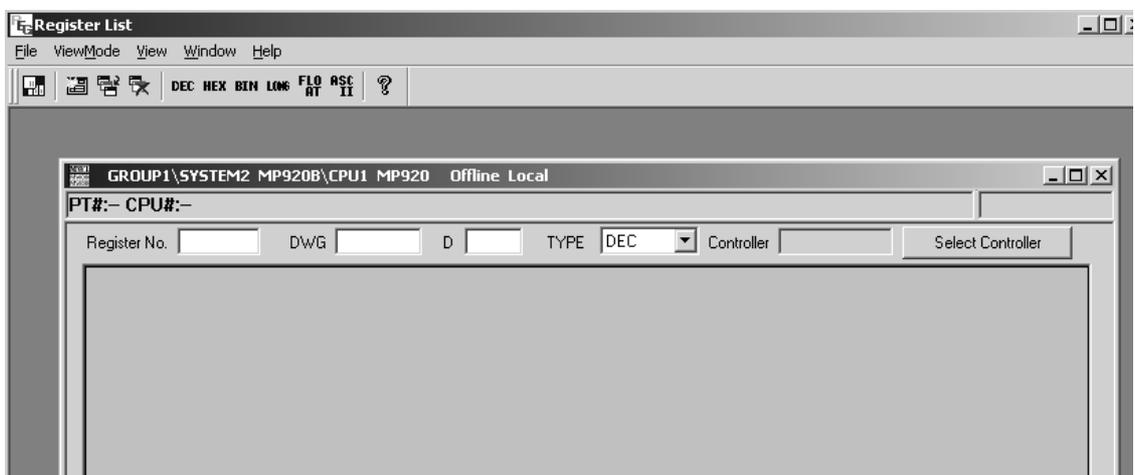
2. Opening From the Engineering Manager
   Select *File – Open – Tool – Register List* from the Engineering Manager Menu.

(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.
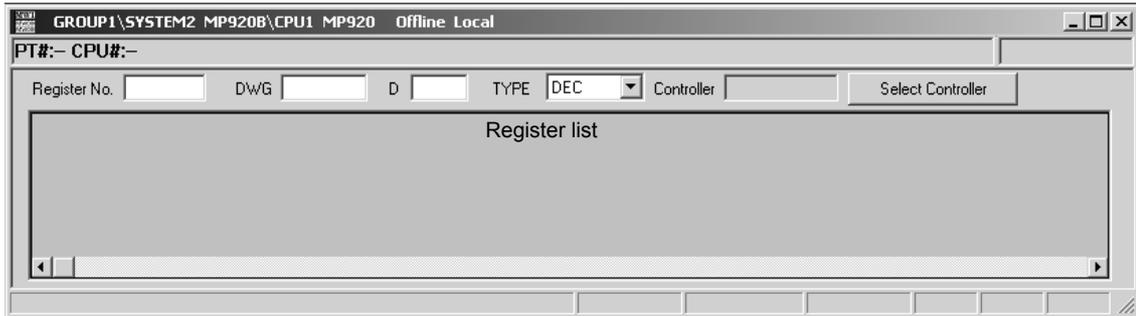
12.4.3 Register List Menus

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	
About Application	Displays version information.

* Displayed only in the **Register List** window.

- 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.
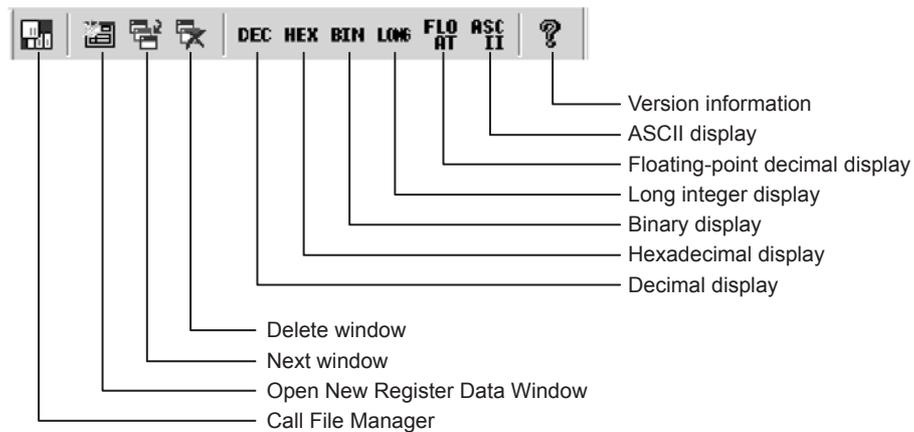
12.4.4 Configuration and Operation of the Register Data Window

(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.)

(a) 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.

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Click the **Select Controller** Button to display the **Select** window.

Select				
Controller N..	CPU Name	Order Name	Group Name	Server

INFO
- 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.

(3) 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.

(4) 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.

INFO
• 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.

12.4.5 Exiting the Register List

Exit the register list by closing the Register List Window and the **Register Data** window using the following pro-
cedure.

• 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.

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12.5 Cross References

This section describes the cross reference function for registers used in programs.

12.5.1 Outline

The cross reference function will search programs to find out which registers are used in which programs and how the registers are used.

12.5.2 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.

12.5.3 Cross Reference Menus

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		
	About Application	Displays version information.

12.5.4 Configuration and Operation of the Cross Reference Condition Window

(1) 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.

(a) Specifying Cross Reference Conditions

Input the Cross Reference setting conditions in the **Cross Reference Specifying** 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 *(b) Details of Search Mode*.	

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(b) 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.

(2) 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.

```
H01  :  010  i  ILKTB  P002
                            └──── 6.
                     └─────────── 5.
                 └─────────────── 4.
            └──────────────────── 3.
       └───────────────────────── 2.
  └──────────────────────────────── 1.
```
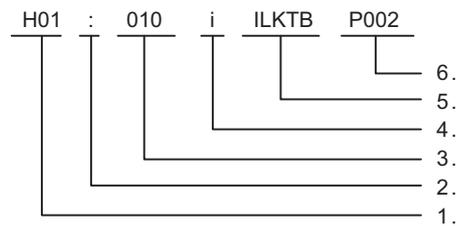
1. DWG Number or Function Symbol

   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.

12.6.1 Outline

Disable Coils Lists searches for disabled coils in the program and display information on them.

12.6.2 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.
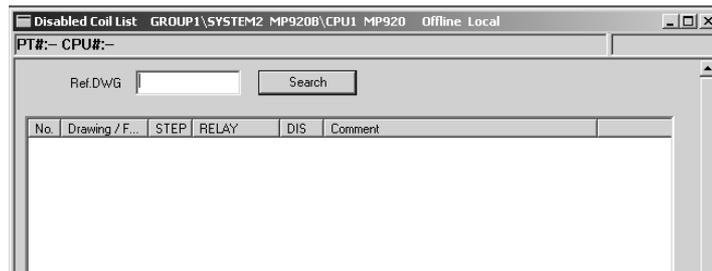
12.6.3 Disable Coil List Menus

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	
About Application	Displays version information.

12.6.4 Configuration and Operation of the Disable Coil List Window

(1) Setting Disable Coil Lists

Setting/Display	Details
Ref. DWG	Specify the range of programs to search for.
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 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.

(a) 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.

(b) Display of Step Numbers

Step numbers and program types are displayed as follows:

/   010

The step number in the program

The program type
/: Main program
–: SFC program
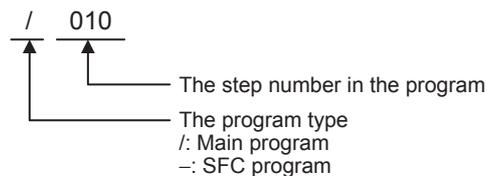
12.6.5 Exiting Disable Coil Lists

Close the **Disable Coil List** window to exit disabled coil lists.

Select *File – Close* from the Disable Coil List menu to close the window.

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12.7 Comment Lists

This section describes the creation of comments for registers in programs.

12.7.1 Outline

DWG and function program titles and comments for registers in currently displayed programs can be created at the same time.

12.7.2 Opening Comment List Window

• Opening from the Engineering Manager

Select *File – Open – Tool – Comment List* from the Engineering Manager menu.
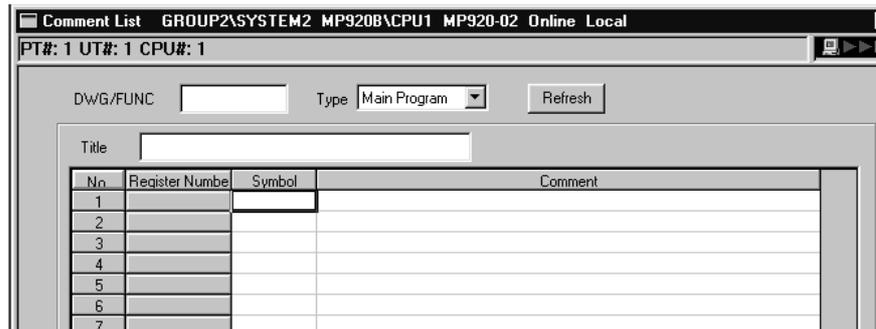
12.7.3 Comment List Menus

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	
About Application	Displays version information.

12.7.4 Configuration and Operation of the Comment List Window

(1) Display Items

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.

(2) 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.

INFO ▶ Comments are saved when the **Enter** key is pressed after the comment has been entered in step 3.

(3) 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.

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12.8 Replacing Register Numbers

This section describes the function for replacing a register number with another number.

12.8.1 Outline

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.

12.8.2 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.
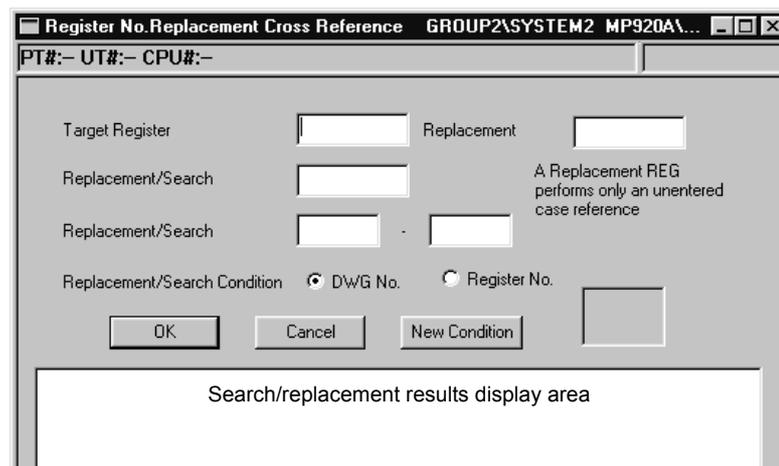
12.8.3 Register Number Replacement Cross Reference Menus

The following table shows the menu commands and functions displayed in the **Register No. 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		
	About Application	Displays version information.

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12.8.4 Configuration and Operation of the Register Number Replacement Cross Reference Window

(1) Executing Register Number Replacement

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 No. 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.

(a) 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 *(c) Executing Register Number Replacement* in *12.8.3 Register Number Replacement Cross Reference Menus*.

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 *(c) Executing Register Number Replacement* in *12.8.3 Register Number Replacement Cross Reference Menus.*

(b) 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.

(c) Display of Search/Replacement Results

Search and replacement results are displayed in the following form when a search/replacement operation is executed.

```
    *   L01. 03   /   001   $   i
                                  ├── 6.
                                ├──── 5.
                          ├────────── 4.
                    ├──────────────── 3.
        ├──────────────────────────── 2.
    ├──────────────────────────────── 1.
```
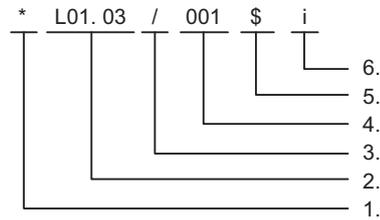
1. Replacement Result

   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

12.8.5 Closing Register Number Replacement

Close the **Register No. 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 describes how to follow motion program execution conditions one step at a time with an operation cursor.

12.9.1 Outline

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*.
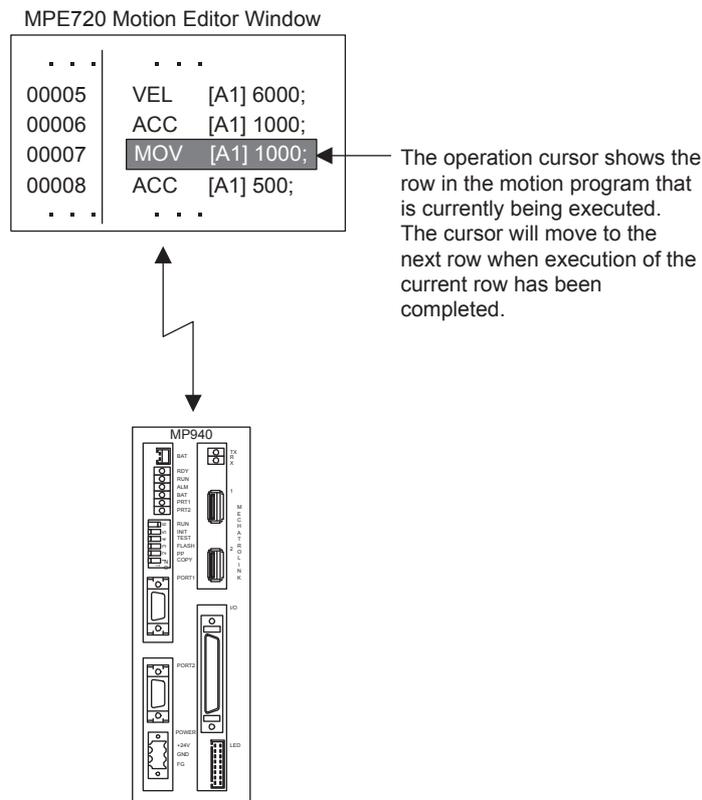
12.9.2 Opening the Motion Program Monitor

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.

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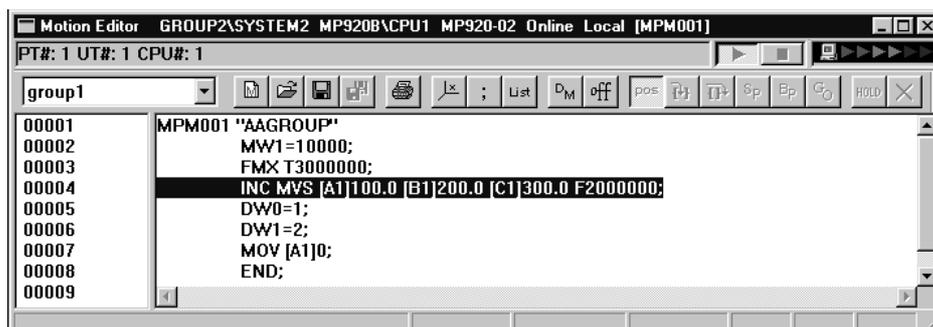
(1) Monitor Display for PFORK Command

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.

```
              ⋮

              PFORK   Label 1, Label 2, Label 3, Label 4;

      ⌈ Label 1: Process 1 ◄─────────────────┐
      ⌊        JOINTO Label 9                 │
Block ─┤                                ┌──────────────────┐
      ⌈ Label 2: Process 2             │ The motion        │
      ⌊        JOINTO Label end         │ command from      │
      ⌈ Label 3: Process 3             │ process 1 is      │
      ⌊        JOINTO Label 9           │ displayed in reversed │
      ⌈ Label 4: Process 4             │ color as the default. │
      ⌊        JOINTO Label 9           └──────────────────┘

        Label 9: PJOINT;

              ⋮
```
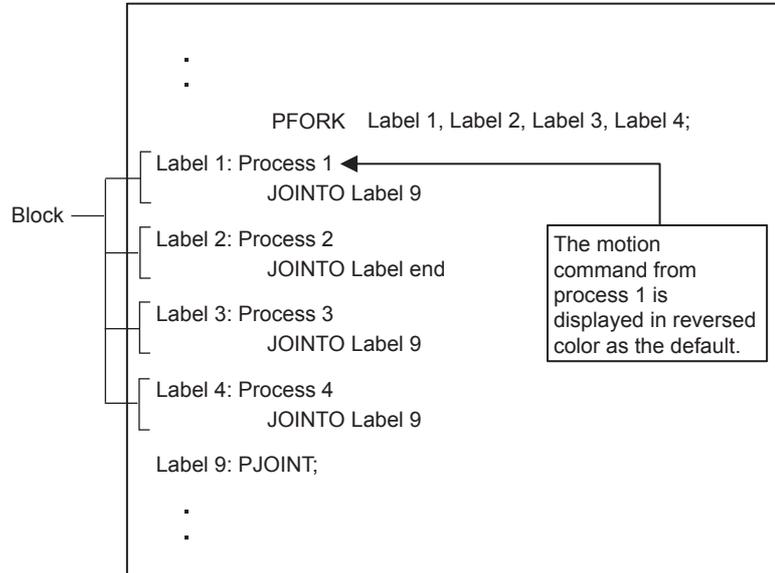
Change the block that is to be displayed for monitoring using the following procedure.

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.

```
┌─ Monitor Parallel Specification ──────── ⊠ ┐
│ ┌─ Parallel Execution No. ─────┐           │
│ │                              │  ┌─────────────┐ │
│ │  Parallel No. |4         |   │  │ Execution(S) │ │
│ │                              │  └─────────────┘ │
│ └──────────────────────────────┘  ┌─────────────┐ │
│                                    │   Cancel    │ │
│                                    └─────────────┘ │
└────────────────────────────────────────────┘
```
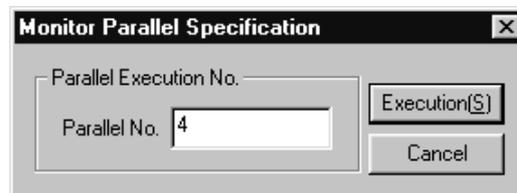
(2) Commands Displayed for Monitoring

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

12.9.3 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.

```
00003 |  VEL   [A1] 3000;
00004 |  ACC   [A1] 2000;
00005 |  MOV   [A1] 1000;
```

```
00003 |  VEL   [A1] 3000;
00004 |  ACC   [A1] 2000;
00005 ‖  MOV   [A1] 1000;
```

Editing cursor
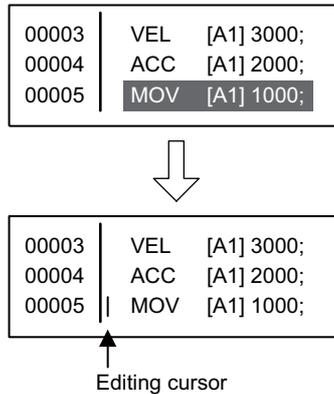
| IMPORTANT | If an attempt is made to edit and save a program that is being executed while the monitoring display is stopped, the program may not run normally. |

(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. |

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12.10 Position Monitor

This section explains how to use position monitoring to display the current positions of the axes.

12.10.1 Outline

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.
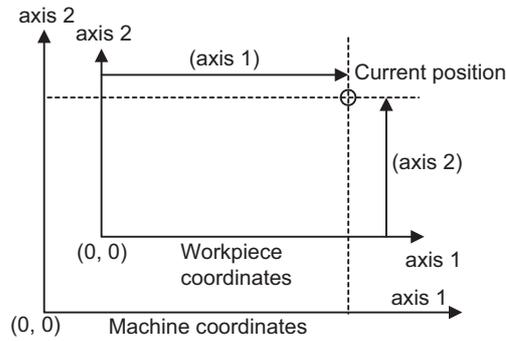
Fig 12.2 Coordinate System Example

12.10.2 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.
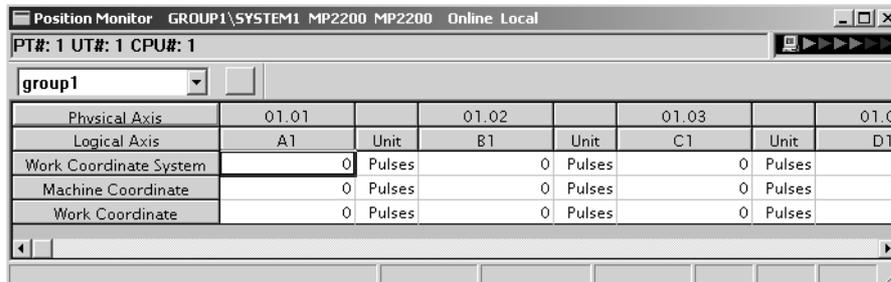
12.10.3 Position Monitor Menus

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.
Register in User Menu	Registers a shortcut for 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	
About Application	Displays version information.

12.10.4 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) 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.
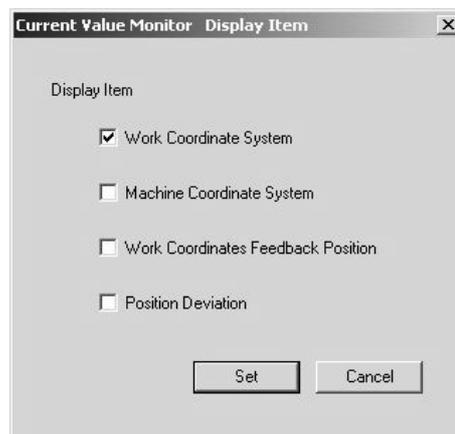
The item selected in step 2 will be displayed.

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.

12.10.5 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.

12.11.1 Outline

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.
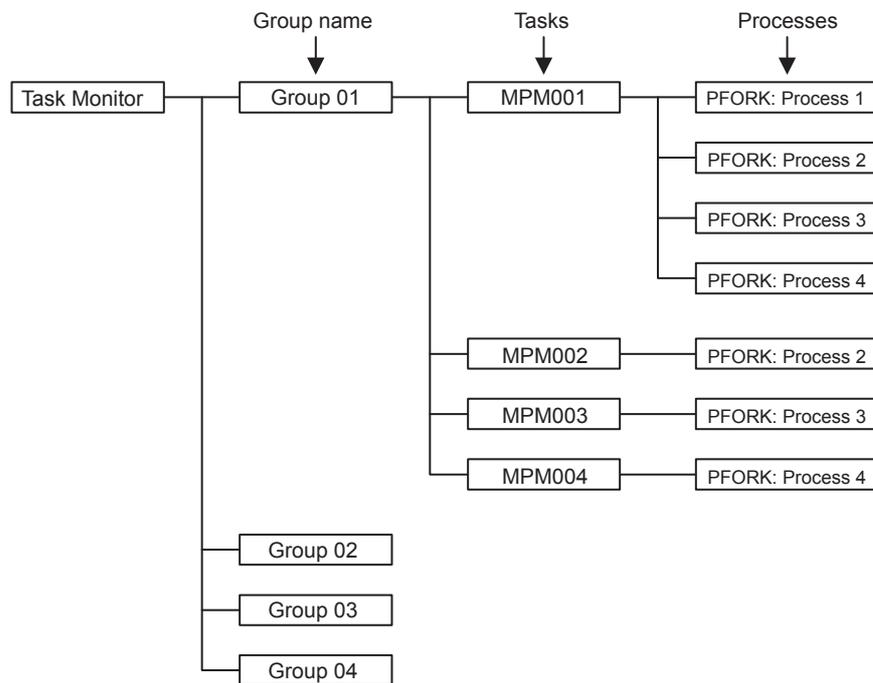
12.11.2 Opening the Task Monitor Window

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.
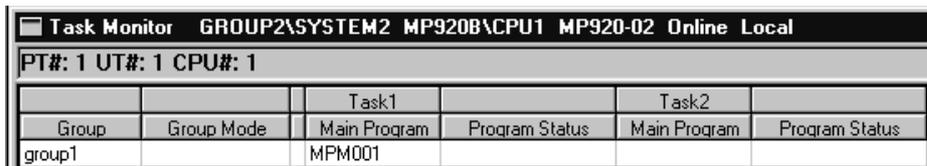
• Login Information

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.

12.11.3 Task Monitor Menus

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.
	Register in User Menu	Registers a shortcut for 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.
	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		
	About Application	Displays version information.

12.11.4 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.

Task Monitor						
PT# · · · ·						
Group		Task 1		Task 2		Task 3
	Group Mode	Main Program	Program Status	Main Program	Program Status	· · ·
		MPM□□□				
			· · ·			

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(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.

Task Monitor							
PT# · · · ·							
Group		Task 1			Task 2		
	Group Mode	Main Program	Program Status	Step#	Main Program	Program Status	Step#
		MPM□□□					
		Process 1					
		Process 2					
		Process 3					
		Process 4					
· · ·							

12.11.5 Task Monitor Configuration

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

12.11.6 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.

12.12.1 Outline

This function can be used to check whether or not a motion alarm has occurred at the Machine Controller using the Motion Alarm Monitor.
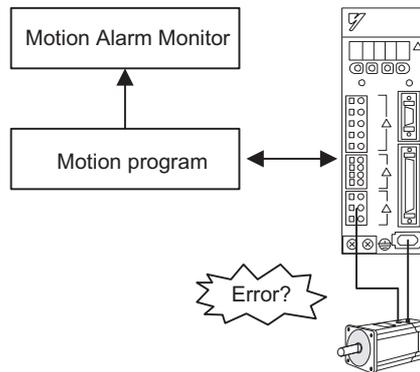
12.12.2 Opening the Motion Alarm Window

Open the **Motion Alarm** window from the Engineering Manager. Select *File – Open – Motion Program – Motion Alarm* from the Engineering Manager menu.
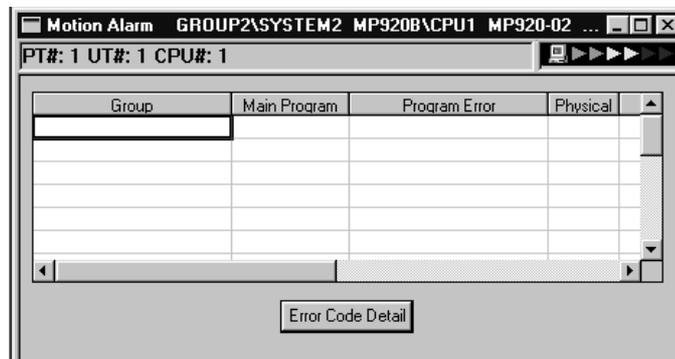
- Login Information

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.

12.12.3 Motion Alarm Menus

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.
Register in User Menu	Registers a shortcut for 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.
Window	
Cascade	Stacks windows in the display.
Tile	Lines up windows in the display.
Arrange Icons	Lines up icons.
Help	
About Application	Displays version information.

12.12.4 Motion Alarm Display

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.

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(1) Motion Alarm Example

(a) Motion Alarm Error Code Detail Dialog Box

Motion Alarm

PT# · · · ·

Group	Main Program	Program Error	Physical	Servo
Group 01	Group mode		01.01	02
			01.02	05
	Group mode	MPM001		
		MPM002		
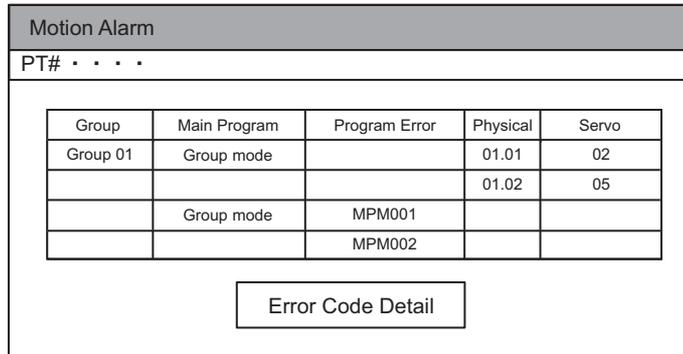
Error Code Detail

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 ►

Motion Alarm Error Code Detail   ✖

Servo Error Bit Details

0	Servo amp abnormal	○ ON	○ OFF
1	Positive direct overtravel	○ ON	○ OFF
2	Negative direct overtravel	○ ON	○ OFF
3	Positive direct soft limit	○ ON	○ OFF
4	Negative direct soft limit	○ ON	○ OFF
5	Servo power supply hasn't been completed	○ ON	○ OFF
6	Locating time over	○ ON	○ OFF
7	Excessive locate movement quantity	○ ON	○ OFF
8	Filter type change error	○ ON	○ OFF
9	Filter fixed number change error	○ ON	○ OFF
10	Control mode error	○ ON	○ OFF
11	Origin non-establishment	○ ON	○ OFF
12	Origin establish movement	○ ON	○ OFF
13	User fixed number establishment error	○ ON	○ OFF
14	MECHATROLINK Servo same period	○ ON	○ OFF
15	MECHATROLINK Servo communicate error	○ ON	○ OFF
16	MECHATROLINK Servo command timeout	○ ON	○ OFF
17	ABS ENC revolution quantity over	○ ON	○ OFF

MECHATROLINK Servo Alarm   HHHH

OK

Fig 12.3 Example of Motion Alarm Error Code Detail Dialog Box for MP930 MECHATROLINK Servo Module
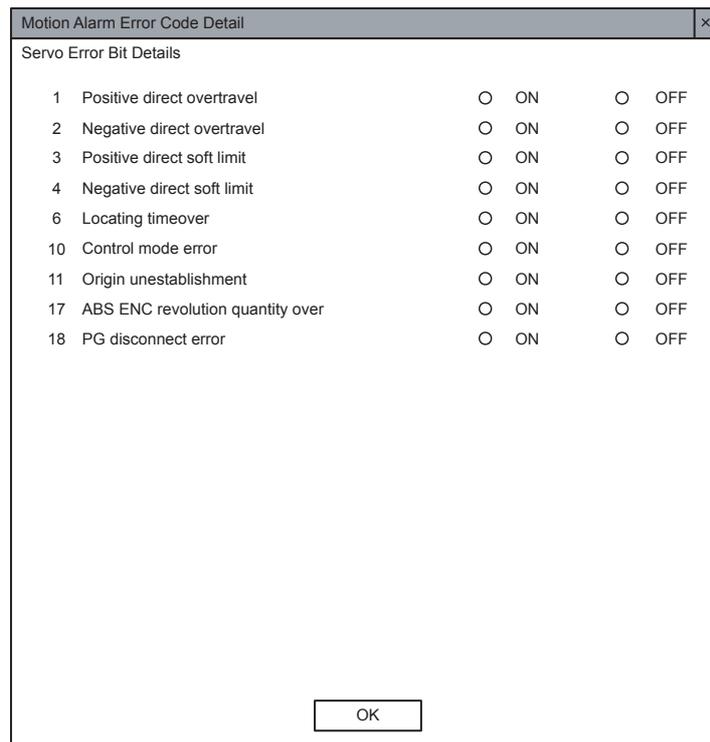
Fig 12.4 Example of Motion Alarm Error Code Detail Dialog Box for MP920 SVA Module

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.

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(b) 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

12.12.5 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 Error Messages

A.1 System Error Messages

The following tables show the messages with error codes of the form CPDH_□□□_ΔΔΔ.

CPDH_□□□_ΔΔΔ

Error number

Classification code
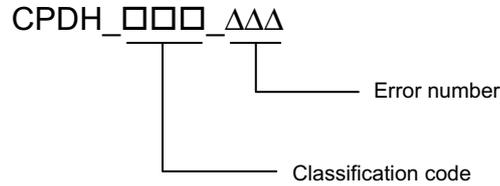
CT: Thread or other internal error
CMP: DWG or other compiling error
CPU: Errors from Machine Controller
DRV: Device driver-level errors
COM: Communication-related errors

(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.

(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.
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.

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(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.
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.	_

(Cont'd)

Error Message	Cause	Correction
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.
Program write-protected (CPDH_CPU_0F0)	The program is currently write-protected by the system definition and the program cannot be written.	Set the program to write-enabled mode in the System Definition Window and try the operation again.

(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.

(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.
Error in lower or upper limit of parameter range. (CPDH_COM_048)	One or more of the set values is outside the allowable setting range.	Reset the fixed parameter.
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.
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.

(Cont'd)

Error Message	Cause	Correction
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.)

(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.
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.

Appendices

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A.2 Motion Compile Error Messages

Table A.1 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.1 and correct the motion program.

Table A.1 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.
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.

Table A.1 Compile Error Messages (Cont'd)

Error Message	Cause
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.
Execution Mode Change	Selects standard or simple operation.
Tool	
User Menu Manager	Displays the User Menu Manager.
Register Lists	Displays the register list.
Cam tool	Displays the Cam tool.
PLC Import Tool	Displays the PLC Import Tool.
Automatic Conversion Wizard	Starts the Automatic Application Converter.
Manual Conversion Wizard	Starts the Manual Application Converter.
Multi-register Replace	Performs register replacement.
Help	
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.

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(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*.
	Save All Motion Programs (HD)	Saves all the motion programs.
	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*.

(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.
	Automatic Conversion Wizard	Starts the Automatic Application Converter.
	Manual Conversion Wizard	Starts the Manual 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.

(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.
	Register in User Menu	Creates a shortcut icon.
	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*.
Register in User Menu		Creates a shortcut icon.
Application Converter		
	Conversion Wizard	Starts the Application Converter.
	Automatic Conversion Wizard	Starts the Automatic Application Converter.
	Manual Conversion Wizard	Starts the Manual 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.
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.
	Automatic Conversion Wizard	Starts the Automatic Application Converter.
	Manual Conversion Wizard	Starts the Manual 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		
		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.
	Register in User Menu		Registers a shortcut icon on the desktop.*
	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	
		SFC Flow Chart	
		Constant Table (# Reg)	
		Constant Table (M Reg)	Sets the data files to be displayed in the List Display Section.
		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*.

* Valid only in online mode.

(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	
	SFC Flow Chart	
	Constant Table (# Reg)	
	Constant Table (M Reg)	Sets the data files to be displayed in the List Display Section.
	I/O Conversion Table	
	Interlock Table	
	Part Composition Table	
	Tuning Panel	
	Register in User Menu	Creates a shortcut icon.
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			
	New Drawing		Opens a new program.
	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
New Drawing		Opens a new program.
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.
	Automatic Conversion Wizard	Starts the Automatic Application Converter.
	Manual Conversion Wizard	Starts the Manual 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			
	Open 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
Open 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.
	Automatic Conversion Wizard	Starts the Automatic Application Converter.
	Manual Conversion Wizard	Starts the Manual 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			
	Open New Program		Opens a new motion program.
	Open		
		Motion Editor	Edits the motion program.
		Position Monitor	Displays the current position.*[1]
		Motion Alarm	Displays alarm information.*[1]
	Delete		Deletes motion program files.
	Log Off		Logs off from the Machine Controller.
	Register in User Menu		Creates a shortcut icon.*[2]
	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*.

* 1. Valid only in online mode.
* 2. Refer to *2.5.1 Registering Shortcut Icons* for details.

(b) Pop-up Menus

Menu Command			Function
Open 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.*
Register in User Menu			Creates a shortcut icon.
Delete			Deletes the motion program file.
Copy to			Copies the motion program file.
Application Converter			
	Conversion Wizard		Starts the Application Converter.
	Automatic Conversion Wizard		Starts the Automatic Application Converter.
	Manual Conversion Wizard		Starts the Manual 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.
	Register in User Menu	Registers a shortcut icon on the desktop.*[1]
	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.*[2]
View		Refer to *B.1 Common Menus*.
Tool		Refer to *B.1 Common Menus*.
Help		Refer to *B.1 Common Menus*.

* 1. Refer to *2.5.1 Registering Shortcut Icons* for details.
* 2. Valid only in online mode.

(b) Pop-up Menus

Menu Command		Function
Transfer		Refer to *B.1 Common Menus*.
Register in User Menu		Creates a shortcut icon.
Application Converter		
	Conversion Wizard	Starts the Application Converter.
	Automatic Conversion Wizard	Starts the Automatic Application Converter.
	Manual Conversion Wizard	Starts the Manual 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		
		Mnemonics	Pull-down Menu	Selection Key
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		
		Mnemonics	Pull-down Menu	Selection Key
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]

Appendices

App

(3) Sequence Program Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	Selection Key
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	⊣ʃ⊢	]P	[RELAY(R)]-[ONPULSE(P)]	8[⊣ʃ⊢]
OFF PULSE	⊣ʇ⊢	]N	[RELAY(R)]-[OFFPULSE(Q)]	9[⊣ʇ⊢]
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	Selection Key
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	Selection Key
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[×]
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]

(6) Numeric Conversion Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	Selection Key
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		
		Mnemonics	Pull-down Menu	Selection Key
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		
		Mnemonics	Pull-down Menu	Selection Key
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]
BYTE-TO-WORD EXPANSION	BEXTD	BEXTD	[MOVE(M)]-[BEXTD]	5[BEXTD]
WORD-TO-BYTE COMPRESSION	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		
		Mnemonics	Pull-down Menu	Selection Key
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		
		Mnemonics	Pull-down Menu	Selection Key
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 GENERATOR	IFGN	IFGN	[DDC(D)]-[IFGN]	7[IFGN]
LINEAR ACCELERATOR/ DECELERATOR 1	LAU	LAU	[DDC(D)]-[LAU]	7[LAU]
LINEAR ACCELERATOR/ DECELERATOR 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		
		Mnemonics	Pull-down Menu	Selection Key
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]

D MECHATROLINK Devices

Classification	Model	Description	MP910	MP920	MP930	MP940	MP2000 M-I	MP2000 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.

INFO Refer to *Machine Controller MP900/MP2000 Series User's Manual: MECHATROLINK System* (SIEZ-C887-5.1) for details.

E Remote Operation Function

E.1 Outline

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.2 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.3 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.

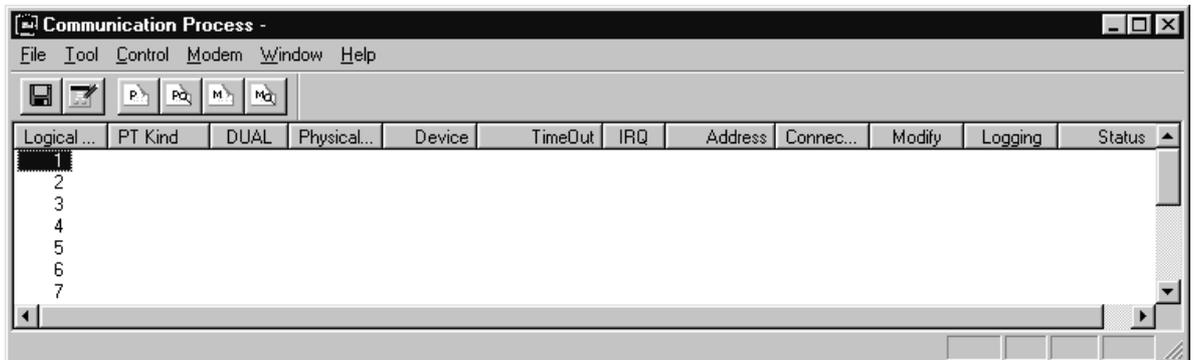2. The **Communication Process** window will be displayed.
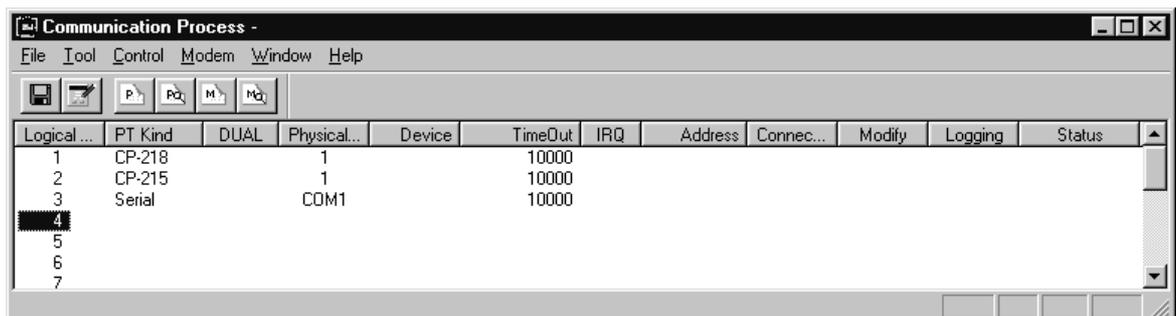
In this case, the *CP-218* (218IF), *CP-215* (215IF), and *Serial* (serial port) have already been set as devices connected to the Machine Controller. Refer to *2.1 Communication Manager* for details on setting devices.
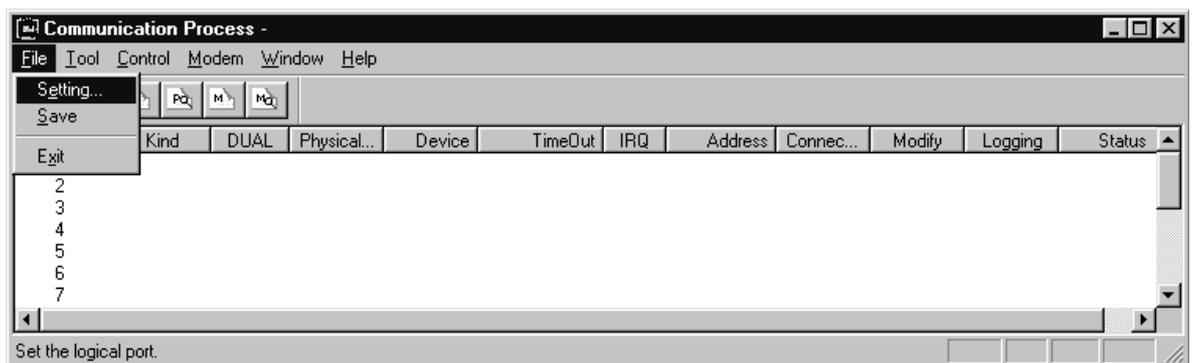
(b) Communication Process Settings (Modem)

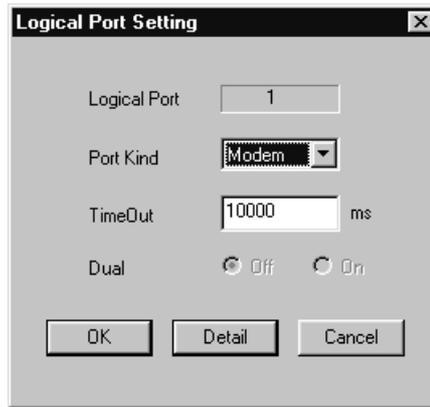Make the following settings to enable modem communication in the communication process.

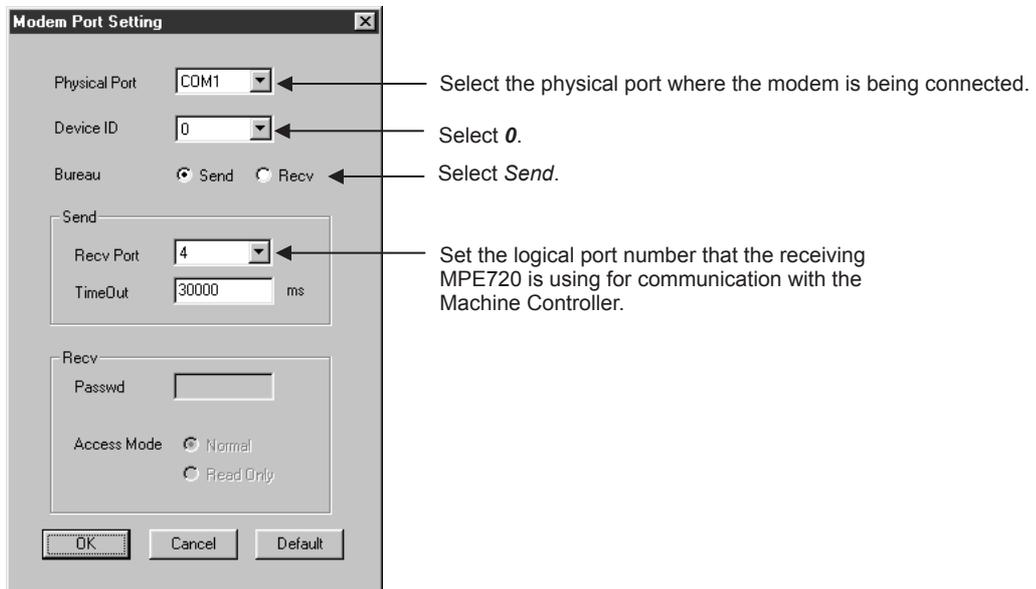1. Click an unused logical port number (logical port 4 in this example).
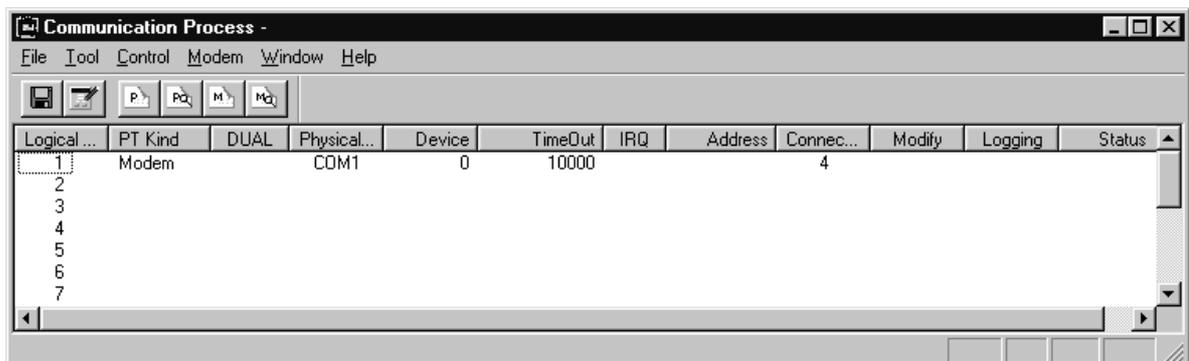

2. Select *File – Setting...* from the menus.

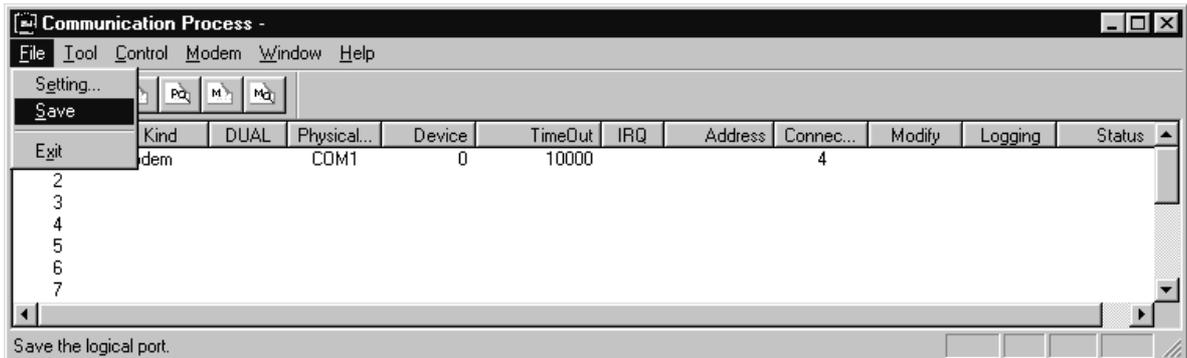3. In the **Logical Port Setting** window, set the *Port Kind* to *Modem* and then click the **Detail** button.

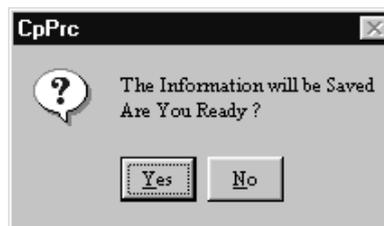4. Make the modem settings as shown below in the **Modem Port Settings** window and click the **OK** button.

Select the physical port where the modem is being connected.

Select *0*.

Select *Recv*.

Set a password up to 8 characters long.

Set the access right for the transmitting station.
Normal: Read/write access
Read Only: Read-only access

5. Click the **OK** button in the **Logical Port Setting** window.

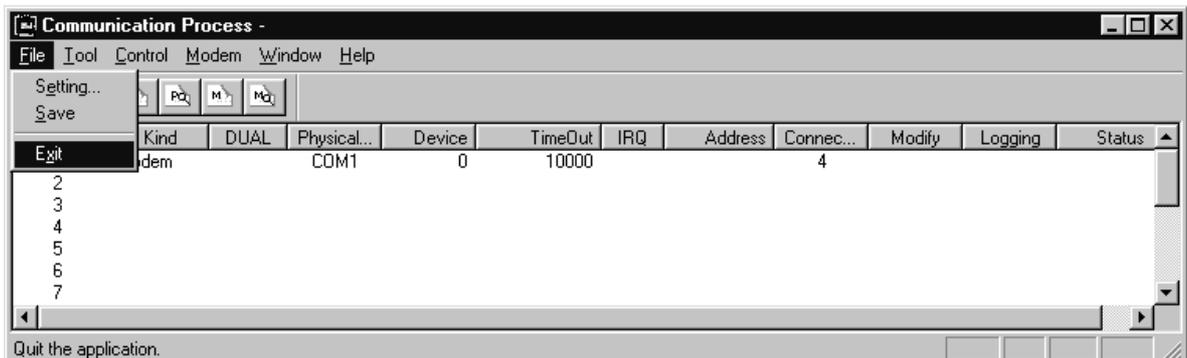6. The modem information will be set in the **Communication Process** window.

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.
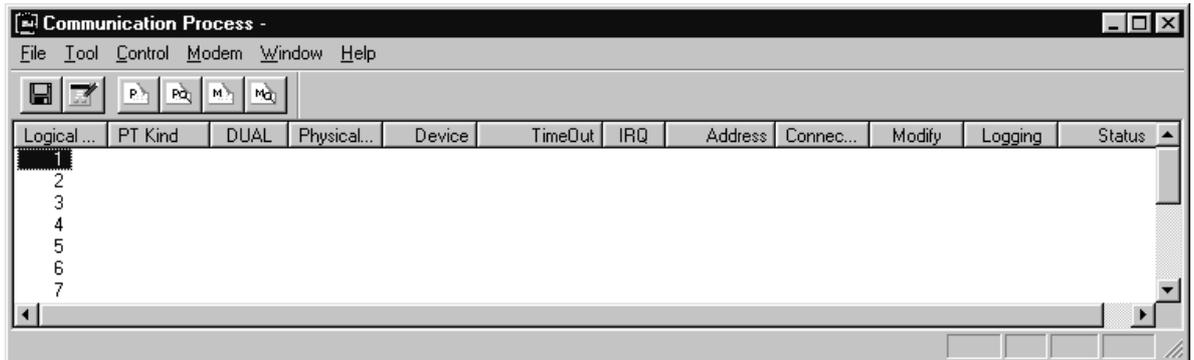
In this case, no devices have been set as devices connected to the Machine Controller.

(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.

Select the physical port where the modem is being connected.

Select *0*.

Select *Send*.

Set the logical port number that the receiving MPE720 is using for communication with the Machine Controller.

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.4 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.
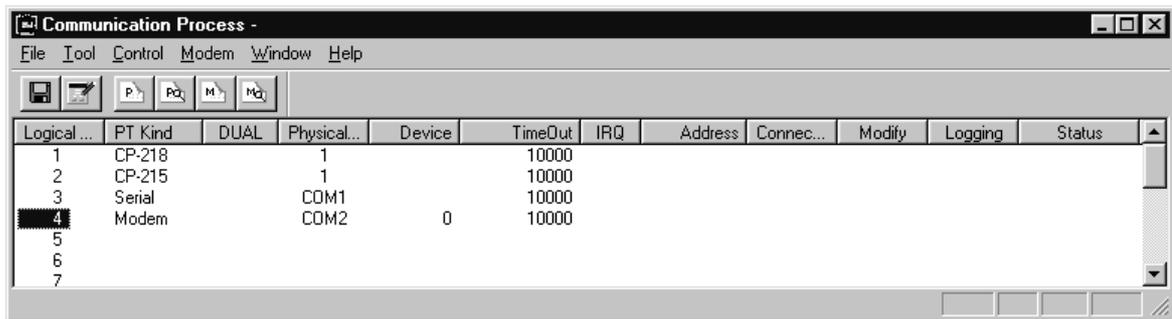
This completes the receiving MPE720 settings.

(b) Operations for the Transmitting MPE720

1. Double-click the **Communication Manager** icon.

2. The **Communication Process** window will be displayed.
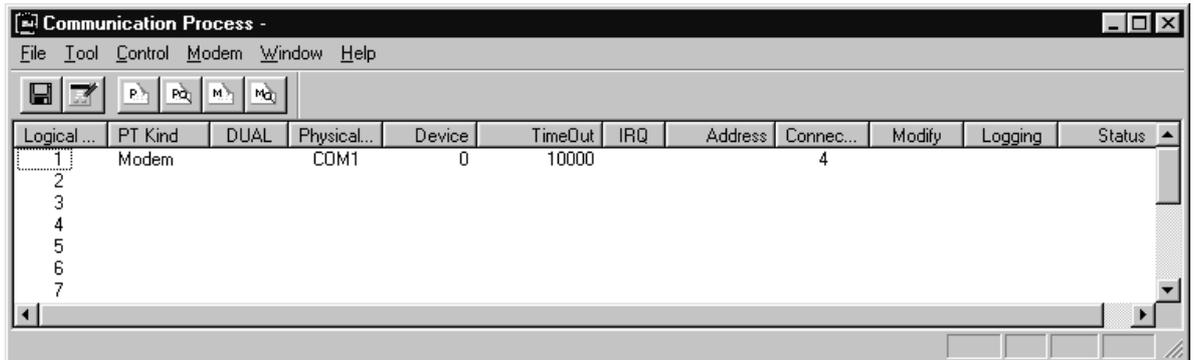
3. Click the logical port number allocated to the modem (logical port 1 in this example) and select *Modem – Connect...* from the menus.
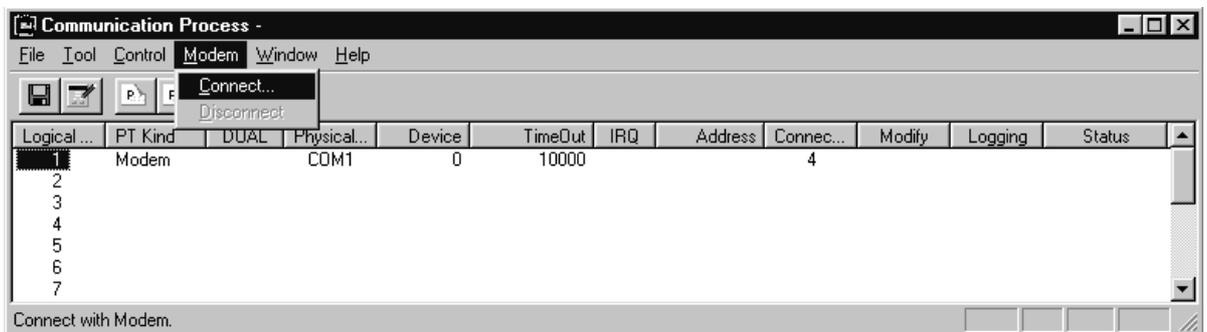
4. In the **Dialing** window, input the receiving MPE720's phone number (Dial Number) and the password set for the receiving MPE720, and click the **OK** button.

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.
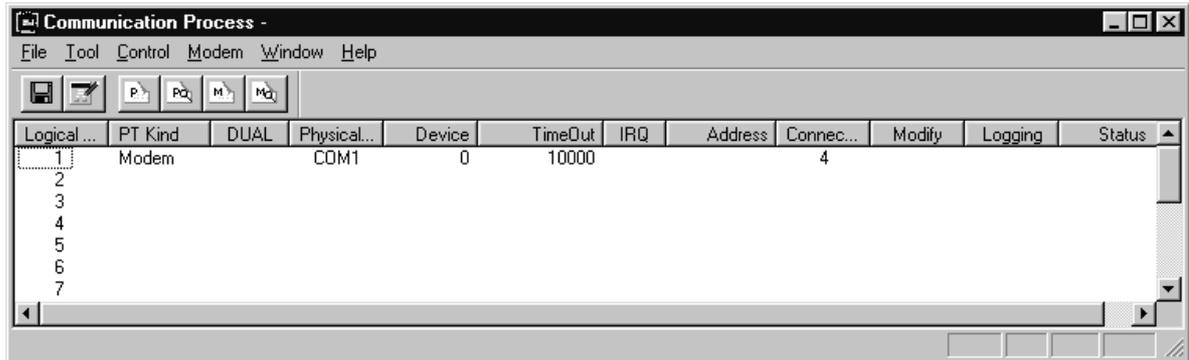
6. Double-click the **MPE720** icon and start the MPE720.
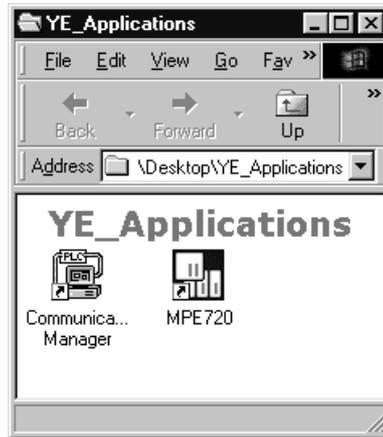
7. The **File Manager** window will be displayed. Click the PLC folder of the Machine Controller that will perform remote operations.
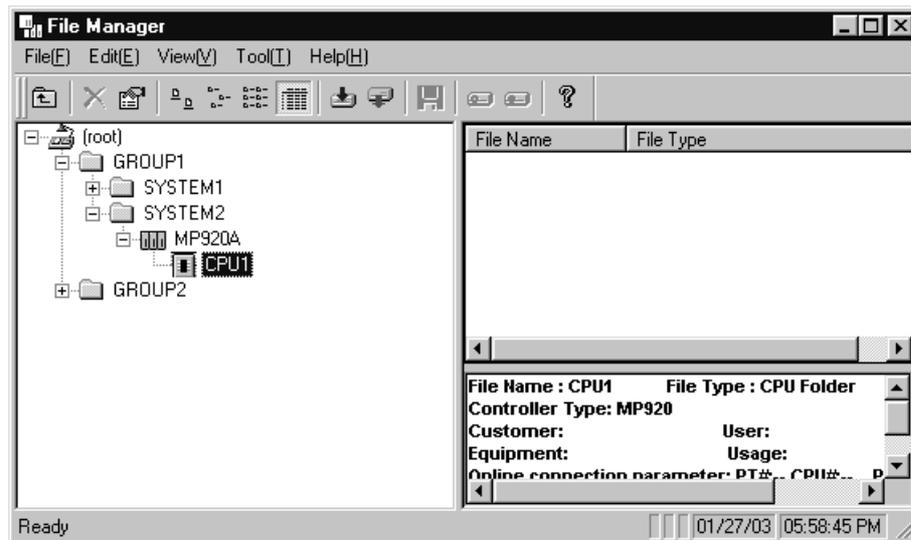
8. Select *File* – *Properties* from the menus.
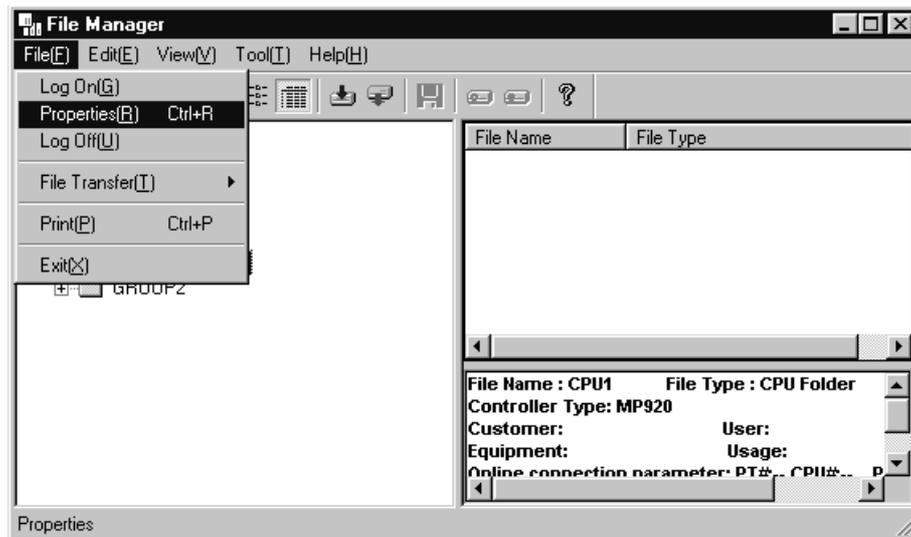
9. Click the **Network** tab in the **Controller Configuration** window, make the settings shown below, and click the **OK** button.
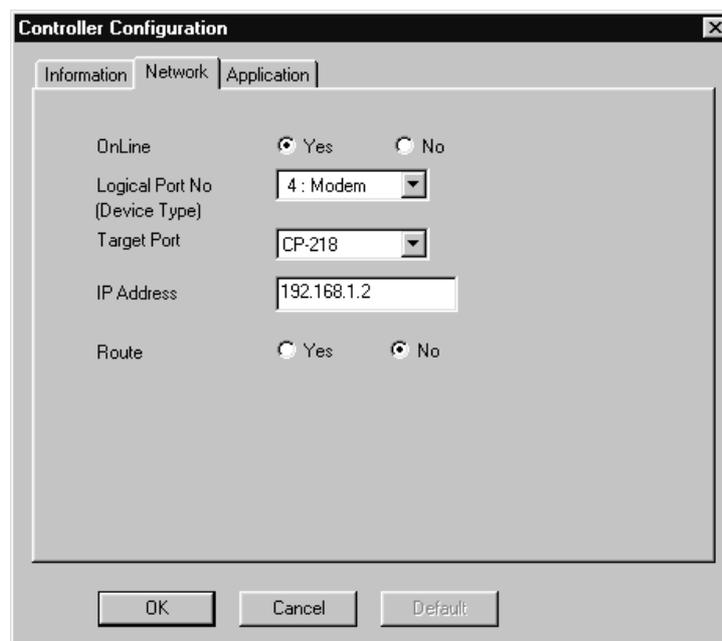
10. Logon from the File Manager. After logging on, the same operations as the MPE720 can be performed.

(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 –*
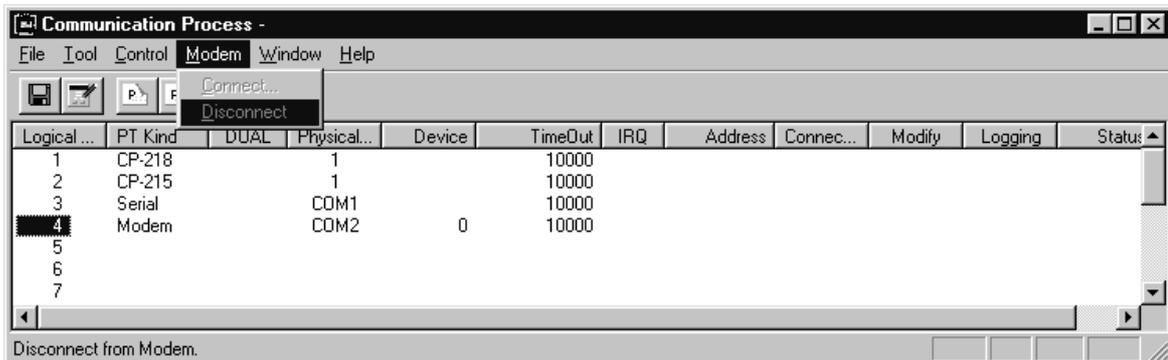*Disconnect* from the menus.
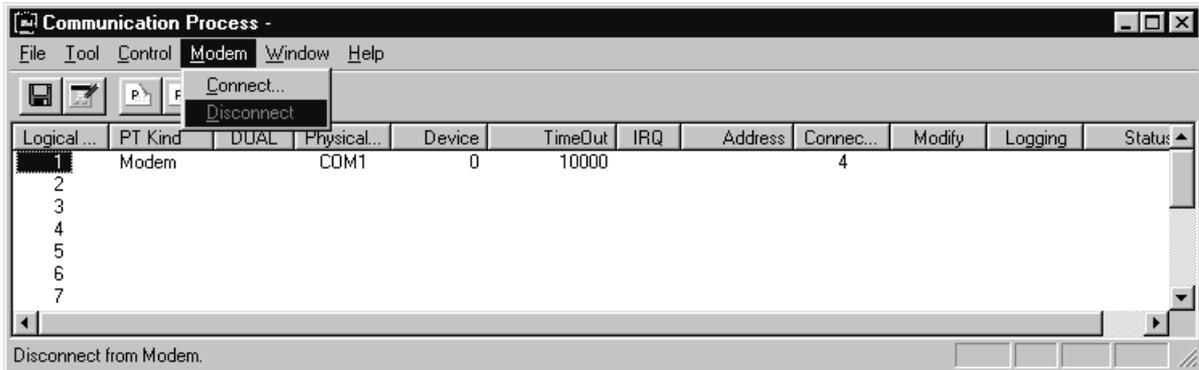
4. The *Status* display will change from **CONNECTED** to **IDLE** and the circuit will be disconnected.
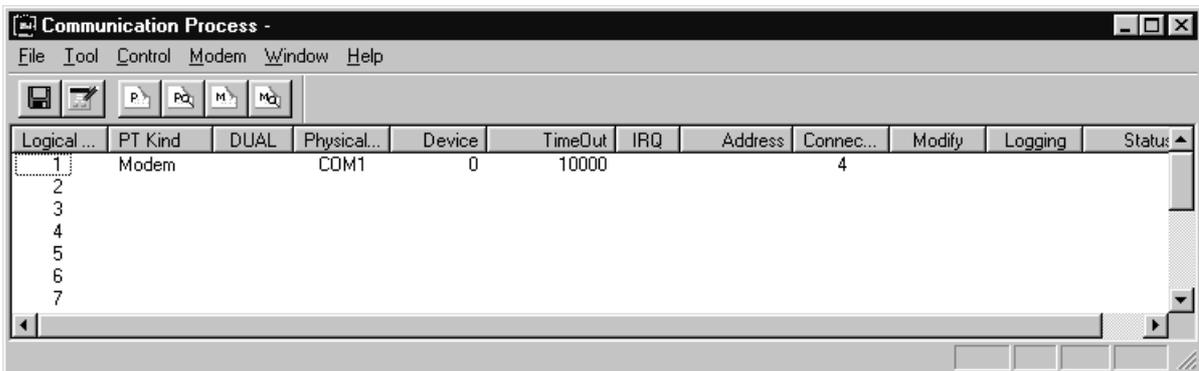
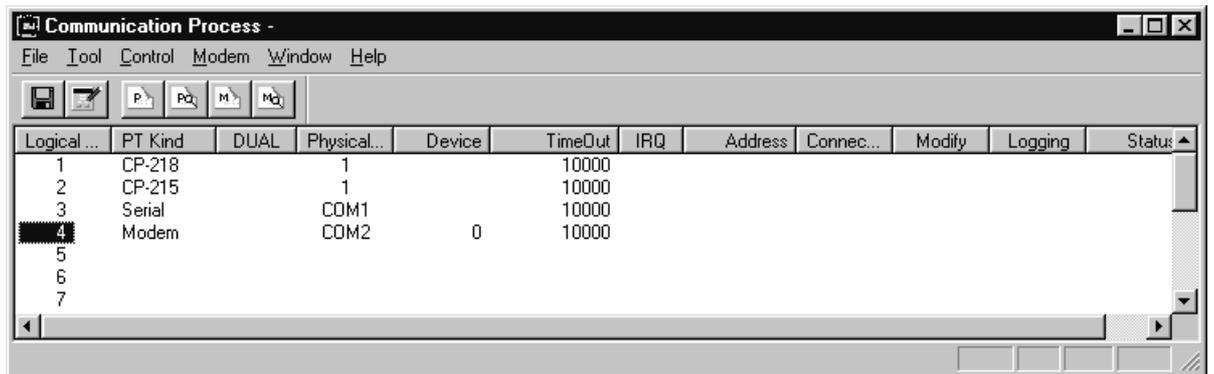
At this point, the *Status* display in the receiving MPE720's **Communication Process** window will change
from **CONNECTED** to **DISCONNECTED**.

(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.

Logical ...	PT Kind	DUAL	Physical...	Device	TimeOut	IRQ	Address	Connec...	Modify	Logging	Status
1	CP-218		1		10000						
2	CP-215		1		10000						
3	Serial		COM1		10000						
4	Modem		COM2	0	10000						
5											
6											
7											

F Error and Warning List for the Application Converter

This appendix describes the list of errors and warnings that can occur when executing conversion with the Application Converter.

F.1 Error List

The details of the errors are as follows.

No.	Message
1000	Failed to read the file.
1001	Failed to write the file.
1007	Since a function was lost, the parameter was deleted.
1009	Since function was supported by other parameters, the parameter was deleted.
1014	The parameter was divided into two or more parameters.
1015	As for the parameters, two or more parameters were integrated.
1016	The setting value is less than maximum value of the destination.
1017	The parameter cannot convert, since it was invalid.
1025	Failed to allocate memory.
1028	The model of the source and destination are not compatible models.
1044	The servo model of the source and destination are not compatible of the servo amplifier models.
1046	Undefined the source information. (fixed parameter)
1047	Undefined the source information. (setting parameter)
1048	Undefined the source information.
1049	Cannot convert the object PLC model.
1057	There are insufficient read privileges, it cannot be converted.
1058	There are insufficient write privileges, it cannot be converted.
1061	The bit type parameter is referred as word/long type. It can't be converted as the bit type order is changed.
1062	Since the setting range (a) of a conversion destination was exceeded, value (b) was not convertible. Default value "c" is set up. • (a) is setting range, (b) is value and "c" is default value are displayed.
1063	It could not be converted, since an empty slot was insufficient.
1064	It could not be converted, since the line of becoming empty was insufficient.
1066	Not supported module is defined. It could not be converted.
1067	Since the motion module could not be specified, it converted it into M register.
1069	The target program of register replacement does not exist.
1070	The converted D register number exceeds the maximum D register number of target DWG.
1071	The "linear motor" is set in the source, but it is not available in the target module.
1072	The working register for the MSEE instruction is out of range.

F.2 Error Detail

The details of each error are explained below.

error 1000: Failed to read the file.

Cause	Remedy
The probable causes of the failure to read a file are as follows. • The file doesn't exist. • You don't have a high enough privilege level to read the file. • The data is corrupted. • Internal error	This is an error relating to folder or file access. Notify us of the mode of occurrence, the controller environment and the computer environment.

error 1001: Failed to write the file.

Cause	Remedy
The probable causes of the failure to write a file are as follows. • The location you are attempting to write to is read only. • You don't have a high enough privilege level to write to the file. • There is insufficient free space in the hard disc. • Internal error etc.	This is an error relating to folder or file access. Notify us of the mode of occurrence, the controller environment and the computer environment.

error 1007: Since a function was lost, the parameter was deleted.

Cause	Remedy
The relevant parameter is invalid with the MP2000 series and has therefore been deleted.	Check the converted data.
1. Setting parameter No. 2 (OBxx01B/emergency stop/ deceleration to stop signal cancel)	1. Setting parameter No. 2 (OBxx01B/emergency stop/ deceleration to stop signal cancel)
2. Setting parameter No. 19 (OLxx12/Position buffer No.)	2. Setting parameter No. 19 (OLxx12/Position buffer No.)
3. Setting parameter No. 39 (OLxx26/Stop distance)	3. Setting parameter No. 39 (OLxx26/Stop distance)
4. Setting parameter No. 57 (OLxx38/Position buffer access No.)	4. Setting parameter No. 57 (OLxx38/Position buffer access No.)
5. Setting parameter No. 59 (OLxx3A/Position buffer write data)	5. Setting parameter No. 59 (OLxx3A/Position buffer write data)
6. Monitor parameter No. 38 (IBxx250/SIO [general use input signal])	6. Monitor parameter No. 38 (IBxx250/SIO [general use input signal])

error 1009: Since function was supported by other parameters, the parameter was deleted.

Cause	Remedy
The function of the relevant parameter is supported by another parameter so it has been deleted.	Use latch detection signal selection (OWxx04 Bit 0 to Bit 3).
1. Setting parameter No. 1 (OBxx00C/Counting value pre-setting request)	1. Setting parameter No. 1 (OBxx00C/Counting value pre-setting request)
2. Setting parameter No. 1 (OBxx00E/DI latch signal selection)	2. Setting parameter No. 1 (OBxx00E/DI latch signal selection)

error 1014: The parameter was divided into two or more parameters.

Cause	Remedy
The setting method for the relevant registers has been changed and their functions have also been dispersed to other registers, so conversion was not performed.	Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033).
1. Setting parameter No. 54 (OWxx35/Servo driver user constant No.) The relevant registers have been dispersed to OWxx4F, OWxx50 and OWxx51 and were therefore not converted. OWxx4F: Servo driver alarm monitor No. OWxx50: Servo driver user constant No. OWxx51: Servo driver user constant size Note: Output when the value of setting parameter No. 33 is 17 or 18.	1. Setting parameter No. 54 (OWxx35/servo driver user constant No.) <Example remedies> • When 17: "Read user constant" has been set for OWxx20 (motion command code) With the MP2000 series, this has been changed to OWxx50 (servo driver user constant No.) and OWxx51 (servo driver user constant size). Delete the relevant registers and change the program. • When 18: "Write user constant" has been set for OWxx20 (motion command code) With the MP2000 series, this has been changed to OWxx50 (servo driver user constant No.) and OWxx51 (servo driver user constant size). Delete the relevant registers and change the program.

error 1015: As for the parameters, two or more parameters were integrated.

Cause	Remedy
With the MP2000 series the relevant parameters have been merged, so conversion was not performed.	Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033).
1. Setting parameter No. 54 (OWxx35/Servo driver current alarm monitor No. specification) ⇒ When converting from SVB to SVB, or when OWxx20 = 19	<Example remedies> • When 19: "Current alarm monitor" has been set for OWxx20 (motion command code) With the MP2000 series, this has been changed to OWxx4F (servo driver alarm monitor number). Delete the relevant registers and change the program.
2. Setting parameter No. 54 (OWxx35/Servo driver alarm history monitor No. specification) ⇒ When converting from SVB to SVB, or when OWxx20 = 20	• When 20: "Alarm history monitor" has been set for OWxx20 (motion command code) With the MP2000 series, this has been changed to OWxx4F (servo driver alarm monitor number). Delete the relevant registers and change the program.

error 1016: The setting value is less than maximum value of the destination.

Cause	Remedy
Conversion was not possible because the setting at the setting source exceeded the setting range at the conversion destination.	Reduce the value set for the relevant parameter at the setting source.

error 1017: The parameter cannot convert, since it was invalid.

Cause	Remedy
The parameter cannot be converted since it is invalid at the destination.	Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033).
1. Fixed parameter No. 10 (D/A output voltage when the torque clamp is 100%)	1. Fixed parameter No. 10 (D/A output voltage when the torque clamp is 100%) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
2. Fixed parameter No. 11 (input voltage when the high-speed monitor (A/D) is at 100%)	2. Fixed parameter No. 11 (input voltage when the high-speed monitor (A/D) is at 100%) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
3. Fixed parameter No. 14 (Bit 2) (Limit switch signal selection)	3. Fixed parameter No. 14 (Bit 2) (Limit switch signal selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
4. Fixed parameter No. 14 (Bit 5) (Emergency stop (DI) signal selection)	4. Fixed parameter No. 14 (Bit 5) (Emergency stop (DI) signal selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
5. Fixed parameter No. 17 (Bit 6) (Backlash compensation validity selection)	5. Fixed parameter No. 17 (Bit 6) (Backlash compensation validity selection) Conversion was not performed because the function is invalid at the conversion destination.
6. Fixed parameter No. 17 (Bit 10) (Deceleration limit switch reversal selection)	6. Fixed parameter No. 17 (Bit 10) (Deceleration limit switch reversal selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
7. Fixed parameter 36 (Bias speed for index acceleration/deceleration filter)	7. Fixed parameter 36 (Bias speed for index acceleration/deceleration filter) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

Appendices

App

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy

8. Setting parameter No. 1 (OWxx00/Operation mode setting)
 	
Conversion was not performed because the functions in the content of the bit parameters of the relevant registers have been dispersed to OWxx00, OWxx08 and OWxx09 or deleted.
	8. Setting parameter No. 1 (OWxx00/Operation mode setting)
	
	Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
	<Example remedies>
	Bit 2 (Position control mode):
	   With the MP2000 series, the control mode is switched with motion commands. Delete the relevant registers.
	Bit 6 (Alarm clear):
	   With the MP2000 series, this has been changed to OBxx00F. Delete the relevant register and make the setting with OBxx00F.
	Bit 8 (Motion command validity selection):
	   With the MP2000 series, motion commands are always valid. Delete the relevant register.
	Bit 9 (Zero point return direction selection):
	   With the MP2000 series, this has been changed to OBxx093. Delete the relevant register and make the setting with OBxx093.

9. Setting parameter No. 1 (OBxx000/Velocity reference output mode) The control mode has been eliminated and the command is issued with motion command 23: Velocity reference.	9. Setting parameter No. 1 (OBxx000/Velocity reference output mode) Change to the appropriate parameter.
10. Setting parameter No. 1 (OBxx001/Torque command output mode) The control mode has been eliminated and the command is issued with motion command 24: Torque command.	10. Setting parameter No. 1 (OBxx001/Torque command output mode) Change to the appropriate parameter.
11. Setting parameter No. 1 (OBxx002/Position control mode) With the MP2000 series, the relevant parameter is automatically selected so this setting parameter has been deleted.	11. Setting parameter No. 1 (OBxx002/Position control mode) Since the control mode is switched with motion commands, delete the relevant registers.
12. Setting parameter No. 1 (OBxx003/Phase control mode) The control mode has been eliminated and the command is issued with motion command 25: Phase command.	12. Setting parameter No. 1 (OBxx003/Phase control mode) Change to the appropriate parameter.
13. Setting parameter No. 1 (OBxx004/Zero point return mode) The control mode has been eliminated and the command is issued with motion command 8: Zero point return.	13. Setting parameter No. 1 (OBxx004/Zero point return mode) Change to the appropriate parameter.
14. Setting parameter No. 1 (OBxx005/Phase control test signal)	14. Setting parameter No. 1 (OBxx005/Phase control test signal) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
15. Setting parameter No. 1 (OBxx007/Phase command generation calculation invalid)	15. Setting parameter No. 1 (OBxx007/Phase command generation calculation invalid) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
16. Setting parameter No. 1 (OBxx008/Motion command code validity selection) With the MP2000 series, the relevant parameter is always valid so this parameter has been deleted.	16. Setting parameter No. 1 (OBxx008/Motion command code validity selection) Delete the relevant register.
17. Setting parameter No. 1 (OBxx009/Zero point return direction selection)	17. Setting parameter No. 1 (OBxx009/Zero point return direction selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
18. Setting parameter No. 1 (OBxx00A/Absolute position read request)	18. Setting parameter No. 1 (OBxx00A/Absolute position read request) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
19. Setting parameter No. 1 (OBxx00B/Feed forward compensation when switching control mode) With the MP900 series the default setting was OFF, but with the MP2000 series it is always valid.	19. Setting parameter No. 1 (OBxx00B/Feed forward compensation when switching control mode) If this parameter was used with the MP900 series it will become always valid so no remedies are required.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy

20. Setting parameter No. 2 (OWxx01/Operation command setting)
 	
Conversion was not performed because the functions in the content of the bit parameters of the relevant registers have been dispersed to OWxx00 and OWxx09 or deleted.
	20. Setting parameter No. 2 (OWxx01/Operation command setting)
	
	Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
	
	<Example remedies>
	Bit 0 (Servo ON):
	    With the MP2000 series, this has been changed to OBxx000. Delete the relevant register and make the setting with OBxx000.
	Bit C (Position command value selection):
	    With the MP2000 series, the position buffer function doesn't exist. Delete the relevant register. If a "valid" setting has been made for the position buffer, change the control so that the position buffer is not used.
	Bit D (Velocity reference value selection):
	    The previous two types of velocity reference register, OLxx22 and OWxx15, have been merged as OLxx10 in the MP2000 series. Delete the relevant register.
	    Set the units for velocity references in speed unit selection (OWxx03 Bit 0 to Bit 3).
	    0: Command unit/sec.
	    1: Specified unit/min.
	    2: % specification
	Bit E (Position command type):
	    With the MP2000 series, the definition for the position command type has been changed. Set the position command type with the position command type (OWxx09 Bit 5) of the motion command control flag.
	    Position command type (OWxx09 Bit 5)
	    0: Incremental value addition system
	    1: Absolute value specification system

21. Setting parameter No. 2 (OBxx011/DO1)	21. Setting parameter No. 2 (OBxx011/DO1) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
22. Setting parameter No. 2 (OBxx011/P-CON)	22. Setting parameter No. 2 (OBxx011/P-CON) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause		Remedy	
23.	Setting parameter No. 2 (OBxx012/DO2)	23.	Setting parameter No. 2 (OBxx012/DO2) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
24.	Setting parameter No. 2 (OBxx012/G-SEL)	24.	Setting parameter No. 2 (OBxx012/G-SEL) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
25.	Setting parameter No. 2 (OBxx013/DO3)	25.	Setting parameter No. 2 (OBxx013/DO3) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
26.	Setting parameter No. 2 (OBxx013/P-CL)	26.	Setting parameter No. 2 (OBxx013/P-CL) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
27.	Setting parameter No. 2 (OBxx014/ROC)	27.	Setting parameter No. 2 (OBxx014/ROC) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
28.	Setting parameter No. 2 (OBxx014/DO04)	28.	Setting parameter No. 2 (OBxx014/DO04) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
29.	Setting parameter No. 2 (OBxx014/N-CL)	29.	Setting parameter No. 2 (OBxx014/N-CL) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
30.	Setting parameter No. 2 (OBxx015/ZCLAMP)	30.	Setting parameter No. 2 (OBxx015/ZCLAMP) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

	Cause		Remedy
31.	Setting parameter No. 2 (OBxx016/Position control mode: Synchronous scan selection)	31.	Setting parameter No. 2 (OBxx016/Position control mode: Synchronous scan selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
32.	Setting parameter No. 2 (OBxx017/Position control mode: Parameter synchronous scan selection)	32.	Setting parameter No. 2 (OBxx017/Position control mode: Parameter synchronous scan selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
33.	Setting parameter No. 2 (OBxx018/Position control mode: Acceleration/deceleration not used selection)	33.	Setting parameter No. 2 (OBxx018/Position control mode: Acceleration/deceleration function not used selection for simple positioning) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
34.	Setting parameter No. 2 (OBxx019/Position control mode: Segment division function not used selection)	34.	Setting parameter No. 2 (OBxx019/Position control mode: Segment division function not used selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
35.	Setting parameter No. 2 (OBxx01B/emergency stop/ deceleration to stop signal cancel)	35.	Setting parameter No. 2 (OBxx01B/emergency stop/ deceleration to stop signal cancel) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
36.	Setting parameter No. 2 (OBxx01B/Magnetic pole detection command)	36.	Setting parameter No. 2 (OBxx01B/Magnetic pole detection command) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
37.	Setting parameter No. 2 (OBxx01C/Position command value selection) With the MP2000 series, the position buffer function has been eliminated.	37.	Setting parameter No. 2 (OBxx01C/Position command value selection) Set position commands with OLxx1C.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
38. Setting parameter No. 2 (OBxx01D/Velocity reference value selection) The velocity reference setting range is fixed by OLxx10.	38. Setting parameter No. 2 (OBxx01D/Velocity reference value selection) Delete the relevant register. Set the units for velocity references by speed unit selection (OWxx03 Bit 0 to Bit 3). 0: Command unit/sec. 1: Specified unit/min. 2: % specification
39. Setting parameter No. 2 (OBxx01F/Zero point return deceleration point limit switch signal)	39. Setting parameter No. 2 (OBxx01F/Zero point return deceleration point limit switch signal) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
40. Setting parameter No. 5 (OWxx04/Positive side speed limiter value setting)	40. Setting parameter No. 5 (OWxx04/Positive side speed limiter value setting) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
41. Setting parameter No. 6 (OWxx05/Negative side speed limiter value setting)	41. Setting parameter No. 6 (OWxx05/Negative side speed limiter value setting) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
42. Setting parameter No. 18 (OWxx11/Feed forward compensation setting)	42. Setting parameter No. 18 (OWxx11/Feed forward gain) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
43. Setting parameter No. 29 (OWxx1C/Velocity limit)	43. Setting parameter No. 29 (OWxx1C/Velocity limit) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
44. Setting parameter No. 31 (OLxx1E/Compensation pulse setting)	44. Setting parameter No. 31 (OLxx1E/Compensation pulse setting) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

Appendices

App

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy

45. Setting parameter No. 34 (OWxx21/Motion command control flag)
 	
Conversion was not performed because the functions in the content of the bit parameters of the relevant registers have been dispersed to OWxx01, OWxx03 and OWxx09 or deleted.
	45. Setting parameter No. 34 (OWxx21/Motion command control flag)
	
	Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
	<Example remedies>
	Bit 0 (Pause a command):
	  With the MP2000 series, this has been changed to OBxx090. Delete the relevant register and make the setting with OBxx090.
	Bit 1 (Interrupt a command):
	  With the MP2000 series, this has been changed to OBxx091. Delete the relevant register and make the setting with OBxx091.
	Bit 2 (Direction of travel (for JOG/STEP)):
	  With the MP2000 series, this has been changed to OBxx092. Delete the relevant register and make the setting with OBxx092.
	Bit 3 (Speed loop P/PI switching):
	  With the MP2000 series, this has been changed to OBxx013. Delete the relevant register and make the setting with OBxx013.
	Bit 4 to Bit 7 (Filter type selection):
	  With the MP2000 series, this has been changed to OBxx038 to OBxx03B. Delete the relevant register and make the setting with OBxx038 to OBxx03B.
	Bit E (Position buffer write):
	  With the MP2000 series, the position buffer function doesn't exist. Delete the relevant register and switch the control so that the position buffer is not used.
	Bit F (Position buffer read):
	  With the MP2000 series, the position buffer function doesn't exist. Delete the relevant register and switch the control so that the position buffer is not used.

46. Setting parameter No. 34 (OBxx213/No primary lag)	46. Setting parameter No. 34 (OBxx213/No primary lag) To set "no primary lag" with the MP2000 series, make the following setting: Primary lag constant (OWxx33) = 0.
47. Setting parameter No. 34 (OBxx213/No feed speed excess compensation selection)	47. Setting parameter No. 34 (OBxx213/No feed speed excess compensation selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
48. Setting parameter No. 34 (OBxx218/Position loop P/PI switching) With the MP900 series the default was "P", but with the MP2000 series the default has become "PI."	48. Setting parameter No. 34 (OBxx218/Position loop P/PI switching) When using "P" with the MP2000 series, make the following setting: Position integral time constant (OWxx32) = 0 (default).

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

	Cause		Remedy
49.	Setting parameter No. 34 (OBxx21A/Speed compensation during position control (OWxx18) valid)	49.	Setting parameter No. 34 (OBxx21A/Speed compensation during position control (OWxx18) valid) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
50.	Setting parameter No. 34 (OBxx21B/SGDH serial command valid flag)	50.	Setting parameter No. 34 (OBxx21B/SGDH serial command valid flag) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
51.	Setting parameter No. 34 (OBxx21C/Reverse rotation side limit signal for zero point return)	51.	Setting parameter No. 34 (OBxx21C/Reverse rotation side limit signal for zero point return) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
52.	Setting parameter No. 34 (OBxx21D/Forward rotation side limit signal for zero point return)	52.	Setting parameter No. 34 (OBxx21D/Forward rotation side limit signal for zero point return) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
53.	Setting parameter No. 34 (OBxx21E/Position buffer write) With the MP2000 series, the position buffer function does not exist.	53.	Setting parameter No. 34 (OBxx21E/Position buffer write) When "valid" has been set for the position buffer, change the control so that the position buffer is not used.
54.	Setting parameter No. 34 (OBxx21F/Position buffer read) With the MP2000 series, the position buffer function does not exist.	54.	Setting parameter No. 34 (OBxx21F/Position buffer read) When "valid" has been set for the position buffer, change the control so that the position buffer is not used.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
55. Setting parameter No. 46 (OWxx2D/Position management control flag) Conversion was not performed because the functions in the content of the bit parameters of the relevant registers have been dispersed to OWxx00.	55. Setting parameter No. 46 (OWxx2D/Position management control flag) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter. <Example remedies> Bit 0 (Machine lock mode setting): 　With the MP2000 series, this has been changed to OBxx001. Delete the relevant register and make the setting with OBxx001. Bit 1 (POSMAX number of turns preset request): 　With the MP2000 series, this has been changed to OBxx006. Delete the relevant register and make the setting with OBxx006. Bit 2 (ABS unlimited length position management information load request): 　With the MP2000 series, this has been changed to OBxx007. Delete the relevant register and make the setting with OBxx007.
56. Setting parameter No. 46 (OBxx2D3/Position monitor 2 (ILxx34) unit selection)	56. Setting parameter No. 46 (OBxx2D3/Position monitor 2 (ILxx34) unit selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
57. Setting parameter No. 46 (OBxx2DC/Servo driver user monitor information selection)	57. Setting parameter No. 46 (OBxx2DC/Servo driver user monitor information selection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
58. Setting parameter No. 55 (OWxx36/Integral upper/lower limit for position control) With the MP2000 series, the limits have been removed.	58. Setting parameter No. 55 (OWxx36/Integral upper/lower limit for position control) Make adjustments with the position integral time constant (OWxx32).
59. Setting parameter No. 56 (OWxx37/Time constant for primary lag)	59. Setting parameter No. 56 (OWxx37/Time constant for primary lag) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
60. Setting parameter No. 57 (OWxx38/SGDH serial command setting (for system use))	60. Setting parameter No. 57 (OWxx38/SGDH serial command setting (for system use)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
61. Setting parameter No. 57 (OLxx38/Position buffer access No.)	61. Setting parameter No. 57 (OLxx38/Position buffer access No.) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
62. Setting parameter No. 57 (OWxx39/SGDH serial command address setting (for system use))	62. Setting parameter No. 57 (OWxx39/SGDH serial command address setting (for system use)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
63. Setting parameter No. 59 (OWxx3A/SGDH serial command data setting)	63. Setting parameter No. 59 (OWxx3A/SGDH serial command data setting) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
64. Setting parameter No. 59 (OLxx3A/Position buffer write data)	64. Setting parameter No. 59 (OLxx3A/Position buffer write data) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
65. Monitor parameter No. 1 (IWxx00/Operating status) Conversion was not performed because the functions in the content of the bit parameters of the relevant registers have been dispersed to IWxx00, ILxx02 and IWxx0C.	65. Monitor parameter No. 1 (IWxx00/Operating status) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter. <Example remedies> Bit 1 (Motion setting parameter setting error): With the MP2000 series, this has been changed to ILxx02 Bit 1: Setting parameter error. Delete the relevant register and change the program. Bit 2 (Motion fixed parameter setting error): With the MP2000 series, this has been changed to ILxx02 Bit 2: Fixed parameter error. Delete the relevant register and change the program. Bit 7 (Servo controller ready for operation): With the MP2000 series, this has been changed to IWxx00 Bit 0: Motion controller ready. Delete the relevant register and change the program. Bit 8 (Servo controller operating): With the MP2000 series, this has been changed to IWxx00 Bit 1: Running. Delete the relevant register and change the program. Bit D (Positioning completed signal): With the MP2000 series, this has been changed to IWxx0C Bit 1: Positioning completed. Delete the relevant register and change the program.
66. Monitor parameter No. 1 (IBxx004/Cumulative number of rotations reception error (when using an absolute encoder))	66. Monitor parameter No. 1 (IBxx004/Cumulative number of rotations reception error (when using an absolute encoder)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
67. Monitor parameter No. 1 (IBxx009/Report on direction of rotation when using an absolute encoder)	67. Monitor parameter No. 1 (IBxx009/Report on direction of rotation when using an absolute encoder) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
68. Monitor parameter No. 1 (IBxx00A/Absolute position reading completed)	68. Monitor parameter No. 1 (IBxx00A/Absolute position reading completed) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
69. Monitor parameter No. 1 (IBxx00C/Feedback pulse 0)	69. Monitor parameter No. 1 (IBxx00C/Feedback pulse 0) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
70. Monitor parameter No. 1 (IBxx00E/Motor type)	70. Monitor parameter No. 1 (IBxx00E/Motor type) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
71. Monitor parameter No. 1 (IBxx00E/Match detection signal)	71. Monitor parameter No. 1 (IBxx00E/Match detection signal) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
72. Monitor parameter No. 1 (IBxx00F/Zero point return completed) With the MP2000 series, there is no zero point return mode.	72. Monitor parameter No. 1 (IBxx00F/Zero point return completed) Execute zero point return by motion command code (OWxx08) and monitor IBxx0C5 for zero point return completion.
73. Monitor parameter No. 2 (IBxx011/DI1)	73. Monitor parameter No. 2 (IBxx011/DI1) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
74. Monitor parameter No. 2 (IBxx011/WARN (Warning))	74. Monitor parameter No. 2 (IBxx011/WARN (Warning)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
75. Monitor parameter No. 2 (IBxx012/DI2 (Brake input))	75. Monitor parameter No. 2 (IBxx012/DI2 (Brake input)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
76. Monitor parameter No. 2 (IBxx012/DI2)	76. Monitor parameter No. 2 (IBxx012/DI2) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
77. Monitor parameter No. 2 (IBxx012/V-CMP (Speed match))	77. Monitor parameter No. 2 (IBxx012/V-CMP (Speed match)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
78. Monitor parameter No. 2 (IBxx013/PG disconnection status (OFF: Disconnected))	78. Monitor parameter No. 2 (IBxx013/PG disconnection status (OFF: Disconnected)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
79. Monitor parameter No. 2 (IBxx013/TGON (Motor running detection))	79. Monitor parameter No. 2 (IBxx013/TGON (Motor running detection)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
80. Monitor parameter No. 2 (IBxx014/S-RDY (Servo ready))	80. Monitor parameter No. 2 (IBxx014/S-RDY (Servo ready)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
81. Monitor parameter No. 2 (IBxx015/CLT (Torque clamp detection)	81. Monitor parameter No. 2 (IBxx015/CLT (Torque clamp detection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
82. Monitor parameter No. 2 (IBxx016/VLT (Speed restriction detection)	82. Monitor parameter No. 2 (IBxx016/VLT (Speed restriction detection) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
83. Monitor parameter No. 2 (IBxx017/BK (Brake interlock)	83. Monitor parameter No. 2 (IBxx017/BK (Brake interlock) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
84. Monitor parameter No. 2 (IBxx017/D16 (ZERO signal)	84. Monitor parameter No. 2 (IBxx017/D16 (ZERO signal) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
85. Monitor parameter No. 2 (IBxx019/D18)	85. Monitor parameter No. 2 (IBxx019/D18) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
86. Monitor parameter No. 2 (IBxx019/PON (Main circuit ready))	86. Monitor parameter No. 2 (IBxx019/PON (Main circuit ready)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
87. Monitor parameter No. 2 (IBxx01A/D19)	87. Monitor parameter No. 2 (IBxx01A/D19) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
88. Monitor parameter No. 2 (IBxx01A/Latch completed)	88. Monitor parameter No. 2 (IBxx01A/Latch completed) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
89. Monitor parameter No. 2 (IBxx01B/Positioning vicinity)	89. Monitor parameter No. 2 (IBxx01B/Positioning vicinity) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
90. Monitor parameter No. 2 (IBxx01C/Forward rotation software limit)	90. Monitor parameter No. 2 (IBxx01C/Forward rotation software limit) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
91. Monitor parameter No. 2 (IBxx01D/Reverse rotation software limit)	91. Monitor parameter No. 2 (IBxx01D/Reverse rotation software limit) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
92. Monitor parameter No. 5 (ILxx04/Target position incremental monitor)	92. Monitor parameter No. 5 (ILxx04/Target position incremental monitor) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
93. Monitor parameter No. 17 (ILxx10/Cumulative number of rotations received from the absolute encoder)	93. Monitor parameter No. 17 (ILxx10/Cumulative number of rotations received from the absolute encoder) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
94. Monitor parameter No. 19 (ILxx12/Number of initial incremental pulses received from the absolute encoder)	94. Monitor parameter No. 19 (ILxx12/Number of initial incremental pulses received from the absolute encoder) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
95. Monitor parameter No. 22 (IWxx15/Motion command status) Conversion was not performed because the functions in the content of the bit parameters of the relevant registers have been dispersed to IWxx09 and IWxx0C.	95. Monitor parameter No. 22 (IWxx15/Motion command status) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter. <Example remedies> Bit 0 (Command execution in progress flag): With the MP2000 series, this has been changed to IWxx09 Bit 0: Command execution in progress flag. Delete the relevant register and change the program. Bit 1 (Command pause completed flag): With the MP2000 series, this has been changed to IWxx09 Bit 1: Command pause completed flag. Delete the relevant register and change the program. Bit 2 (Distribution completed): With the MP2000 series, this has been changed to IWxx0C Bit 0: Distribution completed. Delete the relevant register and change the program. Bit 3 (Zero point setting completed): With the MP2000 series, this has been changed to IWxx0C Bit 5: Zero point return (setting) completed. Delete the relevant register and change the program. Bit 4 (External positioning signal latching completed): With the MP2000 series, this has been changed to IWxx0C Bit 2: Latching completed. Delete the relevant register and change the program. Bit 5 (Command abnormal termination signal): With the MP2000 series, this has been changed to IWxx09 Bit 3: Command abnormal termination signal. Delete the relevant register and change the program. Bit 6 (Zero point return completion status): With the MP2000 series, this has been changed to IWxx0C Bit 5: Zero point return (setting) completed. Delete the relevant register and change the program.
96. Monitor parameter No. 23 (IWxx16/Number of places after decimal point monitor) With the MP2000 series, this parameter has been eliminated and a fixed parameter is monitored using a motion subcommand instead.	96. Monitor parameter No. 23 (IWxx16/Number of places after decimal point monitor) To monitor the number of places after the decimal point, set "5" for the fixed parameter number (OWxx5C) of the setting parameter and "5" for the motion subcommand (OWxx0A): the "number of places after the decimal point" will then be reported in the fixed parameter monitor (ILxx56).

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy

97. Monitor parameter No. 24 (IWxx17/Position management status)
 	
Conversion was not performed because the functions in the content of the bit parameters of the relevant registers have been dispersed to IWxx0C or the specification has been changed.
	97. Monitor parameter No. 24 (IWxx17/Position management status)
	
	Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
	
	<Example remedies>
	Delete the relevant register and change the program.
	Bit 0 (Machine lock in effect):
	  With the MP2000 series, this has been changed to IWxx0C Bit 6: Machine lock in effect.
	Bit 1 (Zero point position):
	  With the MP2000 series, this has been changed to IWxx0C Bit 4: Zero point position.
	Bit 2 (2nd INP completed):
	  With the MP2000 series, this has been changed to IWxx0C Bit 3: Positioning completed 2.
	Bit 3 (Absolute unlimited length position management information load completed):
	  With the MP2000 series, this has been changed to IWxx0C Bit 8: Absolute unlimited length position management information load completed.
	Bit 4 (Number of POSMAX turns preset completed):
	  With the MP2000 series, this has been changed to IWxx0C Bit 9: Number of POSMAX turns preset completed.
	Bit 5 (Electronic gear ON/OFF selection):
	  With the MP2000 series, whether the electronic gear is ON or OFF is automatically selected in accordance with the command unit selection. To monitor the electronic gear ON/OFF selection, set "4" for fixed parameter number (OWxx5C) of the setting parameter and "5" for motion subcommand (OWxx0A): the "command unit selection" will then be reported in the fixed parameter monitor (ILxx56). If this value is 0 (the specified unit is "Pulse"), the electronic gear is OFF.
	Bit 6 (Axis selection):
	  A change has been made such that the fixed parameter is monitored using a motion subcommand. To monitor the axis type selection, set "1" for fixed parameter number (OWxx5C) of the setting parameter and "5" for motion subcommand (OWxx0A): the "axis type selection" will then be reported in the fixed parameter monitor (ILxx56 Bit 0).

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
98. Monitor parameter No. 24 (IBxx175/Electronic gear ON/OFF selection) With the MP2000 series, this parameter has been eliminated and a fixed parameter is monitored using a motion subcommand instead.	98. Monitor parameter No. 24 (IBxx175/Electronic gear ON/OFF selection) With the MP2000 series, whether the electronic gear is ON or OFF is automatically selected in accordance with the command unit selection. To monitor the electronic gear ON/OFF selection, set "4" fixed parameter number (OWxx5C) of the setting parameter and "5" for motion subcommand (OWxx0A): the "command unit selection" will then be reported in the fixed parameter monitor (ILxx56). If this value is 0 (the specified unit is "Pulse"), the electronic gear is OFF.
99. Monitor parameter No. 24 (IBxx176/Axis selection) With the MP2000 series, this parameter has been eliminated and a fixed parameter is monitored using a motion subcommand instead.	99. Monitor parameter No. 24 (IBxx176/Axis selection) With the MP2000 series, a change has been made such that the fixed parameter is monitored using a motion subcommand. To monitor the axis type selection, set "1" for fixed parameter number (OWxx5C) of the setting parameter and "5" for motion subcommand (OWxx0A): the "axis type selection" will then be reported in the fixed parameter monitor (ILxx56 Bit 0).
100. Monitor parameter No. 27 (IWxx1A/Serial command answer monitor)	100. Monitor parameter No. 27 (IWxx1A/Serial command answer monitor) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
101. Monitor parameter No. 28 (IWxx1B/Serial command address monitor)	101. Monitor parameter No. 28 (IWxx1B/Serial command address monitor) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
102. Monitor parameter No. 29 (ILxx1C/POSMAX monitor) With the MP2000 series, this parameter has been eliminated and a fixed parameter is monitored using a motion subcommand instead.	102. Monitor parameter No. 29 (ILxx1C/POSMAX monitor) With the MP2000 series, a change has been made such that the fixed parameter is monitored using a motion subcommand. T monitor POSMAX, set "23" for fixed parameter number (OWxx5C) of the setting parameter and "5" for the motion subcommand (OWxx0A): "POSMAX" will then be reported in the fixed parameter monitor (ILxx56 Bit 0).
103. Monitor parameter No. 33 (IWxx20/SGDH serial command data monitor)	103. Monitor parameter No. 33 (IWxx20/SGDH serial command data monitor) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

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error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
104. Monitor parameter No. 33 (ILxx20/Servo driver user monitor information)	104. Monitor parameter No. 33 (ILxx20/Servo driver user monitor information) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
105. Monitor parameter No. 35 (IBxx22A/Control mode error) The relevant register does not exist in the MP2000 series.	105. Monitor parameter No. 35 (IBxx22A/Control mode error) Delete the relevant register.
106. Monitor parameter No. 35 (IBxx22C/Zero point setting during travel)	106. Monitor parameter No. 35 (IBxx22C/Zero point setting during travel) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
107. Monitor parameter No. 35 (IBxx22E/Servo driver synchronous communication error)	107. Monitor parameter No. 35 (IBxx22E/Servo driver synchronous communication error) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
108. Monitor driver No. 35 (IBxx232/PG disconnection error)	108. Monitor driver No. 35 (IBxx232/PG disconnection error) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
109. Monitor parameter No. 35 (IBxx23E/Motor type setting error)	109. Monitor parameter No. 35 (IBxx23E/Motor type setting error) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
110. Monitor parameter No. 35 (IBxx23F/Encoder type mismatch)	110. Monitor parameter No. 35 (IBxx23F/Encoder type mismatch) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
111. Monitor parameter No. 37 (IWxx24/Servo driver alarm code)	111. Monitor parameter No. 37 (IWxx24/Servo driver alarm code) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
112. Monitor parameter No. 38 (IBxx251/DEC (deceleration limit switch signal))	112. Monitor parameter No. 38 (IBxx251/DEC (deceleration limit switch signal)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
113. Monitor parameter No. 38 (IBxx252/P-OT (forward overtravel signal))	113. Monitor parameter No. 38 (IBxx252/P-OT (forward overtravel signal)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
114. Monitor parameter No. 38 (IBxx253/N-OT (reverse overtravel signal))	114. Monitor parameter No. 38 (IBxx253/N-OT (reverse overtravel signal)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
115. Monitor parameter No. 38 (IBxx254/EXT1 (external input signal 1)	115. Monitor parameter No. 38 (IBxx254/EXT1 (external input signal 1) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
116. Monitor parameter No. 38 (IBxx255/EXT2 (external input signal 2))	116. Monitor parameter No. 38 (IBxx255/EXT2 (external input signal 2)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
117. Monitor parameter No. 38 (IBxx256/EXT3 (external input signal 3))	117. Monitor parameter No. 38 (IBxx256/EXT3 (external input signal 3)) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
118. Monitor parameter No. 38 (IBxx259/Brake status output)	118. Monitor parameter No. 38 (IBxx259/Brake status output) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
119. Monitor parameter No. 41 (ILxx28/Position buffer read data)	119. Monitor parameter No. 41 (ILxx28/Position buffer read data) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
120. Monitor parameter No. 43 (ILxx2A/Position command output value monitor) With the MP900 series, the relevant register is used for system debugging. With the MP2000 series, there is no parameter of the same kind.	120. Monitor parameter No. 43 (ILxx2A/Position command output value monitor) Delete the relevant register.
121. Monitor parameter No. 43 (ILxx2A/Number of output pulses) With the MP900 series, the relevant register is used for system debugging. With the MP2000 series, there is no parameter of the same kind.	121. Monitor parameter No. 43 (ILxx2A/Number of output pulses) Delete the relevant register.
122. Monitor parameter No. 45 (ILxx2C/Integral output value monitor)	122. Monitor parameter No. 45 (ILxx2C/Integral output value monitor) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
123. Monitor parameter No. 49 (ILxx30/Primary lag monitor)	123. Monitor parameter No. 49 (ILxx30/Primary lag monitor) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
124. Monitor parameter No. 51 (ILxx32/Position loop output value monitor)	124. Monitor parameter No. 51 (ILxx32/Position loop output value monitor) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.
125. Monitor parameter No. 53 (ILxx34/Position monitor 2)	125. Monitor parameter No. 53 (ILxx34/Position monitor 2) Refer to the *Machine Controller MP2000 Series SVA-01 Motion Module User's Manual* (manual no.: SIEPC88070032) and *Machine Controller MP2000 Series Built-in SVB/SVB-01 Motion Module User's Manual* (manual no.: SIEPC88070033) and change to the appropriate parameter.

error 1017: The parameter cannot convert, since it was invalid. (Cont'd)

Cause	Remedy
126. Monitor parameter No. 55 (IWxx36/Serial converter resolution monitor) With the MP2000 series, this parameter has been eliminated and a fixed parameter is monitored using a motion subcommand instead.	126. Monitor parameter No. 55 (IWxx36/Serial converter resolution monitor) It is possible to read the value using the fixed parameter monitor function.

error 1025: Failed to allocate memory.

Cause	Remedy
There has been a failure to secure the memory area required to run the Application Converter.	Increase the memory size or virtual memory size of the computer that you are using.

error 1028: The model of the source and destination are not compatible models.

Cause	Remedy
The combination of the models of the conversion source controller and conversion destination controller is not supported by the Application Converter.	Check the models at the conversion source and conversion destination and execute the application conversion again.

error 1044: The servo model of the source and destination are not compatible of the servo amplifier models.

Cause	Remedy
A servo pack that has no compatibility at conversion has been allocated.	Allocate *"stp,***"* to the conversion source and the conversion destination. However, conversion is not possible in the following cases. • *"stp,***"* is allocated to the conversion source axis. → *"stp,***"* is not allocated to the conversion destination. • *"stp,***"* is not allocated to the conversion source axis. → *"stp,***"* is allocated to the conversion destination.

error 1046: Undefined the source information. (fixed parameter)

Cause	Remedy
The fixed parameter for the axis specified for the conversion source has not been saved.	Save the fixed parameter for the axis of the conversion source. Note: If it is not necessary to convert the setting of the fixed parameter of the conversion source, the parameter does not need to be saved.

error 1047: Undefined the source information. (setting parameter)

Cause	Remedy
The setting parameter for the axis specified for the conversion source has not been saved.	Save the setting parameter for the axis of the conversion source. Note: If it is not necessary to convert the setting of the setting parameter of the conversion source, the parameter does not need to be saved.

error 1048: Undefined the source information.

Cause	Remedy
No fixed parameter and setting parameter have been defined for the conversion source module.	Check the conversion source definition status.

error 1049: Cannot convert the object PLC model.

Cause	Remedy
The PLC model specified for the conversion source/destination is not supported by the Application Converter.	Select PLC models that can be the conversion source and destination.

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error 1057: There are insufficient read privileges, it cannot be converted.

Cause	Remedy
The user privilege level used for logon doesn't give the authority to access the relevant drawing.	Log on again with a user name that has a higher level of user privilege.

error 1058: There are insufficient write privileges, it cannot be converted.

Cause	Remedy
The user privilege level used for logon doesn't give the authority to write the relevant drawing.	Log on again with a user name that has a higher level of user privilege.

error 1061: The bit type parameter is referred as word/long type. It can't be converted as the bit type order is changed.

Cause	Remedy
A bit parameter has been used as a Word/Long type parameter. The meaning of the bit parameter has been changed so it cannot be converted.	–
1. Monitor parameter No. 2 (IWxx01/Servo driver status)	1. Create another ladder manually in accordance with the specifications of the model at the conversion destination.
2. Monitor parameter No. 2 (IWxx01/General DI monitor)	2. Create another ladder manually in accordance with the specifications of the model at the conversion destination.
3. Monitor parameter No. 38 (IWxx25/Servo driver I/O monitor)	3. Create another ladder manually in accordance with the specifications of the model at the conversion destination.

error 1062: Since the setting range (a) of a conversion destination was exceeded, value (b) was not convertible. Default value "c" is set up.

Cause	Remedy
The data set for the parameter at the conversion source is outside the setting range for the parameter at the conversion destination.	The parameter at the conversion destination will be set to the default value. Check the converted data.

error 1063: It could not be converted, since an empty slot was insufficient.

Cause	Remedy
Conversion to the PLC model selected for the conversion destination is not possible because it has insufficient slots.	Either convert to a PLC model with a greater number of slots than the one currently specified for the conversion destination or reduce the number of modules allocated at the conversion source.

error 1064: It could not be converted, since the line of becoming empty was insufficient.

Cause	Remedy
Conversion was not performed because there were insufficient line numbers to which communication modules and servo modules of the conversion destination could be allocated.	Remove the communication module and servo module definitions that can be deleted from the conversion source module configuration definitions, then execute the conversion again.

error 1066: Not supported module is defined. It could not be converted.

Cause	Remedy
A module for MP900 defined at the conversion source is not supported by MPE720 Ver. 5.	Remove the allocation of the relevant module from the module configuration definitions and execute the conversion again.

error 1067: Since the motion module could not be specified, it converted it into M register.

Cause	Remedy
There is no allocation of the relevant motion module to the motion register used by the application in the module configuration definitions for the conversion source.	Take one of the following remedies. • Perform the conversion manually for the parts converted to M registers at the conversion destination. • Allocate the relevant motion module to the motion register used in the program at the conversion source, then execute the conversion again.

error 1069: The target program of register replacement does not exist.

Cause	Remedy
The drawings specified at the conversion source for the Multi-register Replace function do not exist.	Review the names of the drawings specified at the conversion source for the Multi-register Replace function.

error 1070: The converted D register number exceeds the maximum D register number of target DWG.

Cause	Remedy
A local register specified for replacement is outside the register range at the replace destination.	Review the size and address of the register to be replaced, and change the settings so that the register after the replacement is within the appropriate range.

error 1071: The "linear motor" is set in the source, but it is not available in the target module.

Cause	Remedy
The servo module allocated at the conversion destination doesn't support "linear type" as a motor classification.	When making a conversion to "linear type", change to a servo module that supports linear motors at the conversion destination.

error 1072: The working register for the MSEE instruction is out of range.

Cause	Remedy
The working registers used with the MSEE command exceed the range of registers that can be used for the specified register classification.	Correct the working registers used with the MSEE command. Note: With the M2000 series, the size of the working registers used with the MSEE command has been expanded to four words.

F.3 Warning List

The details of the warnings are as follows.

No.	Message
3001	D-Register Data was imported, but it is not compatible.
3005	Parameters are converted, but two parameters are merged. Please confirm.
3006	Parameters are converted, but the parameter requires the unit configuration, so please change the unit to be same it with the source environment.
3007	The motion registers (set/monitor parameters) are used with index i, j.
3008	The scale is changed (10 = 1 Hz to 1 = 1 Hz). Please confirm the program.
3009	The degree speed unit is changed. Please check ACC, DCC, SCC command.
3010	The speed unit is changed. Please check VEL command.
3011	Line number was changed to empty line number Since line number overlapped.
3012	The line number was set by the empty line number.
3013	Transmission cycle 250 us/500 us/1 msec of the parameter definition was converted into 2 msec.
3015	The conversion has been done. The meaning of parameter is changed "the acceleration (deceleration) time to feed speed" to "the acceleration time (deceleration) time to rated speed". Please check in the target program.
3016	The conversion has been done. The unit of the parameter is changed. Please check in the target program.
3017	The conversion has been done. The unit of the parameter can be changed. Please check in the target program.
3018	The register is converted to a bit for Alarm (IBxxx49). You can change it to a bit for Warning (IBxxx20) also.
3019	The conversion has been done. "DEC" and "EXT" bits are converted in a bit.
3020	"Positioning completed" and "Speed coincidence" are assigned into a bit in the target. Please make notice in Speed control mode.
3021	"Distribution completed" and "Zero speed" are assigned into a bit in the target. It is "Zero speed" in Speed control mode.
3022	"Position proximity" and "Torque limit detection" are assigned into a bit in the target. It is "Position proximity" in Position control mode.
3023	The conversion has been done. Please set "0.01" to "Torque unit".
3024	It is converted to "Torque Reference Monitor". You can change it to "General-Purpose AI Monitor 1" also. In the target program, set "0.01" to "Torque Unit Selection".
3025	The baud-rate which is set in the source is invalid in the target, so it is converted to 19.2 [kbps].
3026	Conversion failed because the circuit (module) does not apply in the target.
3027	The third and fourth working registers for the MSEE instruction are used.
3028	A MSEE instruction was found.
3032	The RS-232C of the source converted into the 217IF of 218IF-01 at destination.
3034	The row of Bit is different conversion ahead though it converted. Please check in the target program.
3035	The motion register (setting parameter and monitor parameter) is used by index i and j though it converted. Please check in the target program. (i and j)
3036	The meaning of Bit reverses conversion ahead though it converted. Please check in the target program.
3037	The speed unit is changed. Please check VEL command.
3038	It is different from the type of the corresponding parameter though it converted. Please check in the target program.
3039	The station allocation of the source was changed by the destination.
3040	The SVA definition was converted into the MECHATROLINK servo of SVB.
3041	Transmission cycle 1 msec/4 msec of the parameter definition was converted into 2 msec.
3042	It was converted with MECHATROLINK-II (32 byte Mode), 0.5 msec.
3043	It was replaced with *****I/O, because the selected module does not exist.
3044	Because the set Motion Command is not supported in the target, this setting is ignored.
3045	Because the set Home Return Type is not supported in the target, this setting is ignored.

F.4 Details of Warnings

The details of each warning are explained below.

warning 3001: D-Register Data was imported, but it is not compatible.

Cause	Remedy
Application register data that includes D-register data has been imported into the conversion source environment.	Check the converted data.

warning 3005: Parameters are converted, but two parameters are merged. Please confirm.

Cause	Remedy
The relevant register has been converted but multiple parameters have been merged.	Check the converted data.
1. Setting parameter No. 3 (OWxx02/Forward torque clamp setting)	1. Setting parameter No. 3 (OWxx02/Forward torque clamp setting) With the MP2000 series, this has been changed to OLxx14 (torque clamp setting when a velocity reference is given). It is not possible to make independent settings for forward and reverse motion.
2. Setting parameter No. 17 (OWxx10/Position loop gain) The conversion source parameters OWxx10 and OWxx19 have been merged as OWxx2E. The values and comments follow those of OWxx10.	2. Setting parameter No. 17 (OWxx10/Position loop gain) The warning detected by the relevant register is only detected when an MP900 series SVA is used.
3. Setting parameter No. 26 (OWxx19/Proportional gain) The conversion source parameters OWxx10 and OWxx19 have been merged as OWxx2E. The values and comments follow those of OWxx10.	3. Setting parameter No. 26 (OWxx19/Proportional gain) The warning detected by the relevant register is only detected when an MP900 series SVA is used.

warning 3006: Parameters are converted, but the parameter requires the unit configuration, so please change the unit to be same it with the source environment.

Cause	Remedy
The relevant register has been converted but the unit system needs to be changed to match the existing settings.	Check the converted data.
1. Monitor parameter No. 39 (ILxx26/Velocity reference output value monitor)	1. Monitor parameter No. 39 (ILxx26/Velocity reference output value monitor) Set the unit for velocity references with "speed unit selection" (OWxx03, Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification

warning 3007: The motion registers (set/monitor parameters) are used with index i, j.

Cause	Remedy
Conversion has been performed, but indices i and j have been specified with the relevant motion register.	The settings for i and j are not automatically converted by the Application Converter. Check the values of i and j of the relevant motion register in the conversion results.

warning 3008: The scale is changed (10 = 1 Hz to 1 = 1 Hz). Please confirm the program.

Cause	Remedy
The unit system of the relevant register has been converted (1 = 0.1 Hz to 1 = 1 Hz).	Check the converted data.
1. Setting parameter No. 30 (OWxx1D/Speed loop gain)	1. Setting parameter No. 30 (OWxx1D/Speed loop gain) The unit has been changed from 0.1 Hz to Hz.

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warning 3009: The degree speed unit is changed. Please check ACC, DCC, SCC command.

Cause	Remedy
The unit of acceleration has been changed.	Check the ACC, DCC and SCC commands.
1. Setting parameter No. 3 (Bit 4 to Bit 7) (OWxx03/ Acceleration unit selection)	1. Setting parameter No. 3 (Bit 4 to Bit 7) (OWxx03/ Acceleration unit selection) If the value for speed unit selection (OWxx03 Bit 4 to Bit 7) is other than 1, the operation of the acceleration/ deceleration commands (ACC, DCC, SCC) in the motion program changes. To ensure the same operation as in the conversion source motion program, change to acceleration unit selection = 1 (ms).

warning 3010: The speed unit is changed. Please check VEL command.

Cause	Remedy
The unit of speed has been changed.	Check the VEL command.
1. Setting parameter No. 3 (Bit 0 to Bit 3) (OWxx03/Speed unit selection)	1. Setting parameter No. 3 (Bit 0 to Bit 3) (OWxx03/Speed unit selection) If the value for speed unit selection (OWxx03 Bit 0 to Bit 3) is other than 1, the operation of the speed change command (VEL) in the motion program changes. To ensure the same operation as in the conversion source motion program, change to speed unit selection = 1 (command unit/min.).

warning 3011: Line number was changed to empty line number Since line number overlapped.

Cause	Remedy
The line number was changed to an empty line number since line numbers overlapped.	Check the converted data.

warning 3012: The line number was set by the empty line number.

Cause	Remedy
Because conversion was performed for multiple modules, it wasn't possible to assign the same line numbers as were used at the conversion source. For this reason, empty line numbers were assigned.	Check the assigned line numbers.

warning 3013: Transmission cycle 250 us/500 us/1 msec of the parameter definition was converted into 2 msec.

Cause	Remedy
Because a transmission cycle that was invalid for MECHA-TROLINK was set, it was changed to one that is valid with MECHATROLINK.	Check whether there is no problem even if the cycle is changed.

warning 3015: The conversion has been done. The meaning of parameter is changed "the acceleration (deceleration) time to feed speed" to "the acceleration time (deceleration) time to rated speed". Please check in the target program.

Cause	Remedy
Conversion has been performed, but the parameter information has been changed.	Check the converted data.
1. Setting parameter No. 13 (OWxx0C/Constant for linear acceleration) The relevant register has been converted to OLxx36, but the method for setting the unit system has been changed, so the unit system has been changed to ms.	1. Setting parameter No. 13 (OWxx0C/Constant for linear acceleration) The setting has been changed from the time required to reach the feed speed to the time required to reach the rated speed.
2. Setting parameter No. 14 (OWxx0D/Constant for linear deceleration) The relevant register has been converted to OLxx38, but the method for setting the unit system has been changed, so the unit system has been changed to ms.	2. Setting parameter No. 14 (OWxx0D/Constant for linear deceleration) The setting has been changed from the time required to reach the feed speed to the time required to reach the rated speed.

warning 3016: The conversion has been done. The unit of the parameter is changed. Please check in the target program.

Cause	Remedy
Conversion has been performed, but the parameter units have been changed.	Check the converted data.
1. Setting parameter No. 11 (OWxx0A/Approach speed)	1. Setting parameter No. 11 (OWxx0A/Approach speed) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification
2. Setting parameter No. 12 (OWxx0B/Creep speed)	2. Setting parameter No. 12 (OWxx0B/Creep speed) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification
3. Setting parameter No. 21 (OWxx14/Filter time constant)	3. Setting parameter No. 21 (OWxx14/Filter time constant) Check the converted data.
4. Setting parameter No. 23 (OLxx16/Phase compensation setting)	4. Setting parameter No. 23 (OLxx16/Phase compensation setting) Check the converted data.
5. Setting parameter No. 31 (OLxx1E/Compensation pulse setting)	5. Setting parameter No. 31 (OLxx1E/Compensation pulse setting) Check the converted data.
6. Setting parameter No. 35 (OLxx22/Fast speed) The previous two types of velocity reference register - OLxx22 and OWxx15 - have been merged as OLxx10 in the MP2000 series.	6. Setting parameter No. 35 (OLxx22/Fast speed) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification
7. Monitor parameter No. 13 (IWxx0C/Velocity reference output value monitor)	7. Monitor parameter No. 13 (IWxx0C/Velocity reference output value monitor) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification Or [pulse/sec.], or "command unit/H scan"
8. Monitor parameter No. 14 (IWxx0D/Speed monitor)	8. Monitor parameter No. 14 (IWxx0D/Speed monitor) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification
9. Monitor parameter No. 39 (ILxx26/Velocity reference output value monitor)	9. Monitor parameter No. 39 (ILxx26/Velocity reference output value monitor) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification

Appendices

App

warning 3017: The conversion has been done. The unit of the parameter can be changed. Please check in the target program.

Cause	Remedy
Conversion has been performed, but the units for the parameters may have been changed.	Check the converted data.
1. Monitor parameter No. 39 (ILxx26/Velocity reference output value monitor)	1. Monitor parameter No. 39 (ILxx26/Velocity reference output value monitor) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification

warning 3018: The register is converted to a bit for Alarm (IBxxx49). You can change it to a bit for Warning (IBxxx20) also.

Cause	Remedy
Conversion has been performed in such a way that the relevant parameter generates an alarm.	Check the converted data.
Monitor parameter No. 1 (IBxx000/Abnormal deviation)	Monitor parameter No. 1 (IBxx000/Abnormal deviation) An alarm or warning can be selected by changing the setting for the abnormal deviation error level setting (OWxx01 Bit 0).

warning 3019: The conversion has been done. "DEC" and "EXT" bits are converted in a bit.

Cause	Remedy
At the MP2000 series, conversion has been performed so that the DEC/EXT signals of the registers below are used in common.	Check the converted data.
1. Monitor parameter No. 2 (IBxx015/DI5 (external latch signal))	
2. Monitor parameter No. 2 (IBxx016/DI5)	
3. Monitor parameter No. 2 (IBxx018/DI7 (external latch signal)	

warning 3020: "Positioning completed" and "Speed coincidence" are assigned into a bit in the target. Please make notice in Speed control mode.

Cause	Remedy
At the MP2000 series, "V-CMP (speed match)" and "Positioning completed" have been converted to "Positioning completed/speed match".	Check the converted data.
1. Monitor parameter No. 2 (IBxx012/V-CMP (Speed match))	
2. Monitor parameter No. 2 (IBxx017/Positioning completed)	

warning 3021: "Distribution completed" and "Zero speed" are assigned into a bit in the target. It is "Zero speed" in Speed control mode.

Cause	Remedy
At the MP2000 series, "Distribution completed" has been converted to "Distribution completed/zero speed".	Check the converted data.
1. Monitor parameter No. 2 (IBxx018/Distribution completed)	

warning 3022: "Position proximity" and "Torque limit detection" are assigned into a bit in the target. It is "Position proximity" in Position control mode.

Cause	Remedy
At the MP2000 series, "VLT (velocity limit detection)" has been converted to "Positioning vicinity/velocity limit".	Check the converted data.
1. Monitor parameter No. 2 (IBxx016/VLT (Velocity limit detection)	

warning 3023: The conversion has been done. Please set "0.01" to "Torque unit".

Cause	Remedy
Conversion has been performed, but the units have been changed.	Check the converted data.
1. Monitor parameter No. 15 (IWxx0E/Torque monitor)	1. Monitor parameter No. 15 (IWxx0E/Torque monitor) Set the torque unit selection (OWxx03 Bit C to Bit F) to 0.01%.

warning 3024: It is converted to "Torque Reference Monitor". You can change it to "General-Purpose AI Monitor 1" also. In the target program, set "0.01" to "Torque Unit Selection".

Cause	Remedy
Conversion has been performed, but the units have been changed.	Check the converted data.
1. Monitor parameter No. 15 (IWxx0E/Torque monitor)	1. Monitor parameter No. 15 (IWxx0E/Torque monitor) Since the analog input voltage is reported as [0.001 V], unit conversion is necessary. Set torque unit selection (OWxx03 Bit C to Bit F) to 0.01%.

warning 3025: The baud-rate which is set in the source is invalid in the target, so it is converted to 19.2 [kbps].

Cause	Remedy
The baud rate specified by the module setting at the conversion source is not supported at the conversion destination. Therefore, it is converted to the default baud rate of 19.2 k[bps].	Check the converted data.

warning 3026: Conversion failed because the circuit (module) does not apply in the target.

Cause	Remedy
Conversion was not performed because the circuit of the relevant module is not applicable to conversion in automatic conversion.	Check the converted data.

warning 3027: The third and fourth working registers for the MSEE instruction are used.

Cause	Remedy
With the MP900 series the working register area that MSEE commands use was 2 words but with the MP2000 series this area has been expanded to 4 words. The relevant location overlaps the area for the third and fourth words generated by this expansion.	Check the converted data. If the area is not being used for its intended purpose, change the application so that there is no overlap with the working register area.

warning 3028: A MSEE instruction was found.

Cause	Remedy
A location where MSEE commands are used has been detected inside the application.	Check the location that is using MSEE commands.

warning 3032: The RS-232C of the source converted into the 217IF of 218IF-01 at destination.

Cause	Remedy
The RS-232C definition of the conversion source has been converted into the 217IF definition of the 218IF-01 module at the MP2000 series conversion destination.	Since the device type has been changed, check if there is any location that accesses the relevant communication module using the MSG-RCV/SND function, etc., in the application. And, if necessary, change the device type of the MSG-RCV/SND function.

warning 3034: The row of Bit is different conversion ahead though it converted. Please check in the target program.

Cause	Remedy
Conversion has been performed but there is a difference in the order of the bits between the register at the conversion source and the register at the conversion destination.	Check the converted data by referring to the Guide to Parameter Conversion Specifications.

warning 3034: The row of Bit is different conversion ahead though it converted. Please check in the target program.

Cause	Remedy
1. Monitor parameter No. 35 (ILxx22/Alarm) Conversion has been performed but there is a difference in the order of the bits between the register at the conversion source and the register at the conversion destination.	1. Monitor parameter No. 35 (ILxx22/Alarm) Check the converted data by referring to the Guide to Parameter Conversion Specifications below. <Guide to Parameter Conversion Specifications> Bit 0 (Servo amplifier error): With the MP2000 series, this has been changed to ILxx04 Bit 0: Servo driver error. Bit 1 (Positive overtravel): With the MP2000 series, this has been changed to ILxx04 Bit 1: Positive overtravel. Bit 2 (Negative overtravel): With the MP2000 series, this has been changed to ILxx04 Bit 2: Negative overtravel. Bit 3 (Positive software limit): With the MP2000 series, this has been changed to ILxx04 Bit 3: Positive software limit. Bit 4 (Negative software limit): With the MP2000 series, this has been changed to ILxx04 Bit 4: Negative software limit. Bit 5 (Servo OFF/excitation OFF): With the MP2000 series, this has been changed to ILxx04 Bit 5: Servo OFF. Bit 6 (Positioning time limit exceeded): With the MP2000 series, this has been changed to ILxx04 Bit 6: Positioning time limit exceeded. Bit 7 (Excessive positioning travel/Excessive speed): With the MP2000 series, this has been changed to ILxx04 Bit 7: Excessive positioning travel, and ILxx04 Bit 8: Excessive speed. Bit 8 (Filter type change error): With the MP2000 series, this has been changed to ILxx04 Bit 10: Filter type change error. Bit 9 (Filter time constant change error): With the MP2000 series, this has been changed to ILxx04 Bit 11: Filter time constant change error. Bit 10 (Control mode error): With the MP2000 series, the relevant register has been deleted. Change the program. Bit 11 (Zero point not set): With the MP2000 series, this has been changed to ILxx04 Bit 13: Zero point not set. Bit 12 (Zero point set during travel): With the MP2000 series, this has been changed to ILxx04 Bit 14: Zero point set during travel. Bit 13: (Servo pack Cn constant setting error): With the MP2000 series, this has been changed to ILxx04 Bit 15: Servo driver user constant setting error. Bit 14 (Servo driver synchronous communication error): With the MP2000 series, this has been changed to ILxx04 Bit 16: Servo driver synchronous communication error.

warning 3034: The row of Bit is different conversion ahead though it converted. Please check in the target program.

Cause	Remedy
1. Monitor parameter No. 35 (ILxx22/Alarm) Conversion has been performed but there is a difference in the order of the bits between the register at the conversion source and the register at the conversion destination.	Bit 15 (Servo driver communication error): With the MP2000 series, this has been changed to ILxx04 Bit 17: Servo driver communication error. Bit 16 (Servo driver command timeout error): With the MP2000 series, this has been changed to ILxx04 Bit 18: Servo driver command timeout error. Bit 17 (Excessive absolute encoder rotation): With the MP2000 series, this has been changed to ILxx04 Bit 19: Excessive absolute encoder rotation. Bit 18 (PG disconnection error): With the MP2000 series, this has been changed to ILxx04 Bit 20: PG disconnection error. Bit 30 (Motor type setting error): With the MP2000 series, this has been changed to ILxx04 Bit 31: Motor type setting error. Bit 31 (Encoder type mismatch): With the MP2000 series, this has been changed to ILxx04 Bit 30: Linear motor connection error.

warning 3035: The motion register (setting parameter and monitor parameter) is used by index i and j though it converted. Please check in the target program. (i and j)

Cause	Remedy
Conversion has been performed, but indices i and j have been specified with the relevant motion register.	The settings for i and j are not automatically converted by the Application Converter. Check the values of i and j of the relevant motion register in the conversion results.

warning 3036: The meaning of Bit reverses conversion ahead though it converted. Please check in the target program.

Cause	Remedy
The meanings of the bits in the register at the conversion destination are inverted with respect to the relevant register that was used at the conversion source.	Check the converted data.
1. Setting parameter No. 2 (OBxx01E/Position command type)	1. Setting parameter No. 2 (OBxx01E/Position command type) If the relevant register is used by the application, check its setting.

warning 3037: The speed unit is changed. Please check VEL command.

Cause	Remedy
The conversion source parameters OLxx22 and OWxx15 have been merged as OLxx10.	Check the converted data.
1. Setting parameter No. 22 (OWxx15/Velocity reference) The conversion source parameters OLxx22 and OWxx15 have been merged as OLxx10. The values and comments follow those of OLxx22. The unit system setting must be checked.	1. Setting parameter No. 22 (OWxx15/Velocity reference) Set the unit for velocity references with speed unit selection (OWxx03 Bit 0 to Bit 3). Speed unit selection (OWxx03 Bit 0 to Bit 3) 0: Command unit/sec. 1: Command unit/min. 2: % specification

warning 3038: It is different from the type of the corresponding parameter though it converted. Please check in the target program.

Cause	Remedy
Conversion has been performed, but there is a discrepancy between the type of the register and the type of the relevant parameter.	Check the converted data.

warning 3039: The station allocation of the source was changed by the destination.

Cause	Remedy
The SVA axis of MP940 has been allocated as the SVB MECHATROLINK servo at the conversion destination, which means that, if there is already an allocation to station #1 in the MECHATROLINK definition at the conversion source, the station allocation at the conversion destination will change.	Check the converted data.

warning 3040: The SVA definition was converted into the MECHATROLINK servo of SVB.

Cause	Remedy
The SVA definition at the conversion source has been converted to the SVB MECHATROLINK servo.	Check the converted data.

warning 3041: Transmission cycle 1 msec/4 msec of the parameter definition was converted into 2 msec.

Cause	Remedy
The MLINK transmission cycle at the conversion source (1 ms/4 ms) has been converted to a transmission cycle of 2 ms at the conversion destination.	Check the converted data.

warning 3042: It was converted with MECHATROLINK-II (32 byte Mode), 0.5 msec.

Cause	Remedy
The MLINK definition at the conversion source MP940M has been converted to MECHATROLINK-II (32-byte mode) with a communication cycle of 0.5 ms at the conversion destination.	Check the converted data.

warning 3043: It was replaced with *****I/O, because the selected module does not exist.

Cause	Remedy
No selectable module exists at the conversion destination so it has been replaced with ****I/O.	Check the converted data.

warning 3044: Because the set Motion Command is not supported in the target, this setting is ignored.

Cause	Remedy
The module at the conversion destination is not compatible with the motion command codes set at the conversion source and therefore this setting is ignored.	Check the converted data.

warning 3045: Because the set Home Return Type is not supported in the target, this setting is ignored.

Cause	Remedy
The module at the conversion destination is not compatible with the zero point return method set at the conversion source and therefore this setting is ignored.	Check the converted data.

G Operations Possible with the Application Converter

G.1 Cancelling Display in Red of Conversion Errors

This is a function for canceling the display in red of registers where a conversion error has occurred.

It is used when there are some registers that can be left as they are without problems after the details of conversion errors have been checked and necessary corrections made.

When this operation is performed all of the registers that are indicated in red due to conversion errors are reset and the original font color is reinstated.

IMPORTANT	Note that once the display of conversion errors has been cancelled, it is not possible to display them again.

The procedure for cancellation is given below.

1. Right-click the PLC folder and select *Hide Conversion Error Display* from the pop-up menu.
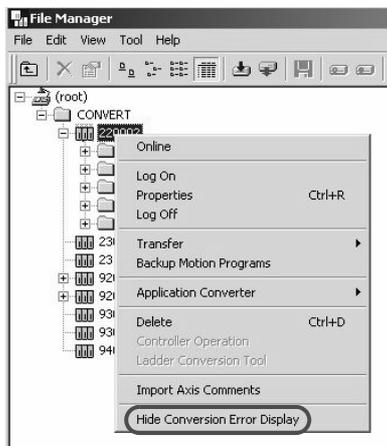
2. The color of all the registers and symbols that have been subject to a conversion error changes from red to the standard color.

G.2 Rules for Module Conversion

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP900-series Machine Controllers to the MP2000-series Machine Controllers are presented in the table below.

MP900-Series Models	Compatible M2000-Series Models	Conversion Procedure (Reference Section)
MP920/MP920-02	MP2200/MP2200-02	*G.2 (1)*
MP920/MP920-02	MP2300/MP2310	*G.2 (2)*
MP930/MP930-02/MP930-03	MP2300/MP2310	*G.2 (3)*
MP930/MP930-02/MP930-03	MP2300S	*G.2 (4)*
MP940M	MP2300S	*G.2 (5)*
MP940M	MP2300	*G.2 (6)*
MP940M	MP2310	*G.2 (7)*
MP940D	MP2300	*G.2 (8)*
MP940D	MP2310	*G.2 (9)*

(1) Conversion from MP920/MP920-02 to MP2200/MP2200-02

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP920-series or MP920-02-series Machine Controllers to the MP2200-series or MP2200-02-series Machine Controllers are presented in the table below.

No.	MP920/MP920-02 Module (Before Conversion)	Conver-sion →	MP2200/MP2200-02 Module (After Conversion)	Conversion of Detailed Definitions
1	CPU	→	CPU	–
		–	SVR	–
		–	CARD (MP2200-02 only)	–
		–	USB (MP2200-02 only)	–
	Communication function (built-in CPU)	→	218IF-01	–
		–	218IF	–
	CIR#01: RS-232	×	Cannot be converted.	Not possible
	CIR#02: RS-232	→	217IF	Possible
2	Multi CPU (MP920-02 only)	×	Cannot be converted.	–
	Communication function (built-in CPU)	×	Cannot be converted.	–
	RS-232C	×	Cannot be converted.	Not possible
	RS-232C	×	Cannot be converted.	Not possible
3	SVA-01 (4 axes, 2-slot width)	→	Converts axes 1 and 2 of SVA-01 (2 axes).	Possible
		→	Converts axes 3 and 4 of SVA-01 (2 axes).	Possible
4	SVA-02 (2 axes)	→	SVA-01 (2 axes)	Possible
5	PO-01 (4 axes)	→	PO-01 (4 axes)	Possible
6	SVB-01	→	SVB-01	Possible
		→	216IF-01 (in CP216 transmission mode)	Possible
7	CNTR-01 (4 channels)	→	CNTR-01 (2 channels) Converts channels 1 and 2	Not possible
		→	CNTR-01 (2 channels) Converts channels 3 and 4	Not possible
8	LIO-01 (32 inputs/32 outputs)	→	LIO-04 (32 inputs/32 outputs)	Possible
9	AI-01 (4 channels)	→	AI-01 (8 channels)	Not possible
10	AO-01 (4 channels)	→	AO-01 (4 channels)	Possible
11	DI-01 (64 inputs)	→	LIO-04 (32 inputs/32 outputs)	Not possible
		→	LIO-04 (32 inputs/32 outputs)	Not possible
12	DO-01 (64 outputs)	→	DO-01 (64 outputs)	Possible
13	217IF	→	217IF-01	–
	CIR#01: RS-232	→	RS-232	Possible
	CIR#02: RS-232	×	Cannot be converted.	Not possible
	CIR#03: RS-485	→	RS-485	Possible
14	217IFT1	→	217IF-01	–
		–	RS-232	–
	CIR#01: RS-485	→	RS-485	Possible
	CIR#02: RS-485	×	Cannot be converted.	Not possible
	CIR#03: RS-485	×	Cannot be converted.	Not possible
15	218IF	→	218IF-01	–
		→	218IF	Possible
		–	217IF	–
16	260IF	→	260IF-01	–
		→	260IF	Possible
		–	217IF	–

No.	MP920/MP920-02 Module (Before Conversion)	Conver-sion →	MP2200/MP2200-02 Module (After Conversion)	Conversion of Detailed Definitions
17	261IF	→	261F-01	–
		→	261IFS	Possible
		–	217IF	–
18	215IF	→	215AIF-01	–
		→	MPLINK	Possible
		–	RS-232	–
19	CSIF	→	CSIF-01	–
		→	CSIF	Possible
20	EXIO	→	EXIO	–

(2) Conversion from MP920/MP920-02 to MP2300/MP2310

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP920-series or MP920-02-series Machine Controllers to the MP2300-series or MP2310-series Machine Controllers are presented in the table below.

No.	MP920/MP920-02 Module (Before Conversion)	Conver-sion →	MP2300/MP2310 Module (After Conversion)	Conversion of Detailed Definitions
1	CPU	→	CPU	–
	Communication function (built-in CPU)	→	218IF-01	–
		–	218IF	–
	CIR#01: RS-232	×	Cannot be converted.	Not possible
	CIR#02: RS-232	→	217IF	Possible
2	Multi CPU (MP920-02 only)	×	Cannot be converted.	–
	Communication function (built-in CPU)	×	Cannot be converted.	–
	RS-232C	×	Cannot be converted.	Not possible
	RS-232C	×	Cannot be converted.	Not possible
3	SVB-01		Built-in CPU	–
		→	MECHATROLINK	Possible
		→	216IF-01 (in the CP216 transmission mode)	Possible
4	EXIO	→	EXIO	–
5	Other modules	→	Same pattern of conversion as described in *G.2 (1) Conversion from MP920/MP920-02 to MP2200/MP2200-02*.	–

(3) Conversion from MP930/MP930-02/MP930-03 to MP2300/MP2310

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP930-series, MP930-02-series, or MP930-03-series Machine Controllers to the MP2300-series or MP2310-series Machine Controllers are presented in the table below.

No.	MP930/MP930-02/MP930-03	Conver-sion	MP2300/MP2310	Conversion of Detailed Definitions
	Module (Before Conversion)	→	Module (After Conversion)	
1	RS232C	→	218IF-01	–
		–	218IF	–
	CIR#01: RS-232	×	Cannot be converted.	Not possible
	CIR#02: RS-232	→	217IF	Possible
2	MC-350IO (16 inputs/16 outputs)	→	LIO-01 (16 inputs/16 outputs)	Possible
3	MC-350NET	–	Built-in CPU	–
		→	MECHATROLINK	Possible

(4) Conversion from MP930/MP930-02/MP930-03 to MP2300S

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP930-series, MP930-02-series or MP930-03-series Machine Controllers to the MP2300S-series Machine Controllers are presented in the table below.

No.	MP930/ MP930-02/ MP930-03	Conver-sion	MP2300S	Conversion of Detailed Definitions
	Module (Before Conversion)	→	Module (After Conversion)	
1	RS232C	→	Built-in CPU	–
		–	218IF	–
	CIR#01: RS-232	×	No conversion	Not possible
	CIR#02: RS-232	×	No conversion	Not possible
2	MC-350IO (16 inputs/16 outputs)	→	LIO-01 (16 inputs/16 outputs)	Possible
3	MC-350NET	–	Built-in CPU	–
		→	MECHATROLINK	Possible

(5) Conversion from MP940/MP940M to MP2300S

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP940-series or MP940M-series Machine Controllers to the MP2300S-series Machine Controllers are presented in the table below.

No.	MP940/MP940M	Conver-sion	MP2300S	Conversion of Detailed Definitions
	Module (Before Conversion)		Module (After Conversion)	
1	Serial	×	No conversion	−
	CIR#01: RS-232	×	No conversion	Not possible
	CIR#02: RS-485	×	No conversion	Not possible
2	LIO	→	LIO-06	−
	Discrete input	→	MIXIO (Discrete input)	Possible
	Discrete output	→	MIXIO (Discrete output)	Possible
	Interrupt input	→	MIXIO (Interrupt input)	Possible
	Analog input	→	MIXIO (Analog input)	Possible
	Analog output	→	MIXIO (Analog output)	Possible
3	SVA (1 axis)	→	Built-in CPU	Possible
			MECHATROLINK	−
4	CNTR	→	LIO-06 (Same module as No. 2)	−
			CNTR-A	Possible
5	MLINK (C)	−	Built-in CPU	−
		→	MECHATROLINK	Possible

For details on the conversion of the MLINK definitions of MP940/MP940M, refer to *(a) Cautions on conversion of MLINK definitions*.

Note: 1. S drawings cannot be converted for use with the MP2000 series.

2. When definitions allocated to S scans are converted for use with the MP2000 series, they are allocated to H scans.

3. When a 261IFS is selected for the sixth slot of an MP940, it will not be applicable for conversion.

(a) Cautions on conversion of MLINK definitions

The MLINK definitions of MP940/MP940M are converted to MECHATROLINK-II (32-byte mode/0.5 ms) with MP2300S. When such a conversion is performed, since the I/O modules allocated in the MLINK definitions cannot be used with MECHATROLINK-II, if there are no modules compatible with MECHATROLINK-II that can be converted, they are converted to *****I/O.

The rules for conversion of I/O modules that have been allocated in MLINK definitions are presented in the table below.

MP940/MP940M MLINK Definitions			Conver-sion	MP2300S MECHATROLINK-II		
Model Name	Input Size	Output Size	→	Model Name	Input Size	Output Size
JEPMC-IO350	4	4	→	JEPMC-IO2310	4	4
MP940	8	8	→	SVB-01	8	8
CP-216: RIO-01	1	1	→	*****I/O	1	1
ABS_CODER	8	8	→	*****I/O	8	8
*****I/O	0 to 8	0 to 8	→	*****I/O	0 to 16	0 to 16
JAMSC-120DRA83030	0	1	→	*****I/O	0	1
JAMSC-120DAI53330	1	0	→	*****I/O	1	0
JAMSC-120DAI73330	1	0	→	*****I/O	1	0
JAMSC-120DDI34330	1	0	→	*****I/O	1	0
JAMSC-120DDO34330	0	1	→	*****I/O	0	1
JAMSC-120AVI02030	7	2	→	JEPMC-AN2900	7	2
JAMSC-120AVO01030	2	4	→	JEPMC-AN2910	2	4
JAMSC-120DAO83330	0	1	→	*****I/O	0	1

(6) Conversion from MP940/MP940M to MP2300

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP940-series or MP940M-series Machine Controllers to the MP2300-series Machine Controllers are presented in the table below.

No.	MP940/MP940M	Conver-sion	MP2300	Conversion of Detailed Definitions
	Module (Before Conversion)	→	Module (After Conversion)	
1	Serial	→	218IF-01	−
		−	218IF	−
	CIR#01: RS-232	→	No conversion	Not possible
	CIR#02: RS-485	×	No conversion	Not possible
2	LIO	→	LIO-06	Possible
	Discrete input	→	MIXIO (Discrete input)	Possible
	Discrete output	→	MIXIO (Discrete output)	Possible
	Interrupt input	→	MIXIO (Interrupt input)	Possible
	Analog input	→	MIXIO (Analog input)	Possible
	Analog output	→	MIXIO (Analog output)	Possible
3	SVA (1 axis)	→	SVA-01 (2 axes)	Possible
4	CNTR	→	LIO-06 (Same module as No. 2)	−
			CNTR-A	Possible
5	MLINK (C)	−	Built-in CPU	−
		→	MECHATROLINK	Possible

Note: 1. S drawings cannot be converted for use with the MP2000 series.

2. When definitions allocated to S scans are converted for use with the MP2000 series, they are allocated to H scans.

3. When a 261IFS is selected for the sixth slot of an MP940, it will not be applicable for conversion.

(7) Conversion from MP940/MP940M to MP2310

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP940-series or MP940M-series Machine Controllers to the MP2310-series Machine Controllers are presented in the table below.

No.	MP940/MP940M	Conver-sion	MP2310	Conversion of Detailed Definitions
	Module (Before Conversion)	→	Module (After Conversion)	
1	Serial	×	No conversion	−
	CIR#01: RS-232	×	No conversion	Not possible
	CIR#02: RS-485	×	No conversion	Not possible
2	LIO	→	LIO-06	Possible
	Discrete input	→	MIXIO (Discrete input)	Possible
	Discrete output	→	MIXIO (Discrete output)	Possible
	Interrupt input	→	MIXIO (Interrupt input)	Possible
	Analog input	→	MIXIO (Analog input)	Possible
	Analog output	→	MIXIO (Analog output)	Possible
3	SVA (1 axis)	→	SVA-01 (2 axes)	Possible
4	CNTR	→	LIO-06 (Same module as No. 2)	−
			CNTR-A	Possible
5	MLINK (C)	−	Built-in CPU	−
		→	MECHATROLINK	Possible

Note: 1. S drawings cannot be converted for use with the MP2000 series.
     2. When definitions allocated to S scans are converted for use with the MP2000 series, they are allocated to H scans.
     3. When a 261IFS is selected for the sixth slot of an MP940, it will not be applicable for conversion.

(8) Conversion from MP940D to MP2300

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP940D-series Machine Controllers to the MP2300-series Machine Controllers are presented in the table below.

No.	MP940D	Conver-sion	MP2300	Conversion of Detailed Definitions
	Module (Before Conversion)	→	Module (After Conversion)	
1	Serial	→	260IF-01	−
		−	260IF	−
	CIR#01: RS-232	→	217IF	Possible
	CIR#02: RS-485	×	No conversion	Not possible
2	LIO	→	LIO-06	Possible
	Discrete input	→	MIXIO (Discrete input)	Possible
	Discrete output	→	MIXIO (Discrete output)	Possible
	Interrupt input	→	MIXIO (Interrupt input)	Possible
	Analog input	→	MIXIO (Analog input)	Possible
	Analog output	→	MIXIO (Analog output)	Possible
3	SVA (1 axis)	→	SVA-01 (2 axes)	Possible
4	CNTR	→	LIO-06 (Same module as No. 2)	−
			CNTR-A	Possible
5	260IF	→	260IF-01 (Same module as No. 1)	−
		→	260IF	Possible
		−	217IF	−

Note: 1. S drawings cannot be converted for use with the MP2000 series.
     2. When definitions allocated to S scans are converted for use with the MP2000 series, they are allocated to H scans.
     3. When a 261IFS is selected for the sixth slot of an MP940, it will not be applicable for conversion.

(9) Conversion from MP940D to MP2310

The rules for conversion of modules when the Automatic Conversion Wizard is used to convert from the MP940D-series Machine Controllers to the MP2310-series Machine Controllers are presented in the table below.

No.	MP940D	Conver-sion	MP2310	Conversion of Detailed Definitions
	Module (Before Conversion)	→	Module (After Conversion)	
1	Serial	×	No conversion	−
	CIR#01: RS-232	×	No conversion	Not possible
	CIR#02: RS-485	×	No conversion	Not possible
2	LIO	→	LIO-06	Possible
	Discrete input	→	MIXIO (Discrete input)	Possible
	Discrete output	→	MIXIO (Discrete output)	Possible
	Interrupt input	→	MIXIO (Interrupt input)	Possible
	Analog input	→	MIXIO (Analog input)	Possible
	Analog output	→	MIXIO (Analog output)	Possible
3	SVA (1 axis)	→	SVA-01 (2 axes)	Possible
	CNTR	→	LIO-06 (Same module as No. 2)	−
			CNTR-A	Possible
	260IF	→	260IF-01 (Same module as No. 1)	−
		→	260IF	Possible
		−	217IF	−

Note: 1. S drawings cannot be converted for use with the MP2000 series.
2. When definitions allocated to S scans are converted for use with the MP2000 series, they are allocated to H scans.
3. When a 261IFS is selected for the sixth slot of an MP940, it will not be applicable for conversion.

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The revision dates and numbers of the revised manuals are given on the bottom of the back cover.

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Machine Controller MP900/MP2000 Series
MPE720
Software for Programming Device
USER'S MANUAL

YASKAWA YASKAWA ELECTRIC CORPORATION