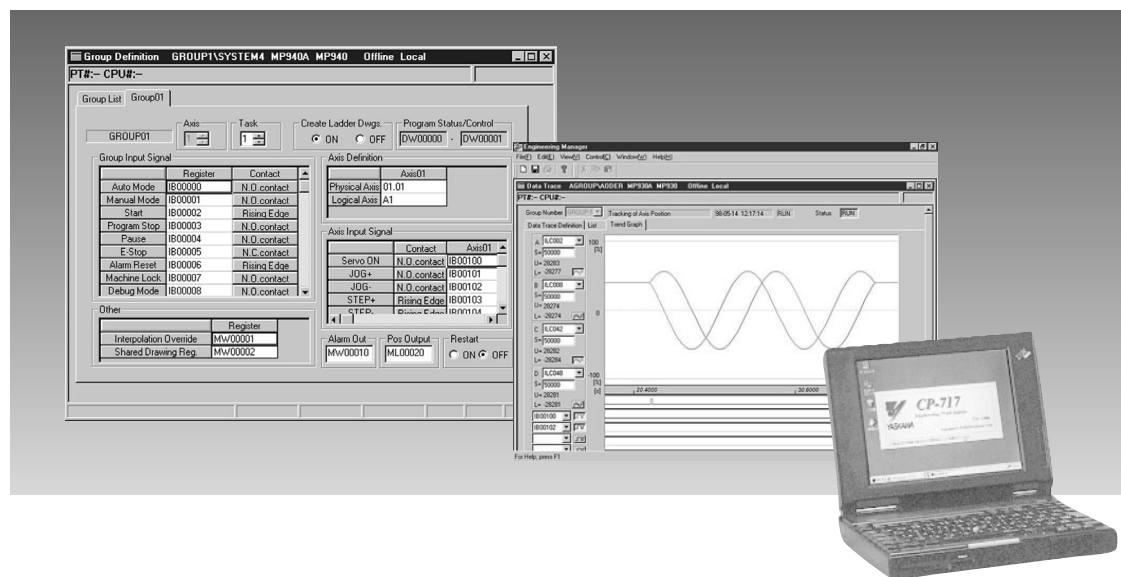Machine Controller MP900 Series
Programming Panel Software
USER'S MANUAL

FOR STANDARD OPERATION

YASKAWA

Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ **WARNING**   Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.

⚠ **Caution**   Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

In some situations, the precautions indicated could have serious consequences if not heeded.

🚫 **Prohibited**   Indicates prohibited actions that must not be performed. For example, this symbol would be used to indicate that fire is prohibited as follows: ⊗.

⏚ **Mandatory**   Indicates compulsory actions that must be performed. For example, this symbol would be used as follows to indicate that grounding is compulsory: ⏚ .

Visual Aids

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

IMPORTANT   Indicates important information that should be memorized.

Also, indicates low-level precautions that, if not heeded, may cause an alarm to sound but will not result in the device being damaged.

INFO   Indicates additional information or information that is useful to have memorized.

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

CONTENTS

Overview

■ About this Manual

This manual describes the installation and operation of the CP-717 Engineering Tool, a programming software package that aids in the design and maintenance of MP900-series Machine Controllers.

This manual is written for readers with a working knowledge of Microsoft Windows 95/NT. 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 CP-717 Engineering Tool. Also, keep this manual in a safe place so that it can be referred to whenever necessary.

■ Related Manuals

Refer to the following related manuals as required.

Manual Name	Manual Number	Contents
MP900 Series Machine Controller User's Manual: Ladder Programming	SIEZ-C887-1.2	Describes the instructions used in MP900 ladder logic programming.
MP900 Series Machine Controller User's Manual: Motion Programming	SIEZ-C887-1.3	Describes the motion programming language used for MP900 Machine Controllers.
MP900 Series Machine Controller User's Manual: MECHATROLINK	SIEZ-C887-5.1	Describes MECHATROLINK Modules used for MP900 Machine Controllers.
MP910 Machine Controller User's Manual: Design and Maintenance	SIEZ-C887-3.1	Describes the design and maintenance for the MP910 Machine Controller.
MP920 Machine Controller User's Manual: Design and Maintenance	SIEZ-C887-2.1	Describes the design and maintenance for the MP920 Machine Controller.
MP930 Machine Controller User's Manual: Design and Maintenance	SIEZ-C887-1.1	Describes the design and maintenance for the MP930 Machine Controller.
MP940 Machine Controller User's Manual: Design and Maintenance	SIEZ-C887-4.1	Describes the design and maintenance for the MP940 Machine Controller.
MP920 Machine Controller User's Manual: Motion Module	SIEZ-C887-2.5	Describes the functions, specifications, and usage of the MP920 Motion Modules (SVA-01, SVB-01, and PO-01).
MP920 Machine Controller User's Manual: Communications Module	SIEZ-C887-2.6	Describes the functions, specifications, and usage of the MP920 Communications Modules (217IF, 215IF, and 218IF).
MP920 Machine Controller User's Manual: DeviceNet	SIEZ-C887-5.2	Describes the functions, specifications, and operating methods of the MP920 DeviceNet Module (260IF).

Using This Manual

■ Intended Audience

This manual is intended for the following users.

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

■ Description of Technical Terms

In this manual, the following term is defined as follows:

- **PLC** = Machine Controller
- **CP-717** = CP-717 Engineering Tool

About the Software

■ Precautions

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

■ Trademarks

- Windows and Windows 95 are registered trademarks of Microsoft Corporation.
- Pentium is a registered trademark of Intel Corporation.
- Ethernet is a registered trademark of Xerox Corporation.

1 Welcome to the CP-717

This chapter introduces the CP-717 software for the MP900-series Machine Controller Engineering Tool.

1.1 CP-717

The CP-717 Engineering Tool is a software programming package used to control and monitor MP900-series Machine Controllers.

The CP-717 Engineering Tool runs on Windows 95 or Windows NT 4.0. In general, the CP-717 running on a personal computer (PC) is called a Programming Device.

A CP-717 Programming Device and an MP900-series Machine Controller are normally connected by an RS-232C communications interface. A CP-215 high-speed communications interface and CP-218 Ethernet interface are also available depending on the MP900-series model. Refer to the *MP900 Series Machine Controller User's Manual: Design and Maintenance* for details.

Installation device

CD-ROM

Installation

CP-717

Programming Device

Communications interface

MP900-series
Machine Controller

1
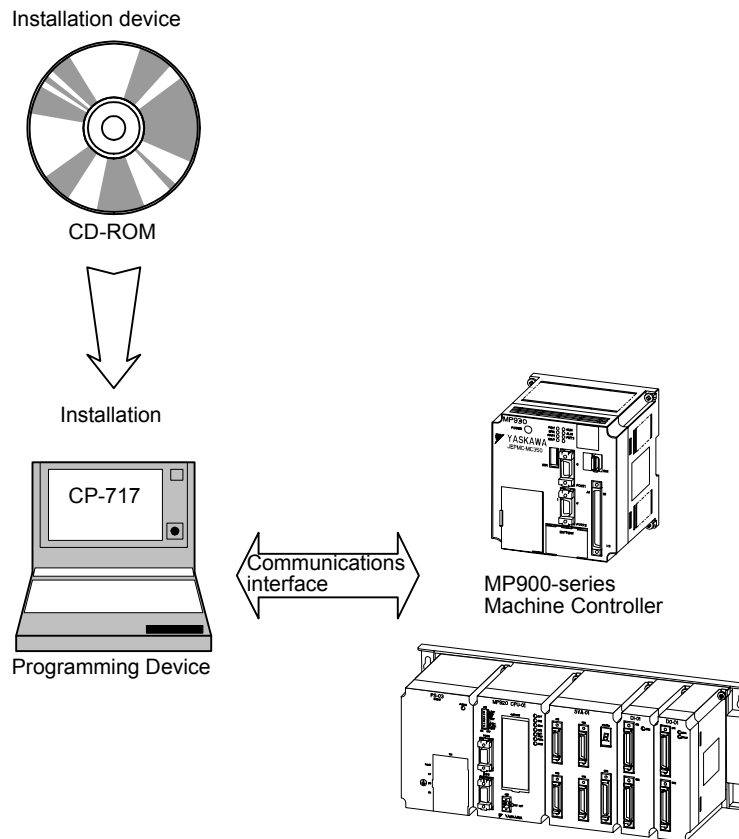
1.1.1 Recommended Personal Computers

The Programming Device must be able to perform many functions, such as high-speed data transfer with Machine Controllers, control operations, and monitoring operations.

The personal computer should conform to the specifications listed below to allow smooth operation of the CP-717. Check the specifications before installing the CP-717.

Notebook PC

Operating system

Windows 95
or
Windows NT 4.0

or

Desktop computer

PC architecture	DOS/V[*1]
CPU	Punting 200 MHz or better [*2]
Memory	64 MB min. (128 MB recommended)[*3]
Resolution	800 x 600 pixels
Hard disk	200 MB [*4]
Communications port	RS-232C (19.2 Kbps)
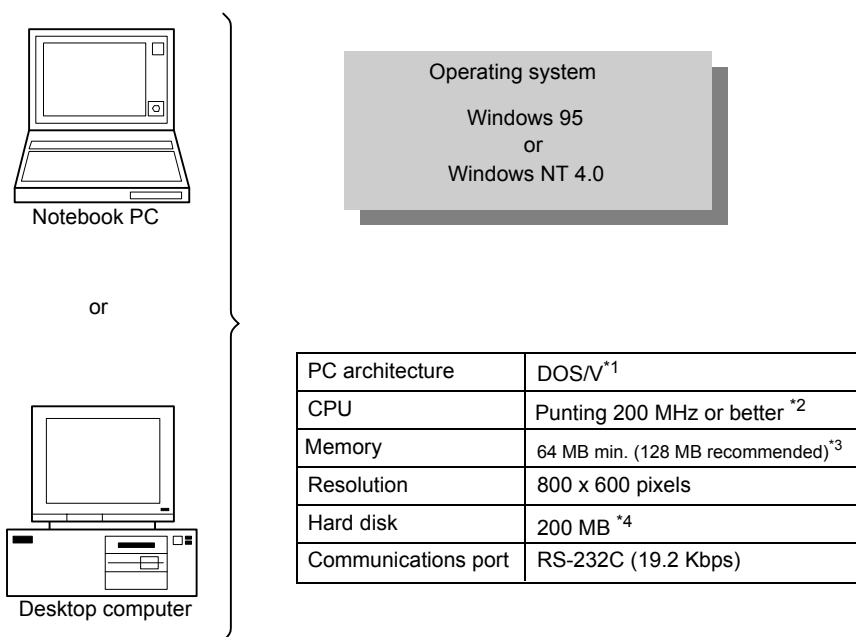
∗ 1. NEC9800-series personal computers can be used. However, only RS-232C communications are supported with the Machine Controller. The 215 high-speed communications interface is not supported.

∗ 2. Other CPUs with equivalent specifications to Intel CPUs can be used.

∗ 3. Increase memory size if other applications are to be run simultaneously. If memory size is not increased, performance may be adversely affected by the computer frequently searching for free memory.

∗ 4. The hardware disk capacity includes normal working space after installation.

1.1.2 Main Functions of the CP-717

1

The CP-717 is configured from five management programs called the Managers. The Managers are used to manage and control MP900-series systems. The main functions provided by these Managers are listed below.

Manager	Function	Outline
File Manager	Displays the CP-717 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 Engineering Tool and Machine Controllers.
	Commands	Starts the tools.
Engineering Manager	Accesses the engineering tools. When online with an MP900-series 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, element assemble 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.
Communications Process Manager	Communications processing	Sets the communications parameters and manages communications processing with MP900-series Controllers.

1.1.3 Function Tree

The following schematic diagram shows the commands activated by each manager. The first window displayed by the CP-717 is the File Manager Window.

1

1.1.3 Function Tree

1

Configuration

File Manager

Print Manager

User Manager

Communications Process

List Manager

Transfer

Online/Offline

User Menu Manager

Engineering Manager

Register Lists

Properties

Menu Lists

Definitions	Motion	Tools	C Register	Tables	Programs
Group Definitions	New Programs	Register Lists	C register Lists	Table Lists	New Drawings
Scan Setting	Existing Programs	Cross-Reference			Properties
Data Trace	Position Monitoring	Disable Lists			Main Programs
	Task Monitoring	Comments			Constant Tables
	Motion Alarm	Replace Register No.			I/O Conversion Table

Module Configuration

SERIAL	LIO	SVA	CNTR	MLINK

Interlock Tables

System Definitions

Parts Assembling Table

Application Settings

Tuning Panel

1.1.4 System Connections

The standard system configuration is 1:1 between the CP-717 and a MP900-series Machine Controller.

A MECHATROLINK/DeviceNet Interface Unit can also be connected using the MP900 Series network functions.

Engineering Tool

CP-717   Or   CP-717

Notebook personal computer   Desktop personal computer

RS-232C

MP930
POWER
RDY RUN
ERR ALM
PRT1 PRT2
BAT
YASKAWA
JEPMC-MC350
SW1
PORT1
PORT2
BATTERY
CN1
A1 B1
I/O

RS-232C device

MP900 Machine Controller

Local I/O
(DI/DO, CNTR, AO)

MECHATROLINK,
DeviceNet

Distributed I/O

I/O device . . . . I/O device . . . . I/O device
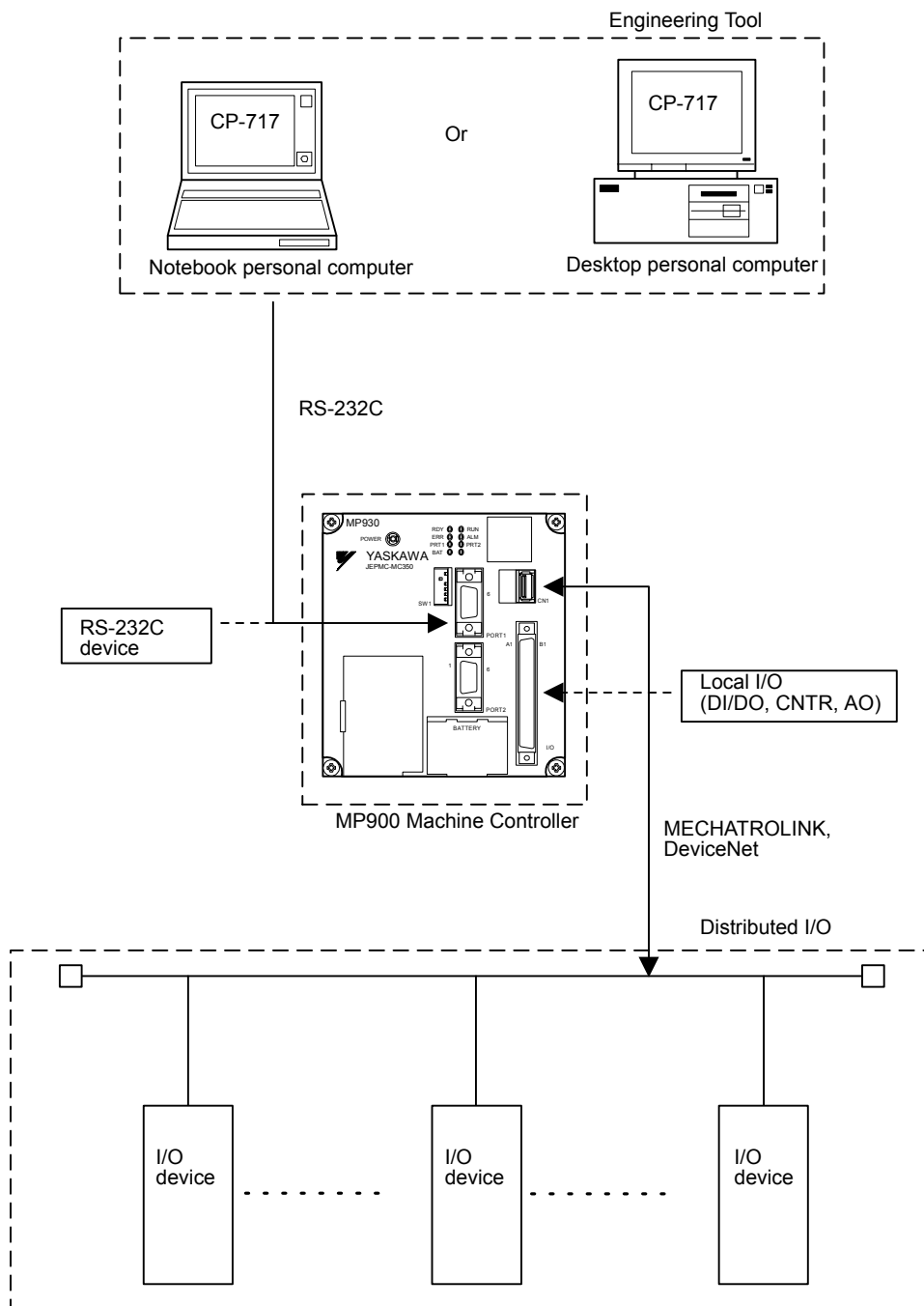
1.2 Installing the CP-717

This section explains the procedure for installing the CP-717 system software.

1.2.1 Installation Disk

The CP-717 installation driver is provided on a CD-ROM.

1

1.2.2 Starting the Installer

The installation procedure for the CP-717 software is given below.

1. Insert the CD-ROM into the CD-ROM drive.

   The following window will be displayed.

2. To install the Japanese version, click the **CP-717 (Japanese Version)** Button.

   To install the English version, click the **CP-717 (English Version)** Button.

3. Double-click *setup.exe* in the file list to start the Installer.

(INFO)

1 *setup.exe* can also be started using the Add/Delete Applications Icon on the Control Panel.

2 *1.2.3 Installation Procedure* and *1.2.4 Completing Setup* below explain using the CP-717 (English Version) Installer.

If using the CP-717 (Japanese Version) Installer, the same content as the English version is displayed in Japanese. If installing the Japanese version, refer to the procedure for the English version.

1.2.3 Installation Procedure

1. When *setup.exe* is started, the following window will be displayed and installation will start.

2. Check the message in the window, and then click the **Next** Button to proceed with the installation. The User Registration Window will be displayed. Enter your name, company name, and serial number, and then click the **Next** Button. The Setup Method Window will be displayed.
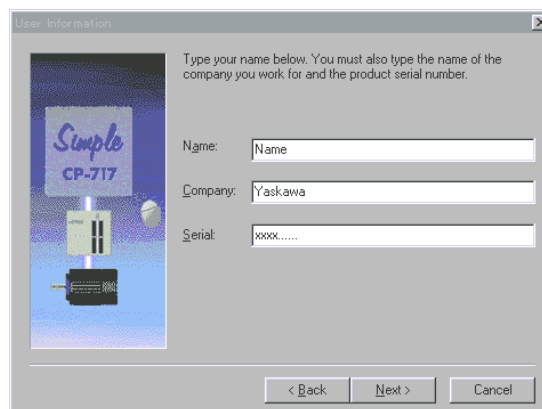
3. Select the installation directory using the **Select Destination** Box, and then click the **Next** Button.

4. Specify the program folder in which the application group is registered from the *Select Program Folder* Box, and then click the **Next** Button. The default folder is *YE_Applications*.

5. The information entered so far will be displayed in the Start File Copy Window. Check that the information is correct, and then click the **Next** Button to start copying the file.

6. Check the progress of the copying using the Progress Bar and the Information Gauge displayed at the bottom of the Window. Wait until copying has been completed.

1

1.2.4 Completing Setup

Once the files have been copied, the Setup Complete Window will be displayed.

The following two options are shown on the Window. Set the options to suit your requirements, and click the **Finish** Button.

- The **Yes, Open the ReadMe file right away** option displays the ReadMe file, which contains the Software License Agreement (shown below). Deselect this option if not required.
- The **Yes, Execute the File Manager right away** option starts the File Manager once setup has been completed.

1.2.5 Confirming Setup Information

Once setup has been completed, the program folder, which serves as the basis for the group of applications, will have been created on the desktop. The default folder is *YE_Applications*.

Perform the following procedure to check that setup has been executed correctly.

1. Double-click the *YE_Applications* program folder. The folder will open and its contents will be shown on the next window.
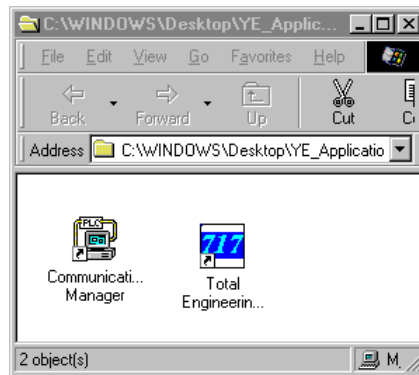
2. Double-click the **Total Engineering Workstation** icon and check that the application starts up correctly.

INFO ► This application can also be selected and started from the Program Menu on the Start Button of your screen.

1.3 Communications Settings

This section explains settings for communications between the CP-717 and Machine Controllers.

1.3.1 Outline

Be sure to make the CP-717 communications settings once installation has been completed.

Once the communications interface has been set, the settings will be stored as CP-717 system information, and will not need to be set again unless the communications interface is changed.
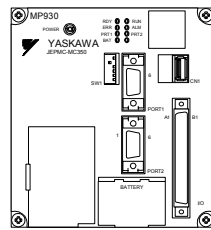
MP900-series
Machine Controller
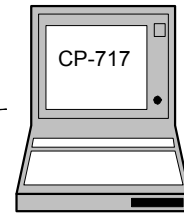
Set the communications port
on the Programming Device.

1.3.2 Opening the Communications Process

Double-click the communications process icon called ***Communications Manager*** in the ***YE_Applications*** program folder.
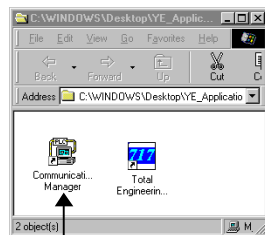
Double-click this icon.

The Communications Process Window will be displayed. The communications process can operate logical ports for up to 16 channels. Select and set the first unused port from the top.

Double-click the logical port number, or, alternatively, click ***File*** and then ***Setting***. Selecting the logical port will display the following Logical Port Setting Window.

1.3.3 Serial Communications Port Settings

■Procedure

The procedure for setting a serial communications port is as follows:

1. Select *Serial* under *Port Kind* on the Logical Port Setting Window and click the **Detail** Button.
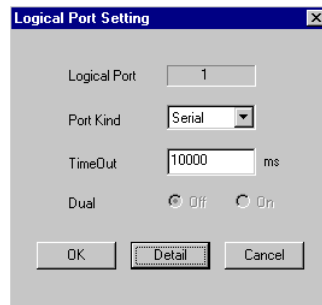
2. The settings will be displayed. Set the serial port parameters, and click the **OK** Button. Normally the default settings will be displayed. Check these settings and click the **OK** Button if they are acceptable.
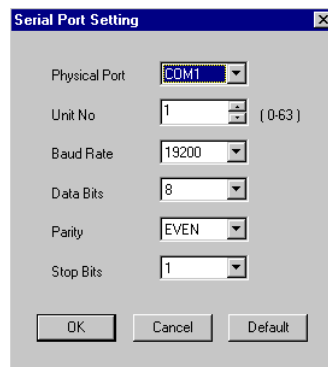
3. The Logical Port Setting Window will be displayed. Click the **OK** Button again. The Communication Process Window will be displayed. Confirm that **Serial** is allocated to logical port 1.

■Saving Communications Port Settings

Communications port settings are saved in a file. When the communications process is subsequently activated, these settings will be provided as the communications port information.

1. Click *File* and then *Save*.

2. The CpPrc Window will open to confirm that the information is to be saved. Click the **Yes** Button to save the information.

■Exiting the Communications Process

Click *File* and then *Exit* to close the Communication Process Window.

1.3.4 Setting the CP-717 Logical Port

Up to 16 logical ports can be set for the communications process. The logical port to be used needs to be specified when engineering a Machine Controller using the CP-717.

The logical port to be used can be set for each Machine Controller. The logical port is usually set when registering a new Machine Controller under the File Manager. The following window will be displayed when registering a new PLC folder or opening the property window for an existing PLC folder. Click the **Network** Tab.
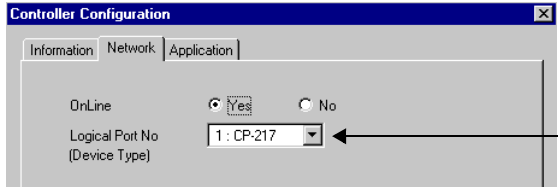
This number corresponds to the logical port number in the Communication Process Window.

Set the logical port number in this window to the number of the logical port to be used.

1.4 Outline of the Motion Program Development Procedure

This section explains the standard procedure and points for developing a motion program.

1.4.1 Simple Development Flowchart

The basic procedure is as follows: After installing the system, create the Machine Controller Folder, and then define the Machine Controller and servos before starting programming. The definition settings given here are the minimum required to execute a motion program. Depending on the system configuration, other definition settings may be necessary. Refer to *Chapter 4 System Configuration Definitions* for details.

```
      ┌─────────────────────────┐
      │ Make environment settings │
      └─────────────────────────┘
                  │
                  ▼
      ┌─────────────────────────┐
      │   Create definition data  │
      └─────────────────────────┘
                  │
                  ▼
      ┌─────────────────────────┐
      │     Transfer the data     │
      └─────────────────────────┘
                  │
                  ▼
      ┌─────────────────────────┐
      │      Develop program      │
      └─────────────────────────┘
                  │
                  ▼
      ┌─────────────────────────┐
      │       Run the program     │
      └─────────────────────────┘
```
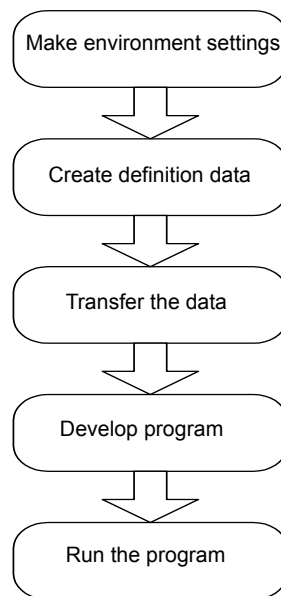
1.4.2 Environment Settings

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

■Hardware Installation

This section assumes that hardware installation has been completed. If the hardware has not yet been installed, refer to the *MP900 Series Machine Controller User's Manual: Design and Maintenance*, and install the required hardware.

This restriction does not apply when defining systems and creating programs offline.

■CP-717 Installation

Install the CP-717 system on the personal computer to be used as an Engineering Tool.

1

■Communication Settings

Set the communications conditions for communications between the Engineering Tool and the Machine Controller.

The following example shows the connection between a CP-717 and an all-in-one Machine Controller using an RS-232C Serial Cable.

Engineering Tool
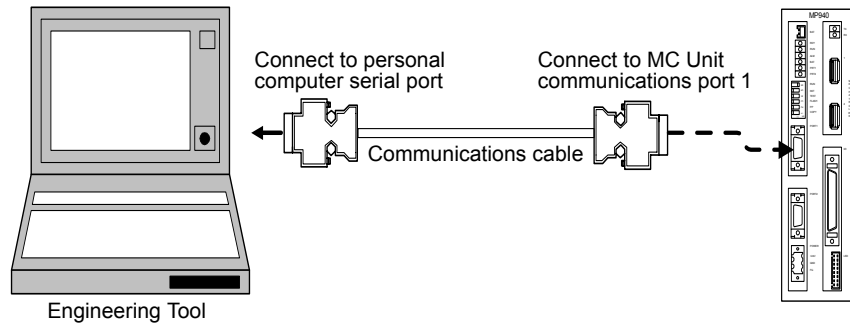
1.4.3 Creating Definition Data

Use the following procedure to configure the Machine Controller Modules and make operation settings in offline mode.

■Registering the PLC Folder

Create a new MP900-series Machine Controller registration using the CP-717 File Manager. 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.

Refer to *2.1 File Manager* for details.
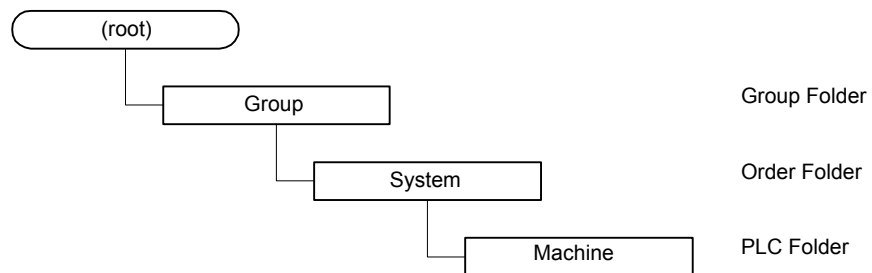
■Logging On from Offline

The group definitions set later are important definition files for the motion program operating environment, so they cannot be defined while online. Consequently, logon[1] while offline to make definition settings at the first time.

■Setting Module Configuration Definitions

Set the Machine Controller Module configurations. These settings are essential. Set the Machine Controller Module configurations, the communications port, network, and I/O for each Module. Refer to *Chapter 3 Module Configuration Definitions* for details.

■Defining System Information

Group definitions and scan time definitions are required settings for Machine Controller operations. Be sure to make these settings. Set other definitions depending on your system configuration.

■Defining Groups

Of the definition settings, set the group definitions while offline. These settings cannot be made online.

Use group definitions to set the signals for controlling the machine, number of axes, number of parallel processes, etc. The CP-717 provides standard control signals that enable automatic generation (default). The motion control ladder program, which is required for program operation, will be generated automatically. In this case, the following step, *Creating Motion Control Ladder Programs*, is not necessary. Normally, it is recommended to use the default to enable automatic generation.

TERMS

[1] 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.

1

For example, if operating multiple machines using a single Motion 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		Machine 2
Definition		
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
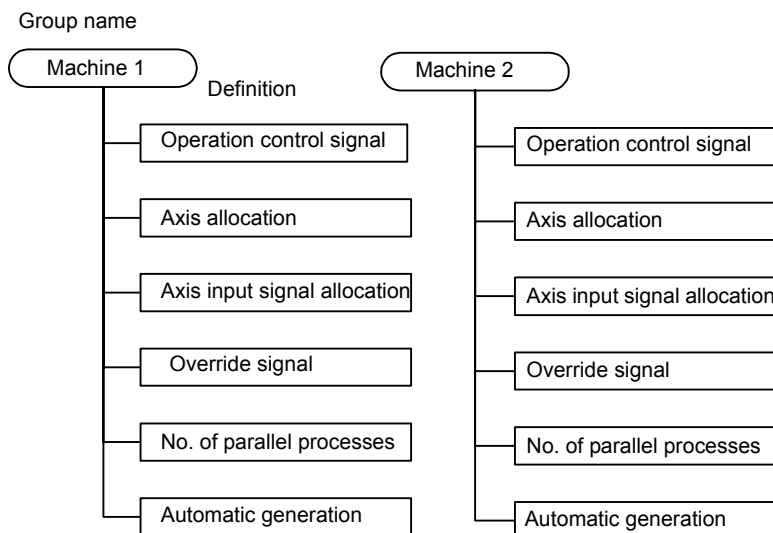
Often, one machine is operated by one group.

■Defining Scan Time

Set the scan times for both high and low speed for the system. Set the high-speed scan in multiples of 2-ms units from 2 ms minimum. The low-speed scan is processed using the empty time slots between high-speed scans.

The motion program is scheduled using the high-speed scan, so set the actual scan time value in 2-ms units using x2 the current high-speed scan time value as a standard.

Refer to *Chapter 4 System Configuration Definitions* for information on acquiring and setting the scan time current value.

■Setting Motion Parameters

Motion parameter settings are required to adjust the initial setting parameters for the servo amplifier and motor. Refer to *MP900 Series Machine Controller User's Manual: Design and Maintenance*, and set the parameters depending on the type of servo and its application.

1.4.4 Transferring Files

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

Log online

Transfer files

1
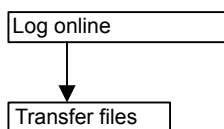
■Logging Online

Communications are required between the CP-717 and the Machine Controller, so log on to online mode.

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

■Transferring Data

Normally, define the system 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.

Group definitions in particular cannot be edited online, so be sure to define groups offline. Other definitions can be edited online.

Refer to *2.1.10 Transferring Files* for the operations required.
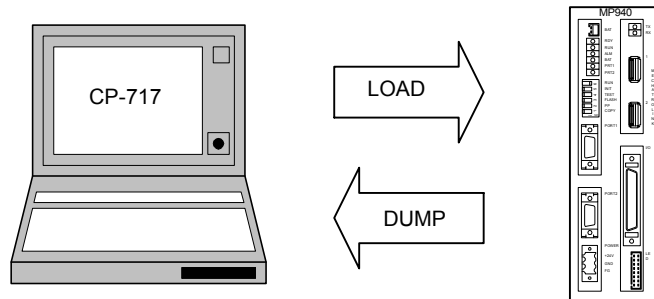
1.4.5 Developing Programs

The procedure performed up to this point completes the settings required for programming. This section explains the procedure for actual programming.
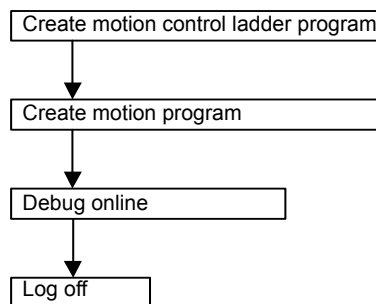
■Creating Motion Control Ladder Programs

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

1

motion programs in the *MP900 Series Motion Controller User's Manual: Design and Maintenance* before creating new motion control ladder programs.

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

If automatically generated motion control ladder programs require considerable revision, use the ladder editor for easy revision. Refer to *Chapter 7 Ladder Logic Programming* for details.

■Creating Motion Programs

Create motion programs using the motion editor. Refer to *Chapter 5 Motion Programming* for details of editor operations, and refer to the *MP900 Series User's Manual: Motion Programming* (SIEZ-C887-1.3) for individual motion commands.

■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.

■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 and opening the program.

1.4.6 Operation

This completes the motion programming. The Machine Controller can now be operated.

2 Manager Functions

This chapter explains the main manager windows in the CP-717.

2

2.1 File Manager

This section explains the File Manager Window configuration and menus.

2.1.1 File Manager Window

The File Manager Window is the first window that opens when the CP-717 Engineering Tool is started. All CP-717 operations are started from this window, which provides a user interface mainly for files.

The File Manager Window is made up of three sections to enable easy comprehension of the MP900 Series system configuration. The three sections are the Directory Tree, List Display, and Details.

File Manager Window

Directory Tree   List   Details
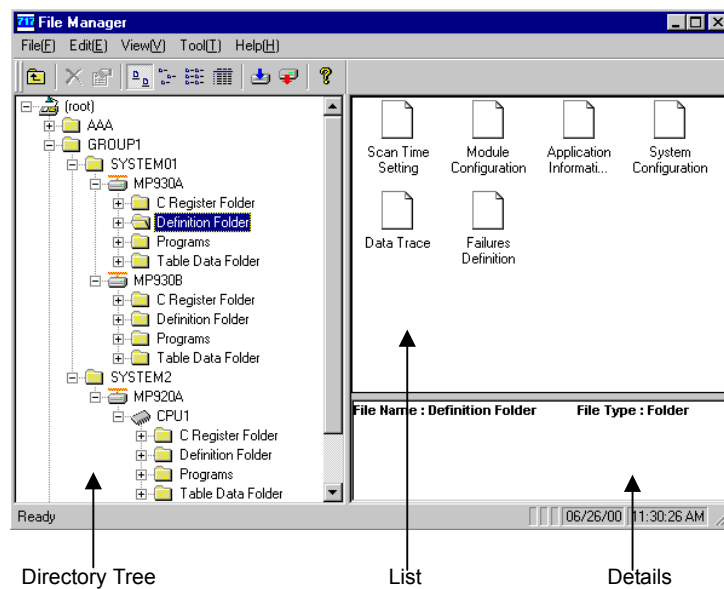
The following table gives an outline of each section of the File Manager Window.

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

■ Directory Tree Section

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

Hard disk folders are displayed when the CP-717 is in offline mode, and the files saved in the Machine Controller are displayed when it is in online mode.

2

Opening Folders

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

Symbol	Meaning
⊞	• The + 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.

Folder Icons

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

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

■ List Section

A list of the folders and files contained within the folder at the cursor position will be displayed. The detailed information displayed will differ depending on the type of folder or file selected with the cursor.

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.

■ Details Section

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

Detailed/Basic Display

Click *View (V)* and then *Detail Window (W)* on the File Manager Menu to switch between detailed and basic display.

2.1.2 Basic Tree Concepts

This section explains the configuration of folders displayed in tree diagrams. Each tree diagram has a root folder under which multiple systems can be created by job.

■ 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 CP-717 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 MP900 Series.
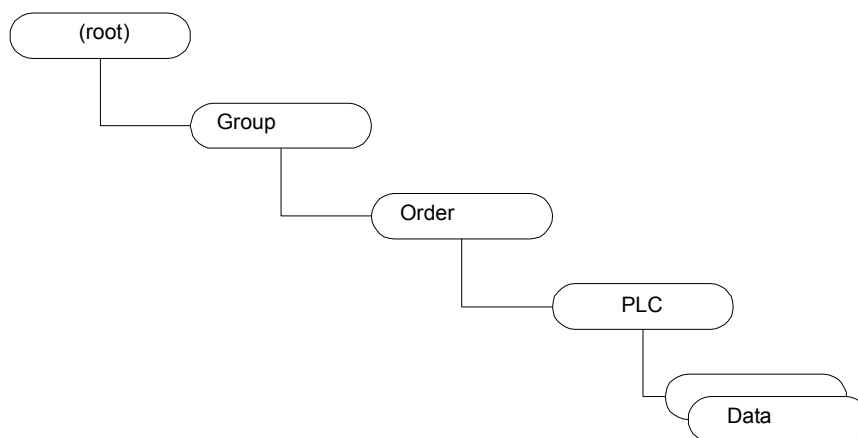
Fig 2.1 Folder Tree Branches

Root Folder

User-defined folders are managed under the root folder, which is the only folder provided by default by the CP-717. The CP717 can manage multiple group folders and order folders.

Group Folders

Group folders are relevant to one project and indicate one large job unit.

Order folders, in which one job can be broken down into multiple tasks, can be defined 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.

Order Folders

Order folders hold system information, 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.

PLC Folders

A PLC folder defines a MP900-series 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 MP900 Series from the PLC folder. Multiple PLC folders can be defined, but only one PLC can be connected online at a time, so do not try to connect online to multiple Machine Controllers.

Folder Configuration Example

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

Tree	Description
(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 configuration	Order folder name (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

2

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 diagram shows the standard tree diagram when logged on to the MP900 Series.
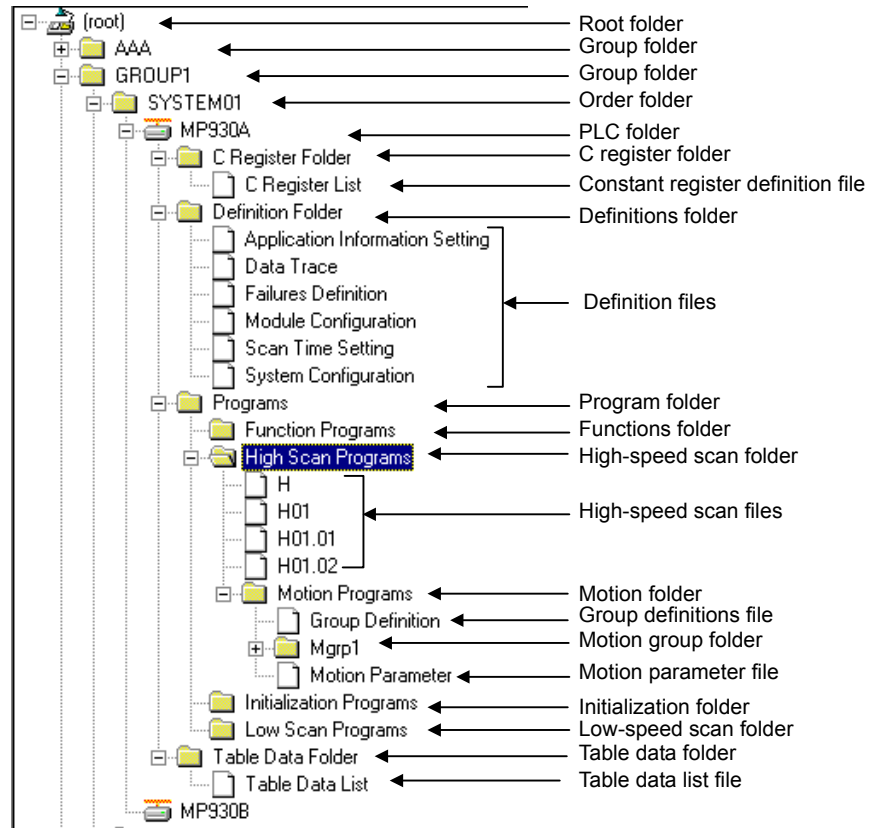
2.1.3 Command Menus

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 tree and list display.

■ 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 (F) Menu when the group folder and the PLC folder are selected with the cursor.

Group Folder   PLC Folder

2
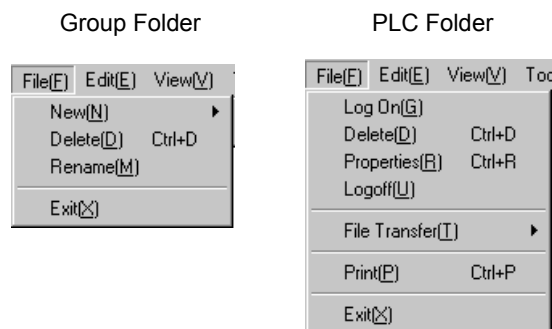
■ Selecting from the Pop-up Menus

Right-click a folder or file to display the pop-up menu.
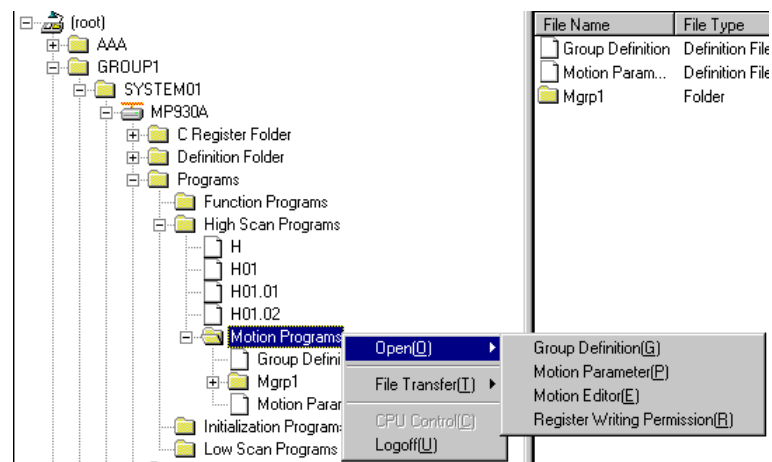
Refer to *Appendix B File Manager Menus* for menu changes dependent on the position of the cursor.

2.1.4 Registering PLC Folders

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

■ Creating New Group Folders

The operating procedure to create new group folders is given below.

1. Select the root folder with the cursor.

2. Select *File (F)*, *New (N)*, and then *Group Folder (G)* from the CP-717 File Manager Menu.

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

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

   A new group folder will be created.

───

> **INFO**
>
> Path names for group folders can be up to 64 characters in length.
>
> Example: "Group 2" is created under "Group 1."
>
> C:$GROUP1$GROUP2$... 17 characters

───

Changing Group Folder Names

The procedure to change group folder names is given below.

1. Select the group folder whose name you want to change with the cursor.

2. Select *File (F)* and then *Rename (M)* from the menu bar. Alternatively, right-click the group folder and make the selection using 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.
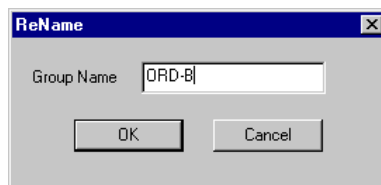
4. A confirmation dialog box will be displayed. Click the **Yes (Y)** Button. The file name will be changed.

───

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

───

■ Deleting Group Folders

In online mode, the group folder data on both the Machine Controller and hard disk will be deleted. In offline mode, the group folder data on the hard disk will be deleted.

The procedure to delete group folders is given below.

1. Select the group folder to be deleted with the cursor.

2. Select *File (F)*, and then *Delete (D)* from the menu bar. 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 (Y)** Button to delete the group folder. The folder and its files will be deleted.

2

| IMPORTANT | 1 Deleting files and folders while the system is operating may cause the currently operating device to malfunction. Be sure to check before deleting. |

2 The delete function deletes files and folders created by the user. Consequently, folders (including program folders and definition folders) created by the system by the CP-717 cannot be deleted.

■ Creating New Order Folders

The procedure to create new order folders is given below.

1. Select the group folder in which to create the root folder or order folder with the cursor.

2. Select **File (F)**, **New (N)**, and then **Order Folder (O)** 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 | Group folder names must be 8 characters maximum. |

■ Changing and Deleting Order Folders

Refer to changing and deleting group folders.

■ Creating New PLC Folders

The procedure to create new PLC folders is given below.

1. Select the order folder in which to create the new PLC folder with the cursor.

2. Select **File (F)**, **New (N)**, and then **Controller Folder (C)** 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.
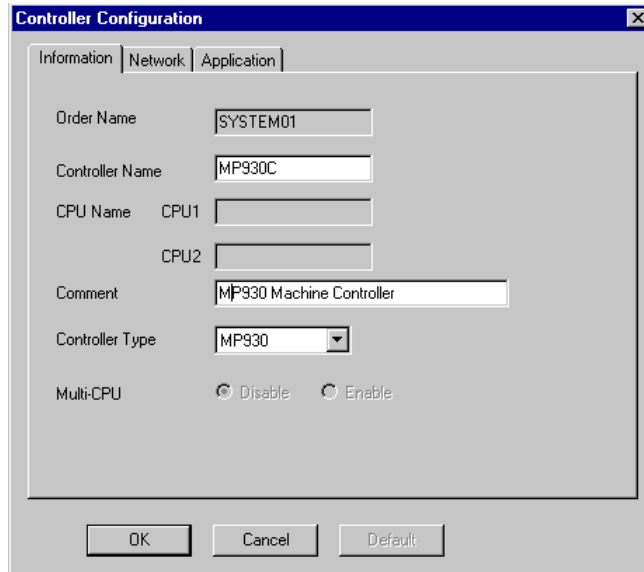
The new PLC folder will be created.

Information Tab Page Settings

Setting	Details
Order Name	Displays the order folder name. The order folder name cannot be changed.
Controller Name	Enter the Machine Controller name up to 8 characters maximum.
CPU Name	CPU names cannot be set for the MP900 Series.
Comment	Enter comments for the Machine Controller and CPU up to 32 characters maximum.
Controller Type	Select the MP900 Series.
Multi-CPU	Multi-CPU cannot be set for the MP900 Series.

Network Tab Page Settings

Set the communications port for the MP900 Series to which the CP-717 will log on.

Setting	Details
Online	Set whether or not the CP-717 and the Machine Controller will be connected online.
Logical Port No. (Device Type)	Specify the logical port number set using the communications process. Be sure that the port number is set to 1. "Device Type" displays the Communications Module type.
Unit No.	If the CP-717 is connected to a serial port, specify the serial port device address.

Setting	Details
Route	If the 215IF's Relay Function is used, set the network number and the station number. For details, refer to *5.6 Relay Function* in the *MP920 Machine Controller Communications Module User's Manual* (SIEZ-C887-2.6).

Application Tab Page Settings

Setting	Details
Customer	Enter the client name up to 32 characters maximum.
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.

■ Changing PLC Folder Information

The procedure to change PLC folder information is given below.

1. Select the PLC folder to be changed with the cursor.

2. Select **File (F)**, and then **Properties (R)** from the menu bar.

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

3. The Controller Configuration Window will be displayed. Change the Machine Controller information using the following three tabs in the Controller Configuration Window: Information Tab, Network Tab, and Application Tab. Refer to creating new PLC information for the Information Tab Page and Network Tab Page settings.

⊙ INFO

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

Information Tab Page

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

Network Tab Page

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

2

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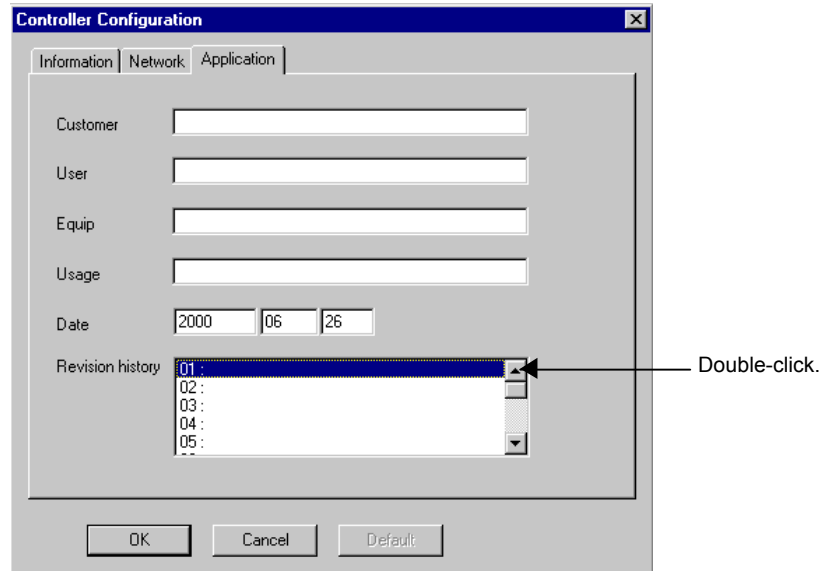
Double-click a number entered in the revision history to display the Controller Configuration Window. Next, enter the revision history information up to 50 characters maximum, and click the **OK** Button to set the revised data of the application tab page.

IMPORTANT

1 Changing settings while the system is operating may cause the currently operating device to malfunction. Be sure to check before making any changes.

2 If the user's write privileges are set lower than the write privileges of the deleted programs, the program cannot be deleted.

3 When a program is deleted, all the sub-programs pertaining to the main program (SFC program, format program, etc.) will also be deleted at the same time.

4 The delete function deletes files and folders created by the user. Consequently, folders (including program folders and definition folders) created by the system of the CP-717 cannot be deleted.

2.1.5 User Management

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

In online mode, the user management data stored in the MP900 Series is used, and in offline mode, the user management data stored on the Engineering Tool hard disk is used.

■ User Management Window

Use the User Management Window to register new user information, and to change and delete existing information.

1. Select the PLC folder with the cursor. Next, select **Edit (E)** and then **User Manager (U)** from the File Manager Menu.

   The User Management Window will be displayed.

Display Item	Details
Active	Two asterisks ("**") are displayed next to the current user. "User-A" is shown as logged on in the dialog box shown above.
User Name	Displays users with authorization 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 user privilege and the privilege of the file for each program are compared, and if the user's read (R) privilege is greater than the program's read (R) privilege, the user can read the program. Similarly, if the user's write (W) privilege is greater than the program's write (W) privilege, the user can save or update the program.
Default Privileges	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.

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.

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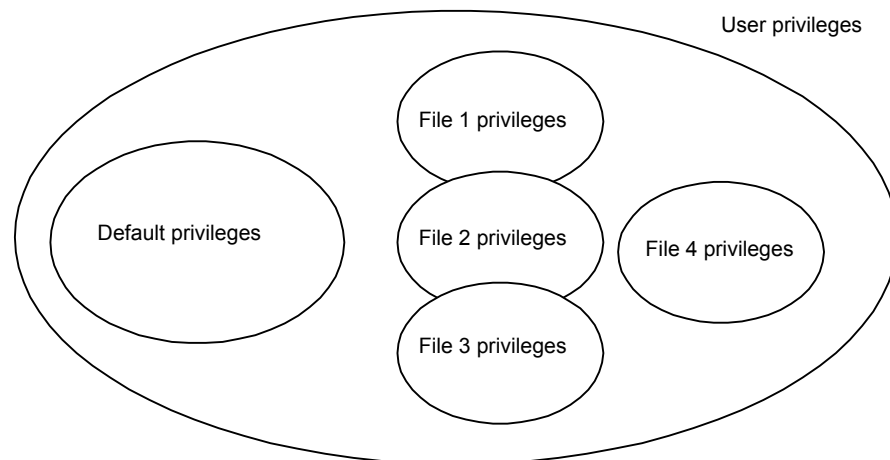
The read (R) and write (W) privilege values in the user privileges can be thought of as the maximum values that the user can allocate as file privileges.

⬤ INFO

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

2 The first user on the list of users is the current user, followed by users with lower privileges. Information on users with higher privileges will not be displayed.

3 Program file privileges can be set and browsed via the drawing program or motion program properties.

■ Registering New Users

Up to 20 users can be registered.

The procedure to register new users in the User Management Window is given below.

1. Click *New (N)* 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 CP-717 system, and cannot, therefore, 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 existing 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

1 The CP-717 has users that are registered beforehand for each Machine Controller. Standard user privileges and default privileges are also registered for each of these users.

2 The following table shows the standard registered users.

Table 2.1 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 security administrator
USER-C	USER-C	R1W0	R0W1	For operators

■ Changing User Information

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

2

The procedure to change the user information is given below.

1. In the *No.* column, click the number of the user to be changed.

2. Click the *Modify (M)* 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.

■ Deleting Users

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

The procedure to delete users is given below.

1. In the *No.* column, click the number of the user to be deleted.

2. Click the *Delete (D)* Button. A confirmation message box will be displayed. Click the **Yes (Y)** 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.

■ Saving User Management Data

The procedure to save user management data is given below.

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 hard disk. When in offline mode, the data is saved only to the hard disk.

2. The User Management Window closes once the data is saved.

INFO ▶ The Error Detected 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.

■ 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, however, by setting a default user. The default user will then be logged on automatically.

The procedure to set and to delete the default user is given below.

1. Select the PLC folder with the cursor, and select *Edit (E)* and then *Default User Set (D)*.

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.

2
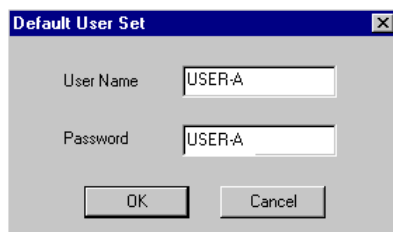
◼ Deleting Default Users

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

IMPORTANT The default user is not saved on the Machine Controller or hard disk, and, therefore, is deleted if the File Manager is closed or the system rebooted. The default user must be reset if the CP-717 is restarted.

2.1.6 Switching between Online[1] and Offline[2] Modes

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

When online, the Engineering Tool's hard disk and the MP900 Series' data are both updated simultaneously, but when offline, only the Engineering Tool's hard disk is updated. Consequently, caution is required.

The procedure to switch between online and offline modes is given below.

1. Click the PLC folder which is to be switched to either online or offline mode.

2. Click *File (F)* and then *Properties (R)* on the File Manager Menu. Alternatively, right-click the PLC folder and make the selections from the pop-up menu.

3. Click either **Yes** or **No** for *Online* on the Network tab page in the Controller Configuration Window, and then click the **OK** Button.

TERMS

1 Online Mode
The Engineering Tool and the MP900-series Machine Controller are connected using a serial communications connection and data is transferred back and forth between them via the CP-717. The CP-717 must be online to display or update Machine Controller data. When the data is updated, both the Engineering Tool hard disk and the MP900-series Machine Controller data are updated.

2 Offline Mode
The Engineering Tool is operated independently of the Engineering Tool. Machine Controller data cannot be referred or updated. Only data stored on the hard disk can be accessed.

Controller Configuration

Information | Network | Application |

OnLine   ○ Yes   ● No
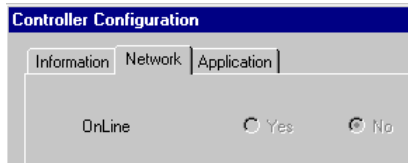
⬤ INFO ▷   The user cannot switch between online and offline mode when logged on to the CPU. Set whether to use online or offline mode before logging on.

2.1.7 Logging On and Logging Off from the CPU

The user must log on to the PLC folder's CPU to operate or reference data in the PLC folder, such as MP900 Series 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 privileges levels set for each user ID is also a security management function.

■ Logging On to the CPU

The procedure to log on to the CPU is given below.

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

     ⊟ 🖥 (root)
       ⊞ 📁 AAA
       ⊟ 📁 GROUP1
          ⊟ 📁 SYSTEM01
              🖳 **MP930A**
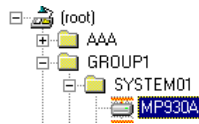
2. Input the user name and password, and click the **OK** Button.

CPU Log On   ✕

User Name   USER-A

Password   ******

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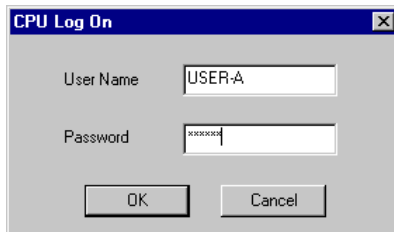
3. A plus (+) mark will appear in front of the PLC folder. The logon process has now been completed.

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.

■ Logging Off from the CPU

The procedure to log off from the CPU is given below.

1. Click the PLC folder to be logged off from the CPU.

2. Click *File (F)* and then *Logoff (U)* on the File Manager Menu.

   Alternatively, right-click the folder, and make the selections from the pop-up menu.

3. Click the **Yes** Button in the logoff confirmation dialog box to confirm the logoff.

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.

2.1.8 Switching the CPU Status

The CPU status refers to the operating status of the MP900-series Machine Controller. **RUN** means the Machine Controller is operating, and **STOP** means it is not operating. The CPU status can be valid when in online mode.

Normally, the CPU can be in RUN mode with no problem, but must be in STOP mode in some cases, for example, when transferring files, or the command will not operate.

The procedure to switch the CPU status is outlined below.

1. Select the PLC or CPU folder for which the CPU status is to be switched with the cursor.

2. Click *Edit (E)* and then *CPU Control (C)* on the File Manager Menu. Alternatively, right-click the folder and make the selections from the pop-up menu.

3. Click either **RUN** to start operation, or **STOP** to stop operation, in the Controller Running Status Dialog Box.
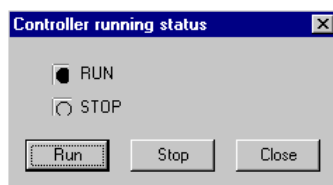
4. The CPU status will be switched.

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

2.1.9 Program File Operations

■ Copying DWG Program Files

The procedure to copy DWG program files is given below.

1. Right-click the DWG program file to be copied.

2

2. Click *Copy DWG (C)* on the pop-up menu.

3. Input the copy destination program number or function symbol and the name of the program, and click the **OK** Button.

```
Copy DWG                                           ×

Copy Source DWG No:        H01

Copy Destination DWG No:   H02

Copy Destination DWG Name: 2nd Task

            OK                    Cancel
```
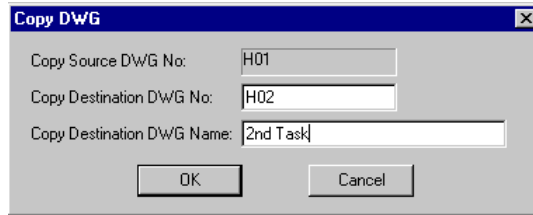
4. The specified program will be saved as a new program under the copy destination number.

INFO

1 All drawings contained in the program file will be copied.

2 The program name can be up to 48 characters.

3 If a main program is copied, all associated subroutines, such as table format programs, will be copied at the same time.

4 Programs cannot be copied to existing programs.

■ Enabling and Disabling DWG Programs

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

The procedure to enable and to disable DWG programs is given below.

1. Select with the cursor the DWG program to be disabled.

2. Click *Edit (E)* and then *Enable/Disable (E)* on the File Manager Menu. Alternatively, right-click the program and make the selections from the pop-up menu.

3. Click the **Yes** Button in the confirmation window that is displayed.

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

```
⊟ 📁 High Scan Programs
        🗋 H
        🗋 H01
        🗋 H01.01
        🗋 H01.02
        🗋 H01.03
```

INFO
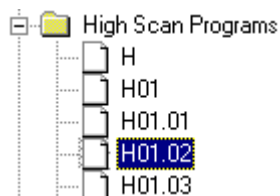
1 If the selected program is already disabled, the disable setting will be cancelled. If the selected program is not disabled, it will be disabled.

2 Only drawing or function programs can be enabled or disabled.

■ 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 Display Section of the File Manager Window can be designated.

Select the type of subroutine to be displayed on the submenu under *View (V)* and then *List Display (L)* on the File Manager Menu. Alternatively, right-click the subroutine and make the selection using the pop-up menu.

■ Updating Information

When executing motion programs and DWG/function program files, display the latest tree status by selecting **View (V)** and then **Refresh (R)** from the File Manager Menu.

■ Copying Motion Programs

The procedure to copy motion programs is given below.

1. Select the motion program file to be copied with the cursor.
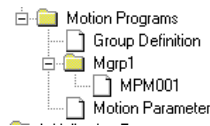
2. Click *Copy DWG (C)* on the pop-up menu. Alternatively, right-click the file and make the selection using the pop-up menu.

3. Input the name of the copy destination motion program and click the **OK** Button.
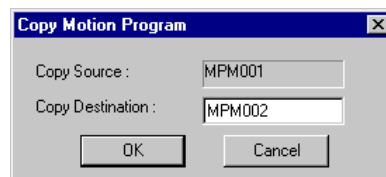
4. A new program will be created at the copy destination.

INFO   Existing motion programs cannot be copied to or overwritten.

2.1.10 Transferring Files

This function reads and writes data between the Engineering Tool and the MP900-series Motion Controllers using the CP-717.

■ Outline of File Transfers

All data in the PLC folder can be transferred at one time, or individual files can be desig-

2

nated for transfer. The Load[1], Dump[2], and Compare[3] functions can be used only when the user is logged on in online mode. The transfer source and destination will be either the hard disk or the MP900-series Machine Controller.
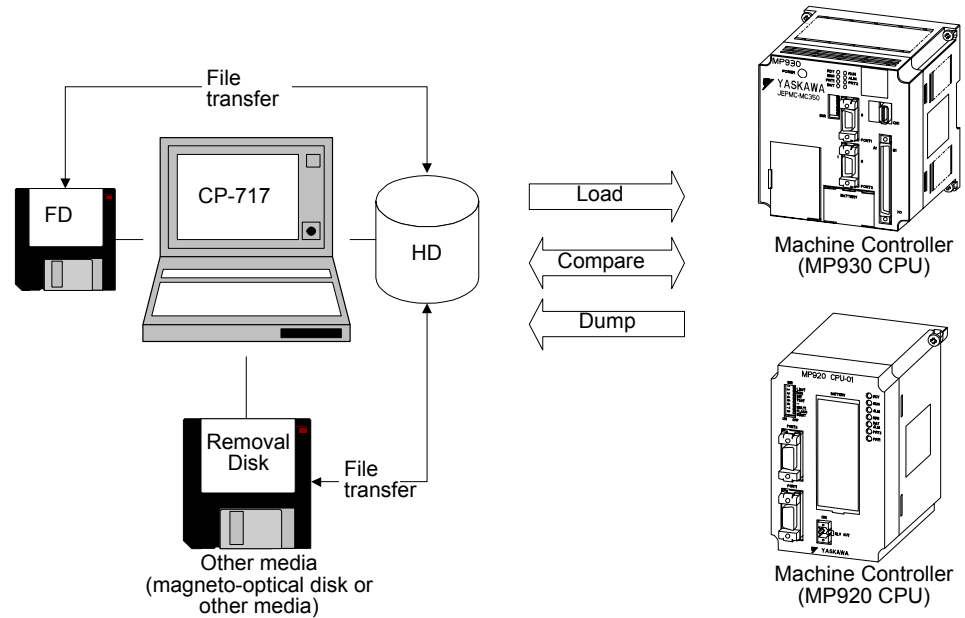
Generally, the Load Function is used to register or update data or programs on the MP900-series Machine Controller that have been defined or developed using the CP-717. The Dump Function is used when MP900-series Machine Controller data is to be saved in the CP-717. The Compare Function is used to compare data stored on both the CP-717 and the Machine Controller to see if it is the same.

In addition, there are functions to register, update, and store data on CP-717 hard disk, floppy disks, or other media.

TERMS

1 Load
    The function for transferring data from the CP-717 to the Machine Controller.

2 Dump
    The function for transferring data from the Machine Controller to the CP-717.

3 Compare
    The function used to compare CP-717 and Machine Controller data.

The following table outlines the transfer functions described above.

Transfer Type	File Transfer Function	Function
All File Transfer (A)	Load all files (from HD to CPU)	Transfers all programs or definition data.
	Dump all files (from CPU to HD)	
	Compare all files (between CPU and HD)	
	Transfer all files (from HD to FD)	
	Transfer all files (from FD to HD)	
	Transfer all files (from HD to other medium)	
	Transfer all files (from other medium to HD)	
Individual File Transfer (I)	Load individual file (from HD to CPU)	Transfers individual designated programs or definition data.
	Dump individual file (from CPU to HD)	
	Compare individual files (between CPU and HD)	
	Transfer individual file (from HD to FD)	
	Transfer individual file (from FD to HD)	
	Transfer individual file (from HD to other medium)	
	Transfer individual file (from other medium to HD)	
Continuous File Transfer (C)	Load continuously (from HD to CPU)	Transfers multiple Machine Controller programs or definition data.
	Dump continuously (from CPU to HD)	
	Continuous file transfer (from HD to other medium)	
	Continuous file transfer (from other medium to HD)	
Other (O)	Flash save	Transfers programs or definition data between flash memory and the Machine Controller.
	Flash comparison	

2

■ Opening the File Transfer Window

The procedure to open the File Transfer Window is given below.

1. Select the PLC folder with the cursor.

2. Click *File (F)* and *File Transfer (T)* on the File Manager Submenu, and then click the required file transfer function.

   Alternatively, right-click the PLC folder and make the selection from the following pop-up menu. Select from the range of transfer functions available on the submenu under *File Transfer (T)*: All File Transfer (A), Individual File Transfer (I), Continuous File Transfer (C), and Other (O).

3. The window for the selected file transfer will be opened.

⦿ INFO ▶ 1 File transfer cannot be executed if the user is not logged onto the Machine Controller.

2 Continuous File Transfer (<u>C</u>) and Other (<u>O</u>) transfer functions are not available for the MP930.

3 For functions that use floppy disks (FD) or magneto-optical disks (MO), the floppy disk or MO must be inserted into the floppy disk or MO drive. File transfer to or from the Machine Controller cannot be executed when the user is in offline mode.

■ Transferring All Files

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

If this function is to be used to transfer all files to the Machine Controller, Machine Controller operation must be stopped first. Be sure to perform the following procedure to change the Machine Controller Status before transferring all files.

Changing the CPU Status

The procedure to change the CPU status is given below.

This function is used to switch the MP900-series Machine Controller status between RUN and STOP modes.

1. Click *Edit (E)* and then *CPU Control (C)* on the menu.

2. In the PLC Running Status Window, click the **RUN** or **STOP** Button as required to switch the operation status of the Machine Controller.
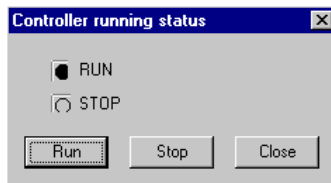
3. The Machine Controller status will be switched.

⦿ INFO ▶ The current status of the Machine Controller is shown by the black dot. The Machine Controller status cannot be switched when in offline mode or if the user has not logged onto 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.

Starting the All File Transfer

The procedure to start the all file transfer is given below.

1. Select *All Program File Load[HD → CPU] [L]*. The following Execute Window will be displayed. Make the required settings.

Setting	Details
Source	The source path name will be displayed if the source is a hard disk, floppy disk, or magneto-optical disk. If the source is a Machine Controller, the communications address and Machine Controller type of the source Machine Controller will be displayed.
Destination	The destination path name will be displayed if the destination is a hard disk, floppy disk, or magneto-optical disk. If the destination is a Machine Controller, the communications 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 file with the same name exists at the destination, it will be overwritten. New:If a file with the same name exists at the destination, the folder and its contents will be deleted, a new directory created, and the transfer executed. 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 transferred. These specifications can be canceled. Normally, the default settings should be used.

2. Click the **OK** Button once the parameters for loading all files have been checked. The transfer will start. A confirmation message will be displayed when transfer has been completed. Click the **OK** Button.

The next Execute Status Window will be displayed when the **OK** Button is clicked. The next All load Window will appear if the operation is cancelled or an error is generated before the transfer has been completed.

■ All File Transfer Window

The title of the window will change depending on whether the function to be performed is load, dump, or file transfer. The procedure, however, is the same.

2
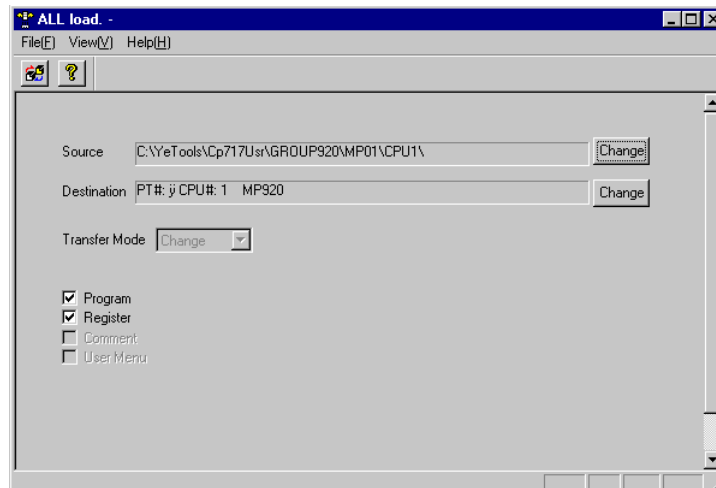
The process of transferring all files can be continued or stopped on this window. To stop file transfer click *File (F)* and then *Exit (E)* and return to the File Manager screen.

To continue file transfer, perform the procedures explained below.

All File Transfer Menus

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

Menu Command		Function
File (F)		
	Execute (S)	Starts transfer of all files.
	Clear (W)	Cancels the settings for the transfer files.
	Exit (E)	Closes the File Transfer Window.
View (V)		
	Tool Bar (T)	Displays the tool bar.
	Status Bar (S)	Displays the status bar.
	Error List (I)	Reopens the error window.
	PLC Running Status (P)	Changes the status of the Machine Controller.
	Change Source (O)	Changes the transfer source.
	Change Destination (R)	Changes the transfer destination.
Help (H)		
	About Application (A)	Displays version information for the CP-717.
	Help Topics (H)	Searches for topics.

Changing Transfer Source and Destination

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

The procedure to change transfer source and transfer destination is given below.

1. Changing the CPU

If the transfer source or destination is a Machine Controller, the communications set-
tings or CPU used in the transfer can be changed.

a) Click *View (V)* and then *Change Source (Q)* or *Change Destination (R)* on the File
   Transfer Menu. The transfer source and transfer destination can also be changed by
   clicking the **Change** Button.

b) Input the communications information in the dialog box, and click the **OK** Button.
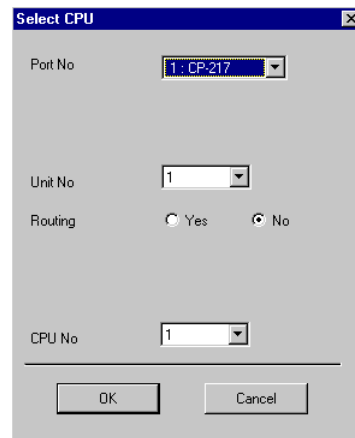
2. Changing Floppy Disk Transfer Directories

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

   a) Click *View (V)* and then *Change Source (Q)* or *Change Destination (R)* on the File
      Transfer Menu. The transfer directory can also be changed by clicking the **Change**
      Button.

   b) Set the floppy disk drive number and PLC name in the dialog box, and click the **OK**
      Button. Enter the PLC name as the directory name on the floppy disk up to 8 charac-
      ters maximum.

3. Changing Hard Disk Transfer Directories

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

   a) Click *View (V)* and then *Change Source (Q)* or *Change Destination (R)* on the File
      Transfer Menu. The Select CPU Window will be displayed. The PLC name can also
      be changed by clicking the **Change** Button.

   b) Point to the appropriate Machine Controller name, and click the **OK** Button.

4. Changing Transfer Drives for Other Media

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

   a) Click *View (V)* and then *Change Source (Q)* or *Change Destination (R)* on the File
      Transfer Menu. The folder name can also be changed by clicking the **Change** Button.

   b) Set a new drive number and transfer path name in the dialog box, and click the **OK**
      Button.

Starting Transfer

The procedure to start transfer is given below.

1. Click *File (F)* and then *Execute (S)* on the File Transfer Menu.

2. A start file transfer confirmation message box will be displayed. Click the **Yes** Button to continue.

3. Once the transfer has been completed, a transfer completed confirmation message box will be displayed. Click the **OK** Button in the message box.

( ) INFO

The screen display will return to the All Load/Dump/File Compare Window when the file transfer has been completed.

2

Stopping Transfers

The following dialog box will be displayed while files are being transferred. Click the **Cancel** Button to stop the transfer.

Transfer Errors

The Error List Window will be displayed if an error is generated during transfer. Click the **Cancel** Button to close this window, and click *View (V)* and then *Error List (I)* on the File Transfer Menu to display this window again.

Data listed in the Data Name column must be transferred again. Check the error and retransfer the data.

■ Individual File Transfers

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

Opening Individual File Transfer Windows

Select **File (F)**, **Transfer (T)**, and then **Individual File Transfer (I)** to display the Individual File Load/Dump/Compare Window.

Setting	Details
Source	If the transfer source is a hard disk, floppy disk, or magneto-optical disk, the source directory name will be displayed. If the transfer source is a Machine Controller, communications information for the source Machine Controller and the Machine Controller type will be displayed.
Destination	If the transfer destination is a hard disk, floppy disk, or magneto-optical disk, the destination directory name will be displayed. If the transfer destination is a Machine Controller, communications information for the destination Machine Controller and the Machine Controller type will be displayed.
Transfer Mode	Select the transfer mode. Change:If a directory with the same name exists at the destination, it will be overwritten. New:If a directory with the same name exists at the destination, that directory and its contents will be deleted, a new directory created, and the file transferred. The transfer mode will be Change if the transfer is for a Machine Controller. The combo box menu for the transfer mode cannot be changed.
DWG to Motion Program	Select the type of file to be transferred. Click *File (F)* and then *Clear (W)* in the File Transfer Window to clear transfer file type settings.

Menu Commands

Menu Command	Function
File (F)	
Execute (S)	Starts transfer of all files.
Clear (W)	Deletes the settings for the transfer files.
Exit (E)	Closes the File Transfer Window.
View (V)	
Tool Bar (T)	Displays the tool bar.
Status Bar (S)	Displays the status bar.
Error List (I)	Reopens the error window.
Change Source (O)	Changes the transfer source.
Change Destination (R)	Changes the transfer destination.
Help (H)	
About Application (A)	Displays version information for the CP-717.
Help Topics (H)	Searches for topics.

Changing Transfer Source and Destination

The Machine Controller or floppy disk used in the transfer can be changed. Refer to Changing Transfer Source and Destination under *page 2-27 All File Transfer Window*.

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 Detail Data Set Window for that type of file. Make the data settings and click the **OK** Button to save the settings.

The procedure to make detailed data settings is given below.

1. DWG Detail Data Set Window

   Select the drawing program to be transferred.

   Click the **Select All** Button to select all drawing programs for transfer.

2. FUNC Detail Data Set Window

   Select the function programs to be transferred.

   Click the **Select All** Button to select all function programs for transfer.

3. Table Data Detail Window

   Select the table data to be transferred.

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

   Click the **Select All** Button to select all table data for transfer.

4. Constant Tables (C registers) Detail Data Set Window

   Select the C register tables to be transferred.

   Click the **Select All** Button to select all C register tables for transfer.

5. Motion Main Program Detail Set Window

   Select the motion main programs to be transferred.

   Click the **Select All** Button to select all motion main programs for transfer.

6. Motion Sub Program (Subroutine) Detail Set Window

   Select the motion subroutines to be transferred.

   Click the **Select All** Button to select all motion subroutines for transfer.

Starting Transfer

The procedure to start individual file transfers is given below.

1. Select **File (F)** and then **Execute (S)** in the File Transfer Menu.

2. A file transfer start confirmation message box will be displayed. Click the **Yes (Y)** Button to continue.

3. When transfer has been completed, a transfer completed confirmation message box will be displayed. Click the **OK** Button to finish.

Table 2.2

Transfer File	All File Transfer			Individual File Transfer		
	Load	Dump	File Transfer	Load	Dump	File Transfer
DWG (program)	Yes		Yes	(Yes)		(Yes)
FUNC (program)	Yes		Yes	(Yes)		(Yes)
Table Data	Yes		Yes	(Yes)		(Yes)
Constant Table (C REG)	Yes		Yes	(Yes)		(Yes)
FBD Menu	Yes		Yes	(Yes)		(Yes)
System Configuration	Yes		Yes	(Yes)		(Yes)
Application Information	Yes		Yes	(Yes)		(Yes)
Module Configuration	Yes		Yes	(Yes)		(Yes)
Type Definition	No	Yes	Yes	No	(Yes)	(Yes)
Scan Time	Yes		Yes	(Yes)		(Yes)
Data Trace	Yes		Yes	(Yes)		(Yes)
Failures Definition	Yes		Yes	(Yes)		(Yes)
Group Definition	Yes		Yes	(Yes)		(Yes)
Motion Parameters	Yes		Yes	(Yes)		(Yes)
Motion Main Program	Yes		Yes	(Yes)		(Yes)
Motion Sub Program	Yes		Yes	(Yes)		(Yes)
M Register	Yes		Yes	(Yes)		(Yes)
S Register	No	Yes	Yes	No	(Yes)	(Yes)
I Register	No	Yes	Yes	No	(Yes)	(Yes)
O Register	No	Yes	Yes	No	(Yes)	(Yes)

Transfer File	All File Transfer			Individual File Transfer		
	Load	Dump	File Transfer	Load	Dump	File Transfer
D Register	Yes		Yes	(Yes)		(Yes)
DWG (comments)	No		(Yes)	No		(Yes)
FUNC (comments)	No		(Yes)	No		(Yes)
User Menu	-		-	-		-

Note: Yes: Defaults, but the specification can be canceled.

      (Yes):   Must be selected if required for transfer.

      No: Cannot be transferred.

      -:   Not supported in the current version.

2

■ Continuous Transfers

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

Continuous Transfer Window

The Continuous Transfer Window that is used when multiple Machine Controller programs or definition data files are transferred is shown below.

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

Continuous File Transfer Menus

Menu Command		Function
File (F)		
	Execute (S)	Starts continuous file transfer.
	Exit (E)	Closes the File Transfer Window.
View (V)		
	Tool Bar (T)	Displays the tool bar.
	Status Bar (S)	Displays the status bar.
	Error List (I)	Reopens the Error Window.
	Change Transfer Drive (D)	Changes the transfer drive.
Help (H)		
	About Application (A)	Displays version information for the CP-717.
	Help Topics (H)	Searches for topics.

Changing Transfer Drives

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

The procedure to change the transfer drive is given below.

1. Click *View (V)* and then *Change Transfer Drive* on the File Transfer Menu.

2. Select the drive number in the Select Drive Dialog Box and click the **OK** Button.

Starting a Transfer

The procedure to start continuous file transfers is given below.

1. Select **File (F)** and then **Execute (S)** on the File Transfer Menu.

2. A file transfer start message confirmation box will be displayed. Click the **Yes (Y)** Button to continue.

3. When transfer has been completed, a transfer completed confirmation message box will be displayed. Click the **OK** Button to finish.

■ Saving in and Comparing with Flash Memory

Flash Memory Save/Compare Window

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

2
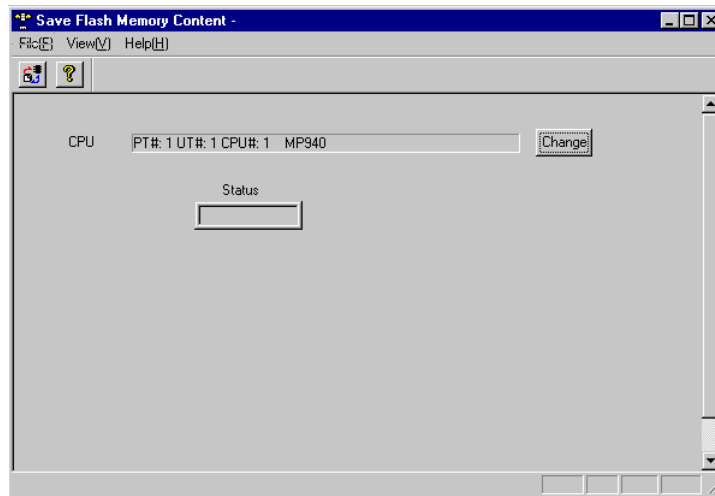
Setting	Details
CPU	The communications information for the CPU with which the transfer will be made and the type of Machine Controller is displayed.
Status	When transfer is being executed, the status will be "Running." When transfer is completed, the status will be "Completed Normally."

⦿ INFO ▶ The function for saving and comparing files between the Machine Controller and flash memory is not available in offline mode.

Flash Memory Transfer Menus

The menus displayed on the Flash Memory Transfer Window are shown in the following table.

Table 2.3 Flash Memory Transfer Menus

Menu Command	Function
File (F)	
Execute (S)	Starts saving to flash memory or comparing to flash memory.
Exit (E)	Closes the File Memory Transfer Window.
View (V)	
Tool Bar (T)	Displays the tool bar.
Status Bar (S)	Displays the status bar.
Change CPU (C)	Changes the transfer CPU.
Help (H)	
About Application (A)	Displays version information for the CP-717.

Changing the Transfer CPU

The communications information and the transfer CPU can be changed. For details, refer to "All File Transfer Window."

Click *File (F)* and then *Change CPU (C)* on the pull-down menu.

Starting a Transfer

The procedure to start file transfer between the Machine Controller and the flash memory is given below.

1. Click *File (F)* and then *Execute (S)*.
2. Click the **Yes** Button in the message box that is displayed.
3. Click the **Yes** Button in the message box that is displayed when the transfer has been completed.

⬤ INFO ▶ To compare 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.

■ Closing the File Transfer Window

The procedure to close the File Comparison Window is given below.

1. Click *File (F)* and then *Exit (E)* on the File Transfer Menu.
2. The File Transfer Window will be closed.

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

2.1.11 Configuration

The Configuration Window is used to set the CP-717 system environment.

■ Opening the Configuration Window

Select **View (V)** and then **Configuration (C)** from the menu bar.

2
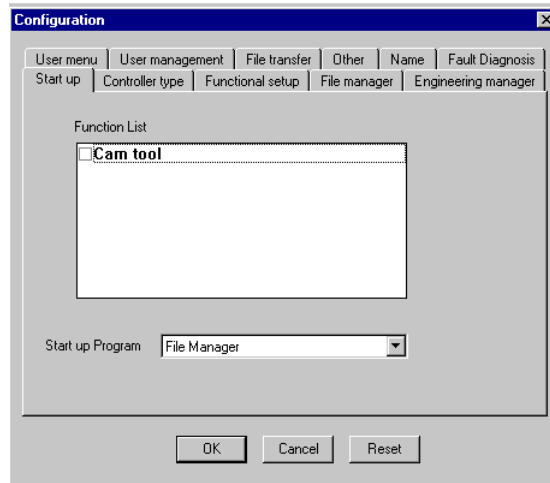
■ Configuration of the Configuration Window

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

Tab Page	Details
Start up	Not currently supported.
Controller type	Displays the models of controller compatible with the CP-717.
Functional setup	Sets write protect, etc.
File manager	Not currently supported.
Engineering manager	Sets the conditions for opening ladder programs.
User menu	Not currently supported.
User management	Registers default user names and passwords for logging on.
File transfer	Sets the default drive for other transfer destinations.
Other	Sets the communications process timeout value.

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

■ Controller Type Tab Page

The PLC models that can be currently operated are displayed.

■ Functional Setup Tab Page

Function Specification	Details	Default
Monitor Mode (Write protected)	When turned On, the user cannot write files to the Controller.	Off
Server appointment	Not currently supported.	---
Client appointment	Not currently supported.	---
Ladder conversion function	This function changes ladder programs created using the CP9200H to ladder programs that can be used by the CP-9200SH.	On
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

■ Engineering Manager Tab Page

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

(◉) INFO▶   1 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 a ladder program is opened in online mode, the *Get Current Value ON/OFF* Button is displayed in the top right of the ladder program editing window (when the Get Current Value ON/OFF function is enabled).

Use this button to turn ON and OFF get current value processing.

2

```
┌──────────────────────────────────────────────┐
│ DWG No.                                   X    │
├──────────────────────┬───┬───┬────────────────┤
│                      │ ▶ │ ■ │                │
└──────────────────────┴───┴───┴────────────────┘
                         ↑   ↑
                       Start Stop
   Ladder logic program
```
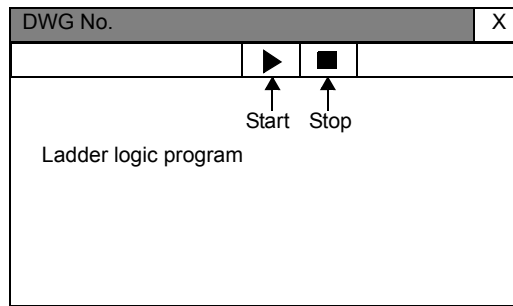
While the ladder program is open, the ON/OFF function can be specified using "Monitor ON/OFF."

2 Number of Open Ladder Programs

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.

■ User Management Tab Page

Use this tab page to register the default user name and password.

When logging on to the Controller from the CP-717, 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.

■ File Transfer Tab Page

Alternative Default Drive for All Transfers

Set the drive letter of other transfer destinations (e.g., MO drive).

M Register Clearing Setup During All Load File Transfer

Set whether or not to clear the contents of the M register to zero when loading all files.

Overwrite Message

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

■ Other Tab Pages

Communication Timeout

Set the communications process timeout value in milliseconds.

Path for Online Monitor Animation File

The animation file, which shows that the system is connected online, are displayed. The animation file name is displayed here.

2.2 Engineering Manager

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

2.2.1 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.

```
CP-717    File  Manager

Directory
tree
```

Click File (F) and then Open (O), or double-click a
file in the directory tree display area.

```
CP-717    File  Manager
Directory
tree
        Engineering  Manager

        XXX . . .XX (Function window)
        PT#... (Login information)

        The contents of the file are
        displayed. (This area will be
        blank for new files.)
```

The programming tool allocated to the specified file is opened, and the contents of the file are displayed.

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

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

◀**EXAMPLE**▶

1. Start the Motion Editor from the File Manager.
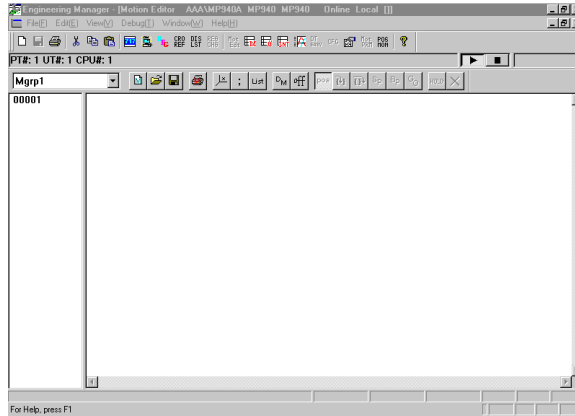
2. Click *Motion Editor (E)* from the File Menu, as shown in the above screen, or double click the *MPM001* file to open the Engineering Manager (large window) and the Motion Editor (small window) as shown below.
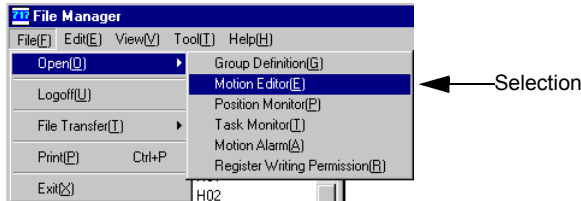
3. If the Motion Editor is closed at this stage, only the Engineering Manager Window will be displayed.
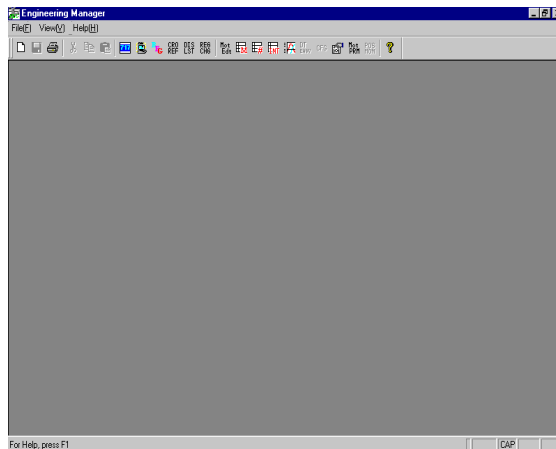
The Engineering Manager Window

2.2.2 Basic Functions

All of the functions called using the Engineering Manager can be selected by clicking *File (F)* and then *Open (O)*.

Position Monitor (P), Task Monitor (T), Motion Alarm (A), and the menu are displayed only when online.
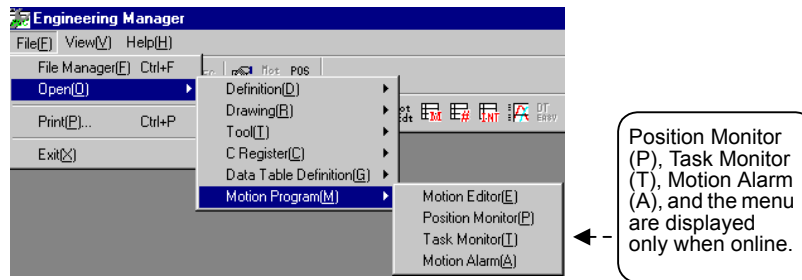
Several function windows can be open at once, and the window to be used can be activated as needed.

2.2.3 Basic Menus

The basic menus are active when no function windows are open, i.e., they are active when no function windows are displayed in the Engineering Manager Window.

Menu Command				Function
File (F)				
	File Manager (F)			Opens the File Manager.
	Open (O)			
		Definition (D)		
			Module Configuration (M)	Define the Modules.
			System Configuration (S)	
			Scan Time Setting (T)	
			Application Info. (I)	
			Data Trace (D)	
			Fault Monitor (F)	
			Group Definition (G)	
			Motion Parameter (P) [*1]	
		Drawing (D)		
			Open New DWG (O)	Calls sequence programming tools.
			Properties (R)	
			Main Program (L)	
			SFC Flow Chart (S)	
			SFC Time Chart (T)	
			SFC Action Box (B)	
			Constant Table (# Reg) (H)	
			Constant Table (M Reg) (M)	
			I/O Convert Table (C)	
			Interlock Table (I)	
			Part Composition Table (A)	
			Tuning Panel (P)	

2

Menu Command			Function
	Tool (T)		
		Register List (C)	Calls programming support tools.
		Cross Reference (X)	
		Disable Coil List (D)	
		Comment List (C)	
		Register Replace (S)	
	C Register (C)		
		C Register Map (M)	Displays C registers.
	Data Table Definition (G)		
		Table Data Map (L)	Displays table data.
	Motion Program (M)		
		Motion Editor (E)	Calls motion programming tools.
		Position Monitor (P)[*2]	
		Task Monitor (T)[*2]	
		Motion Alarm (A)[*2]	
	Print (P)		Prints data.
	Exit (X)		Closes the Engineering Manager.
View (V)			
	Tool Bar (T)		Displays and hides the Tool Bar.
	Status Bar (S)		Displays and hides the Status Bar.
Help (H)			
	About Application (A)		Displays version information for the CP-717.
	Help Topics (H)		Searches for topics.

∗ 1. Motion Parameters (M) is only displayed when the MP930 is used.

∗ 2. Position Monitor (P), Task Monitor (T), and Motion Alarm (A) are
active only when online.

2.2.4 Function Windows

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 diagram, 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.
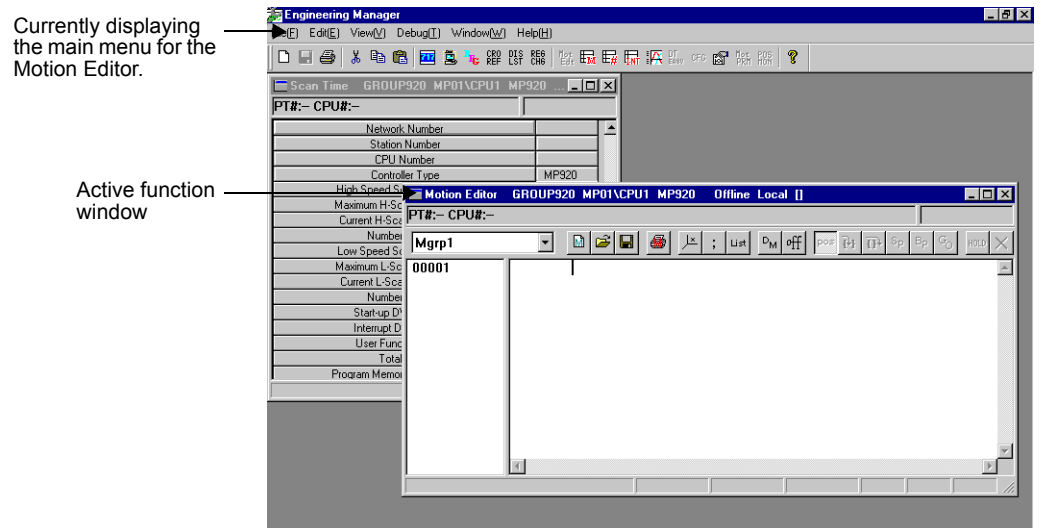
Currently displaying the main menu for the Motion Editor.

Active function window

2

■ Window Configuration

This section explains the basic configuration of function windows.

Title bar
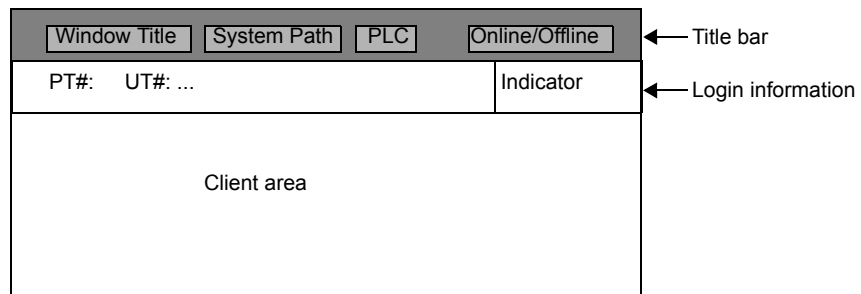
Login information

Title Bar

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

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 communications logical port number.
UT#	The MP900 Series unit number is fixed at 1.
CPU#	Number of the CPU currently logged in.
Indicators	Displays the animation data when online.

Client Area

The function window internal information is displayed in the client area. Refer to each window for details.

2.2.5 Exiting the Engineering Manager

The procedure to exit the Engineering Manager is given below.

1. Close all open function windows.

2. Close the Engineering Manager by selecting *File (F)* and then *Exit (X)*.

No confirmation message will be displayed.

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

2.3 List and Print Managers

2.3.1 Basic Outline of the List and Print Managers

Use this manager to print lists and details of motion programs, ladder programs, registers, and definition files managed by the CP-717.

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

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

The Print Manager edits data selected via the user interface and requests print jobs to the List Manager.
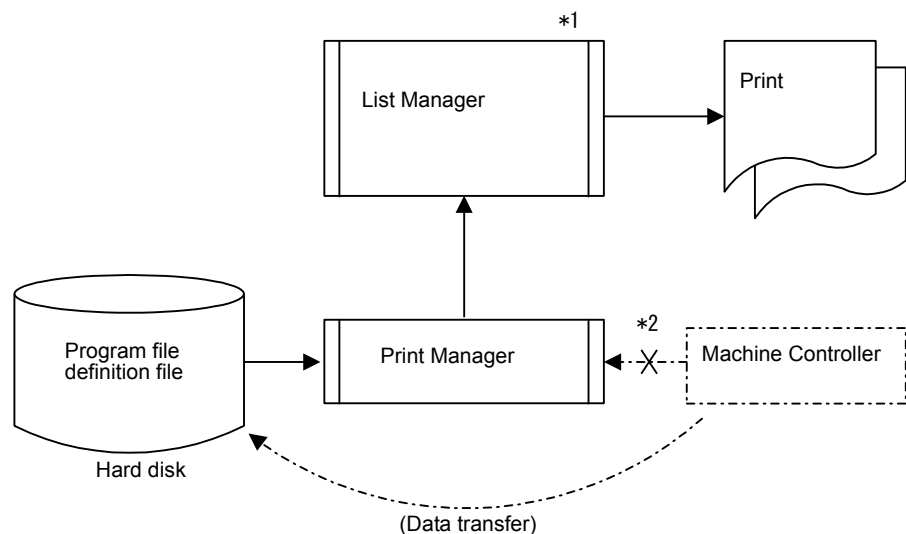
* 1. The List Manager starts when the Print Manager Window is first opened. The List Manager is an independent window, as print jobs can also be requested from applications other than the CP-717. Consequently, when the CP-717 finishes, the List Manager must be closed manually.

* 2. Data for printing is stored on the Engineering Tool hard disk. To print data stored on the Machine Controller, the data must be transferred to the hard disk using the transfer function (dump). In normal operations, however, Machine Controller and hard disk data are the same, so no transfer is necessary.

2.3.2 List Manager

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

■ Opening the List Manager Window

The List Manager can be opened from the Print Manager.

To open the List Manager, select *Print (P)* and then *Printing Status (D)* on the Print Manager Menu, or click the **List Manager** icon on the task bar. The print status window will open.
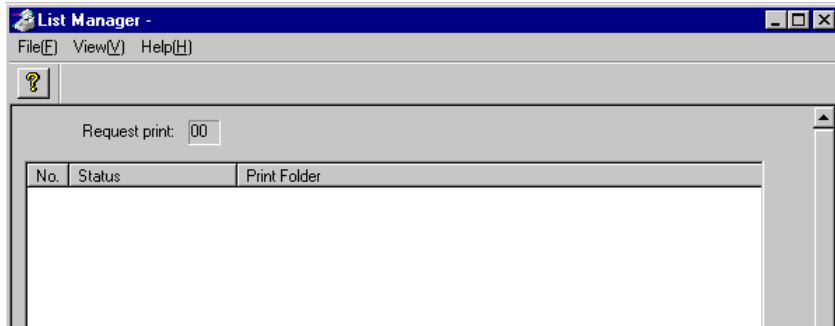
Alternatively, click the List Manager icon.

List Manger icon

INFO

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

2.3.3 List Manager Window Menus

Table 2.4 List Manager Window Menus

Menu Command		Function
File (F)		
	Cancel (C)	Cancels printing jobs.
	Exit (X)	Ends printing of the CP-717 document.
View (V)		
	Tool Bar (T)	Displays the tool bar.
	Status Bar (S)	Displays the status bar.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

■ 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.

■ Cancelling Printing Jobs

The procedure to cancel printing jobs is given below.

1. Select the printing job to be cancelled.

2. Select *File (F)* and then *Cancel (C)* on the List Manager Menu.

3. Click the **Yes** Button in the message box.

   The printing job selected in step 1. will be cancelled.

2.3.4 Print Manager

■ Opening the Print Manager Window

Opening from the File Manager

Click a Machine Controller folder, CPU folder, or a drawing folder under within these folders on the directory tree. Select *File (F)* and then *Print (P)* on the File Manager Menu. The Print Manager is started and the Print Manager Window is opened.
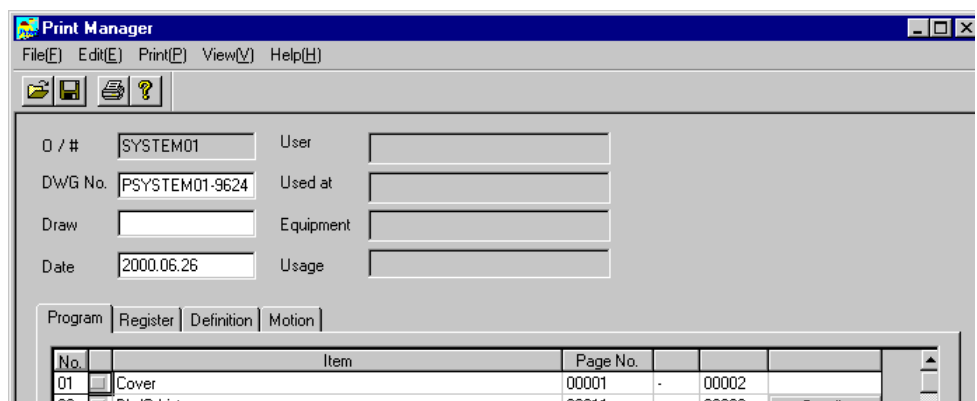
Opening from the Engineering Manager

Select *File (F)* and then *Print (P)* on the Engineering Manager Menu to start the Print Manager and open the Print Manager Window.

2

⬤ INFO ▶ The Print (<u>P</u>) command under the File (<u>F</u>) Menu in Ladder Logic Program Windows prints the main program displayed in the window. Accordingly, the Print Manager is not started.

■ Print Manager Menus

Table 2.5 Print Manager Menus

Menu Command		Function
File (<u>F</u>)		
	Read (<u>R</u>)	Reads printing settings files.
	Save (<u>S</u>)	Saves printing settings data.
	Delete (<u>D</u>)	Deletes printing settings files.
	Exit (<u>X</u>)	Closes the Print Manager.
Edit (<u>E</u>)		
	Date (<u>D</u>)	Sets the current date.
	Copy History (<u>N</u>)	Copies revision history data.
Print (<u>P</u>)		
	Execute Print (<u>E</u>)	Executes printing.
	Printing Status (<u>D</u>)	Displays the printing status.
View (<u>V</u>)		
	Tool Bar (<u>T</u>)	Displays the tool bar.
	Status Bar (<u>S</u>)	Displays the status bar.
	Next Page (<u>N</u>)	Displays the next tab page.
	Back Page (<u>B</u>)	Displays the previous tab page.
Help (<u>H</u>)		
	About Application (<u>A</u>)	Displays version information for the CP-717.
	Help Topics (<u>H</u>)	Searches for topics.

■ Print Window Tab Pages

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

Table 2.6 Print Manager Window Tab Pages

Tab Page Name	Function
Program	Sets the printing data for drawing 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.

Program Tab Pages

1. Program Print Settings
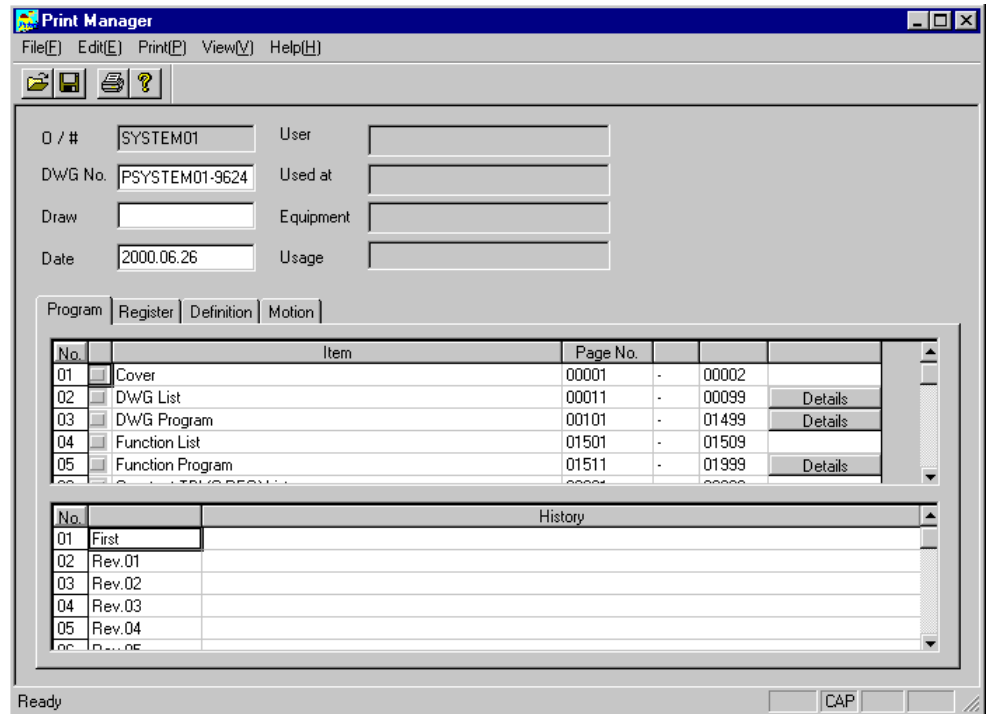
Setting	Details
O/#	Data from the *Order No.* column in the Application Information Window is displayed. This data cannot be altered. This information is printed on the cover page and in the footer of the document.
DWG No.	Enter a drawing number of up to 16 characters. This data is printed in the header 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	Data from the User column in the Application Information Window will be displayed. This data cannot be altered. This data is printed in the *User* column on the document cover page.
Used At	Data from the *Used At* column in the Application Information Window is displayed. This data cannot be altered. This data is printed in the *Used At* column on the document cover page.
Equipment	Data from the *Equipment* column in the Application Information Window is displayed. This data cannot be altered. This data is printed in the *Equipment* column on the document cover page.

2

Setting	Details
Usage	Data from the *Usage* column in the Application Information Window is displayed. This data cannot be altered. This data is printed in the *Usage* column on the document cover page.
Selection Status	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.
Print Items	Printing items are displayed.
Page No.	Enter the first and last page numbers to be printed for the printing item. If the document has more pages than the number of pages specified, the pages following the page designated as the last page will also be printed.
Details	Detail printing item selections can be made. Refer to the next section for information on the **Details** Button.
History	Enter revision history data for the printing settings file of up to 64 characters. Up to 20 pieces of revision history data can be entered. Select *Edit (E)* and then *Copy History (N)* on the Print Menu to copy revision history data from the current tab page to revision history data on another tab page.

2. Detailed Settings for Programs

Detailed printing settings are required for items that have a Details Button to the right of the printing item. Click the **Details** Button, and then set the print details.

a) Detailed Settings for Drawing Lists

Select the Print Class Window and designate the drawing trees and drawing lists for printing.

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

b) Detailed Settings for Drawing Programs

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

Check Item	Details
Select All	Prints all drawing programs.
Individual select	Selects and prints individual drawing programs from the list box.
Type Button	Displays the Select Print Class Dialog Box to select the type of drawing program to be printed. Only the selected data will be printed.

c) Detailed Settings for Function Programs

Designate **Select All** or **Individual Select** using the Function Program List Details Window.

Check Item	Details
Select All	Prints all function programs.
Individual Select	Selects individual function programs from the list box.
Type Button	Displays the Function Program List Details Dialog Box to select the type of function program to be printed. Only the selected data will be printed.

d) Detailed Settings for C Register Constant Tables

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

Check Item	Details
Select All	Prints all C register constant tables.
Individual Select	Selects individual C register constant tables from the list box.
Print Cross	Prints the C register cross information.

e) Detailed Settings for Table Data

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

Check Item	Details
Select All	Prints all the table data.
Individual Select	Selects 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.

Register Tab Pages

1. Register Printing Settings
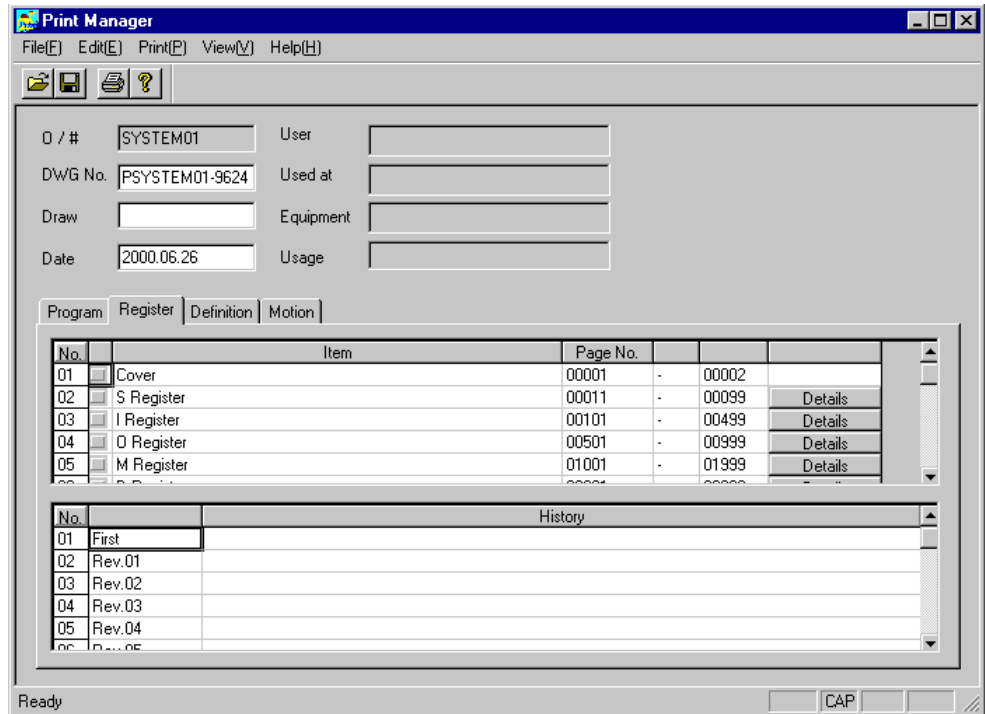
The window configuration is the same as the one for program printing settings. Refer to *page 2-51 1.Program Print Settings*.

2. 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 to make the detailed settings.

a) Detailed S Register Settings

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.

Button	Details
Select All	Designates all the S registers.
Delete	Move the cursor to the register range to be deleted and click the **Delete** Button to delete the register range at the cursor position.
Sort	Sorts the entered register range by register number.

b) Detailed Settings for I Registers

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. Refer to *Detailed Settings for S Registers* for details.

c) Detailed Settings for 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. Refer to *Detailed Settings for S Registers* for details.

d) Detailed Settings for 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. Refer to *Detailed Settings for S Registers* for details.

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

e) Detailed Settings for D Registers

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

Check Item	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 drawing or function programs, and prints the D registers used in the selected programs.

f) Detailed Settings for # Registers

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

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

Definitions Tab Page

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

2

1. Definition Printing Settings
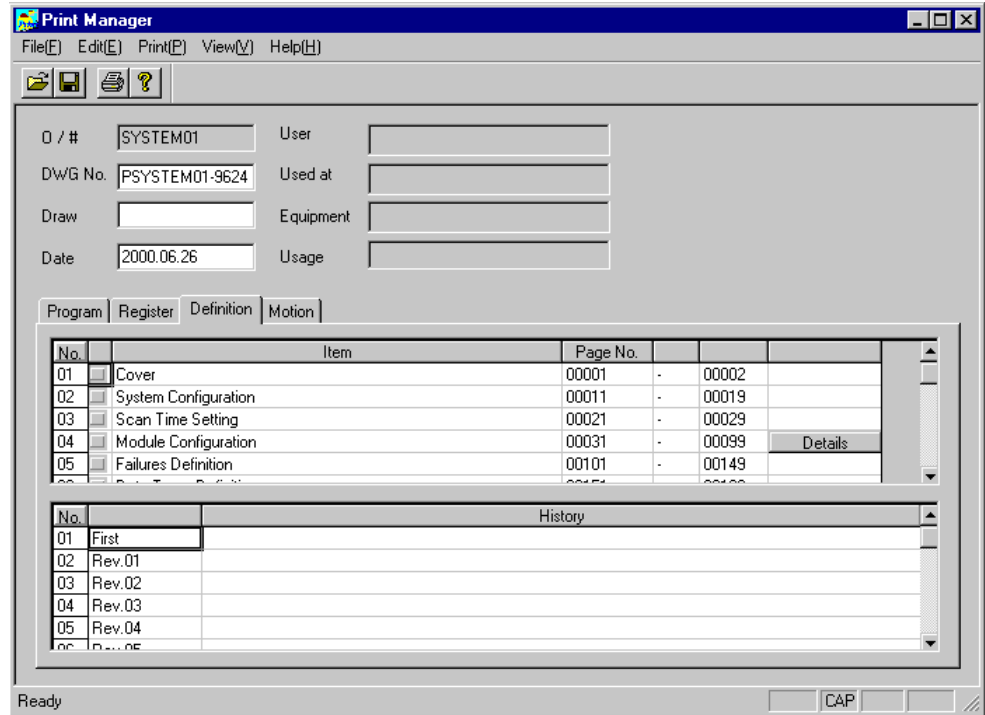
The window configuration is the same as the one for the program printing settings.
Refer to *page 2-51 1.Program Print Settings*.

2. Detailed Settings for Definitions

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.

• Detailed Settings for Module Configuration Definitions

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

⟨●INFO⟩ Data at RESERVED or UNDEFINED slot numbers is invalid even if selected.

Motion Tab Page

Motion program and motion parameter printing data can be selected.

1. Motion Printing Settings
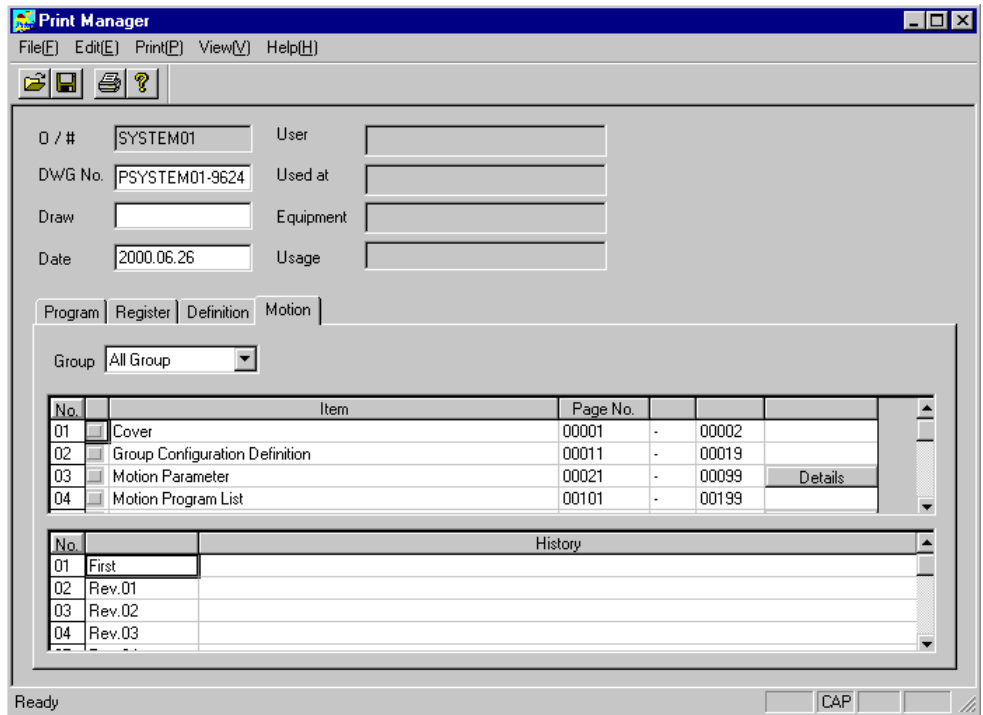
Setting	Details
Group	Select a group. The motion program and other data for the designated group will be printed.
Selection Status	Select the items to be printed. • ☐ : Indicates items that have not been selected for printing. • ☑ : Indicates items that have been selected for printing.
Print Item	Displays 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. Input a lower number for the first page. 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.

2. Detailed Settings for Motion Parameters and Programs

   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.

   • Detailed Settings for Motion Parameters and Programs

     Designate **Select All** or **Individual Select** in the Motion Program List Details Win-

2

dow.

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

■ 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

The procedure to print is given below.

1. Select *Print (P)* and then *Execute Print (E)* on the Print Menu.

2. Set the file to be printed and the printing margins in the Execute Print Dialog Box, and click the **Execute** Button.
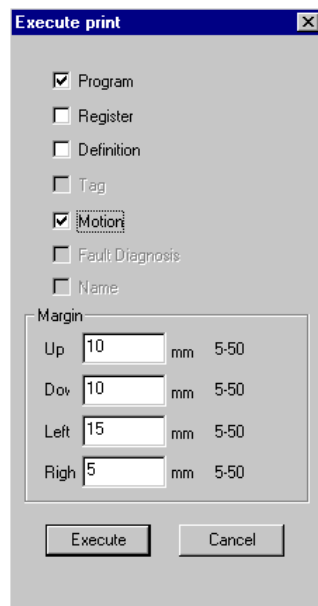
3. Set the printer in the Execute Print Dialog Box and click the **OK** Button.

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

■ 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.

Reading Printing Settings Files

Select *File (F)* and then *Read (R)* on the Print Menu. In the Read Print Information File Window, point to the printing settings file to be read and click the **OK** Button.

Deleting Printing Settings Files

Select *File (F)* and then *Delete (D)* on the Print Menu. In the Delete Print Information File Window, point to the printing settings file to be deleted and click the **OK** Button.

Saving Printing Settings Files

Select *File (F)* and then *Save (S)* on the Print 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.

2.4 Communications Manager

The Communications Manager function provides communications services between the engineering Tool and the MP900-series Machine Controllers. The Communications Manager is called the Communications Process in the CP-717.

The Communications Manager itself supports various physical lines, but the MP900-series Controllers can only support serial communications.

2.4.1 Starting the Communications Manager

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

Normally, however, there is no need to start the Communications Manager manually, as it starts automatically when the CP-717 is started.

2.4.2 Communications Manager Operations

Click the **Communications Process** icon on the task bar to display the Communications Process Window.

Use the Communications Manager to update and check the communications parameters, and to check the communications status.

INFO   Do not close the Communications Manager by selecting **File (F)** and then **Exit (X)** during online communications, as a communications error will occur.

During communications, keep the Communications Process Window closed.

2.4.3 Closing the Communications Manager

Click the **Communications Process** icon on the task bar to display the Communications Process Window.

Select **File (F)** and then **Exit (X)** from the menu bar. A confirmation dialog box will be displayed. Click the **OK** Button to continue. The Communications Manager and the communications process will be closed.

INFO   The Communications Manager starts at the same time as the CP-717, but does not close at the same time. They must be closed separately.

2.5 User Menu Manager

The User Menu Manager allows you to register a shortcut icon on the desktop for function windows. Once a shortcut icon has been registered, simply click that icon to open the corresponding function window and execute the function. The user will have to log on after clicking the icon. User Menu Registration allows users to bypass the startup sequence and open the execution processes directly.

⟨ INFO ⟩

The User Menu Manager Window is opened by selecting *Tool (T)* and then *Shortcut Menu (S)* from the File Manager, but is not currently supported. The User Menu Manager shortcut function, however, can be used by selecting *File (F)* and then *Register User Menu (S)* from the menu bar in the Functions Window.

2

2.5.1 Registering Shortcut Icons

Click **Register User Menu (U)** located on the File Menu in each function window. A shortcut icon will be registered for the function window that is currently active.

```
File(F) Edit(E) View(V) Debug(T
   File Manager(F)      Ctrl+F
   Open(O)                    ▶
   Close(C)
   Motion Properties(R)
   Regist User menu(U)
   Save(S)              Ctrl+S
   Save New File(A)
   Import(I)
   Export(E)
   Print(P)...
   Program Print(G)     Ctrl+P
   Exit(X)
```
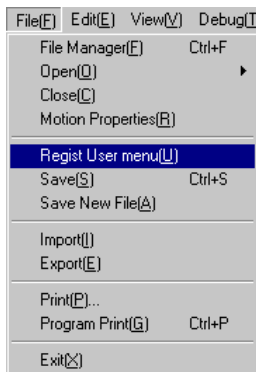
The following Register User Menu Dialog Box will be displayed. Input the required information. A shortcut icon can be registered simply by inputting the title at each stage.
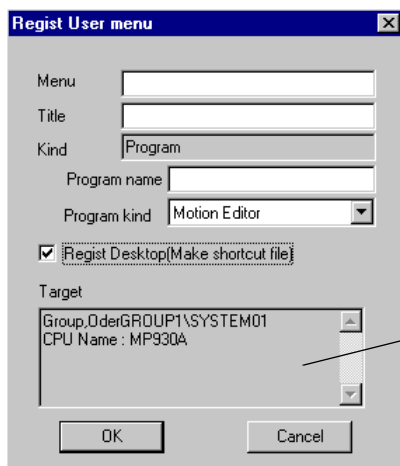
```
Regist User menu                        ✕

   Menu     [                          ]
   Title    [                          ]
   Kind     [Program                   ]
        Program name [                 ]
        Program kind [Motion Editor  ▼ ]
   ☑ Regist Desktop(Make shortcut file)
   Target
   [Group,OderGROUP1\SYSTEM01      ▲ ]
   [CPU Name : MP930A                ]          ┌─────────────────┐
   [                                ]           │ This information is │
   [                                ]           │ also registered in  │
   [                               ▼ ]          │ the system.         │
                                                └─────────────────┘
        [   OK   ]        [  Cancel  ]
```

The Register User Menu Dialog Box is displayed when the Motion Editor Window is open. Input *Motion Editor* as the title, and click the **OK** Button to register a shortcut icon like the one shown below on the desktop.

2.5.2 Starting from a Shortcut Icon

Double-click the shortcut icon on the desktop.

The registered function window will be opened. The user can execute the function immediately.

The original startup sequence can, therefore, be reduced to two steps: using a shortcut icon and performing the logon operation. Simply click the shortcut icon and log on to open the Motion Editor. Operability of the CP-717 is greatly improved by using shortcut icons for frequently used function windows.

3 Module Configuration Definitions

This chapter explains how to set the operating conditions for Basic Modules that have already been installed and summarizes the configuration of each Machine Controller. Refer to the following manuals for more details on the Machine Controllers.

- MP900-series Machine Controller User's Manual: Design and Maintenance
- MP920 Machine Controller User's Manual: Motion Modules
- MP920 Machine Controller User's Manual: Communications Modules

3

3

3.1 Module Configurations

3.1.1 MP900-series Module Configurations

The configuration of MP900-series Machine Controllers vary with the application and include All-in-one Machine Controllers, in which all functions are housed in a single case, Interface Board Controllers mount in a personal computer, Building-block Machine Controllers in which the required basic Modules are mounted to Mounting Bases, and Machine Controllers integrated with a SERVOPACK.

MP910   MP920

MP930   MP940
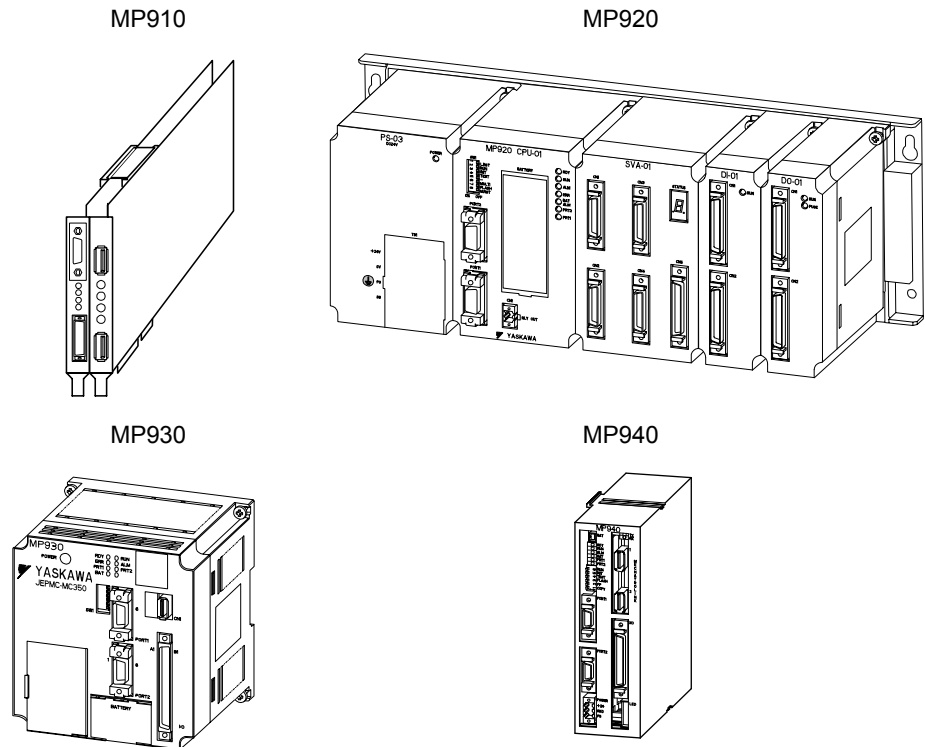
Machine Controller	Module Configuration
MP910	Interface board
MP920	Building block
MP930	All-in-one
MP940	Integrated with SERVOPACK

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 operation to define Module configurations differs for each Machine Controller. They are explained here in the following order.

• MP910 Module configuration definitions

- MP920 Module configuration definitions
- MP930 Module configuration definitions
- MP940 Module configuration definitions

3

3.2 Basic Module Configuration Definition Operation

3.2.1 Outline of Basic Module Configuration Definition Operation

The Module Configurations Definitions Window consists of individual Module Configuration Definitions Windows, which define individual Modules, and the Module Configuration Definitions Window, which shows the overall configuration, regardless of the model of Machine Controller. Select the Module to be defined in the main window to open the individual Module Configuration Definitions Windows.

Module configuration definitions

Rack settings				
Rack 01 · · ·				
· · ·	00	01	02	· · ·
Module	· · ·	217IF	SVA	· · ·
Definition item	· · ·	· · ·	· · ·	· · ·
· · ·	· · ·	· · ·	· · ·	· · ·

Module Configuration Definitions Window

217F definition

SVA definition

...Definition

(Windows) Individual Module definitions

3
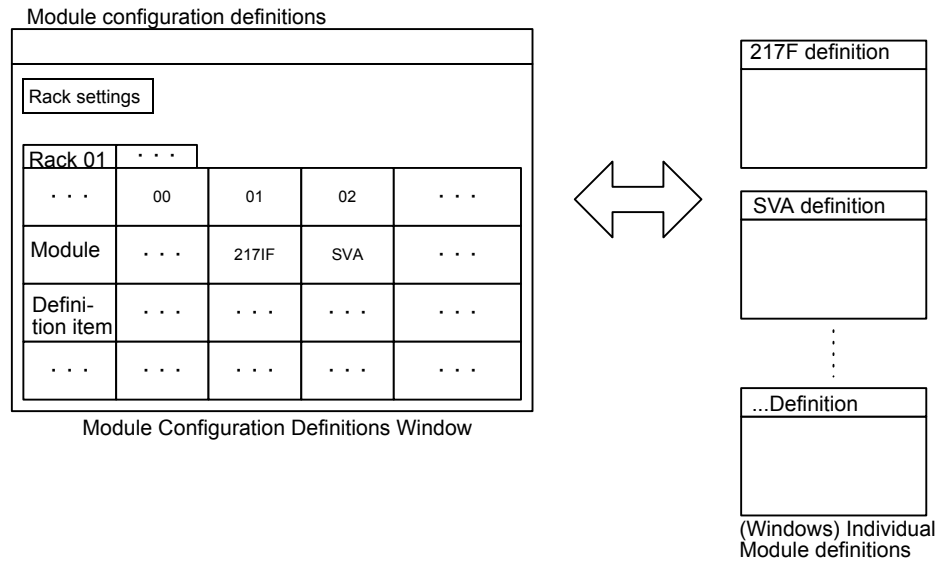
3.2.2 Basic Flowchart
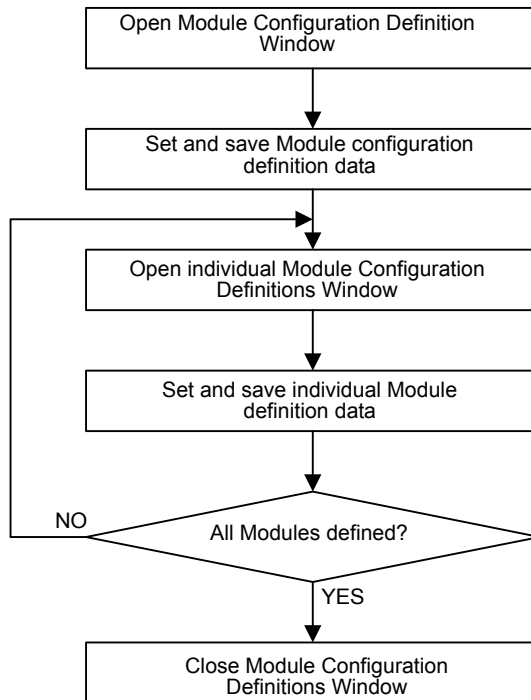
3.2.3 Opening the Module Configuration Definitions Window

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

■ Opening from the File Manager

Open the *Definition Folder* on the directory tree and double-click *Module Configuration*.

■ Opening from the Engineering Manager

Select *File (F)*, *Open (O)*, *Definition (D)*, and then *Module Configuration (M)*.
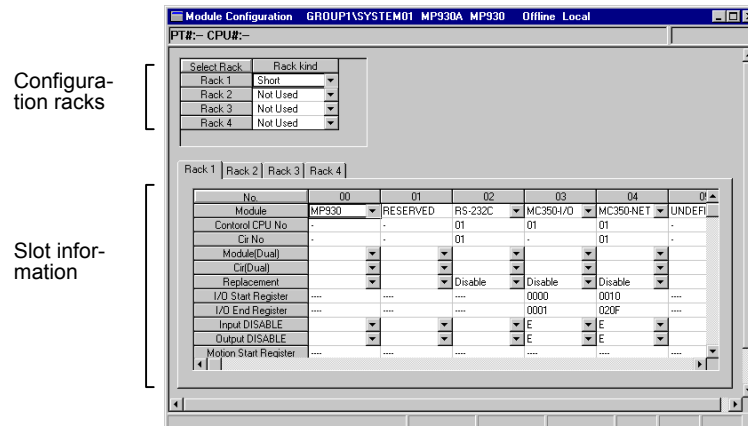
Module combinations depend on the Machine Controller.

3.2.4 Module Configuration Definitions Window Menus

The following table shows the functions of the menu commands that can be selected in the Module Configuration Definitions Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Selects or executes another function.
Close (C)	Closes the Module Configuration Window.
Regist User menu (U)	Registers a shortcut icon on the desktop.
Save (S)	Saves definition data.
Delete (D)	Deletes definition data.
Delete Slot (Z)	Deletes definition data for one slot.
Open Slot (T)	Displays the Module Configuration Window for a slot.
Print (P)	Prints definition data.
Exit (X)	Closes the Engineering Manager.
View (V)	
Tool Bar (T)	Displays the Tool Bars.
Status Bar (S)	Displays the Status Bar.
Next Page (N)	Displays the next tab page.
Back Page (B)	Displays the previous tab page.
Order (O)	
Reset Module (R)	Resets a Module.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.
Help Topics (H)	Searches for topics.

3.2.5 Setting Module Configuration Definitions Data

Definition data is given as follows: Columns (left to right) are slot numbers, and rows (top to bottom) are setting items.

Setting Item	Details
Select Rack and Rack Kind	Sets the configuration rack information.
No.	This number shows the slot numbers on the rack.
Module	The Module name set in the slots is set automatically.
Control CPU No.	Sets the CPU number to control the Modules.

Setting Item	Details
Cir No.	Sets the circuit number in order from 01 for each Communications and Motion Module.
Module (Dual)	The Dual Modules Setting is not supported in the current version.
Cir (Dual)	Dual Transmission Paths Setting is not supported in the current version.
Replacement	Hot Swapping (removal/insertion under power) is not supported in the current version.
I/O Start Register	Sets the I/O register start (leading) address.
I/O End Register	Sets the I/O register ending address.
Input DISABLE	Sets to enable/disable inputs. Blank: Disable specification not allowed, D: Disabled, E: Enabled
Output DISABLE	Sets to enable/disable outputs. Blank: Disable specification not allowed, D: Disabled, E: Enabled
Motion Start Register	Sets the start address for the motion parameters register. This address is set automatically.
Motion End Register	Sets the end address for the motion parameters register. This address is set automatically.
Detail	It is not supported in the current version.
Status	Displays each Module's status when online.

INFO

For detailed items, refer separately to each of the following Machine Controllers.

- MP910 Module configuration
- MP920 Module configuration
- MP930 Module configuration
- MP940 Module configuration

■ 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 (F)* and then *Save (S)* from the menu.

2. Verify the message in the message box and click the **Yes** Button to save the definition data.

■ 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 (F)* and then *Delete (D)* from the menu.

2. Verify the message in the message box and click the **Yes** Button to delete the definition data.

3

■ Ending the Module Configuration Definitions

Select *File (F)* and then *Close (C)* from the menu to return to the Engineering Manager Window.

3.3 Basic Individual Module Definition Operations

3.3.1 Opening Individual Module Definitions Windows

■ Opening from the File Menu

The procedure to open the Module Definitions Window for the slot that has been selected with the cursor are given below.

1. Click the name of the desired Module.

2. Select *File (F)* and then *Open Slot (T)*. The individual Module Definitions Window will be displayed.

Rack 1				
No.	00	01	02	· · ·
Module	MC350	RESERVED	RS-232C	· · ·
· · ·				

For example, click here, and then select **File (F)** and then **Open Slot (T)**.

■ 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. The individual Module Definitions Window will be displayed.

Rack 1				
No.	00	01	02	· · ·
Module	MC350	RESERVED	RS-232C	· · ·
· · ·				

For example, click here.

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

■ Individual Module Definitions Window Configurations

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

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

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.

Login information items can vary depending on the Module model.

Item	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.
Circuit #	Displays the circuit number allocated using Module configuration definitions for Communications Modules.
I/O Address	Displays the I/O address space allocated to the Module using Module configuration definitions.

⊙ INFO ▶ ■ Individual Module Definition Data Settings

Refer to the following Machine Controllers separately.

- MP910 individual Module definitions
- MP920 individual Module definitions
- MP930 individual Module definitions
- MP940 individual Module definitions

■ 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 (F)* and then *Save (S)* from the menu.

2. Verify the message in the message box and click the **Yes** Button to save the definition data.

■ Deleting Individual Module Definitions

1. Select *File (F)* and then *Delete (D)* from the menu.

2. Verify the message in the message box and click the **Yes** Button to delete the definition data.

■ Closing Individual Module Definitions

Select *File (F)* and then *Close (C)* from the menu to return to the Module Configuration Definitions Window.

3.4 MP910 Module Configuration Definitions

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

3.4.1 MP910 Virtual Module Configuration

The MP910 is a Machine Controller installed in a personal computer, and whose essential basic Module functions are contained in two boards.

The parameter settings for the boards are realized by the same operating environment as the Module Machine Controllers. Consequently, definitions can be easily understood by assuming that the built-in personal computer construction is a Modular design. If the MP910 is shown as a virtual Modular design, its configuration is shown below.
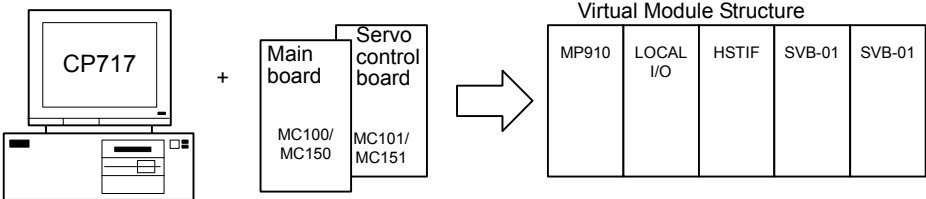
3.4.2 Opening the Module Configuration Definitions Window

Open the window shown below according to *3.2 Basic Module Configuration Definition Operation*.
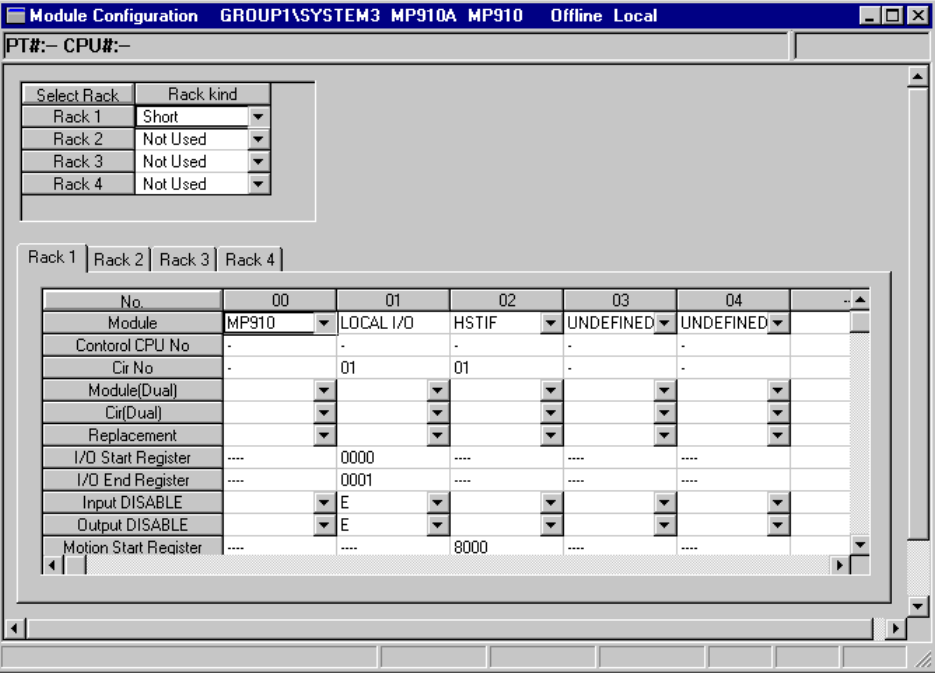
Fig 3.1 MP910 Module Configuration Definitions Window

■ Configuration Information

This window consists of tab pages that define the slot details for the racks and the rack settings.

A maximum of a 4-rack Machine Controller can be set using the CP-717, but the MP910 is restricted to Rack 1settings. Racks 2 to 4 cannot be set.

The number of functional Modules (i.e., number of slots) that can be mounted to a rack is 9 maximum, but the MP910 is installed in a personal computer, so settings are limited to slot 04. Also, the Modules allocated to the slots cannot be changed.

Rack 1:

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

3.4.3 Setting Module Configuration Definitions

■ Configuration Rack Information and Slot Information

MP910 virtual racks are allocated to the tab page for Rack 1.

Setting Item	Details
Select Rack, Rack Kind	The MP910 is automatically set to Rack 1 and a short rack.
No.	This number shows the slot numbers in the rack.
Module	Automatically set using the Module name set in the slots.
Control CPU No	The MP910 CPU is set automatically to 01.
Cir No.	In the MP910, LOCAL I/O and HSTIF Modules are automatically set to 01.
Module (Dual)	The Dual Modules Setting is not supported in the current version.
Cir (Dual)	Dual Transmission Paths Setting is not supported in the current version.
Replacement	Hot Swapping (removal/insertion under power) is not supported in the current version.
I/O Start Register	Refer to LOCAL I/O and SVB-01 settings.
I/O End Register	Refer to LOCAL I/O and SVB-01 settings.
Input DISABLE	Sets to enable/disable inputs. Blank: Enable/disable, D: Disabled, E: Enabled
Output DISABLE	Sets to enable/disable outputs. Blank: Enable/disable, D: Disabled, E: Enabled
Motion Start Register	This is set automatically.
Motion End Register	This is set automatically.
Detail	Performs MECHATROLINK communications definitions for SVB-01.
Status	This is not currently supported.

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

1 0000 to 13FF hex (5,120 words total)
Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.

2 With the MP910, standard register numbers have been set for each Module. We recommend using these standard register number settings.

- LOCAL I/O: 0000 to 0001
- SVB-01: 0100 to 04FF (slot 03)
    0500 to 08FF (slot 04)

Automatically set items cannot be changed.

■ Saving, Deleting, and Closing Module Configuration Definitions

For the saving, deleting, and closing procedures, refer to *3.3 Basic Individual Module Definition Operations*.

3.4.4 Opening Individual Module Configuration Definitions Window

Set the individual Module definition data for the MP930 using the procedure in *3.3 Basic Individual Module Definition Operations*. Refer to the following for individual Module setting data.

- LOCAL I/O definitions
- SVB-01 definitions

3.4.5 Local I/O Definitions

This section explains the local I/O definitions that are set for virtual slot 01.
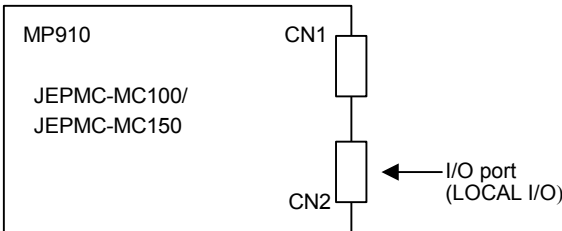
■ Opening the Local I/O Definition Window

Open the following window by referring to *3.3 Basic Individual Module Definition Operations*.

3
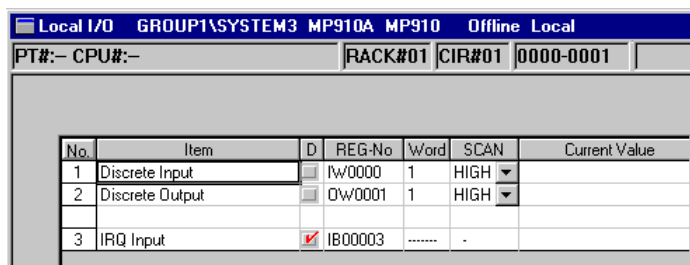
Fig 3.2 Local I/O Definitions Window

Local I/O Definition Details

Setting Item	Details
No.	Indicates the number of the setting.
Item	Indicates the name of the setting and the I/O signal name.
D	Controls the register's disable setting. A register is one word in length, so the setting applies to 16 I/O bits. The register is disabled when a check is displayed in the box. • ☐ : Enabled • ☑ : Disabled
REG-No.	Indicates the I/O register number. In the MP910, the inputs use 5 bits and the outputs use 4 bits, and the register number allocation is fixed (IW0000 and OW0001).
Word	Indicates the number of consecutive words in the register. In the MP910, the allocation is fixed at 1 word, so the number of words is "1."
SCAN	Sets the transmission processing scan. • High: High-speed scan • Low: Low-speed scan • (NA): No scan specification
Current value	In online mode, the current value of the allocated Machine Controller register will be displayed in binary. The current value of "Discrete Output" can be changed and is immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the current value column. In offline mode, nothing will be displayed.

REG-No.

The following table shows the default register allocations for group input signals.

For details, refer to *5.2 Group Definitions*.

Group Input Signal	Register
Auto Mode	IB00000
Manual Mode	IB00001
Start	IB00002
Program Stop	IB00003

Group Input Signal	Register
Pause	IB00004
E-Stop	IB00005
Alarm Reset	IB00006
Machine Lock	IB00007
Debug Mode	IB00008
Debug Run	IB00009
Skip 1	IB0000A
Skip 2	IB0000B

Local I/O Definition Window (Current Values)

No.	Item	D	REG-No	Word	SCAN	Current Value	HEX
1	Discrete Input		IW0000	1	HIGH ▼	0000 0001 0010 1010	H012A
2	Discrete Output		OW0001	1	HIGH ▼	0000 0000 0000 0000	H0000

■ Saving, Deleting, and Closing Local I/O Definition Data

Refer to *3.3 Basic Individual Module Definition Operations*.

3.4.6 SVB-01 Definitions

This section explains SVB-01 (MECHATROLINK) definitions, which can be allocated to MP910 virtual slot numbers 03 and 04.

■ MECHATROLINK Network Outline

The following example provides a conceptual diagram of MECHATROLINK connections. In this example, Network Servos and an I/O Unit are connected to the MP910 (servo control board) by high-speed serial communications (MECHATROLINK).

Two MECHATROLINK network systems can be configured in the MP910.
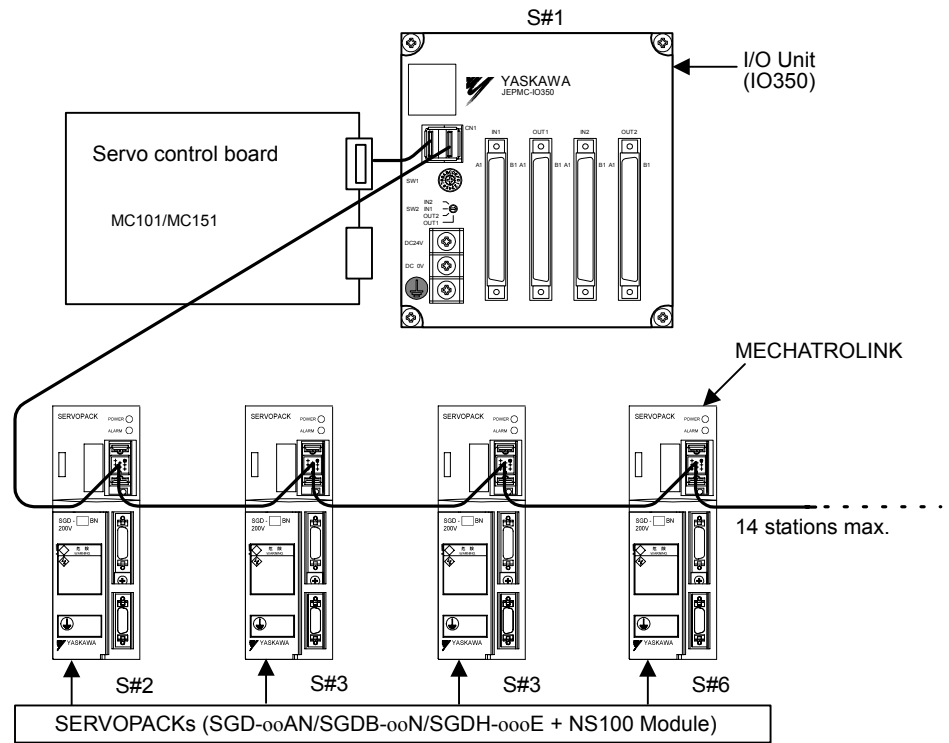
Fig 3.3 MECHATROLINK Connections Example

In this diagram, a Remote I/O Unit is connected in station 1 (S#1) and SERVOPACKs are connected in stations 2 through 5 (S#2 through S#5).

■ SVB-01 and MECHATROLINK Definitions

Refer to *3.5.19 SVB Motion Parameters Settings* and *3.5.20 MECHATROLINK Definitions*.

3.5 MP920 Module Definitions

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

3.5.1 MP920 Module Configuration

The MP920 is a Building-block Machine Controller and Modules can be assembled as required with only certain restrictions. Expansion Interface Modules can be used to create a system with up to 4 racks.

The following diagram shows an example MP920 configuration.

The number of Basic Modules can be increased by mounting an Expansion Interface Module here and expanding to another rack.
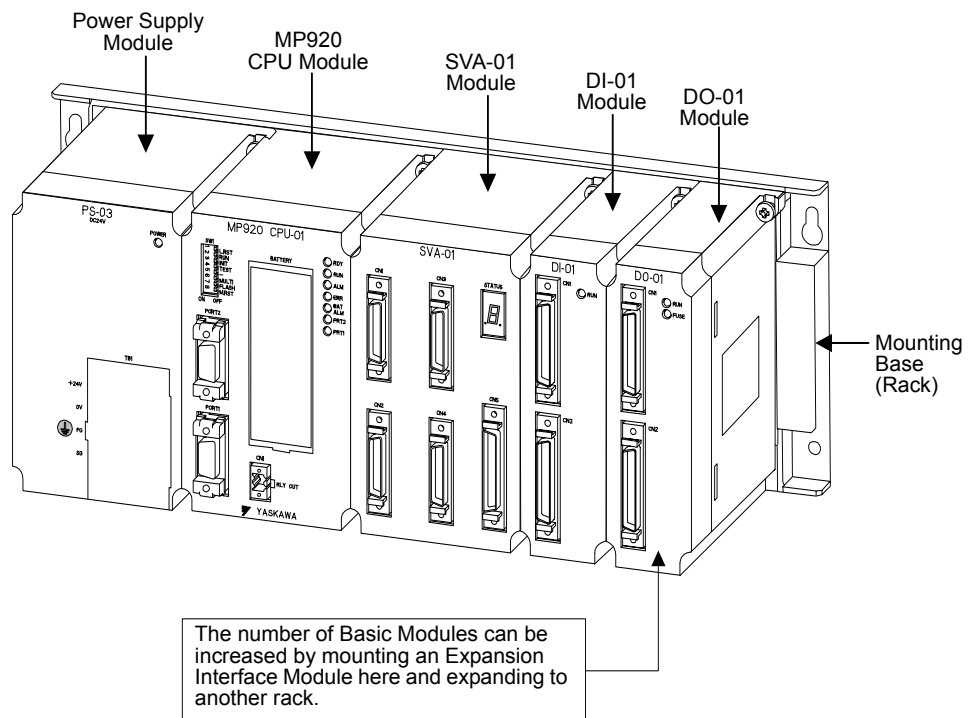
3.5.2 Opening the Module Configuration Definitions Window

Open the following window according to the procedure in *3.2 Basic Module Configuration Definition Operation*.

On the MP920, slots 00 to 08 (with a long rack) on racks 1 to 4, the maximum system configuration, must be set. The first time registration is attempted, all Modules will be UNDEFINED, so settings must be made from the CPU Module. For details information concerning racks and slots, refer to the MP920 User's Manual: Design and Maintenance (SIEZ-C887-2.1).
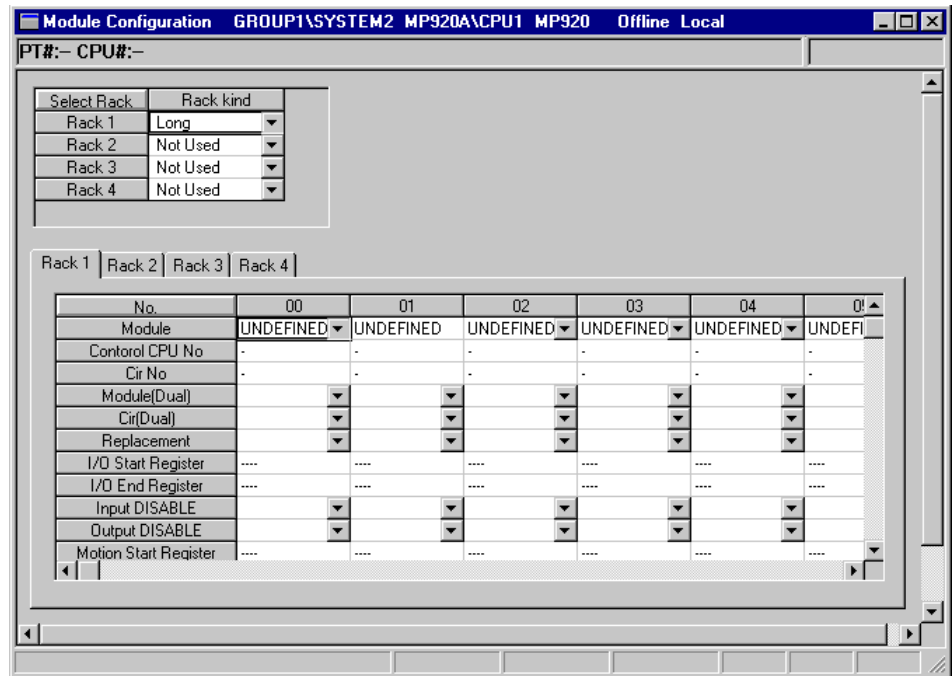
Fig 3.4 Initial Registration Window

3.5.3 Setting Module Configuration Definitions

■ Configuration of the Module Configuration Definitions Window

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

Power Supply Module MP920 CPU Module SVA-01 Module DI-01 Module DO-01 Module

The Power Supply Module is mounted on the left side of each rack.

Mounting Base (Rack)

Slots are numbered 0, 1, 2, ... from the left following the Power Supply Module.

PS	Slot 0	1	2	3	4	5	6	7	8

(Slot numbers on a long rack)
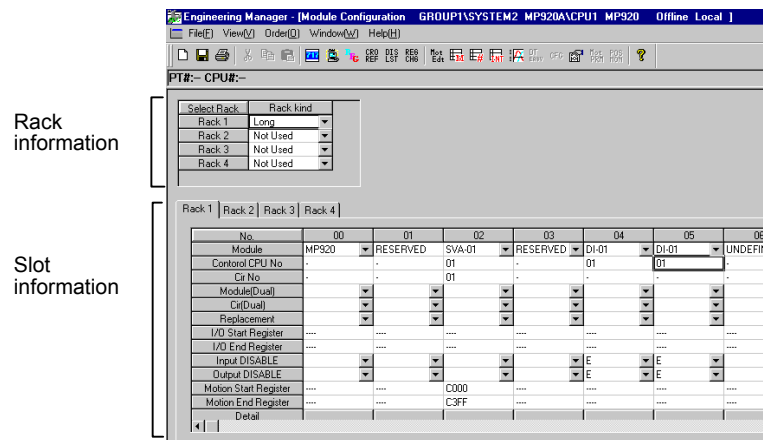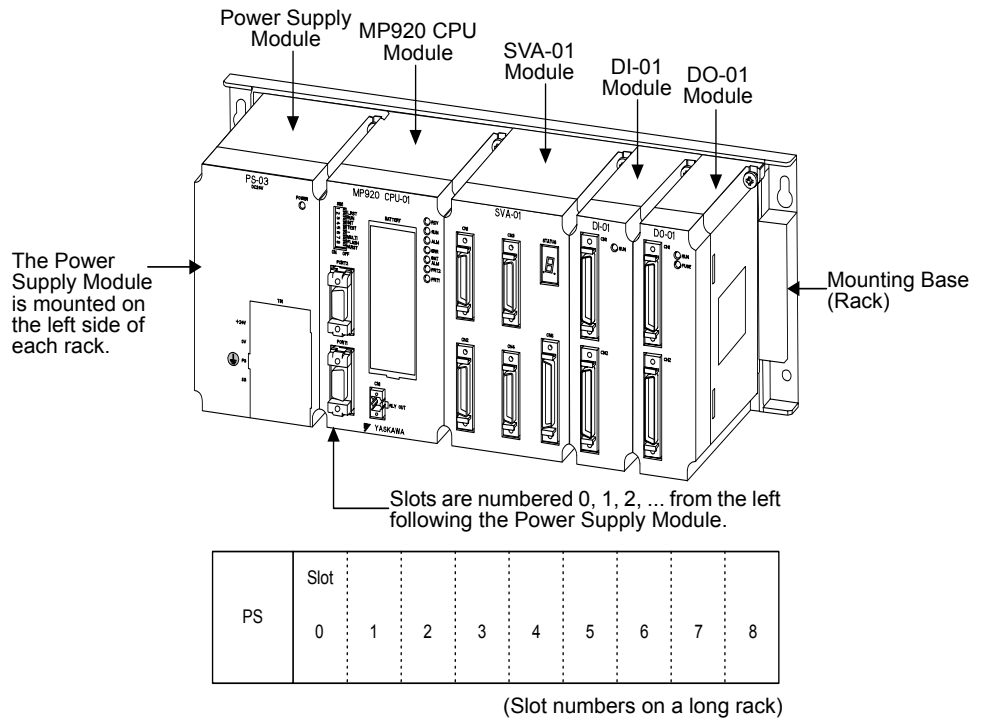
The Power Supply Module is required, even though it is not displayed in the Module Configuration Definitions Window.

■ Setting Configuration Rack Information

Select the kind of rack to be connected to the Module. A maximum of 4 racks can be connected to the MP920. Short racks have 6 slots and long racks have 9 slots. Set the configuration rack information depending on the system configuration in use.

Machine Controller	Maximum No. of Racks	Remarks	Select Rack	Rack kind
MP920	4		Rack 1	Long
			Rack 2	Not Used
			Rack 3	Not Used
			Rack 4	Not Used

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

For example, if Modules from slot 8 onwards are defined using the long configuration, and this is changed to the short configuration, Modules from slot 8 onwards cannot be edited.

For single CPU configuration and multiple CPU configuration, select "long" or "short."

IMPORTANT If changing racks in online mode, execute the change while Machine Controller operation is stopped. Refer to *2.1.8 Switching the CPU Status* for the procedure to stop the Machine Controller.

■ Setting Slot Information Columns

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

• No.	• I/O End Register
• Module	• Input DISABLE
• Control CPU No.	• Output DISABLE
• Cir No.	• Motion Start Register
• Module (Dual)	• Motion End Register
• Cir (Dual)	• Detail
• Replacement (Hot Swapping)	• Status
• I/O Start Register	---

No. (Slot Number)

Indicates the slot number of the slot in which Modules are mounted.

Slot numbers are determined by the kind of rack for racks 1 through 4. Modules are defined for slot numbers that are in the long/short rack's range. Slot numbers outside of a rack's range are listed as "UNDEFINED," and an error will occur when the settings are saved.

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

Module

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

Item	Module	No. of Occupied Slots	Remarks
UNDEFINED	Not defined	1	
MP920	CPU Module	2	Can only be mounted to slots 00 and 02 on rack 1.
EXIOIF	EXIOIF Module	1	
215IF	215IF Module	1	
217IF	217IF Module	1	
218IF	218IF Module	1	
260IF	260IF Module	1	
LIO-01	LIO-01 Module	1	
AI-01	AI-01 Module	1	
AO-01	AO-01 Module	1	
DI-01	DI-01 Module	1	
DO-01	DO-01 Module	1	

Item	Module	No. of Occupied Slots	Remarks
CNTR-01	CNTR-01 Module	1	
SVA-01	SVA Module	2	Enabled with Control CPU number 1.
PO-01	PO-01 Module	1	
SVB-01	SVB-01 Module	1	
SVA-02	SVA-02 Module	1	

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

IMPORTANT

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

The following diagram shows a multiple-CPU configuration.

Slot No.   00   01   02   03   04
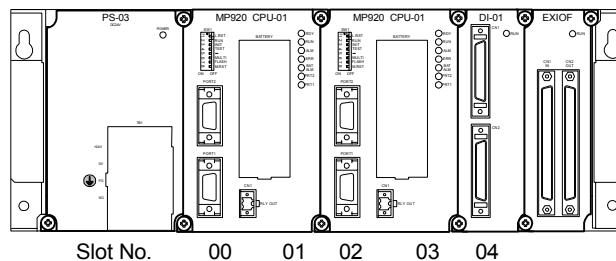
Control CPU No.

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

Input "1" to select the CPU Module in slot 0 or "2" to select the CPU Module in slot 2. Input "1" for a single-CPU configuration. An error will occur when the settings are saved if the Control CPU Number is set to "2" but there is only one CPU Module.

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

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

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

INFO

To use the multiple-CPU configuration, multiple CPUs must be specified when creating a new PLC folder with the File Manager. See *2.1 File Manager* for details.

1. CPU Configuration

    a) Single/Multiple CPU

        There are two CPU configurations: The single CPU configuration and the multiple

CPU configuration. The CPU configuration can be defined by setting the Modules as shown in the following table.

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

b) CPU Rack

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

- If a CPU Module is not defined in slot 00 of rack 1.
- If the multiple-CPU configuration has been set in the CP-717 File Manager Window, but only one CPU Module is set in the Module Configuration Definitions Window.

c) Other Points

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

2. Control CPU Number Setting and Module Operation

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

- Control CPU Number = 1

  Control CPU: CPU Module in slot 0 (CPU #1)

  Non-Control CPU: CPU Module in slot 2 (CPU #2)

- Control CPU Number = 2

  Control CPU: CPU Module in slot 2 (CPU #2)

  Non-Control CPU: CPU Module in slot 0 (CPU #1)

a) Module Initialization

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

Compatible Modules are as follows:

- 215IF, 217IF, 218IF, 260IF, LIO-01, AI-01, AO-01, CNTR-01, DI-01, DO-01, SVA-01/02, PO-01, SVB-01

b) Link I/O Processing

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

The only compatible Module is the 215IF Module.

c) Local I/O Processing

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

Compatible Modules are as follows:

- LIO-01, AI-01, AO-01, DI-01, DO-01, CNTR-01

d) Message I/O Processing

For the following Modules, messages can be input and output by using the system functions (MSG-SND and MSG-RCV) in the control CPU.

Compatible Modules are as follows: 215IF, 217IF, 218IF, and 260IF.

- Master (Send):
  Messages can be sent using the MSG-SND function in the control CPU.
- Slave (Receive):
  Messages specified for the CPU number are received using the MSG-RCV function in the control CPU. With the 217IF Module, the CPU number is not specified in messages, so the receiving CPU can be selected by controlling the MSG-RCV function startup in the application.

e) Motion Control

The SVA-01/02, PO-01, and SVB-01 Modules can perform motion control. Motion can be controlled only for Control CPU #1. Only CPU #1 can be displayed and set in the Motion Parameter Window, but it is possible to program motion I/O with CPU #2's drawing/function programs or display and set the motion I/O registers in the register list.

Compatible Modules are as follows: SVA-01/02, PO-01, SVB-01.

f) Other Points

- External Interrupt Processing

  For the LIO-01, CNTR-01, and DI-01 Modules, external interrupts are controlled by the control CPU, although the Interrupt Process Drawing (DWG.I) is activated simultaneously for both the CPUs.

  Compatible Modules are as follows: LIO-01, CNTR-01, and DI-01.

- Hot Swapping (Replacement) and Dual Modules

  These functions are controlled by the control CPU. Hot swapping is not supported in the current version for the MP920. The 215IF and EXIOIF Module support Dual Module operation.

3

Cir No. (Circuit Number)

Input each Module's circuit number. When two or more of the same model Module are used, assign circuit numbers in order (1, 2, 3, ...).

The circuit number for Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01) are handled as Motion Module numbers.

The following table shows the range of circuit numbers that can be input for each Module.

Module	Circuit Numbers	Module	Circuit Numbers
MP920	-	AO-01	-
EXIOIF	-	DI-01	-
215IF	1 to 8	DO-01	-
217IF	1 to 25	CNTR-01	-
218IF	1 to 8	SVA-01	1 to 16
260IF	1 to 8	SVA-02	1 to 16
LIO-01	-	PO-01	1 to 16
AI-01	-	SVB-01	1 to 16

Each 217IF Module uses three circuits, so allow three circuit numbers for each Module by inputting values 3n+1 (1, 4, 7, ...).

Modules other than the 217IF Module use just 1 circuit per Module, so allow just one circuit number for each Module by inputting consecutive values (1, 2, 3, ...).

Circuit numbers for Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01) are treated as Motion Module numbers. The maximum number of Motion Modules that can be used in one system is limited to 16.

The same circuit number cannot be set for more than one of the same type of Module, in systems using multiple racks (4 max.).

An error will occur when the settings are saved if the same circuit number is set for more than one Modules.

Module (Dual) (Dual Modules)

Some Modules can be set as Dual Modules to improve reliability.

The following table shows the Modules for which can be set as Dual Modules.

Module	Specification	Module	Specification
MP920	No	AO-01	No
EXIOIF	Yes	DI-01	No
215IF	Yes	DO-01	No
217IF	No	CNTR-01	No
218IF	No	SVA-01	No
260IF	No	SVA-02	No
LIO-01	No	PO-01	No
AI-01	No	SVB-01	No

1. Dual Module Setting

   When setting a Dual Module, the same type of Module must be defined in another slot and the Dual Module setting for the Modules must be set to "Enable."

2. Dual Setting Error

   An error will occur when the settings are saved if Dual Modules are set but there are not two Dual Modules, i.e., if there is just one Module or more than two Modules.

3. Dual Transmission Paths

   With 215IF Modules, it is possible to specify a dual transmission path. The Dual Module setting must also be made for the dual transmission path.

Cir (Dual) (Dual Transmission Paths)

Sets a dual 215IF transmission path.

Replacement (Hot Swapping)

Hot swapping (removal/insertion under power) is not supported in the current version.

I/O Start Register

Inputs the leading register number for each Module's I/O.

- Register Ranges

  The following table shows the fixed range of registers for each Module.

Table 3.1 Register Ranges

Module	Minimum Number of Words	Maximum Number of Words
MP920	-	-
LIO-01	-	-
215IF	0 Hex	800 Hex
217IF	-	-
218IF	-	-
260IF	-	-
LIO-01	1 Hex	10 Hex
AI-01	1 Hex	8 Hex
AO-01	1 Hex	4 Hex
DI-01	1 Hex	4 Hex
DO-01	1 Hex	4 Hex
CNTR-01	1 Hex	40 Hex
SVA-01	400 Hex	400 Hex
SVA-02	400 Hex	400 Hex
PO-01	400 Hex	400 Hex
SVB-01	400 Hex	400 Hex

3

When the leading register number of the register range is input, the default ending register will be calculated automatically by adding the fixed register range for each Module to the leading register number. A value of "-" can be input to set the register range to 0. (The display will show "-----" when the register range is 0.)

An error will occur when the settings are saved if a value that exceeds the register range has been input.

An error will occur when the settings are saved if Dual Modules has been set but the Modules have different register ranges.

◉ INFO ▶

With the SVA-01, SVA-02, PO-01, and SVB-01 Modules, the circuit number is also the Servo Module number and the register range is fixed according to that Motion Module number. This fixed register range is not displayed in the I/O Start Register and I/O End Register columns, but in the Motion Start Register and Motion End Register columns.

Details on register ranges for the above Modules are displayed in the *3.5.17 SVA Motion Parameters Settings*, *3.5.18 PO-01 Motion Parameters Settings*, or *3.5.19 SVB Motion Parameters Settings*.

I/O End Register

Inputs the ending register number for each Module's I/O. See *Table 3.1 Register Ranges* on the previous page for details.

Input DISABLE

Controls the Input Disable setting for each Module.

- Blank: Disable specification not allowed.
- D: Inputs disabled.
- E: Inputs enabled.

The following table shows the Modules in which I/O can be disabled.

Module	Specification Allowed	Module	Specification Allowed
MP920	No	AO-01	Yes
EXIOIF	No	DI-01	Yes
215IF	No	DO-01	Yes
217IF	No	CNTR-01	Yes
218IF	No	SVA-01	No
260IF	No	SVA-02	No
LIO-01	Yes	PO-01	No
AI-01	Yes	SVB-01	-

Output DISABLE

Controls the Output Disable setting for each Module. See Input DISABLE above for a table listing the Modules in which I/O can be disabled.

- Blank:Disable specification not allowed.
- D: Outputs disabled.
- E: Outputs enabled.

Select "D" to disable or "E" to enable.

Modules marked with a "-" in the I/O disabled column cannot be disabled.

An error will occur when the settings are saved if Dual Modules has been set but the Modules have different I/O DISABLE settings.

Motion Start Register

With Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01), this row displays the motion parameter register's leading offset address, which is allocated according to the circuit number (Motion Module number) setting for the Module. The Motion Start Register cannot be set.

Motion Module Number	Leading Register Number (Motion Start Register)	Ending Register Number (Motion End Register)
1	C000	C3FF
2	C400	C7FF
3	C800	CBFF
4	CC00	CFFF
5	D000	D3FF
6	D400	D7FF
7	D800	DBFF
8	DC00	DFFF
9	E000	E3FF
10	E400	E7FF
11	E800	EBFF
12	EC00	EFFF
13	F000	E3FF
14	F400	E7FF
15	F800	EBFF
16	FC00	EFFF

Motion End Register

With Motion Modules (SVA-01, SVA-02, PO-01, and SVB-01), this row displays the motion parameter register's ending offset address, which is allocated according to the circuit number (Motion Module number) setting for the Module. The Motion End Register cannot be set.

Detail

This heading was provided to indicate a second set of individual definitions when the Module assigned to the slot has individual definitions that are divided into more than one group.

For example, both MECHATROLINK Interface Definitions and Servo Parameter Defini-

3

tions are required when an SVB-01 Module is assigned, so "M-LINK" will be displayed under the Detail heading and the Module's MECHATROLINK Definitions can be displayed by double-clicking M-LINK.

No.	00	01	02	03	04
Module	MP920 ▼	RESERVED	SVA-02 ▼	SVB-01 ▼	218IF ▼
Contorol CPU No	-	-	01	01	01
Cir No	-	-	01	01	01
Module(Dual)	▼	▼	▼	▼	▼
Cir(Dual)	▼	▼	▼	▼	▼
Replacement	▼	▼	▼	▼	▼
I/O Start Register	----	----	----	----	----
I/O End Register	----	----	----	----	----
Input DISABLE	▼	▼	▼	▼	▼
Output DISABLE	▼	▼	▼	▼	▼
Motion Start Register	----	----	C000	C000	----
Motion End Register	----	----	C3FF	C3FF	----
Detail				M-LINK	

Status

The status of each Module will be displayed when the CP-717 is in online mode. Nothing will be displayed in this row in offline mode. The following table lists the status that is displayed.

Display	Meaning
No Display	A Module has not been defined and no Module is mounted.
Empty	A Module has been defined, but no Module is mounted.
Running	The Module is operating normally.
Waiting	The Module is in standby status.
Breaking	An error was detected in the Module.
X "Module name"	The mounted Module doesn't match the defined Module.
Waiting a Initialize	A Module is mounted, but no Module is defined.
Stopped	An LIO-01 Module is stopped.
Stop (DO NOT REPLACE)	The Remove Switch is ON, but hot swapping (Replacement) has been disabled in the Module Configuration Definitions Window.
Replacement Ready	The Remove Switch is ON and the RMV indicator is lit.
Running (Control)	The Module is operating in Dual Synchronous Operation[1] and has control of the bus.
Running (Standby)	The Module is operating in Dual Synchronous Operation but does not have control of the bus.

TERMS

[1] Dual Synchronous Operation
   To increase reliability in RUN mode, two of the same Modules are run simultaneously for redundant control. The specification can be made for the 215IF and EXIOIF Modules.

3.5.4 Saving, Deleting, and Closing Module Configuration Definitions

Save, delete, and close Module definitions according to the procedure in *3.2 Basic Module Configuration Definition Operation*.

INFO

In a multiple-CPU configuration, the Module configuration definitions cannot be deleted if one of the CPUs is in RUN state.

IMPORTANT

Saving or deleting Module configuration definitions in online mode can have a significant effect on operation. Be sure that it is safe to change the Module configuration definitions before saving or deleting Module definitions in online mode.

3.5.5 Opening Separate Definition Windows

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Set the definition data for the individual MP920 Modules according to *3.3 Basic Individual Module Definition Operations*. An MP920 Module example is shown below.

INFO

When the individual Definition Window of one Dual Module is opened and its configuration data is saved, the other duplicated Module's configuration data will be saved at the same time.

Table 3.2 Individual Definitions Table

Basic Module (Abbreviation)	Module Name	Slot Occupied	Reference Item
MP920	CPU	2	Generic Serial definitions
RESERVED	Reserved by system	1	No individual definitions. Reserved using slot 2 Module.
UNDEFINED	Undefined	1	No individual definitions.
EXIOIF	System bus expansion interface	1	No individual definitions.
215IF	215IF	1	215IF communications definitions
217IF	Serial	1	217IF communications definitions
218IF	Ethernet	1	218IF communications definitions
260IF	DeviceNet	1	260IF definitions
LIO-01	Local I/O	1	Local I/O communications definitions
DI-01	Digital input	1	Digital input definitions
DO-01	Digital output	1	Digital output definitions
CNTR-01	Counter	1	Counter I/O definitions
AI-01	Analog input	1	Analog input definitions

Basic Module (Abbreviation)	Module Name	Slot Occupied	Reference Item
AO-01	Analog output	1	Analog output definitions
SVA-01	4-axis servo	2	SVA settings
SVA-02	2-axis servo	1	SVA settings
PO-01	Pulse output	1	PO-01 settings
SVB-01	MECHATROLINK I/F	1	MECHATROLINK definitions, SVB definitions

> INFO
>
> 1 An individual Module Definition Window cannot be opened for slots set to "EXIOIF," "UNDE-FINED," or "RESERVED."
>
> 2 The MP920 Module has two general-purpose serial ports. The Generic Serial Definitions Window will be displayed when the MP920 is clicked. The general-purpose serial port parameters are the only parameters set for the MP920 Module.
>
> 3 The SVB-01 Module's MECHATROLINK settings must be made before the Motion Parameters. The MECHATROLINK Definitions Window can be opened by double-clicking *M-LINK* in the *Details* row of the Module Configuration Definitions Window.

3.5.6 General-purpose Serial Communications Definitions

This section explains the methods for defining general-purpose serial communications systems.

■ Outline of Generic Serial Communications

The MP920 is equipped as a standard feature with two RS-232 general-purpose serial ports (port 1 and port 2), enabling data communications with other Machine Controllers and devices that support RS-232 communications. Ports 1 and 2 can also be used as engineering ports for the CP-717.

Here, the hardware and software definitions necessary for serial communications are set. The Machine Controller operates as a master or slave depending on the protocol and according to these settings.

- Generic serial communications 01 and 02: If the MP920 is being used as a slave, responses are sent automatically in answer to queries from the master. If the MP920 is being used as a master, communications are started using MSG-SND functions within the DWG or function programs.

Generic Serial ports

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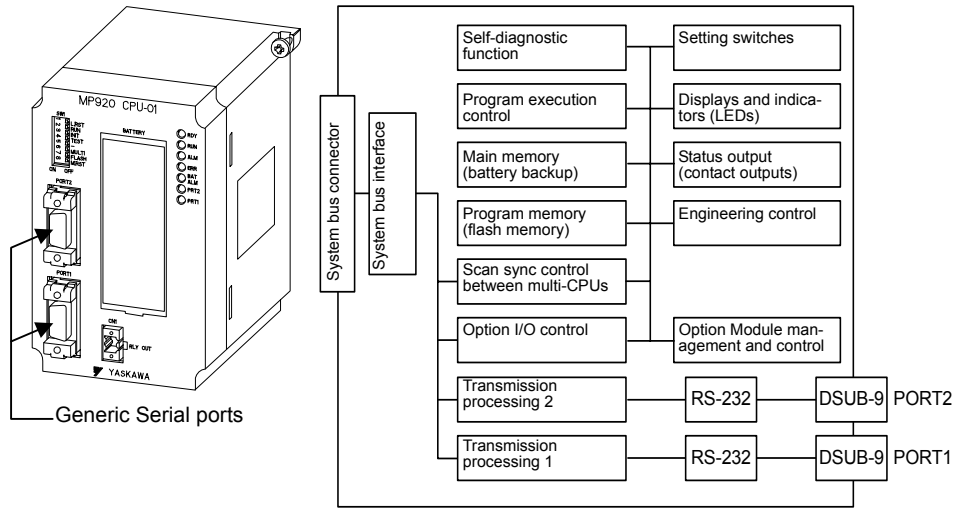
Generic Serial Connections Example
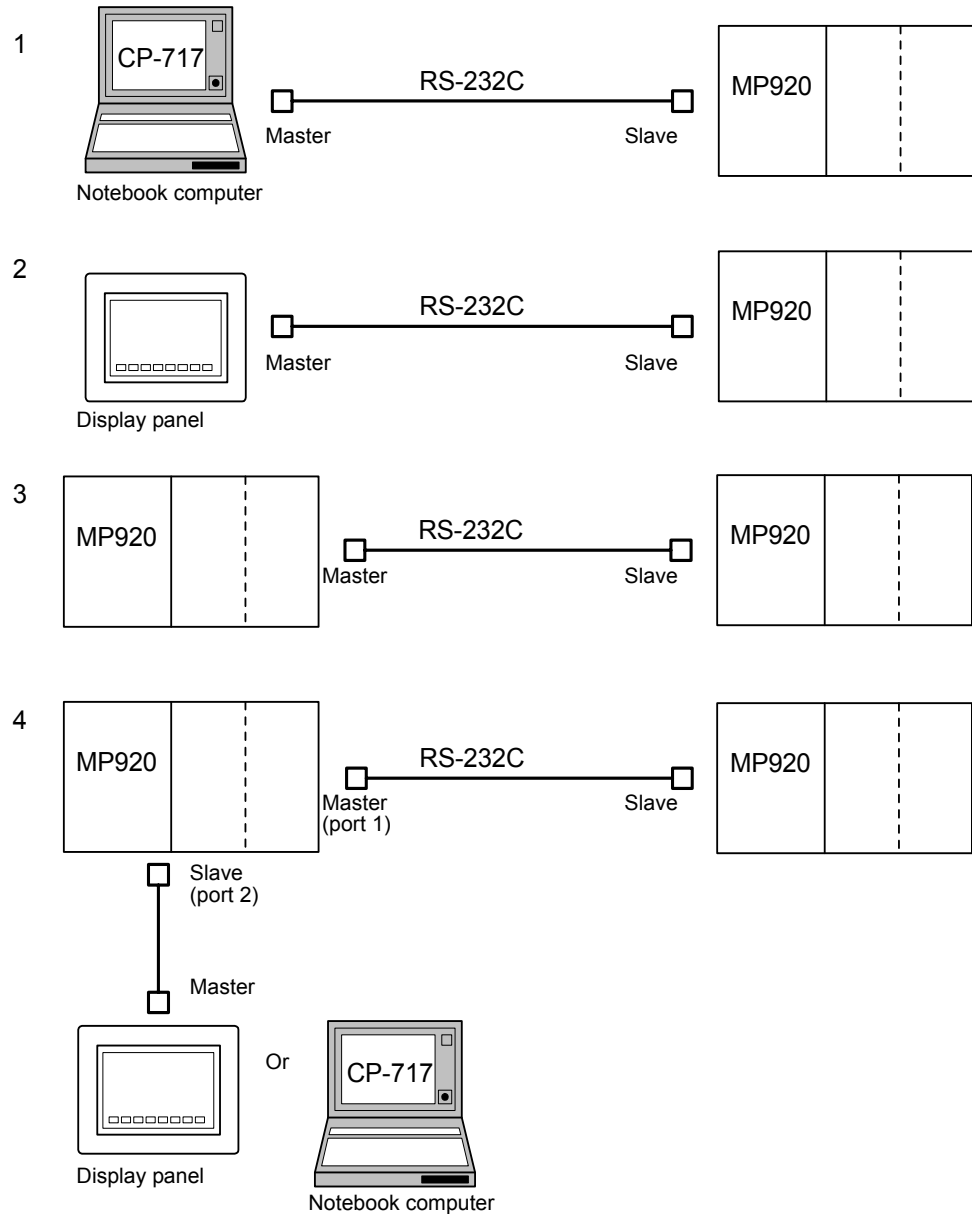
Opening the Generic Serial Communications Definitions Window

Open the Generic Serial Communication Definitions Window according to *3.3 Basic Individual Module Definition Operations*.

The general-purpose serial ports are provided on the MP920 CPU Module, so they correspond to the Module for slot 00.
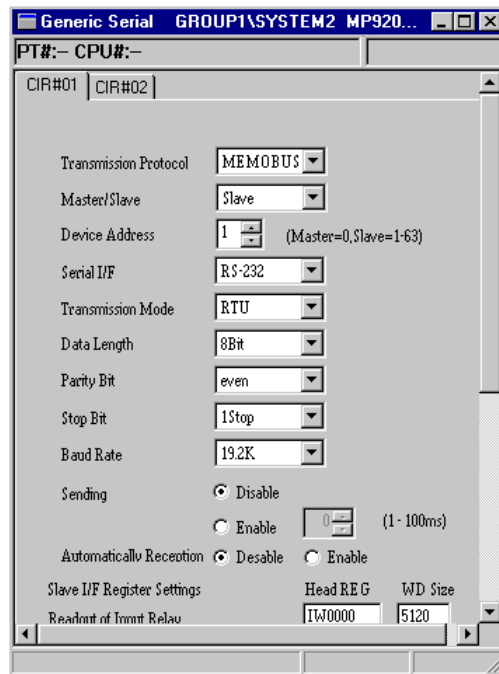
Fig 3.5 Generic Serial Communication Definitions Window

■ Generic Serial Communications Definitions

Setting Generic Serial Parameters

Set the required parameters to use the general-purpose serial communications system.

Use the CIR#01 tab to set general-purpose serial 01, and use the CIR#02 tab to set general-purpose serial 02.

Table 3.3 Generic Serial Communication Definitions Window

Setting Items	Details
Transmission Protocol	Select the desired protocol. • MEMOBUS: Yaskawa's standard MEMOBUS protocol. • MELSEC: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links. • No protocol: Data can be transferred at any time by the user application program.
Master/Slave	When the Transmission Protocol has been set to MEMOBUS or MELSEC, select whether the Machine Controller will operate as a Master or a Slave.
Device Address	Select the device address. When the Machine Controller is being used as a Master, set the device address to 0. When the Machine Controller is being used as a Slave, set the device address to a value between 1 and 63.
Serial I/F (Serial Interface)	Select the serial interface.

Setting Items	Details
Transmission Mode	Select the transmission mode. • RTU: Specifies RTU mode when the Transmission Protocol is set to MEMOBUS. • ASCII: Specifies ASCII mode when the Transmission Protocol is set to MEMOBUS. • None: Use for MELSEC, OMRON, and no-protocol transmissions.
Data Length	Select the number of bits in one character. • 8Bit: 8 bits • 7Bit: 7 bits
Parity Bit	Specify whether or not the parity bit will be used. • Even: Even parity • Odd: Odd parity • None: No parity check
Stop Bit	Select whether there will be one or two stop bits at the end of the sending character. • 1stop: 1 stop bit • 2stop: 2 stop bits
Baud Rate	Select the transmission speed (bps).

Sending (Send Delay Setting)	When *Enable* is selected, a delay until the beginning of transmissions (1 to 100 ms) can be set.
	• Master Station:
	  The delay will be included between execution of the MSG-SND function and the transmission of the command.
	• Slave Station:
	  The delay will be included between reception of a command by the MSG-RCV function and the transmission of the response.

■ Setting Slave Interface Registers (Automatic Response)

Specify the ranges of relays, registers, and coils to check when automatically sending a response message to a query from the master. These settings are valid for slave stations only.

There is no need to set the ranges when message communications will not be performed between the master and slaves. Also, if the ladder program is being used to return a response message with the MSG-RCV function, disable the MSG-RCV so that redundant processing is not performed.

With the system default settings, response messages will be sent using the ranges set with the following parameters.

Setting Item	Details
Readout of Input Relay	With general-purpose serial communications, set the range and start address of input relays that can be read using serial communications. Refer to the table below for setting details.
Readout of Input Register	With general-purpose serial communications, set the range and start address of input registers that can be read using serial communications. Refer to the table below for setting details.
Readout/Write-in Coil	With general-purpose serial communications, set the range and start address of coils that can be read or written to using serial communications. Refer to the table below for setting details.

Setting Item	Details
Readout/Write-in of Hold Register	With general-purpose serial communications, set the range and start address of holding registers that can be read or written to using serial communications. Refer to the table below for setting details.
Write-in width of Coil/ Hold Register	Set the range that can be written to of the coils and holding registers as a whole.

Table 3.4 Start Register Address and Number of Words

Setting Item		Machine Controller					
		MP920	CP-316	CP-316H	CP-916A	CP-916G	RIO-55
Readout of Input Relay	Leading register	IW0000	IW0000	IW0000	IW0000	IW0000	IW0000
	No. of words	5120	6400	6400	2304	2304	2304
Readout of Input Register	Leading register	IW0000	IW0000	IW0000	IW0000	IW0000	IW0000
	No. of words	5120	6400	6400	2304	2304	2304
Readout/ Write-in Coil	Leading register	MW00000	MW00000	MW00000	MW00000	MW00000	MW00000
	No. of words	32768	8192	16384	3072	3072	3072
Readout/ Write-in Hold Register	Leading register	MW00000	MW00000	MW00000	MW00000	MW00000	MW00000
	No. of words	32768	8192	16384	3072	3072	3072

■ Saving, Deleting, and Closing Generic Serial Definitions Data

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.7 215IF Transmission Definitions

This section explains how to define the 215IF transmission system.

■ Outline of 215IF Transmissions

The 215IF transmission system is a unique real-time Yaskawa network with transmission speed 4 Mbps. Twisted-pair cable is used for the transmission lines, so an inexpensive but highly reliable transmission system can be constructed.

The settings required for 215IF transmissions are divided into four tab pages: The **Parameter Settings**, **Link Assignments**, **I/O Map**, and **Status** Tabs.

There are two kinds of transmissions in a 215IF Transmission System: Link transmissions and message transmissions. The required settings for the link transmissions are made here. Link transmissions are repeated every cycle according to the settings made here. Message transmissions are programmed in drawing/function programs using the MSG-SND and MSG-RCV functions.

3.5.7 215IF Transmission Definitions
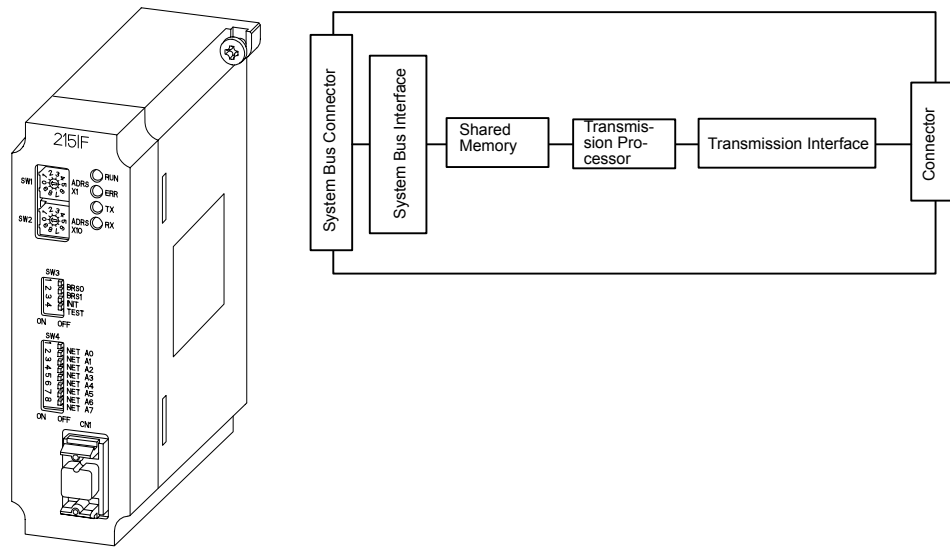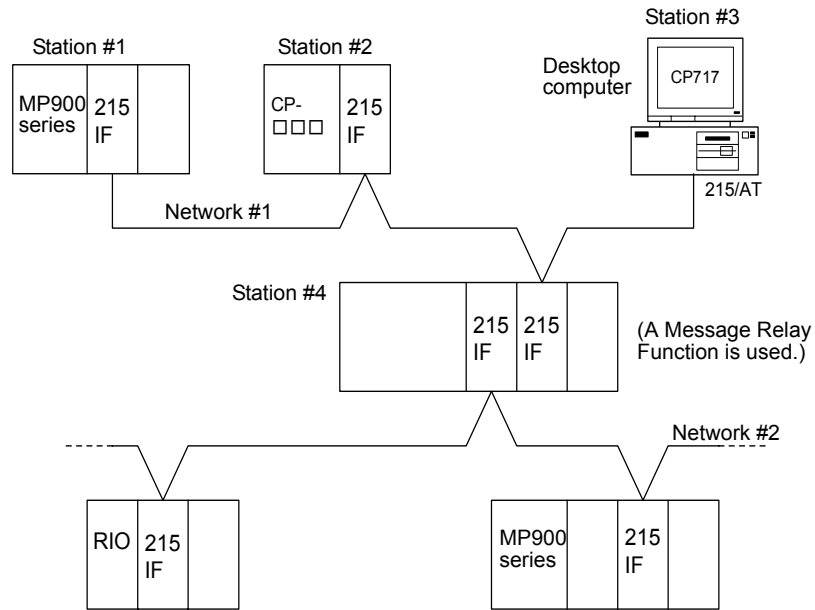
Note: 1. The network is composed of two segments: Network #1 and Net-
work #2.

2. Station 4 (S#4) uses the 215IF Module's Message Relay Function
to exchange data between Network #1 and Network #2.

3. A 215/AT Interface Card is required in the desktop computer.

Fig 3.6 215IF Network Configuration Example

■ Opening the 215IF Transmission Definitions Window

Open the 215IF Transmission Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.

■ 215IF Transmission Definitions Window Original Menus

The following table shows the functions of the menu commands in the 215IF Transmission Definitions Window.

Menu Command	Function
Edit (<u>E</u>)	
Default (<u>S</u>)	Sets default values.
Assignment Delete (<u>D</u>)	Deletes assignment data.
Set (<u>L</u>)	
Set DI/DO (<u>S</u>)	Allocates DI/DO for the RIO-05. (Not currently supported.)

Setting 215IF Transmission Definitions

The CP-215 Transmission Definitions Window is composed of four tab pages: The **Parameter Settings**, **Link Assignments**, **I/O Map**, and **Status** Tabs. The following table shows the settings grouped in each tab page.

3

Table 3.5 Tab Pages in the 215IF Transmission Definitions Window

Tab Name	Function
Transmission Parameters (Parameter Settings)	Sets the 215IF transmission parameters.
Link Assignment	Allocates the 215IF link transmissions.
I/O Map	Sets the I/O map.
Status	Displays the Link status.

Parameter Settings Tab Page
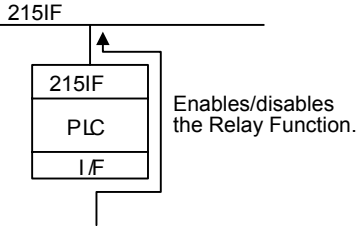
The Parameter Settings Tab contains the various parameters required to use the 215IF transmission system.

Setting Item	Details
Own Station No.	Input the local station number (1 to 64) of the 215IF Module.
Own Network No.	Input the network number (1 to 254) of the network in which the 215IF Module is connected.
Token[1] Cycle Time Setting*	Input the desired time (5 to 100) for the interval between station receptions of the token.
MEMOBUS Response Monitoring Time	Input the time to wait (0 to 255) for a response after sending a MEMOBUS command by executing the MSG-SND function. If the time is set between 1 and 255, a timeout will occur after the time setting x 2 s and the MSG-SND function will return an error. If the time is set to 0, the MSG-SND function will wait indefinitely for a response without returning an error.
Station Search Interval*	Input the number of cycles (5 to 1,000) between each search for a new station. A station search will be performed at this interval (once every 5 to 1,000 token cycles) to determine whether a new station has been started.
Transmission Speed*	Select the 215IF transmission speed (1, 2, or 4 Mbps).
Max No. of Stations Connected*	Input the maximum number of stations that can be connected (16, 32, 48, or 64). This setting is used as an upper limit value during station searches. Input a value higher than the local station number shown in the "Own Station No." box.

TERMS

[1] Token

A token is a piece of data that circulates from station to station in the network and provides each station with the right to send data. The Token Cycle Time is the time required for the token to make a complete cycle through the network and return to a given station.

Setting Item	Details
Message Relay Function	This setting determines whether the 215IF will receive messages from another transmission interface and relay that message through the 215IF interfaces, i.e., this setting enables or disables the Message Relay Function. When not using the Message Relay Function, set to "0." When using the Message Relay Function, set to "1." 215IF 215IF PLC Enables/disables I /F the Relay Function. Message Relay Function
No. of Relayed Network 1	When the Message Relay Function is enabled, this setting specifies the range of network numbers (0 to 254) that can be relay destinations. Messages will not be relayed to networks that are outside of the specified range. The network number in the No. of Relayed Network 1 setting is ORed with the network number in the No. of Relayed Network 2 setting. The Relay Function will be disabled if both settings are "0."
No. of Relayed Network 2	See the explanation for the No. of Relayed Network 1 setting, above.
Maintenance Switch	These settings are all OFF during operation. These switches are used for Yaskawa maintenance. Do not change the settings.

∗ For parameter set values and network configuration, refer to the MP920 Machine Controller User's Manual: Communications Module (SIEZ-C887-2.6).

Setting Default Values

The transmission parameters can be reset to their default values without inputting each parameter, by selecting *Edit (E)* and then *Default (S)* from the 215IF Transmission Definitions menu.

Table 3.6 Default Values of Transmission Parameters

Parameter	Default
Own Station No.	0
Own Network No.	0
Token Cycle Time Setting	100
MEMOBUS Response Monitoring Time	0
Station Search Interval	0
Transmission Speed	4
Max No. of Stations Connected	16
Message Relay Function	0
No. of Relayed Network 1	0
No. of Relayed Network 2	0

Parameter		Default
Maintenance Switches	SW1 SW2	All OFF

Link Assignments Tab Page

1. Setting Assignment Data

   Parameters such as the 215IF I/O assignment data, station name, and synchronous scan parameters are set in the Link Assignments Tab.

Setting Item	Details
SYNC-SCAN	215IF transmission is always executed. Select the scan frequency at which the 215IF transmission data is to be synchronized with the Machine Controller. • HIGH: High-speed scan • LOW: Low-speed scan
ST#	Displays the station number. Two asterisks (**) will be displayed for the local station number. The local station number is determined by the number input in the Transmission Parameter Tab's Own Station Number Box. The station number displays only the number input in the Transmission Parameter Tab's Max No. of Stations Connected Box.

Setting Item	Details			
TYPE	Select a name for the I/O device connected to each station. The following table shows the I/O devices that can be selected.			
	Selected Item	I/O Device Name	Selected Item	I/O Device Name
	CP-3500H	CP-3500H	CP-517	CP-517
	CP-316	CP-316	MP920	MP920
	CP-916A	CP-916A	CP-902	CP-902
	CP-9200SH	CP-9200SH	215IF/INV	215IF/INV
	CP-317	CP-317	RIO-05	RIO-05
	CP-316H	CP-316H	RIO-2000	RIO-2000
	CP-916G	CP-916G	RIO-120	RIO-120
	ACGC4000	ACGC4000	-	-
REG-No., SIZE	Set the leading register number (I register number) and amount of I/O data. Input an O register number for the leading register number of the local station. Be sure that the registers set for each station does not overlap with the register numbers for another station.			
SCAN	Select the transmission processing scan that services I/O. • HIGH: High-speed scan • LOW: Low-speed scan			
Station Name (Comment)	Comments up to 32 characters can be input for each station.			

2. Deleting Assignment Data

   The procedure to delete the assignment data for one station is given below.

   a) Move the cursor to the row to be deleted.

   b) Click *Edit (E)* and then *Assignment Delete (D)* on the 215IF Transmission Definitions Menu.

   The assignment data selected in step **1.** will be deleted.

I/O Map Tab Page

Allocate the Machine Controller's process I/O (local I/O and remote I/O) in the I/O Map Tab Page.

Setting Item	Details
Register Number	Each column in the table represents the first digit of the register numbers displayed on the left side of the table. In the following diagram, the cursor is positioned over bit IB30B03.
I/O Assignments	Allocate bits to I/O registers for high-speed or low-speed scan. • HI: Input set for a high-speed scan. • HO: Output set for a high-speed scan. • LI: Input set for a low-speed scan. • LO: Output set for a low-speed scan. To allocate I/O, move the cursor to the desired bit and click *HI*, *HO*, *LI*, or *LO* at the bottom of the display. An I/O allocation can be deleted by moving the cursor to the desired bit and clicking *DEL* at the bottom of the display.
ST#	Displays the station number set in the I/O Assignment Tab.
TYPE	Displays the I/O device name set in the I/O Assignment Tab.

1. Limitations on Changing I/O Map Allocations

The settings made in advance in the Link Assignment Tab are allocated as defaults for the high-speed scan I/O and low-speed scan I/O. The following limitations apply when changing I/O allocations.

- I/O allocation can be deleted.
- The scan speed designation can be changed. (For example, "LI" can be changed to "HI.")
- The I/O designation cannot be changed. (For example, "LI" cannot be changed to "LO.")

Status Tab Page

The Status Tab displays the data that the 215IF is actually handling in link transmissions.

The tab only displays the settings; the settings cannot be changed.

Setting Item	Details
Token Cycle Time, Setting, Max. Value, Current Value	Displays the Token Cycle Time Setting set in the Transmission Parameter Tab, as well as the actual maximum and current values. In offline mode, data will not be displayed in the "Max. Value" and "Current Value" boxes.
ST#	Displays the station number. Two asterisks (**) will be displayed for the local station number. The local station number is determined by the number input in the Transmission Parameter Tab's Own Station Number Box. The station number displays only the number input in the Transmission Parameter Tab's Max. No. of Stations Connected Box.
TYPE	Displays the I/O device name set in the Link Assignment Tab.
REG-No., SIZE	Displays the leading register number and amount of I/O data set in the Link Assignment Tab.
SCAN	Displays the transmission mode set in the Link Assignment Tab.
LISTS	In online mode, the 215IF's link status data is displayed in hexadecimal. In offline mode, nothing will be displayed. The following diagrams show the meaning of the link status data for other stations and the local station.
Station Name (Comment)	Displays the station name set in the Link Assignment Tab.

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a) Link Status Data for Other Stations


```
F E D C B A 9 8 7 6 5 4 3 2 1 0
```

Link Transmissions: Reception Length Error
Link Transmissions: Timeout Error
Link Transmissions: Reserved
Link Transmissions: Reserved
Reserved
Link Map Registered Station
Initial Status (Nothing Received Since Reset)
Completed Normal Reception of Link Data
PLC Model Code
(Corresponds to the content of the "TYPE" column.)

02: CP-350H	0D: CP-317	0F: CP-916G
05: CP-316	11: ACGC4000	C2: RIO-05
06: CP-916A	12: CP-517	C5: RIO-2000
0C: CP-9200SH	0E: CP-316H	C6: RIO-120
14: MP920	16: CP-902	62: 215IF/INV

Fig 3.7 Link Status Data (Other Stations)

b) Link Status Data at the Local Station


```
F E D C B A 9 8 7 6 5 4 3 2 1 0
```

MAC Status: LSI Error
MAC Status: CD Break
MAC Status: Reserved
MAC Status: Out of Ring (Token Not Received Timeout.)
Local Station Display
Reserved
Reserved
Reserved
PLC Model Code
(Corresponds to the content of the "TYPE" column.)

02: CP-350H	0D: CP-317	0F: CP-916G
05: CP-316	11: ACGC4000	C2: RIO-05
06: CP-916A	12: CP-517	C5: RIO-2000
0C: CP-9200SH	0E: CP-316H	C6: RIO-120
14: MP920	16: CP-902	62: 215IF/INV

■ Saving, Deleting, and Closing 215IF Transmission Definitions Data

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.8 217IF Transmission Definitions

This section explains how to set the parameters for the 217IF Transmission System.

■ Outline of 217IF Transmissions

The 217IF Module is a Serial Transmission Interface Module equipped with two RS-232C circuits and one RS-422/485 interface circuit. Each interface supports various transmission protocols, beginning with Yaskawa's own MEMOBUS transmission protocol. The RS-232C CN1 D-sub 9-pin connector can be used as an engineering port. The CP-717 can be connected to perform MP920 engineering.

This section explains the hardware and software settings that must be made for 217IF transmissions (serial transmissions). These settings allow the Machine Controller to operate as a Master or a Slave conforming to each transmission protocol.

217IF transmissions can send and receive data using MSG-SND and MSG-RCV functions programmed in drawing or function programs.

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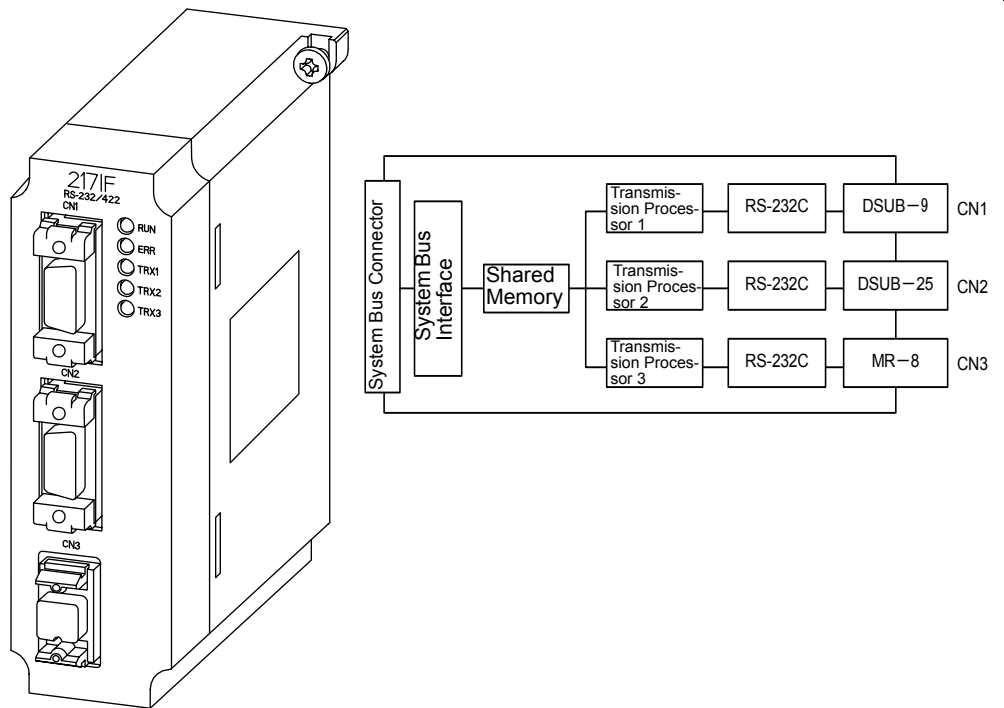
■ Opening the 217IF Transmission Definitions Window

Open the 217IF Transmission Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.
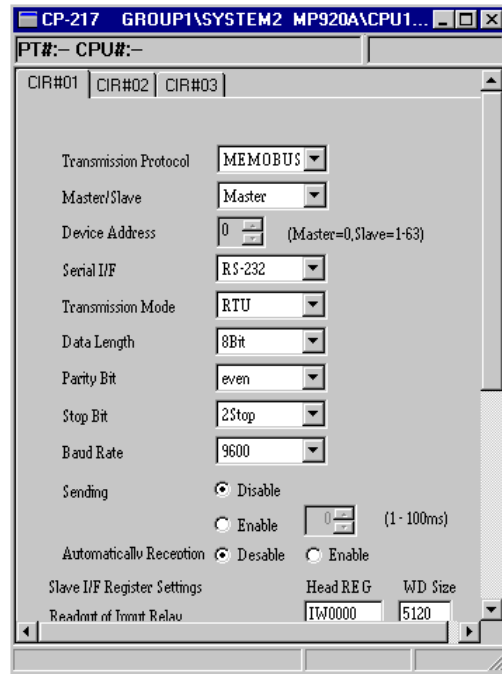
Fig 3.8 217IF Transmission Definitions Window

■ Setting 217IF Transmission Definitions

This section explains the various parameters required to use the 217IF transmission system.

The 217IF has tabs for the current circuit and the next two circuits. Click another circuit's tab to switch to that circuit's Transmission Parameters Window.

The numbers displayed in the tabs at the top of the window (CIR#nn) are the 217IF Module circuit numbers. Each 217IF Module requires 3 circuits and the same circuit number must not be used more than once.

Machine Controller	Circuit Numbers
MP920	1 to 25

Setting Items	Details
Transmission Protocol	Select the desired protocol. • MEMOBUS: Yaskawa's standard MEMOBUS protocol. • MELSEC: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links. • OMRON: OMRON's SYSMAC C-series Host Link protocol. • No protocol: Data can be transferred at any time by the user application program.
Master/Slave	When the Transmission Protocol has been set to MEMOBUS, MELSEC, or OMRON, select whether the Machine Controller will operate as a Master or a Slave.
Device Address	Select the device address. When the Machine Controller is being used as a Master, set the device address to 0. When the Machine Controller is being used as a Slave, set the device address to a value between 1 and 63.
Serial I/F (Serial Interface)	Select the serial interface.
Transmission Mode	Select the transmission mode. • RTU: Specifies RTU mode when the Transmission Protocol is set to MEMOBUS. • ASCII: Specifies ASCII mode when the Transmission Protocol is set to MEMOBUS. • None: Use for MELSEC, OMRON, and no-protocol transmissions.
Data Length	Select the number of bits in one character. • 8Bit: 8 bits • 7Bit: 7 bits
Parity Bit	Specify whether or not the parity bit will be used. • Even: Even parity • Odd: Odd parity • None: No parity check
Stop Bit	Select the number of stop bits. • 1stop: 1 stop bit • 2stop: 2 stop bits
Baud Rate	Select the transmission speed (bps).

3

Setting Items	Details
Sending (Send Delay Setting)	When *Enable* is selected, a delay until the beginning of transmissions (1 to 100 ms) can be set. • Master Station: The delay will be included between execution of the MSG-SND function and the transmission of the command. • Slave Station: The delay will be included between reception of a command by the MSG-RCV function and the transmission of the response. See the Machine Controller's *User's Manual* for details on each parameter's settings.
Slave I/F Register Settings (Automatic Response)	See *3.5.6 General-purpose Serial Communications Definitions* for details.

■ Saving, Deleting, and Closing 217IF Transmission Definitions Data

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

> ◉ INFO When the Delete operation is executed, the CP-217 Transmission Definitions data settings for all 3 circuits will be deleted.

3.5.9 218IF Transmission Definitions

This section explains how to set the parameters for the 218IF Transmission System.

■ Outline of 218IF Transmissions

The 218IF Module is used to connect the MP920 to 218IF related devices. The 218IF Module is equipped with one AUI (Attachment Unit Interface) communications port and 10Base5, 10Base2, or 10BaseT circuits can be connected by an external transceiver.

The 218IF Transmission System can connect to a standard Ethernet system, so other company's controllers and computers can be connected easily. The CP-717 can be connected to perform MP920 engineering.

To define 218IF transmissions, the required data settings must be made (or referenced) in 2 tab pages: The Transmission Parameters Tab and the Status Tab.

Mounting a 218IF Module enables the Machine Controller to send and receive data through an Ethernet transmission line. Only message transmissions are possible in the 218IF Transmission System. Program the MSG-SND and MSG-RCV functions in drawing or function programs for 218IF transmissions.
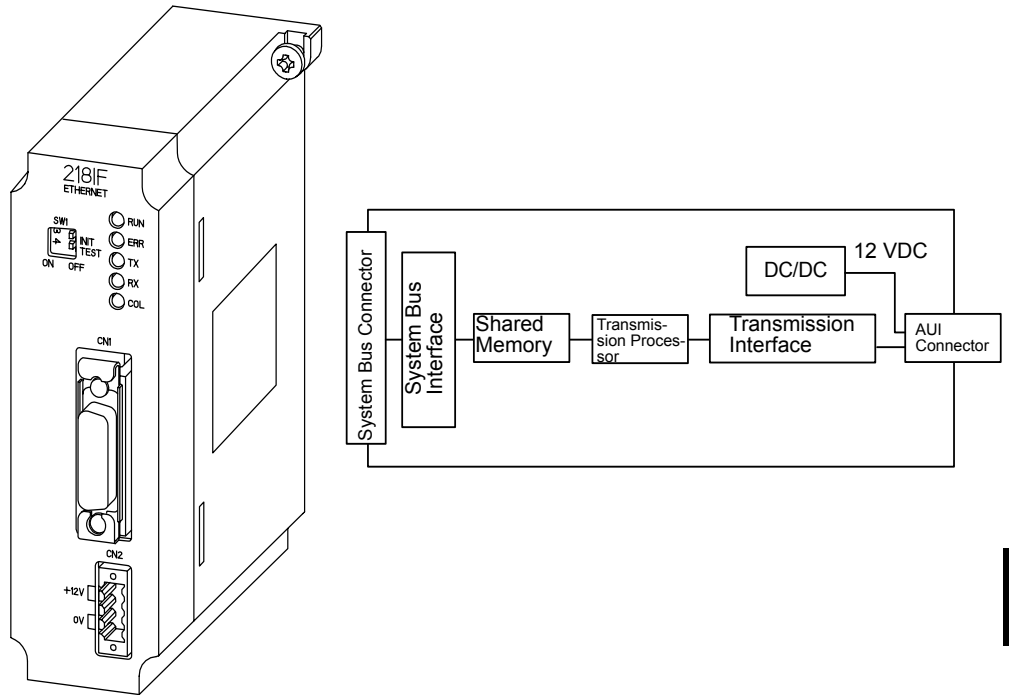
■ Opening the 218IF Transmission Definitions Window

Open the 218IF Transmission Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.
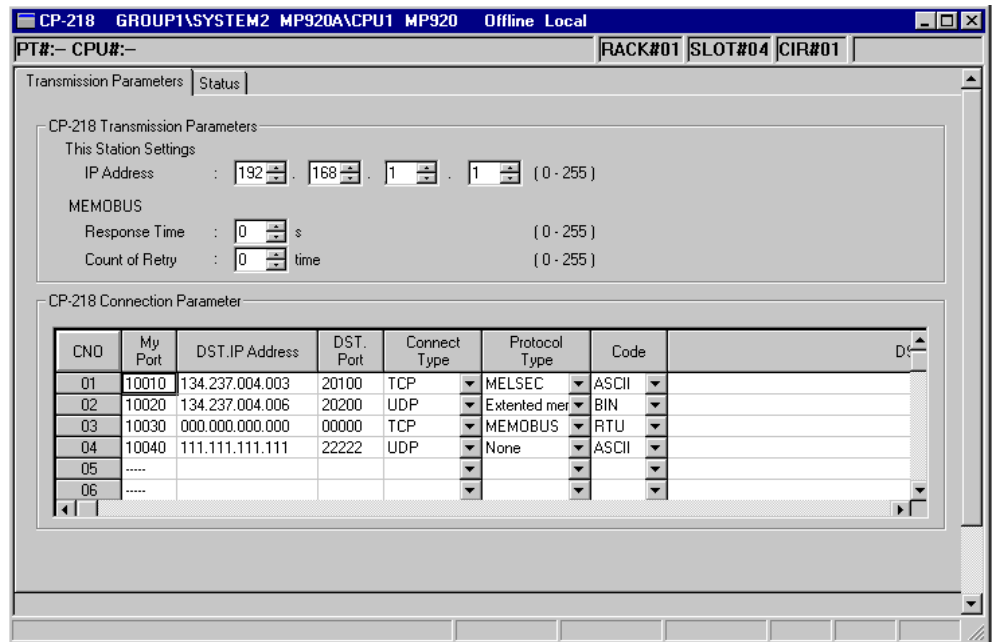
Fig 3.9 218IF Transmission Definitions Window

■ The 218IF Transmission Definitions Window Menus

The following table shows the menu displayed in the 218IF Transmission Definitions Window.

Menu Command	Function
Edit (E)	
My Port: TCP/IP Setting (M)	Sets local station and TCP/IP.
Ethernet Address Setting (A)	Sets the Ethernet address of the remote station.
Transmission Parameters Default Setting (D)	Sets transmission parameters to default value.
Assignment Delete (C)	Deletes assignment data.

■ Setting 218IF Transmission Definitions

The CP-218 Transmission Definitions Window is composed of two tab pages: The **Transmission Parameters** and **Status Tabs**.

Tab Name	Function
Transmission Parameters	Sets the 218IF transmission parameters.
Status	Displays the transmission status.

■ Setting 218IF Transmission Parameters

The 218IF Transmission Definitions Window contains the various parameters required to use the 218IF transmission system.

Parameter Settings Tab Page

Set the transmission parameters and connection parameters in the Transmission Parameters Tab.

Setting Item	Details
IP Address	Input the local station's IP address. Do not used the same address as another node in the Ethernet system.
Response Time	Input the time (0 to 255) that the CP-218 will wait for a response after sending a command using the system function (the MSG-SND function). If a response is not received and a timeout occurs, the transmission will be retried. (The number of retries is set with the **Count of Retry**.) Input 0 for the *Response Time* if the *Count of Retry* is set to 0 and the *Protocol Type* is set to MEMOBUS.

Setting Item	Details
Count of Retry	Input the number of retries (0 to 255) to attempt when a timeout is detected after execution of the system function (the MSG-SND function). An error will be returned for the MSG-SND function if a response is not received after the command is resent by the setting number of retries. Input 0 for the **Count of Retry** if the **Response Time** (parameter 3) is set to 0 and the **Protocol Type** is set to MEMOBUS.
CNO	Displays the connection number (1 to 20).
My Port (Local Station's Port Number)	Input the local station's port number (256 to 65,535) for connections. Be sure to input a port number that is not used for other connections or for diagnostics. If "0" is input for this parameter, that connection number's data will be cleared and "-----" will be displayed in the **My Port** column.
DST. IP Address (Remote Station's IP Address)	Input the remote station's IP address for connections. The input ranges are different for each field of the DST. IP Address: • Field No. 1: 0 to 255 (excluding 127) • Field No. 2: 0 to 255 • Field No. 3: 0 to 255 • Field No. 4: 1 to 254 When an unpassive open is being used, input 0 in all four fields.
DST. Port (Remote Station's Port Number)	Input the remote station's port number (0 or 256 to 65,535) for connections. Be sure that the **DST. IP Address** and **DST. Port** combination are not the same as those for another connection.
Connect Type	Select the transport-layer protocol. • TCP: Communications operate according to TCP (Transmission Control Protocol). • UDP: Communications operate according to UDP (User Datagram Protocol).
Protocol Type	Select an application-layer protocol that is supported by the remote station. • Extended MEMOBUS: Yaskawa's Extended MEMOBUS protocol • MEMOBUS: Yaskawa's MEMOBUS protocol • MELSEC: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links. • No protocol: General-purpose message communications. Data can be sent or received without being processed into continuous MW registers.

3

3

Setting Item	Details			
Code	Input the data format that matches the format set in the remote station. • RTU: Specifies RTU mode when MEMOBUS protocol is being used. • ASCII: Specifies ASCII mode. • BIN: Specifies binary mode. The codes that can be selected depend on the data in the Protocol Type field. The codes that can be selected are shown below.			
	Protocol Selected	Data Code		
		RTU	ASCII	BIN
	Extended MEMOBUS	No	Yes	Yes
	MEMOBUS	Yes	Yes	No
	MELSEC	No	Yes	Yes
	No protocol	No	Yes	Yes
DST. Station (Remote Station's Name)	Input a station name (comment) for the remote station. The station name can be up to 32 characters.			

INFO

1 The address is made up of 32 bits, as shown in the following diagram. The 4 bytes (8 bits each) are separated by periods and the byte values are input in decimal.

The bytes are handled as 4 fields: Field No. 1 through Field No. 4 from the most-significant byte through the least-significant byte.

The input ranges are different for each field:
- Field No. 1: 0 to 255 (excluding 127)
- Field No. 2: 0 to 255
- Field No. 3: 0 to 255
- Field No. 4: 1 to 254

2 We recommend IP addresses 192.168.1.1 through 192.168.1.254 as private addresses, but contact your company's system administrator for confirmation.

3 When the *DST. IP Address* and *DST. Port* are both set to 0, that connection will be in unpassive open mode and will connect to a station that accesses it. If more than one station accesses a connection in unpassive open mode, the connection will connect to the first station that requests access. The second station will be connected after the first station is disconnected.

Setting Default Values

The transmission parameters can be reset to their default values without inputting each parameter, by selecting *Edit (E)* and then *Transmission Parameters Default Settings (D)* from the 218IF Transmission Definitions menu.

Table 3.7 Default Values of Transmission Parameters

Parameter	Default
IP Address	192.168.001.001
Response Time	0
Count of Retry (Number of Retries)	0
Subnet Mask	000.000.000.000
Gateway IP Address	000.000.000.000
System Port No. (Diagnostic/Engineering Port)	65535
TCP Zero Window Timer Value	3
TCP Retry Time	500
TCP Close Time	60
IP Assemble Time	30
MAX. Packet Length	1500

INFO

This operation does not return the remote stations' Ethernet addresses or the connection parameters to their default values.

Setting Local Station and TCP/IP

The procedure to set the local station and TCP/IP is given below.

1. Click *Edit (E)* and then *My Port: TCP/IP Settings (M)* on the 218IF Transmission Definitions menu.

2. Set each parameter in the dialog box and click the **OK** Button at the bottom of the window.

3.5.9 218IF Transmission Definitions

Details of the Local Station and TCP/IP Settings

Setting Item	Details
Subnet Mask[1]	Input a subnet mask for the local station's IP address. When the subnet mask is not being used, input 0 in fields 1 through 4.
Gateway IP Address[2]	Input the gateway's IP address when transmitting data between connected networks through a gateway (router). The input ranges are different for each field of the gateway's IP address: • Field No. 1: 0 to 255 (excluding 127) • Field No. 2: 0 to 255 • Field No. 3: 0 to 255 • Field No. 4: 1 to 254 If a gateway is not being used, input 0 in all four fields of the **Gateway IP Address**. When a gateway IP address is being input, be sure not to duplicate any other IP address.
System Port No.	Input the port number/engineering port (256 to 65,535) that receives diagnostic commands from the diagnostic terminal.
TCP (Transmission Control Protocol) Zero Window Timer Value	Input the retry time (1 to 255) for the Send Window confirmation packet when the TCP's Send Window size is set to 0.
TCP Retry Time	Input the time to wait (50 to 32,000 ms) before resending data when an ACK (acknowledgment) is not received after opening a TCP connection or transmitting data.
TCP Close Time	Input the time to wait (1 to 255) for a remote station to completely close the connection when a TCP connection is being closed.
IP Assemble Time	Input the time to wait (1 to 255) for the next segment of data after the IP has received a segment of data.
MAX. Packet[3] Length	Input the maximum packet length (64 to 1,500) in the 218IF.

Setting a Remote Station's Ethernet Address

When a remote station does not support the ARP (Address Resolution Protocol), use the following procedure to set a remote station's Ethernet address.

1. Move the cursor to the connection where the Ethernet address needs to be set.

TERMS

1 Subnet Mask
  The IP address is composed of a network address and a host address, but part of the host address can be used as the network address. This is known as the subnet address and the bit pattern is known as the subnet mask.

2 Gateway IP Address
  Normally transmissions are relayed through a router when transmitting between different network addresses. This router's IP address is known as the gateway address or default IP address.

3 Packet
  A packet is a single segment of transmission data that has a destination address.

CNO	My Port	DST.IP Address	DST. Port	Connect Type	Protocol Type	Code	DST. Station
01	10010	134.237.004.003	20100	TCP	MELSEC	ASCII	check system
02	10020	134.237.004.006	20200	UDP	Extented mer	BIN	
03	10030	000.000.000.000	00000	UDP	Extented mer	BIN	
04	-----						

2. Select *Edit (E)* and then *Ethernet Address Setting (A)* from the 218IF Transmission Definitions menu.

3. Complete each setting in the box and then click the **OK** Button.

CP-218 (Target Ether Net Address)

CNO	01
My port	10010
DST. IP Address	237 134 004 003
DST. Port	20100

Target Ether Net Address

00 : 11 : 22 : 33 : 44 : 55

OK   Cancel
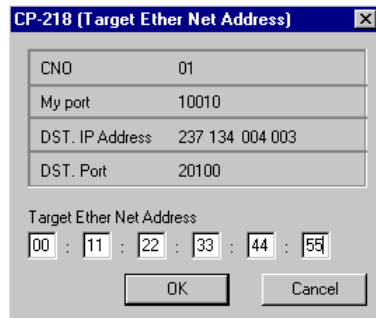
Connection Parameter Consistency Check

The following restrictions apply to the input values of connection parameters:

Consistency Item	Details
Duplication of the Local Station Port Number	The same local station port number and connect type combination set in the connection parameters must not be used for any other connection.
Duplication of the System Port	When the Connect Type is set to "TCP" in the connection parameters, the local station's port number must not be the same as the diagnostic (system) port number.
Open Mode	A connection's Ethernet address will be all zeroes when its DST. IP Address is set to all zeroes and its DST. Port is set to zero.
Duplication of a Remote Station	A DST. IP Address, DST. Port, and Connect Type combination set in the connection parameters must not be used for any other connection. This restriction does not apply when the DST. IP Address and DST. Port are set to all zeroes.
Ethernet Address	The DST. IP Address settings must be the same when the same Ethernet address has been set in the connection parameters. This restriction does not apply when the Ethernet address is set to all zeroes.
Duplication of the Port Number:	The DST. Port must not be the same as the local station's port number.
Remote Station	There can be only one local station/remote station pair. The two stations are paired in the connection parameters, i.e., the local station's port number is specified for the remote station's port number and the remote station's port number is specified for the local station's port number.

Consistency Item	Details
Protocol Type and Code Settings	The following table shows the possible combinations of the Protocol Type and Code (data format) settings for each connection. The Protocol Type and Code Combinations are shown below.

Protocol Type	Code
Extended MEMOBUS	Binary or ASCII
MEMOBUS	RTU or ASCII
MELSEC	Binary or ASCII
General-purpose	Binary or ASCII

Table 3.8 Pairing Conditions

| Parameter | CNO | | |
	XX	YY	Pairing Condition
Local Station's Port Number	10000	20000	Set each other's port numbers.
Remote Station's Port Number	20000	10000	
Remote Station's IP Address	134.237.127.004	134.237.127.004	Set both to the local station's IP address.
Connection Type	TCP	TCP	Set both to the same value.
Protocol Type	Extended MEMOBUS	Extended MEMOBUS	
Code	Binary	Binary	
Remote Station's Ethernet Address	12:34:56:78:9A:BC	12:34:56:78:9A:BC	

Deleting Assignment Data

The procedure to delete the assignment data for one connection is given below.

1. Move the cursor to the connection to be deleted.

CNO	My Port	DST.IP Address	DST. Port	Connect Type	Protocol Type	Code	
01	10010	134.237.004.003	20100	TCP	MELSEC	ASCII	
02	10020	134.237.004.006	20200	UDP	Extented mer	BIN	
03	10030	000.000.000.000	00000	TCP	MEMOBUS	RTU	
04	10040	111.111.111.111	22222	UDP	None	ASCII	
05	-----						

2. Click *Edit (E)* and then *Assignment Delete (C)* from the 218IF Transmission Definitions menu.

3. The assignment data selected in step **1.** will be deleted.

CNO	My Port	DST.IP Address	DST. Port	Connect Type	Protocol Type	Code	
01	-----						
02	10020	134.237.004.006	20200	UDP	Extented mer	BIN	
03	10030	000.000.000.000	00000	TCP	MEMOBUS	RTU	
04	10040	111.111.111.111	22222	UDP	None	ASCII	
05	-----						

○ INFO ▷ The definitions data can be deleted even if 0 is input for My Port (the local station's port number).

■ Status Tab Page

The Status Tab Page displays the data that the 218IF is actually transmitting. The tab only displays the data; the settings cannot be changed.
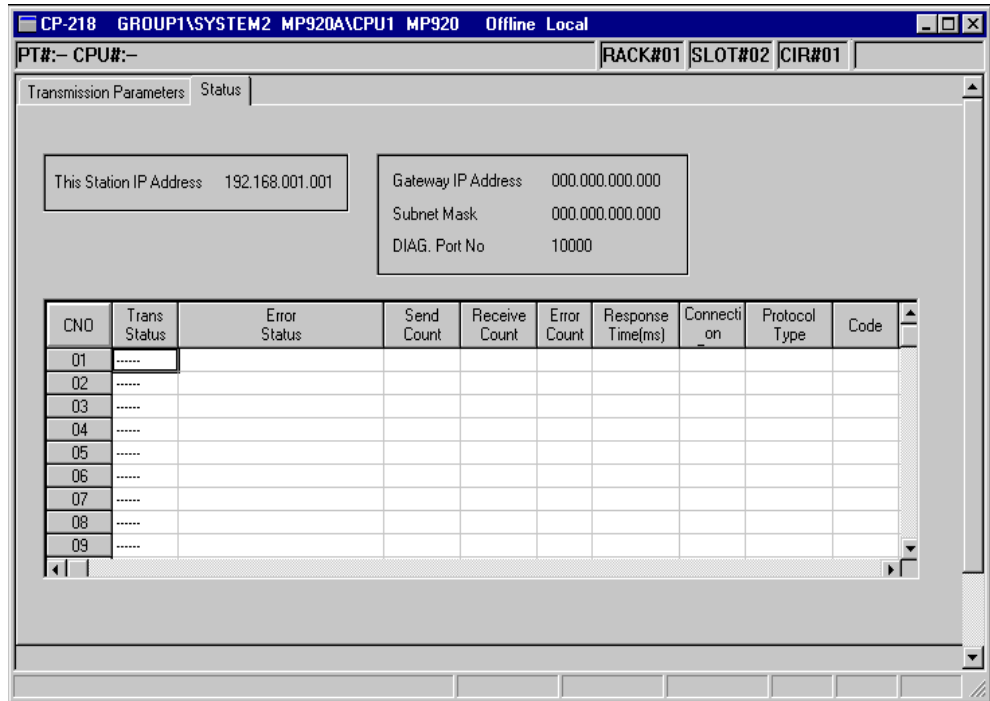
Setting Item	Details
This Station IP Address (Local Station's IP Address)	Displays My Port (the local station's IP address) set in the Transmission Parameters Tab.
Gateway IP Address	Displays the Gateway IP Address set in the Transmission Parameters Tab.
Subnet Mask	Displays the Subnet Mask set in the Transmission Parameters Tab.
DIAG. Port No	Displays the System Port Number (diagnostic/engineering port number) set in the Transmission Parameters Tab.
CNO	Displays the connection number (1 to 20).
Trans Status	Displays the status of the connection when in online mode. The following table lists the transmission status values.

	Status Value	Meaning
	1	IDLE status
	2	WAIT status (waiting for connection)
	3	CONNECT status (data transfers possible)
	---	Unused connection

Setting Item	Details	
Error Status	Displays the details on the error when an error has occurred in transmission status. The following table lists the error status.	
	Status Value	Meaning
	0	No error
	1	System error
	2	Local station port number setting error
	3	System error (TCP settings)
	4	System error (TCP settings)
	5	Connection error (TCP settings)
	6	System error
	7	Data send error (TCP settings)
	8	Data send error (TCP settings)
	9	Data reception error (TCP settings)
	10	Data reception error (TCP settings)
	11	System error
	12	Data conversion error (MEMOBUS and MELSEC settings)
Send Count	Displays the number of data (number of packets) sent to the remote station.	
Receive Count	Displays the number of data (number of packets) received from the remote station.	
Error Count	Displays the number of times that an error has occurred.	
Response Time [ms]	Displays the time taken for a response to be received after a command was sent with the MSG-SND function.	
Connection	Displays the Connect Type (connection type) set in the Transmission Parameters Tab.	
Protocol Type	Displays the Protocol Type set in the Transmission Parameters Tab.	
Code	Displays the Code (data format) set in the Transmission Parameters Tab.	
DST. Station	Displays the DST. Station name (remote station name) set in the Transmission Parameters Tab.	

All of the data listed above will be displayed in online mode. None will be displayed in offline mode.

3

■ Saving, Deleting, and Closing 218IF Transmission Definitions Data

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

IMPORTANT

1 The connection parameters cannot be saved unless the parameter input values pass a consistency check. See *Connection Parameter Consistency Check* on page 3-58 for details.

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

3.5.10 260IF Setup

Perform the setup for the 260IF from the CP-717 Engineering Tool.

■ Opening the 260IF Definitions Window

The procedure to open the 260IF Definitions Window is given below.

1. Double-click the Module configuration definitions set in the controller mounting the 260IF Module. The Module Configuration Definitions Window will be displayed.

No.	00	01	02
Module	MP920 ▼	RESERVED	260IF ▼
Control CPU No.			
. . .	. . .	. . .	. . .
I/O Start Register	. . .	. . .	. . .
I/O End Register	. . .	. . .	. . .
. . .	. . .	. . .	. . .

Fig 3.10 MP920 Module Configurations Window

No.	00	01	02	03	04	05	06
Module	MP920 ▼	RESERVED	SERIAL	LIO	SVA	CNTR	260IF ▼
Control CPU No.							
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
I/O Start Register	. . .	. . .	. . .	. . .	. . .	. . .	. . .
I/O End Register	. . .	. . .	. . .	. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .

Fig 3.11 MP940 Module Configurations Window

With the MP920, select the 260IF Module for the 260IF Module mounting slot. In the MP920 Module Configurations Window example shown above, 260IF has been allocated to slot 02.

With the MP940, the 260IF is allocated to slot 06 and this cannot be changed; select the

260IF Module.

The I/O start and end register addresses must be set in the 260IF Module settings. Allocate the I/O register addresses to be used within the ranges shown below.

---	MP920	MP940D
I/O Start Register (IW/OW Register Start Offset)	0000 to 13FF	0000 to 07FF
I/O End Register (IW/OW Register End Offset)	0000 to 13FF	0000 to 07FF

2. Double-click the slot set for the 260IF Module to open the 260IF Definitions Window.
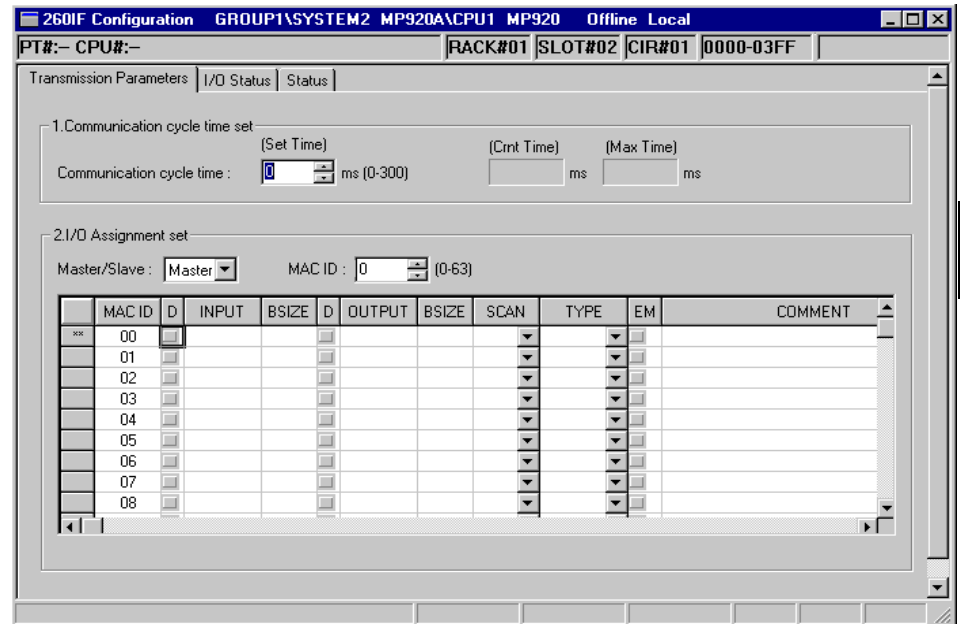
Fig 3.12 260IF Definitions Window

■ Setting Methods

The 260IF Definitions Window consists of the following three tab pages.

Tab Page	Details
Transmission Parameters	Sets the communications and network parameters for the 260IF Module.
I/O Status	Displays the communications status with the slaves when setting the online master. For details, refer to *Chapter 6 Network Maintenance* in the *MP900 Series Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2).
Status	Displays the 260IF Module status when online. For details, refer to *Chapter 6 Network Maintenance* in the *MP900 Series Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2).

3

Setting Parameters

Set the following items using the 260IF Definitions Window and the Transmission Parameters Tab Page shown above.

1. Communications Cycle Time Information Settings

Setting Item	Details
Communication cycle time (Set Value)	If using the 260IF as a DeviceNet master, enter the communications cycle time set value.
Communication cycle time (Current Value); Display Only	Displays the communications cycle current value during I/O communications.
Communication cycle time (Maximum Value); Display Only	Displays the communications cycle maximum value during I/O communications.

Refer to *4.2 Calculating Communications Cycle Times* in the *MP920 Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2) for details.

2. I/O Allocation Settings

The asterisks ("**") displayed on the left of the I/O allocations setting table denote the 260IF itself, allocated using the Module configuration definitions.

Setting Item	Details		
Master/Slave	Set the operating mode (i.e., DeviceNet master or slave) for the 260IF. Set to the same value as the value set using 260IF setting switch SW1 (X1).		
MAC ID	The MAC ID is the DeviceNet MAC ID (i.e., DeviceNet address) of the 260IF. Set to the same value as the value set using 260IF setting switches 2 and 3.		
MAC ID column	The MAC ID field is the DeviceNet MAC ID (i.e., DeviceNet address) for I/O allocation. MAC ID column are set automatically in order starting from 00.		
D	Input enable/disable sets whether or not the Controller CPU exchanges I/O data with the 260IF. Select it to disable I/O data exchange.		
INPUT	Set the start address of the input area (input register IWxxxx) allocated to the relevant device. Specify using a hexadecimal word address.		
BSIZE	Displays in bytes the size of the output area (input register IWxxxx) allocated to the relevant device. Specify from 1 to 256 (in decimal) for 1 slave. For example, if setting 3 bytes from IW1100 and 1 byte from IW1102, the registers are used as shown below.		
	Register Address	F to 8	7 to 0
	IW1100H		
	IW1101H		
	IW1102H		
	IW1103H		
D	Output enable/disable sets whether or not the Controller CPU exchanges I/O data with the 260IF. Select it to disable I/O data exchange.		

Setting Item	Details
OUTPUT	Set the start address of the output area (output register OWxxxx) allocated to the relevant device. Specify using hexadecimal word address.
BSIZE	Displays in bytes the size of the output area (output register OWxxxx) allocated to the relevant device. Specify from 1 to 256 (in decimal) for 1 slave. The bytes are little endian, the same as the input registers.
SCAN	The data exchange cycle (SCAN) is the timing for exchanging I/O data between the Controller CPU and the 260IF. The Controller CPU data exchange cycle is asynchronous with I/O communications. When set to high, the Controller CPU exchanges I/O data using the CPU's high-speed scan timing. When set to low, the Controller CPU exchanges data using the CPU's low-speed scan timing.
TYPE	Set the I/O communications type (TYPE) to Polled or Strobed. • Polled enables any DeviceNet slaves to be set. • Strobed enables input only, and limits DeviceNet slaves to communications of 8 bytes maximum. For details on polled and strobed connections, refer to the DeviceNet specifications manual.
EM (Explicit Message)	Select EM allocation (EM) only when the 260IF is the DeviceNet master and message communications are to be performed with the slaves. DeviceNet slaves performing I/O communications can exchange messages, but EM allocation setting is not necessary.
COMMENT	A comment of up to 32 characters can be input to include the name, type, or other information on the relevant device.

3

1. Saving Parameters

When the parameter settings have been completed, save the parameters by selecting *File (F)* and then *Save (S)* from the menu.

2. I/O Allocation Settings Supplementary Explanation

a) Master/Slave Selection and MAC ID Settings

Select the operating mode in Master/Slave Settings to match the 260IF setting switch SW1 (X1) set value.

Set the DeviceNet address in MAC ID to match the 260IF setting switches SW2 and SW3 set values.

b) Communications Cycle Settings

Enter the communications cycle time required in *4.2 Calculating Communications Cycle Times* in the *MP920 Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2).

This setting is not necessary when using the 260IF as a DeviceNet slave.

c) I/O Allocation

Allocate the I/O registers for sending and receiving I/O data between the Controller CPU and the 260IF according to the DeviceNet system configuration.

3. Example of Master I/O Allocations

Make the settings as shown in the following diagram to use the 260IF as a DeviceNet master with MAC ID = 5, to send data to a 2-byte Output Module with MAC ID =2 and receive data from a 1-byte Input Module with a MAC ID = 3.

PS | MP920 | 260IF — Node address #05 (MAC ID = 05)

Node address #02 — MAC ID = 02

Node address #03 — MAC ID = 03

2. I/O Allocation Settings

Master/slave: Master ▼   MAC ID : 5 ⬍

	MAC ID	D	INPUT	BSIZE	D	OUTPUT	BSIZE	SCAN		TYPE		EM	Comment
	01												
	02					OW1100	2	Low	▼	Polled	▼		
	03		IW1101	1				Low	▼	Polled	▼		
	04												
	. . .												
	. . .												

Node address #03 (MAC ID = 03)

Node address #05 (MAC ID = 05) Input relays

Input contact signal 1	→	IB11021
Input contact signal 2	→	IB11022
Input contact signal 3	→	IB11023
Input contact signal 4	→	IB11024
Input contact signal 5	→	IB11025
.	.	.
Input contact signal 8	→	IB110028

Node address #02 (MAC ID = 02)

Output coils

Output contact signal 1	←	OB11000
Output contact signal 2	←	OB11001
Output contact signal 3	←	OB11002
.	.	.
Output contact signal 16	←	OB1100F

3

4. Example of Slave I/O Allocation

Set the 260IF as shown in the following diagram to use the 260IF as a DeviceNet slave with MAC ID = 3, to send and receive I/O data between the slave and the DeviceNet master using 64 bytes of input and 64 bytes of output.

2. I/O Allocation Settings

Master/slave:　[Master ▼]　MAC ID :　[5 ⬍]　(0-63)

MAC ID	D	INPUT	BSIZE	D	OUTPUT	BSIZE	SCAN		TYPE		EM	Comment
01												
02					OW1100	2	Low	▼	Polled	▼		
03		IW1101	1				Low	▼	Polled	▼		
04												
. . .												
. . .												

Node address #03
(MAC ID = 03)

Node address #05
(MAC ID = 05)
Input relay

Input contact signal 1	→	IB11010
Input contact signal 2	→	IB11011
Input contact signal 3	→	IB11012
Input contact signal 4	→	IB11013
Input contact signal 5	→	IB11014
. . .	. . .	. . .
Input contact signal 8	→	IB11017

Node address #02
(MAC ID = 02)

Output coils

Output contact signal 1	←	OB11000
Output contact signal 2	←	OB11001
Input contact signal 3	←	OB11002
. . .	. . .	. . .
Output contact signal 16	←	OB1100F

- I/O Allocation Using Network Configuration Information

When using the 260IF as a DeviceNet master, the settings can be configured based on the I/O sizes read from the slaves.

To read the I/O sizes from the slaves, use the network configuration information read function.

For setting method details, refer to *6.1 Reading Network Configuration Information* in the MP920 Machine Controller User's Manual: 260IF DeviceNet (SIEZ-C887-5.2).

INFO

If allocating I/O using the network configuration information, delete the I/O allocation from all the slaves before performing allocation.

3.5.11 Local I/O Definitions

This section explains how to set Local I/O Definitions.

■ Outline of the Local I/O Definitions

The LIO-01 Module is equipped with 32 digital inputs (DI) and 32 digital outputs (DO). I/O servicing is performed at fixed intervals, once for each high-speed scan or low-speed scan in the MP920 CPU Module.

Four digital inputs can be used as interrupts by enabling interrupts in the Module Configuration Definitions Window.

The Local I/O Definitions Window sets the scan timing and assigns registers to the discrete inputs and outputs (16 of each) in connectors CN1 and CN2.

I/O Type	CN1	CN2
Discrete Input	16 inputs	16 inputs
Discrete Output	16 outputs	16 outputs
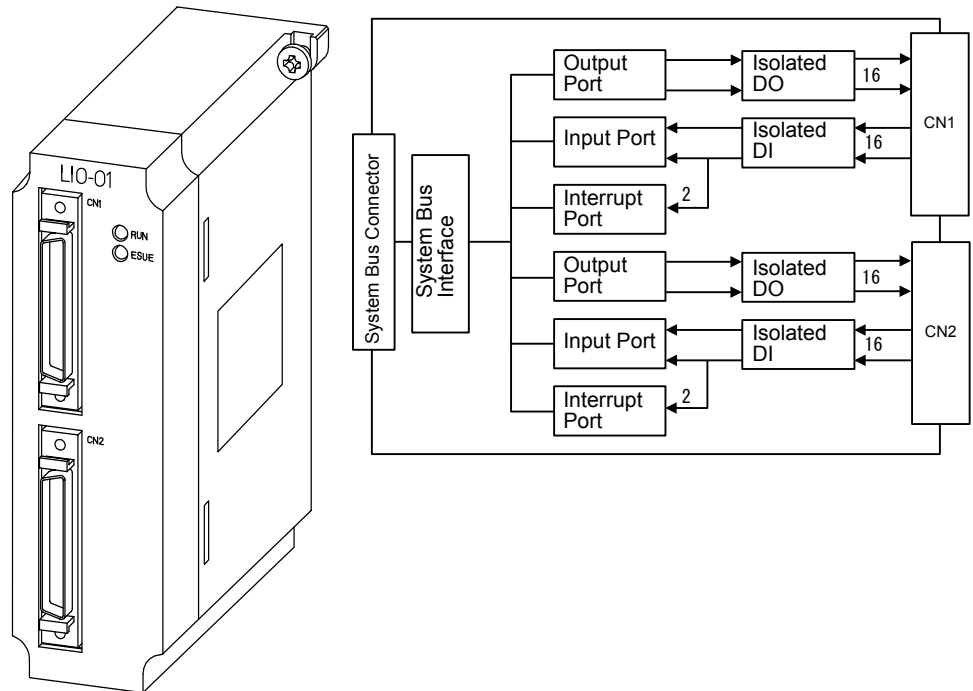
■ Opening the Local I/O Definitions Window

Open the Local I/O Definitions Window in accordance with *3.3 Basic Individual Module Definition Operations*.
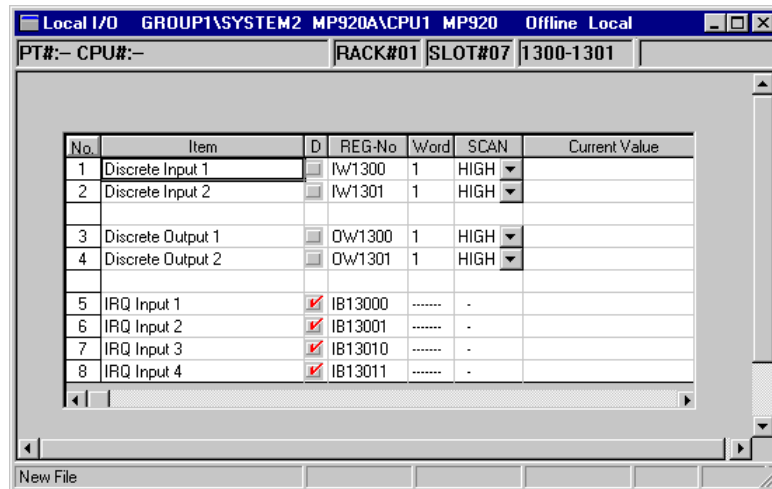
■ Setting Local I/O Definitions

The Local I/O Definitions determine the operation and disable status of the Module's I/O.

Setting Item	Details
Item	Displays the I/O items.
D	Controls the register's disable setting. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8. • ▢ : Enabled • ✔ : Disabled
REG-No	Displays the I/O register number. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.
Word	Displays the number of consecutive register words. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.
SCAN	Sets the transmission processing scan. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8. • HIGH: High-speed scan • LOW: Low-speed scan • (NA): No scan specification
Current Value	In online mode, this column displays the current value of the Machine Controller's register. The current values of discrete I/O are displayed in binary and the current values of discrete outputs can be changed. The current values of interrupt inputs 1 to 4 are displayed as ON or OFF. When a new current value is input, the value will be checked and immediately stored in the Machine Controller's register. In offline mode, nothing will be displayed. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.
HEX	Displays the hexadecimal equivalent of the binary values in the Current Value column. In offline mode, nothing will be displayed. When the register range is set to one word, only items 1, 3, 5, and 6 will be displayed; a "-" will be displayed for items 2, 4, 7, and 8.

■ Saving, Deleting, and Closing Local I/O Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.12 Digital Input Definitions

This section explains how to set the Digital Input Definitions.

■ Outline of the Digital Input Definitions

The DI-01 Module is equipped with 64 digital inputs (DI). Input servicing is performed at fixed intervals, once for each scan (high-speed or low-speed) in the CPU-01 Module.

The Digital Input Definitions Window sets the scan timing and allocates registers to the discrete inputs (32 each) in connectors CN1 and CN2.

I/O Type	Connector CN1	Connector CN2
Discrete Input	32 inputs	32 inputs
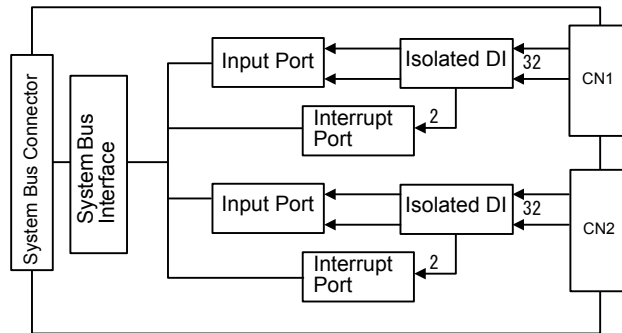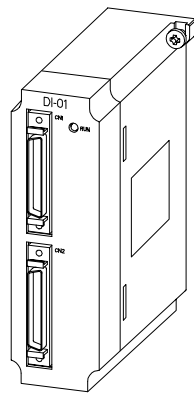
■ Opening the Digital Input Definitions Window

Open the Digital Input Definitions Window according to *3.3 Basic Individual Module Definition Operations*.
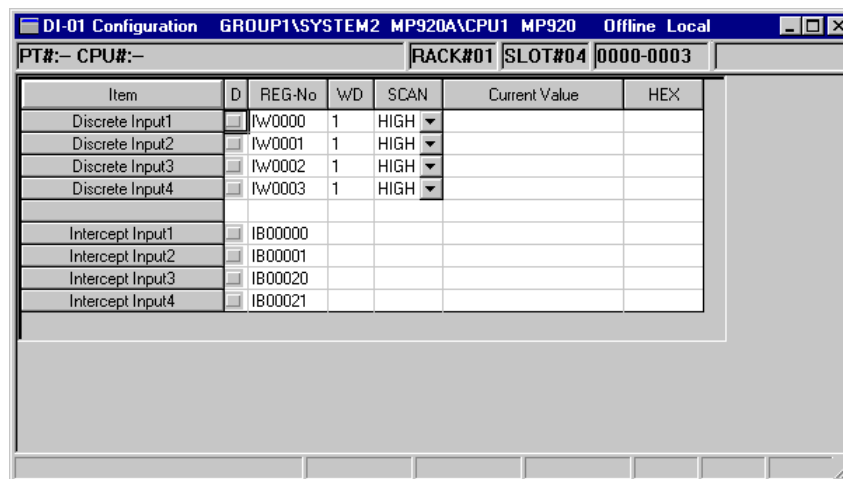
Fig 3.13 Digital Input Definitions Window

■ Digital Input Definitions Window Original Menus

Table 3.9 Digital Input Definitions Window Original Menus

Menu Command	Function
Edit (E)	
Assignment Delete (D)	Deletes allocation data.

■ Setting Digital Input Definitions

Setting Allocation Data

The Digital Input Definitions determine the operation and the disable status of the digital inputs.

Setting Item	Details
Item	Displays the input item.
D	Controls the register's disable setting. • ☐ : Enabled • ☑ : Disabled
REG-No	Enter the number of the register (I register number) that handles the input. Register numbers are allocated to interrupt inputs automatically if the register number for a discrete input is entered.
WD (Number of Words)	Displays the number of consecutive register words.
SCAN	Sets the transmission processing scan in which inputs are serviced. HIGH:High-speed scan LOW:Low-speed scan (NA):No scan specification
Current Value	In online mode, this column displays the current value of the Machine Controller's register. The current values of discrete inputs are displayed in binary and the current values of interrupt inputs are displayed as ON or OFF. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the current value column. In offline mode, nothing will be displayed.

■ Deleting Allocation Data

1. Click the REG-No line to be deleted.

2. Select *Edit (E)* and then *Assignment Delete (D)* from the Digital Input menu.

3. The data selected in step 1. will be deleted.

Register allocations can be deleted for discrete inputs 1 to 4. When the register allocation for discrete input 1 is deleted, the allocations for interrupt inputs 1 and 2 will be deleted simultaneously. When the allocation for discrete input 2 is deleted, the allocations for interrupt inputs 3 and 4 will be deleted simultaneously.

■ Saving, Deleting, and Closing Digital Input Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.13 Digital Output Definitions

This section explains how to set the Digital Output Definitions.

■ Outline of the Digital Output Definitions

The DO-01 Module is equipped with 64 digital outputs (DO). Output servicing is performed at fixed intervals, once for each scan (high-speed or low-speed) in the CPU-01 Module.

The Digital Output Definitions Window sets the scan timing and allocates registers to the discrete outputs (32 each) in connectors CN1 and CN2.

I/O Type	Connector CN1	Connector CN2
Discrete Output	32 outputs	32 outputs
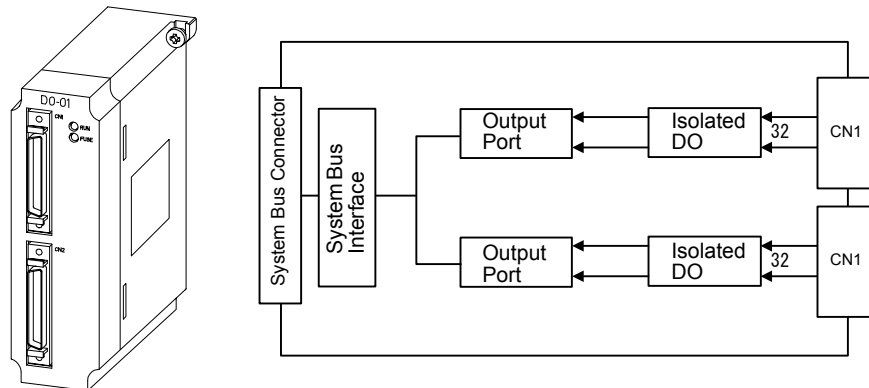
■ Opening the Digital Output Definitions Window

Open the Digital Output Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.

Fig 3.14 Digital Output Definitions Window

■ Digital Output Definitions Window Original Menus

The following table shows the functions of the original menu commands in the Digital Output Definitions Window.

Table 3.10 The Digital Output Definitions Window Original Menus

Menu Command	Function
Edit (E)	
Assignment Delete (D)	Deletes allocation data.

■ Setting Digital Output Definitions

Setting Allocation Data

The Digital Output Definitions determine the operation and the disable status of the digital outputs.

Setting Items	Details
Item	Displays the output item.
D	Controls the register's disable setting. • : Enabled • : Disabled
REG-No	Input the number of the register (O register number) that handles the output.
WD (Number of Words)	Displays the number of consecutive register words.
SCAN	Sets the transmission processing scan in which outputs are serviced. • HIGH: High-speed scan • LOW: Low-speed scan • (NA): No scan specification

Setting Items	Details
Current Value	In online mode, displays the current values of the Machine Controller's registers in binary. The current values of discrete outputs can be changed. When a new current value is input, the value will be checked and immediately stored in the Machine Controller's register. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the Current Value column. In offline mode, nothing will be displayed.

■ Deleting Allocation Data

1. Click the REG-No line to be deleted.

2. Click *Edit (E)* and then *Assignment Delete (D)* on the Digital Output menu.

3. The data selected in step **1.** will be deleted.

■ Saving, Deleting, and Closing Digital Output Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.14 Counter I/O Definitions

This section explains how to set the Counter I/O Definitions.

■ Outline of the Counter I/O Definitions

The CNTR-01 Module uses up to 4 channels for 4 pulse inputs (PI).

Select either a 5-V differential or 12-V voltage input for each channel. Connect 5-V differential inputs to connector CN1 and 12-V voltage inputs to connector CN2.

The CNTR-01 Module has a Latch Input Signal, so the counter value can be latched when the latch signal is received. A Coincident Detection Signal Output is also provided, so a signal can be recognized by the CPU and output to an external device when the count matches an internal set value.

Input servicing of the count data is performed at fixed intervals, once for each scan (high-speed or low-speed) in the CPU-01 Module. At this time, 4 channels are scanned as a group. Each channel can be specified as used or unused to reduce the processing time required in the CNTR-01 Module and CPU-01 Module.

Set the pulse input parameters for 1 to 4 channels.

A maximum of 4 channels must be selected from a total of 8 pulse input channels: Four 5-V input channels on CN1, and four 12-V input channels on CN2.
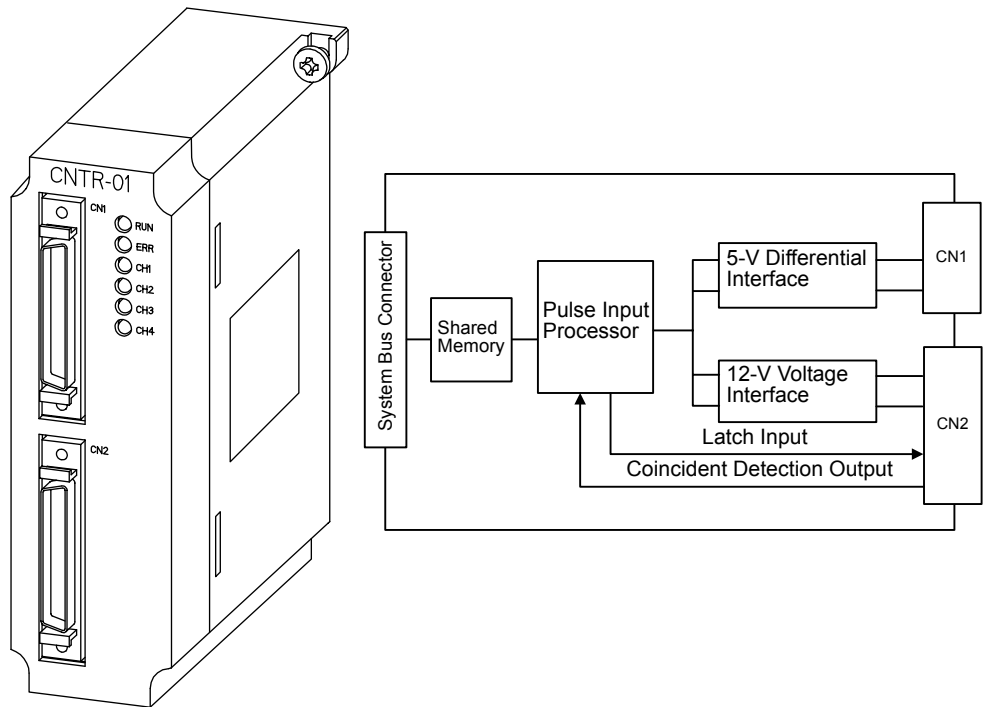
■ Opening the Counter I/O Definitions Window

Open the Counter I/O Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.

The Fix Parameter Set Tab Page will be displayed.

Fig 3.15 Counter I/O Definitions Window

3

■ Counter I/O Definitions Window Original Menus

The following table shows the functions of the menu commands in the Counter I/O Definitions Window.

Table 3.11 Counter I/O Definitions Window Original Menus

Menu Command		Function
Set (S)		
	Default (R)	Returns settings to default values by channel.
View (V)		
	Tool Bar (T)	Displays the Tool Bar.
	Status Bar (S)	Displays the Status Bar.
	DEC (D)	Displays the I/O data in decimal.
	HEX (H)	Displays the I/O data in hexadecimal.
	BIN (B)	Displays the I/O data in binary.

■ Counter I/O Definitions

The Counter I/O Definitions Window is composed of two tab pages: the **Fix Parameter Set** and **I/O Data Set** Tabs. The following table shows the settings grouped in each tab page.

Table 3.12 Tab Pages in the Counter I/O Definitions Window

Tab Name	Function
Fix Parameter Set	Sets fixed parameters.
I/O Data Set	Sets I/O data.

Fixed Parameters Settings Tab Page

The various fixed parameters for counter I/O are set in the Fix Parameter Set Tab Page.

Setting Item	Details
SYNC-SCAN	This setting determines whether the I/O data refresh cycle of the CNTR-01 Module is synchronized with the HIGH or LOW scan cycle of the Machine Controller. • HIGH: High-speed scan • LOW: Low-speed scan
Top Register No. (Leading Register Number)	Displays the leading register number that corresponds to the parameter.
Fix Parameter Name	Displays the name of the fixed parameter.
Parameter Settings	Displays the parameter settings for channels 1 to 4 (CH#1 to CH#4).

Setting Default Values

The fixed parameters can be reset to their default values (of each channel) without inputting each parameter. The following table shows the default values of the fixed parameters.

Table 3.13 Default Values of Fixed Parameters

Fixed Parameter	Default Value
A/B Pulse Signal Type	+5V Differential Input
C Pulse Signal Type	+5V Differential Input
A/B Pulse Signal Polar	Plus Logic (positive logic)
C Pulse Signal Polar	Plus Logic (positive logic)
Pulse Count	A/B Pulse (x4)
Counter Mode	Reversible Counter
PI Latch Detection	PI Latch
Coincident Detection	Not used.
Coincident IRQ	Not used.
Frequency	x100

The procedure to reset parameters to their default values is given below.

1. Move the cursor to the channel number that you want to reset to default values.

2. Click *Set (S)* and then *Default (R)* on the Counter I/O Definitions menu.

3. Verify the message in the message box and click the **Yes** Button.

4. The fixed parameters in the channel number selected in step **1.** will be returned to their default values.

I/O Data Settings Tab Page

The CNTR-01 Module's I/O data is set in the I/O Data Set Tab Page.
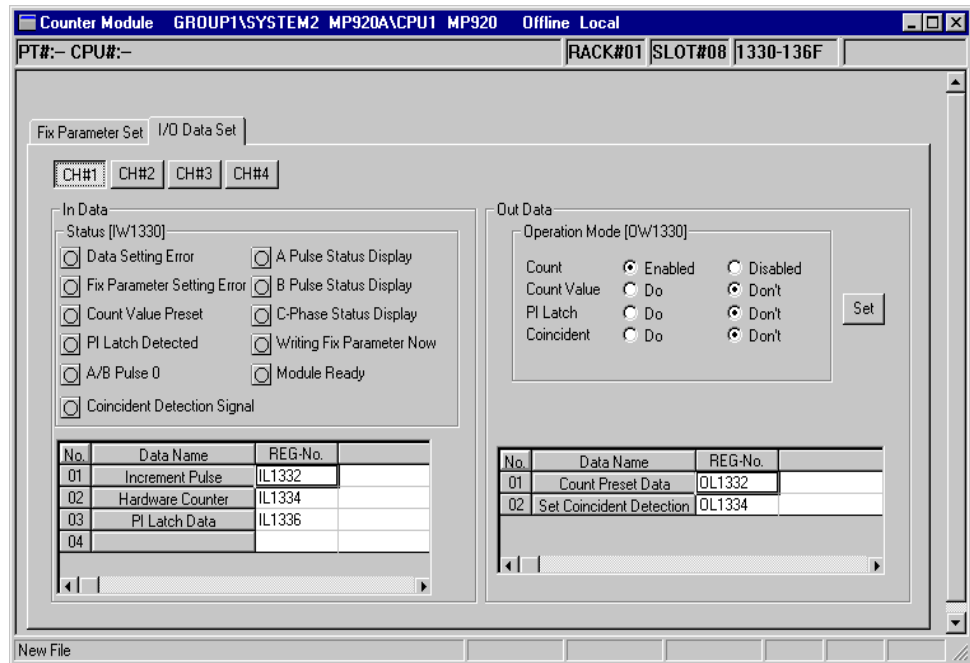
Setting Item	Details
Channel Number Selection	Selects the channel displayed in the I/O Data Set Tab.
Status (Operating Status Display)	Displays the status of each bit in the register that contains the operating status. The corresponding box will contain a black circle when the bit is ON and a white circle when the bit is OFF.
Operation Mode (Operating Mode Settings)	Selects the status of each bit in the register that controls the operating mode. Click the Set Button to activate the new operating mode settings.
Data Name (for input)	Displays the name of the input data.
REG-No. (for input)	Displays the register number of the corresponding input data name.
Input Data	Displays the current value of the corresponding register number and input data name.
Data Name (for output)	Displays the name of the output data.
REG-No. (for output)	Displays the register number of the corresponding output data name.
Output Data	Displays the current value of the corresponding register number and output data name.

• Switching the Data Format of the Display

The I/O Data of the Counter Module can be switched among three data formats: decimal, hexadecimal, and binary. Switch the data format by selecting another format from the drop-down list.

  • Decimal:

    Click *View (V)* and then *DEC (D)* on the Counter I/O Definitions menu.

  • Hexadecimal:

    Click *View (V)* and then *HEX (H)* on the Counter I/O Definitions menu.

  • Binary:

    Click *View (V)* and then *BIN (B)* on the Counter I/O Definitions menu.

■ Saving, Deleting, and Closing Counter I/O Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.15 Analog Input Definitions

This section explains how to set the Analog Input Definitions.

■ Outline of the Analog Input Definitions

The AI-01 Module is equipped with 8 analog input (AI) channels. The overall input circuit is isolated, but the channels are not isolated from each other.

It is possible to use 1, 2, 4, or 8 channels. Processing speed can be improved by selecting fewer channels because it is not necessary for the CPU to scan all 8 channels.

Input servicing is performed at fixed intervals, once for each scan (high-speed or low-speed) in the CPU-01 Module. Each channel can be set to the high-speed or low-speed scan independently.

Set the scan timing and allocates registers to 4 analog input channels in the Analog Input Definitions Window.

Three types of analog input ranges must be selected.
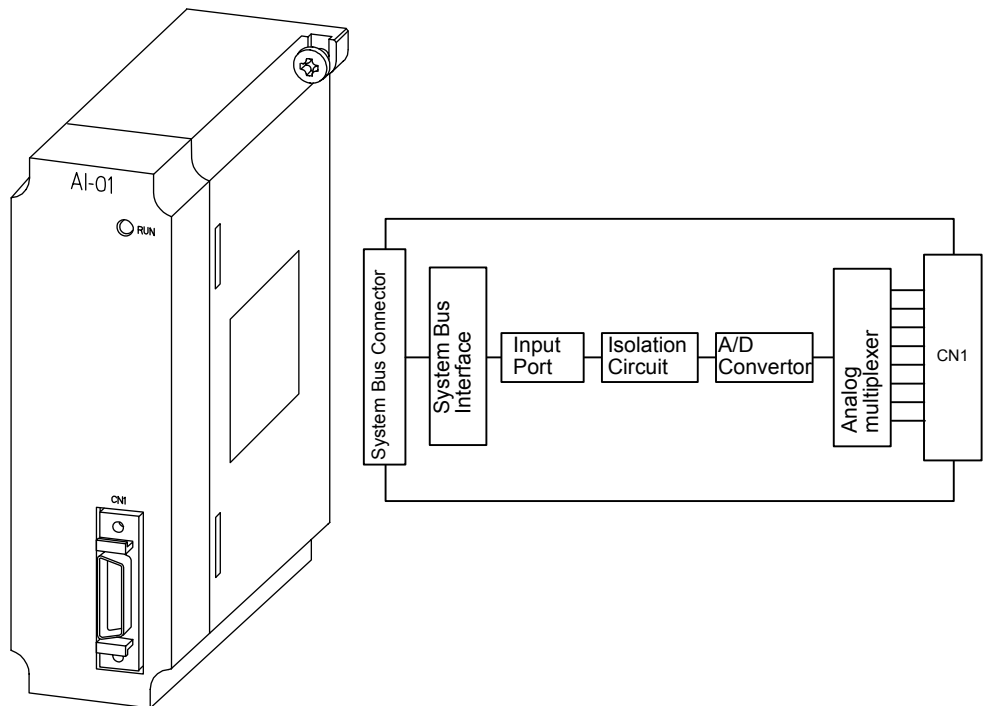
■ Opening the Analog Input Definitions Window

Open the Analog Input Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.
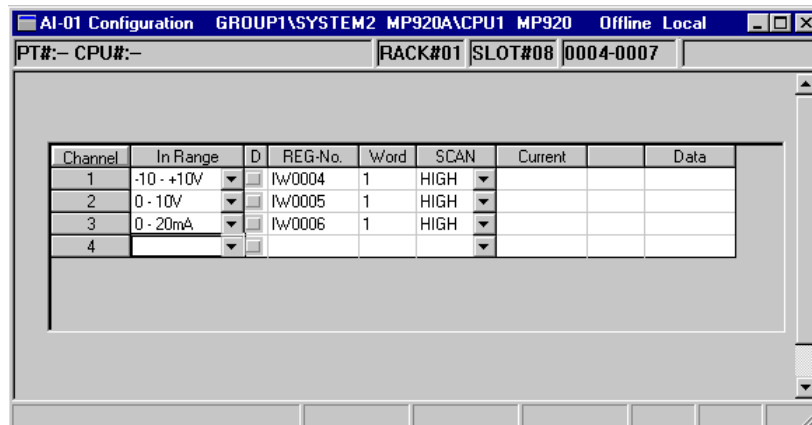
Fig 3.16 Analog Input Definitions Window

■ The Analog Input Definitions Window Original Menus

Menu Command	Function
Edit (E)	
Assignment Delete (D)	Deletes allocation data.
Set (S)	
Offset/Gain (O)	Sets the offset and gain.

■ Setting Analog Input Definitions

Setting Allocation Data

The Analog Input Definitions determine the operation and the disable status of the analog inputs.

Setting Item	Details
Channel	Displays the channel number (1 to 8).
In Range (Input Range)	Selects the input range: -10 to +10 V, 0 to 10 V, or 0 to 20 mA.
D	Controls the register's disable setting. • ▢ : Enabled • ☑ : Disabled
REG-No.	Input the number of the register (I register number) that handles the input.
Word (Number of Words)	Displays the number of consecutive register words.
SCAN	Sets the transmission processing scan in which inputs are serviced. • HIGH: High-speed scan • LOW: Low-speed scan
Current Data	In online mode, these columns display the current value in the order of current value, units, and hexadecimal current value of the Machine Controller's register. The unit corresponds to the unit set in In Range. In offline mode, nothing will be displayed.

Setting the Offset and Gain

1. Click *Set (S)* and then *Offset/Gain (O)* on the Analog Input Definitions menu.

2. Input the desired offset and gain in the following dialog box and then click the **OK** Button.

| Offset | 00000 | (-9999 - 9999) |
| Gain | 1.000 | (0.000 - 9.999) |

OK   Cancel

Deleting Allocation Data

1. Move the cursor to the channel number to be deleted.

2. Click *Edit (E)* and then *Assignment Delete (D)* on the Analog Input Definitions menu.

3. The data selected in step **1.** will be deleted.

■ Saving, Deleting, and Closing Analog Input Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.16 Analog Output Definitions

This section explains how to set the Analog Output Definitions.

■ Outline of the Analog Output Definitions

The AO-01 Module is equipped with 4 analog output (AO) channels.

The overall output circuit is isolated, but the channels are not isolated from each other. The voltage output range can be set to either -10 to 10 V or 0 to 10 V.

Output servicing is performed at fixed intervals, once for each scan (high-speed or low-speed) in the CPU-01 Module. Each channel can be set to the high-speed or low-speed scan independently.

Set the scan timing and allocates registers to 4 analog output channels in the Analog Output Definitions Window.
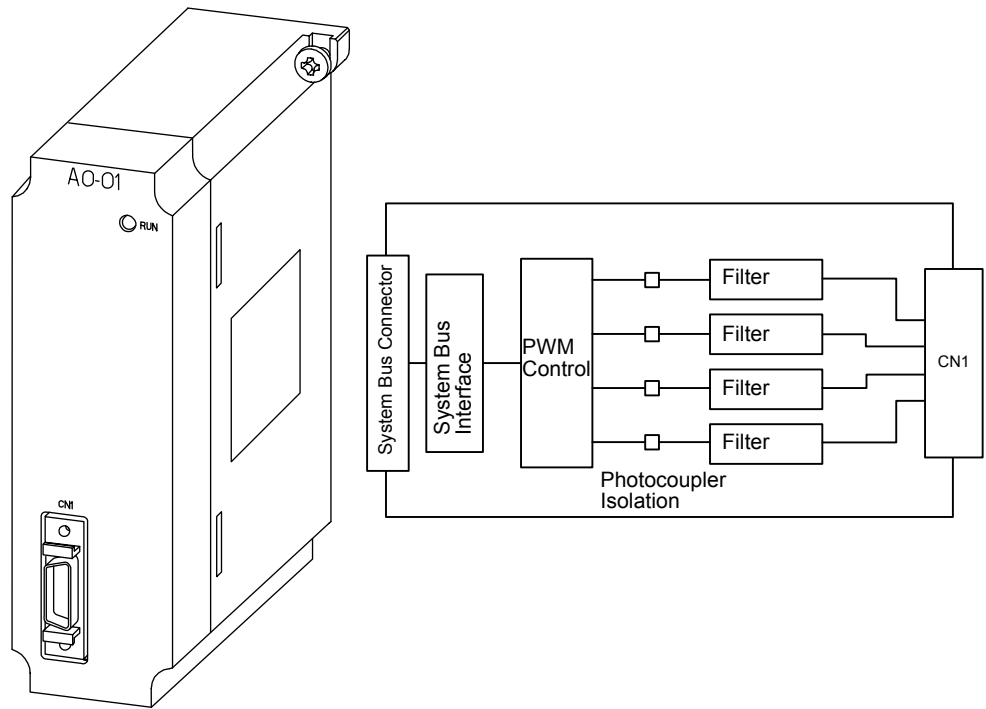
3

■ Opening the Analog Output Definitions Window

Open the Analog Output Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.
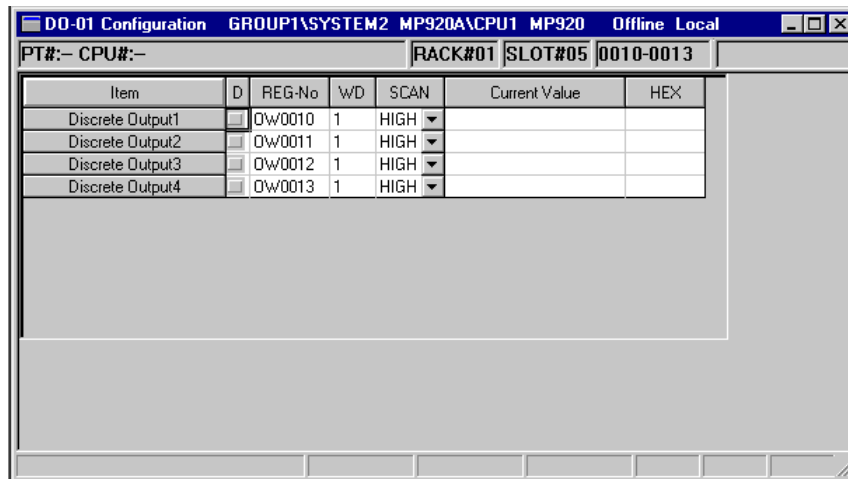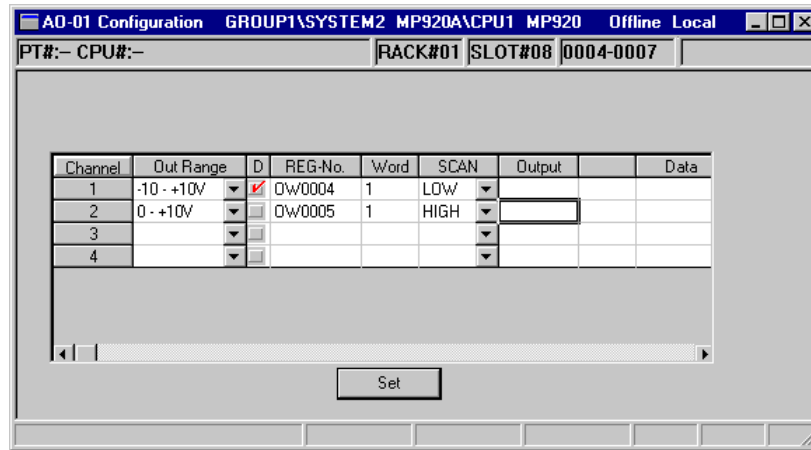

Fig 3.17 Analog Output Definitions Window

■ Analog Output Definitions Window Original Menus

The following table shows the functions of the menu commands in the Analog Output Definitions Window.

Menu Command	Function
Edit (E)	
Assignment Delete (D)	Deletes allocation data.
Set (S)	
Offset/Gain (O)	Sets the offset and gain.
Set Register (R)	Sets the register.

■ Setting Analog Output Definitions

Setting Allocation Data

The Analog Output Definitions determine the operation and the disable status of the analog outputs.

Setting Item	Details
Channel	Displays the channel number (1 to 4).
Out Range (Output Range)	Selects the output range: -10 to +10 V or 0 to 10 V.
D	Controls the register's disable setting. • ☐ : Enabled • ☑ : Disabled
REG-No	Input the number of the register (O register number) that handles the output.
Word (Number of Words)	Displays the number of consecutive register words.
SCAN	Sets the transmission processing scan in which outputs are serviced. • HIGH: High-speed scan • LOW: Low-speed scan
Output, Data	In online mode, these columns display the current value in the order of current value, units, and hexadecimal current value of the Machine Controller's register. The unit corresponds to the unit set in Out Range. A new current value input in the **Output** column can be stored in the Machine Controller's register immediately by clicking the Set Button or clicking *Set (S)* and then *Set Register (R)* on the Analog Output Definitions menu. In offline mode, nothing will be displayed.

Setting the Offset and Gain

1. Click *Set (S)* and then *Offset/Gain (O)* on the Analog Output Definitions menu.

2. Input the desired offset and gain in the following dialog box and then click the **OK** Button.

Set Offset/Gain

Channel No. 2

Offset 00000 (-9999 - 9999)

Gain 1.000 (0.000 - 9.999)

OK   Cancel

Deleting Allocation Data

1. Move the cursor to the channel number to be deleted.

2. Click *Edit (E)* and then *Assignment Delete (D)* on the Analog Output Definitions menu.
   The data selected in step **1.** will be deleted.

■ Saving, Deleting, and Closing Analog Output Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.5.17 SVA Motion Parameters Settings

This section explains how to set the motion parameters of the SVA Modules.

■ Outline of SVA Motion Parameter Settings

SVA Modules are available that control 2 axes per Module or up to 4 axes per Module.

The SVA Modules have either 2 or 4 connectors (CN1 to CN4) for connections to the SER-VOPACKs. Each of these connectors has an analog output for speed reference, an analog input for speed monitoring (SVA-02 only), a phase-A/B/C pulse input (5-V differential or 12-V), a pulse latch digital input, general-purpose digital inputs, and general-purpose digital outputs.

Module	Main Features
SVA-01	• Analog-output 4-axis Servo Module • Independent position control, speed control, and phase control are possible for each axis. • Up to 64 axes (up to 16 Modules) can be controlled. • Interpolations and complex processing operations can be easily programmed in motion programs. • The CN5 External Interface Connector is used to connect the SVA-01 Module with the following external I/O signals. External Inputs: (6 inputs x 4 axes) + (1 common digital input) External Outputs: (2 outputs x 4 axes) + (1 common digital output)
SVA-02	• Analog-output 2-axis Servo Module • Independent position control, speed control, torque control, and phase control are possible for each axis. • Up to 32 axes (up to 16 Modules) can be controlled. • Interpolations and complex processing operations can be easily programmed by motion programs.

3
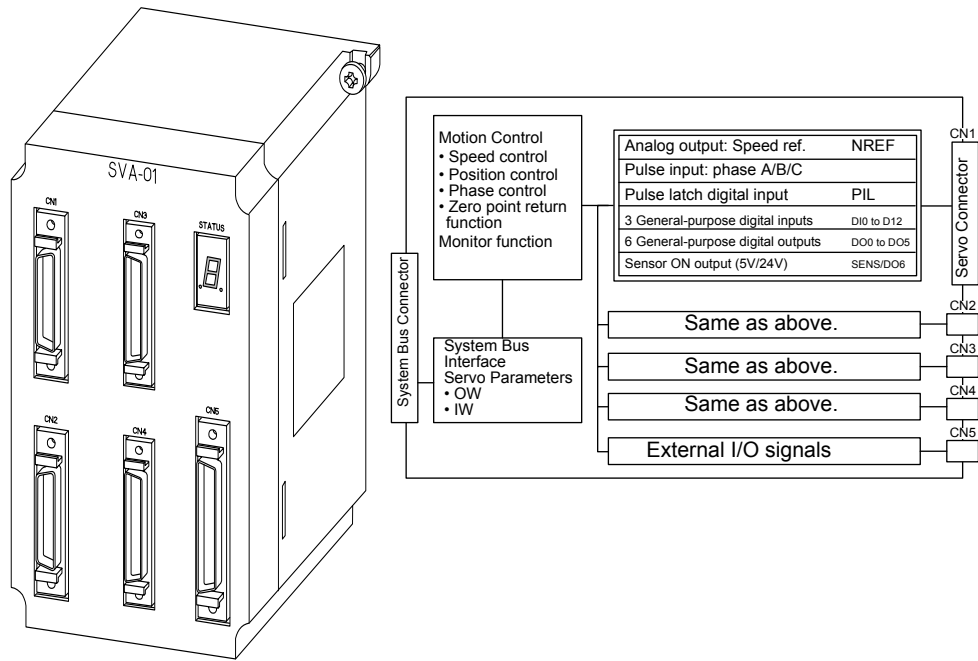
Fig 3.18 SVA-01 Module
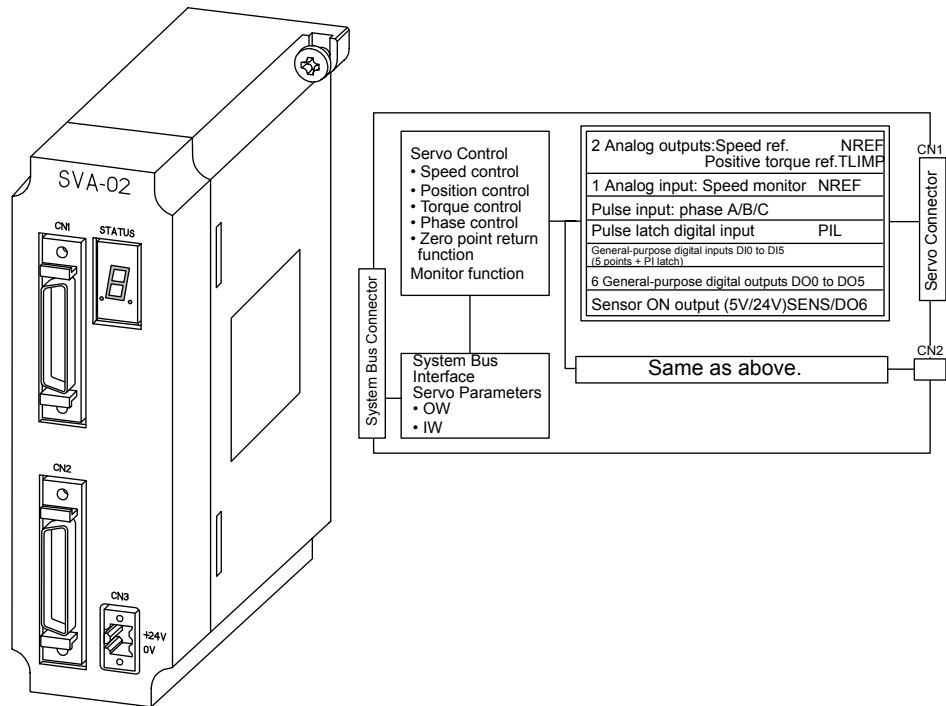
Fig 3.19 SVA-02 Module

To set the SVA motion parameters, the required data must be set (or referenced) in three tab pages: the **Fixed Parameters Tab**, **Set Up Parameters Tab**, and **Monitor Tab**.

The following table lists the basic I/O specifications for the two models of SVA Modules.

Table 3.14 Comparison of the SVA-01 and SVA-02 Modules

Item	4-axis Module (SVA-01)	2-axis Module (SVA-02)
Size	2-slot	1-slot
Number of Axes Controlled	4 axes	2 axes
Analog Outputs	For speed reference: PWM 16 bits, 4 channels For torque reference: None	For speed reference: PWM 16 bits, 2 channels For torque reference: D/A 12 bits, 2 channels
Analog Inputs	None	16 bits, 2 channels
Pulse Inputs	Phase-A/B/C inputs, 4 channels	Phase-A/B/C inputs, 2 channels
DI	3 inputs x 4 channels DI0: SV RDY DI1: SV ALM DI2: BRK	(5 points + PI latch input) x 2 channels DI0: General-purpose (RDY) DI1: General-purpose (ALM) DI2: General-purpose (ZERO) DI3: General-purpose (OTF) DI4: General-purpose (OTR) DI5: PI latch
DO	6 outputs x 4 channels DO0: SVON DO1: SV ALM-RST DO2: SV PCON DO3: SV SEN DO4: OTF DO5: OTR	6 outputs x 2 channels DO0: SV ON DO1: General-purpose (ALM-RST) DO2: General-purpose (PCON) DO3: SV SEN DO4: General-purpose DO5: General-purpose
External Inputs	6 inputs x 4 + 1 RCI input (OTF, OTR, DEC, ZERO, EXT, RI) x 4 (RCI) x 1 (An PI latch is possible with ZERO and EXT.)	None
External Outputs	2 outputs x 4 + 1 RCO output (BRK, RO) x 4 (RCO) x 1	None

■ Opening the SVA Motion Parameters Window

Open the SVA Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations*. The Fixed Parameters Tab Page will be displayed first.
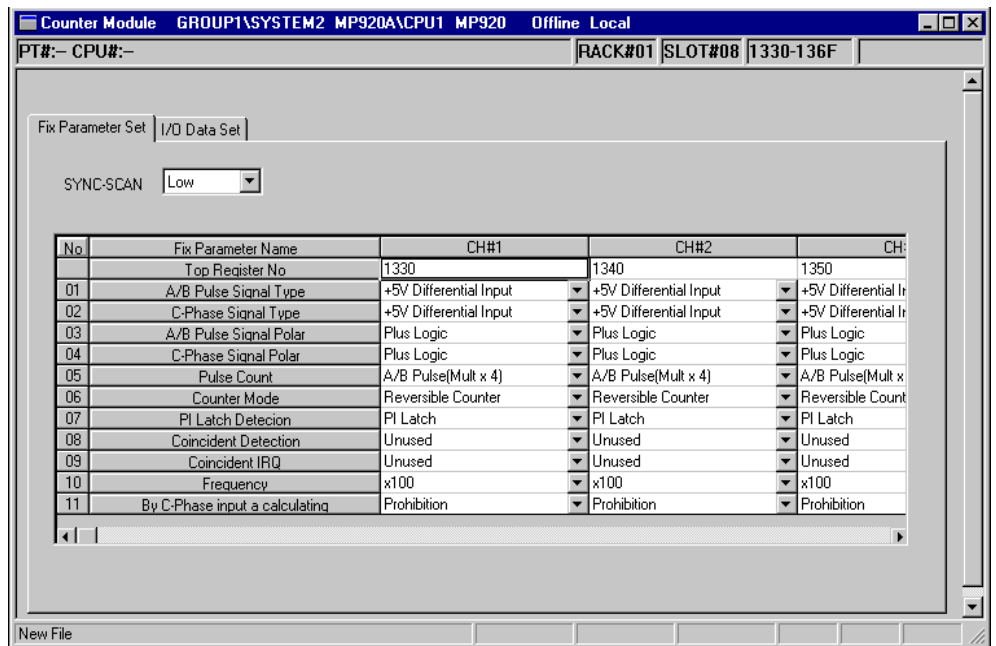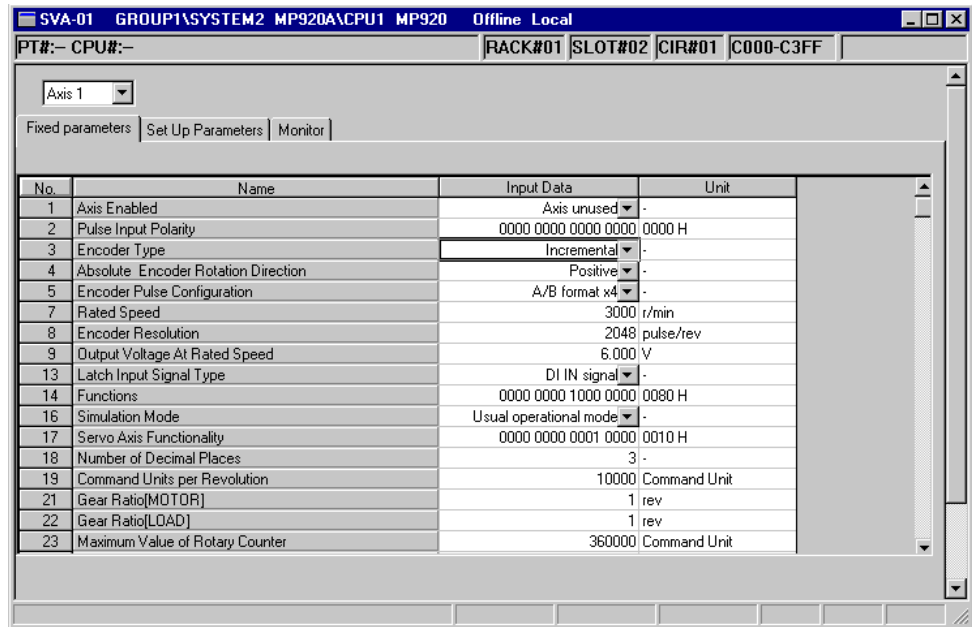
Fig 3.20 SVA Definitions Window

The Motion Parameters Window is composed of three tab pages: The **Fixed parameters**,
Set Up Parameters, and **Monitor** Tabs.

Tab Name	Function
Fixed Parameters	Sets the Motion Fixed Parameters.
Set Up Parameters	Sets the Motion Setting Parameters.
Monitor	Monitors the Motion Parameters.

■ SVA Motion Parameters Window Original Menus

Refer to *SVB Motion Parameters Window Original Menus* in *3.5.19 SVB Motion Parameters
Settings* for details.

■ Setting SVA Motion Parameters

Motion Fixed Parameters Tab Page

The motion fixed parameters required for Servo adjustment are set in the Fixed Parameter
Tab Page.

Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). Set the fixed parameters for each axis in the Fixed Parameter Tab.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value in this column.
Unit	Displays the units of the corresponding set data.

> **INFO**
>
> Refer to *MP920 Machine Controller User's Manual: Design and Maintenance (SIEZ-C887-2.1)* or *MP920 Machine Controller User's Manual: Motion Module (SIEZ-C887-2.5)* for details on motion fixed parameter settings.

Motion Setting Parameters Tab Page

Parameters required for Servo adjustment are set in the Set Up Parameters Tab Page.

Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). The parameters for each axis are displayed.
Parameter Name	Displays the parameter name.
REG-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the servo number currently being displayed, as shown in the following table.
Input Data (Set Data)	Input the parameter value in this column.
Unit	Displays the units of the corresponding set data.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Table 3.15 Register Ranges

Servo Number	Axis Number			
	1	2	3	4
1	C000 to C03F	C040 to C07F	C080 to C0BF	C0C0 to C0FF
2	C400 to C43F	C440 to C47F	C480 to C4BF	C4C0 to C4FF
3	C800 to C83F	C840 to C87F	C880 to C8BF	C8C0 to C8FF
4	CC00 to CC3F	CC40 to CC7F	CC80 to CCBF	CCC0 to CCFF

Servo Number	Axis Number			
	1	2	3	4
5	D000 to D03F	D040 to D07F	D080 to D0BF	D0C0 to D0FF
6	D400 to D43F	D440 to D47F	D480 to D4BF	D4C0 to D4FF
7	D800 to D83F	D840 to D87F	D880 to D8BF	D8C0 to D8FF
8	DC00 to DC3F	DC40 to DC7F	DC80 to DCBF	DCC0 to DCFF
9	E000 to E03F	E040 to E07F	E080 to E0BF	E0C0 to E0FF
10	E400 to E43F	E440 to E47F	E480 to E4BF	E4C0 to E4FF
11	E800 to E83F	E840 to E87F	E880 to E8BF	E8C0 to E8FF

> **INFO**
>
> Refer to *the MP920 Machine Controller User's Manual: Design and Maintenance (SIEZ-C887-2.1) or MP920 Machine Controller User's Manual: Motion Module (SIEZ-C887-2.5) for details on motion setting parameters.*

3

Motion Monitor Tab Page

The Motion Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Monitor Tab Page; the settings cannot be changed here.

Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). The parameters for each axis are displayed.
Parameter Name	Displays the parameter name.
REG-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the servo number currently being displayed. See *Table 3.15 Register Ranges* for details.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the parameter.

INFO

Refer to *MP920 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-2.1) or *MP920 Machine Controller User's Manual: Motion Module* (SIEZ-C887-2.5) for details on monitor parameter settings.

■ Saving, Deleting, and Closing the SVA Motion Parameters

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

IMPORTANT

1 This operation deletes the SVA motion fixed parameters and setting parameters of all axes.

2 The edited motion fixed parameters cannot be saved if the RUN (Servo ON) Flag is ON. Save the motion parameters data after this flag has gone OFF.
The RUN (Servo ON) Flag is bit 0 of parameter number 2 (RUN Command Settings) in the Set Up Parameters Tab. The register number for parameter 2 is OWC001.

3 The Save (S) command saves the motion fixed parameters for all axes of the servo number currently being displayed.

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

3.5.18 PO-01 Motion Parameters Settings

This section explains how to set the motion parameters of the PO-01 Module.

■ Outline of PO-01 Motion Parameter Settings

The PO-01 Module is a pulse-train output Motion Control Module. One PO-01 Module can be connected to up to 4 pulse motor drivers (4 axes).

Two connectors (CN1 and CN2) are provided for connections to pulse motor drivers. Each connector is equipped with 2 (5-V differential) pulse-train outputs, 4 digital outputs (DO) and 5 digital inputs (DI) for various pulse driver control applications.

To set the motion parameters, the required data must be set (or referenced) in three tab pages: the **Fixed Parameters Tab**, **Set Up Parameters Tab**, and **Monitor Tab**.
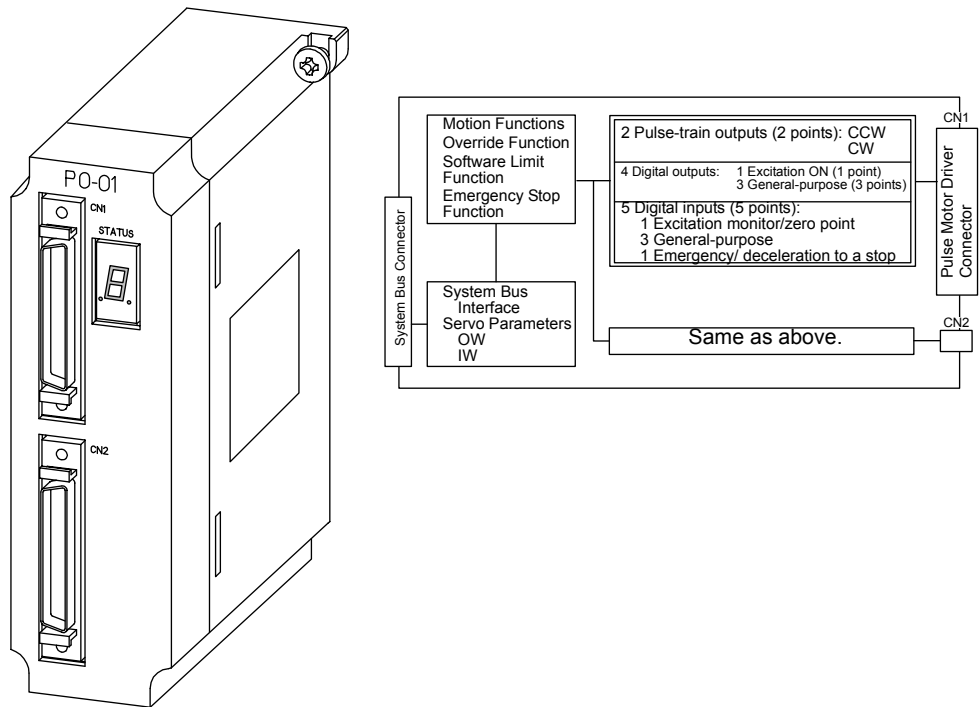
Opening the PO-01 Definitions Window

Open the PO-01 Definitions Window in accordance with the procedure in *3.3 Basic Individual Module Definition Operations*.


No.	Name	Input Data	Unit
1	Axis Enabled	Axis unused ▼	-
7	Rated Speed	100	r/min
14	Functions	0000 0000 1000 0000 0080	H
17	Servo Axis Functionality	0000 0000 0000 0000 0000	H
18	Number of Decimal Places	3	-
19	Command Units per Revolution	10000	Command Unit
21	Gear Ratio[MOTOR]	1	rev
22	Gear Ratio[LOAD]	1	rev
23	Maximum Value of Rotary Counter	360000	Command Unit
27	Forward Software Limit	2147483647	Command Unit
29	Reverse Software Limit	-2147483648	Command Unit
31	Home Return Type	DEC1 + ZERO signal ▼	-
33	Encoder Resolution in Simulation Mode	200	pulse
35	Bias speed	0	10**n Command Unit/s
36	Speed Filter Bias	0	10**n Command Unit/s
37	Pulse OUT signal morphologic SEL	0000 0000 0000 0000 0000	H
38	Number of the pulse OUT highest cycle	10	10KHz

The PO-01 Definitions Window is composed of three tab pages: The **Fixed Parameters**, **Set Up Parameters**, and **Monitor** Tabs.

Table 3.16 Tab Pages in the PO-01 Definitions Window

Tab Name	Function
Fixed parameters	Sets the Motion Fixed Parameters.
Set Up parameters	Sets the Motion Setting Parameters.
Monitor	Monitors the Motion Parameters.

It is possible to switch between these tab pages by selecting *View (V)* and then *Next Page (N)* or *Back Page (B)* from the PO-01 Definitions menu.

■ PO-01 Definitions Window Original Menus

Refer toSVB Motion Parameters Window Original Menus in *3.5.19 SVB Motion Parameters Settings* for details.

■ Setting PO-01 Motion Parameters

Motion Fixed Parameters Tab Page

The parameters required in the MP920 are set in the Fixed Parameters Tab Page.

Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). Set the motion fixed parameters for each axis.
No.	Displays the parameter number of the motion fixed parameter.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value in this column.
Unit	Displays the units of the corresponding parameter.

INFO

Refer to *MP920 Machine Controller User's Manual: Motion Module (SIEZ-C887-2.5) for details on motion fixed parameter settings.*

Setting Parameters Tab Page

Parameters required in the MP920 are set in the Set Parameter Tab Page.

Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). The parameters for each axis are displayed.
No.	Displays the parameter number of the setting parameter.
Parameter Name	Displays the parameter name.
REG-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the motion number and axis number currently being displayed.
Input Data (Set Data)	Input (or select) the parameter value in this column.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

INFO

Refer to *MP920 Machine Controller User's Manual: Motion Module* (SIEZ-C887-2.5) for details on setting parameter settings.

Motion Monitor Tab Page

The Motion Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Motion Monitor Tab Page; the settings cannot be changed here.

Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). The parameters for each axis are displayed.
No.	Displays the parameter number of the motion monitor.
Parameter Name	Displays the parameter name.
REG-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the motion number and axis number currently being displayed.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.

> **INFO** Refer to *MP920 Machine Controller User's Manual: Motion Module* (SIEZ-C887-2.5) for details on monitor parameter settings.

■ Saving, Deleting, and Closing the PO-01 Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

IMPORTANT

1 This operation deletes the motion fixed parameter and setting parameter settings of all axes.

2 The edited motion fixed parameters cannot be saved if the RUN (Servo ON) Flag is ON. Save the motion parameters data after this flag has gone OFF.
The RUN (Servo ON) Flag is bit 0 of parameter number 2 (RUN Command Settings) in the Set Up Parameters Tab. The register number for parameter 2 is OWC001.

3 The Save (S) command saves the fixed parameters for all axes of the servo number currently being displayed.

3

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

3.5.19 SVB Motion Parameters Settings

This section explains how to set the motion parameters for the SVB-01 Module.

The SVB Module is equipped with a MECHATROLINK interface, and can connect to a maximum of 14 SERVOPACKs and I/O devices that are MECHATROLINK-compatible.

SVB Module definitions are set on two levels: MECHATROLINK and the motion parameters. The required settings will differ depending on the device connected using MECHATROLINK.

	MECHATROLINK Device	
	SERVOPACK	I/O Device
MECHATROLINK Definitions	Yes	Yes
Motion Parameter Settings	Yes	No

First, define the MECHATROLINK interface according to *3.5.20 MECHATROLINK Definitions*. The Motion Parameters Window cannot be opened without the MECHATROLINK definitions first being set.

■ Outline of SVB Motion Parameter Settings

The SVB-01 Module has a single MECHATROLINK connector and can control up to 14 Module Devices with MECHATROLINK interfaces.

To set the motion parameters, the required data must be set (or referenced) in four tab pages: the **Fixed Parameters Tab, Set Up Parameters Tab**, **SERVOPACK Tab**, and **Monitor Tab**.
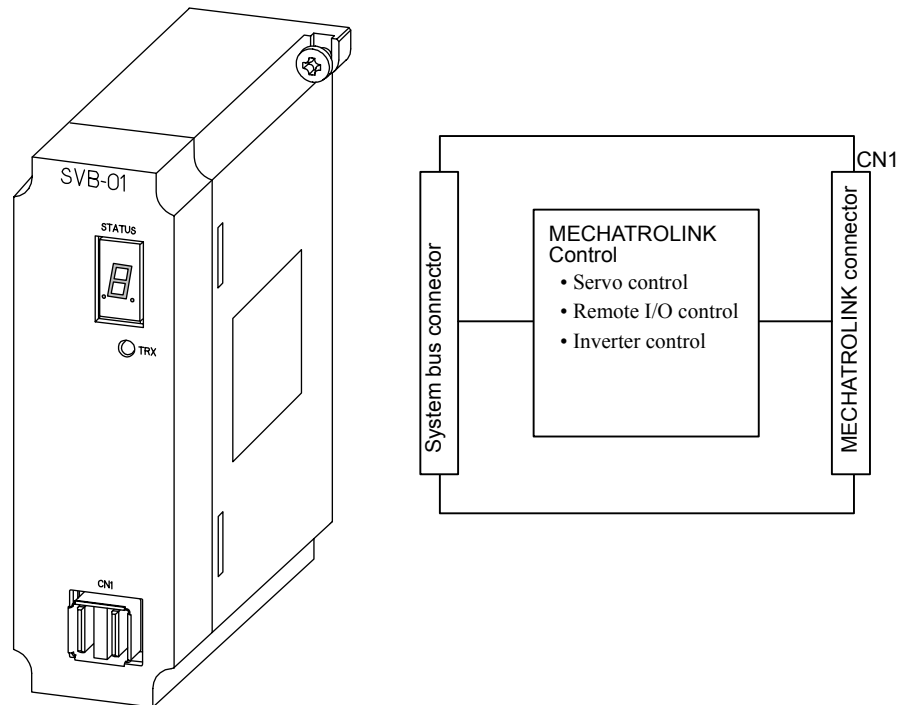
■ Opening the SVB Motion Parameters Window

Open the SVB Motion Parameters Window according to the procedure in *3.3 Basic Individual Module Definition Operations*. The Fixed Parameters Tab Page will be displayed first.
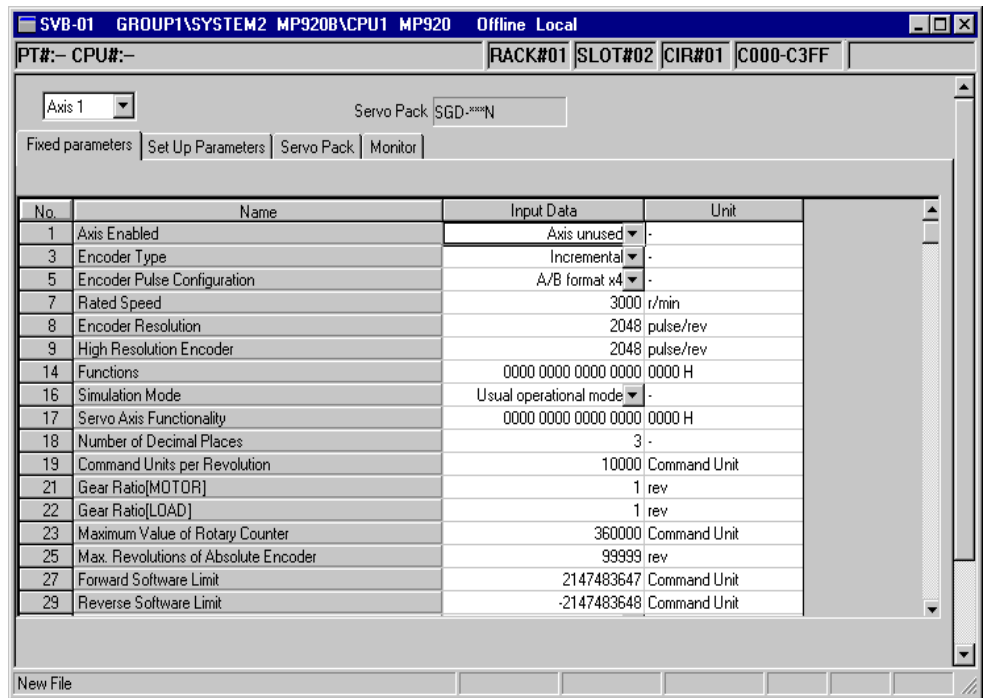
The SVB Motion Parameters Window is composed of four tab pages: The **Fixed Parameters Tab**, **Set Up Parameters Tab**, **SERVOPACK Tab**, and **Monitor Tab**.

Table 3.17 Tab Pages in the SVB Motion Parameters Window

Tab Name	Function
Fixed Parameters	Sets the Motion Fixed Parameters.
Set Up Parameters	Sets the Motion Setting Parameters.
SERVOPACK	Sets the SERVOPACK Setting Parameters.
Monitor	Monitors the Motion Parameters.

It is possible to switch between these tab pages by clicking *View (V)* and then *Next Page (N)* or *Back Page (B)* on the Motion Parameters Window's menu.

■ SVB Motion Parameters Window Original Menus

These menus can be used only in the SVB Motion Parameters Window.

Menu Command	Function
Edit (E)	
Axis Data Copy (C)	Temporarily saves the displayed axis setting data.
Axis Data Paste (P)	Copies the temporarily saved axis data to the currently selected axis data.
Details (D)	Displays individual data in bit format.
Default Set (R)	Sets the default value.
Copy Current Value (V)	Sets the set data a the current value.
View (V)	
Refresh Current Value (R)	Updates the display of the current value of the servo parameters.

Axis Data Copy

Select the axis data to be copied, and then select *Edit (E)* and then *Axis Data Copy (C)* from the menu. The source axis data will be copied and saved temporarily in the cut buffer.

Axis Data Paste

Select the axis data to be copied, and then select *Edit (E)* and then *Axis Data Paste (P)* from the menu. The axis data saved temporarily in the cut buffer will overwrite the axis data at the copy destination.

IMPORTANT

Copying between axes is possible using the Copy Axis Data and the Paste Axis Data functions. Copying between axes requires separate operations for fixing, setting, and SERVOPACK parameters.If the pasted data is for a different type of parameter, an error message will be displayed.

Details (D)

Use this function to display setting data as bit images for motion parameters except for servo parameters. The information can be displayed for each bit by selecting *Edit (E)* and then *Details (D)* from the menu bar.

Default Set (R)

Use this function to restore the settings data for the motion fixed parameters, setting parameters, and servo parameters (for the MECHATROLINK interface only) to their default values.

Select *Edit (E)* and then *Default Set (R)* from the menu bar. The axis parameters currently displayed will be set to their default values. Parameters whose current values are displayed will have their current values updated.

Copy Current Value (V)

This function is enabled only for servo parameters. It overwrites the settings data using the data displayed in the Current Value field. Select *Edit (E)* and then *Copy Current Value (V)* from the menu bar. The data on the SERVOPACK will be overwritten temporarily.

Check the details displayed, and then select *File (F)* and then *Save (S)* from the menu bar to save the data permanently. This operation is possible while the servo is ON.

Refresh Current Value (R)

This function is enabled only for servo parameters. Current values are not automatically updated when the servo parameters are displayed. Select *View (V)* and then *Refresh Current Value (R)* to read and display the most recent values.

The following table shows the functions given above.

	Motion Fixed Parameters	Setting Parameters	Servo Parameters (See *1)	Motion Parameters	Remarks
Axis Data Copy (C)/ Axis Data Paste (P)	Yes	Yes	No	No	---
Details (D)	Yes	Yes	No	Yes	Parameters in bit format only
Default Set (R)	Yes	Yes	Yes	No	---
Copy Current Value (D)	No	No	Yes	No	Enabled only when online
Refresh Current Value (R)	No	No	Yes	No	Enabled only when online

∗ Possible also when the servo is ON.

Note: Yes: Operation possible, NO: Operation not possible.

■ Setting Motion Fixed Parameters

Motion Fixed Parameters Tab Page

The parameters required in the MP920 are set in the Fixed Parameters Tab Page.

Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). Set the fixed parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the motion fixed parameter.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value in this column. The settings for each parameter are listed below.
Unit	Displays the units of the corresponding parameter.

3

● INFO
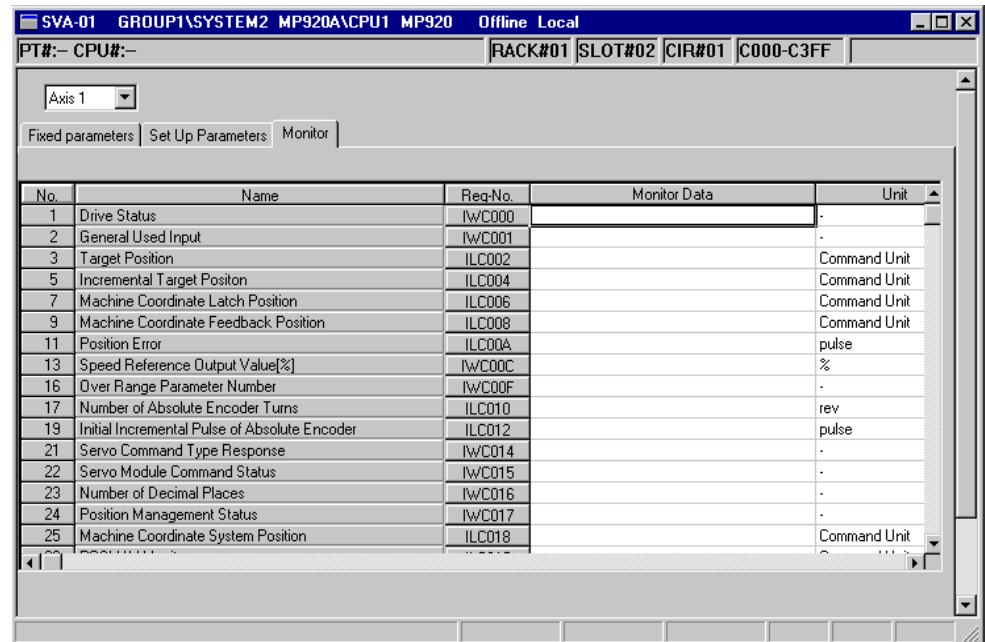
Refer to *MP920 Machine Controller User's Manual: Design and Maintenance (SIEZ-C887-2.1) or MP920 Machine Controller User's Manual: Motion Module (SIEZ-C887-2.5) for details on motion fixed parameter settings.*

Setting Parameters Tab Page

Parameters required in the Motion Controller are set in the Set Parameter Tab Page.
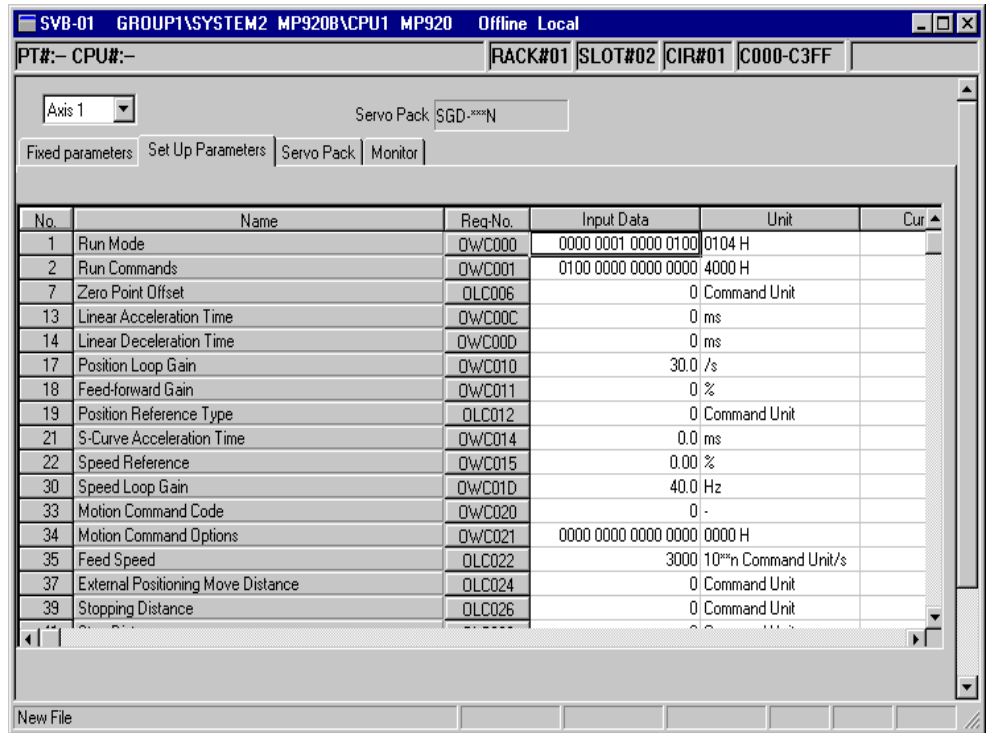
Setting Item	Details
Axis Number	Select the desired axis number (axis 1 or axis 2). Set the setting parameters for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the setup parameter.
Parameter Name	Displays the parameter name.
REG-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the motion number and axis number currently being displayed, as shown below.
Input Data (Set Data)	Input (or select) the parameter value in this column.
Unit	Displays the units of the corresponding parameter.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Table 3.18 Register Ranges

Servo Number	Axis Number			
	1	2	3	4
1	C000 to C03F	C040 to C07F	C080 to C0BF	C0C0 to C0FF
2	C400 to C43F	C440 to C47F	C480 to C4BF	C4C0 to C4FF
3	C800 to C83F	C840 to C87F	C880 to C8BF	C8C0 to C8FF
4	CC00 to CC3F	CC40 to CC7F	CC80 to CCBF	CCC0 to CCFF

Servo Number	Axis Number			
	1	2	3	4
5	D000 to D03F	D040 to D07F	D080 to D0BF	D0C0 to D0FF
6	D400 to D43F	D440 to D47F	D480 to D4BF	D4C0 to D4FF
7	D800 to D83F	D840 to D87F	D880 to D8BF	D8C0 to D8FF
8	DC00 to DC3F	DC40 to DC7F	DC80 to DCBF	DCC0 to DCFF
9	E000 to E03F	E040 to E07F	E080 to E0BF	E0C0 to E0FF
10	E400 to E43F	E440 to E47F	E480 to E4BF	E4C0 to E4FF
11	E800 to E83F	E840 to E87F	E880 to E8BF	E8C0 to E8FF
12	EC00 to EC3F	EC40 to EC7F	EC80 to ECBF	ECC0 to ECFF
13	F000 to F03F	F040 to F07F	F080 to F0BF	F0C0 to F0FF
14	F400 to F43F	F440 to F47F	F480 to F4BF	F4C0 to F4FF
15	F800 to F83F	F840 to F87F	F880 to F8BF	F8C0 to F8FF
16	FC00 to FC3F	FC40 to FC7F	FC80 to FCBF	FCC0 to FCFF

3

⟨ INFO ⟩ Refer to *MP920 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-2.1) or *MP920 Machine Controller User's Manual: Motion Module* (SIEZ-C887-2.5) for details on setting parameter settings.

SERVOPACK Tab Page

SERVOPACK parameters required in the MP920 are set in the SERVOPACK Tab Page.
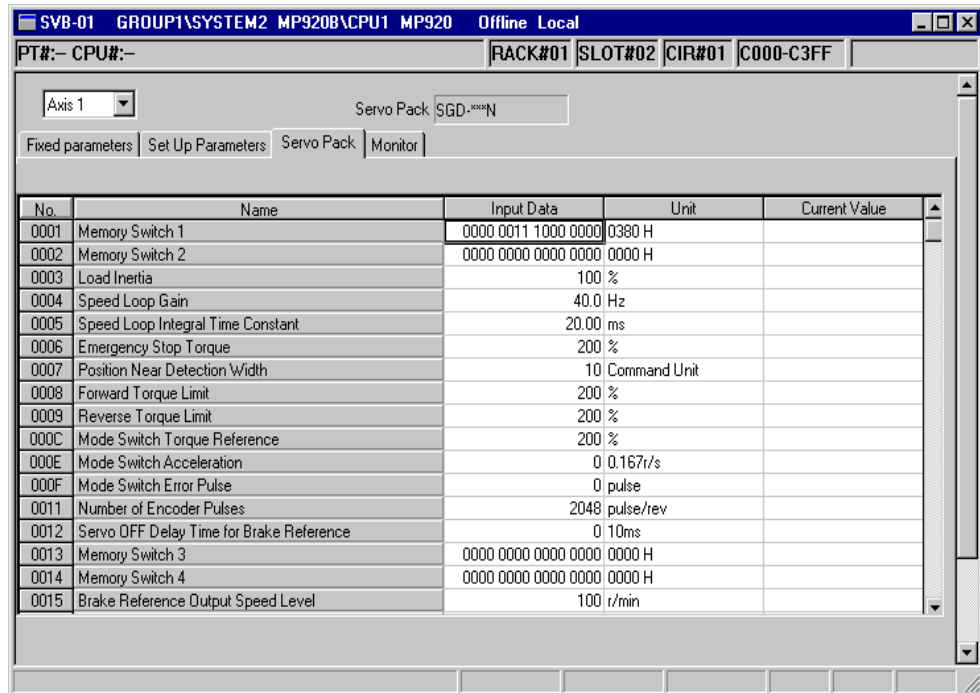
Setting Item	Details
Axis Number	Select the desired axis number (axis 1 to axis 4). Set the SERVO-PACK for each axis.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the servo parameter.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input (or select) the parameter value in this column.
Unit	Displays the units of the corresponding parameter.

●INFO▶ Refer to *MP920 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-2.1) or *MP920 Machine Controller User's Manual: Motion Module* (SIEZ-C887-2.5) for details on servo parameter settings.

Motion Monitor Tab Page

The Motion Monitor Tab Page displays the current values of the motion parameters. The parameters are only displayed in the Motion Monitor Tab Page; the settings cannot be changed here.

```
SVB-01   GROUP1\SYSTEM2 MP920B\CPU1 MP920   Offline Local          _□×
PT#:- CPU#:-                          RACK#01 SLOT#02 CIR#01 C000-C3FF

 Axis 1  ▼                 Servo Pack SGD-****N

Fixed parameters | Set Up Parameters | Servo Pack | Monitor


No.              Name                Reg-No.        Monitor Data
 1   Drive Status                    IWC000
 2   Network Servo Status            IWC001                            ·
 3   Target Position                 ILC002                          Cor
 7   Machine Coordinate Latch Position ILC006                        Cor
 9   Machine Coordinate Feedback Position ILC008                     Cor
16   Over Range Parameter Number     IWC00F                            ·
21   Servo Command Type Response     IWC014                            ·
22   Servo Module Command Status     IWC015                            ·
23   Number of Decimal Places        IWC016                            ·
24   Position Management Status      IWC017                            ·
25   Machine Coordinate System Position ILC018                       Cor
29   POSMAX Monitor                  ILC01C                          Cor
31   POSMAX Number of Turns          ILC01E                          rev
33   Network Servo User Monitor Information ILC020                     ·
35   Servo Alarms                    ILC022                            ·
37   Network Servo Alarm Code        IWC024                            ·
```
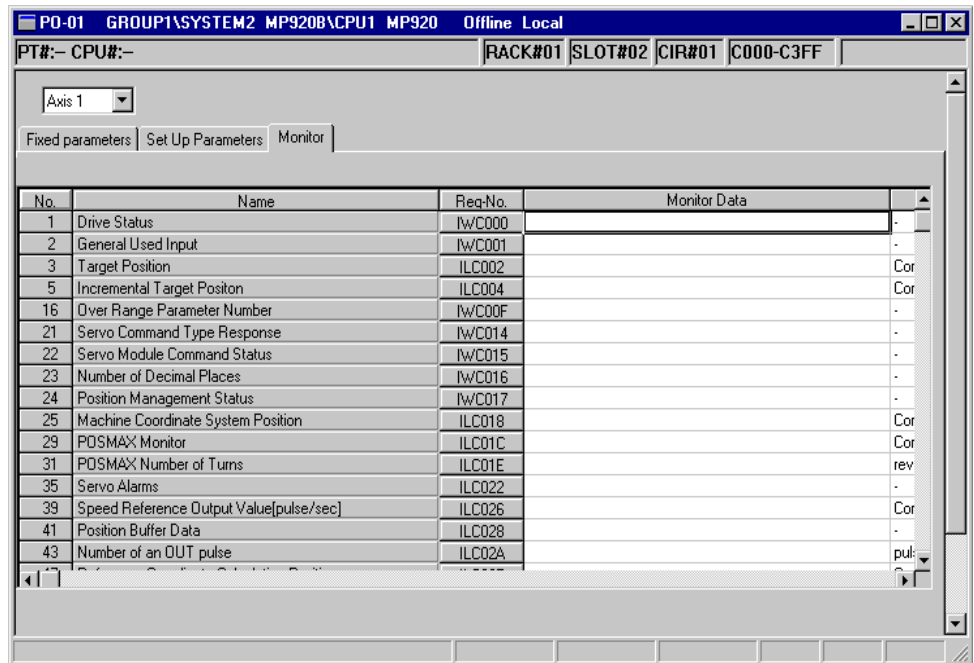
Setting Item	Details
Axis Number	Select the desired axis number (axis 1 or axis 2). The parameters for each axis are displayed.
SERVOPACK	Displays the type of SERVOPACK.
No.	Displays the parameter number of the parameter.
Parameter Name	Displays the parameter name.
REG-No.	Displays the number of the register that corresponds to the parameter name. The range of registers depends on the motion number and axis number currently being displayed.
Monitor Data	In online mode, the current values of the parameters are displayed. In offline mode, nothing will be displayed.
Unit	Displays the units of the corresponding parameter.

● INFO

Refer to *MP920 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-2.1) or *MP920 Machine Controller User's Manual: Motion Module* (SIEZ-C887-2.5) for details on monitor parameter settings.

3

■ Saving, Deleting, and Closing the SVB Motion Parameters

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

IMPORTANT

1 This operation deletes the SVA motion fixed parameters and setting parameters of all axes.

2 The edited motion fixed parameters cannot be saved if the RUN (Servo ON) Flag is ON. Save the motion parameters data after this flag has gone OFF.
The RUN (Servo ON) Flag is bit 0 of parameter number 2 (RUN Command Settings) in the Set Up Parameters Tab. The register number for parameter 2 is OWC001.

3 The Save (S) command saves the motion fixed parameters for all axes of the servo number currently being displayed.

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

3.5.20 MECHATROLINK Definitions

This section explains how to set the MECHATROLINK Definitions.

■ Outline of the MECHATROLINK Definitions

To set the motion parameters, the required data must be set in three tab pages: The **Transmission Parameters Tab**, **I/O Assignment Tab**, and **I/O Map Tab**.

The status of transmissions can be monitored in the **Status Tab**.
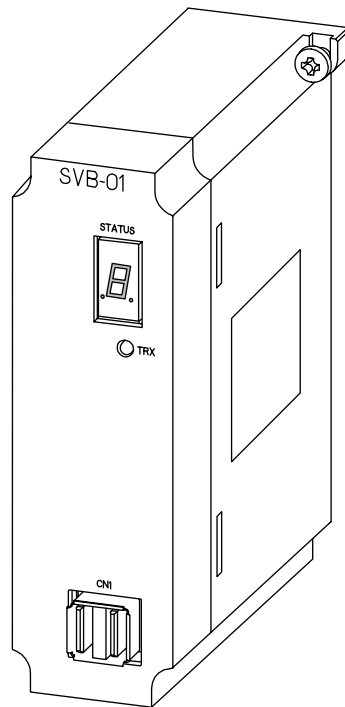
3

■ Opening the MECHATROLINK Definitions Window

Open the MECHATROLINK Definitions Window according to the procedure given in *3.3 Basic Individual Module Definition Operations*. Open the MECHATROLINK Definitions Window from the M-LINK details field in the Module Configuration Definitions Window.
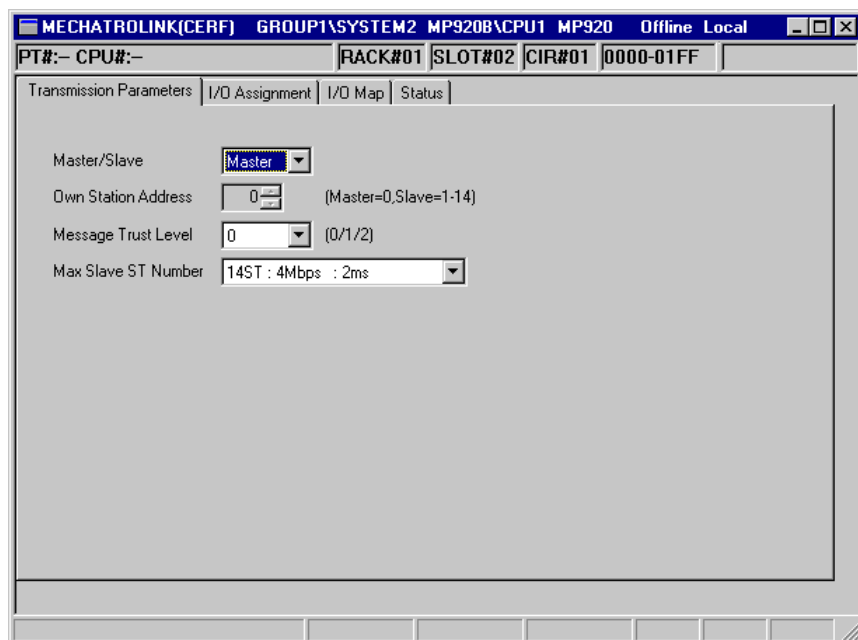
The settings are divided into four tab pages, as shown in the following table.

Transmission Parameters	Sets the MECHATROLINK transmission parameters.
I/O Assignment	Allocates the MECHATROLINK's I/O.
I/O Map	Sets the I/O map.
Status	Displays the transmission status.

■ The MECHATROLINK Definitions Window Menus

The following table shows the functions of the menu commands in the MECHATROLINK Definitions Window.

Menu Command	Function
Edit (E)	
Parameter Setting (D)	Returns the allocation settings to default values.
Assignment Delete (A)	Clears the allocation settings.

■ Setting MECHATROLINK Definitions

Transmission Parameters Tab Page

This tab sets the parameters required to use the MECHATROLINK communications system.

Setting Item	Details	
Master/Slave	Sets whether the Machine Controller is used as a Master station or a Slave station.	
Own Station Address	When the Machine Controller is being used as a master station, the local station address is fixed at 0 and cannot be changed. When it is being used as a slave station, set a station address between 1 and 30.	
Message Trust Level	Sets the error recovery level for sending MEMOBUS commands.	
	0	Send command just once and wait indefinitely for a response from the destination.
	1	Send command once and resend if a response is not received within 8 seconds.
	2	When sending the command, send each word of data twice consecutively and wait indefinitely for a response from the destination. This method improves transmission quality but reduces transmission efficiency by 50%.

Setting Item	Details		
Max Slave ST Number (Maximum Number of Slave Stations)	Number of Slaves	Transmission Speed	Transmission Cycle
	2 Stations	4 Mbps	500 μs
	2 Stations	10 Mbps	250 μs
	3 Stations	2 Mbps	1 ms
	6 Stations	4 Mbps	1 ms
	6 Stations	10 Mbps	500 μs
	7 Stations	2 Mbps	2 ms
	14 Stations	4 Mbps	2 ms
	14 Stations	10 Mbps	1 ms
	15 Stations	2 Mbps	4 ms
	29 Stations	4 Mbps	4 ms
	29 Stations	10 Mbps	2 ms
	30 Stations	10 Mbps	4 ms

I/O Assignment Tab Page

1. Setting Assignment Data

   The I/O Assignment Tab Page is used to set the I/O devices, I/O registers, scan, etc., connected in the MECHATROLINK.

3

Setting Item	Details
ST#	Displays the station number. Up to 14 stations can be set.
TYPE	Sets the type of I/O device connected at the station. Select an I/O device type from the pull-down list.
D	Controls the input register's disable setting. • ☐ : Enabled • ☑ : Disabled
INPUT, SIZE	Sets the leading input register and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station does not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Definition Window.
D	Controls the output register's disable setting. • ☐ : Enabled • ☑ : Disabled
OUTPUT, SIZE	Sets the leading output register and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station do not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Definition Window. This setting is not required when a SERVOPACK has been selected for the TYPE field.
SCAN	Sets the scan for I/O servicing. The scan will be fixed at High when a SERVOPACK has been selected for the TYPE field. • High: High-speed scan • Low: Low-speed scan
Station Name (Comment)	Comments up to 32 characters can be input for each station.

● INFO ▶ The I/O devices set using the TYPE field are shown in *Appendix D.1 MECHATROLINK Devices*.

2. Deleting I/O Assignments

The procedure to delete the allocation settings for one station at a time is given below.

a) To delete a station's allocation data, move the cursor to the row of the station, to be deleted, click *Edit (E)*, and then *Assignment Delete (A)*.

b) The station's allocation settings will be deleted.

I/O Map Tab Page

The I/O Map Tab Page displays the status of the Machine Controller's I/O allocations.
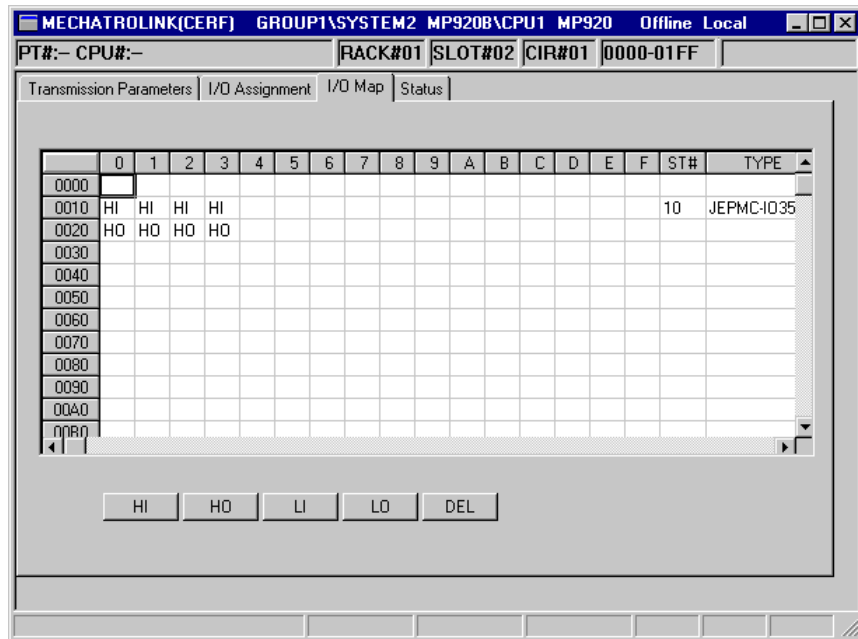
HI	Allocates to an input set for a high-speed scan.
HO	Allocates to an output set for a high-speed scan.
LI	Allocates to an input set for a low-speed scan.
LO	Allocates to an output set for a low-speed scan.
DEL	Deletes allocations.

Status Tab Page

The Status Tab Page displays the data that is currently being transmitted by the MECHA-TROLINK.

The tab only displays the status; the displayed values cannot be changed.
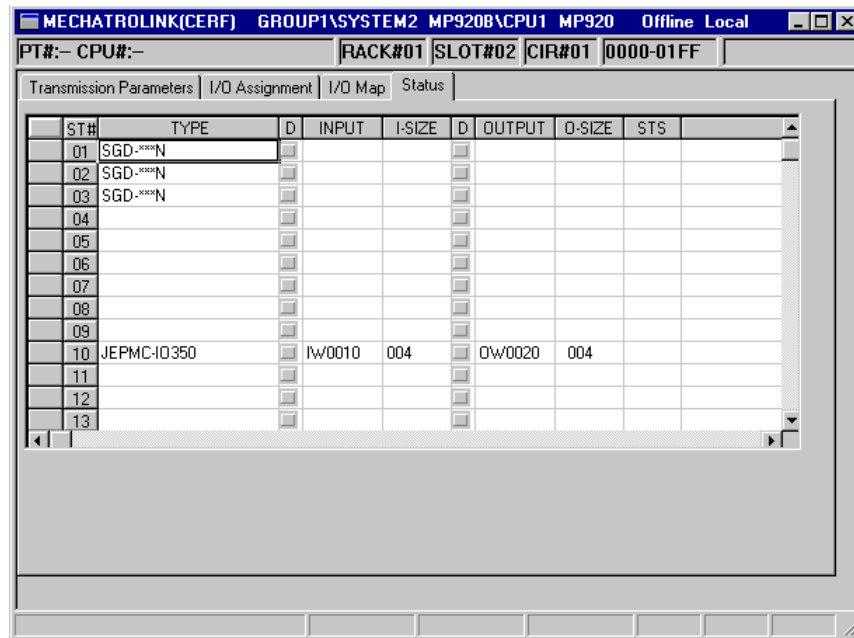
The meaning of each column is identical to the columns in the I/O Assignment Tab Page except for the additional "STS" column.

- STS

  In online mode, the MECHATROLINK transmission status information is displayed in hexadecimal. The meaning of each bit is shown in the following diagram. In offline mode, nothing will be displayed.

■ Saving, Deleting, and Closing MECHATROLINK Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.6 MP930 Module Definitions

This section explains the parameter settings for RS-232C, local I/O, and MECHATROLINK in the MP930.

3.6.1 MP930 Virtual Module Configuration

The MP930 Machine Controllers feature an all-in-one structure, i.e., the required basic Module functions are contained in a single unit.

The parameter settings for each Basic Module are the same as the settings for building-block Machine Controllers. To set the parameters easily, the MP930 Machine Controllers feature a virtual building-block structure. The following diagram shows the virtual building-block structure used by MP930 Machine Controllers.

Virtual Building-block Structure

MC350	RS-232C	MC350 I/O	MC350 -NET

3
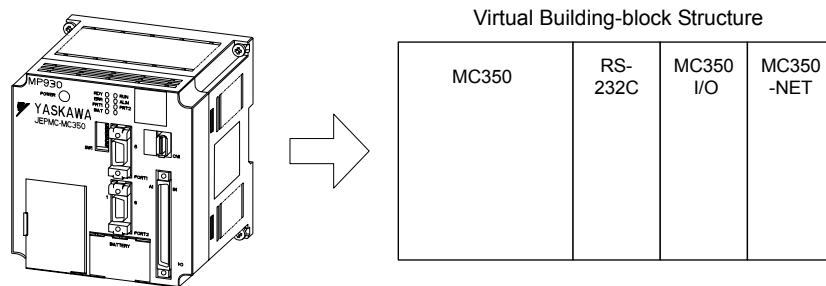
3.6.2 Opening the Module Configuration Definitions Window

Open the Module Configuration Definitions Window according to the procedure in *3.2 Basic Module Configuration Definition Operation*.
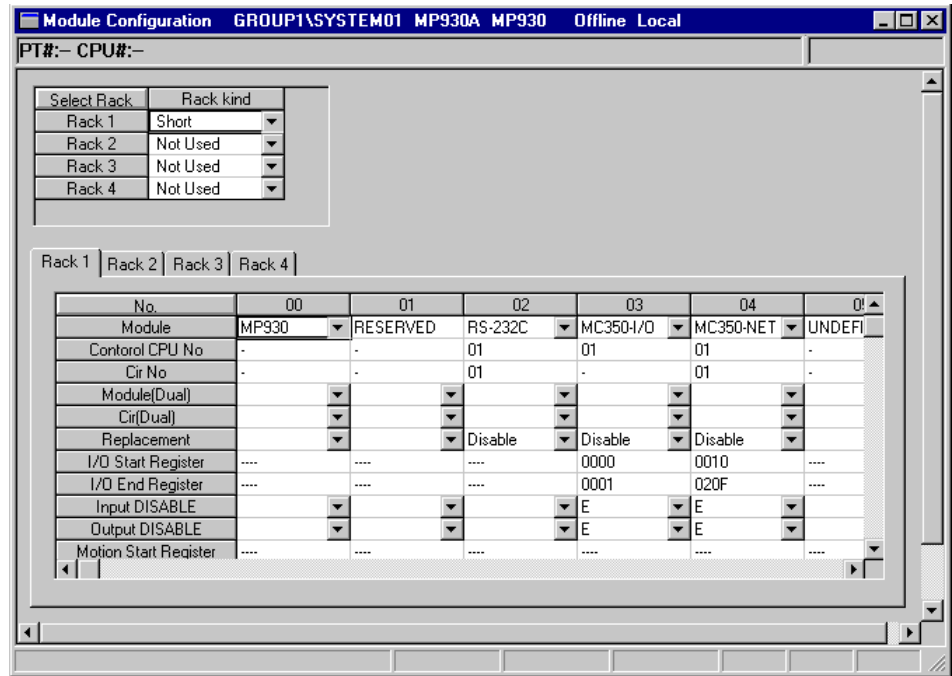
Fig 3.21 MP930 Module Configuration Definitions Window

■ Configuration Information

This window consists of tab pages used to define the slots of each rack, and the rack settings.

A maximum 4-rack Machine Controller can be set with the CP-717, but the number of racks is limited to 1 rack for the MP930. Racks 2 to 4 cannot be set.

The maximum number of function Modules (i.e., the number of slots) that can be mounted to each rack is nine, but the MP930 is an all-in-one type, so its settings are limited to a maximum of five slots. The Modules allocated to these slots cannot be changed.

Rack 1:

Slot 00	Slot 01	Slot 02	Slot 03	Slot 04
MP930	RESERVED	RS-232C	MC350-I/O	MC350-NET

3.6.3 Setting Module Configuration Definitions

■ Rack and Slot Information

An MP930 virtual rack is allocated to the tab page for rack 1.

Setting Item	Details
Select Rack, Rack Kind	Set the information on the rack. The MP930 is set automatically to rack 1 and short rack.
No.	This row shows the virtual slot numbers of the slots in the rack.
Module	The Module is set automatically using the Module name set in each slot.

Setting Item	Details
Control CPU No.	Set the number of the CPU to control each Module. The MP930 CPU is set automatically to 01.
Cir No.	The Cir No for RS-232C and MC350-NET Modules is set automatically to 01.
Module (Dual)	The Dual Modules Setting is not supported in the current version.
Cir (Dual)	Dual Transmission Paths Setting is not supported in the current version.
Replacement	Hot Swapping (Removal/insertion under power) is not supported in the current version.
I/O Start Register	Refer to the settings for MC350-I/O and MC350-NET.
I/O End Register	Refer to the settings for MC350-I/O and MC350-NET.
Input DISABLE	Controls each Module's Input Enable/Disable setting. Blank: Setting not possible, D: Disabled, E: Enabled
Output DISABLE	Controls each Module's Output Enable/Disable setting. Blank: Setting not possible, D: Disabled, E: Enabled
Motion Leading Register	The motion leading register is set automatically.
Motion Ending Register	The motion ending register is set automatically.
Detail	This is not supported in the current version.
Status	This is not supported in the current version.

3

(INFO) ■ Setting Ranges for the MP930 I/O Leading/Ending Register Numbers

1 0000 to 07FF hex (2,048 words total)
 Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.

2 With the MP930, standard register numbers have been set for each Module. We recommend using these standard register number settings.
 • MC350-I/O (Local I/O): 0000 to 0001 hex
 • MC350-NET (Remote I/O): 0010 to 020F hex

 Settings made automatically cannot be changed.

■ Saving, Deleting, and Closing Module Configuration Definitions

Refer to the procedure in *3.3 Basic Individual Module Definition Operations* for details.

3.6.4 Opening Individual Module Definition Windows

Open the Individual Module Definition Windows according to the procedure in *3.3 Basic Individual Module Definition Operations*. Refer to the following for setting data for individual Modules.

 • RS-232C definitions

• MC350-I/O definitions

• MC350-NET definitions

3.6.5 RS-232C Definitions

This section explains the settings for the general-purpose serial (RS-232C) port allocated to virtual slot number 02.
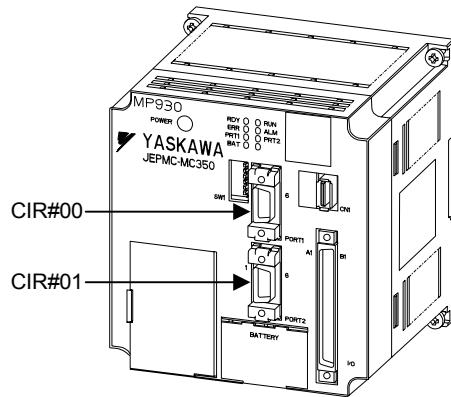
■ Opening the Generic Serial Definitions Window

Open the Generic Serial Definitions Window by referring to *3.3 Basic Individual Module Definition Operations*.
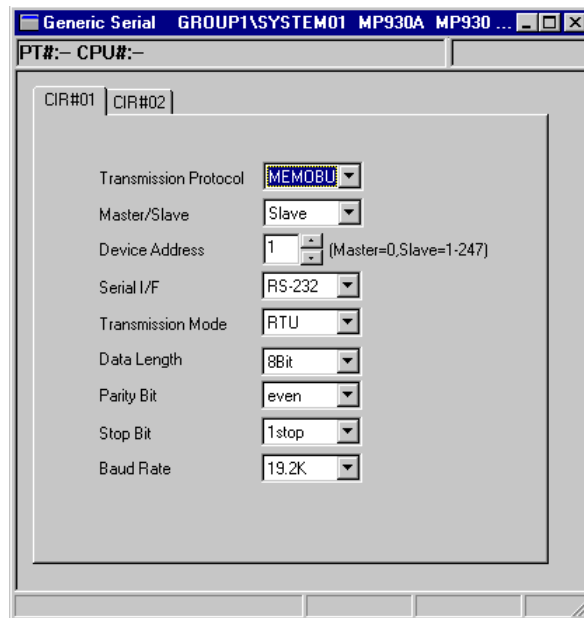
Fig 3.22 Generic Serial Definitions Window

Tab Pages

Use the tab pages to set the parameters for the RS-232C Module. There are two tab pages, one for each port.

Tab Page	Details
CIR#01	Sets the RS232-C transmission parameters.
CIR#02	Sets the RS232-C transmission parameters.

> ⓘ INFO ▶ When the Generic Serial Definitions Widow is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

3

■ General-purpose Serial Definitions

Two CIR# definition tabs are displayed in the Generic Serial Definitions Window. Make the definitions while switching between the tabs as required.

General-purpose Serial Transmission Definitions

Setting Item	Details
Circuit Number	Select the CIR# for the tab page.
Transmission Protocol	Select from MEMOBUS, MELSEC, or no protocol.
Master/Slave	Select whether the Module is a master or a slave.
Device Address	Set the master's address to 0, and slave addresses from 1 to 63.
Serial I/F	Select RS-232 .
Transmission Mode	Select from RTU, ASCII, or none.
Data Length	8Bit: 8 bits; 7Bit: 7 bits
Parity Bit	Select even, odd, or none (no parity).
Stop Bit	1stop: 1 stop bit; 2stop: 2 stop bits
Baud Rate	Select the transmission speed (bps).

Transmission Protocol

- MEMOBUS: Yaskawa's standard MEMOBUS protocol.
- MELSEC: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links.
- No protocol: Data can be transferred at any time by the user application program.

Transmission Mode

- RTU: Specify RTU mode for MEMOBUS protocols.
- ASCII: Specify ASCII mode for MEMOBUS protocols.
- None: Specify MELSEC, OMRON, or no protocol.

| IMPORTANT | The serial transmission parameters (communications parameters) are set to predetermined values, so it is necessary to set the parameters again only for special cases. The values shown in the Generic Serial Definitions Window are the default settings. |

■ Saving, Deleting, and Closing General-purpose Serial Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

INFO	1 When the Delete command is executed, the 2-circuit general-purpose serial definitions data will be deleted.
	2 Ports Connecting to the CP-717
	The transmission protocol for a port connecting to the CP-717 should be set to MEMOBUS. The MEMOBUS specification is the default setting. The maximum transmission speed for a connection to the CP-717 is 19.2 Kbps.

3.6.6 MC350-I/O Definitions

This section explains the MC350-I/O (Local I/O) Definitions that are set for virtual slot 03.
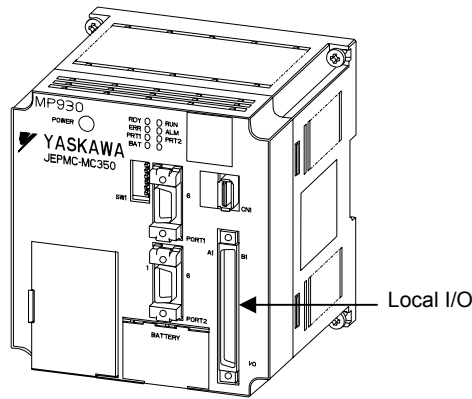
Local I/O

■ Opening the Local I/O Definitions Window

Open the Local I/O Definitions Window by referring to *3.3 Basic Individual Module Definition Operations*.
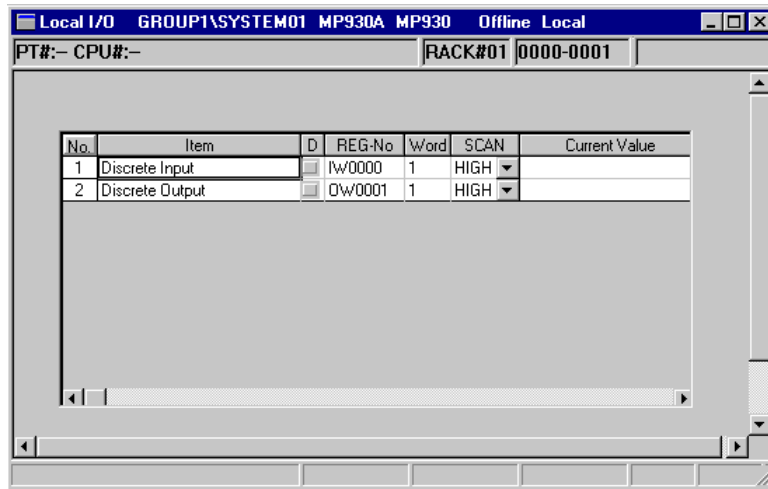
Fig 3.23 The Local I/O Definitions Window

Local I/O Definitions

Setting Item	Details
No.	Displays the number of the setting.
Item	Displays the name of the setting and the I/O signal name.
D	Controls the register's disable setting. A register is one word in length, so the setting applies to 16 I/O points. The register is disabled when a check is displayed in the box. • ☐ : Enabled • ☑ : Disabled
REG-No.	Indicates the I/O register number. In the MP930, the inputs and outputs both use 16 points, and the register number allocation is fixed (IW0000 and OW0001).
Word	Displays the number of consecutive words in the register. In the MP930, the allocation is fixed at 1 word, so the number of words is "1."
SCAN	Sets the transmission processing scan. High: High-speed scan Low: Low-speed scan (NA): No scan specification
Current Value	In online mode, the current value of the allocated Machine Controller register will be displayed in binary. The current values of discrete outputs can be changed and are immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
HEX	Displays the hexadecimal equivalent of the binary values in the Current Value column. In offline mode, nothing will be displayed.

REG-No.

The following table shows the default register allocations for group input signals.

Group Input Signal	Register
Auto Mode	IB00000
Manual Mode	IB00001
Start	IB00002
Program Stop	IB00003
Pause	IB00004
E-Stop	IB00005
Alarm Reset	IB00006
Machine Lock	IB00007
Debug Mode	IB00008
Debug Run	IB00009
Skip 1	IB0000A
Skip 2	IB0000B

Local I/O Definitions Window (Current Values)

No.	Item	D	REG-No	Word	SCAN	Current Value	HEX
1	Discrete Input		IW0000	1	HIGH ▼	0000 0001 0010 1010	H012A
2	Discrete Output		OW0001	1	HIGH ▼	0000 0000 0000 0000	H0000

■ Saving, Deleting, and Closing Local I/O Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.6.7 MC350-NET Definitions

This section explains the MC350-NET (MECHATROLINK) Definitions that are set for virtual slot 04.

■ Outline of MECHATROLINK Connections

The following example provides a conceptual diagram of MECHATROLINK connections. In this example, Network Servos and an I/O Unit are connected to the MP930 Machine Controller (MC Unit) by high-speed serial communications (MECHATROLINK).
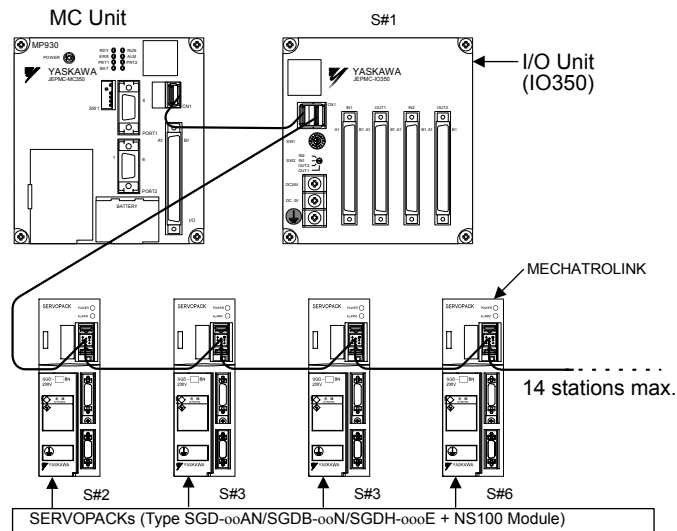
In this diagram, a Remote I/O Unit is connected in station 1 (S#1) and SERVOPACKs are connected in stations 2 through 5 (S#2 through S#5).

■ Opening the MECHATROLINK Definitions Window

Open the MECHATROLINK Definitions Window by referring to *3.3 Basic Individual Module Definition Operations*.
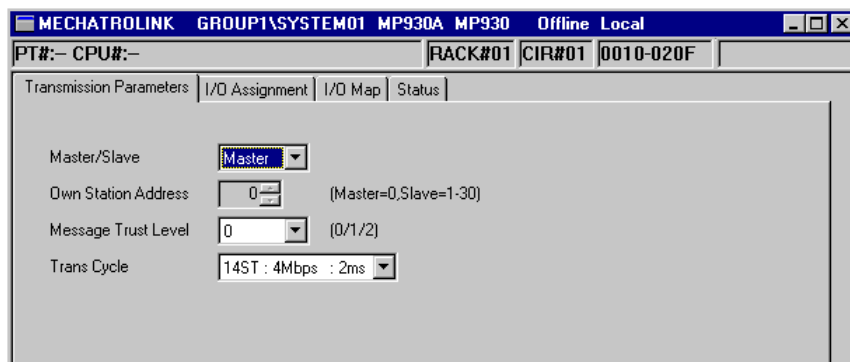
Fig 3.24 The MECHATROLINK Definitions Window

Tab Pages

Set the various devices connected to the MECHATROLINK network. The following four
tab pages are displayed.

Tab Page	Details
Transmission Parameters	Sets the MECHATROLINK transmission parameters.
I/O Allocation	Allocates the MECHATROLINK's I/O.
I/O Map	Sets the I/O map.
Status	Displays the transmission status.

```
INFO
```
When the Definitions Window for each Module is opened without any settings having been made pre-
viously, a New File Message box will be displayed. Click the **OK** Button to proceed to the next opera-
tion.

3

■ The MECHATROLINK Definitions Window Menus

The following table shows the functions of the menu commands on the MECHATROLINK
Definitions Window's *Edit (E)* menus. See *3.2.4 Module Configuration Definitions Window
Menus* for details on commands on the other menus.

Menu Command	Function
Edit (E)	
Parameter Setting (D)	Returns the allocation settings to default values.
Assignment Delete (A)	Clears the allocation settings.

■ Setting MECHATROLINK Definitions

Transmission Parameters Tab Page

This tab page is used to set the parameters required to use the MECHATROLINK transmis-
sion system.
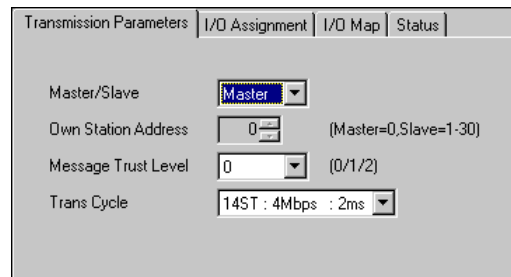
Setting Item	Details
Master/Slave	Sets whether the Machine Controller is used as a Master station or a Slave station. The MP930 can be used as a Master station only.

Setting Item	Details	
Own Station Address	The MP930 is always a Master station, so the local station address is fixed at 0 and cannot be changed.	
Message Trust Level	Sets the error control method used when sending MEMOBUS commands. In the MP930, the Message Trust Level is fixed at 1.	
	0	Send command just once and wait indefinitely for a response from the destination.
	1	Send command just once and resend if a response is not received within 8 seconds.
	2	When sending the command, send each word of data twice consecutively and wait indefinitely for a response from the destination. This method improves transmission quality but reduces transmission efficiency by 50%.
Trans Cycle	The transmission cycle can be set to 2 ms only. Transmission Speed: The transmission speed can be set to 4 Mbps only.	

I/O Assignment Tab Page

This tab page is used to set the I/O devices connected in the MECHATROLINK and their transmission definition data.

Setting Item	Details
ST#	Displays the station number. Up to 14 stations can be set in the MP930.
TYPE	Sets the type of I/O device connected at the station. Select an I/O device type from the pull-down list.
D	Controls the input register's disable setting. • ▢ : Enabled • ☑ : Disabled
INPUT, SIZE	Sets the leading input register and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station does not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Definition Window.

Setting Item	Details
D	Controls the output register's disable setting. • ☐ : Enabled • ☑ : Disabled
OUTPUT, SIZE	Sets the leading output register and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station do not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Definitions Window.
SCAN	Sets the scan for I/O servicing. The scan will be fixed at "High" when a SERVOPACK is set in the TYPE field. • High: High-speed scan • Low: Low-speed scan
Station Name (Comment)	Comments up to 32 characters can be input for each station.

1. TYPE (MECHATROLINK Devices)

   Refer to *D.1 MECHATROLINK Devices* for a list of the currently supported MECHATROLINK Devices.

2. INPUT/OUTPUT SIZE

3. Automatic Input Register Allocation

   When a SERVOPACK has been connected, the input registers are allocated automatically as shown in the following table. These registers are allocated automatically only when automatic PGM generation is set on the Group Definitions Window to enable automatic ladder program generation.

Axis Input Signals	Axis 01	Axis 02	Axis 03	...	Axis 04
Servo ON	IB00100	IB00110	IB00120	...	IB001D0
JOG+	IB00101	IB00111	IB00121	...	IB001D1
JOG-	IB00102	IB00112	IB00122	...	IB001D2
STEP+	IB00103	IB00113	IB00123	...	IB001D3
STEP-	IB00104	IB00113	IB00124	...	IB001D4
ZRN	IB00105	IB00115	IB00125	...	IB001D5
Zero Point Setting	IB00106	IB00116	IB00126	...	IB001D6
Stop	IB00107	IB00117	IB00127	...	IB001D7

◉ INFO ▶

The ending register number of "020F" is set considering the MECHATROLINK devices that are likely to be connected. Reset this value if more registers are needed.

4. Deleting Allocation Data

a) To delete a station's allocation data, move the cursor to the row of the station to be deleted, select *Edit (E)*, and then *Assignment Delete (A)*.

b) The station's allocation data will be deleted.

I/O Map Tab Page

This tab page displays the status of the Machine Controller's I/O allocations. In the MP930, the I/O allocation data set in the I/O Assignment Tab Page will be displayed but cannot be changed.

Table 3.19 I/O Map Tab Page

HI	Allocates to an input set for a high-speed scan.
HO	Allocates to an output set for a high-speed scan.
LI	Allocates to an input set for a low-speed scan.
LO	Allocates to an output set for a low-speed scan.
DEL	Deletes allocation.

Status Tab Page

This tab page can be used to check the MECHATROLINK's transmission status.

The tab page only displays the present status of transmissions; the status cannot be changed.

3

	ST#	TYPE	D	INPUT	I-SIZE	D	OUTPUT	O-SIZE	STS	
	01									
	02									
	03									
	04									
	05									
	06									
	07									
	08									
	09									
	10									
	11									
	12									
	13									

The meaning of each column is identical to the columns in the I/O Assignment Tab Page except for the additional "STS" column.

1. STS

   In online mode, the MECHATROLINK transmission status information is displayed in hexadecimal. The meaning of each bit is shown in the following diagram. In offline mode, nothing will be displayed.
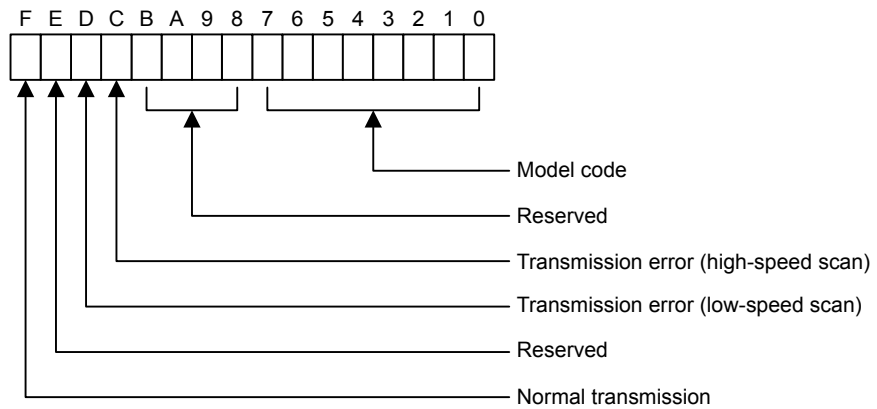
■ Saving, Deleting, and Closing MECHATROLINK Definitions

Refer to the procedures in *3.2 Basic Module Configuration Definition Operation* for details.

3.6.8 MP930 Motion Parameter Definitions

Motion parameters must be set when a servo is set as a MECHATROLINK I/O device.

■ Outline of Motion Parameters

Parameters must be set for Servo Modules connected to the MP930 via a MECHA-TROLINK network.
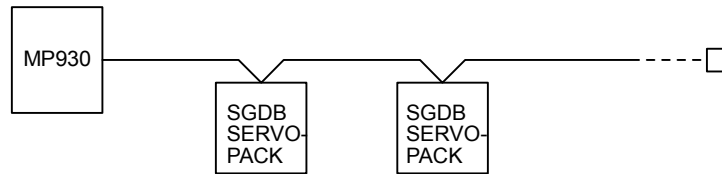
■ Opening the MP930 Motion Parameter Window

To open the MP930 Motion Parameter Window, double-click the Motion Parameter File Icon under the Motion Programs Folder displayed in the File Manager.

To open the Motion Parameter Window from the Engineering Manager Window, select **File (F)**, **Open (O)**, **Definition (D)**, and then **Motion Parameter (P)**.
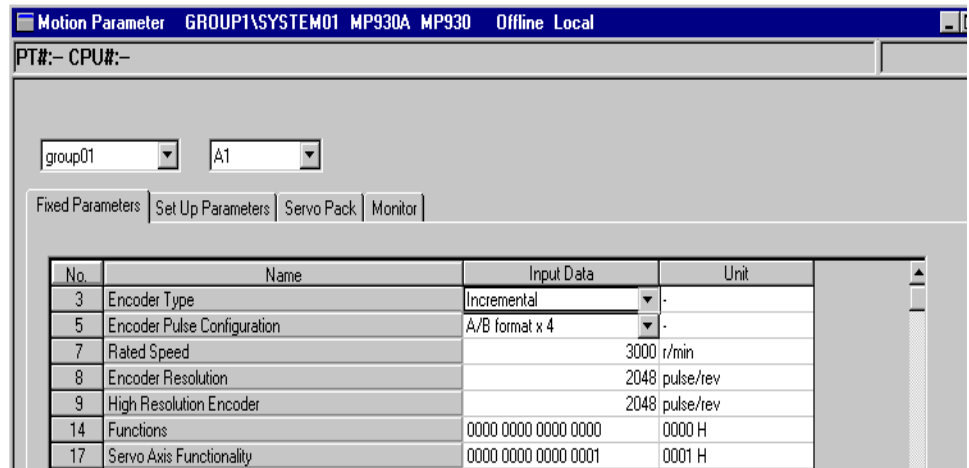
INFO

The tab pages can be scrolled in the following order by selecting **View (V)** and then **Next Page (N)** from the menu.

• Fixed Parameters, Set Up Parameters, SERVOPACK, Monitor

To scroll in the opposite direction, select **View (V)** and then **Back Page (B)** from the menu.

MP930 Motion Parameter Window Control Tabs

The MP930 Motion Parameter Window consists of four control tabs: **Fixed Parameters**, **Set Up Parameters**, **SERVOPACK**, and **Monitor**.

Table 3.20 Motion Parameter Window Control Tabs

Tab	Function
Fixed Parameters	Sets the fixed motion parameters.
Set Up Parameters	Sets the setup motion parameters.
SERVOPACK	Sets the Servo parameters.
Monitor	Monitors the motion parameters.

MP930 Motion Parameter Window Original Menus

Refer to *SVB Motion Parameters Window Original Menus* in *3.5.19 SVB Motion Parameters Settings*.

■ Fixed Parameters Tab Page

Setting Optional Values

This tab page is used to set the motion fixed parameters required for servo adjustment.
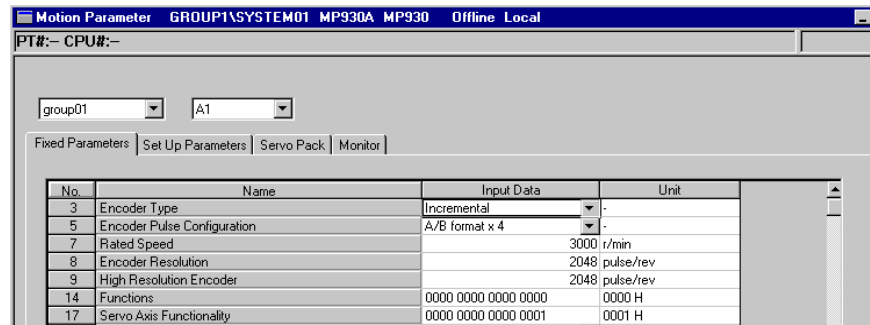
Setting Item	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. Set motion fixed parameters for each axis.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input (or select) the setting for the parameter.

> **INFO** Refer to *MP930 Machine Controller User's Manual: Design and Maintenance (SIEZ-C887-1.1)* for details on motion fixed parameter settings.

■ Set Up Parameters Tab Page

This tab page is used to set the parameters required for servo adjustment.
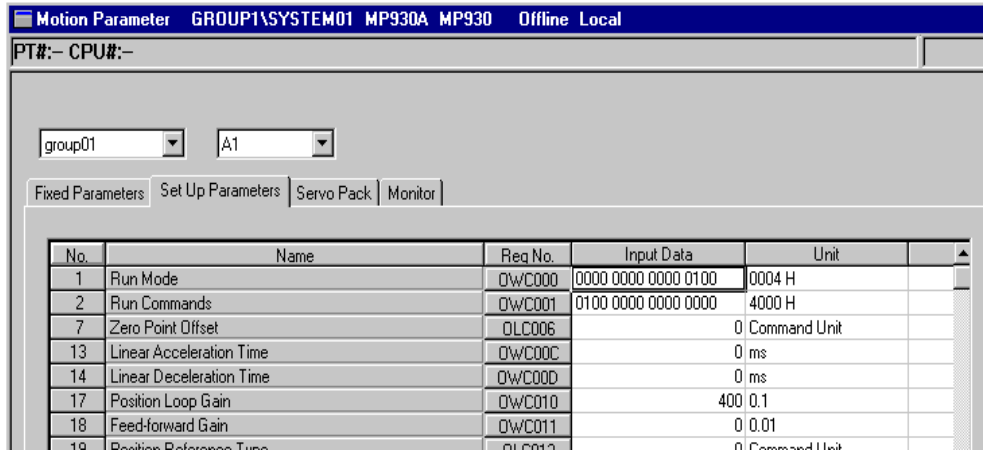
Setting Item	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. Set motion setting parameters for each axis.
Parameter Name	Displays the parameter name.
Reg No.	Displays the register number corresponding to the parameter name.
Input Data (Set Data)	Input the setting for the parameter.
Unit	Displays the unit used to set the parameter.
Current Value	Displays the current setting of the parameter in online mode. Nothing will be displayed in offline mode.

⊙ INFO

Refer to MP930 Machine Controller User's Manual: Design and Maintenance (SIEZ-C887-1.1) for details on motion setting parameter settings.

IMPORTANT

In online mode, set values that are input are immediately saved to Machine Controller registers when the Enter Key is pressed. The current value displays will be refreshed using these values.

■ SERVOPACK Parameters Tab Page

This tab page is used to set the servo parameters.
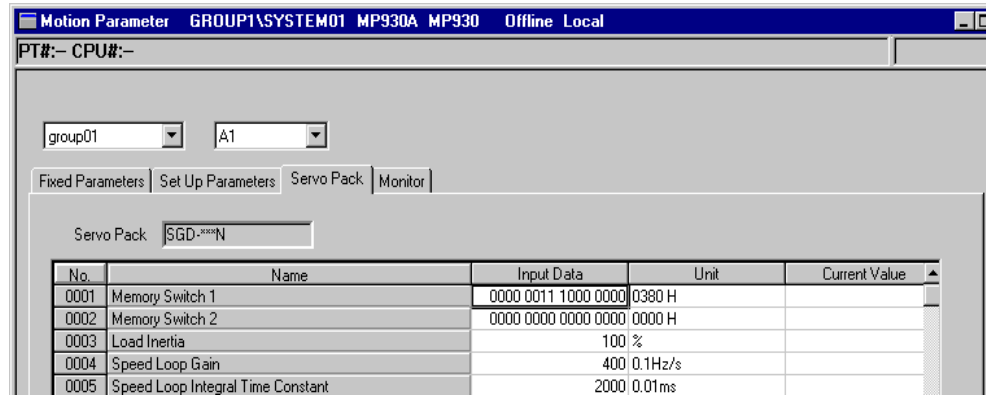
Setting Item	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. Set servo parameters for each axis.
SERVOPACK Name	Displays the SERVOPACK type.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input the setting for the parameter.
Unit	Displays the unit for setting the parameter.
Current Value	Displays the current value saved in the SERVOPACK.

INFO

1 Refer to MP930 Machine Controller User's Manual: Design and Maintenance (SIEZ-C887-1.1) for details on servo parameter settings.

2 Displaying Current Values

The current values will not be displayed if a SERVOPACK alarm exists even when the SERVOPACK Tab is clicked. First clear the alarm, and then try again to display the current values.

■ Monitor Tab Page

This tab page is used to display the current values for the motion parameters. This window is only for displaying the values, and settings cannot be changed here.
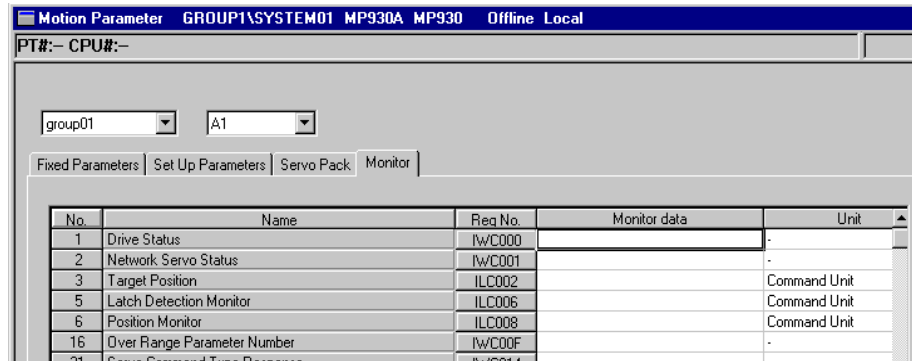
Setting Item	Details
Group Name	Select one of the group names that was set in the group definitions.
Logical Axis Name	Select a logical axis name. The parameters are monitored for each axis.
Parameter Name	Displays the parameter name.
Reg No.	Displays the register number corresponding to the parameter name. This register number is allocated a fixed allocation according to the servo number.
Monitor Data	Displays the current value for the parameter in online mode. Nothing will be displayed in offline mode.
Unit	Displays the unit for setting the parameter.

■ Saving MP930 Motion Parameter Definitions

In online mode, the motion parameters are saved to both the Machine Controller and the hard disk. In offline mode, they are saved only to the hard disk.

The procedure to save motion parameters is given below.

1. Select *File (F)* and then *Save (S)* from the Motion Parameter Window menu.

2. Click the **Yes** Button in the message box (motion parameters).

IMPORTANT

1 The save operation must be executed separately for each axis and for each of the Fixed Parameters, Set Up Parameters, and SERVOPACK Tabs.

2 In online mode, changes to fixed parameters and servo parameters cannot be saved if the RUN (Servo ON) Flag is ON. Save the data after the flag has gone OFF during servo drive operation. The RUN (Servo ON) Flag is bit 0 of parameter number 2 (RUN command settings) in the Set Up Parameters Tab. The register number for parameter 2 is OWC001.

3 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.

■ Deleting MP930 Motion Parameter Definitions

The procedure to delete motion parameter settings is given below.

1. Select *File (F)* and then *Delete (D)* from the Motion Parameter Window menu.

2. Click the **Yes** Button in the message box (motion parameters).

( ) INFO

When the delete operation is executed, the fixed and setting parameter data for all of the axes will be deleted, and the default values will be set.

■ Closing MP930 Motion Parameter Definitions

To exit the motion parameter definitions and display operations, close the MP930 Motion Parameter Window by selecting *File (F)* and then *Close (C)* from the menu.

3.7 MP940 Module Definitions

This section explains the basic parameter settings for the Serial, Local I/O, SVA, CNTR, and MLINK Modules in the MP940.

3.7.1 Outline of MP940 Module Configuration Definitions

The MP940 is a 1-axis controller with a bus connection of a SGDH SERVOPACK. It consists of Communications, Local I/O, and other Modules built into a single case.
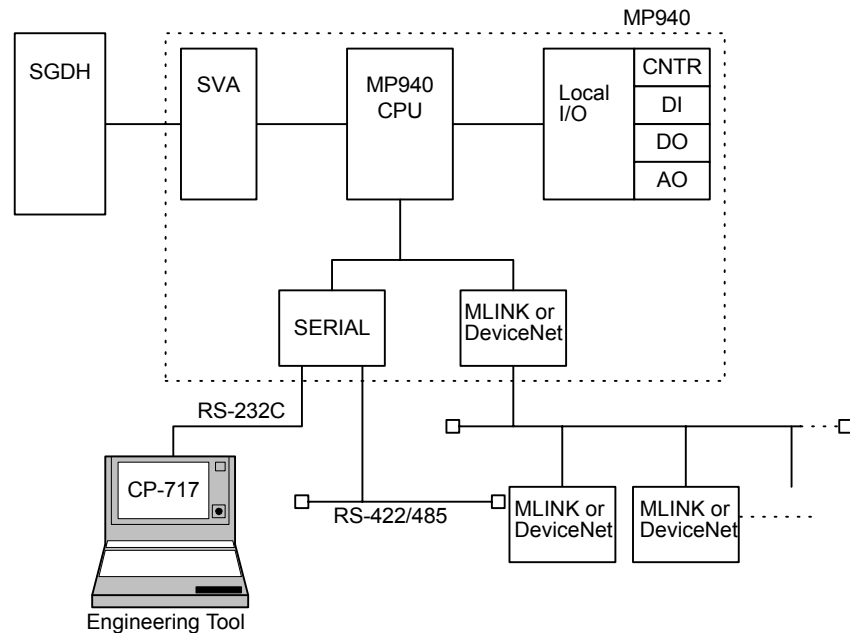
3.7.2 MP940 Virtual Module Configuration

The MP940 Machine Controllers feature an all-in-one structure, i.e., the required basic Module functions are contained in a single compact unit.

The parameter settings for each Basic Module are the same as the settings for building-block Machine Controllers. To set the parameters easily, the MP930 Machine Controllers feature a virtual building-block structure. The following diagram shows the virtual building-block structure used by MP930 Machine Controllers.
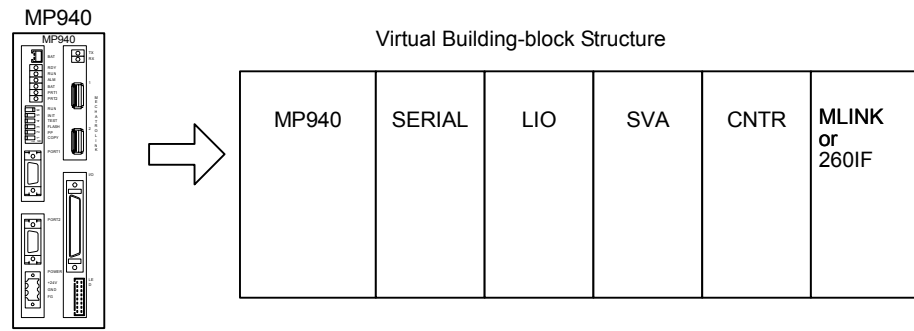
It is necessary to define how each Module in the virtual building-block structure will be used.

Table 3.21 Module Definitions

Defined Module	Settings
MP940	Defines the main Machine Controller parameters. No settings are required.
SERIAL	Sets the serial communications parameters.
LIO	Sets the local I/O parameters.
SVA	Sets the motion parameters.
CNTR	Sets the counter parameters.
MLINK	Sets the MECHATROLINK parameters.

3.7.3 Opening the Module Configuration Definitions Window

Open the Module Configuration Definitions Window according to the procedure in *3.2 Basic Module Configuration Definition Operation*.

For the MP490, slots 00 to 06 of rack 1 must be set. Slot 01, however, is reserved by the system, and therefore cannot be set.
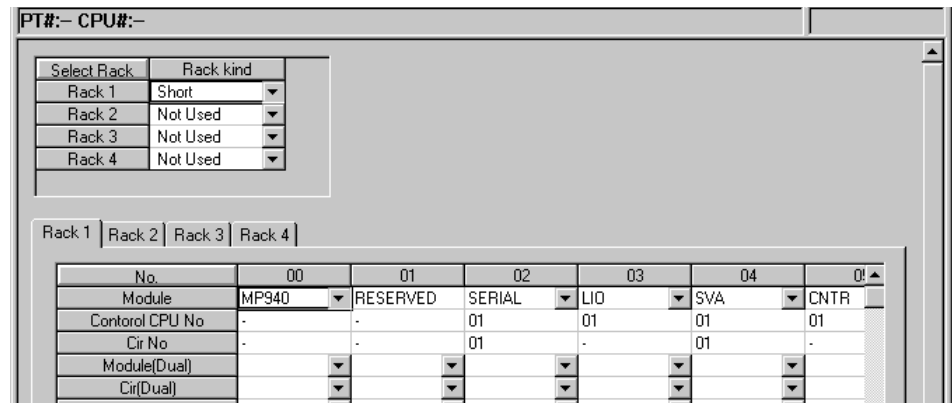
Fig 3.25 Module Configuration Definitions Window

3.7.4 Setting Module Configuration Definitions

■ Configuration Information

This window consists of tab pages used to define the slots of each rack, and the rack settings.

A maximum 4-rack Machine Controller can be set with the CP-717, but the number of racks is limited to 1 rack for the MP940. Racks 1 to 3 cannot be set.

The maximum number of function Modules (i.e., the number of slots) that can be mounted to each rack is nine, but the MP940 is an all-in-one type, so its settings are limited to a maximum of six slots. The Modules allocated to these slots cannot be changed.

Rack 1:

Slot 00	Slot 01	Slot 02	Slot 03	Slot 04	Slot 05	Slot 06
MP940	RESERVED	SERIAL	LIO	SVA	CNTR	MLINK or 260IF

■ Rack and Slot Information

An MP940 virtual rack is allocated to the tab page for rack 1. Slot numbers are displayed in the columns from left to right and setting items are displayed in rows from top to bottom.

Setting Item	Details
Select Rank, Rack Kind	Set information on the rack. The MP930 is set automatically to rack 1 and short rack.
No.	This row shows the virtual slot numbers of the slots in the rack.
Module	The Module is set automatically using the Module name set in each slot.
Control CPU No	Set the number of the CPU to control each Module. The MP940 CPU is set automatically to 01.
Cir No.	Circuit numbers are set for each type of Module starting from 01 for Communications and Motion Modules. With the MP940, this would be the Serial, SVA, and MLINK Modules. There is only one of each kind of Module, so the Cir No is set automatically to 01 for each.
Module (Dual)	The Dual Modules Setting is not supported in the current version.
Cir (Dual)	Dual Transmission Paths Setting is not supported in the current version.
Replacement	Hot Swapping (Removal/insertion under power) is not supported in the current version.
I/O Start Register	Set the address of the leading I/O register. Refer to the settings for LIO, CNTR, and MLINK.
I/O End Register	Set the address of the ending I/O register. Refer to the settings for LIO, CNTR, and MLINK.
Input DISABLE	Controls each Module's Input Enable/Disable setting. Blank: Setting not possible, D: Disabled, E: Enabled
Output DISABLE	Controls each Module's Output Enable/Disable setting. Blank: Setting not possible, D: Disabled, E: Enabled

Setting Item	Details
Motion Leading Register	The address of the first motion parameter register is set automatically.
Motion Ending Register	The address of the ending motion parameter register is set automatically.
Detail	This setting is not supported in the current version.
Status	Displays the status of each Module in online mode.

⊙ INFO ▶ ■ Setting Ranges for the I/O Leading/Ending Register Numbers

1 0000 to 07FF hex (2,048 words total)
   Be sure that the register numbers set for each Module do not overlap with any other Module's register numbers.

2 With the MP940, standard register numbers have been set for each Module. We recommend using these standard register number settings.

   • LIO (Local I/O): 0000 to 0001 hex
   • CNTR (counters): 0002 to 0011hex
   • MLINK (Remote I/O): 0100 to 02FF hex
   • 260IF (DeviceNet)

   Settings made automatically cannot be changed.

■ Saving, Deleting, and Closing Module Configuration Definitions

Refer to the procedures in *3.2 Basic Module Configuration Definition Operation* for details.

3.7.5 Opening Individual Module Definition Windows

Open the Individual Module Definition Windows according to the procedure in *3.3 Basic Individual Module Definition Operations*. Refer to the following for setting data for individual Modules.

   • Serial definitions
   • LIO definitions
   • SVA parameter definitions
   • CNTR I/O definitions
   • MLINK (CERF) definitions
   • 260IF definitions

3.7.6 Serial Transmission Definitions

The MP940 provides a serial transmission interface that includes one RS-232C circuit and one RS-422/485 interface circuit. The interface supports the Yaskawa MEMOBUS protocol and other standard transmission protocols. The MDR 14-pin RS-232C port (port 1) can also

be used as a engineering port to connect the CP-717 as an engineering interface.

This section describes the hardware and software settings required for serial transmissions. These setting will enable the MP940 to function as either a master or slave under the specified protocol.

Serial transmissions are programmed in the drawing and function programs to send and receive data using the MSG-SND and MSG-RCV functions.

3
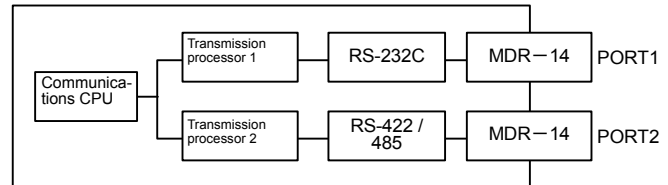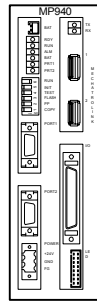
■ Opening the Serial Definitions Window

Open the Serial Definitions Window by referring to *3.3 Basic Individual Module Definition Operations*.
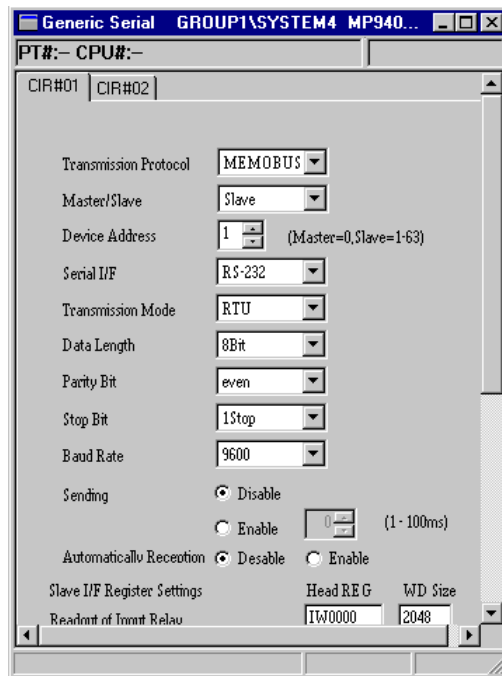
Tab Pages

Use the tab pages to set the parameters for the Serial Module. There are two tab pages, one for each port.

Tab Page	Details
CIR#01	Sets the RS-232C transmission parameters.
CIR#02	Sets the RS-422/485 transmission parameters.

INFO ► When the Serial Definitions Window is opened without any settings having been made previously, a Create New Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

■ Serial Communications Definitions

Two CIR# definition tabs are displayed in the Serial Definitions Window. Make the definitions while switching between the tabs as required.

CP-217 Transmission Definitions

The definitions for CP-217 transmission are listed in the following table.

Setting Item	Details
Circuit Number	Select the CIR# for the tab page.
Transmission Protocol	Select from MEMOBUS, MELSEC, or no protocol.
Master/Slave	Select whether the Module is a master or a slave.
Device Address	Set the master's address to 0, and slave addresses from 1 to 63.
Serial I/F	Select RS-232 (RS-232C), RS-485, or RS-422.
Transmission Mode	Select from RTU, ASCII, or none.
Data Length	8Bit: 8 bits; 7Bit: 7 bits
Parity Bit	Select even, odd, or none (no parity).
Stop Bit	1stop: 1 stop bit; 2stop: 2 stop bits
Baud Rate	Select the transmission speed (bps).
Sending (Send Delay)	Set the delay between executing the send/receive functions (MSG-SND OR MSG-RCV) and sending the message.
Automatically Reception (Automatic Reception)	Set whether or not to automatically respond to quires from the master.
Readout of Input Relay	Set the leading address and range of the input relays that can be read for automatic response.
Readout of Input Registers	Set the leading address and range of the input registers that can be read for automatic response.
Readout/Write-in of Coil	Set the leading address and range of the coils that can be read/written for automatic response.
Readout/Write-in of Hold Register	Set the leading address and range of the holding registers that can be read/written for automatic response.

Setting Item	Details
Write-in width of Coil/ Hold Register	Set the range of the coils and holding registers that can be written for automatic response.

Transmission Protocol

- MEMOBUS: Yaskawa's standard MEMOBUS protocol.
- MELSEC: Mitsubishi's special protocol (control protocol type 1) for use with general-purpose sequencers and computer links.
- OMRON: OMRON's SYSMAC C-series Host Link protocol.
- No protocol: Data can be transferred at any time by the user application program.

Serial I/F

Select CIR#01 for RS-232C and CIR#2 for RS-485/422.

Transmission Mode

- RTU: Specify RTU mode for MEMOBUS protocols.
- ASCII: Specify ASCII mode for MEMOBUS protocols.
- None: Specify MELSEC, OMRON, or no protocol.

Sending (Send Delay)

When *Enable* is selected, a delay until the beginning of transmissions (1 to 100 ms) can be set.

- Master Station:
  The delay will be included between execution of the MSG-SND function and the transmission of the command.
- Slave Station:
  The delay will be included between reception of a command by the MSG-RCV function and the transmission of the response.

Automatically Reception (Automatic Reception)

Specify the ranges of relays, registers, and coils to check when automatically sending a response message to a query from the master. These settings are valid for slave stations only.

There is no need to set the ranges when message transmissions will not be performed between the master and slaves. Also, if the ladder program is being used to return a response message with the MSG-RCV function, disable the automatic response so that redundant processing is not performed.

With the system default settings, response messages will be sent using the ranges set with the following parameters.

Leading Register Numbers and Number of Words

The leading register numbers and number of words are listed in the following table.

Setting Item		Machine Controller					
		MP920	CP-316	CP-316H	CP-916A	CP-916G	RIO-05
Readout of Input Relays	Leading register	IW0000	IW0000	IW0000	IW0000	IW0000	IW0000
	Number of words	5120	6400	6400	2304	2304	2304
Readout of Input Registers	Leading register	IW0000	IW0000	IW0000	IW0000	IW0000	IW0000
	Number of words	5120	6400	6400	2304	2304	2304
Read/Write Coils	Leading register	MW0000	MW0000	MW0000	MW0000	MW0000	MW0000
	Number of words	32768	8192	16384	3072	3072	3072
Read/Write Holding Registers	Leading register	MW0000	MW0000	MW0000	MW0000	MW0000	MW0000
	Number of words	32768	8192	16384	3072	3072	3072

Default Settings for General-purpose Serial Parameters

The default setting of the serial parameters are listed in the following table.

Setting Item	CIR01	CIR02
Rack Number Slot Number	01 02	01 02
Circuit Number	01	01
Transmission Protocol	MEMOBUS	MEMOBUS
Master/Slave	Slave	Slave
Device Address	01	02
Serial I/F	RS-232	RS-485
Transmission Mode	RTU	RTU
Data Length	8	8
Parity Bit	Even	Even
Stop Bit	1	1
Baud Rate	9,600	9,600
Sending (Send Delay)	None	None
Automatically Reception (Automatic Reception)	No	No
Readout of Input Relay	IW0000/5120	IW0000/5120
Readout of Input Registers	IW0000/5120	IW0000/5120
Readout/Write-in of Coils	MW00000/32768	MW00000/32768
Readout/Write-in of Hold Register	MW00000/32768	MW00000/32768
Write-in width of Coil/ Hold Register	MW00000/MW32767	MW00000/MW32767

■ Saving, Deleting, and Closing General-purpose Serial Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

⬤ INFO ▶

1 When the delete operation is executed, the 2-circuit general-purpose serial definitions data will be deleted.

2 Ports Connecting to the CP-717

The transmission protocol for a port connecting to the CP-717 should be set to MEMOBUS. The MEMOBUS specification is the default setting. The maximum transmission speed for a connection to the CP-717 is 19.2 Kbps.

3.7.7 LIO Definitions

The LIO Module is equipped with 8 digital inputs (DI), 8 digital outputs (DO), and 1 analog output (AO). I/O servicing is performed at fixed intervals, once for each high-speed scan or low-speed scan in the MP940.

One of the digital inputs can be used as an interrupt by enabling the interrupt in the Module Configuration Definitions Window.

The register numbers allocated to each I/O port are fixed.

Connector	I/O	REG-NO
Discrete inputs	8 points	IW0000
Discrete outputs	8 points	OW0000
Analog output	1 channel	OW0001
Analog input	1 channel	IW0001
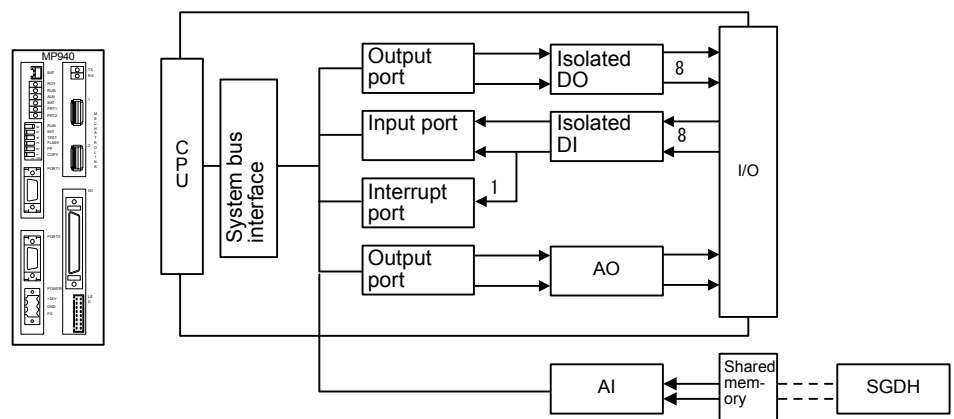
■ Opening the LIO Definitions Window

Open the LIO Definitions Window according to procedures in *3.3 Basic Individual Module Definition Operations*.
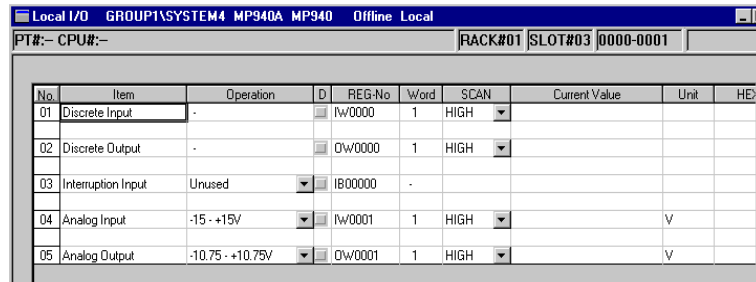
■ LIO Definitions

The LIO definitions set the I/O operations and disable status.

Setting Items

Setting Items	Details
No.	Displays the I/O item.
Item	Displays the name of the I/O item.
Operation	Set the operation of the I/O item. The setting is made automatically for everything but interrupts input.
D	Controls the register's disable setting. • : Enabled • ✔ : Disabled
REG-No.	Displays the I/O register number for the I/O item. This setting is made automatically and cannot be changed.
Word (Number of Words)	Displays the number of consecutive words of the I/O registers for the I/O item. This setting is made automatically and cannot be changed.
SCAN	Set the transmission processing scan. SYSTEM: System scan • High: High-speed scan • Low: Low-speed scan • (NA): No scan specification
Current Value	In online mode, the current value of the Machine Controller registers will be displayed. The current values of discrete I/O are displayed in binary and the current values of discrete outputs can be changed. The current values of interrupt inputs are displayed as ON or OFF. The current values are immediately saved in the Machine Controller's register when inputs are confirmed. In offline mode, nothing will be displayed.
Unit	Displays the unit of the I/O item.
HEX	Displays the hexadecimal equivalent of the binary values in the Current Value column. In offline mode, nothing will be displayed.

■ Saving, Deleting, and Closing LIO Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.7.8 SVA Parameter Settings

The SVA Module connects to the servo connector on an SGDH SERVOPACK via the bus connection to control one axis through shared memory.

To control the SGDH, the SVA Module sends and receives data through the shared memory to perform all operations traditionally performed through analog voltage, such as speed control and encoder pulse inputs.

Refer to the *MP940 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details.
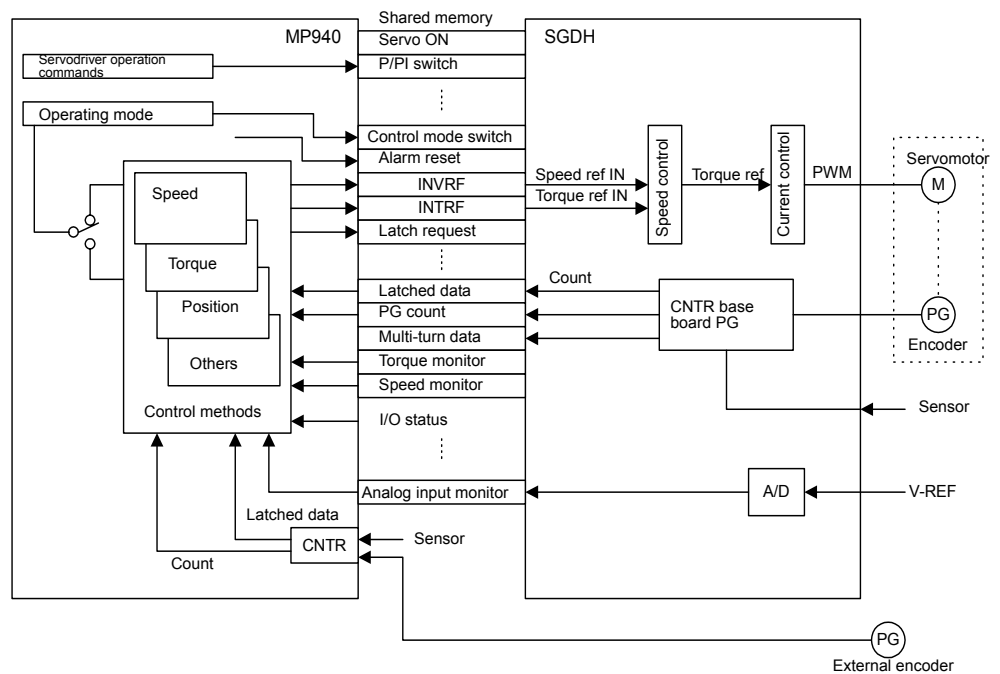
Fig 3.26 SVA Module

■ Opening the SVA Motion Parameters Window

Open the SVA Motion Parameters Window according to the procedure in *3.3 Basic Individual Module Definition Operations*.
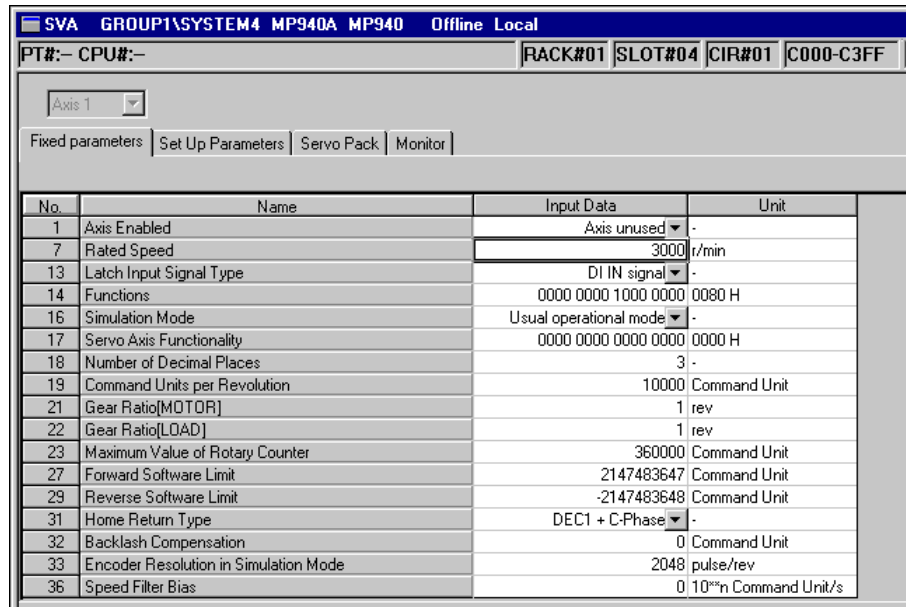
Tab Pages

The SVA Motion Parameters Window is composed of four tab pages: Fixed Parameters,

Setup Parameters, SERVOPACK, and Monitor.

Tab Page	Function
Fixed Parameters	Sets the basic motion fixed parameters.
Set Up Parameters	Sets the motion setting parameters in registers.
SERVOPACK	Sets the servo parameters of the SGDH.
Monitor	Sets the parameters to monitor.

```
INFO
```
When the SVA Motion Parameters Window is opened without any settings having been made previously, a "New File" Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

SVA Motion Parameters Window Original Menus

Refer to SVB Motion Parameters Window Original Menus under *3.5.19 SVB Motion Parameters Settings* for details.

■ Setting SVA Motion Parameters

Fixed Parameters Tab Page

This tab page is used to set the motion fixed parameters required for servo adjustment. Refer

to the initial Motion Parameters Window.

Setting Item	Details
Axis Number	Displays the axis number. The axis is fixed at Axis 1.
No.	Displays the number of the fixed parameter.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input (or select) the value for the parameter. Refer to the list of motion fixed parameters for details.
Unit	Displays the unit for setting the data.

Refer to *6.3.1 Motion Fixed Parameter Details* in the *MP940 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on parameter settings.

Set Up Parameters Tab Page

Click the **Set Up Parameters Tab**.

Setting Item	Details
Axis Number	Displays the axis number. The axis is fixed at Axis 1.
No.	Displays the number of the setting parameter.
Parameter Name	Displays the parameter name.
REG-No.	Displays the number of the register that corresponds to the parameter name.
Input Data (Set Data)	Input (or select) the value for the parameter. Refer to the list of motion setup parameters for details.
Unit	Displays the unit for setting the data.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Refer to *6.3.2 Motion Setting Parameter Details* in the *MP940 Series Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on parameter settings.

⊙ INFO ▶ Refer to MP930 Machine Controller User's Manual: Design and Maintenance (SIEZ-C887-1.1) for details on servo parameter settings.

SERVOPACK Parameters Tab Page

Click the **SERVOPACK Tab**.

Setting Item	Details
Axis Number	Displays the axis number. The axis is fixed at Axis 1.
No.	Displays the number of the servo parameter.
Parameter Name	Displays the parameter name.
Input Data (Set Data)	Input (or select) the value for the parameter. Refer to the list of motion SERVOPACK parameters for details.
Unit	Displays the unit for setting the data.
Current Value	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.

Refer to *6.4 Parameters for SGDH SERVOPACK* in the *MP940 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on servo parameter settings.

■ Motion Monitor Tab Page

Click the **Monitor Tab**. The settings cannot be changed in this window.

Setting Item	Details
Axis Number	Displays the axis number. The axis is fixed at Axis 1.
No.	Displays the number of the monitor parameter.
Parameter Name	Displays the parameter name.
Reg-No.	Displays the register number corresponding to the monitor parameter.
Monitor Data	In online mode, the parameter's current value will be displayed. In offline mode, nothing will be displayed.
Unit	Displays the unit for setting the data.

Refer to *6.3.3 Motion Monitoring Parameter Details* in the *MP940 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details.

■ Saving, Deleting, and Closing MP930 Motion Parameter Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

IMPORTANT

1 The edited motion fixed parameters cannot be saved if the RUN (Servo ON) Flag is ON. Save the motion parameters data after this flag has gone OFF.
The RUN (Servo ON) Flag is bit 0 of parameter number 2 (RUN Command Settings) in the Set Up Parameters Tab. The register number for parameter 2 is OWC001.

2 The Save (S) command saves the motion fixed parameters for all axes of the servo number currently being displayed.

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

3.7.9 CNTR I/O Definitions

The MP940 CNTR Module provides 1 pulse input (PI) with a 5-V differential interface.

The CNTR Module has a Latch Input Signal, so the counter value can be latched when the latch signal is received. A Coincident Detection Signal Output is also provided, so a signal can be output to an external device when the count matches an internal set value.

The count data is input to the CPU-01 Module once each scan (high-speed or low-speed).
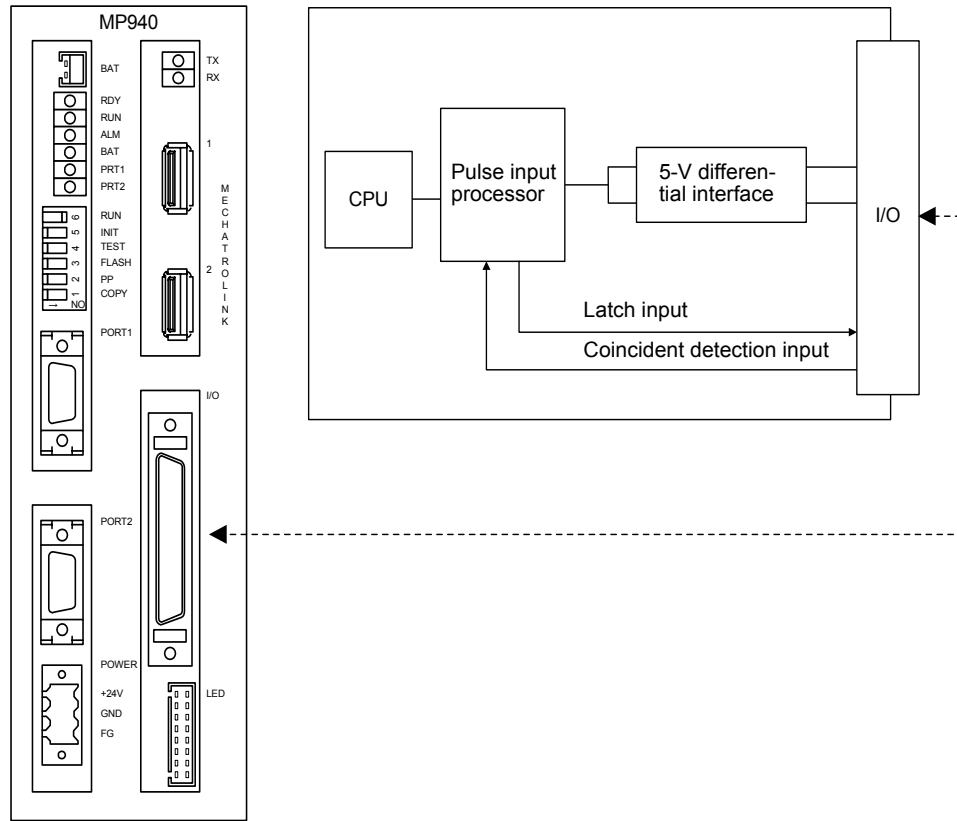
■ Opening the CNTR I/O Definitions Window

Open the CNTR I/O Definitions Window according to the procedure in *3.3 Basic Individual Module Definition Operations.*
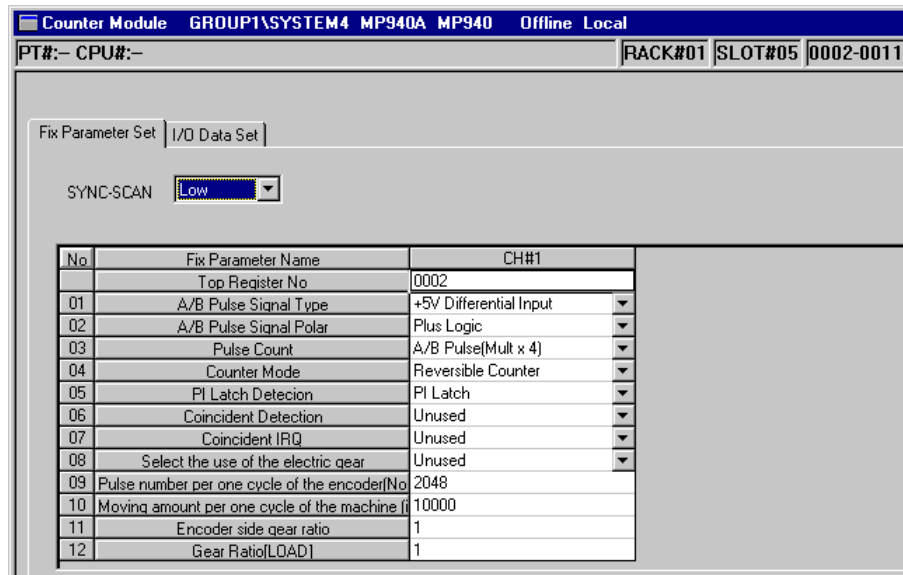
Tab Pages

The Counter I/O Definitions Window is composed of two tab pages: **Fixed Parameter Set Tab** and **I/O Data Set Tab**.

Tab Page	Function
Fixed Parameter Set	Sets the CNTR fixed parameters.
I/O Data Set	Sets the CNTR I/O data.

INFO

When the CNTR I/O Definitions Window is opened without any settings having been made previously, a New File Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

■ CNTR I/O Definitions Window Menus

The following table shows the functions of the menu commands in the CNTR I/O Definitions Window.

Table 3.22 CNTR I/O Definitions Window Menu Commands

Menu Command	Function
Set (S)	
Default (R)	Returns settings to default values by channel.
View (V)	
Tool Bar (T)	Displays the tool bar.
Status Bar (S)	Displays the status bar.
DEC (D)	Displays I/O data in decimal.
HEX (H)	Displays I/O data in hexadecimal.
BIN (B)	Displays I/O data in binary.

■ CNTR I/O Definitions

Fixed Parameter Set Tab Page

This tab page is used to set the sync scan. Select *System*, *High*, or *Low* from the pull-down list.

Refer to the *MP940 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-4.1) for details on scans.

Table 3.23 Fixed Parameter Settings

No.	Setting Item	Details	Default
-	Top Register No (Leading Register Number)	Displays the leading address of the I/O register to be used.	0
1	A/B Pulse Signal Type	Always set to 5-V Differential Input.	-

No.	Setting Item	Details	Default
2	A/B Pulse Signal Polar	The polarity of the A/B pulse Positive: 0, Negative: 1	0
3	Pulse Count	0: Signed (multiply x1) 1: Signed (multiply x2) 2: Up/Down (multiply x1) 3: Up/Down (multiply x2) 4: A/B pulse (multiply x1) 5: A/B pulse (multiply x2) 6: A/B pulse (multiply x4)	6
4	Counter Mode	Always set to Reversible Counter.	-
5	PI Latch Detection	Always set to PI Latch.	-
6	Coincident Detection	Use of coincident detection Unuse: 0, Use: 1	0
7	Coincident IRQ	Use of coincident interrupt Unuse: 0, Use: 1 Coincident IRQ is valid only when Coincident Detection above is set to "1."	0
8	Select the use of electronic gear	Use of gear ratio Unuse: 0, Use: 1	0
9	Pulse number per one cycle of the encoder	1 to 65535	2048
10	Moving amount per one cycle of the machine	1 to 2-1	10000
11	Encoder side gear ratio	1 to 65535	1
12	Gear ratio (load)	1 to 65535	1

I/O Data Set Tab Page

Click the **I/O Data Set Tab**.
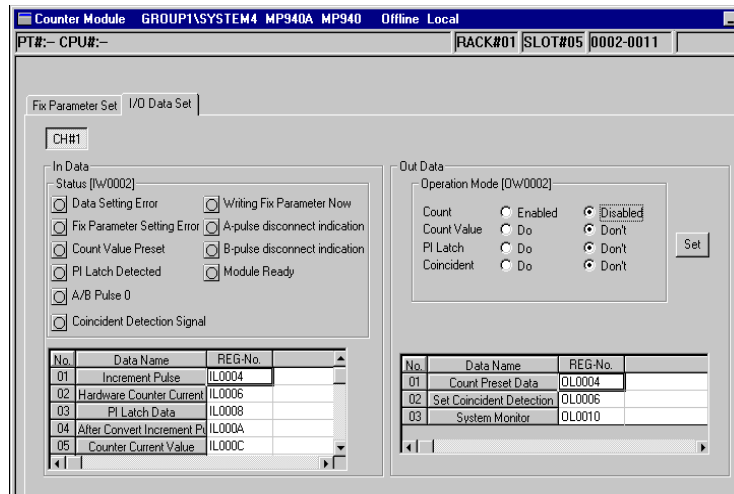
1. Channel Number

   The channel number display is fixed at CH#1.

2. IN Data

a) Status

Displays the status of each bit in the operating status register. The corresponding box will contain a black circle when the bit is ON and a white circle when the bit is OFF. The leading input register is the status word.

Status	Meaning
Data Setting Error	ON: Data setting error
Fixed Data Setting Error	ON: Fixed parameter setting error
Count Value Preset	ON: Count value preset completed.
PI Latch Detected	ON: PI latch detection completed.
A/B Pulse 0	ON: Feedback pulses within ±1 pulse
Coincident Detection Signal	ON: Coincident detected signal ON (pulse units).
Writing Fixed Parameter Now	ON: Parameters being written online.
A-pulse disconnect indication	ON: Disconnected.
B-pulse disconnect indication	ON: Disconnected.
Module Ready	ON: CNTR Module is ready.

b) IN Data Settings

Setting Item	Register	Range	Meaning
Increment Pulse	IL0004	0 to 2147483647	1 = 1 pulse
Hardware Counter Current Value	IL0006	0 to 2147483647	1 = 1 pulse
PI Latch Data	IL0008	0 to 2147483647	1 = 1 pulse
After Convert Increment Pulse	IL000A	0 to 2147483647	1 = 1 reference unit
Counter Current Value	IL000C	0 to 2147483647	1 = 1 reference unit
After Convert PI Latch Data	IL000E	0 to 2147483647	-
System Monitor	IL0010	0 to 2147483647	-

3. OUT Data

a) Operation Mode

The status of each bit of the output mode register is displayed. Settings can be selected with option buttons.

Status	Meaning
Count	Enabled/Disabled
Count Value	Do/Don't
PI Latch	Do/Don't
Candescent	Do/Don't

b) OUT Data Settings

Setting Item	Register	Range	Meaning
Count Preset Data	OL0004	0 to 2147483647	1 = 1 pulse
Set Coincident Detection	OL0006	0 to 2147483647	1 = 1 pulse

■ Saving, Deleting, and Closing CNTR I/O Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

> ● 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.

3.7.10 MLINK (CERF) Definitions

To show the concept of the MLINK, the following illustration shows an example of network-compatible I/O Module connections to the MP900-series Machine Controller using the MECHATROLINK high-speed serial communications.
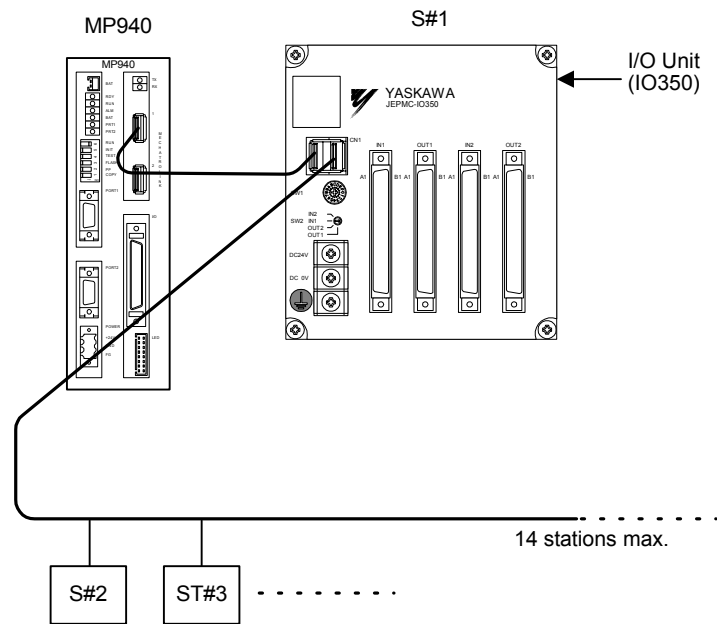
Fig 3.27 MLINK Connections Example

In this diagram, a Remote I/O Module is connected in station 1 (S#1) and MECHA-TROLINK I/O Devices are connected from station 2 on.

To set the MLINK parameter, data must be set on the following tab pages: **Transmission Parameters Tab**, **I/O Assignment Tab**, and **I/O Map Tab**. Communications status can be checked on the **Status Tab** Page.

■ Opening the MECHATROLINK (CERF) Window

Open the MECHATROLINK Definitions Window according to the procedure given in *3.3 Basic Individual Module Definition Operations*.
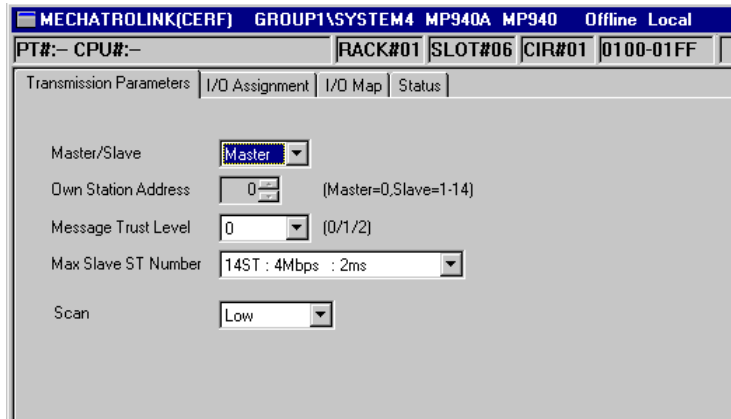
The above illustration shows the window as it appears when first opened.

Tab Pages

The tab pages are used to set the devices to be connected to the MLINK network. The MLINK Definitions Window is composed of four tab pages.

Tab Page	Function
Transmission Parameters	Sets the basic MLINK transmission parameters.
I/O Assignment	Allocates the MLINK I/O devices and registers.
I/O Map	Allocates the detailed I/O map.
Status	Displays the transmission status.

ⓘ INFO

When the MECHATROLINK (CERF) Window is opened without any settings having been made previously, a "New File" Message Box will be displayed. Click the **OK** Button to proceed to the next operation.

■ MECHATROLINK (CERF) Window

The following table shows the functions of the menu commands in the MECHATROLINK (CERF) Window.

Menu Command	Function
Edit (E)	
Default (D)	Returns the allocation data to the default values.
Assignment Delete (A)	Clears the allocation data.

■ MLINK Definition Settings

This section describes the settings on the tab pages.

Transmission Parameters Tab Page

This tab page is used to set the parameters required to use the MLINK transmission system.

Setting Item	Details	Default
Master/Slave	Sets whether to use the Machine Controller as a master station or as a slave station.	Master
Own Station Address	When the Machine Controller is being used as a master station, the local station address is fixed at 0 and cannot be changed. When it is being used as a slave station, set a station address between 1 and 14.	0
Message Trust Level	Sets the error control method used when sending MEMOBUS commands. Set the level from the table of message trust levels given below.	0
Max Slave ST Number (Maximum Slave ST Number)	One of three levels can be selected. Refer to the table of the maximum number of slave stations given below. Set the number according to the scale of the system.	14 stations
Scan	Set to High or Low.	Low

Table 3.24 Message Trust Levels

Level	Details
0	Send command just once and wait indefinitely for a response from the destination.
1	Send command just once and resend if a response is not received within 8 seconds.
2	When sending the command, send each word of data twice consecutively and wait indefinitely for a response from the destination. This method improves transmission quality but reduces transmission efficiency by 50%.

Table 3.25 Maximum Number of Slave Stations

Number of Slave Stations	Baud Rate	Communications Cycle
14 stations	4 Mbps	2 ms

I/O Assignment Tab Page

This tab page is used to set the I/O devices and registers connected in the MECHA-TROLINK.

Setting Item	Details
ST#	Displays the station number. Up to 14 stations can be set.
TYPE	Sets the type of I/O device connected at the station. Select an I/O device type from the pull-down list.
D	Controls the input register's disable setting. • ☐ : Enabled • ☑ : Disabled
INPUT, SIZE	Sets the leading input register number and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station does not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Definitions Window.
D	Controls the output register's disable setting. • ☐ : Enabled • ☑ : Disabled
OUTPUT, SIZE	Sets the leading output register number and number of registers (SIZE). The number of registers is set automatically. Be sure that the range of registers set for each station do not overlap with another station's register numbers. The setting range for registers is determined by the leading register number and ending register number set in the Module Configuration Definitions Window.
SCAN	Sets the scan for I/O servicing. Set the scan according to the scan set on the Transmission Parameters Tab Page.
Station Name (Comment)	Comments up to 32-characters can be input for each station.

⬤ INFO ▷　Refer to *Appendix D.1 MECHATROLINK Devices* for the I/O devices set using the TYPE field.

3

Deleting I/O Allocations

1. To delete a station's allocation data, move the cursor to the row of the station to be deleted, click *Edit (E)* and then *Assignment Delete (A)*.

2. The station's allocation settings will be deleted.

I/O Map Tab Page

This tab page is used to display the status of the Machine Controller's I/O allocations.
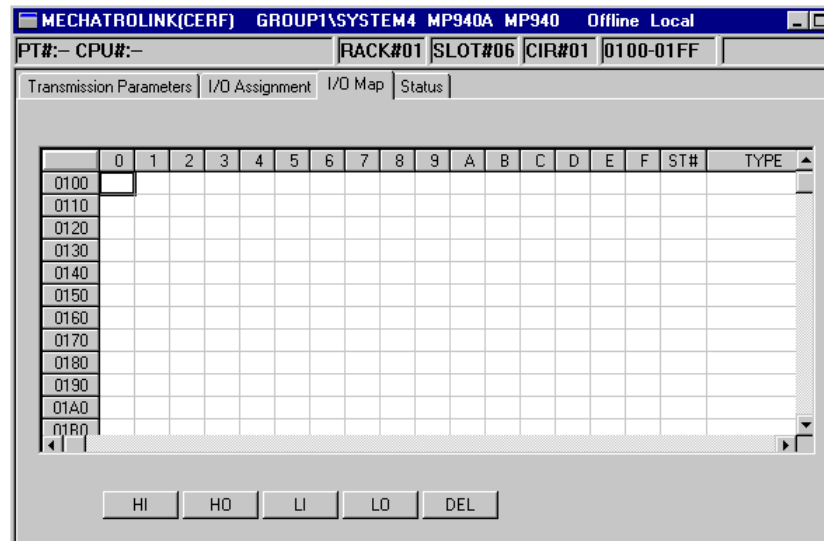
HI	Allocates to an input set for a high-speed scan.
HO	Allocates to an output set for a high-speed scan.
LI	Allocates to an input set for a low-speed scan.
LO	Allocates to an output set for a low-speed scan.
DEL	Deletes allocation.

INFO

The scan settings on the I/O Map Tab Page are not used for the MP900 series. All settings will be performed according to the scan settings on the Transmission Parameters Tab Page.

Status Tab Page

This tab page is used to display the data that is currently being transmitted by the MLINK.
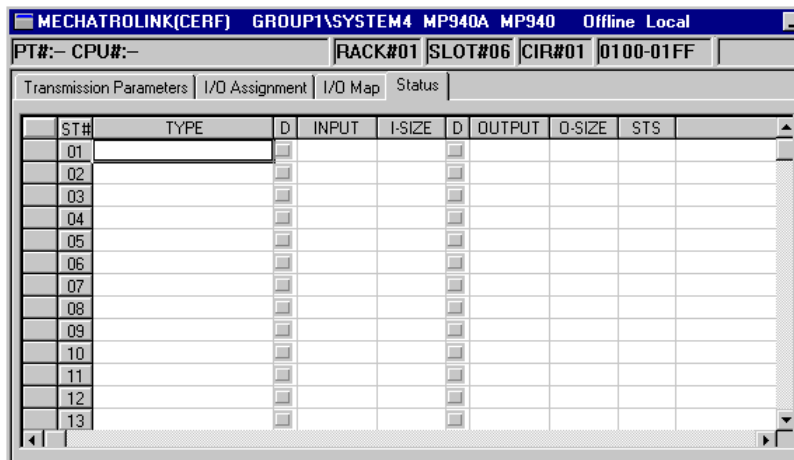
The tab only displays the status; the displayed values cannot be changed.

The meaning of each column is identical to the columns in the I/O Assignment Tab Page except for the additional "STS" column.

STS

In online mode, the MLINK transmission status information is displayed in hexadecimal. The meaning of each bit is shown in the following diagram. In offline mode, nothing will be displayed.
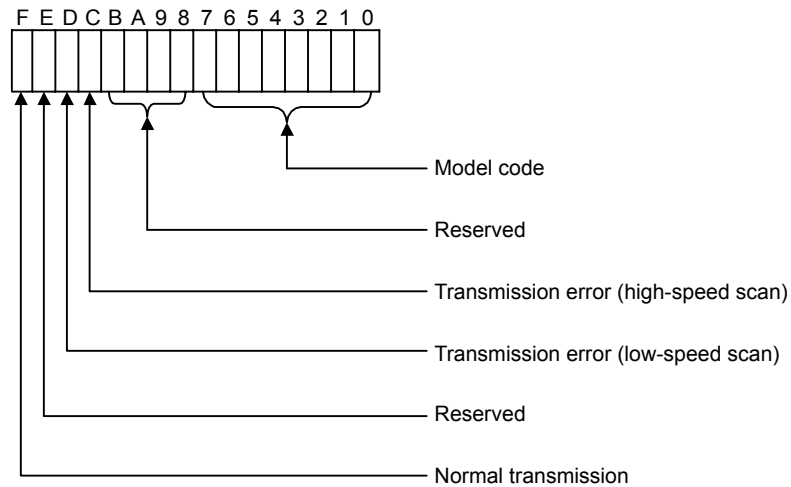
■ Saving, Deleting, and Closing MLINK Definitions

Refer to the procedures in *3.3 Basic Individual Module Definition Operations* for details.

3.7.11 260IF Setup

Perform the setup for the 260IF from the CP-717 Engineering Tool.

■ Opening the 260IF Definitions Window

The procedure to open the 260IF Definitions Window is given below.

1. Double-click the Module configuration definitions of the controller mounting the 260IF. The Module Configuration Definitions Window will be displayed.

No.	00	01	02	03	04	05	06
Module	MP940 ▼	RESERVED	SERIAL	LIO	SVA	CNTR	260IF ▼
Control CPU Number							
.	. . .	. . .	. . .	. . .	. . .	. . .	. . .
I/O Start Register	. . .	. . .	. . .	. . .	. . .	. . .	. . .
I/O End Register	. . .	. . .	. . .	. . .	. . .	. . .	. . .
.	. . .	. . .	. . .	. . .	. . .	. . .	. . .

Fig 3.28 MP940 Module Configurations Window

With the MP940, the 260IF is allocated to slot 06 and this cannot be changed; select the 260IF Module.

The I/O leading and ending register addresses must be set in the 260IF Module settings. Allocate the I/O register addresses to be used within the ranges shown below.

I/O Leading Register (IW/OW Register Start Offset)	0000 to 07FF
I/O Ending Register (IW/OW Register End Offset)	0000 to 07FF

2. Double-click the slot set for the 260IF Module to open the 260IF Definitions Window.
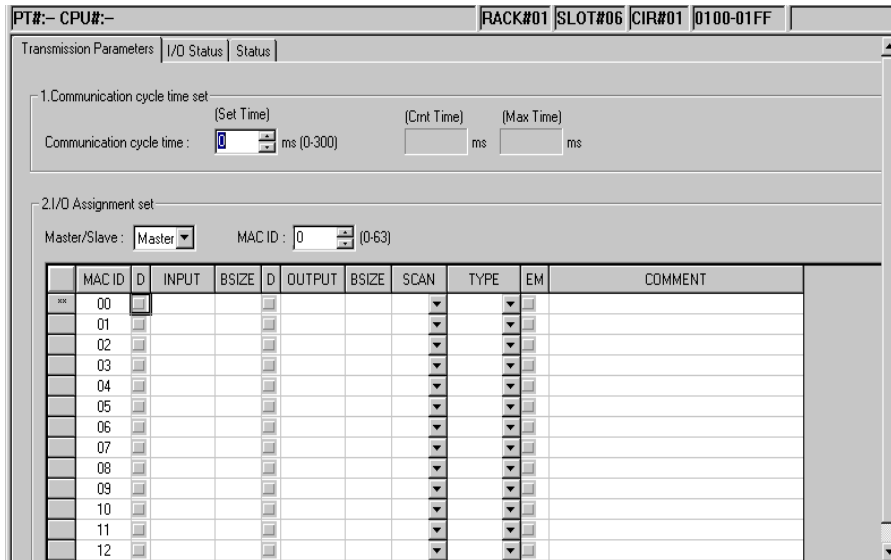
Fig 3.29 260IF Definitions Window

■ Setting Methods

The 260IF Definitions Window consists of the following three tab pages.

Tab Page	Details
Transmission Parameters	Sets the communications and network parameters for the 260IF Module.
I/O Status	Displays the communications status with the slaves when setting the master at online. For details, refer to *Chapter 6 Network Maintenance* in the *MP920 Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2).
Status	Displays the 260IF Module status when online. For details, refer to *Chapter 6 Network Maintenance* in the *MP920 Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2).

Transmission Parameters Tab Page

This tab page is used to set the following items.

1. Communications Cycle Time Information Settings

Setting Item	Details
Communications Cycle Time (Set Value)	If using the 260IF as a DeviceNet master, enter the communications cycle time set value.
Communications Cycle Time (Current Value); Display Only	Displays the communications cycle current value during I/O transmission.

Setting Item	Details
Communications Cycle Time (Maximum Value); Display Only	Displays the communications cycle maximum value during I/O transmission.

Refer to *4.2 Calculating Communications Cycle Times* in the *MP920 Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2) for details.

2. I/O Allocation Settings

The asterisks ("**") displayed on the left of the I/O allocations setting table denote the 260IF itself, allocated using the Module configuration definitions.

Setting Item	Details		
Master/Slave	Set the operating mode (i.e., DeviceNet master or slave) for the 260IF. Set to the same value as the value set using 260IF setting switch SW1 (X1).		
MAC ID	The MAC ID is the DeviceNet MAC ID (i.e., DeviceNet address) of the 260IF. Set to the same value as the value set using 260IF setting switches SW2 and SW3.		
MAC ID Field	The MAC ID field is the DeviceNet MAC ID (i.e., DeviceNet address) for I/O allocation. MAC ID fields are set automatically in order starting from 00.		
D	Input enable/disable sets whether or not the Controller CPU exchanges I/O data with the 260IF. Select it to disable I/O data exchange.		
INPUT	Set the leading address of the input area (input register IWxxxx) allocated to the relevant device. Specify using a hexadecimal word address.		
BSIZE	Displays in bytes the size of the input area (input register IWxxxx) allocated to the relevant device. Specify from 1 to 256 (in decimal) for 1 slave. For example, if setting 3 bytes from IW1100 and 1 byte from IW1102, the registers are used as shown below.		
	Register Address	F to 8	7 to 0
	IW1100H		
	IW1101H		
	IW1102H		
	IW1103H		
D	Output enable/disable sets whether or not the Controller CPU exchanges I/O data with the 260IF. Select it to disable I/O data exchange.		
OUTPUT	Set the leading address of the output area (output register OWxxxx) allocated to the relevant device. Specify using hexadecimal word address.		
BSIZE	Displays in bytes the size of the output area (output register OWxxxx) allocated to the device. Specify from 1 to 256 (in decimal) for 1 slave. The bytes are little endian, the same as the input registers.		
SCAN	The data exchange cycle (SCAN) is the timing for exchanging I/O data between the Controller CPU and the 260IF. The Controller CPU data exchange cycle is asynchronous with I/O transmission. When set to High, the Controller CPU exchanges I/O data using the CPU's high-speed scan timing. When set to Low, the Controller CPU exchanges data using the CPU's low-speed scan timing.		

Setting Item	Details
TYPE	Set the I/O transmission type (TYPE) to Polled or Strobed. • Polled enables any DeviceNet slaves to be set. • Strobed enables input only, and limits DeviceNet slaves to communications of 8 bytes maximum. For details on polled and strobed connections, refer to the DeviceNet specifications manual.
EM (Explicit Message)	EM allocation (EM) is checked only when the 260IF is the DeviceNet master and only message communications are to be performed with the slaves. DeviceNet slaves performing I/O transmission can exchange messages, but EM allocation is not necessary to be set.
COMMENT	A comment of up to 32 characters can be input to include the name, type, or other information on the relevant device.

3. Saving Parameters

When the parameter settings have been completed, save the parameters by selecting *File (F)* and then selecting *Save (S)* from the menu.

4. I/O Allocation Settings Supplementary Explanation

a) Master/Slave Selection and MAC ID Settings

Select the operating mode in Master/Slave Settings to match the 260IF setting switch SW1 (X1) set value.

Set the DeviceNet address in MAC ID to match the 260IF setting switches SW2 and SW3 set values.

b) Communications Cycle Settings

Enter the communications cycle time required in *4.2 Calculating Communications Cycle Times* in the *MP900 Series Machine Controller User's Manual: 260IF DeviceNet* (SIEZ-C887-5.2).

This setting is not necessary when using the 260IF as a DeviceNet slave.

c) I/O Allocation

Allocate the I/O registers for sending and receiving I/O data between the Controller CPU and the 260IF according to the DeviceNet system configuration.

5. Example of Slave I/O Allocation

Set the 260IF as shown in the following diagram to use the 260IF as a DeviceNet slave with MAC ID = 3, to send and receive I/O data between the slave and the DeviceNet master using 64 bytes of input and 64 bytes of output.

	MAC ID	D	INPUT	BSIZE	D	OUTPUT	BSIZE	SCAN	TYPE	EM	Comment
	00										
	01										
	02										
	03		IW1100	064		OW1200	064	High ▼	Polled ▼		Slave
	. . .										

2. I/O Allocation Settings

Master/Slave: Master ▼   MAC ID : 3

Node address #00
(MAC ID = 00)
Master

Node address #03
(MAC ID = 03)
Slave

Output data ⇒

IB11000
IB11001
IB11002
. . .
IB1100F

Input data ⇐

OB12000
OB12001
OB12002
. . .
OB1200F
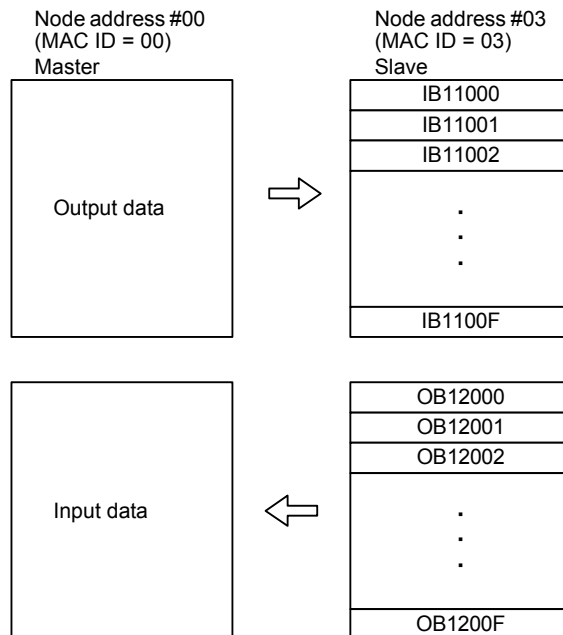
4 System Configuration Definitions

This section explains how to define the system configuration that must be preset before using the MP900 Series.

4

4

4.1 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 the previous chapter.

4.1.1 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.

■ 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
Application Information Setting	Edits the system information history.	-
System Configuration	Checks and modifies the Machine Controller status.	-
Scan Time Setting	Sets the high-speed, low-speed, and system scan times.	Yes
Data Trace	Defines the data to be traced.	-
Module Configuration	Defines the system configuration.	Yes

Refer to the previous chapter for the Module configuration.

4.1.2 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

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

■ Opening from the File Manager

As shown below, open the relevant PLC folder from the tree on the left side of the File Manager.

Open the Definition Folder from the PLC Folder, and then move the cursor to the desired definition file and double-click. The files contained in the selected folder will also be displayed in the right window of the File Manager, so double-clicking the file here will have the same effect.

■ Opening from the Engineering Manager

The definition menu can be displayed by selecting *File (F)*, *Open (O)*, and then *Definition (D)* from the Engineering Manager Window. Select the desired item from the menu.

■ New Definition Files

When a system information definition file is opened for the first time, there is no existing data and a dialog box will be displayed to confirm that a new file is to be created. Click the **OK** Button to continue with the definition operations.

4

4.1.3 Updating Files in Online Mode and Offline Mode

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

■ Logging in Online

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

■ Logging in Offline

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

```
                              ↓
                    ┌──────────────────────┐
                    │ Data file designation │
                    └──────────────────────┘
                              ↓
                         ◇ Online ◇──────NO──────┐
                           YES                    │
                    ┌──────────────┐       ┌──────────────┐
                    │Only PLC data │       │Only HDD data │
                    │    read      │       │    read      │
                    └──────────────┘       └──────────────┘
                              ↓◄────────────────────┘
                    ┌──────────────────────┐
                    │ Data created or updated│
                    └──────────────────────┘
                              ↓
                         ◇ Online ◇──────NO──────┐
                           YES                    │
                    ┌──────────────┐              │
                    │ PLC data     │              │
                    │  updated     │              │
                    └──────────────┘              │
                              ↓◄───────────────────┘
                    ┌──────────────┐
                    │ HDD data     │
                    │  updated     │
                    └──────────────┘
                              ↓
```
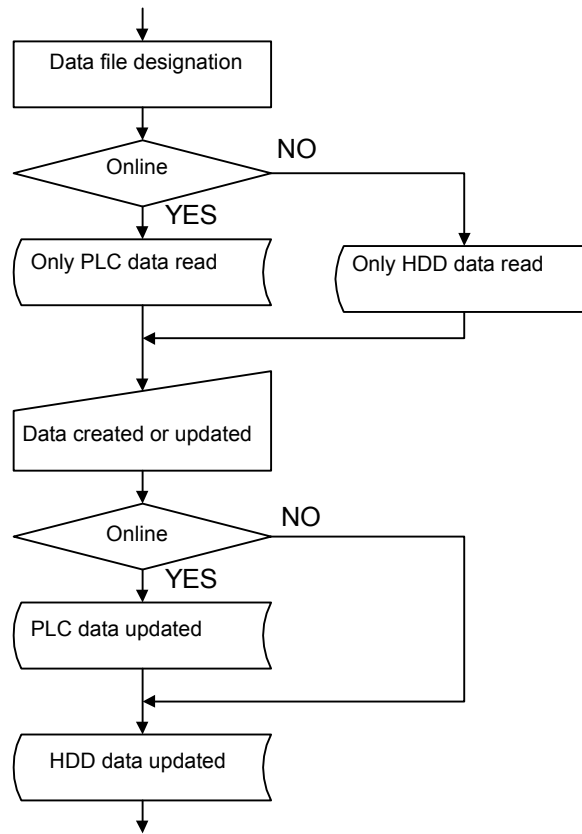
IMPORTANT   The creation and updating of all data and files is managed in offline mode.

4.2 System Configuration

This section 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.

4.2.1 Opening the System Configuration Window

Open the System Configuration Window according to instructions in *4.1.2 Opening System Configuration Definitions Windows*.

■ 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#	The communications logical port is displayed.
UT#	The unit number of the MP900-series Machine Controller is displayed. The unit number is always 1.
CPU#	The number of the CPU which was logged onto is displayed. The CPU number is always 1.

■ Tab Pages

The System Configuration Window has only one tab page, System Configuration.

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

4.2.2 System Configuration Window Menus

The following menus are available through the System Configuration Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the System Configuration Window.
Regist User Menu (U)	Registers a system configuration shortcut.
Save (S)	Saves system definition data.
Print (P)	Prints documents.
Exit (X)	Closes the Engineering Manager.
Edit (E)	
Delete Assignment (D)	Clears the shared memory allocation data.
Control (C)	
CALENDAR (D)	Changes the calendar values.
CPU RUN (R)	Sets online operating mode.
CPU STOP (S)	Sets offline stop mode.
ERR RESET (E)	Resets the display of detected errors.
MEM CLEAR (M)	Clears the Machine Controller's memory.
MEM COMPACT (L)	Compresses the Machine Controller's user program memory.
CPU RESET (T)	Cannot be used with the MP930.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Next Page (N)	Displays the next tab page.
Back Page (B)	Displays the previous tab page.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

4

4.2.3 System Configuration Tab Page

This tab page is used to set the following items. Status-related items can be accessed only in online mode.

Setting Item	Details
Start-up Alter Power Down (Start-up Upon Ordinary Interruption)	Select the method with which the Machine Controller will be started following power interruption.
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.
Battery Check	Select whether battery alarms are detected or not.
Retain H-Scan Input Values Setting (Retention of Previous High-scan Input Value)	Designate the number of times that the previous high-speed input values are to be retained in the event of an I/O error. Designate a number from 1 to 255. If 3 is designated, 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)	Designate the number of times that the previous low-speed input values are to be retained in the event of an I/O error. Designate a number from 1 to 255. If 3 is designated, 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.

■ Running Status

Status		Meaning
Ready	ON: Normal OFF: Self-diagnosis error	ON when Module is normal. OFF when an error has occurred.
Run	ON: Running OFF: Stopped	ON when online mode (scan executed). Turns OFF if a fatal error occurs or if an operation is executed in the System Configuration Window that stops the Machine Controller.
Alarm	ON: Alarm OFF: Normal	ON when an alarm has occurred. OFF when normal.
Error	ON: Error OFF: Normal	ON when an error has occurred. OFF when normal.

Status		Meaning
BAT Alarm	ON: Battery voltage low OFF: Battery voltage normal	ON when battery voltage is low. OFF when battery voltage is normal.
BUS Access	ON: Bus being accessed OFF: Bus accessed stopped	ON during CPU Module bus access. OFF when bus access is stopped.

4.2.4 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 on the Engineering Manager's menu bar. The changes made are immediately reflected in the Machine Controller's operation.

IMPORTANT Machine Controller status cannot be changed in offline mode.

■ Starting Machine Controller Operation

1. Select *Control (C)* and then *CPU RUN (R)* from the menu.
2. Click the **Yes** Button in the message box.

■ Stopping Machine Controller Operation

1. Select *Control (C)* and then *CPU STOP (S)* from the menu.
2. Click the **Yes** Button in the message box.

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

■ Resetting the Machine Controller's Error Display

The procedure to reset the display of errors detected by the Machine Controller. Before resetting the display, use the register list function to check the error contents.

1. Select *Control (C)* and then *ERR RESET (E)* from the menu.
2. Click the **Yes** Button in the message box.

■ 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 affected.

1. Select *Control (C)* and then *MEM CLEAR (M)* from the menu.
2. Click the **Yes** Button in the message box.

IMPORTANT The Machine Controller operation must be stopped when this operation 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.

■ 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 operation, the utilized area in the user program memory will be packed and the fragmented area will be repaired.

1. Select *Control (C)* and then *MEM COMPACT (L)* from the menu.

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.

4.2.5 Saving System Definitions

The procedure to save the system definitions is given below.

1. Select *File (F)* and then *Save (S)* from the 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.

4.2.6 Closing System Configuration

To close the window, select *File (F)* and then *Close (C)* from the menu.

4.3 Scan Time Definitions

This section 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 MP940 operation. Refer to the *MP940 Machine Controller User's Manual: Design and Maintenance* (SIEZ-C887-4.1) and be sure that suitable times are set.

4.3.1 Opening the Scan Time Window

Open the Scan Time Window according to instructions in *4.1.2 Opening System Configuration Definitions Windows*.

```
Scan Time   GROUP1\SYSTEM4 MP940A MP...  _ □ ×
PT#:– CPU#:–

Network Number
Station Number
Controller Number
Controller Type                        MP940
High Speed Scan Setting [ms]           8.00
Maximum H-Scan run time [ms]           0.08
Current H-Scan run time [ms]           0.00
Number of steps                        0
Low Speed Scan Setting [ms]            100.00
Maximum L-Scan run time [ms]           0.49
Current L-Scan run time [ms]           0.00
Number of steps                        0
Start-up DWG   Steps                   0
Interrupt DWG   Steps                  0
User Function   Steps                  0
Total Steps                            0
Program Memory Total   [Byte]          0
```

■ Login Information

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

Information	Details
PT#	Displays the communications logical port.
UT#	Displays the unit number of the MP900-series Machine Controller. The unit number is always 1.
CPU#	Displays the number of the CPU which was logged onto. The CPU number is always 1.

■ Network Information

MP900-series network information is displayed. The information displayed is always the same because the MP900 is a stand-along controller.

Information	Details
Network Number	NT#000: Network 0
Station Number	ST#00: Station 0
Controller Number	CPU#01: CPU 1
Controller Type	MP900 series: Controller type

4.3.2 Scan Time Window Menus

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

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the Scan Time Window.
Regist User Menu (U)	Registers a scan time setting shortcut.
Save (S)	Saves scan time setting data.
Print (P)	Prints documents.
Exit (X)	Closes the Engineering Manager.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
PC Add (A)	Adds the Machine Controller displaying the scan time.
PC Delete (D)	Deletes the Machine Controller displaying the scan time.
Set (S)	Set the basic control cycle (B).
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

4.3.3 Setting the System Scan Time

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 *MP940 Machine Controller 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

■ Opening the Basic Control Cycle Window

Select *View (V), Set (S),* and *Basic Control Cycle (B)* from the menu.
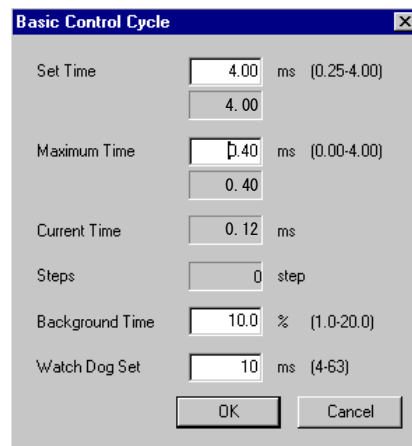
Setting Item	Contents
Set Time	Sets the system scan time. The current system scan time setting is shown underneath the setting.
Maximum Time	Sets the maximum value of the system can time. The maximum value measured to present is shown underneath the setting.
Current Time	Displays the current system scan time.
Steps	Displays the number of steps for the system scan time.
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

1 The power supply must be turned OFF and back ON to after the basic control cycle is changed.

2 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.

4.3.4 Setting Scan Time Definitions

Refer to the window shown in *4.3.1 Opening the Scan Time Window*.

4

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

Setting Item	Details
High Speed Scan Setting	Setting: Input the set value for the scan time.
	Maximum Run Time: The maximum value for the scan time is displayed here. To clear the maximum value, input 0 here. In offline Mode, 0 is always displayed.
	Current Run Time: The current scan time is displayed here. In offline mode, 0 is always displayed.
	Number of steps: The total number of steps in the scan program is displayed here. Number of steps.
Low Speed Scan Setting	Sets the low-speed scan time. The meaning of the data 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.

4.3.5 Saving Scan Time Definitions

The procedure to save the scan time definitions is given below.

1. Select *File (F)* and then *Save (S)* from the menu.
2. Click the **Yes** Button in the Scan Time message box.
3. Click the **OK** Button in the message box.

4.3.6 Closing Scan Time Definitions

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

To close the window, select *File (F)* and then *Close (C)* from the menu.

4.4 Application Information Definitions

This section 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, revision history, etc. 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 *4.1.2 Opening System Configuration Definitions Windows*.

4.4.2 Application Information Window Menus

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

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the Application Information Window.
Regist User Menu (U)	Registers an application information shortcut.
Save (S)	Saves application information data.
Print (P)	Prints documents.
Exit (X)	Closes the application.

Menu Command		Function
View (<u>V</u>)		
	Tool Bar (<u>T</u>)	Displays the Tool Bar.
	Status Bar (<u>S</u>)	Displays the Status Bar.
Window (W)		
	Cascade (<u>C</u>)	Stacks windows in the display.
	Tile (<u>T</u>)	Lines up windows in the display.
	Arrange Icons (<u>A</u>)	Lines up icons.
Help (<u>H</u>)		
	About Application (<u>A</u>)	Displays version information for the CP-717.

4.4.3 Setting Application Information

Refer to the Application Information Window in *4.4.1 Opening the Application Information Window*.

Setting Item	Contents
Order No.	Input the system order number, up to eight characters.
Controller Name	Input a name for the MP900-series Machine Controller, up to eight characters.
Controller Type	Input the model number of the 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.

4.4.4 Saving Application Information

1. Select *File (<u>F</u>)* and then *Save (<u>S</u>)* from the menu.
2. Click the <u>Y</u>es Button in the Application Information message box.

4.4.5 Closing Application Information

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

To close the window, select *File (<u>F</u>)* and then *Close (<u>C</u>)* from the menu.

4.5 Data Trace Definitions

This section 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.

4.5.1 Opening the Data Trace Window

Open the Data Trace Window according to instructions in *4.1.2 Opening System Configuration Definitions Windows*.
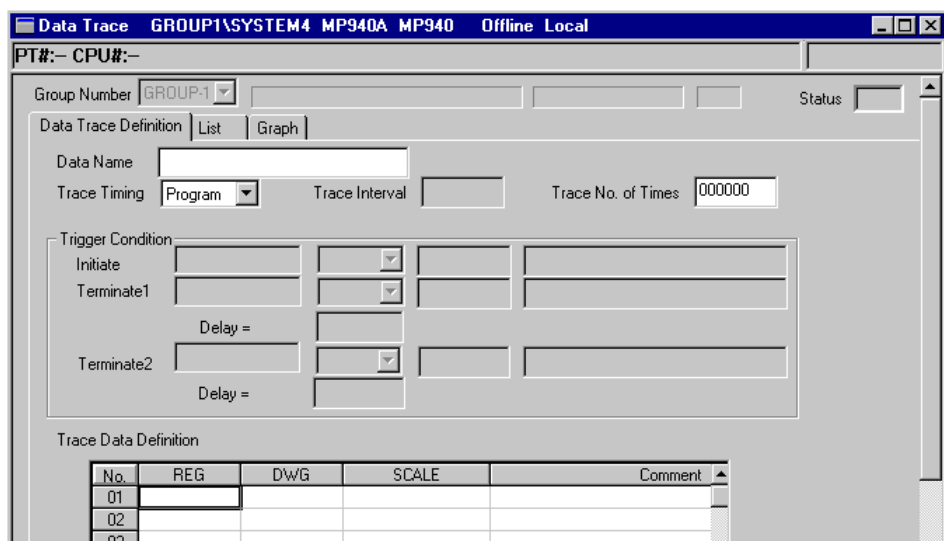
■ Login Information

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

Information	Details
PT#	Displays the communications logical port.
UT#	Displays the unit number of the MP900-series Machine Controller. The unit number is always 1.
CPU#	Displays the number of the CPU which was logged onto. The CPU number is always 1.

■ Group and Status Information

Information	Details
Group Number	Displays the group name set in the group definitions.
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.

■ Tab Pages

The Data Trace Window consists of three tabs: **Data Trace Definition**, **List**, and **Graph**.

Table 4.1 Data Trace Tab Pages

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

4

◉ INFO

1 While the Data Trace Window is active, the tab pages can be accessed in the following order by selecting *View (V)* and then *Next Page (N)* from the menu.

• Data Trace Definition Æ List Æ Graph Æ Data Trace Definition

2 To access the tab pages in reverse order, select *View (V)* and then *Back Page (B)* from the menu.

4.5.2 Data Trace Window Menus

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

Menu Command			Function
File (F)			
	File Manager (F)		Opens the File Manager.
	Open (O)		Opens the function window.
	Close (C)		Closes the Data Trace Window.
	Regist User Menu (U)		Registers a data trace definition shortcut.
	Save (S)		Saves trace definition data.
	Delete (D)		Deletes trace definition data.
	Trace Data (T)		
		Read (R)	Reads trace data from floppy disk.
		Write (W)	Writes trace data to floppy disk.
	Trace Data Write (CSV Type)		Saves trace data in CSV format.
	Page Setting (M)		Used to make the page settings for printing.
	Trace Data Print (P)		Prints trace data.
	Exit (X)		Closes the Engineering Manager.
Edit (E)			
	Trigger Initiate Condition (T)		
		Delete (D)	Deletes the trigger condition.
	Trace Setting (S)		
		Delete (D)	Deletes an item specified for tracing.
		Add (A)	Adds an item for tracing.
	Default Setting (D)		Sets the default values.
View (V)			
	Tool Bar (T)		Displays the Tool Bar.
	Status Bar (S)		Displays the Status Bar.
	Mode (M)		
		RE-DSP (R)	Refreshes the display data.
		AUTO (A)	Automatically refreshes the display data.

4

Menu Command			Function
Sampling (S)			
	Number of read data (R)		Changes the number of data to be read.
	Trace Time Axis (T)		Changes the trace time axis.
	Jump to Appoint Data (O)		Displays trace data from any sample number.
Data (D)			
	DEC (D)		Displays trace data in decimal.
	HEX (H)		Displays trace data in hexadecimal.
	m/s (M)		Switches the time axis unit.
Next Page (N)			Displays the next tab page.
Back Page (B)			Displays the previous tab page.
Control (C)			
	Trace Start (S)		Starts the data trace.
	Trace Stop (P)		Stops the data trace.
Window (W)			
	Cascade (C)		Stacks windows in the display.
	Tile (T)		Lines up windows in the display.
	Arrange Icons (A)		Lines up icons.
Help (H)			
		About App.. (A)	Displays version information.

4.5.3 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.

■ Standard Operations

A standard procedure for data tracing is given below.

1. Set the data trace trigger conditions on the Data Trace Definition 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 in graph form.

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
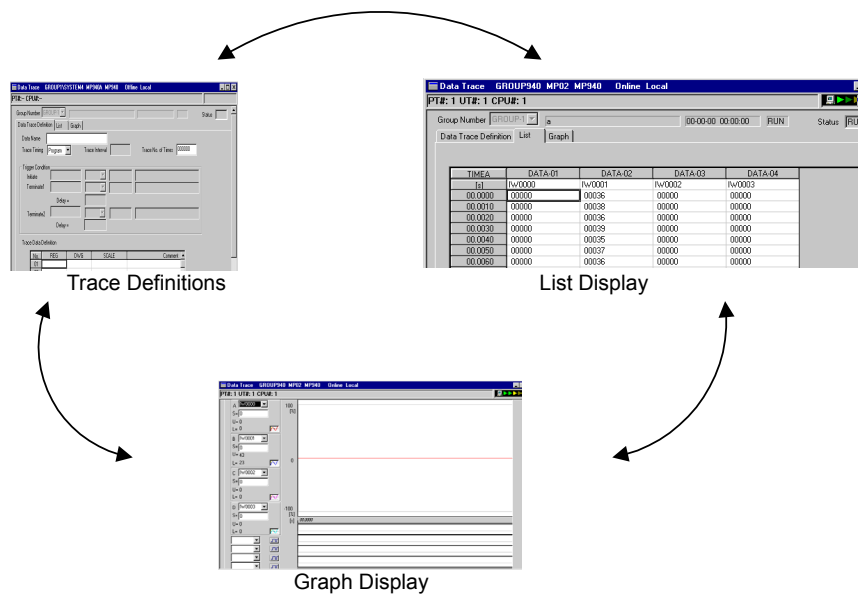
The tab pages are described in the following sections.

4.5.4 Data Trace Definition Tab Page

4

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

■ Setting Trace Definitions

Refer to the Data Trace Definition Tab Page in *4.5.1 Opening the Data Trace Window*.

Setting Item	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 drawing or function program.
	H-SCAN: Executes the data trace with each high-speed scan.
	L-SCAN: Executes the data trace with each low-speed scan.
Trace Interval	Input the trace scan cycle (0 to 32,767). Cannot be set when "Program" is selected for the Trace Timing Box. 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.

Setting Item	Details
Trace No. of Times	Input the maximum number of times that the data trace is to be executed. Cannot be set when "Program" is selected for the Trace Timing Box. If 0 is input, a continuous trace (cyclic trace) will be executed until it is stopped either manually or by the condition in the Terminate Trigger Condition Box. If 1000 is input, the trace will be executed for 1,000 data samples.
Trigger Condition: Initiate (Initiate Trigger Condition)	Input the condition for beginning the data trace. Cannot be set when "Program" is selected for the Trace Timing Box. If no condition is input here, then the trace operation must be started manually.
Trigger Condition: Terminate 1 or Terminate 2 (Terminate Trigger Condition)	Input the condition for stopping the data trace and the number of traces to be executed after the condition is met. Up to two terminate trigger conditions can be set. Cannot be set when "Program" is selected for the Trace Timing Box. If 0 is input in the Delay Box, the trace will be stopped immediately when the trigger condition is met. If no terminate trigger condition is input, the data trace will be executed until it is stopped either manually or by reaching the number of traces specified in the Trace No. of Times Box. If there are two conditions set for the terminate trigger condition, then the data trace will be stopped when either of those conditions is met.
Trace Data Definition	Input the register numbers, drawing numbers, scale conversion values, or comments that are to be traced. A maximum of 16 items can be specified.

Details of Trace Data Definitions

Setting Item	Details
REG (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.
DWG (Drawing Number)	If the register number to be traced is a D register (i.e., if a D register is input in the REG Box), then input a D register drawing number. For a motion program, input a motion program drawing number (MPxxxx). 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 in the Trace Timing Box.
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 in the Trace Data Definition field, the trace definition data for the currently displayed group will be deleted. In effect, this is the same as deleting it by selecting *File (F)* and then *Delete (D)* from the Data Trace Menu.

⬤ INFO ➤ ■ Trigger Conditions

1 There are three trigger conditions: Initiate trigger, terminate trigger 1, and terminate trigger 2.

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.

3 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.

4 For the terminate trigger delay, input a number from 0 to 65,534.

5 Input a comment up to 32 characters.

■ Setting Default Values

The default values can be set by selecting Edit (E) and then Default Setting (D) from the Data Trace Menu. The Trace Timing will become "Program," the Trace No. of Times will become 0, and all other data will be cleared.

■ Tracing D Registers

1 The execution timing and DWG settings are checked when the trace definitions data is saved. The following table shows the possible combinations. Do not use any other combinations.

Trace Timing	DWG
Program	Hxx, Hxx.xx, MPxxxx
H-SCAN	Hxx, Hxx.xx, MPxxxx
L-SCAN	Lxx, Lxx.xx

For example, an error will occur if an MPxxxx drawing with the trace timing set to the low-speed scan is detected when saving.

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

3 Error checks are not performed in offline mode.

■ Editing Trace Definitions

This section explains how to edit trace definition data.

Deleting the Trigger Condition

The procedure to delete the trigger condition is given below.

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

2. Select *Edit (E)*, *Trigger Initiate Condition (T)*, and then *Delete (D)* 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 trigger condition 1 is deleted, the data for the condition type, comment, and delay will all be deleted.

Deleting a Trace Data Condition Row

The procedure to delete a trace data condition row is given below.

1. Move the cursor to the row of the trace data to be deleted.

2. Select *Edit (E)*, *Trace Setting (S)*, and then *Delete (D)* from the Data Trace Menu.

3. The trace definition selected in step 1. will be deleted.

Inserting a Trace Data Condition Row

The procedure to insert a trace data condition row is given below.

1. Move the cursor to the position where the trace data definition is to be inserted.

2. Select *Edit (E)*, *Trace Setting (S)*, and then *Add (A)* from the Data Trace Menu.

3. A blank row will be inserted at the position specified in step 1.

■ Saving and Deleting Data Trace Definitions

Saving

1. Select *File (F)* and then *Save (S)* 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. Referring to *Appendix <$chapnumError Messages*, remove the cause of the error, and then save the data again.

Deleting

1. Select *File (F)* and then *Delete (D)* from the Data Trace Menu.

2. Click the **Y**es Button in the Data Trace message box.

■ Starting the Data Trace

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

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

INFO

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

1 The Machine Controller is currently in offline stop mode.

2 The CP-717 is in offline mode.

3 The TRACE system function in the main program is not being executed when "Program" is set for the Trace Timing Box under the Data Trace Definition Tab Page.

4 The RESET input for the TRACE system function in the main program is ON when "Program" is set for the Trace Timing Box under the Data Trace Definition Tab Page.

5 The actual number of trace times has reached the Trace Number of Times set in the Trace No. of Times Box under the Data Trace Definition Tab Page.

6 The condition set in the Terminate Trigger Condition Box under the Data Trace Definition Tab Page has been met.

7 The data trace has been manually stopped.

■ 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 Definition 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 data will both be saved.

Write File Window Configuration

Select *File (F), Trace Data (T),* and then *Write (W)*. The Write File Window will be displayed.

4

Write File

File Name	A:\$DTRACE.DAT		Update

No.	Tarce Data Name	Date	Time	D

| Delete List | Delete File | Execute | Cancel |
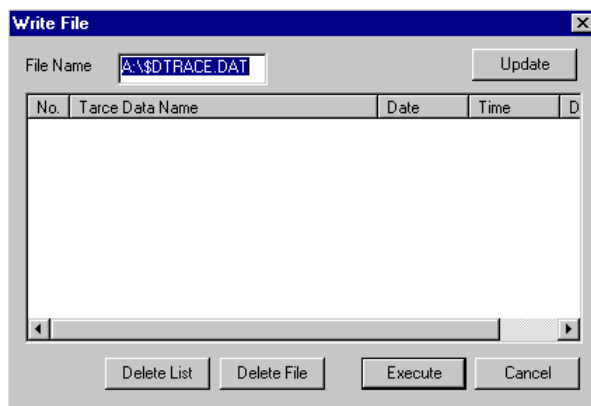
Setting Item	Details
File Name	Input the file name and the number of the floppy disk drive where the trace data is to be saved. The default file name is $DTRACE.DAT. After inputting the file name, click the **Update** Button. The trace data saved to the file that was input will then be displayed under numbers 1 to 10.
No.	Displays the trace data number.
Trace Data Name	Displays the name of the trace data. The trace data name is where the data for the Data Name Box under the Data Trace Definition Tab Page is saved.
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.

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 data.
  • ∗∗ indicate that no data is saved there.

Saving Trace Data

The procedure to save trace data is given below.

1. Select *File (F), Trace Data (T),* and then *Write (W)* from the menu. The Write File Window will be displayed.

2. Input the name of the file to be written in the File Name Box and click the **Update** Button. A list of trace data will be displayed.

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

4. Click the **Execute** Button.

5. Click the **Cancel** Button.
    The trace data will be written successfully.

Deleting Trace Data

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

The procedure to delete trace data is given below.

1. Deleting Trace Data Files

   The procedure to delete the trace data file displayed in the File Name Box of the Write File Window is given below.

   a) Select *File (E)*, *Trace Data (T)*, and then *Write (W)* from the menu. The Write File Window will be displayed.

   b) In the File Name Box, 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. The trace data file specified in step b) will be deleted.

   e) Click the **Cancel** Button to complete the deletion of the trace data file.

2. Deleting Individual Trace Data

   The procedure to delete trace data for specific trace data numbers is given below.

   a) Select *File (E)*, *Trace Data (T)*, and then *Write (W)* from the menu. The Write File Window will be displayed.

   b) In the File Name Box, 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. The trace data item specified in step c) will be deleted.

   f) Click the **Cancel** Button to complete the deletion of the trace data items.

4

■ Reading Trace Data from a Floppy Disk

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

Read File Window Configuration

Select *File (E)*, *Trace Data (T)*, and then *Read (R)* from the menu. The Read File Window will be displayed.

Read File   ☒

File Name `A:\$DTRACE.DAT`   [Update]

No.	Tarce Data Name	Date	Time	D

[Delete List] [Delete File]   [Execute]   [Cancel]
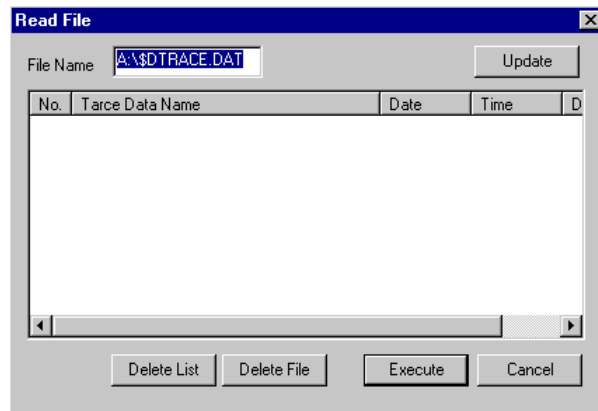
Reading Trace Data

The procedure to read trace data from a floppy disk is given below.

1. Select *File (F)*, *Trace Data (T)*, and then *Read (R)* from the menu. The Read File Window will be displayed.

2. In the File Name Box, 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.

3. Select the number of the data that is to be read.

4. Click the **Execute** Button.

5. Click the **Cancel** Button to complete the reading of the trace data.

INFO

1 A maximum of 10 trace data items can be written to a single file.

2 Trace data is read by group. If the read operation is executed for Group 1, for example, the trace data for the other group numbers will not be read.

4.5.5 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
- Updating 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 read

■ Setting the List Tab Page

Click the **List** Tab in the Data Trace Window.
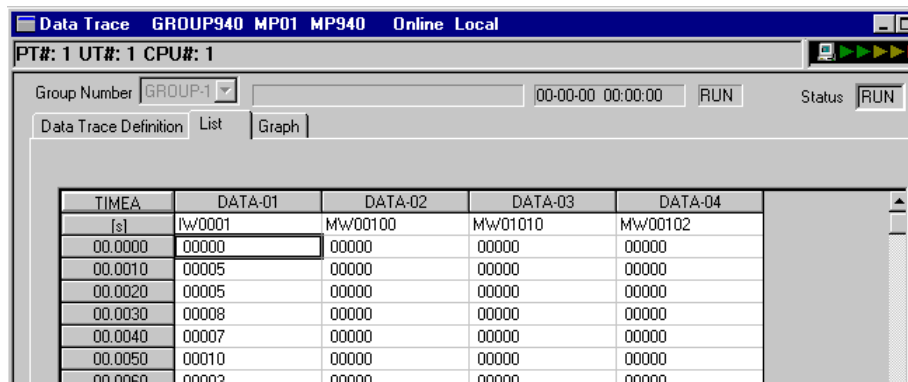
Group and Status Information

Group and status information are displayed in the List Tab Page.

Information	Details
Group Number	Displays the group name set in the group definitions.
Data Name	Displays the name input in the Data Name Box in the Data Trace Definition Tab Page.
Last 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.

Display Configuration

- The trace time axis type is determined by the trace time axis setting.
- The sample numbers are displayed after the register number in the column under the trace time axis type.
- The registers set in the Trace Data Definition field in the Data Trace Definition Tab Page are displayed in order in the Register Number row.

Display Items

Display Items	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 registers being traced.
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 with each scan as set in the Scan Time Window.

- TIMEB

  Trace data is displayed in time units*, with the time at which the trace was stopped as 0. Accordingly, 0 represents the newest trace data. The data is traced with 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 in the Trace Timing Box in the Data Trace Definition Tab Page. Trace data numbers are displayed in order, from smaller to larger (0 1, 2, 3...), with 0 being the earliest.

- 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 in the Trace Timing Box in the Data Trace Definition Tab Page. Trace data numbers are displayed in order, from larger to smaller (...3, 2, 1, 0), with 0 being the most recent.

  ∗ The data can be displayed in units of either 1 or 0.01 second. To switch these two unit settings, select *View (V)*, *Data (D)*, and then *m/s (M)* from the Data Trace Menu. The placement of the decimal point will vary depending on the length of time for the trace, so 01.000 is no different from 1.0000.

■ Updating Display Data

The most recent trace data can be displayed.

The procedure to update the trace data is given below.

Select *View (V)*, *Mode (M)*, and then *RE-DSP (R)* from the Data Trace Menu.

IMPORTANT

■ Automatic Updating of Trace Data

1 When *View (V)*, *Mode (M)*, and then *Auto (A)* are 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.

2 Selecting *View (V)*, *Mode (M)*, and then *Auto (A)* again cancels the automatic updating.

■ 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.

Decimal Display

The procedure to display the data in decimal format is given below.

1. Move the cursor to the item to be displayed in decimal.

2. Select *View (V)*, *Data (D)*, and then *DEC (D)* from the Data Trace Menu. The data will be displayed in decimal.

Hexadecimal Display

The procedure to display the data in hexadecimal format is given below.

1. Move the cursor to the item to be displayed in hexadecimal.

2. Select *View (V)*, *Data (D)*, and then *HEX (H)* from the Data Trace Menu. The data will be displayed in hexadecimal.

■ Manually Starting and Stopping Data Traces

Traces can be started and stopped manually.

Starting Manually

To manually start a data trace operation, select *Control (C)* and then *Trace Start (S)* from the Data Trace Menu.

Stopping Manually

To manually stop a data trace operation, select *Control (C)* and then *Trace Stop (P)* from the Data Trace Menu.

■ Changing the Trace Time Axis

The procedure described below to change the time axis for displaying the trace data is given below.

1. Select *View (V)*, *Sampling (S)*, and then *Trace Time Axis (T)* from the Data Trace Menu.
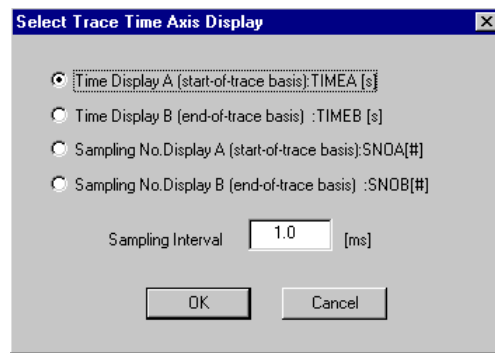
2. In the Select Trace Time Axis Display Dialog Box, set the time axis display and the sampling interval and then click the **OK** Button.

   The numeric data will be displayed.

INFO ▶ If the Trace Timing Box under the Data Trace Definition 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 dialog box in step 2. of the above procedure.

4

■ Changing the Beginning Sample Number for Display

The procedure to change and display trace data beginning with any desired sample number is given below.

1. Select *Sampling (S)* and then *Jump to Appoint Data (Q)* from the Data Trace Menu.
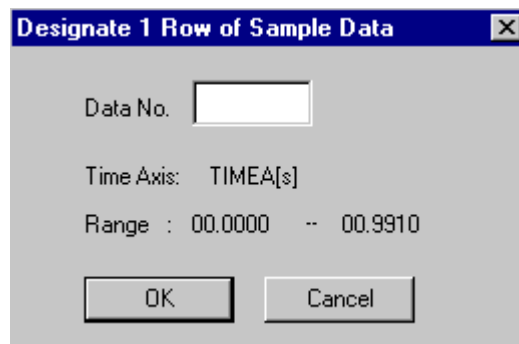
2. Input the beginning sampling number in the Dialog Box, and then click the **OK** Button.

   The trace data will be displayed beginning with the number that was input.

■ Changing the Amount of Data to be Read

The procedure to change the number of trace data items to be read is given below. 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 (V)*, *Sampling (S)*, and then *Number of Read Data (R)* from the Data Trace Menu.
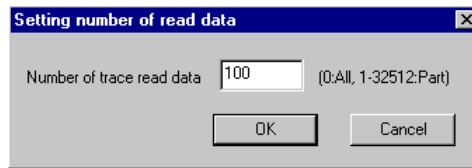
2. Input the number of data items to be read in the Setting Number of Read Data Dialog Box, and then click the **OK** Button.

INFO ▶ Specify the number of data items to be read as the number of frames. A frame consists of one traced data sample for each item being traced.

4.5.6 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

■ Opening the Graph Tab Page

Click the **Graph** Tab Page in the Data Trace Window.
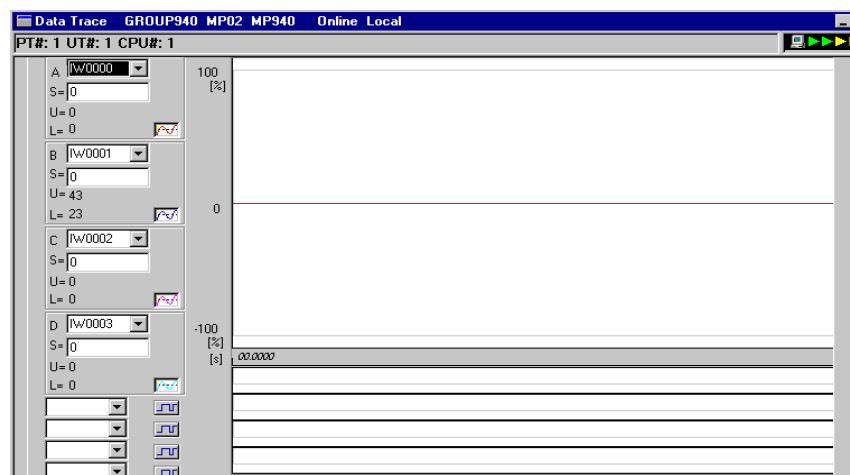
■ Graph Tab Page

Group and Status Information

Refer to information for the List Tab Page.

Display Configuration

4

Setting Items

Setting Item	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 field under the Data Trace Definition 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. (Refer to *Updating Display Data* under *4.5.5 List Tab Page*.) The default setting is the value set for "SCALE" in the Trace Data Definition field under the Data Trace Definition Tab Page. If 0 is set, the amplitude will be the same as if 32767 is set.
Maximum Value	Displays the maximum value for the trace data.
Minimum 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.
Integer, Double 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.
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 gradation for the currently displayed graph, the number of display points, etc. in the following procedure.

4

Setting Graph Button

1. Click the **Setting Graph** Button. The following Setting Graph Dialog Box will be displayed.
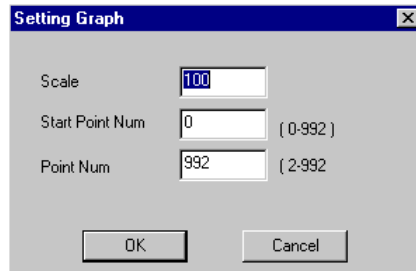
2. Input the graph settings in the dialog box, and then click the **OK** Button.

   The graph display will be changed according to the new settings.

■ Updating Display Data

The most recent trace data can be displayed.
For details on how to update the trace data display, refer to *Updating Display Data* under *4.5.5 List Tab Page*.

■ Manually Starting and Stopping Data Traces

Traces can be started and stopped manually.
For details on how to start and stop data traces manually, refer to *Manually Starting and Stopping Data Traces* under *4.5.5 List Tab Page*.

■ Changing the Trace Time Axis

The trace time axis can be changed.
For details on how to change the time axis for displaying the trace data, refer to *Changing the Trace Time Axis* under *4.5.5 List Tab Page*.

■ Changing the Beginning Sample Number for Display

The beginning sample number can be changed.
For details on how to display trace data beginning with any desired sample number, refer to *Changing the Beginning Sample Number for Display* under *4.5.5 List Tab Page*.

■ Changing the Amount of Data to be Read

The number of data items to be read can be changed.
For details on how to change the number of trace data to be read, refer to *Changing the Amount of Data to be Read* under *4.5.5 List Tab Page*.

4.5.7 Closing Data Trace Definitions

Exit the data trace definition settings by closing the Data Trace Window.

To close the window, select *File (F)* and then *Close (C)* from the menu.

4

5 Motion Programming

This chapter describes the procedure to develop motion programs.

5

5.1 Developing Motion Programs

5.1.1 Outline of Motion Program Development

The following illustration outlines the procedure to develop motion programs. It is assumed that the module configuration and system configuration have already been defined.

5
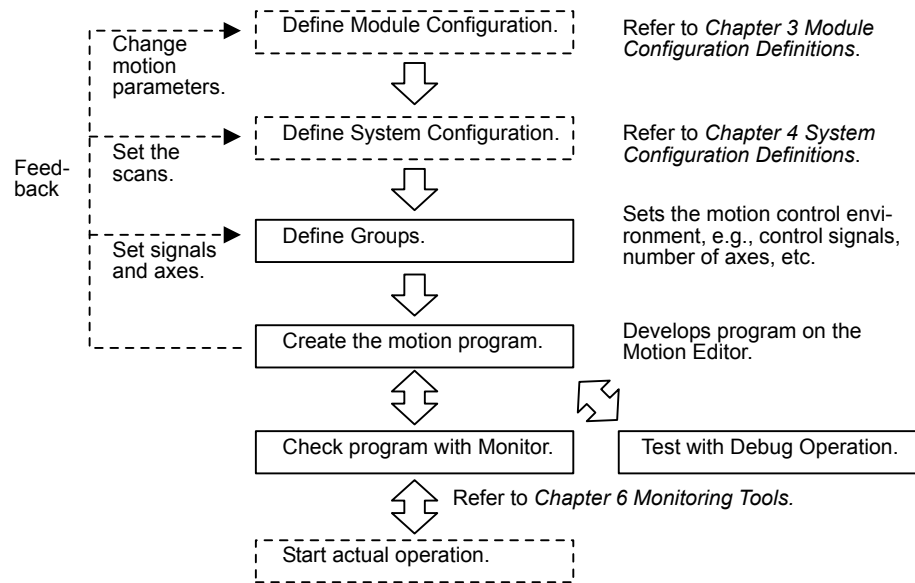
5.2 Group Definitions

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 in.

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.

5.2.1 Outline of Group Definitions

■ Groups

One group defines all of the axes for managing one set of control signals. For the MP940, each group contains only one axis. The same axis cannot be defined in more than one group.

■ Group Registration

Several groups can be controlled by some Machine Controllers. For the MP940, however, only one group can be controlled by each 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.

■ Number of Groups and Tasks

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 diagram.

5
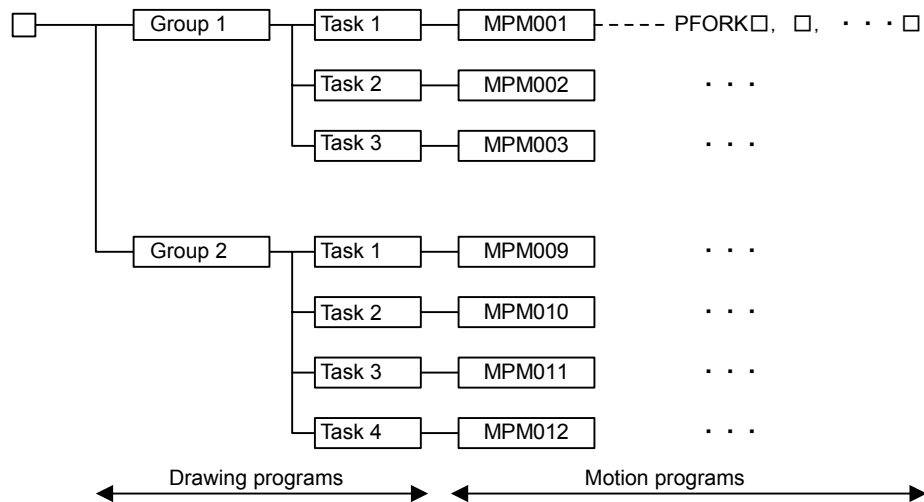
The maximum number of programs that can be executed in parallel is as follows:

- MP940: 1 group x 4 tasks = 4 programs
- MP930: 4 groups x 4 tasks = 16 programs
- MP920: 8 groups x 8 tasks = 64 programs

The PFORK command can also be used for executing small tasks, so the number of programs that can be executed in parallel is actually greater than this. Hardware resources are shared, so be sure to consider the effects on overall system performance.

5.2.2 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(F)*, *Open(O)*, *Definition(D)*, and then *Group Definition(G)*.
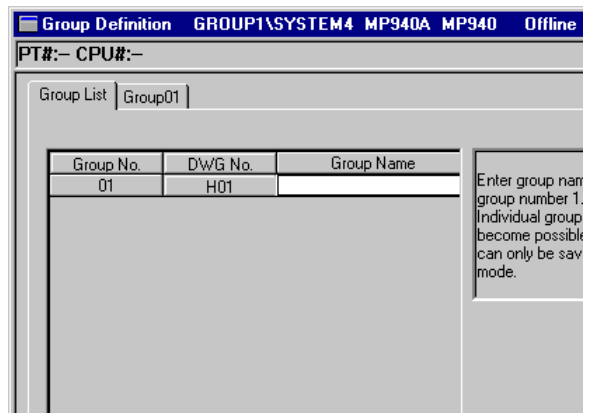
■ Login Information

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 communications logical port.
UT#	Displays the unit number of the MP940-series Machine Controller. The unit number is always 1.
CPU#	Displays the number of the CPU which was logged onto. The CPU number is always 1.

■ Tab Pages

The Group Definition Window contains the Group List Tab and the Group 01 Tab.

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 first *View (V)* and then *Next Page (N)* from the menu.

- Group List Æ Group 01 Æ Group 02 Æ ...

To scroll pages in the opposite direction, select *View (V)* and then *Back Page (B)* from the menu.

5

5.2.3 Group Definition Window Menus

The following table shows the functions of the menu commands in the Group Definition Window.

Menu Command		Function
File (F)		
	File Manager (F)	Opens the File Manager.
	Open (O)	Opens windows for individual functions.
	Close (C)	Closes the group definition window.
	Regist User Menu (U)	Registers a group definition shortcut.
	Save (S)	Saves group definitions.
	Delete (D)	Deletes group definitions.
	Print (P)	Prints group definition contents.
	Exit (X)	Closes the Engineering Manager.
View (V)		

Menu Command		Function
	Tool Bar (T)	Displays the Tool Bar.
	Status Bar (S)	Displays the Status Bar.
	Next Page (N)	Displays the next tab control.
	Back Page (B)	Displays the previous tab control.
Window (W)		
	Cascade (C)	Stacks windows in the display.
	Tile (T)	Lines up windows in the display.
	Arrange Icons (A)	Lines up icons.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

5.2.4 Setting Group Definitions

When setting group definitions, first set the name of each group and then define its operation.

■ 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, drawing (DWG) number, and group name. The group number and drawing number are pre-defined, but the user sets the group name on the Group List Tab Page.

Refer to the window shown in *5.2.2 Opening Group Definition Window*.

Display/Setting Item	Details
Group No.	Displays the group number. From four to eight groups can be created, depending on the Machine Controller model.
DWG No.	Displays the drawing number that corresponds to the group number. The drawing number cannot be changed. This drawing number indicates the location where the motion program control ladder logic program is generated when PGM Automatic Generation is specified in the detailed group information. If Automatic Generation is not specified, the drawing 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

Use the following procedure to set group names.

1. Move the cursor to the position 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.

Added group setting tab

```
Group List  │ Group 01  ┆
            └ ─ ─ ─ ─ ─ ┘
```
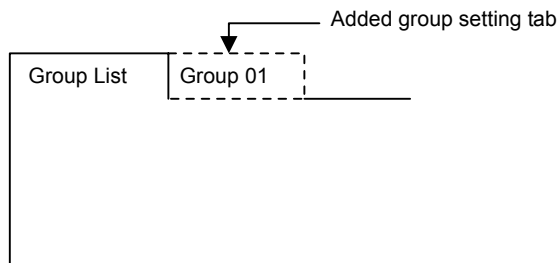
■ Group 01 Tab Page

Click the **Group 01** Tab in the Group Definition Window to display the following window. 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 Item	Details
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. If 0 is input, no axes will be controlled. • MP930: 0 to 14 (number of axes) • MP920: 0 to nnn (number of axes) 　　The number of axes depends on the combination of Motion Modules. Refer to the *MP920 User's Manual: Design and Maintenance*. (SIEZ-C887-2.1).
Task (Number of Tasks)	Input the number of main motion programs to be run simultaneously. • MP930: 1 to 4 (number of tasks) • MP920: 1 to 8 (number of tasks)
Group Input Signal	Allocate group input signals to I or M registers. The default settings are recommended.
Other (Override Signal)	Define the registers for setting the override signals. The default settings are recommended. If the signals must be changed, use M registers.

Display/Setting Item	Details
Create Ladder Dwgs. (Automatic Program Generation)	Specify whether a motion management ladder logic program[1] is to be generated automatically.
Program Status/ Control (Motion Work Registers)	The MSEE instruction is used to start a motion program from a motion management ladder logic program. Define the registers to be used with the MSEE instruction. Two words per task are required for work registers, and either M or D integer registers can be specified. With this version, the registers must start with the D register D00000, i.e., the setting cannot be changed. The upper limit of the D register will depend on the number of tasks.
Axis Definition	Allocate a logical axis name, within eight characters, to the physical axis numbers[2] for the number of control axes. The axis definitions cannot be set if the number of control axes is set to 0.
Axis Input Signal	Allocate group input signals to I or M registers. The default settings are recommended.
Alarm Out (Alarm Output Register)	Define the leading register number for outputting alarms. M, I, or O integer registers can be specified. The number of continuous alarm registers will be stored 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 — Task 1 alarm register MW00011 — Task 2 alarm register MW00012 — Task 3 alarm register MW00013 — Task 4 alarm register

5

1 Motion management ladder logic program

A motion management ladder logic program is a standard ladder logic program for executing group input, override, and axis input functions. If this standard ladder logic program is not required, save the group definition with automatic generation disabled.

2 Physical axis number

A physical axis number consists of an integer and a decimal. The integer is the Servo Module number. With the MP900-series, it is always 01. The figure to the right of the decimal point is the axis number. Values from 01 to 15 are displayed.

Display/Setting Item	Details
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 control axes. For example, if ML00020 is defined as the leading current position register and there are three control axes, then three double-length words (from ML00020 to ML00024) will be used in order from axis 01.
	── ML00020 ── Axis 1 current position ── ML00022 ── Axis 2 current position ── ML00024 ── Axis 3 current position
Restart	Sets whether or not to restart from the ABORT status. Consult with your Yaskawa representative before using this feature, for which restrictions exist.

INFO 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 logic program.

5

5.2.5 Saving Group Definitions

The procedure to save the group definitions is given below.

1. Select *File (F)* and then *Save (S)* 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.

```
AUTO EDIT
  Method of calling          [    OK    ]
    ⦿ Direct   ○ Indirect    [  Cancel  ]
```
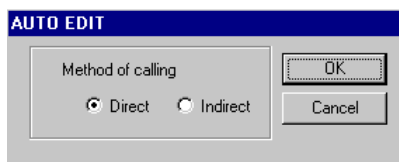
4. Click the **OK** Button in the message box.

INFO 1 The Auto Edit Dialog Box is displayed only when the group is defined with PGM Automatic Generation enabled when Create Ladder Dwgs. is set to ON in the Group Definition Window.

2 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 trans-

fer the group definition data.

5.2.6 Deleting Group Definitions

The procedure to delete group definitions is given below.

1. Select *File (F)* and then *Delete (D)* from the Group Definition Menu.

2. Click the **Yes** Button in the Group Definition Message Box.

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

5.2.7 Closing Group Definitions

Defining a group is completed by closing the Group Definition Window.

To exit group definitions, close the Group Definition Window by clicking the ⊠ Button in the window or by selecting *File(F)* and then *Close (C)*.

5

5.3 Creating Motion Programs

This section explains the basics of motion programming, from editing to compiling and saving files.

5.3.1 Outline of Creating Motion Program

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.

The flow of operations in developing a motion program is as follows:
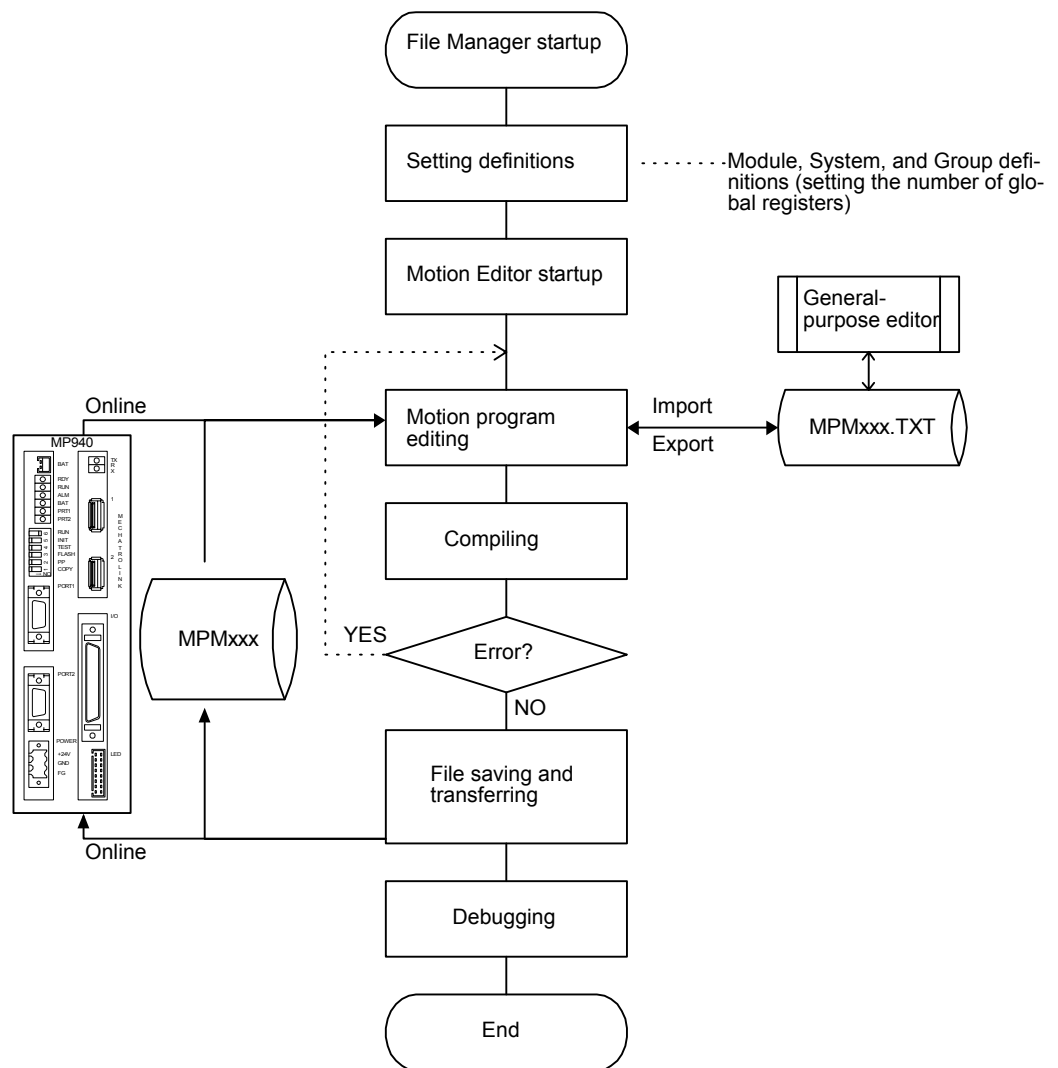
Fig 5.1 Motion Program Development Flow

5.3.2 Setting the Number of Global Registers

Defining global registers can reduce the need for communications, but it requires managing the global registered used in ladder logic programs and motion programs.

There are limits on the global 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.

An example of an M register map is shown below. O registers depending on the I/O registers allocated in the Module Configuration Definitions Window.
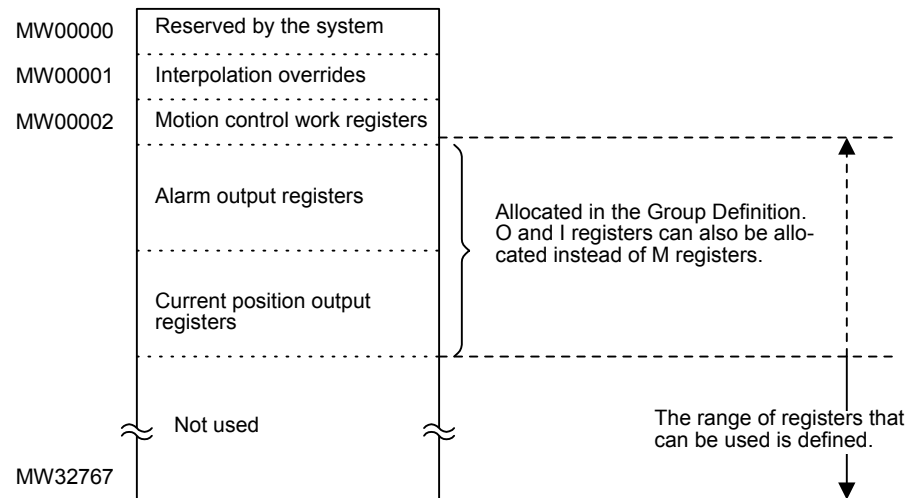
Fig 5.2 M Register Map

■ Opening the Register Write Enable Setting Window

Use the following procedure to open the Resister Writing Permission Window.

1. Double-click the Motion Folder under the Program Folder in the File Manager Window.
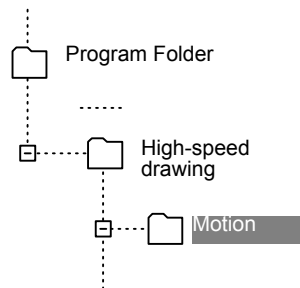
2. Point at the Motion Folder, click the right mouse button, and select *Open (O)* and then *Resister Writing Permission (R)* from the pop-up menu.

The Register Write Enable Setting Window will open.

```
┌─────────────────────────────────────────────────────────┬───┐
│ Setup of register writing permission                     │ × │
├─────────────────────────────────────────────────────────┴───┤
│                                                               │
│   Setup of the range of the register which permits writing in │
│   the motion program.                                         │
│                                                               │
│     M registers  :  MW [          ]  to  [          ] (DEC)   │
│                                                               │
│     O registers  :  OW [          ]  to  [          ] (HEX)   │
│                                                               │
│   User permissions :              [        ]                  │
│                                                               │
│                                                               │
│         [   Set   ]     [  Reset  ]     [  Close  ]           │
│                                                               │
└───────────────────────────────────────────────────────────────┘
```

⊙ INFO ▶   The Resister Writing Permission Window can also be opened by selecting *File (F), Open (O),* and then *Resister Writing Permission (R)* from the menu.

■ Setting Register Write Enable Setting Properties

M and O Registers

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 highest register number. The highest register number depends on the model.

User Permissions

Set the user permissions required to set the enabled ranges. Any user with permissions lower than the value set here will not be able to set values.

Setting Parameters

Click the **Set** Button to enable the set values.

> INFO ⟩ 1 When the Engineering Manager is opened, all values are for display only, i.e., they cannot be changed.
>
> 2 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.
>
> 3 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.
>
> 4 O registers OWC000 to OWCFFF are reserved by the system and are not checked for write enable ranges.

5.3.3 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.

■ Opening the Motion Properties Window

With the Motion Editor open, select *File (F)* and then *Motion Properties (R)*.
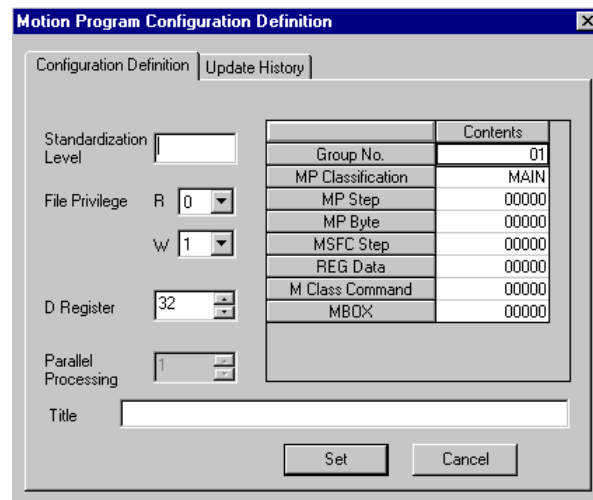
Fig 5.3 Motion Properties Window

■ Tab Pages

The Motion Program Configuration Definition Window contains two tabs: Configuration Definition and Update History.

Tab Page	Details
Configuration Definition	Sets the program attributes. Normally, the default values should be used.
Update History	Records the motion program update history.

■ Configuration Definition Tab Page

The items on the Configuration Definition Tab Page are explained below.

Setting Item	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 drawing/function 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 *2.1.5 User Management*
D Registers	When using D registers in the drawing/function 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 DB000009F
Parallel Processing	Set the maximum number of parallel processes to be specified by the PFORK command. • MP930: 4 (maximum number of parallel processes) • MP920: 8 (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

■ 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.

5
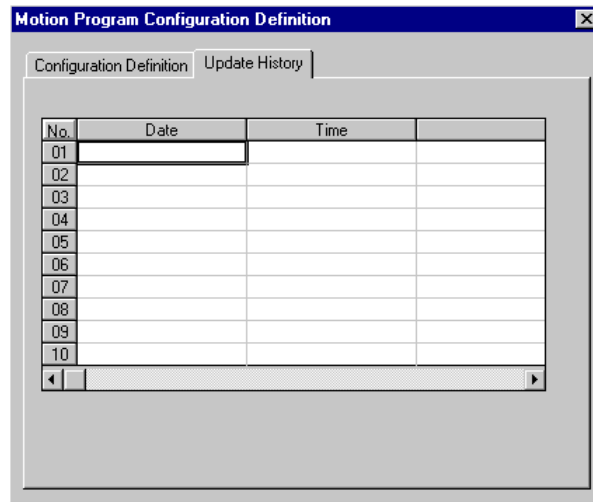
5.3.4 Opening the Motion Editor

The Motion Editor is a programming tool that is required in inputting and editing original motion programs. It provides functions such as text editing, compiling, debugging, and monitoring.

Opening from the File Manager

There are three ways to open the Motion Editor.

1. Double-click the Motion Program Folder in the File Manager.

2. Select *File (F)* and then *Motion Editor (E)* from the File Manager Menu.

3. Alternatively, select an item and then right-click to display the pop-up menu. Then select *Open (O)*.
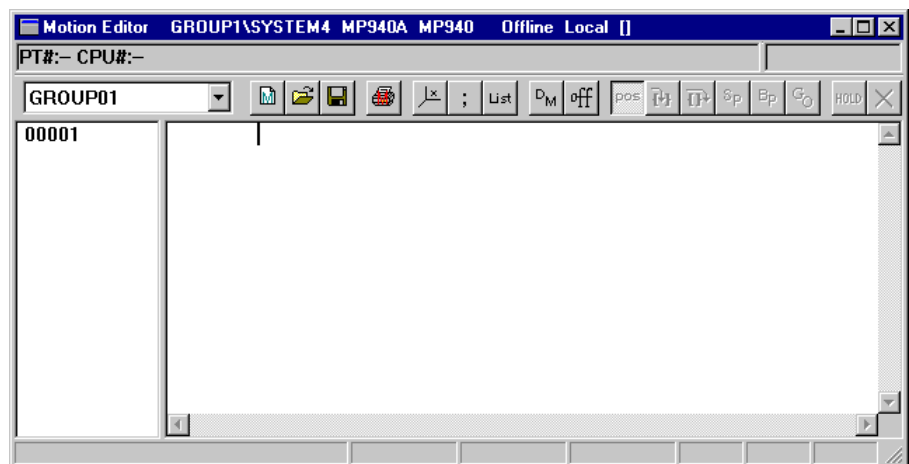
A new motion program can be created by selecting either of the following menu items while a motion-related file or folder is selected in the above figure.

- Select *File (F)* and then *Make New Program (N)*.
- Select *File (F)*, *Open (O)*, and then *Motion Editor (E)*.

Opening from the Engineering Manager

From the Engineering Manager Window, select *File (F)*, *Open (O)*, *Motion Program (M)*, and then *Motion Editor (E)*.

■ Motion Editor Window Configuration

The Motion Editor is displayed as one of the child windows in the Engineering Manager Window. Other function windows besides the Motion Editor are also displayed in the Engineering Manager Window. When the Motion Editor is active, the menu bar of the Engineering Manager changes to reflect that.

```
┌─────────────────────────────────────────────────────────┐
│ Engineering  Manager                                      │
├─────────────────────────────────────────────────────────┤
│       Menu bar (function menu)                            │
├─────────────────────────────────────────────────────────┤
│       Tool bar (Tool icons)                               │
│  ┌─────────────────────────────────────────────────────┐ │
│  │ Motion Editor                                        │ │
│  ├─────────────────────────────────────────────────────┤ │
│  │  PT# :     CPU#                                      │ │
│  │  ┌────────────┬──┐ ┌───────────┐ ┌─────────────────┐ │ │
│  │  │ Group name │▼ │ │ Tool icons│ │ Debug tool icons│ │ │
│  │  └────────────┴──┘ └───────────┘ └─────────────────┘ │ │
│  │  ┌──────────────┬──────────────────────────────────┐ │ │
│  │  │              │                                   │ │ │
│  │  │ Line numbers │        Program edit area          │ │ │
│  │  │              │                                   │ │ │
│  │  └──────────────┴──────────────────────────────────┘ │ │
│  └─────────────────────────────────────────────────────┘ │
├─────────────────────────────────────────────────────────┤
│  Function bar (Debug function keys)          │   │   │   │
├─────────────────────────────────────────────────────────┤
│                Status bar                                 │
└─────────────────────────────────────────────────────────┘
```
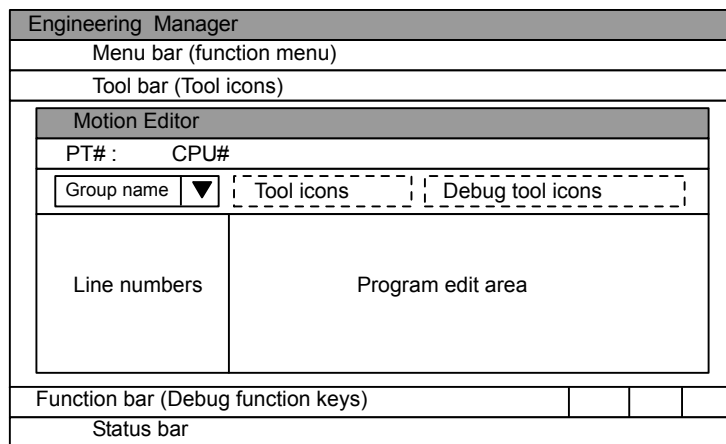
Table 5.1 Motion Editor Window Configuration

Configuration	Details
Group Name	Indicates the name of the group in which the motion program is located.
Menu Bar	The menu bar which is enabled by the Motion Editor.
Tool Icons	Often used commands are available through these icons.
Line Numbers	Line 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 that are allocated debugging functions. For details, refer to *5.5 Debugging Motion Programs*.
Debug Function Keys	

5

5.3.5 Motion Editor Window Menus

The following table shows the functions of the menu commands when the Motion Editor is active.

Menu Command				Function
File (F)				
	File Manager (F)			Opens the File Manager.
	Open (O)			
		Definition (D)		
			Module Configuration (M)	Display the various definition windows.
			System Configuration (S)	
			Scan Time Setting (T)	
			Application Info. (I)	
			Data Trace (D)	
			Fault Monitor (F)	
			Group Definition (G)	
			Motion Parameter (P)	
		Drawing (R)		
			Open New DWG (O)	Ladder programming tools
			Properties (R)	
			Main Program (L)	
			SFC Flow Chart (S)	
			SFC Time Chart (T)	
			SFC Action Box (B)	
			Constant Table (# Reg) (H)	
			Constant Table (M Reg) (M)	
			I/O Convert Table (C)	
			Interlock Table (I)	
			Part Composition Table (A)	
			Tuning Panel (P)	

Menu Command			Function
	Tool (T)		
		Register List (C)	Displays Machine Controller registers.
		Cross Reference (X)	Detects the using registers.
		Disable Coil List (D)	Detects the coils being disable.
		Comment List (C)	Comment making tool
		Register Replace (S)	Register No. detection/replacement tool
	C Register (C)		
		C Register Map (M)	C register management tool
	Table Data Definition (G)		
		Table Data Map (L)	Table data management tool
	Tab		
		Tab list	-
	Motion Program (M)		
		Open New File (N)	Opens a new program.
		Open (O)	Opens an existing program.
		Position Monitor (P)	Displays the position monitor.
		Task Monitor (T)	Displays the task monitor.
		Motion Alarm (A)	Displays the alarm information.
	Close (C)		Closes the Motion Editor.
	Motion Properties (R)		Defines the motion properties.
	Regist User Menu (U)		Registers a shortcut button for the Motion Editor.
	Save (S)		Saves the program.
	Save As (A)		Saves the program with a new name.
	Delete (D)		Deletes the program.
	Import (I)		Converts a text file to a motion program file.
	Export (E)		Converts a program file to a text file.
	Print (P)		Prints data.
	Exit (X)		Exits the Engineering Manager.
Edit (E)			
	Undo		Cancels the last operation.
	Cut (T)		Standard text editing commands
	Copy (C)		
	Paste (P)		
	Find (S)		Finds a text string.
	Replace (R)		Replaces one text string with another.
	Go To (J)		Jumps to a specified row number.
	Head (U)		Jumps to first row.
	Last (E)		Jumps to last row.
	Semicolon (I)		Adds a semicolon at the last column of a program line.
	Position Teaching (P)		Takes the current position as a command operand.

5

Menu Command		Function
View (<u>V</u>)		
	Font (<u>F</u>)	Changes the font.
	Tool Bar (<u>T</u>)	Displays or hides the Tool Bar.
	Status Bar (<u>S</u>)	Displays or hides the Status Bar.
	Function Bar (<u>B</u>)	Displays or hides the Function Bar.
	Debug Operation Function Bar (D)	Allocates function keys for debug operation.
	Position Teaching Function Bar (P)	Allocates function keys for teaching positions.
	Error List (<u>L</u>)	Refreshes the error list display.
	Monitor Parallel No. (<u>M</u>)	Refer to *5.5 Debugging Motion Programs*.
	Monitor Regeneration (<u>V</u>)	
Debug (<u>T</u>)		
	Debug (<u>D</u>)	Refer to *5.5 Debugging Motion Programs*.
	Hold (<u>H</u>)	
	Abort (<u>C</u>)	
	Multi Step Run (<u>G</u>)	
	Start Point (<u>P</u>)	
	Break Point (<u>B</u>)	
	Step Run (<u>S</u>)	
	Step In (<u>I</u>)	
	Code Generation (<u>L</u>)	
	Current Value Update (<u>N</u>)	
	Debug OFF (<u>X</u>)	
Window (<u>W</u>)		
	Cascade (<u>C</u>)	Stacks windows in the display.
	Tile (<u>T</u>)	Lines up windows in the display.
	Arrange Icons (<u>A</u>)	Lines up icons.
Help (<u>H</u>)		
	About Application (<u>A</u>)	Displays version information for the CP-717.

5.3.6 Motion Editor Editing Functions

This section explains the menu bar and the commands that are commonly used.

■ Searching for a Character String

The following procedure can be used to search for a specified character string in a program that is being edited.

1. Select *Edit (E)* and then *Find (S)* 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 bell will sound. Either enter a different character string to be searched for and execute the search again, or click the **Cancel** Button close the Find Window.

■ Replacing a Character String

The following procedure can be used to replace one specified character string with another in a program that is being edited.

1. Select *Edit (E)* and then *Replace (R)* 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 close the Find Window.

  b) If no matching character string is found, a bell will sound. Either enter a different character string to be searched for and execute the search again, or click the **Cancel** Button close the Find Window.

■ Jumping to a Specified Line

Use the following procedure to move the cursor to a specified line number in the program.

1. Select *Edit (E)* and then *Jump (J)*. A window will be displayed for the jump destination.

2. Input the line number (Row No.) and then click the *Execution (S)* Button.
To cancel the jump operation, click the **Cancel** Button to close the window.

■ Jumping to the Beginning of the Program

Select *Edit (E)* and then *Head (U)* to move the cursor to the first line of the program.

■ Jumping to the End of the Program

Select *Edit (E)* and then *Last (E)* to move the cursor to the last line of the program.

■ Adding a Semicolon

The semicolon function can be enabled or disabled by selecting *Edit (E)* and then *Semicolon*

(I).

With this function enabled, a semicolon is added in the last column of a program line when the Enter Key is pressed. The motion language specifications require a semicolon in the last column of every program line, so the purpose of this function is to lighten the program input load.

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 will also stay in pressed state.

To disable the semicolon function, remove the check mark by again selecting ***Edit (E)*** and then ***Semicolon (I)*** (or click the Semicolon Tool Icon).

■ Teaching Positions

The procedures described here take the current coordinate values for the axes controlled by the MP940 as the coordinate value operand for a movement command.

Opening the Position Monitor Window

The Position Monitor Window is opened to display the current coordinate values.

Select ***File (F)***, ***Open (O)***, ***Motion Program (M)***, and then ***Position Monitor (P)*** from the Engineering Manager Menu. The Position Monitor Window is shown below.
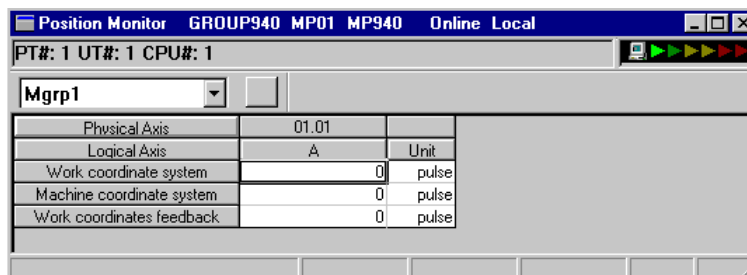
Setting the Teaching Axes

There are two procedures that can be used to set the teaching axis:

- From the Position Monitor Window
- Using the teaching function keys.

1. Setting from the Position Monitor Window.

   a) Select ***File (F)***, ***Edit (E)***, and then ***Position Teaching (P)***. The Position Teaching Window will open.

   Alternatively, click the Teaching Button in the Motion Editor Window.

Teaching Button

The logical axis names and check boxes defined in the Group Definitions are displayed as shown below.
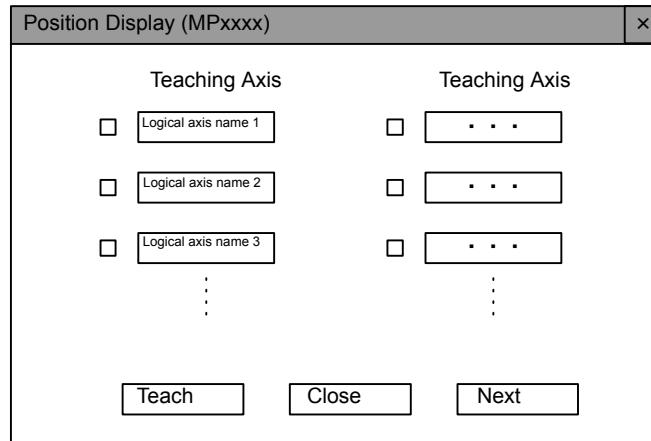
Fig 5.4 Position Teaching Window

b) Set the axes to be taught.

There are two ways to set the axes to be taught. Use these are required.

• Using the Teach 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.

2. Setting with Teaching Function Keys

Axis value can be taught directly from the function keys without opening the Position Display Window.

Select *View (V), Position Teaching Toolbar (P)* from the Engineering Manager Window menus.

5

The function keys will be displayed along with the logical axis names.

5
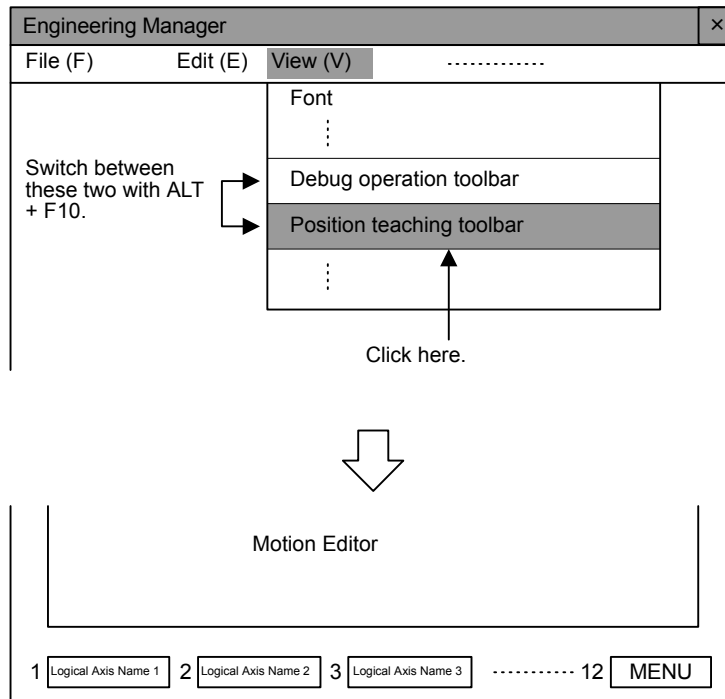
◉ INFO ► ■ Function Keys

1 Eight logical axis names defined in the Group Definitions are allocated to the function keys from the left (F1 to F8).

2 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.

3 The MENU Key is F10 on non-DOS computers.

4 Shortcut Keys

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.

5 When switching between more than one Motion Editor Window, the function keys will be reset to axes 1 to 8.

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 **Teach** 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 value constants can be obtained in the same way for other commands that have axis information operands.

When the Position Monitor and Position Teaching Windows are no longer required, close each of them by clicking on the ☒ Button in the upper right corner.

■ Specifying Fonts

The font used in the Motion Editor Window can be set.

When *View (V)* and then *Font (F)* are selected in the Motion Editor Window, the Font Specification Window will be displayed. Specify the font to be used, the font style, and the size, and then click the **OK** Button.

■ Error List

The compiling error list can be redisplayed when required.

Select *View (V)* and then *Error List (L)* to display the Error List Window displayed when compiling.

Alternatively, click the List tool icon.

To close the window, click the **Close** Button.

5.3.7 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.
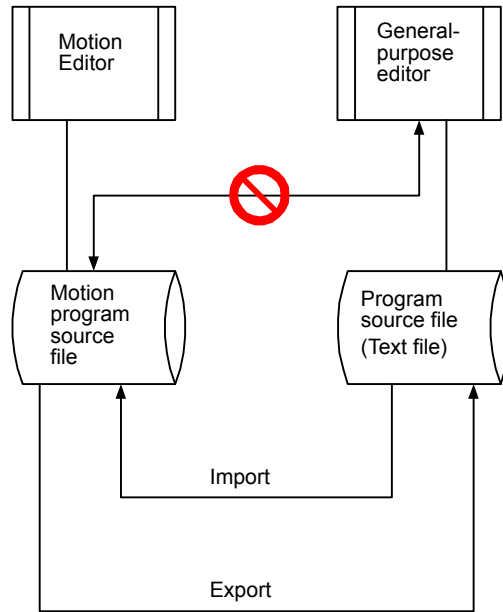
Fig 5.5 Import and Export Commands

■ Importing

The import function is used for bringing files created by a general-purpose editor into the Motion Editor. This function converts a text file into a motion program file.

Use the following procedure to import a file.

1. Select *File (F)* and then *Import (I)*.

   The window for opening the text file to be converted will be displayed.
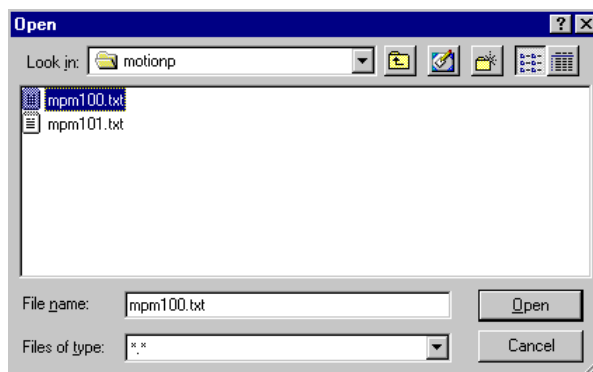
2. Search for the file by using *Look in* or other method.

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.

■ 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. Unless there are no errors, 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 (F)* and then *Export (E)*. A window will be displayed to specify where the text file is to be saved.
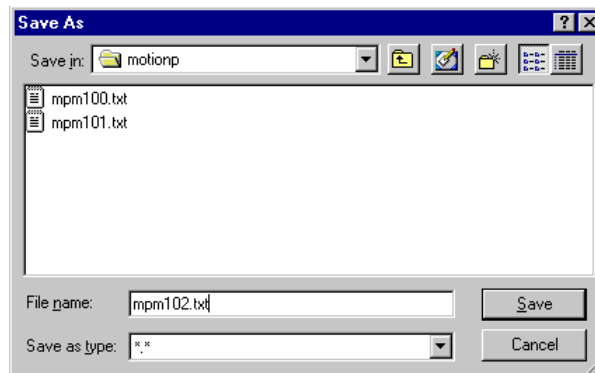
2. Select or input the name of the file and the destination folder, and click the **Save** Button. If a file by that name already exists, it will be overwritten when the new file is saved.

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

5.3.8 Closing the Motion Editor

To close the Motion Editor and return to the Engineering Manager, select *File (F)* and then *Close (C)*.

IMPORTANT

1 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, however, a warning message will be displayed. Confirm the safety of the system before proceeding.

```
┌─────────────────────────────────────┐
│ Engineering Bulider              [×] │
├─────────────────────────────────────┤
│  ⚠   The number of decimal places    │
│      will be changed. This could     │
│      change the amount of axis       │
│      movement. Caution is required.  │
│                                      │
│      Is it okay to save?             │
│                                      │
│   ┌──────────┐      ┌──────────┐     │
│   │ Yes (Y)  │      │  No (N)  │     │
│   └──────────┘      └──────────┘     │
└─────────────────────────────────────┘
```
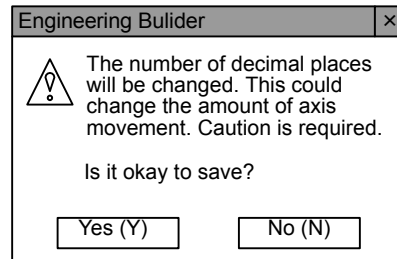
Fig 5.6 Warning Message for Save

2 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.

5

5.4 Compiling Motion Programs

This section explains the process involved in compiling a motion program.

5.4.1 Compile Execution

The program is compiled automatically when the file is saved.

Use the following procedure to execute the compile operation by saving the file.

1. With the motion program open, the program will be compiled when any of the following operations are performed.

   - Select *File (F)* and then *Save (S)*.
   - Select *File (F)* and then *Save As (A)*.
   - 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 the following illustration.

2. If an object to be saved during the compile operation already exists, the following window will be displayed to confirm the overwrite. To overwrite the existing object, click the **Yes** Button. To save the new object without overwriting the existing one, select *File (F)* and then *Save As (A)* and input a different name.

5

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 compress (M)* to compress the memory area. Memory compression is done 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 compress (M)* to compress the memory area. Memory compression is done from within the System Configuration Definition Window.	Source storage area overflow

Remedy

1 From the Motion Editor Window, open the System Configuration Definition Window by selecting *File (F)* and then *System definition (S)* from the menu.

2 Stop the CPU by selecting *Control (C)* and then *CPU STOP (S)* from the menu.

3 Compress memory by selecting *Control (C)* and then *MEM compress (M)* from the menu.

4 Start the CPU by selecting *Control (C)* and then *CPU RUN (R)* from the 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.

5.4.2 Compile Execution Steps

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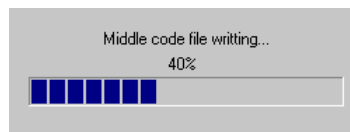
When the compile operation is completed, the Compile Execution Window will be closed.

5.4.3 Normal Completion of the Compile Operation

If the compile operation is completed normally, the file will be saved to the hard disk. Then, in Online Mode, the compiled file will be transferred to the Machine Controller.

The user will then be returned to the Motion Editor Window. If there is no need for editing, close the Motion Editor.

5.4.4 Error Completion of the Compile Operation

If an error occurs during the compile operation, the Error List Window will be displayed. Check the error contents, correct the program, and execute the compile operation again. Even after this window has been closed, it can be displayed again by using the Error List (L) command.
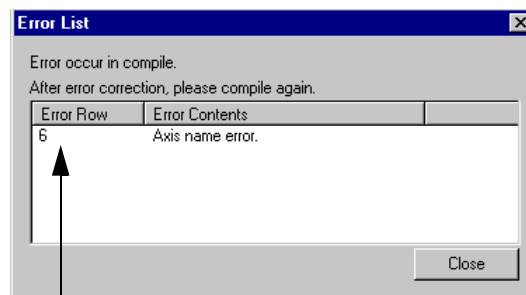
The cursor can be moved to the relevant place in the Motion Editor by double-clicking the line number displayed in the *Error Row* column.

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.

5.5 Debugging Motion Programs

This section describes the Debug Operation used to debug motion programs.

5.5.1 Outline

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.

```
Engineering Builder                    ⊠
  ⚠   Debug Mode not available.
       log on to controller.
              ┌──────────┐
              │    OK    │
              └──────────┘
```

5.5.2 Opening the Debug Window

5

The Debug Operation is provided as one of the functions of the Motion Editor. The Motion Editor Window and the Debug Operation 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.

```
                           Debug Menu
                              |
┌─────────────────────────────┼──────────────────────┐
│ Engineering  Manager        ↓                       │
├──────────────────────┬──────────┬──────────────────┤
│                      │ Debug  T │                  │
├──────────────────────┴──────────┴──────────────────┤
│                                                     │
│  ┌──────────────────────────────────────────────┐  │
│  │  Motion Editor                                 │  │
│  ├────────────────────────────────────────────── │  │
│  │  PT# :     CPU#                               │  │
│  │  ┌──────────────┬─┐   ┌──┬───┬──┬· · · ·┬─┬─┐ │  │
│  │  │              │▼│   │DM│Off│  │   ·   │ │ │ │  │
│  │  └──────────────┴─┘   └──┴───┴──┴───────┴─┴─┘ │  │
│  │                          Debug Tool Icons     │  │
│  │                                               │  │
│  │      Line          Motion program source data │  │
│  │      numbers                                  │  │
│  │                                               │  │
│  │                                               │  │
│  │                                               │  │
│  ├──────────────────────────────────┬──┬──┬──┐  │  │
│  │  Debug Function Keys              │  │  │  │  │  │
│  ├───────────────────────────────────┴──┴──┴──┤  │  │
│  │           Status Bar                        │  │  │
│  └─────────────────────────────────────────────┘  │
└─────────────────────────────────────────────────────┘
```
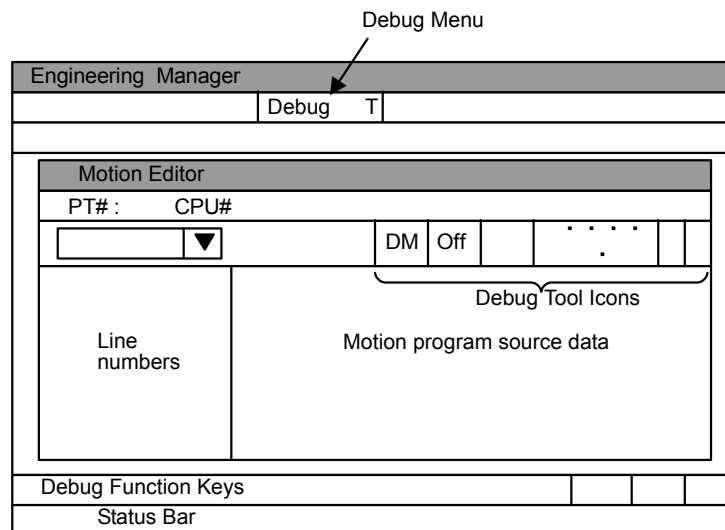
Debug Operation Window Configuration

Item	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.
Status Bar	Displays information on debug operations.
Debug Function Keys	Function Keys have been allocated for debug commands.

■ Debug Menu

The debug commands that are available on the menu bar can be selected from a pull-down menu.

Menu Command		Function
File (F)		Refer to *5.3 Creating Motion Programs*.
Edit (E)		
View (V)		
	Font (F)	Refer to *5.3 Creating Motion Programs*.
	Tool Bar (T)	
	Status Bar (S)	
	Error List (L)	
	Monitor Parallel No. (M)	Refer to *6.3 Motion Program Monitoring* for details.
	Monitor Regeneration (V)	
Debug (T)		
	Debug ON (D)	Enables the debug operations.
	Hold (H)	Holds the motion command that is currently being executed.
	Abort (C)	Aborts the debug operations.
	Multi Step Run (G)	Executes lines 1 to n.
	Start Point (P)	Specifies the first row for debugging.
	Break Point (B)	Specifies the last row for debugging.
	Step Run (S)	Executes debugging one step at a time.
	Step In (I)	Hands control to a subroutine.
	Code Generator (L)	Compiles and updates the object.
	Current Value Update (N)	Updates current coordinates.
	Debug OFF (X)	Disables debug operations.
Window (W)		Refer to other portions of this chapter.
Help (H)		

5

■ Debug Icons

Icons have been created for frequently used debug commands, and these commands can be executed by left-clicking the mouse button.
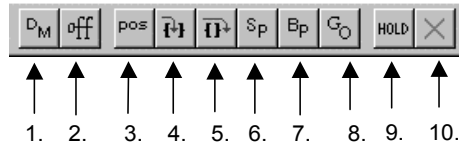
1. Debug ON
2. Debug OFF
3. Current Value Update
4. Step In
5. Step Run (Step Over)
6. Start Point
7. Break Point
8. Multi Step Run.
9. Hold ON/OFF.
10. Abort

■ Debug Function Keys

Debug commands are supported by Function Keys also.

■ Debug Status Bar

The debug status bar is displayed at the bottom of the Edit Window and shows the following debug statuses. More than one status may be displayed.

Status	Meaning
Debug Mode	Debug operations enabled
Running	Operating normally.
Hold	Movement commands remain in hold.
Abort	Resetting debug operations.

Status	Meaning
Alarm	An operation error has occurred.
Break	Held at the breakpoint.

5.5.3 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.

■ 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 to enable the tool icons related to debug operations.
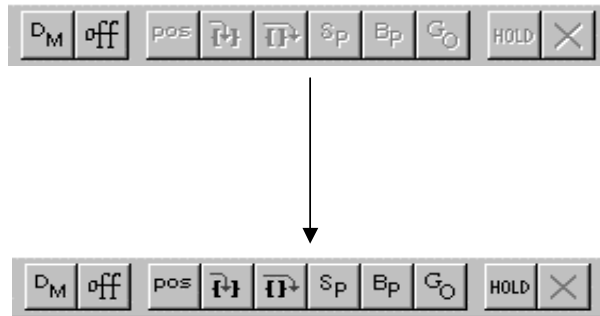
"Debug Mode" will be displayed on the status bar.

2. The Debug OFF command will disable debug operations, and the display will return to the previous screen.

(INFO)

1 Use the Debug ON command when program operation has been stopped.

2 The Debug ON command is valid for one main program only. It cannot be set for multiple main programs simultaneously.

3 If the CP-717 system 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. If an error occurs, execute the Debug OFF command and then the Debug ON command.

■ Debug Window Configuration

The following window will be displayed during debug operations. Start points and breakpoints will appear after the line numbers in the line number display section. The entire line that is currently being debugged will be displayed in reversed color as an operation cursor.

The user can confirm which line is being executed by following the operation cursor.

```
Start point              Operation cursor
   │                          │
   │                          ▼
. . .          . . .
00005  ⇒       mvs    [a1]100 [b1]100;
00006          msee   mps100;
00007  ○       fmx    t30000;
. . .          . . .
       ▲
       │
   Break point
```
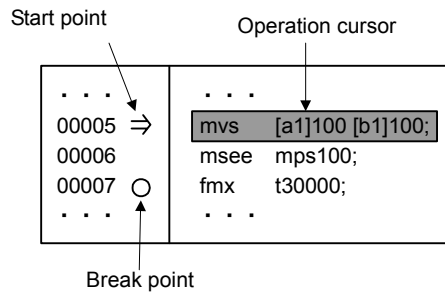
Setting Start Points

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 line for debugging and click the **SP** Button. The start point symbol will appear at the end of the line number. To release the start point ($\Rightarrow$), repeat the step to set the start point on the same line.

The following example shows the editing cursor at line 00005.

```
00005          mvs    [a1]100 [b1]100;
```
⇩
```
00005  ⇒       mvs    [a1]100 [b1]100;
```
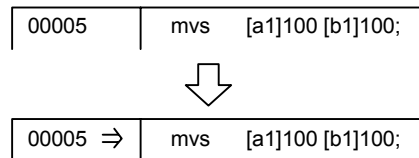
During step execution, the ($\Rightarrow$) symbol may not appear for commands with short execution times, because the start point is set and the command executed at the same time.

Setting Break Points

A breakpoint ($\circ$) will remain at the same position once it is set until it is cleared. Select the line where the debugging is to be stopped, and click the **BP** Button. The breakpoint symbol ($\circ$) will appear at the end of the designated line number.

Break points can be cleared by the following four methods:

- Set a different breakpoint.
- Click the **BP** Button again in the line where a breakpoint is currently set.
- Abort the debug operations.
- Disable the debug operations.

Operation Cursor

The operation cursor displayed in reversed color 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 line currently being displayed in the Motion Editor Window.

The operation cursor will turn back into the edit cursor when the operation is stopped. The

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operation cursor will be displayed during normal operation if a program opened using the Motion Editor is being executed.

■ Step Run

Step Run can be used to debug the program one line 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.

Step Over

Debugging is executed one line 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.

An example of execution of the Step Over command is shown below.

1. Set the cursor in the line for which the Step Run command is to be executed.

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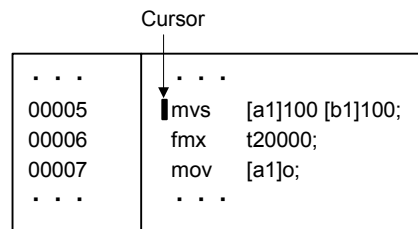
2. The execution of a command can be confirmed by the operation cursor during execution. The operation cursor may not be visible, however, for command executions that are completed quickly.

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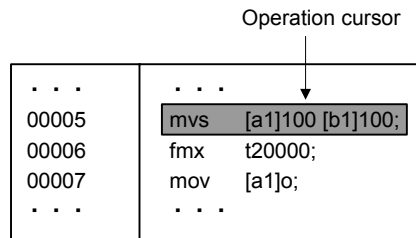
3. A breakpoint and the cursor are automatically set when one line has been debugged.

Breakpoint

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

Cursor
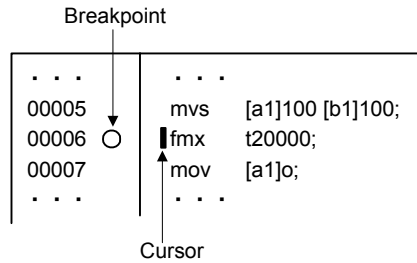
Step In

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 opened and control transferred. Other debug commands can be used in the subroutine, just as for main programs.

If the RET command is executed during the subroutine, the Motion Editor Window for that subroutine will be closed, and the program will return to the next command after the MSEE command. Up to 8 levels of subroutines can be nested within a subroutine.

An example of execution of the Step In command is shown below.

1. The first line has been set in the MSEE command. The MPS101 subroutine is about to be executed.

Cursor

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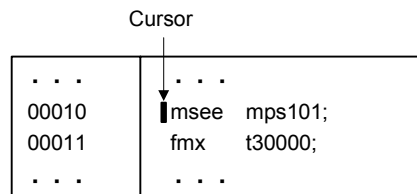
2. When the Step In command is executed the subroutine is opened, and the debug environment is prepared and progress is shown in a progress bar.

100%
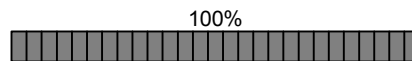
3. The Motion Editor Window for the subroutine is opened, and the cursor set to the first line. Both Step In and Step Over commands can be used.

Cursor

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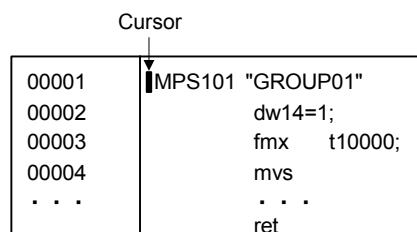
4. When the subroutine RET command is executed, the subroutine window is closed and the display returns to the main program.

```
                 Cursor
         ┌──────────┬─────────────────────┐
         │  . . .   │   . . .             │
         │  00010   │  ↓msee   mps101;    │
         │  00011 ○ │  ▌fmx    t30000;    │
         │  . . .   │   . . .             │
         └──────────┴─────────────────────┘
```
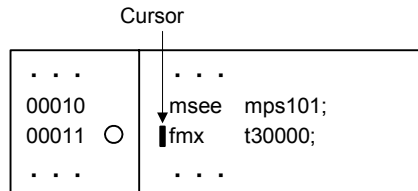
■ Multi Step Run

One or more lines of commands for which the start point and breakpoint have been set will be executed. 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.

When a Breakpoint is Passed

In the following example, the start point has been set on line 2 and the breakpoint on line 7.

```
          Start point
         ┌───────┬────────────────────────┐
         │       │ MPS101 "GROUP01"       │
         │ 00001 │          abs;          │
         │ 00002 �’│         mov    [a1]100;│
         │ 00003 │          . . .         │
         │ . . . │          . . .         │
         │ 00007 ○│         fmx    +20000; │
         └───────┴────────────────────────┘
          Break point
```
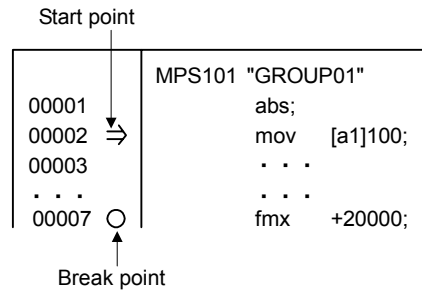
When the Multi Step Run command has been executed, debugging is executed for lines 2 through 6, and stops at the breakpoint in line 7.

```
              Cursor
         ┌───────┬────────────────────────┐
         │       │ MPS101 "GROUP01"       │
         │ 00001 │          abs;          │
         │ 00002 │          mov    [a1]100;│
         │ 00003 │          . . .         │
         │ . . . │          . . .         │
         │ 00007 ○│▌        fmx    +20000; │
         └───────┴────────────────────────┘
          Break point
```
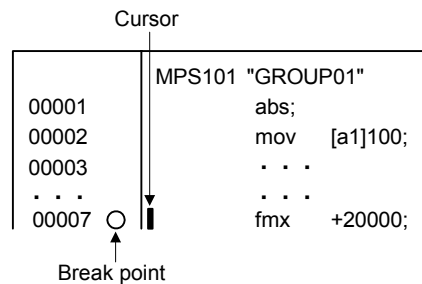
The operation cursor may not be visible for some commands. Refer to *6.3 Motion Program Monitoring* for information on commands for which the operation cursor is displayed.

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.

In the following example, the breakpoint is set at an earlier line. As a result, the Step Over command will be executed until the END command where it will stop.

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;   │
│ · · ·       │   · · ·           │
└─────────────┴───────────────────┘
                  Cursor
     Start point
```
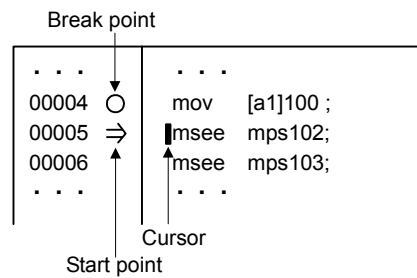
2. The debug operations enter the subroutine. If the Multi Step Run command is executed with the settings shown in the diagram, the RET command will be executed, and control will return to the main program.

```
         Start point
              ↓
┌─────────────┬───────────────────┐
│ 00001  ↓    │  MPS120 · · ·      │
│ 00002  ⇒    │  ▌mov    [b1]200;  │
│ 00003  ○    │  ↑fim    t100;     │
│ · · ·       │   · · ·           │
│             │  │ret;            │
└─────────────┴───────────────────┘
     ↑               Cursor
  Break point
```
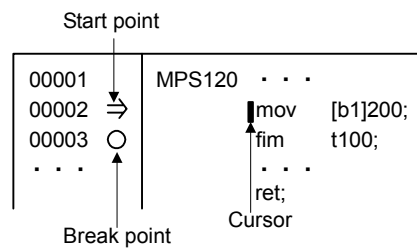
3. Once back at the main program, the process will step at the next command.

```
              Cursor
                │
┌─────────────┬───────────────────┐
│ · · ·       │   · · ·           │
│ 00004       │   mov    [a1]100 ; │
│ 00005       │  ↓msee   mps102;   │
│ 00006       │  ▌ msee  mps103;   │
│ · · ·       │   · · ·           │
└─────────────┴───────────────────┘
```
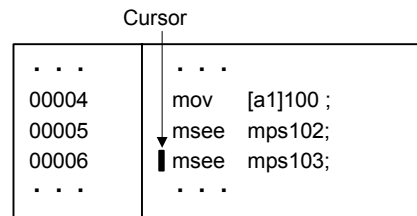
■ Hold ON/OFF

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 movement commands, however, and is ignored when executed for other commands.

The timing charts for the following commands is outlined in the following table.

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.
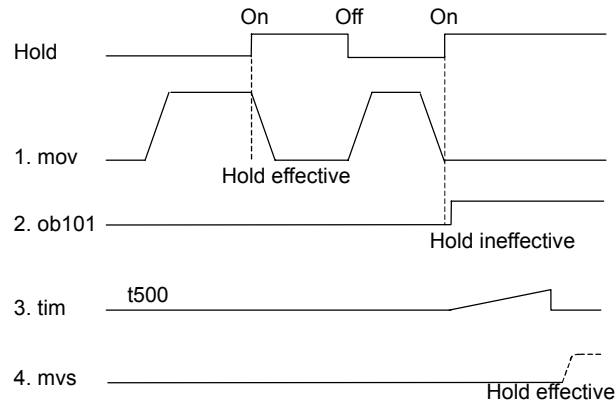
■ Abort

The Abort command aborts the execution of the debug operations. Debugging cannot be resumed once this command has been executed.

Operation Flow after Abort

The operation flow 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 edit cursor will point to the first line. 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 to not only check the debug operations, but to also save any subroutines that have been edited during the debug operations to the Motion Controller.

   Refer to *Editing during Debug Operations* later in this chapter.

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.

Cursor

```
00001     │MPM001 "GROUP01"
  .              .
  .              .
  .              .
  .              .
00010             msee   mps101;
```

■ Current Value Update

The Current Value Update command is used to correct distortions to current values from axis movement by the motion program when axes are jogged or otherwise moved by the ladder logic program during the debug operations.

IMPORTANT   Be sure to execute this command when axes have been moved through manual intervention during the debug operations.

■ 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).

Editing 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.

◀**EXAMPLE**▶ 1 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
```
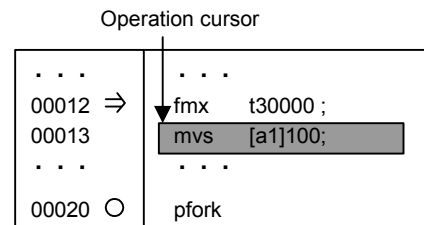
2 The following program can be edited. The debug operations are stopped, and the edit cursor will go to the front of the PFORK command.

Cursor

```
 . . .        . . .
00012        fmx    t30000 ;
00013        mvs    [a1]100;
 . . .        . . .
00020  ○    ↓ pfork
```

5
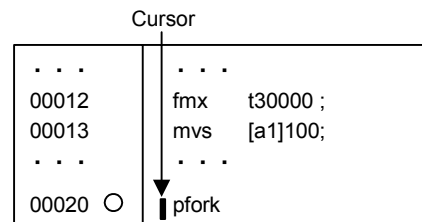
3 In the following program, the MPS101 subroutine, which has been called from the MPM001 main program using the Step In command, is active. In addition, the MPM002 program, which is unrelated to the debug operations, is open.
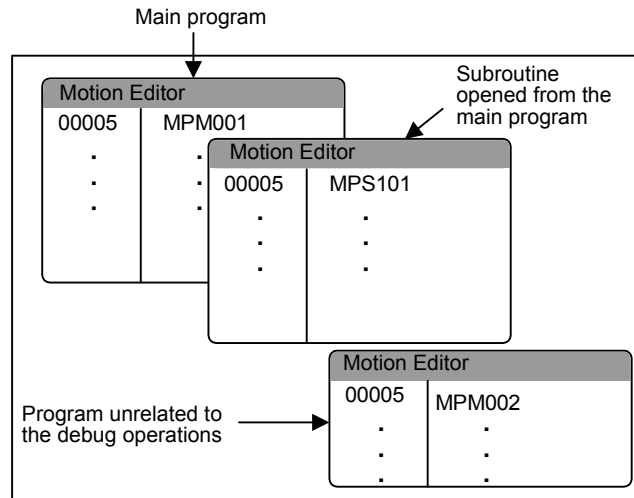
In this example, MPM002, which is unrelated to the active window MPS101, can be edited, but MPM001 cannot be edited because it is still in the debug operations. MPM002 cannot be saved.

■ Editing

Editing and Temporary Registration

The edit operation is based on the Motion Editor edit functions. Press the SHIFT + Enter Keys or selecting **Debug (_T_)** and then **Code Generator (_L_)** to temporarily store altered data on the Machine Controller. To register the data permanently, select **File (_F_)** and then **Save (_S_)**. Refer to the next section *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 save step is omitted and editing executed, the steps for temporarily saving the data will be executed automatically. The compilation will be executed first and, if no errors occur, the temporary save step will be executed. The execution is disabled if an error occurs during compilation.

An example of the editing operation is shown below.

  1. Set the edit cursor at line 6 to insert an allocation statement.

5
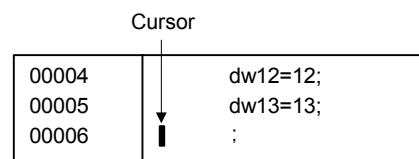
2. Input the substitute text dw14=14.

Cursor

00004	dw12=12;
00005	dw13=13;
00006	dw14=14;
00007	;
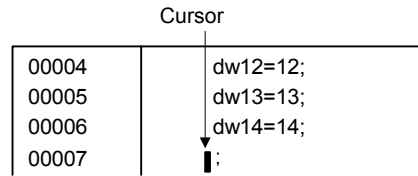
3. Press the Shift + Enter Keys or select *Debug (T)* and then *Code Generator (L)* to compile the amended text. The execution can be recommenced if no errors occur.

30%
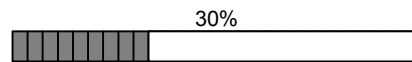
Handling Breakpoints

Breakpoints are set for line numbers. Breakpoints are not set for the command allocated to that line number. As a result, breakpoints will be with different commands when the program has been edited and line numbers have changed as a result.

Take note of the current breakpoint settings during editing.

An example of editing breakpoints is shown below.

1. Set the breakpoint at line 9.

Break point

00007	fmx	t20000;
00008	mvs	[a1]0 [b1]0;
00009 ○	mvs	[c1]o;
00010	;	

Cursor
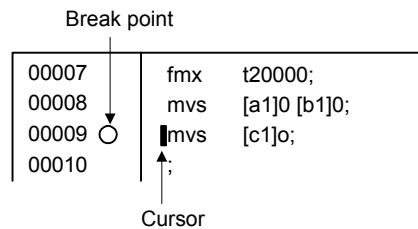
2. Edit the command at line 9. The breakpoint will remain with the same command in this example because the text is being overwritten.

Break point

00007	fmx	t20000;
00008	mvs	[a1]0 [b1]0;
00009 ○	mvs	[c1]200;
00010	;	

Cursor
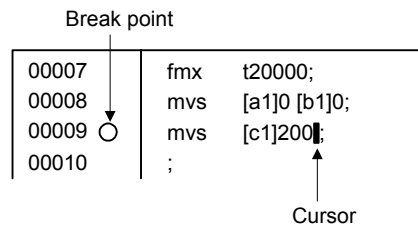
3. Two lines of commands have been added at line 9. The line numbers will move and, as a result, the breakpoint will be located at the TIM command.

Break point

```
00007        fmx      t20000;
00008        mvs      [a1]0 [b1]0;
00009  ○     tim      t100;
00010        mw100 = 100;
00011        mvs      [c1]200 ;
00012        ;
```

Cursor
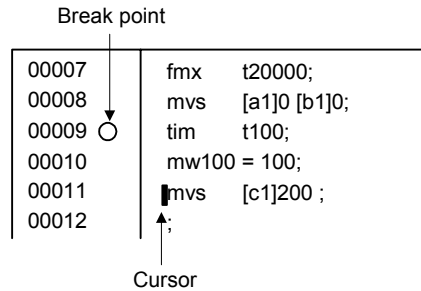
4. The TIM command has been deleted. The line numbers will move up one, and the breakpoint will be located with the substituted text.

Break point

```
00007        fmx      t20000;
00008        mvs      [a1]0 [b1]0;
00009  ○     mw100 = 100;
00010        mvs      [c1]200 ;
00011        ;
```

Cursor
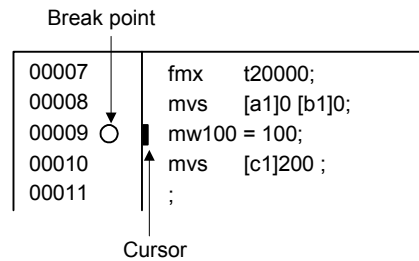
Updating Files

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.

Temporary Registration

Adjusted programs can be temporarily registered on the Machine Controller by pressing the Shift + Enter Keys, or by selecting *Debug (T)* and then *Code Generator (L)*. The original program on the Machine Controller will be overwritten only when the permanent registration command is executed.

Permanent Registration

Files registered on the hard disk and Machine Controller are updated with adjusted programs. The Motion Editor cannot be closed if permanent registration is not executed. Select *File (F)* and then *Save (S)* before closing the Motion Editor.

1. Execute permanent registration in the active Motion Editor Window.

2. A message saying that the program is being edited 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.

■ Restrictions during Debug Operations

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

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	Update Position (POS)	Enabled	Disabled
4	Step Run (1 step run)	Enabled	Disabled
5	Step In (In sub program)	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

Cursors and Breakpoints after Step Run

The edit cursor and breakpoint move to the next line after the Step Run command is executed. If there is a nonexecutable command for comments or labels on the next line, however, the cursor and breakpoint will stop at the next executable command that appears.

An example of edit cursor and breakpoint movement is shown below.

1. Set the cursor to line 5.

Break point

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

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 O |         fmx   t20000;
```
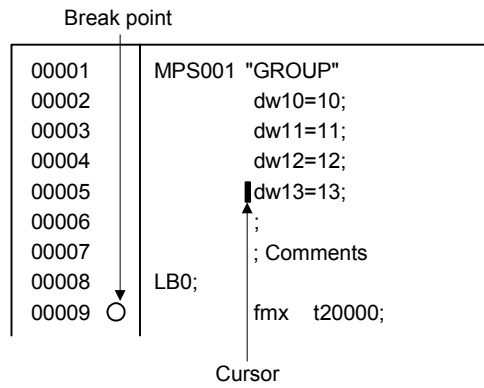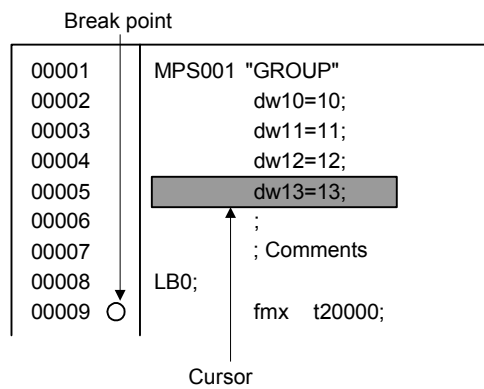
Cursor

3. The comment and label lines are passed, and the breakpoint and cursor are set to line 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 O |        |fmx   t20000;
```

Cursor
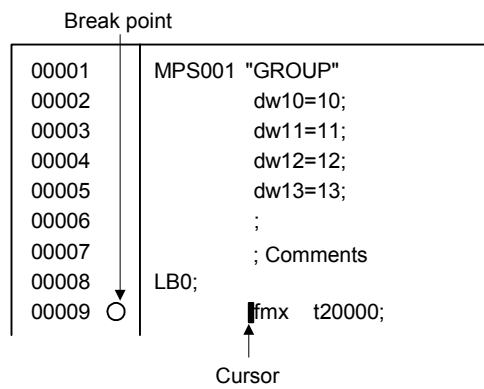
Commands that Cannot be Executed with Step Run

The Step Run command cannot be executed for some commands. An error message will be generated 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.

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 generated 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.
;line	;	No	No	
"Comment"; line	"Interpolation speed";	No	No	
Label line	Label;	No	No	

Executing from Command and Label lines

Step Run can be executed from lines with semi-colons (;) only and comment lines that start with quotation marks ("). In such cases, the next subsequent executable command is executed.

An example is shown below.

Set the cursor to a comment line.

Cursor

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

When step execution is performed, the executable commands after line 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

SNG Operation

The SNG command does not function in debug operations.

SNG commands are specified on lines 30 and 31, however these lines will be executed with Step Run.

5

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.;
```

Cursor

6 Monitoring Tools

This chapter explains the monitoring functions that check the Machine Controller's operating conditions.

6

6

6.1 Monitoring Tools

The Monitoring Tools support program debugging and confirmation of motion program execution conditions.

6.1.1 Outline of the Monitoring Tools

The Monitoring Tools display the contents of MP900-series 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.
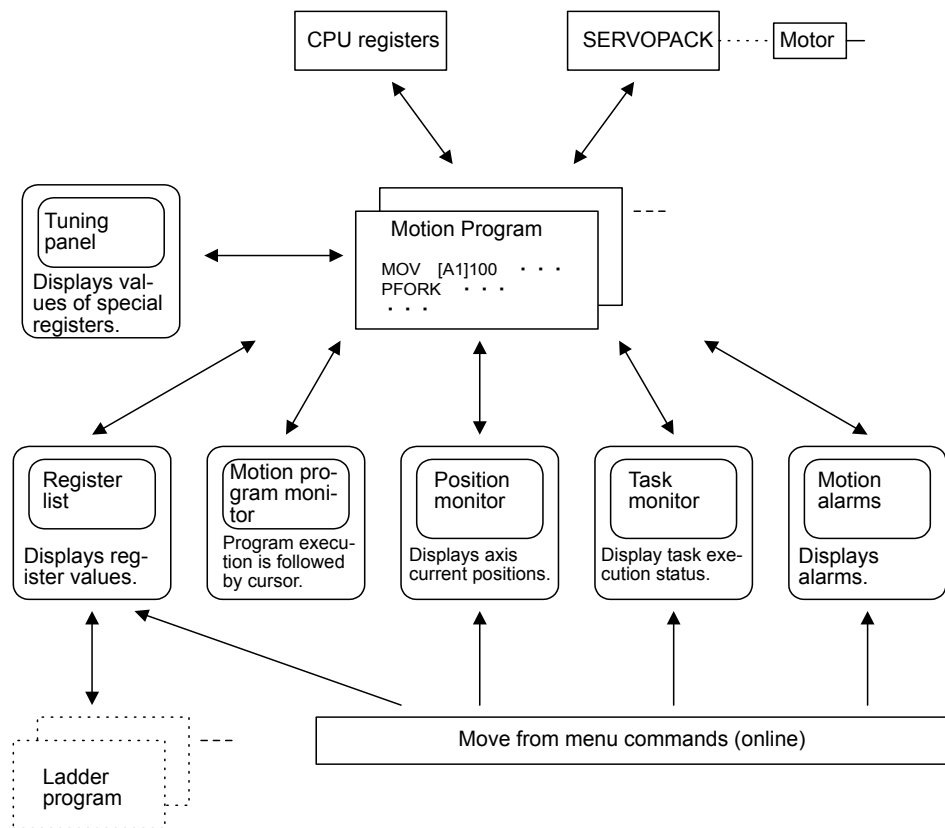
Refer to the following for details.

- Using the Ladder Programming Tool
- Motion Programming Monitor
- Position Monitor
- Task Monitor
- Motion Alarm

6.2 Using the Ladder Programming Tool

This section describes the Register List and Tuning Panel, which are often used as Motion Monitoring Tools from the Ladder Programming Tool.

6.2.1 Register Lists

The current values of the Machine Controller's internal registers, the S, I, O, M, D, and C registers, can be displayed in real time on a register list. These register values are not just for reference only, but can also be changed.

A separate Register List Window is opened for each set of register display parameters, so more than one window can be opened at the same time. When the *Open Register (O)* command is executed, a window to display the contents of the registers will be opened as a child window.
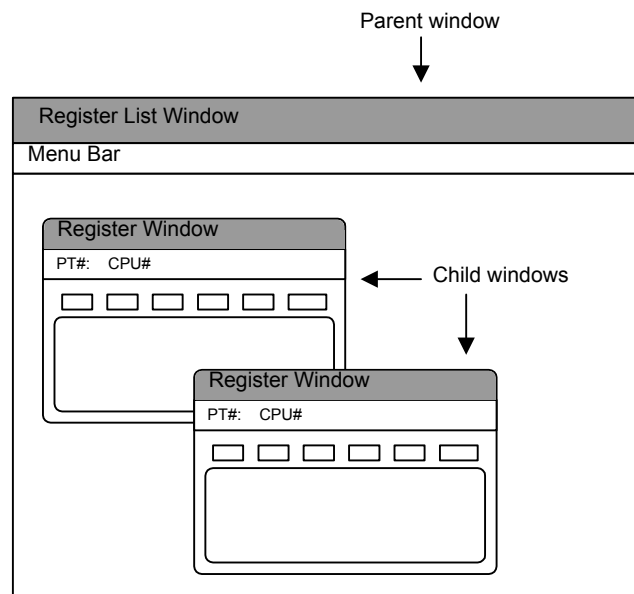
Refer to *7.2.7 # Register Lists* for register list operations.

6.2.2 Tuning Panel

The Tuning Panel is used to define comments for names, units, and other items for registers used in drawing and function programs. In Online Mode, the current values of defined registers are displayed and can be changed.

■ Tuning Panel Window

Definitions data is input on the Tuning Panel. Up to 100 definitions can be created.

No.	Data name	S	Definition	CV	Unit	Lower	Upper	REG-No.	DWG
		DWG				Input mode			

Refer to *7.6.2 Creating Tuning Panels* for Tuning Panel operations.

6

6.3 Motion Program Monitoring

This section how to follow motion program execution conditions one step at a time with an operation cursor.

6.3.1 Outline of Motion Program Monitoring

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 CP-717 connected to the Machine Controller in Online Mode is opened. If an open program is running, the currently executed program statement line will be displayed with an operation cursor.

For details on opening the window and menu configuration, refer to *Chapter 5 Motion Programming*.

CP-717 Motion Editor Window
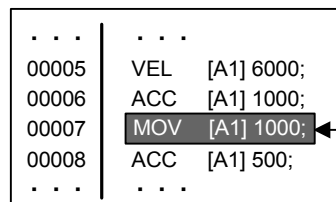
The operation cursor shows the line in the motion program that is currently being executed. The cursor will move to the next line when execution of the current line has been completed.
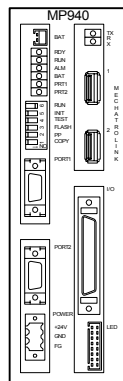
6.3.2 Opening the Motion Program Monitor

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 motion command currently being executed is displayed in reversed color as shown in the following illustration. The area moves according to the program execution.
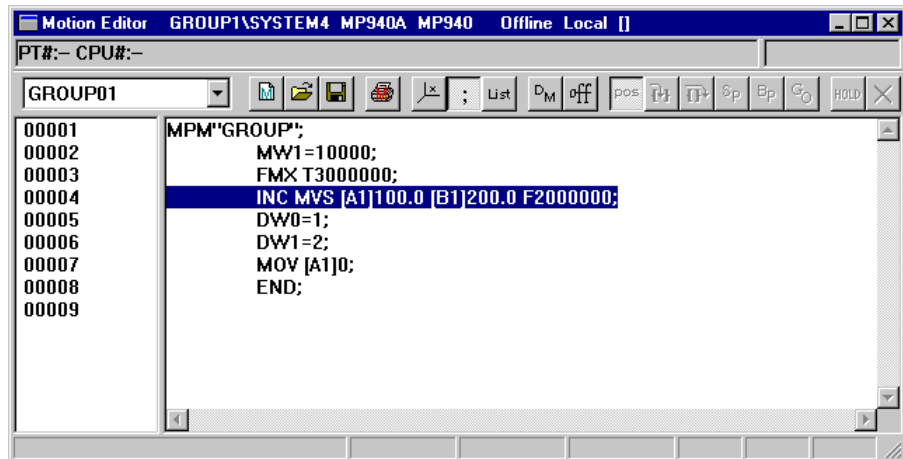
■ Monitor Display for PFORK Command

The PFORK command is used to branch execution into up to four processes executed in parallel based on the operands of the command. The process number to be monitored must be specified to enable monitoring.

When monitoring is performed, the motion command in the block specified by label 1 is displayed by default, and the commands in process with label 1 are monitored.
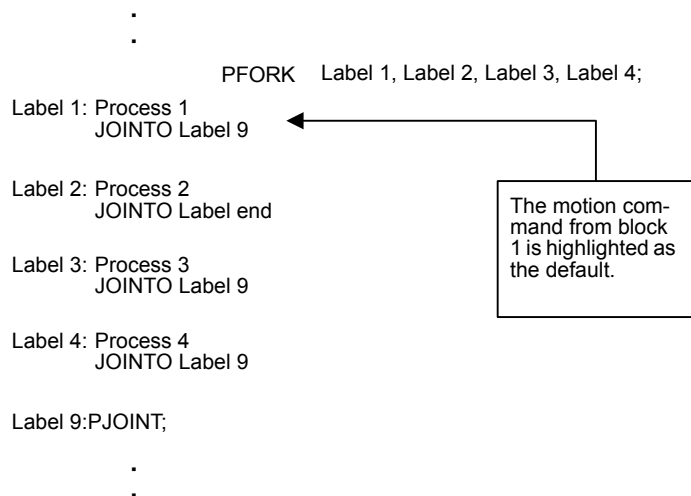
Use the following procedure to change the block that is to be displayed for monitoring.

1. Select *View (V)* and then *Monitor Parallel No. (M)* in the Motion Editor Menu.

2. Input the parallel number (block number) in the dialog box, and then click the **Execution** Button. For the parallel number, input a number from 1 to 4.
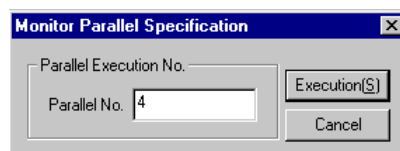
■ Commands Displayed for Monitoring

The following table shows the commands that are displayed in reversed color in the monitor mode.

Command		Command	
MOV	Positioning	MVS	Linear interpolation
MCW	Clockwise circular interpolation	SPH	Spherical interpolation
MCC	Helical circular 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 wait	MSEE	Subroutine call

6.3.3 Stopping and Restarting the Monitoring Display

This section explains how to stop and restart the monitoring display.

■ Stopping the Monitoring Display

To stop the monitoring display, press the Space Key while the focus is on the Motion Editor Window. The cursor condition will be changed from reversed color display to edit. 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 will not run normally.

■ Restarting the Monitoring Display

The following procedure can be used to restart a monitoring display that has been stopped.

Select *View (V)* and then *Monitor Regeneration (V)* in the Motion Editor Menu while the focus is on the Motion Editor Window.

INFO

If a motion program is saved while the monitoring display is stopped, the monitoring display will be restarted

6

6.4 Position Monitor

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

6.4.1 Outline of Position Monitor

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 workpiece coordinate system coordinates and the machine coordinate system coordinates. With a MP900-series Machine Controller, only one axis is displayed.
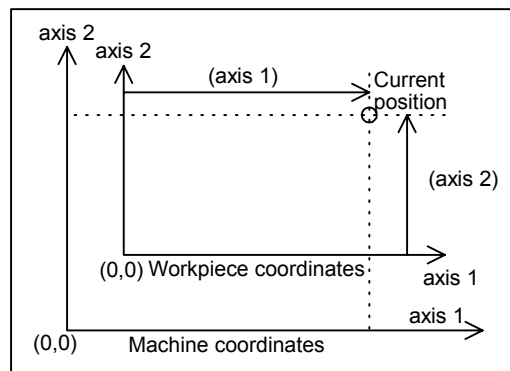
Fig 6.1 Coordinate System Example

6.4.2 Opening the Position Monitor Window

The Position Monitor Window can be opened from the Engineering Manager. Select *File (E)*, *Open (Q)*, *Motion Program (M)*, and then *Position Monitor (P)* from the menu.

The Position Monitor Window will be opened.
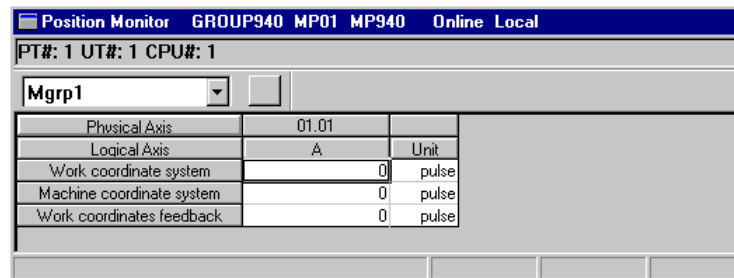
6.4.3 Position Monitor Window Menus

The following table shows the functions of menu commands in the Position Monitor Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the Position Monitor Window.
Register User Menu (U)	Registers a Position Monitor Window shortcut.
Save (S)	Not used with this window.
Delete (D)	Not used with this window.
Print (P)	Prints documents.
Exit (X)	Closes the Engineering Manager.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (B)	Displays the Status Bar.
Display Item (S)	Selects a display item.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

6

6.4.4 Position Monitor Window Configuration

The items displayed in the Position Monitor Window include the workpiece coordinates for axes defined by groups, machine coordinates, and workpiece coordinate system feedback positions.

Refer to the window shown in *6.4.2 Opening the Position Monitor Window*.

■ Login Information

Login information is displayed below the title bar in the System Configuration Definition Window. Hyphens will be displayed in Offline Mode.

Login Information	Details
PT#	The communications logical port is displayed.
UT#	The unit number of the MP900-series Machine Controller is displayed. The unit number is always 1.
CPU#	The number of the CPU which was logged onto is displayed. The CPU number is always 1.

■ Position Information

The following table lists the items displayed on the Position Monitor.

Display Item	Details
Group Name Selection	Select a group name 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 Groups" 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 axis numbers in the Group Definitions.
Work Coordinate System	Displays the workpiece coordinates for each axis. The workpiece coordinates are shown with the workpiece coordinates offset (OLoo2E) added to the target position monitor (ILoo02).
Machine Coordinate System	Displays the machine coordinates for each axis. The machine coordinates use the target position monitor (ILoo02) values.
Work Coordinate System Feedback	Displays the workpiece coordinate system feedback positions for each axis. These positions are shown with the workpiece coordinate offset (OLoo2E) added to the position monitor (ILoo08).
Unit	This is the unit for the coordinates. It is defined by a Servo Module Function Selection Flag.

◉ INFO

1 The Servo Module Function Selection Flags are in a fixed parameter.

2 The workpiece coordinate offset is a setting parameter.

3 The target position monitor and position monitor are parameter monitors.

■ Selecting Display Items

The workpiece coordinates, machine coordinates, and the workpiece coordinate system feedback positions are all displayed when the Position Monitor Window is opened, but any of these items can also be selected for display. To select one of them, use the following pro-

cedure.

1. Select *View (V)* and then *Display Item (S)* in the Position Monitor Window.

2. A dialog box will be displayed. Check the item to be displayed, and then click the **Set** Button.

Position Monitor Display Items	☒

☑ Workpiece coordinates

☐ Machine coordinates

☐ Workpiece feedback position

☐ Position deviation

Set	Cancel
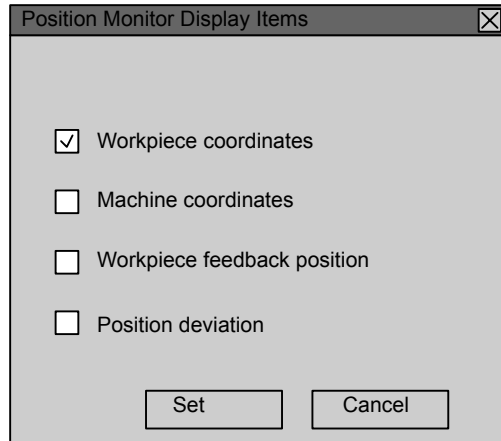
The item checked in step 2. will be displayed.

Physical Axis	01.01	
Logical Axis	A1	Unit
Work coordinate system	480	mm

The machine coordinate system, work coordinate feedback positions, and position deviations are not checked and not displayed.

⊙ INFO ▷ Position deviations cannot be displayed with MP900-series Machine Controllers. It can only be selected as a display item.

6.4.5 Closing Position Monitoring

Exit position monitoring by closing the Position Monitor Window.

To close the Position Monitor Window, select *File (F)* and then *Close (C)* in the Position Monitor Menu.

6

6.5 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.

6.5.1 Outline

With task monitoring, the Machine Controller displays, task by task, the program currently being executed, and shows their execution status.

The following diagram shows four processes four groups with four tasks under the first group and four processed under the first task. The execution status for all tasks and processes under one group can be monitored in the Task Monitor at the same time. MP900-series Machine Controllers, however, support only one group.
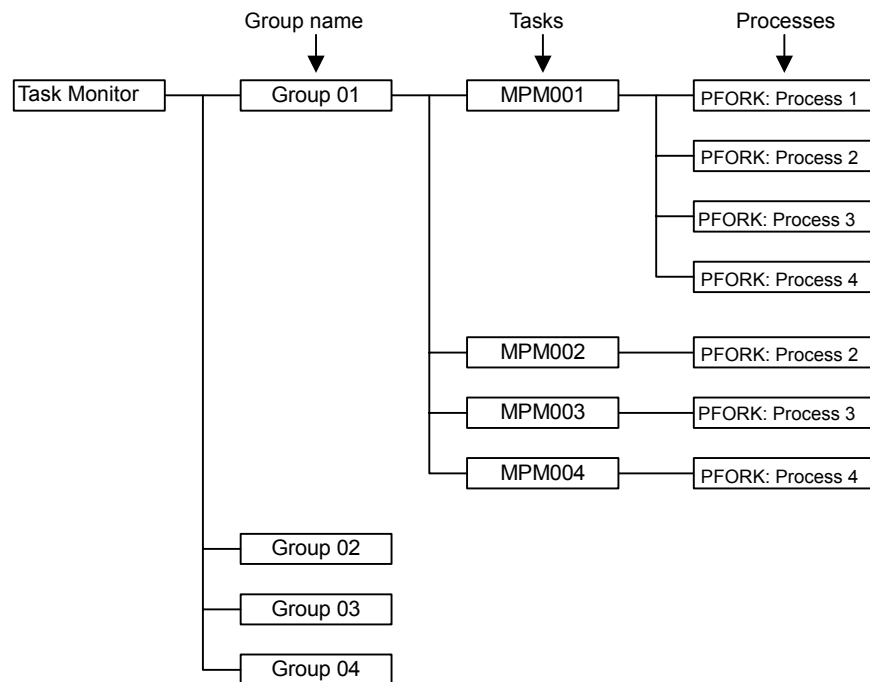
6.5.2 Opening the Task Monitor Window

Open the Task Monitor Window from the Engineering Manager. Select *File (F)*, *Open (Q)*, *Motion Program (M)*, and then *Task Monitor (T)* from the menu.

The Task Monitor Window will be opened.

Task Monitor GROUP940 MP02 MP940 Online Local							
PT#: 1 UT#: 1 CPU#: 1							
		Task1		Task2		Task3	
Group	Group Mode	Main Program	Program Status	Main Program	Program Status	Main Program	Program Status
Group01		MPM001					

■ Login Information

Login information is displayed below the title bar in the System Configuration Definition
Window. Hyphens will be displayed in Offline Mode.

Login Information	Details
PT#	The communications logical port is displayed.
UT#	The unit number of the MP900-series Machine Controller is displayed. The unit number is always 1.
CPU#	The number of the CPU which was logged onto is displayed. The CPU number is always 1.

6.5.3 Task Monitor Window Menus

The following table shows the functions of menu commands in the Task Monitor Window.

Menu Command		Function
File (F)		
	File Manager (F)	Opens the File Manager.
	Open (O)	Opens windows for individual functions.
	Close (C)	Closes the Task Monitor Window.
	Register User Menu (U)	Registers a Task Monitor Window shortcut.
	Delete (D)	Cannot be used with this window.
	Print (P)	Prints documents.
	Exit (X)	Closes the Engineering Manager.
View (V)		
	Tool Bar (T)	Displays the Tool Bar.
	Status Bar (S)	Displays the Status Bar.
	Detailed Mode (M)	Displays monitoring in detail.
Window (W)		
	Cascade (C)	Stacks windows in the display.
	Tile (T)	Lines up windows in the display.
	Arrange Icons (A)	Lines up icons.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

6.5.4 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.

■ 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	· · ·
		MPMxxx				
			· · ·			

■ Detailed Display Mode

To switch from the standard display mode to the detailed display mode, select *View (V)* and then *Detailed Mode (M)* in the Task Manager Menu. To return to the standard display mode, select *Detailed Mode (M)* again.

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

6.5.5 Task Monitor Configuration

The items displayed by the Task Monitor in both standard and detailed mode are listed in the

following table.

Display Item	Details
Group Name	Displays the group name set in the group definitions.
Group Mode	Displays the group execution status. Refer to the *Group Mode Messages,* below.
Task n Main Program	Displays the number of the motion program running for Task n. In detailed mode, the process number is displayed below the motion program number.
Task n Program Status	Displays the execution status of the motion program running for Task n.Refer to the *Program Status Messages* and *Process Status Message,* below. In detailed mode, the process status for each process executed in parallel for PFORK is displayed.
Step #	Displays the step number being executed in the program (detailed mode only).

Group Mode Messages
Group running
Group paused
Group stopped for debugging
Group alarm
Auto mode
Manual mode

Program Status Messages	Process Status Messages
Program running	Motion function running
Program paused	Holding
Program aborted	Aborted
Program stopped for debugging	Stopped for debugging
Program alarm	Alarm
Program break	Break
Program debug mode	Returning
Main program duplication	Debug mode
Main program number overflow	Skip signal latch

6

6.5.6 Closing Task Monitoring

Close this program by closing the Task Monitor Window.

To close the Task Monitor Window, select *File (F)* and then *Close (C)* in the Task Monitor Menu.

6.6 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.

6.6.1 Outline of Motion Alarm Monitor

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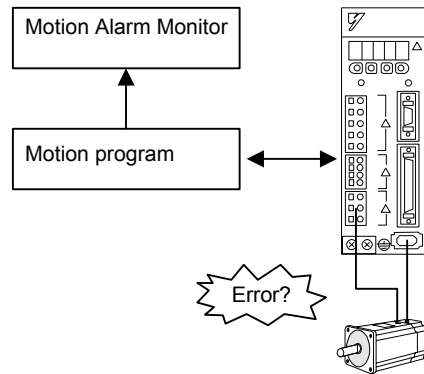
6.6.2 Opening the Motion Alarm Window

Open the Task Monitor Window from the Engineering Manager. Select *File (F)*, *Open (O)*, *Motion Program (M)*, and then *Motion Alarm (T)* from the menu.

■ Login Information

Login information is displayed below the title bar in the System Configuration Definition Window. Hyphens will be displayed in Offline Mode.

Login Information	Details
PT#	The communications logical port is displayed.
UT#	The unit number of the MP900-series Machine Controller is displayed. The unit number is always 1.
CPU#	The number of the CPU which was logged onto is displayed. The CPU number is always 1.

6.6.3 Motion Alarm Window Menus

The following table shows the functions of menu commands in the Motion Alarm Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the Motion Alarm Window.
Register User Menu (U)	Registers a Motion Alarm Window shortcut.
Delete (D)	Cannot be used with this window.
Print (P)	Prints documents.
Exit (X)	Closes the Engineering Manager.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

6

6.6.4 Displaying Motion Alarms

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 Item	Details
Group Name	Displays the name of the group where the alarm occurred.
Main Program	Displays 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 Axis	Displays the number of the physical axis where the error occurred.
Servo Error Code	Displays the servo error code. Refer to the *MP900-series Motion Controller User's Manual: Design and Maintenance* for information on alarm codes.
Error Code Detail Button	When this button is clicked, an Error Code Details Dialog Box is displayed for the error in the line where the cursor is placed. The Error Code Details Dialog Box can also be displayed by double-clicking in the servo error column in a cell when an error code is displayed. No explanation will be displayed, however, for program errors.

■ Motion Alarm Example

```
┌──────────────────────────────────────────────────────────┐
│ Motion Alarms                                              │
├──────────────────────────────────────────────────────────┤
│ PT# · · · ·                                                │
│                                                            │
│  ┌────────┬──────────────┬───────────────┬──────┬──────────┐ │
│  │ Group  │ Main Program │ Program Error │ Axis │Servo error│ │
│  ├────────┼──────────────┼───────────────┼──────┼──────────┤ │
│  │Group 01│ Group mode   │               │01.01 │    02    │ │
│  │        │              │               │01.02 │    05    │ │
│  │        │ Group mode   │    MPM001     │      │          │ │
│  │        │              │    MPM002     │      │          │ │
│  └────────┴──────────────┴───────────────┴──────┴──────────┘ │
│                                                            │
│              ┌──────────────────────┐                     │
│              │   Error code details │                     │
│              └──────────────────────┘                     │
└──────────────────────────────────────────────────────────┘
```

Servo Error Code Details Dialog Box

Servo error codes displayed in the Motion Alarm Window are given in hexadecimal. Errors are allocated to each bit in the hexadecimal number. The Details 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 Code Details	×

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 timeover	○	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 unestablishment	○	ON	○	OFF
12	Origin establish movement	○	ON	○	OFF
13	User fixed number establishment error	○	ON	○	OFF
14	M-LINK Servo same period communicate error	○	ON	○	OFF
15	M-LINK Servo communicate error	○	ON	○	OFF
16	M-LINK Servo command timeout error	○	ON	○	OFF
17	ABS ENC revolution quantity over	○	ON	○	OFF

MECHATROLINK Servo Alarm Code HHHH

OK

Fig 6.2 MP930 MECHATROLINK Servo Module Error Code Details Dialog Box

Motion Alarm Error Code Details	×

Servo Error Bit Details

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
6	Locating timeover	○	ON	○	OFF
10	Control mode error	○	ON	○	OFF
11	Origin unestablishment	○	ON	○	OFF
17	ABS ENC revolution quantity over	○	ON	○	OFF
18	PG disconnect error	○	ON	○	OFF

OK

Fig 6.3 MP920 SVA Module Error Code Details Dialog Box

6

IMPORTANT

1 Servo alarm error codes show the motion monitor parameter alarms (ILoo24).

2 MECHATROLINK servo alarm codes are displayed only for the MECHATROLINK Interface Servo Module.

Motion monitor parameter servo driver alarm codes (IWxx24) are shown.

3 The Servo Error Code Details Dialog Box is not refreshed.

The Motion Alarm Window is refreshed every 0.5 second.

Effective Module Error Bits

Displays in the Details Dialog Box are displayed as shown in the following table. "Yes" indicates the Modules for which the status is displayed.

Bit	Name	9200 SVA	9200 SVB	9200 PO01	MP920 SVA	MP920 SVB	MP920 PO-01	MP910	MP930	MP940 SVA
0	Save amp abnormal		Yes			Yes		Yes	Yes	Yes
1	Positive direct overtravel		Yes		Yes	Yes		Yes	Yes	Yes
2	Negative direct overtravel		Yes		Yes	Yes		Yes	Yes	Yes
3	Positive direct soft limit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Negative direct soft limit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Servo power supply hasn't been completed		Yes			Yes		Yes	Yes	
	Servo OFF			Yes			Yes			
6	Locating timeover	Yes	Yes		Yes	Yes		Yes	Yes	Yes
7	Excessive locate movement quantity		Yes			Yes		Yes	Yes	Yes
	Excessive speed			Yes			Yes			
8	Filter type change error		Yes			Yes		Yes	Yes	
9	Filter fixed number change error		Yes			Yes		Yes	Yes	
10	Control mode error	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Origin unestablishment	Yes	Yes		Yes	Yes		Yes	Yes	Yes
12	Origin establish movement		Yes			Yes		Yes	Yes	
13	User fixed number establishment error		Yes			Yes		Yes	Yes	
14	M-LINK Servo same period communicate error		Yes			Yes		Yes	Yes	
15	M-LINK Servo communicate error		Yes			Yes		Yes	Yes	
16	M-LINK Servo command timeout error		Yes			Yes		Yes	Yes	
17	ABS ENC revolution quantity error	Yes	Yes		Yes	Yes		Yes	Yes	Yes
18	PG disconnect error				Yes					Yes

Bit	Name	9200 SVA	9200 SVB	9200 PO01	MP920 SVA	MP920 SVB	MP920 PO-01	MP910	MP930	MP940 SVA
	MECHATROLINK Servo Alarm Code Displays		Yes			Yes		Yes	Yes	

6.6.5 Closing Motion Alarms

Close this program by closing the Motion Alarm Window.

To close the Motion Alarm Window, select *File (**F**)* and then *Close (**C**)* in the Motion Alarm Menu.

6

7 Ladder Logic Programming

This chapter explains ladder logic programs called drawings or drawing programs.

7

7

Based on the above diagram, the following items are described in this chapter.

- Setting properties
- Creating parent and main programs
- Creating table programs
- Creating tuning panels
- Creating C registers
- Creating table data
- Tools

7.2 Setting Drawing Properties

This section describes the Property Windows used to manage the configuration information for individual ladder programs.

7.2.1 Outline of Property 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 definitions
- Revision histories

There are default settings for properties so they do not always have to be set. Settings are required, however, for ladder logic programs that use many registers.

Check what attributes have been set before using ladder logic programs.

7.2.2 Opening Property Windows

Use one of the following two procedures to open a Property Window.

Opening from the Engineering Manager

Select *File (F)*, *Open (Q)*, *Drawing (P)*, and then *Properties (R)* on the programming menus.

If the program is not open, an Open DWG Setting Window will be displayed. Specify DWG for a main ladder program or FUNC for a ladder function program, input the drawing name, and click the **OK** Button. The Open DWG Setting Window will not be displayed if the program is open.

7
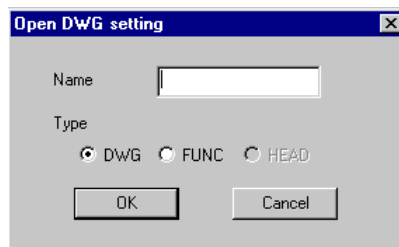
The Property Window for the program will be opened.
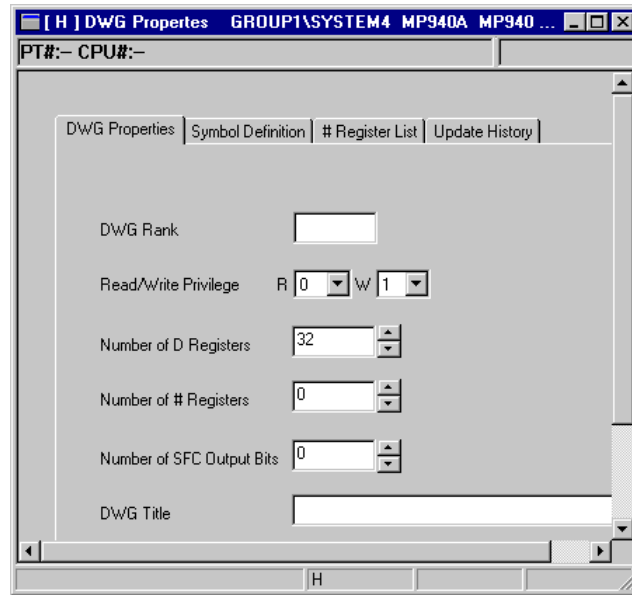
If the properties are for a ladder function program, the following tabs will be displayed.
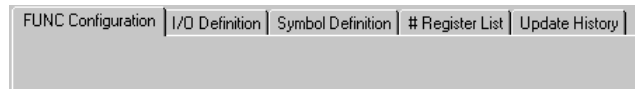
Opening from the File Manager

Select the ladder or function program for which the Property Window is to be opened from the tree area, and then select *File (F), Open (O),* and *DWR Property (R)*.

You can also point at the ladder or function program for which the Property Window is to be opened in the tree area, click the right mouse button, and then select the command from the pop-up menu.

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■ Tab Pages

There are different tab pages for drawing program and function program Property Windows.

Tab Pages for Main Program Property Windows

Tab Page Name	Function
DWG Properties	Defines configuration information for drawing programs.
Symbol Definition	Defines drawing program symbols.
# Register List	Sets # registers for drawing programs.
Update History	Displays Update History for drawing programs.

Tab Pages for Function Program Property Windows

Tab Page Name	Function
FUNC 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

1 Select *View (V)* and then *Next Page (N)* from the programming menus to move through the tab pages in order, starting with the DWG Configuration or FUNC Configuration Tab Page on the left.

2 Select *View (V)* and then *Back Page (B)* to move through the tab pages in reverse order.

7.2.3 Property Window Menus

The menus displayed in Property Windows are the same as those displayed in the ladder program windows. Refer to *7.3.3 Programming Window Menus*.

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7.2.4 Configuration Definition Tab Page

Refer to the window shown in *7.2.3 Property Window Menus*.

Setting Item	Details
DWG 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 accessed by the programs if this number is set to 0.

Setting Item	Details
Number of # Registers	When # registers are to be used by the programs, enter the number of words for the # registers. # registers cannot be accessed by the programs if this number is set to 0.
Number of SFC[1] 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.

- The number of D and # registers will differ depending on the type of Machine Controller.

- There are some Machine Controller models that will not support the use of SFC programs. Refer to the *MP900 Series Machine Controller User's Manual: Design and Maintenance*.

- The D register numbers that can be used in the program when 10 is input 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.

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7.2.5 I/O Definition Tab Page

This tab page is used only for function programs. Click the **I/O Definition** Tab in the Property Window.

TERMS
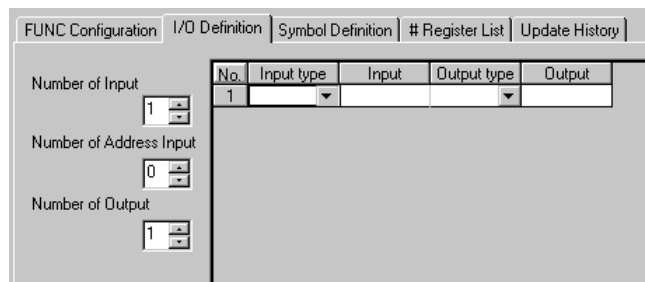
1 SFC

SFC is the abbreviation for Sequential Function Chart, which is a programming language.

Setting Item	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 Comment	Enter a function input data comment of up to 8 characters.
Address Comment	Enter a function address input data comment of up to 8 characters.
Output Comment	Enter a function output data comment of up to 8 characters.
Output Type	Select the function output data type.

Table 7.1 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	

7.2.6 Symbol Definition Tab Page

Click the **Symbol Definition** Tab in the Property Window.

■ Setting Symbol Definition Data

Click the **Symbol Definition** Tab in the Property Window.

Setting Item	Details
Symbol Name	Enter a symbol name of up to 8 characters.
No. of Register	Enter the number of the register to which to allocated the symbol.
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 CP-717. Such symbols are called automatic symbols and are displayed as follows:

   • $AUTOxxx (xxx 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. No. of Register

   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. Data that is entered here is displayed 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 *Automatic Register Number Allocation for 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 CP-717.

   • 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 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.

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(INFO) The maximum number of symbols that can be defined differs depending on the type of Machine Controller.

■ Editing Symbols

Symbols can be edited in rows units.

Deleting Symbols

When a symbol name has been altered in the program 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 program window.

The procedure to delete symbol names is given below.

1. Move the cursor to the symbol name to be deleted.

2. Select *Edit (E)* and *DEL (D)* from the programming menus.

   The row selected in step 1. will be deleted.

Alphabetizing Symbols

The following procedure can be used to display symbols in alphabetical order.

- Select *View (V)* and then *Sort (S)* from the programming menus.

   The symbol names will be displayed in alphabetical order.

■ Automatic Register Number Allocation for 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 program 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	No. of Register	Size	Range		Initial	▲
01	DATA1		H0001	AUTO	▼	*	
02	DATA2		H0001	AUTO	▼	*	
03	DATA3		H0001	AUTO	▼	*	
04					▼		

Normally, symbols would be automatically allocated when the Range column shows AUTO. If, however, a register number has already been set in the No. of Register column, either by previous automatic allocation or manual input of register numbers, symbols will not be allocated automatically for those register numbers even if the Range column shows AUTO.

Automatic D and M Register Number Allocation

Symbols can be automatically allocated to D and M registers starting from a specified number. Use the following procedure to automatically allocate D and M registers.

1. Enter the symbol definition data to allocate as shown below.

2. Select *Data (D)*, *Auto Number (A)*, and then *AUTO (A)* from the programming menus.

3. The Automatic Symbol Allocation (D, M) Window will be displayed. Input 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

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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 first D register number to 0 and the leading M register number to 1.

No.	Symbol Name	No. of Register	Size	Range	
01	DATA1	DW00000	H0001	AUTO	▼
02	DATA2	MF00002	H0001	AUTO	▼
03	DATA3	MW00001	H0001	AUTO	▼
04					▼

● INFO

1 In step 1., the register type (DW, MW, etc.) is also entered in the *No. of Register* column. Nothing needs to be entered in the *No. of Register* column if operands have been specified in symbol input mode in the program window. In the Size column, enter a decimal value corresponding to the size of the register type (in word units for word type, and bit units for bit type). Enter AUTO in the *Range* column.

2 If no data is entered in the *No. of Register* column, and automatic register number allocation is executed, the result will be the same as if DW was entered. Automatic register number allocation is executed in the order of bit, integer, double-length integer, and real number data.

Automatic Number Allocation to All Registers

The procedure to automatically allocate symbols to S, I, O, M, D, C, and # register numbers starting from any number is outlined below.

1. Enter the symbol definition data for which register numbers are to be automatically allocated. Select "AUTO" as the range.

2. Select *Data (D)*, *Auto Number (A)*, and then *AUTO (A)* from the programming menus.

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	No. of Register	Size	Range	
01	DATA1	MF00010	H0002	AUTO	▼
02	DATA2	MF	H0001	AUTO	▼
03	DATA3	MW00012	H0001	AUTO	▼
04	DATA4	MW00013	H0001	AUTO	▼
05					▼

In step 1., the register type is also entered in the *No. of Register* column. The register number does not, therefore, need to be entered when entering operands as symbols in the program window. In the *Size* column, enter a decimal value corresponding to the register type (in word units for word type, and bit units for bit type). Enter AUTO in the *Range* column.

■ Upward Linking of Symbols

Symbols can be defined so that symbol names defined in drawings with different hierarchies can be used to reference the same register number. This is called symbol linking.

Normally, a symbol that is defined for a drawing or function will be unique to that drawing or function program, and cannot be referenced from other drawings or functions. By using the upward linking function for symbols, a symbol defined in a parent drawing can also be referenced by a child drawing, provided the drawing is a process drawing of the same type.

```
Parent        Child         Grandchild

HO1 ———— HO1.01

            └── HO1.02 ── HO1.02.01
```
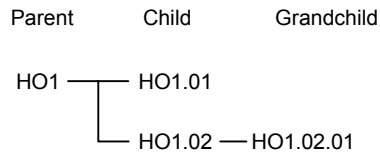
The procedure to link symbols is outlined below.

1. Enter the symbol definition data to be linked as shown below. Set "MTBL" as the range.

2. Select *Data (D)* and then *Symbol Link (L)* from the programming menus.

   Definition data in the same scan as the parent drawing is searched according to the symbol, and the data displayed.

Do not enter any data in the *No. of Register* and *Size* columns. Enter "MTBL" in the Range column.

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7.2.7 # Register Lists

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

■ Making # Register Settings

Click the # Register List Tab in the Property Window to display the window shown below. The # register settings are made in this window. This operation cannot be executed if the register size is set to 0 on the DWG Properties Tab Page.

No. of REG	Value
#W00000	00000
#W00001	00000
#W00002	00000
#W00003	00000
#W00004	00000
#W00005	00000
#W00006	00000
#W00007	00000
#W00008	00000

DWG Properties | Symbol Definition | # Register List | Update History

Setting Item	Details
No. of REG	Displays the # register numbers. The number of registers is declared in the Configuration Definition Tab Page.
Value	Enter the # register values.

■ Changing the Base of # Register Values

The display mode, or base, of the register values can be changed. Depending on the display mode, # registers can be changed to #W, #L, #F, etc.

Decimal Integer Display

Select *Data (D)*, *Cardinal (C)*, and then *DEC (D)* from the programming menus to display the register values in decimal.

Hexadecimal Integer Display

When in decimal integer display mode, select *Data (D)*, *Cardinal (C)*, and then *HEX (H)* in the Property Window to display the register values in hexadecimal.

Real Number Display

Select *Data (D)*, *Cardinal (C)*, and then *FLOAT (F)* from the programming menus to display the register values as real numbers.

Binary Integer Display

Select *Data (D)*, *Cardinal (C)*, and then *BIN (B)* from the programming menus to display the register values as binary numbers.

Decimal Double-length Integer Display

Select *Data (D)*, *Cardinal (C)*, and then *LONG (L)* from the programming menus to display the register numbers as double-length integers.

ASCII Display

Select *Data (D)*, *Cardinal (C)*, and then *ASCII (A)* from the programming menus to change

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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.

■ Changing # Register Values

Input the numbers permitted by the base of the register value. Negative values can be entered for decimal display.

The procedure to change # register values is outlined below.

1. Move the cursor to the register value to be changed.

2. Enter the new value.

■ Clearing # Register Values

The procedure to clean consecutive registers to a user-defined value is outlined below.

1. Select *Data (D)* and then *Set (S)* from the programming menus.

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 initialized.

7.2.8 Update History

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

■ Displaying Update History

Click the Update History Tab in the Property Window to display the following window.

Up to 10 Update History records can be created for each drawing in the drawing or function programs. The Update History is displayed in chronological order.
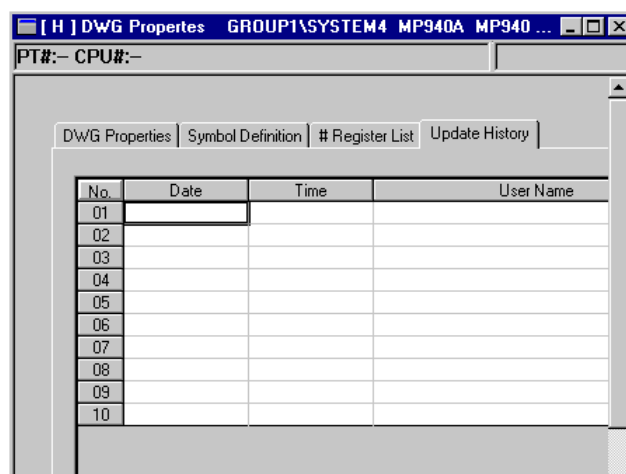
Display Item	Details
Date	Displays the date the drawing or function program was saved.
Time	Displays the time the drawing or function program was saved.
User Name	Displays the name of the user that saved the drawing or function program.

■ Deleting Update History

There are two methods for deleting the Update History: All data for a particular drawing or function program can be deleted or individual records in the Update History can be deleted.

Deleting All Update History Records

Use the following procedure to delete all of the update history records currently displayed.

1. Select *Edit (E)* and then *ALLDEL (Z)* from the programming menus to delete all Update History data currently being displayed.

2. All Update History data will be deleted.

Deleting Individual Update History Records

Use the following procedure to delete one update history record.

1. Move the cursor to the Update History record to be deleted.

2. Select *Edit (E)* and then *DEL (D)* from the programming menus.

3. The Update History record selected in step 1. will be deleted.

7.2.9 Saving Property Information

Property information must be saved at the same time as the drawing or function program is saved. Execute *Save (S)* from the drawing number or function symbol program window for which the property settings were made

The procedure to save property information is outlined below.

1. Select *Window (W)* from the programming menus and select the program window where the property settings were made.

2. Select *File (F)* and then *Save (S)* from the programming menus.

3. Click the **Yes** Button in the message box.

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

◉ INFO

If the save operation fails, an error message will be displayed. Referring to *Appendix A Error Messages*, remove the cause of the error and then retry the save operation.

7.3 Creating Ladder Logic Programs

This section explains how to create drawing (DWG) and function ladder logic programs (main programs).

- Outline of creating ladder programs
- Opening the programming window
- Programming window menus
- Programming window display modes
- Input ladder instructions
- Editing programs
- Creating branching circuits
- Setting disable coils
- Jumps
- Displaying current values
- Creating comments
- Saving ladder programs
- Printing ladder programs
- Exiting editing of ladder programs

7.3.1 Outline of Creating Ladder Logic Programs

The CP-717 includes a Ladder Logic Program Editor for inputting ladder logic programs. The Ladder Logic Program Editor is automatically opened when a new or existing program is opened, enabling ladder logic programs to be edited immediately.

7.3.2 Programming Window

■ Opening the Programming Window

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

Opening New Drawings from the File Manager

1. Select *File (F)* and then *Make New DWG (N)* on the File Manager Menu.

2. The Open DWG Setting Window will be opened. Enter the name and type of drawing in the dialog box and click the **OK** Button.

   An empty Programming Window will be displayed.
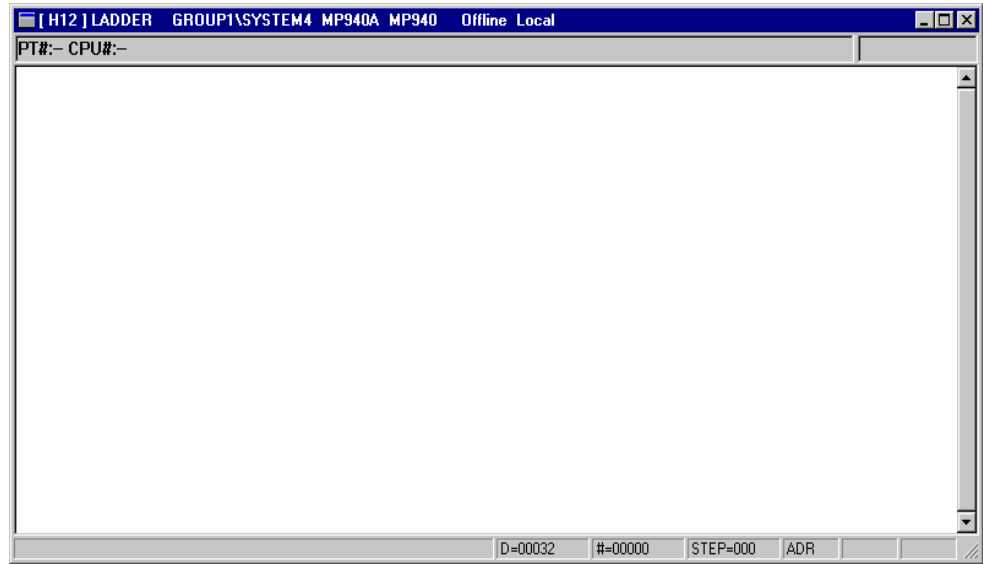
Opening Existing Drawings from the File Manager

1. Click the desired drawing number in the Directory Tree.

2. Select *File (F)*, *Open (Q)*, and then *Main Program (L)* on the File Manager Menu.

   The existing program will be displayed and editing will be enabled.
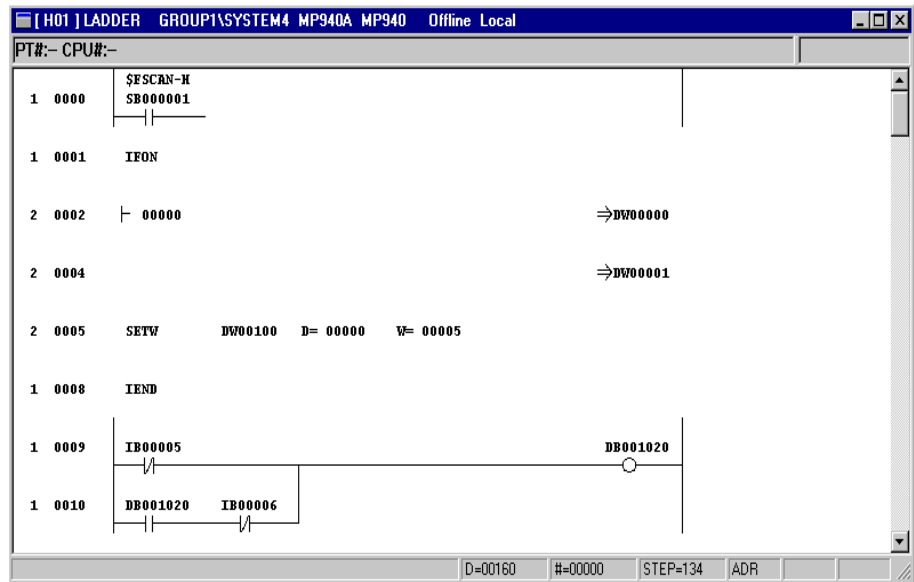
Opening New/Existing Drawings from the Engineering Manager

1. Select *File (F)*, *Open (Q)*, *Drawing (R)*, and then *Open New DWG (Q)* from the programming menus.

2. The Open DWG Setting Window will be displayed. Enter the name and type of drawing in the dialog box and click the **OK** Button.

○ INFO

1 In the dialog box, set the Type Box to **DWG** to open the main drawing program, and set to **FUNC** to open the main function program.

2 Up to 5 drawing number or function symbol programs can be open at the same time in the Programming Window.

■ Programming Window Configuration

```
┌──────────────────────────────────────────────────────────────┐
│ Drawing name Ladder.....                                        │
├──────────────────────────────────────────────────────────────┤
│ PT# login information                                           │
├──────────────────────────────────────────────────────────────┤
│  1   0000      ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐   ┌ ─ ─ ─ ─ ─ ┐       │
│                │                        │   │           │       │
│  1   0001      │                        │   │           │       │
│                │     Ladder program     │   │ Comments  │       │
│  2   000n      │                        │   │           │       │
│  ▲    ▲        │                        │   │           │       │
│  │    │        └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘   └ ─ ─ ─ ─ ─ ┘       │
│  │    │          . . .        . . .        . . .               │
│ Level Step No.                                                  │
│                  . . .        . . .        . . .               │
│                                                                 │
├───────────┬───────────┬──────────┬────────────┬──────────┬──┬──┤
│Starter line│D registers│# registers│Total steps │Input mode│  │  │
└───────────┴───────────┴──────────┴────────────┴──────────┴──┴──┘
```

Display Item	Details
Level	Displays the nesting level of each program.
Step No.	Displays the step number of the instruction.
Program	For drawings, the program executed is displayed. For user functions, the function's internal program is displayed. The current value of each operand is also displayed while the program is being executed.
Comments	Comments for the program being executed will be displayed. Refer to *7.3.10 Creating Comments* for information on how to create comments.
D registers	Display the number of D registers set in the DWG properties.
# registers	Display the number of # registers set in the DWG properties.
Total No. of Steps	Displays the total number of steps for the program.
Operand Input Mode	Displays the operand input mode. ADR: Register Input Mode SYM: Symbol Input Mode S-A: Symbol/Register Input Mode

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7.3.3 Programming Window Menus

The following table shows the functions of menu command in the Programming Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the Programming Window.
Remake Comment (R)	Cannot be used with MP920/MP930 Machine Controllers.
Remake Cross Info. (X)	Refreshes cross-reference information.
Regist User Menu (U)	Registers shortcuts for the Programming Window.
Save (S)	Saves programs.
Page Setting (M)	Sets the printer paper margins.
Print Program (P)	Prints the main program.
Exit (X)	Closes the Engineering Manger.
Edit (E)	
Cut (X)	Cuts an instruction and places it on the clipboard.
Copy (C)	Copies an instruction to the clipboard.
Paste (V)	Pastes the contents of the clipboard.
INS (I)	Inserts an instruction.
DEL (D)	Deletes an instruction.
UNDELETE (Z)	Restores deleted data.
COPYA (Y)	Copies the ladder logic program file.
View (V)	
Input Mode (M)	
Address (O)	Sets to operand input mode.
Symbol (S)	Sets to symbol input mode.
Address + Symbol (D)	Sets to operand and symbol input mode.
Normal (N)	Switches to normal display mode.
Large (L)	Switches to large display mode.
Symbol (Y)	
Drawing (R)	Switches to program symbol display mode.
Comment (C)	Switches to comment symbol display mode.
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Comment Bar (B)	Displays the Comment Bar.
Function Bar (F)	Displays the Function Bar.

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Menu Command	Function
Command (C)	
RELAY (R)	Select instructions. Refer to *MP900 Series Machine Controller User's Manual: Ladder Programming* (SIEZ-C887-1.2) for details on instructions.
MATH (A)	
LOGIC (L)	
CONTROL (C)	
FUNCTION (F)	
MOVE (M)	
DDC (D)	
TABLE (T)	
MOTION (M)	
SFC (S)	
Debug (G)	
SYNC (S)	Synchronously refreshes current values.
HOLD (H)	Pauses refreshing current values.
DIS-ON (N)	Disables the COIL instruction and turns it ON.
DIS-OFF (F)	Disables the COIL instruction and turns it OFF.
ENABLE (E)	Releases the COIL instruction from disable status.
REFER (R)	Opens the program window being called
BACK (B)	Displays the program opened using the REFER command.
Cursor (S)	
Jump to Line (L)	Moves the cursor to the desired step number.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (PrgBld) (A)	Displays version information for the CP-717.

7.3.4 Programming Window Display Mode

The section describes the display modes that are available for the Ladder Editor in the Programming Window. The display can be changed as required during programming.
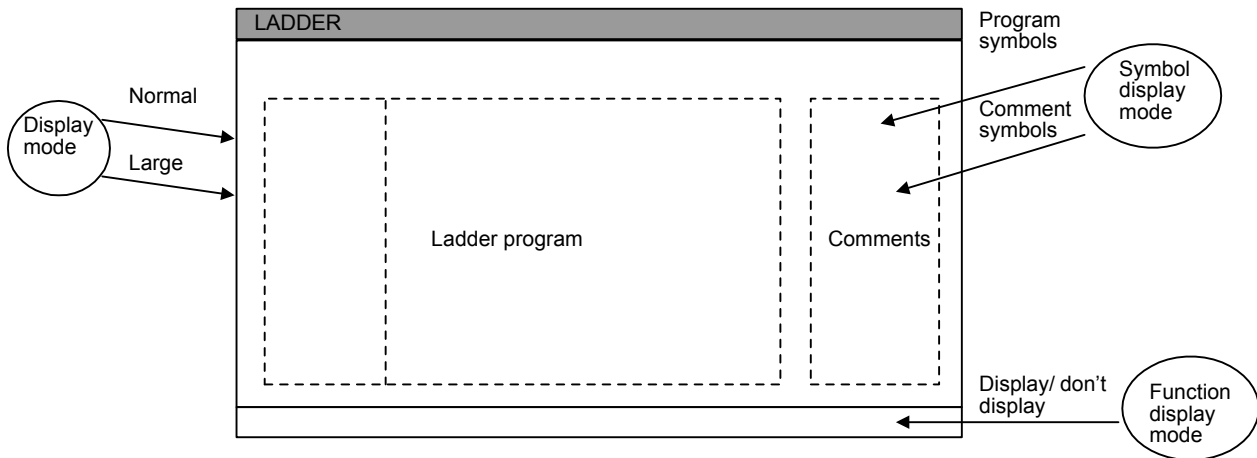
■ Switching Program Display Modes

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 (V)* and then *Normal (N)*.
Large	Select *View (V)* and then *Large (L)*.

■ Switching Symbol Display Modes

There are two symbol display modes in the Programming 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 Programming Window is first opened, the display mode is Comment Symbol.

Program Display Mode	Switching Procedure
Program Symbol	Click *View (V)*, *Symbol (Y)*, and then *Drawing (R)*.
Comment Symbol	Click *View (V)*, *Symbol (Y)*, and then *Comment (C)*.

■ Switching Function Bar Display Modes

Pressing function keys when the function bar is displayed will execute the same functions as selecting instructions from programming menus.

Select *View (V)* and then *Function Bar (F)* from the programming menus to switch ON and OFF the function bar display. Function keys will not operate if the function bar is not displayed.

7.3.5 Entering 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

■ 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
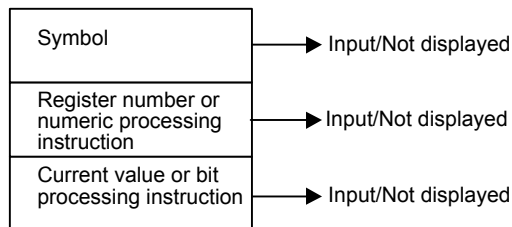
For current values expressed as bit processing instructions, the text will be displayed in bold if the condition of the bit processing instruction is met and will be displayed in normal text is the condition is not met.

The register value is displayed for numeric processing instructions. The current value is displayed only in Online Mode.
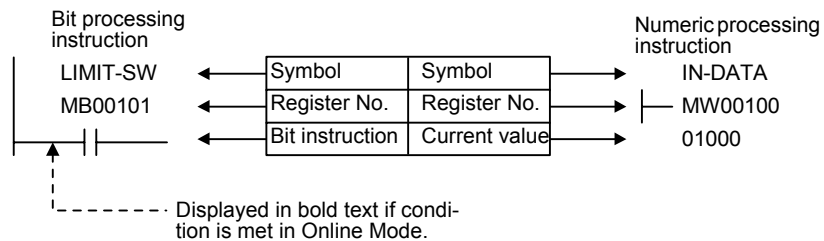
■ Inputting Ladder Instructions

There are three methods that can be used to input ladder instructions. Use the methods as required to facilitate inputting.

Refer to *MP900 Series Machine Controller User's Manual: Ladder Programming* (SIEZ-C887-1.2C) for details on instructions. Refer to the list of instructions that can be entered located in *Appendix C Drawing and Function Instructions*.

Using Mnemonics

Instructions can be selected easily from the keyboard by inputting 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.

Selecting Instructions from the Programming Menus

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 (C)*, *RELAY (R)*, and then *N.O. Contact (A)* from the programming menus. The symbol will be input.

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.

■ Operand[1] Input Methods

There are four methods for inputting operands:

• Using register numbers
• Using symbols
• Using symbols and register numbers
• Using constants

Changing Input Modes

The input mode can be changed using one of the procedures outlined on the table below.

Input Mode	Procedure	Status
Register	Click *View (V)*, *Input Mode (M)*, and then *Address (O)*	ADR
Symbol	Click *View (V)*, *Input Mode (M)*, and then *Symbol (S)*	SYM
Address + Symbol	Click *View (V)*, *Input Mode (M)*, and then *Address + Symbol (D)*	S-A

TERMS

[1] Operand

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

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Register Input Mode is the default when the program window is first displayed.

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 Input Mode (ADR). Select 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 and symbol display modes have been set.

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. Enter the Symbol Input Mode (SYM) and select the instruction.

2. The cursor will appear at the input position for symbols. Enter the symbol.

> **INFO**
>
> 1 If the symbol input at step 2. is defined on the Symbol Definition Tab Page in the Property Window, the register number corresponding to that symbol will also be displayed.
>
> 2 Refer to *Defining Symbols* to define symbols. Symbols must be defined before they can be entered.

Input Using Symbols and Register Numbers

Both a symbol and register number can be entered in Symbol + Register Input Mode using the following procedure. Symbols will be defined automatically and do not need to defined on the Symbol Definition Tab Page in the Property Window.

1. Enter the Symbol + Register Input Mode (S-A) and select the instruction.

2. The cursor will appear at the input position for symbols. Enter the symbol.

3. The cursor will then appear at the input position for register numbers. Enter the register number.

Input Using Constants

The procedure to input using constants is outlined below.

1. Enter the Operand Input Mode (ADR) and select 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	Explanation
Decimal	Integer	00100	100	Use numerals between 0 and 9. Place a minus sign (-) in front of negative values.
	Double-length Integer	0000010000	10000L	Use numerals between 0 and 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 between 0 and 9 and place an 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	Place an H at the beginning of the value, and use 0 to 9 and A to F.
	Double-length Integer	H000032FF	H32FFL	Place an H at the beginning of the value, and use 0 to 9 and A to F. Place an 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.

■ Inputting Instructions

Inputting instructions can be divided into several patterns. These will be described using the following instructions.

- Math, logic, and comparison instructions
- Conditional instructions
- Functions
- MOVW, XCHG, etc.
- SEE
- END
- Inline comments

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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 N   Æ MW02000

1. Select the INTEGER ENTRY (|-) instruction.

2. Enter the register number, MW01000.

3. Select the STORE (⇒) instruction.

4. Enter the register number, MW02000.

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 instruction 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 instructions is shown below.

```
           IB00010                                              |
1  0000    ┤├────────────────                                   |
           

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 CONDITIONAL ([   ])instruction and enter the register number, MW00010.

4. Enter the STORE instruction in the same way as in steps 2. and 3.

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.

Input functions in the following order: Create the function box, the inputs, the addresses, and then the outputs.

7

```
1 0000                                    FUNC-01
                                    IN-1      OUT-1          MB000002
1 0001    MB000001                  FIN       FOUT             O

1 0003    [ ├ MW00010 ]------->     IN-2      OUT-2    -------> ⇒ MW00011
                                    FIN       FOUT

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

1 0006                                    ADDRESS
                                          MA01000
```
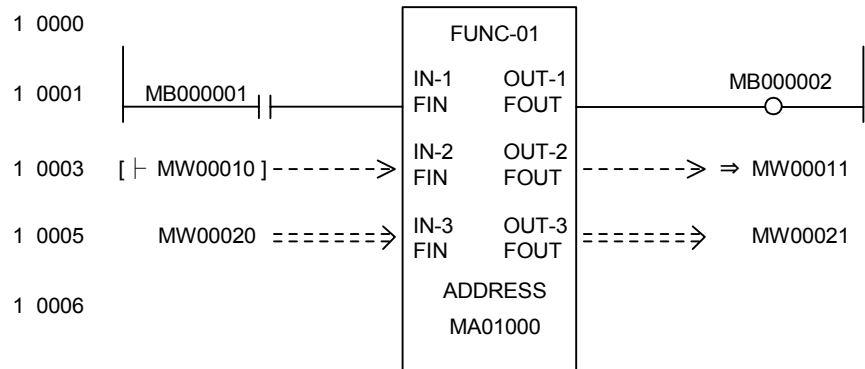
1. Creating the Function Box

   • Select the FSTART instruction and enter the function name, FUNC-01.

     The function box will be displayed.

   Function Box

```
   Function name
   -------------
   Inputs  | Outputs
   -------------
     Addresses
```
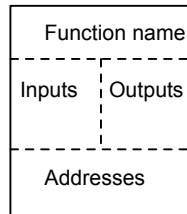
   Next, create the function input section, address input section, and output section as described below.

2. Entering the Inputs

   The following example is for inputting bits (defined using B-VAL).

   a) Enter the N.O. CONTACT instruction and the bit register number MB000001.

   b) Input the FIN instruction. The function input parameters and the N.O. CONTACT instruction will be connected.
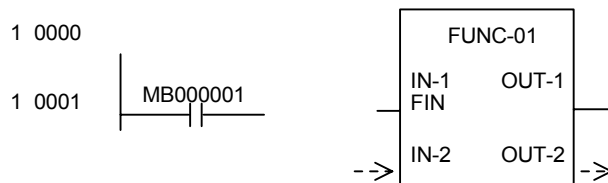
```
1 0000                               FUNC-01
1 0001    MB000001              IN-1      OUT-1
                                FIN
                          ->    IN-2      OUT-2  ->
```

   Create 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.

   c) Enter the INTEGER ENTRY instruction and the register address, MW00010.

   d) Input the FIN instruction. The function input parameters and the INTEGER ENTRY instruction will be connected.
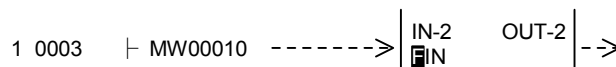
```
1 0003    ├ MW00010  ------->  IN-2    OUT-2  ->
                                FIN
```

Create 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 an integer register.

e) Select the FIN instruction. The function input parameters and the register number (or constant) will be connected.

```
1  0005           ▋           =======⟩| IN-3     OUT-3 |=⟩
                                      | FIN
```

f) Enter the register number or constant.

```
1  0005         MW00020 =======⟩| IN-3     OUT-3 |=⟩
                                | FIN
```
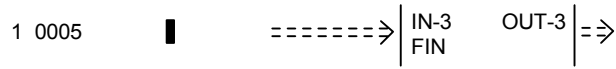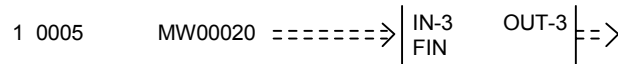
3. Address Section

The following example shows how to input addresses,

a) Select the FIN instruction.

b) Enter the register number, MA01000.

```
1  0006                              |   ADDRESS   |
                                     |   MA01000   |
```

4. Entering Outputs

Create the output section for bit data (defined using B-VAL) as follows:

a) Select the FOUT instruction.

b) Enter the COIL instruction and the register number MB000002. The function output parameters and the COIL instruction will be connected.
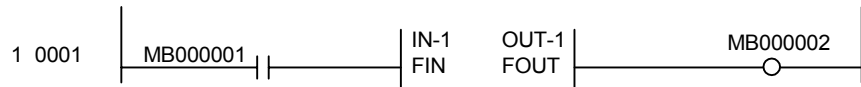
```
1  0001    | MB000001        | IN-1     OUT-1 |          MB000002          |
           |—————| |—————————| FIN      FOUT  |————————————O———————————————|
```

Create 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 an integer register.

c) Select the FOUT instruction.

d) Enter the STORE instruction and the register number, MW00011. The function output parameters and the STORE instruction will be connected.
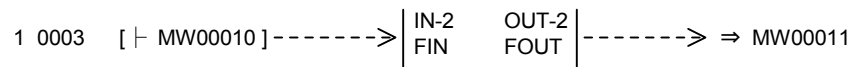
```
1  0003   [ |— MW00010 ]------⟩| IN-2     OUT-2 |------⟩ ⇒ MW00011
                               | FIN      FOUT  |
```

Create 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 an integer register.

e) Select the FOUT instruction.

f) Enter the register number, MW00021.

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

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.

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 drawing number.

   2. Enter the drawing number, H01.01.

Inputting the END Instruction

The END instruction is placed at the end of the IF, WHILE, and FOR statements, and at the end of drawing and function programs. The END instruction will be changed to IEND, WEND, or FEND depending on the statement when it is entered. For drawing and function programs, the END statement will be changed to DEND when entered.

◀**EXAMPLE**▶   As an example, the procedure to input the following instructions is shown below.

```
1  0000    |- 00000                                        Æ J
1  0002                                                     Æ MW02000
1  0003    WHILE
2  0004    |- J          <00100
2  0006    ON
2  0007    |- MW00200  +MW00100j                           Æ MW02000
2  0010    |- J          +00001                             Æ J
1  0013    WEND
```

   1. Enter the counter (J), the integer math 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 above diagram).

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 input.

Inputting Inline Comments

Comments can be entered at any position in main programs and user function programs. Inline comments do not affect the program execution at all.

The procedure to input inline comments is outlined below.

1. Select the COMMENT instruction.

2. Enter the comment, "MW01000 is motor rpms."

3. Enter double quotation marks (") at the end of the comment.

1   0000   "MW01000 is motor rpms"

(INFO)   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.

7.3.6 Editing Programs

Instructions can be edited. If the user starts to edit programs while online, the current value will not be refreshed until the edited program is saved normally.

- Insert
- Delete
- Undelete
- Cut
- Copy
- Paste
- Change operand
- Jump to step number
- Opening Programming Window for SEE and FSTART instructions
- Retracing display windows: Back

IMPORTANT   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.

7

■ Inserting

The procedure to insert instructions into a string of instructions is outlined below.

1. Move the cursor to the position where the instruction is to be inserted.

2. Select **Edit (E)** and then **INS (I)** from the programming menus. "INS" will appear at the bottom of the screen to indicate that the insert operation is in progress, space to insert instructions will be provided, and the rest of the problem below the insertion area will temporarily not be displayed.

```
                                                              SGL01
                                                              MB000020
1  0000    │ MB000202                                             ─○─        │
           └─────────┤├─────────────────────────────────────────────────────┘

  ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
  │ ▊       Insertion area                                                │
  └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```
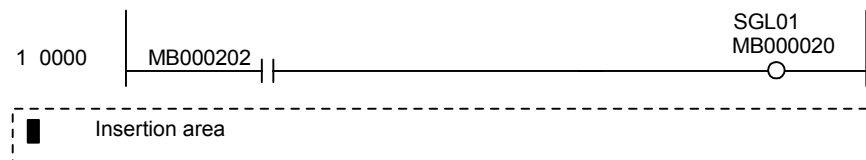
3. Enter the instruction. Further instructions can be entered until step 4. is performed.

4. Select **Edit (E)** and then **INS (I)** from the programming menus.

   The instruction entered in step 3. will be inserted and the portion of the program below the insertion point will be displayed correctly again.

■ Deleting

The procedure to delete a block of instructions is outlined below.

1. Move the cursor to beginning of the block of instructions to be deleted.

2. Select **Edit (E)** and then **DEL (D)** from the programming menus. "DEL" will appear at the bottom of the screen 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.

```
1  0002   ▊ IB00000 ▊                                      ▊ 0B00000 ▊
          ▊   ─/─   ▊──────────────────────────────────────▊   ─○─   ▊
                                                              SGL02
                                                              MB006801
1  0004   ▊ MB004900 ▊                                         ─○─
          ▊   ─┤├─   ▊──────────────────────────────────────
```
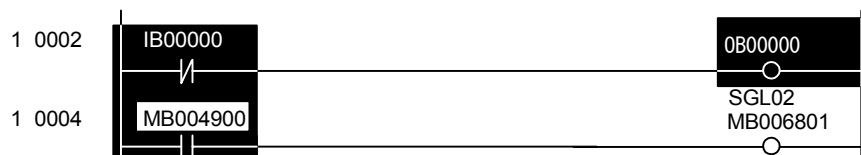
4. Select **Edit (E)** and then **DEL (D)** from the programming menus.

   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 diagram below if one instruction in a relay circuit is deleted, depending on the connection status of the circuit where the instruction was deleted.
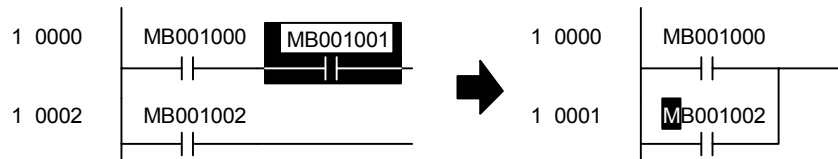
- Circuits will be connected after an instruction is deleted if they are connected directly to the deleted element.
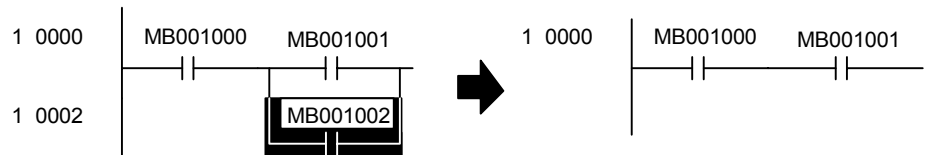
Circuits will be open after an instruction is deleted if they are connected in series to the deleted element.

■ 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.

■ UNDELETE

The UNDELETE can be used to undo one delete, cut, or paste operation. The range in which the UNDELETE can be used is shown below.
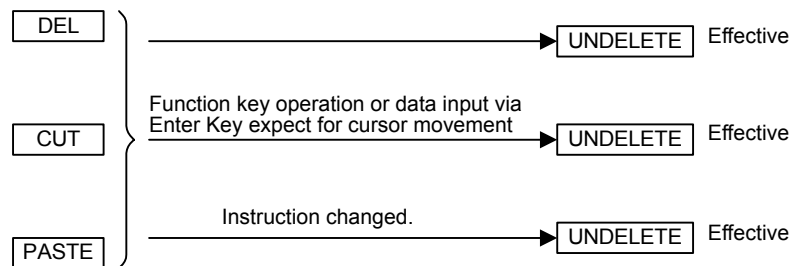
The following example shows executing UNDELETE after DELETE.
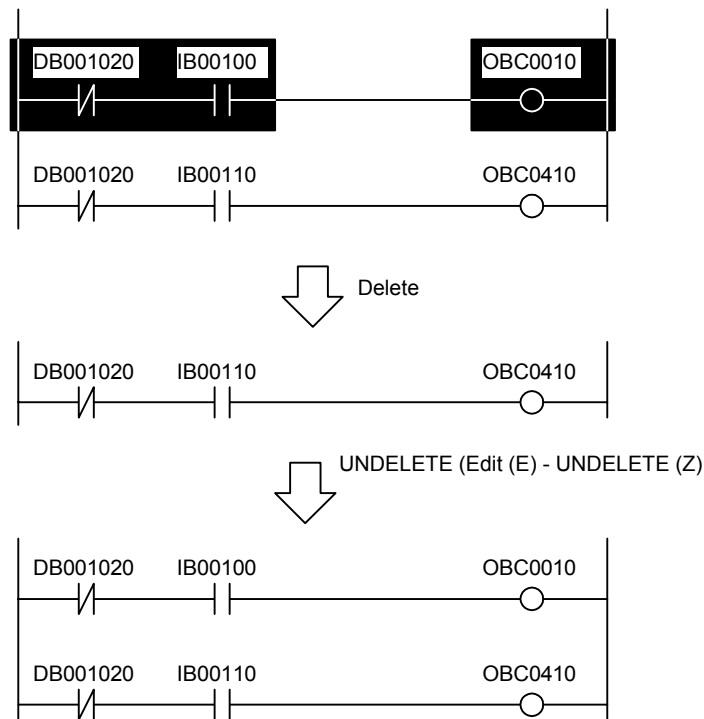
■ Cutting

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.

The procedure to cut instructions is outlined below.

1. Move the cursor to the start of the section to be cut.

2. Select *Edit (E)* and then *Cut (X)* from the programming menus. "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 (E)* and then *Cut (X)* from the programming menus.

   The section specified in 1 and 3 will be cut.

INFO

1 Press the ESC Key to cancel the cut operation without cutting any instructions.

2 Unlike the delete operation, power lines will not be corrected when instructions are cut using the cut operation.

■ Copying

Instructions can be copied to the clipboard. The contents of the clipboard can be reproduced multiple times using the paste operation.

The procedure to copy instructions to the clipboard is outlined below.

1. Move the cursor to the beginning of the section to be copied.

2. Select *Edit (E)* and then *Copy (C)* from the programming menus. "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 (E)* and then *Copy (C)* from the programming menus.

   The section specified in steps 1. and 3. will be copied.

■ Pasting

The contents of the clipboard can be reproduced. The instructions copied to the clipboard using the cut or copy operations will be reproduced. This data 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.

The procedure to reproduce instructions on the clipboard is outlined below.

1. Move the cursor to the position where the instruction is to be pasted.

2. Select *Edit (E)* and then *Paste (V)* from the programming menus.

3. The data on the clipboard will be inserted into the position specified in step 1.

■ Changing Instructions and Operands

The procedure to change previously entered instructions or operands is outlined below.

Changing Relay Numbers

1. Use the Cursor Keys to move the cursor to the relay number to be changed.

2. Enter the new relay number.

Changing Contacts

1. Use the Cursor Keys to move the cursor to the contact instruction to be changed.

2. Enter the new contact instruction.

Changing Relay Numbers and Contacts

1. Use the Cursor Keys to move the cursor to the operand to be changed.

2. Enter the new operand.

3. Enter the new relay number.

Changing Operands

1. Use 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 constants, and subscripted registers for X, Y, Z and A constants.
- Subscript registers (I and J).

Changing Comments

1. Use 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.

■ Jumping to a Particular Step Number

The procedure to move the cursor to a particular step number in the program is outlined below.

1. Select *Cursor (S)* and then *Jump to Line (L)* from the programming menus.

2. Enter the step number in the Display Position Dialog Box and click the **Set** Button.

```
┌─────────────────────────────────────┐
│ Display position                  ⊠ │
│                                      │
│      Step No.    ┌──────────┐        │
│                  │ 15       │        │
│                  └──────────┘        │
│   ┌──────────┐     ┌──────────┐      │
│   │   Set    │     │  Cancel  │      │
│   └──────────┘     └──────────┘      │
│                                      │
└─────────────────────────────────────┘
```
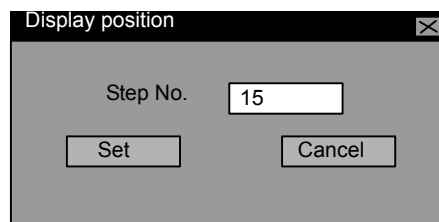
3. The cursor will move to the step number designated in the previous step.

■ Opening Program Windows Used by SEE and FSTART Instructions

When SEE or FSTART instructions are used in the drawing or function program that is currently displayed, the drawing or function program window that is called by these instructions can be opened.

The procedure to open the program window used by SEE and FSTART instructions is outlined below.

1. Move the cursor to the drawing number or function symbol that the SEE or FSTART instruction is calling.

    1 0000   SEE   H01.01

2. Select **Debug (*G*)** and then **REFER (*R*)** from the programming menus.

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

⊙ **INFO**

1 The refer operation cannot be executed in Offline Mode.

2 The current values when the relevant SEE or FSTART instruction was executed will be shown in any drawing or function program opened with the refer operation.

■ Returning to Previous Windows

The window from which the refer operation was used can be returned to in the reverse order.

Select **Debug (*G*)** and then **BACK (*B*)** from the programming menus 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.

7.3.7 Creating Branch Circuits

When branches and parallel connections 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 branch and connection points. The cursor position can be reserved or released by alternately designating branch and connection points. Branch and connection point designation are found on the Command Selection Menu. Mnemonics can also be used to designate branches or connection points.

■ Setting Branches

As shown in the following diagram, branches are display to the left of a COIL instruction, and input positions for parallel circuits are reserved starting from the branch. The branch will be automatically displayed without setting it if a contact is to be connected to the power line.
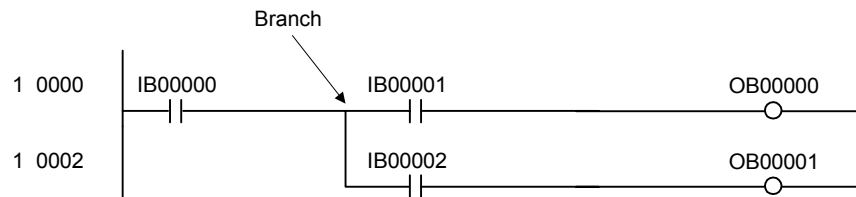
◀**EXAMPLE**▶   The procedure to set the branch shown in the above diagram is outlined below.

1. Select the N.O. CONTACT instruction.
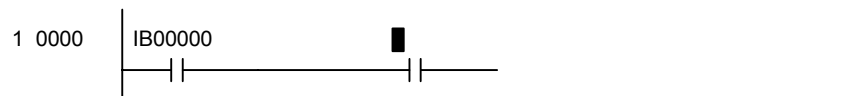
Select **Command (*Q*)**, **RELAY (*R*)**, and then **Branch (*T*)** from the programming menus.

2. A branch will appear.

Branch point

1 0000 | IB00000   ■
          ┤├   ┤├

3. Enter the relay number.

Branch point

1 0000 | IB00000   IB00001   ■
          ┤├   ┤├

⟨● INFO⟩
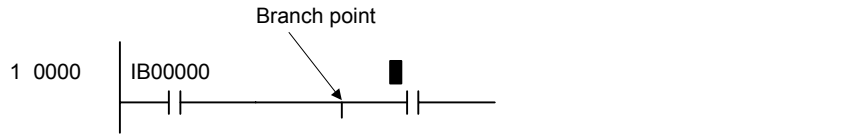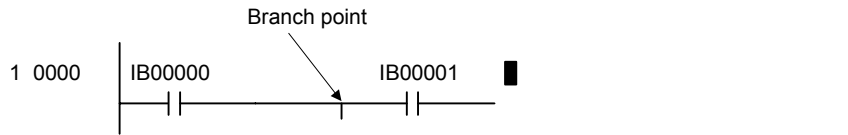
1 The mnemonic for a branch, a comma (,), can be used at step 2. to display a branch.

2 Insert a COIL instruction after completing step 4. to display the cursor at the branch designated in step 3., rather than at the power line. This enables the next instruction to be entered from this point.

Branch point

1 0000 | IB00000   IB00001   OB00000
          ┤├   ┤├   ○

          ■

3 The cursor will move to the last branch if several branches have been designated.

■ Setting Connection Points

As shown in the following diagram, connection points are shown to the right of the contact instruction and the input positions for parallel circuits will be reserved between a branch and connection point if there is a branch, and between the power line and the connection point if there is no branch.

Connection Point

1 0000 | IB00000   IB00001   OB00000
          ┤├   ┤├   ○

1 0002 | IB00002
          ┤├
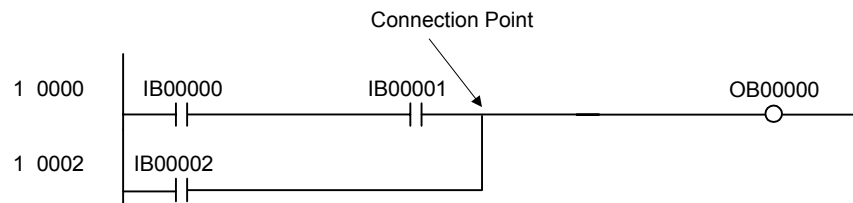
◀**EXAMPLE**▶ The procedure to set the connection point shown in the above diagram is outlined below.

1. Select the N.O. CONTACT instruction.

1 0000 | IB00000   ■
          ┤├   ┤├

2. Select *Command (O)*, *RELAY (R)* and then *Join (J)* from the programming menus.

3. A connection point will appear.

Connection Point

1 0000   IB00000

4. Enter the relay number.

Connection Point

1 0000   IB00000   IB00001

⊙ INFO
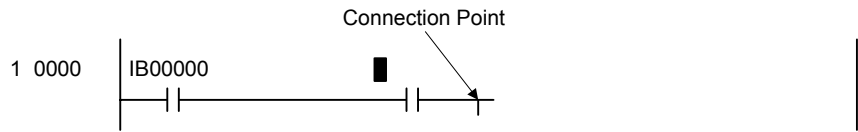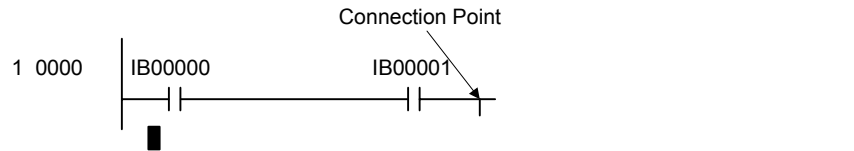
1 The mnemonic for a connection point, a period (.), can be used at step 2. to display a connection point.

2 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 has been designated previously, the next instruction will be entered from the branch position, and if not, the next instruction will be entered from the power line.

■ Setting Parallel Connections

As shown in the following diagram, 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.

1 0000   IB00000   IB00001   OB00000

1 0002   IB00002
                                              Connection point
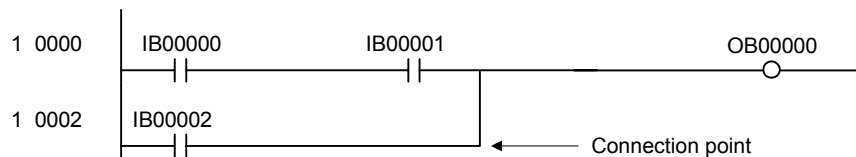
◀EXAMPLE▶   The procedure to set the parallel connection shown in the above diagram is outlined below.

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
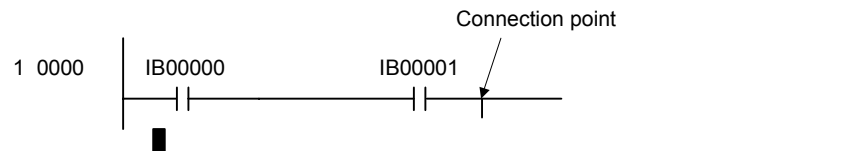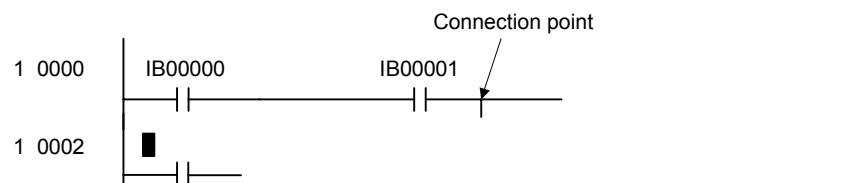
3. Select *Command (O), Relay (R)* and then *Connect (C)* from the programming menus.

Connection point

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

1  0002   █
          ─┤├─
```

4. Enter the relay number.

Connection point

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

1  0002   IB00002
          ─┤├─
```

⦿ INFO
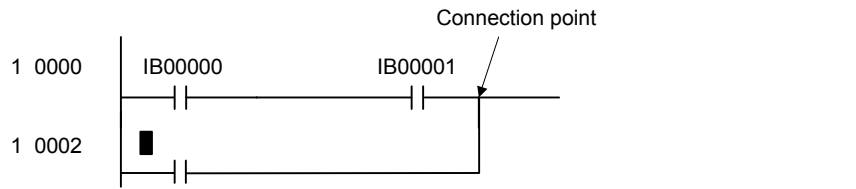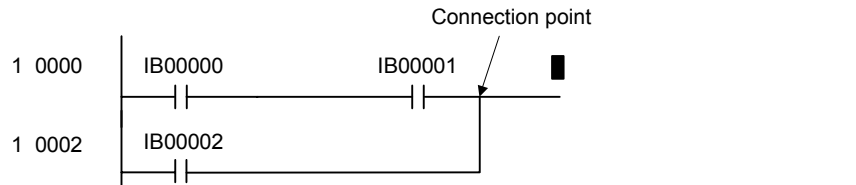
　1 The mnemonic for a parallel connection, a comma and a period (, .), can be used at step 3. to display a parallel connection.

　2 Once step 4. has been completed, the input position for the next instruction will be to the right of the parallel connection.

■ Creating a Pulse Generation Circuit

Pulse Generation Circuits are programmed the same way as the branching method explained in the three preceding sections, *Setting Branches*, *Settings Connection Points*, and *Setting Parallel Connections*.

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

1  0003                  MB009971                    OB00001
                         ─┤↓─                        ─○─
                                        ON PULSE instruction

                                        OFF PULSE instruction
```
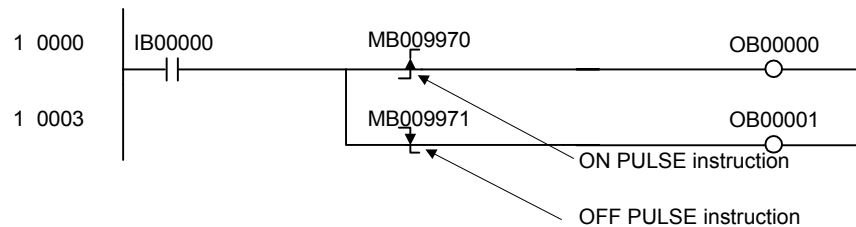
◀**EXAMPLE**▶　The procedure to create the pulse generation circuit shown in the above diagram is outlined below.

　　1. Enter the N.C. CONTACT instruction.

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

```
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.

7

1 0000 │ IB00000   MB009970   OB00000
       ├─┤ ├─────────────────────┤↑──────────────────────○──
                           ■
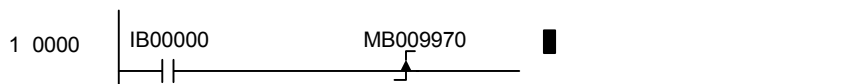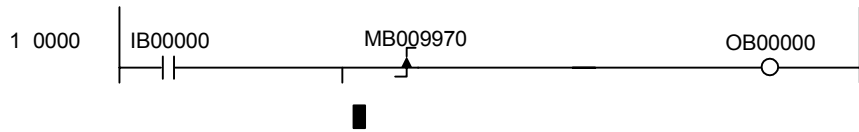
5. Select the OFF PULSE instruction.

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
       │   └─────────┤↓────────────────────○──
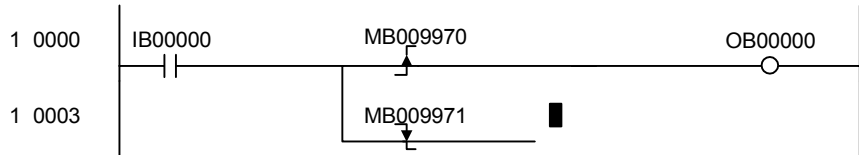
■ Creating Timer Circuits

Timer circuits are created by setting the following points:

- Branches, connection points, and parallel connections.
- Time limit setting constants or register numbers for time limit settings.
- Register numbers for counting.

Timer circuit

1 0000   IB00000   005.00   MW00010   OB00000
         ─┤/├───────────────┤T─────────────┤───────────○──
1 0003   IB00001
                            ─┤ ├──
1 0005   IB00002   OB00001
                            ─┤ ├──────────────────────○──
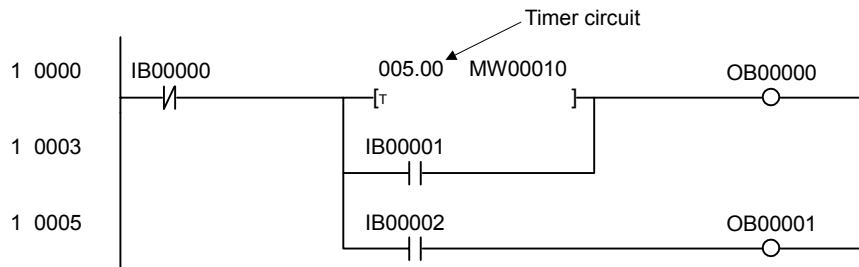
◀EXAMPLE▶   The procedure to create the timer circuit shown in the above diagram is outlined below.

1. Enter the N.C. CONTACT instruction.

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

1 0000   │ IB00000   ■
         ├─┤/├───────────────┬┤T────────────┐├──────
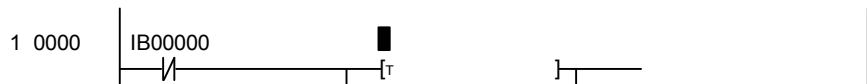
3. Enter the time limit settings (constants or register numbers) which are the operands for the ON DELAY instruction.

7

```
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              ┤ ├──
                                 ▊
```
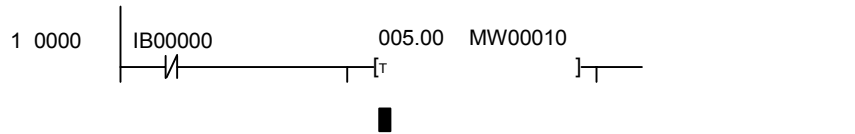
5. Select the N.O. CONTACT instruction and then set the branches and the parallel connections.

```
1  0000    IB00000              005.00  MW00010          OB00000
          ─┤/├──────────────────┤[T          ┤      ─────(  )──

1  0003                          ▊
                                 ──┤ ├──
```

6. Enter a register number as the operand of the N.O. CONTACT instruction.

7. Enter the COIL instruction.
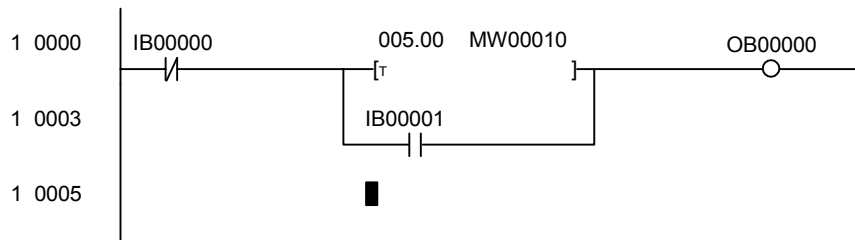
```
1  0000    IB00000              005.00  MW00010          OB00000
          ─┤/├──────────────────┤[T          ┤      ─────(  )──

1  0003                          IB00001
                                 ──┤ ├──

1  0005                          ▊
```

8. Enter the N.O. CONTACT instruction.

```
1  0000    IB00000              005.00  MW00010          OB00000
          ─┤/├──────────────────┤[T          ┤      ─────(  )──

1  0003                          IB00001
                                 ──┤ ├──

1  0005                          IB00002    ▊
                                 ──┤ ├──
```

9. Enter the COIL instruction.

```
1  0000    IB00000              005.00  MW00010          OB00000
          ─┤/├──────────────────┤[T          ┤      ─────(  )──

1  0003                          IB00001
                                 ──┤ ├──

1  0005                          IB00002               OB00001
                                 ──┤ ├──               ──(  )──
```
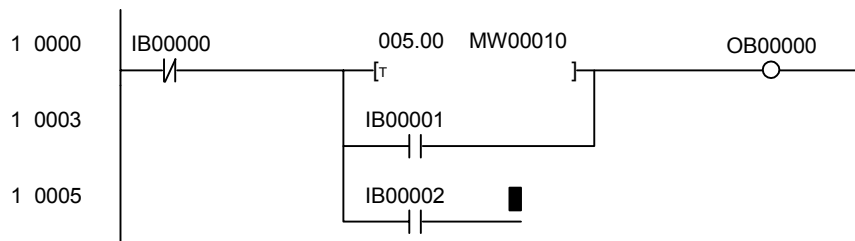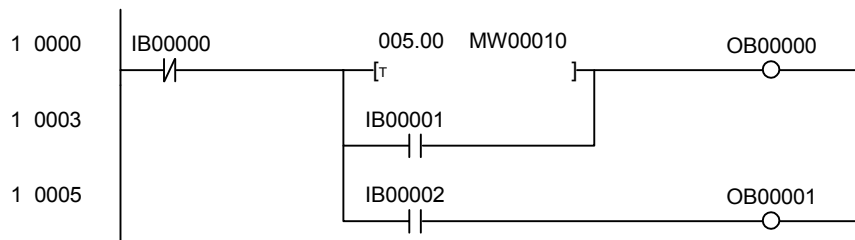
INFO ➤ Branch, connection point, and parallel connection settings can be made when the cursor is on the time

limit setting or the register for counting.

■ Series Connections

When connection points or parallel connections have not been stipulated, 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 diagram, the input position for the next instruction will automatically appear at the start of the next line.
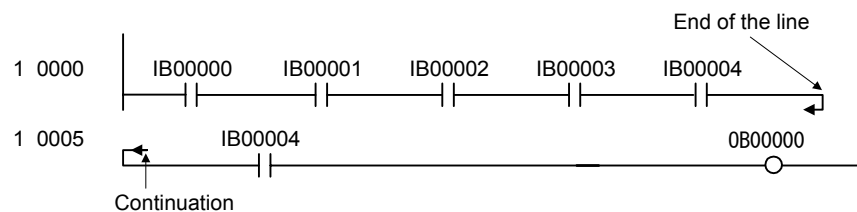
■ Creating Complicated Circuits

Complicated sequence circuits, such as the one shown in the following diagram, can be created by setting branches, connection points, and parallel connections.
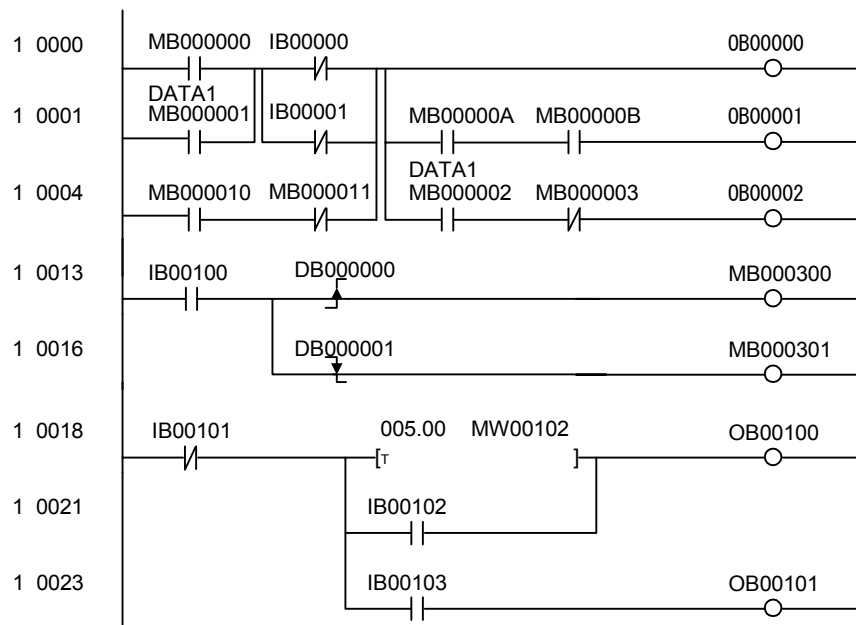
The procedure (steps 1 to 24) for creating the sequence circuit shown in the above diagram is outlined in the following table.

Step	Instruction	Branch or Connection Selection	Operand Input	
1	N.O. CONTACT	Connection point	MB000000	
2	N.O. CONTACT	Parallel connection	MB000001	

Step	Instruction	Branch or Connection Selection	Operand Input	
3	N.C. CONTACT	Branch, 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	OB00000	
8	N.O. CONTACT	Branch	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	DB000000	
16	COIL	-	MB000300	
17	OFF PULSE	-	DB000001	
18	COIL	-	MB000301	
19	N.C. CONTACT	-	IB00101	
20	ON DELAY	Branch, connection point	5	MW00012
21	N.O. CONTACT	Branch, parallel connection	IB00102	
22	COIL	-	OB00100	
23	N.O. CONTACT	-	IB00103	
24	COIL	-	OB00101	

The procedure for step 3 in the table, for example, is outlined below.

1. Select the N.C. CONTACT instruction.

2. Select the BRANCH instruction.

3. Select the connection point.

4. Enter **I0000** and press the **Enter** Key.

7

⬤ INFO ▶

   1 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.

   2 When multiple operands are used, press the Enter Key after inputting each operand to ensure that each operand is entered correctly.

7.3.8 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.
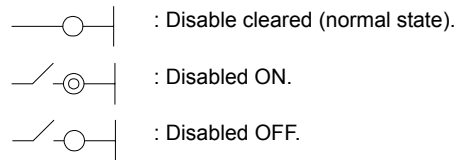
- RESET COIL Instruction Notation

———|R|—| : Disable cleared (normal).

——／|R|—| : Disabled ON.

——／|R|—| : Disabled OFF.
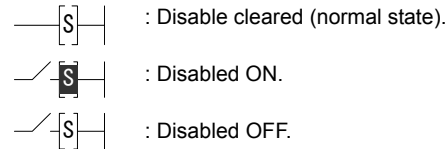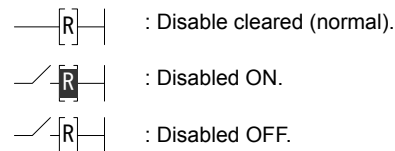
IMPORTANT

1 Devices may malfunction if the above operations are executed during equipment operation. Execute these operations only after checking that equipment is not being operated.

2 In Online Mode, disabled coil settings will be written to the Machine Controller at the same time as the settings are created or cleared.

3 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.

■ Setting Disabled ON

The procedure to force-set and to fix a COIL instruction to ON during program execution is outlined below.

1. Move the cursor to the COIL instruction to be set to Disabled ON.

2. Select **Debug (G)** and then **DIS-ON (N)** from the programming menus. The COIL instruction notation will change to Disabled ON.

■ Setting Disabled OFF

The procedure to force-set and to fix a COIL instruction to OFF during program execution is outlined below.

1. Move the cursor to the COIL instruction to be set to Disabled OFF.

2. Select **Debug (G)** and then **DIS-OFF (F)** from the programming menus. The COIL instruction notation will change to Disabled OFF.

■ Clearing Disable Settings

The procedure to clear Disable Settings for COIL instructions is outlined below.

1. Move the cursor to the COIL instruction for which the disable setting is to be cleared.

2. Select *Debug (G)* and then *ENABLE (E)* from the programming menus. The COIL instruction notation will return to normal.

7.3.9 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.

■ Synchronized Refreshing of 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 refreshed 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.

The procedure to synchronously refresh current values is outlined below.

1. Select *Debug (G)* and then *SYNC (S)* from the programming menus.

2. Enter the register numbers and values in the Set Current Value Collection Condition Window and click the **Set** Button.

Set Current Value Collection Condition

Register   Value

MW1000   10

Set   Cancel   Clear
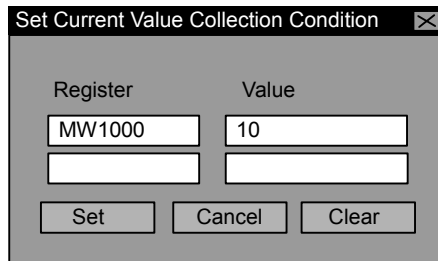
The current values will be refreshed when the set condition is met.

INFO ▶ Click the **Clear** Button in step 2. to clear all the set refreshing conditions for current values.

■ Displaying Current Values Using the Refer Operation

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 drawing 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 diagram, 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.
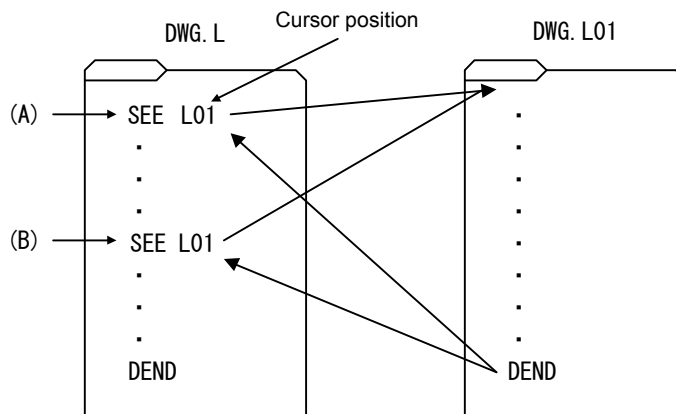
The procedure to display current values using the REFER instruction is outlined below.

1. Move the cursor to the drawing number or function symbol position for the SEE or FSTART instruction.

2. Select **Debug (G)** and then **REFER (R)** from the programming menus.

   The program window being called will be displayed.

■ Pausing Refreshing of Current Values

Select *Debug (G)* and then *HOLD (H)* from the programming menus to pause refreshing of current values.

Execute the hold operation again when the refreshing of current values is paused to restart the refreshing of current values.

7.3.10 Creating Comments

The procedure to create register comments is outlined below.

1. Select *View (V)* and then *Comment Bar (B)* from the programming menus to open the Comment Window.

```
Comment  H01                                                    ×
┌──────────────┐ ┌┴┐ ┌─────────────────────────────────────┐
│              │ │ ││ │                                     │
└──────────────┘ └─┘ └─────────────────────────────────────┘
```

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 (V)* and then *Comment Bar (B)* again to close the Comment Window.

⬤ INFO ▶

1 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.

2 The symbol entered in step 3. is different to the symbol defined on the Symbol Definition Tab Page in the Property Window.

7

7.3.11 Saving Ladder Logic Programs

This section explains how to save ladder logic programs and the configuration of the Error Window.

■ Saving Ladder Logic Programs

Ladder logic programs are saved to the Machine Controller and the hard disk in Online Mode, and to the hard disk in Offline Mode.

If a drawing or function program window is open, all related programs (such as SFC and table programs) will be saved at the same time.

The procedure to save ladder logic programs is outlined below.

1. Select *File (F)* and then *Save (S)* from the programming menus.

2. Click the **Yes** Button in the message box.

3. Click the **OK** Button in the next message box.

An insufficient memory error may occur when saving. Refer to *5.4.1 Compile Execution* for details.

■ Error Window Configuration

The ladder logic program will be compiled when it is saved. If a compile error is detected, the Error Window will be opened.

Save Error				
DWG / FUNC H01				
No.	Type	Code	Message	Remarks
1	Main program	0104	Command of END' not found	1 0 0 0

OK   Cancel

Display Item	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.
Step 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.
Step 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.
Detail 1	This data is disabled for main programs, SFC programs, constant tables (# registers), table programs other than interlock tables, and tuning panels. For constant tables (# registers), the numbers for which errors were detected will be displayed. For Create Interlock Table Windows, the suitable number for which the error was detected will be displayed.
Detail 2	Under development. This data is not available in the current version.
Remarks	Under development. This data is not available in the current version.

Move the highlighted error indication in any error window and click the **OK** Button to move the cursor to the position where the error was detected.

Click the **Cancel** Button to close the Error Window.

7.3.12 Printing Ladder Logic Programs

Ladder logic programs can be printed from the program window without starting up the Print Manager. Only the ladder logic program that is currently open, however, will be printed.

■ Page Settings

Use this procedure to set the print page margins.

1. Select *File (F)* and then *Page Setting (M)* from the programming menus.

2. Set each margin in the Ladder Program Page Set Window, and click the **OK** Button.

```
Ladder Program Page Set                    ⊠

  Up Margin      [ 8  ]   mm
  Down Margin    [ 8  ]   mm
  Left Margin    [ 15 ]   mm
  Right Margin   [ 5  ]   mm

  [   OK   ]              [ Cancel ]
```
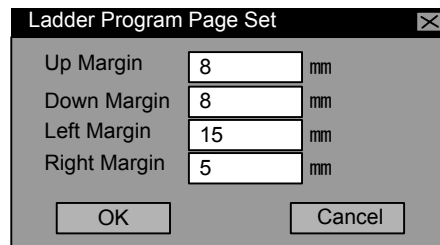
■ Printing

Use this procedure to print the ladder logic program currently displayed.

1. Select *File (F)* and then *Print (P)* from the programming menus.

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.

7.3.13 Closing Ladder Logic Program Editing

The edit process for ladder logic programs is exited by closing the Programming Window.

Select *File (F)* and then *Close (C)* from the programming menus to close the Programming Window.

7

7.4 Creating Table Programs

This section explains how to create table programs.

7.4.1 Outline of Table Programs

Tables can be used to easily create constant tables or ladder logic programs by entering register numbers, contact types, interlock information, and other data.

There are six types of tables:

Table Program	Function
Constant tables (# register)	Creates tension control parameters, position control parameters, and other constants specific to a drawing or function program.
Constant tables (M register)	Creates mechanical and electrical equipment specifications and other constants used by all drawing and function programs.
I/O conversion tables	Creates scale conversions for numeric data and signal conversions for bit signals.
Interlock tables	Creates device startup and operating conditions and other interlocks.
Component assembly tables	Simultaneously creates multiple solenoid valve circuits, auxiliary sequence circuits, and other standard circuits.
C constant tables	Creates constant tables used in all drawings and functions, e.g., items for facilities or products.

7.4.2 Table Program Window

■ Opening Table Program Windows

Except for the window for C constant tables, the Table Program Windows can be opened from the File Manager and the Engineering Manager.

Opening from the File Manager

1. Click the drawing number in the directory tree.

2. Select *File (F)* and then *Open (O)* on the File Manager Menu.

3. Select the type of table from the submenu.

Opening from the Engineering Manager

1. Select *File (F)*, *Open (O)* and then *Drawing (R)* on the File Manager Menu.

2. The submenu will be displayed. Select the type of table from the five types outlined earlier in this section.

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

- *7.4.5 Inputting # Register Constant Table Data*
- *7.4.6 Inputting M Register Constant Table Data*

- *7.4.7 Inputting I/O Conversion Table Data*
- *7.4.8 Inputting Interlock Table Data*
- *7.4.9 Inputting Component Assembly Table Data*
- *7.4.10 Inputting Data in C Constant Tables*

⊙ INFO

1 C constant tables cannot be opened from the File Manager. Select *File (F), Open (O),* and then *C Register (C)* from the Engineering Manager windows.

2 The Open DWG Setting Window will be opened if a Table Program Window is opened when no drawing or function program is open. Enter the drawing name and type, and click the **OK** Button.

3 The table program is set for the drawing or function ladder logic program from which it was opened. Therefore, if different drawing number or function symbol table programs are to be set, the ladder logic program for that drawing number or function symbol must be opened.

7.4.3 Table Program Window Menus

The following table shows the functions of menu commands in Table Program Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens each function windows.
Close (C)	Closes Table Program Windows.
Register User Menu (S)	Registers shortcuts for Table Program Windows.
Save (S)	Saves table programs.
Delete (D)	The delete function cannot be used with Table Program Windows.
Page Setting (M)	Sets print margins.
Print Table (P)	Prints table programs.
Exit (X)	Exits the Engineering Manager.
Edit (E)	
Cut (T)	Cuts table data.
Copy (C)	Copies table data to the clipboard.
Paste (P)	Copies the contents of the clipboard.
Delete Row (D)	Deletes multiple consecutive rows.
Insert Row (I)	Inserts a row.
Input (I)	
Input Setting Data (S)	Switches to settings input mode.
Input Table Definition (T)	Switches to table definition input mode.
Input Register (R)	Switches to register input mode.
Direction of Cursor Movement (C)	Sets the direction for cursor movement.

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Menu Command		Function
View (V)		
	Tool Bar (T)	Displays the Tool Bar.
	Status Bar (S)	Displays the Status Bar.
	Display Head Row (F)	Moves the cursor to the first row in the table.
	Display Designated Row (R)	Moves the cursor to a specific row.
	Display Last Row (E)	Moves the cursor to the last row in the table.
	Next Page (N)*	Moves the cursor to the next page of the table.
	Previous Page (B)*	Moves the cursor to the previous page of the table.
Window (W)		
	Cascade (C)	Stacks windows in the display.
	Tile (T)	Lines up windows in the display.
	Arrange Icons (A)	Lines up icons.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

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

7.4.4 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 input cell data can also be specified.

■ 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 (I)* and then *Input Setting Data (S)* from the menus.
Table Definition Input Mode	Data can be entered into any cell in the table. Select *Input (I)* and then *Input Table definition (T)* from the menu.
Register Input Mode	Only register numbers can be entered in Register Input Mode. No inputs can be made to other cells. Select *Input (I)* and then *Input Register (R)* from the menu.

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■ Switching Cursor Movement Direction

Use the procedure to switch the cursor movement direction after table data has been entered and the Enter Key pressed.

Movement Direction	Details
Horizontal	Select *Input (I)* and then *Direction of Cursor Movement (C)* from the menus. The Designate Direction of Cursor Movement Window will be displayed. Specify the direction of movement and click the **OK** Button.
Vertical	
No movement	

7.4.5 Inputting # Register Constant Table Data

register constant tables are created by inputting constants (integer, double-length integer, and real number constants), 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 DWG Definition Tab Page in the Property Window.

Setting Item	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.
SETVAL	Enter the constant to be saved to the # register. When inputting in hexadecimal, add an "H" to the beginning of the value, such as H00FF. When inputting settings, input values within the range outlined 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

1 SETVAL, Upper Limit, Lower Limit, and Save Point must be set. An error will occur when the table is

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saved if these are not set.

2 # register constant tables cannot be created if the number of # registers is set to 0 on the DWG Definition Tab Page in the Property Window.

7.4.6 Inputting M Register Constant Table Data

M register constant tables are created by inputting 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 Item	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.
SETVAL	Enter the constant to be saved in the M register. When inputting in hexadecimal, add an "H" to the beginning of the value, such as H00FF. When inputting settings, input values within the range outlined 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.
Save Point	Enter the M register number to which the constant will be saved.

⊙ INFO ▷   SETVAL, Upper Limit, Lower Limit, and Save Point must be set. An error will occur when the table is saved if these are not set.

7.4.7 Inputting 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 val-

ues 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 Item		Details
Data Name		Enter a name of up to 36 characters.
Input	Symbol	Enter a symbol of up to 8 characters to be used for the input register.
	Register	Enter the input register number. The current value will be displayed in Online Mode.
	Unit	Enter a unit of up to 8 characters for the input register value.
Setting Range	Lower Limit	Enter the lower limit for the check after scale conversion.
	Upper Limit	Enter the upper limit for the check after scale conversion.
Scale Conversion/Bit		Enter the equation for converting the input register values. Leave a space between the input equation values and the operands. Refer to the *MP900 Series Machine Controller User's Manual: Ladder Programming* (SIEZ-C887.2C) 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 is to be saved. The current value will be displayed when online.
	Unit	Enter a unit of up to 8 characters for the output register value.

IMPORTANT

1 The input register and output register must be set. An error will occur when the table is saved if they are not set.

2 I/O conversion tables cannot be created for user functions.

7.4.8 Inputting Interlock Table[1] Data

Interlock tables define the device startup and operation and other interlock conditions. Interlock conditions are defined by inputting 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.

- Inputting table data
- Switching between subtables and main tables
- Splitting and joining blocks
- Registering comments

■ Inputting Table Data

Up to 500 rows and 25 columns of table data can be entered.

Setting Item	Details
No.	The row number for each block is displayed. The blocks are numbered alphabetically, and are followed by a numeric row number.
M	Enter the input mode for interlock conditions as one letter: I, S, O, or X. Refer to the *Interlock I/O Modes* table 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.

[1] Interlock tables

Interlock tables are a type of table program that show device startup and operating conditions.

Setting Item	Details
Signal	Enter the interlock condition. Enter (⬡) for N.O. CONTACT, (⬡) for N.C. CONTACT, and (●) for COIL. The interlock condition is input as A for N.O. CONTACT, B for N.C CONTACT, and C for COIL.

Table 7.2 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 xx in rows defined in this mode.
S	Used when inputting 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 xx in rows defined in this mode.
X	Used when defining output signals as input signals. An entry must be made in the *Register* column 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

1 The mode, register, and signal must be set. An error will occur when the table is saved if these are not set.

2 Interlock tables cannot be created for user functions.

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■ 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 (V)* and then *Sub Table/Main Table (A)* from the table program menus 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

for that subtable.

No subtable can be displayed for a row where data other than S is set in the *Mode* column.

■ Splitting and Joining Blocks

Interlocks can be split into a maximum of 26 blocks, to treat each block as an independent interlock.

The procedure to split and join blocks is outlined below.

1. Move the cursor to the block to be split or joined.

A11						
A12	S	M 1 POWER ON	M1-PWR	IB01001	◎	
A13	S	M 2 POWER ON	M2-PWR	IB01002	◯	
A14	S	M 3 POWER ON	M3-PWR	IB01003	◎	

2. Select *View (V)* and then *Block Division (W)* from the table program menus.

   The block will be split or joined.

A11						
B01	S	M 1 POWER ON	M1-PWR	IB01001	◎	
B02	S	M 2 POWER ON	M2-PWR	IB01002	◯	
B03	S	M 3 POWER ON	M3-PWR	IB01003	◯	

● INFO ▶

1 Each time the split/join operation is executed, splitting and joining blocks will be performed alternately.

2 Blocks in subtables cannot be split, and one interlock cannot be extended across multiple blocks. Each interlock must consist of one block only.

■ Registering Comments

Use the following procedure to select whether or not to register the data in the *Data Name* column as the register comment for the same row.

1. Select *Edit (E)* and then *Entry Comment (T)* from the table program menus.
2. Click either **Register name as comment** or **Do not register name as comment** in the Comment Registration Selection Window.
3. Click the **OK** Button.

7.4.9 Inputting Component Assembly Table Data

Component assembly tables are created by inputting I/O register numbers for user functions and work register numbers. When a component assembly 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.

- Inputting table data
- Switching part units
- Switching table formats

■ Inputting 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.

Normal Display

Setting Item	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. Put an "Ho" in front of numeric values when inputting in hexadecimal.
Output	Enter the output register numbers for allocating each user function output.
Head Work	Enter the D register number or # register number for allocating the work registers used within the user function.

●INFO

1 Component assembly tables cannot be created for user functions.

2 The default number of columns for the input and output sections of 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 in the *Part Name* column.

■ Switching Part Units

The procedure to switch between single part or multiple part composition tables is shown below.

1. Select *View (V)* and then *Designate Part Unit (P)* from the table program menus. The Part Unit Selection Window will be displayed.

2. Designate the part unit in the window and click the **OK** Button. The table unit will be switched and the component assembly table displayed.

■ 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 (V)* and then *Disp Selection (D)* from the table program menus.

The table format will be switched and the part composition table displayed.

The table format cannot be switched if the part unit is set to **Single Selection**.

7.4.10 Inputting Data in C Constant Tables

C registers are registered on C constant tables and can be accessed from drawing and function programs. C registers can be accessed from programs only.

Up to 200 C registers can be registered and are managed as a unit using the C Register Constant Table List.
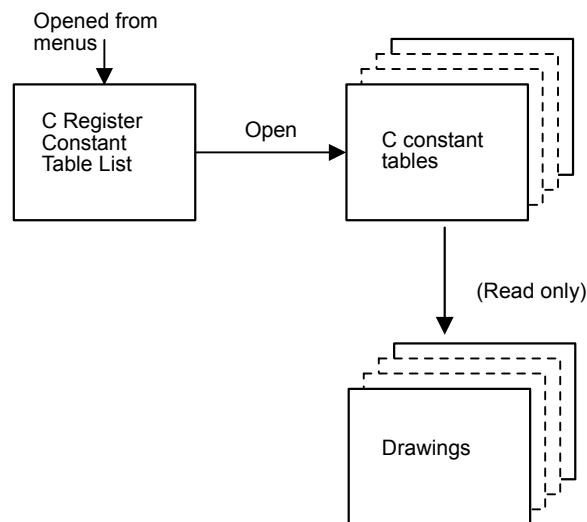
■ Outline of Creation Procedure

1. Open the C register constant table list. (Refer to *7.4.2 Table Program Window*.)

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.

■ C Register Constant List Window Configuration

The C Register Constant 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.
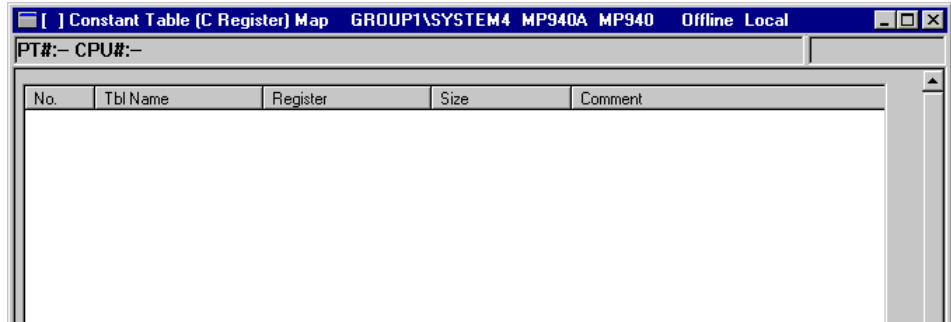
Display Item	Details
No.	Number within table.
Tbl Name	C register table names are displayed.
Register	The number of the first C register is displayed.
Size	The size of each C register starting from the first C register number is displayed in words.
Comment	The C register table comments are displayed.

■ C Register Constant Table List Window Menu Configuration

The following table shows the function of menu commands in the C Register List Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the C Register Constant Table List Window.
Resist User Menu	Resisters shortcuts for Table Program Windows.
Constant Table (C) (T)	Opens C constant tables.
New Open (N)	Creates a new C constant table.
Delete (D)	Deletes C constant tables.
Update (U)	Modifies C constant tables.
Print (P)	Prints documents.
Exit (X)	Exits the Engineering Manager.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Window (W)	

Menu Command		Function
	Cascade (C)	Stacks windows in the display.
	Tile (C)	Lines up windows in the display.
	Arrange Icons (A)	Lines up icons.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

■ Operation in the C Register List Window

The following operations are possible in the C Register List Window.

- Opening C constant tables
- Creating new C constant tables
- Deleting C constant tables
- Correcting C constant table information

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 (F)* and then *Constant Table (C) (T)* 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.

Creating New C Constant Tables

New C constant tables can be created using the following procedure. When a new table is created, the C constant table for that table will be opened.

1. Select *File (F)* and then *New Open (N)* from the C Register Constant Table List Menu. The New Window will be displayed.

2. Enter the table name, leading register number, size, and comment in the New Window and click the **OK** Button.

3. The C Register Table Window will be opened.

1 Enter a table name of up to 8 characters. Enter an initial register number between CW0 and CW4095. The sum of the initial register number and number input for the size must be 4096 or less.

2 Leading register numbers and register sizes that overlap with other C register ranges cannot be input.

■ Deleting C Constant Tables

Use the following procedure to delete C constant tables.

1. Click the *No.* column 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 (F)* and then *Delete (D)* on 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 |

■ Modifying C Constant Table Information

The register range and other C constant table information can be modified using the following procedure. The C Constant Table Window for that C register table will be opened after the modifications have been made.

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

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

2. Select *File (F)* and then *Update (U)* from the C 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 opened.

The name of the register table cannot be modified. Enter a leading register number between CW0 and CW4095. The sum of the register number and size must be 4096 or less. Leading register numbers and register sizes that overlap with other C register ranges cannot be input.

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■ Opening C Constant Table Windows

C constant tables are opened by clicking the corresponding C constant table number in the C Register Constant Table List Window.

■ [ ] Constant Table (C Register) GROUP940 MP02 MP940 Online Local								_▢▣
PT#: 1 UT#: 1 CPU#: 1								💻▶▶▶▶
No.	Data Name		Symbol	SETVAL	Unit	Lower Limit	Upper Limit	SavePoint
1								
2								
3								
4								
5								
6								
7								

■ C Register Table Window Menu Configuration

The following table shows the functions of menu commands in the C Register Table Window.

Menu Command		Function
File (F)		
	File Manager (F)	Opens the File Manager.
	Open (O)	Opens windows for individual functions.
	Close (C)	Closes the C Constant Table Window.
	Regist User Menu (S)	Registers shortcut keys for the C Constant Table Window.
	Save (S)	Saves C constant tables.
	Delete (D)	Not used with this window.
	Page Setting (M)	Sets print margins.
	Print Table (P)	Prints C register tables.
	Exit (X)	Exits the Engineering Manager.
Edit (E)		
	Cut (T)	Cuts table data.
	Copy (C)	Copies table data to the clipboard.
	Paste (P)	Reproduces data on the clipboard.
	Delete Row (D)	Deletes multiple consecutive rows.
	Insert Row (I)	Inserts a blank row.
Input (I)		
	Input Setting Data (S)	Switches to Settings input mode.
	Input Table Definition (T)	Switches to Table Definition input mode.
	Input Register (R)	Switches to Register input mode.
	Direction of Cursor Movement (C)	Changes the direction of cursor movement.

Menu Command		Function
View (V)		
	Tool Bar (T)	Displays the Tool Bar.
	Status Bar (S)	Displays the Status Bar.
	Display Head Row (F)	Moves the cursor to the first row of the table.
	Display Designated Row (R)	Moves the cursor to a specific row in the table.
	Display Last Row (E)	Moves the cursor to the last row of the table.
Window (W)		
	Cascade (C)	Stacks windows in the display.
	Tile (T)	Lines up windows in the display.
	Arrange Icons (A)	Lines up icons.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

■ Setting C Constant Tables

C registers are created by inputting constants (integer, double-length integer, real number, and hexadecimal constants), symbols, and C register numbers. When C registers are 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	SET VAL	Unit	Lower Limit	Upper Limit	Save Point
1 2 . . .							
			C register definition area				
		Table name	Leading Register No	Input Mode			

Setting Item	Details
Data Name	Enter a data 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.
SET VAL	Enter the constant to be saved to the C register. When inputting in hexadecimal, add an "H" to the beginning of the value, such as H00FF. When inputting settings, input values within the range outlined 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.

Setting Item	Details
Lower Limit	Enter the lower constant limit.
Upper Limit	Enter the upper constant limit. The lower limit must be less then or equal to the upper limit.
Save Point	Enter the C register number to which the constants will be saved.
Table Name	Displays the name of the currently open C register table.
Leading Register No.	Displays the leading C register number in the currently open C register table.
Input Mode	Displays the current input mode.

IMPORTANT The set value, upper limits and lower limits, and save points must be set, otherwise, an error will occur when the C constant tables are saved.

7.4.11 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 cells to edit
- Cutting and pasting table data
- Inserting and deleting rows
- Inserting and deleting columns

■ 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.

First Row

Select *View (V)* and then *Display Head Row (F)* from the table program menus. The cursor will move to the first row in the table.

Last Row

Select *View (V)* and then *Display Last Row (E)* from the table program menus. The cursor will move to the last row in the table.

Specific Row

1. Select *View (V)* and then *Display Designated Row (R)* from the table program menus. A window to set the table row will be displayed.

2. In window, input the row number to which the cursor is to be moved and click the **OK**

Button. The cursor will move to the specified row.

Next Page

Select *View (V)* and then *Next Page (N)* from the table program menus. The cursor will move to the first row of the next page.

Previous Page

Select *View (V)* and then *Back Page (B)* from the table program menus. The cursor will move to the first row of the previous page.

■ Selecting Table Cells to Edit

1. Click the top-left cell of the section to be edited.

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
5	ShortStopTime	STime	500	0.1sec	300	2000	#W00004

2. Drag the cursor to the bottom-right cell of the section.

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
5	ShortStopTime	STime	500	0.1sec	300	2000	#W00004

■ Cutting and Pasting Table Data

Table data can be cut, copied, and pasted. The table data editing functions can be used only in Table Definition Input Mode.

Cutting Table Data

Table data within a specified section can be cut in 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 (E)* and then *Cut (T)* from the table program menus.

3. 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

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Copying Table Data

Table data within a specified region can be copied to the clipboard in the following procedure, and this data can be reproduced multiple times by using the paste operation.

Use the following procedure to copy cell data.

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 (E)* and then *Copy (C)* from the table program menus.

   The section specified in step 1. will be copied to the clipboard.

Pasting Table Data

Use this procedure to paste the contents of the clipboard into a table.

1. The table data that has been previously cut or pasted 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	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 (E)* and then *Paste (P)* from the table program menus.

   The data will be reproduced at the position specified in step 1.

■ Inserting and Deleting Rows

Inserting Rows

Use the following procedure to insert one or more blank rows at any point in the table.

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 (E)* and then *Insert Row (I)* from the table program menus. An 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

Deleting Rows

Use the following procedure to delete one or more consecutive rows.

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 (E)* and then *Delete Row (D)* from the table program menus.

   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.

■ Inserting and Deleting Columns

Columns can be inserted or deleted in interlock or part composition tables.

Inserting Columns

Use the following procedure to insert one or more column at the cursor position.

1. Move the cursor to the position where the column is to be inserted.

A01	I	M2Roll		M2-USE	MB010000	○	○	⊠	⊠		
A02	I	M4Roll		M4-USE	MB010001	○	⊠	○	⊠		
A03											
A04	S	M1RollPreparation		M1-PREP	MB010010	○	○	○	○		
A05	S	M2RollPreparation		M2-PREP	MB010011	○	○				

2. Select *Edit (E)* and then *Insert Column (Q)* from the table program menus. 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.

A01	I	M2Roll		M2-USE	MB010000	○	○	⊠		⊠	
A02	I	M4Roll		M4-USE	MB010001	○	⊠	○		⊠	
A03											
A04	S	M1RollPreparation		M1-PREP	MB010010	○	○	○		○	
A05	S	M2RollPreparation		M2-PREP	MB010011	○	○				

INFO ▶ Columns cannot be inserted between the *No.* and *Register* columns in interlock tables.

Deleting Columns

Use the following procedure to delete one or more consecutive columns.

1. Select part of the column to be deleted.

A01	I	M2Roll		M2-USE	MB010000				
A02	I	M4Roll		M4-USE	MB010001				
A03									
A04	S	M1RollPreparation		M1-PREP	MB010010				
A05	S	M2RollPreparation		M2-PREP	MB010011				

2. Select *Edit (E)* and then *Delete Column (R)* from the table program menus.

The column or columns specified in step 1. will be deleted.

A01	I	M2Roll		M2-USE	MB010000		
A02	I	M4Roll		M4-USE	MB010001		
A03							
A04	S	M1RollPreparation		M1-PREP	MB010010		
A05	S	M2RollPreparation		M2-PREP	MB010011		

⬤ INFO ▷ Columns cannot be inserted between the *No.* and *Register* columns in interlock tables.

7.4.12 Saving and Closing Table Programs

■ Saving

If a drawing or function program window is open, all programs (such as main programs) will be saved at the same time.

1. Select *File (F)* and then *Save (S)* from the table program menus.
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

1 Interlock tables can be saved even if contact and COIL settings have not been made. This improves the operability of the CP-717 by allowing the user to temporarily interrupt programming. The contact and COIL settings must be made, however, before the program is executed.

2 The table programs will be compiled when they are saved. An error window will be displayed if a compile error is detected.

3 Refer to *Error Window Configuration* under *7.3.11 Saving Ladder Logic Programs* for information on error windows.

■ Closing

The process of creating table programs can be exited by closing the Table Program Window.

Select *File (F)* and then *Close (C)* to close the Table Program Window.

7.4.13 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 *7.3.12 Printing Ladder Logic Programs* for information on page settings and printing.

7

7.5 Creating Data Tables

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

7.5.1 Outline of Data Tables

Table data can be accessed by using the table data manipulation instructions in the main program.

The procedure to create table data can be divided into the following 3 procedures. Follow the steps to create table data.
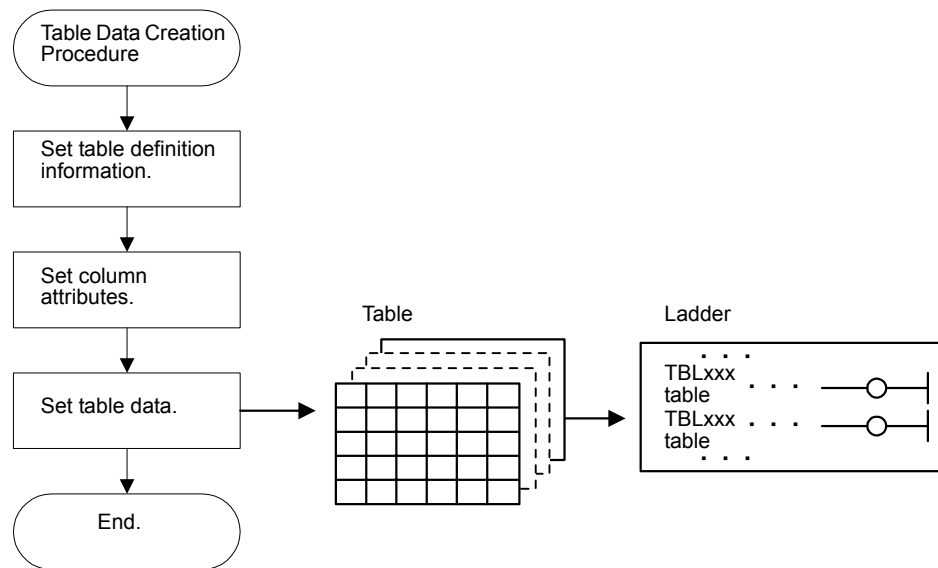
1. Setting Table Definition Information

    Open the Table Data List Window and select creating a new table. The Set Table Definition Window will be displayed. Set the table name, table type, number of columns and rows, and table comment.

Setting	Explanation
Table Name	The name of the table.
Table Type	Either array or record.
Column	The number of columns in the table.
Rows	The number of rows in the table.
Comment	The table comment.

2. Setting Column Attributes

   Open the Column Attributes Window and set the column attribute. The attributes to be set include column names, data types, sizes, and display types.

Setting	Explanation
Column Name	The name of the column.
Data Type	Integer, double-length integer, real number, or character string.
Size	The length of the data.
Display Type	The display format for the table data.
Column Comment	The column comment.

3. Setting Table Data

   Open the Table Data Window and set column data for the number of rows.
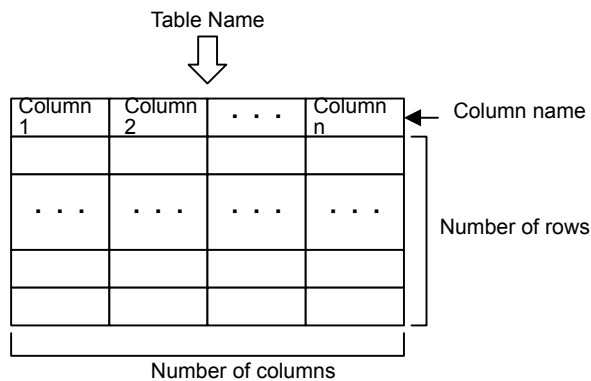
If the table is an array table, there will be only one column name because all of the element data types (integer, real number, etc.) are the same.

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

7.5.2 Table Data List Windows

This section explains how to open the Table Data List Window and the configuration of the window and menus.

■ Opening Table Data List Windows

Opening from the File Manager

1. Open the PLC folder in the directory tree.

2. Double-click a table data list file in the table data folder. The Table Data List Window will be opened.

   The following window will be opened when creating a new data table.
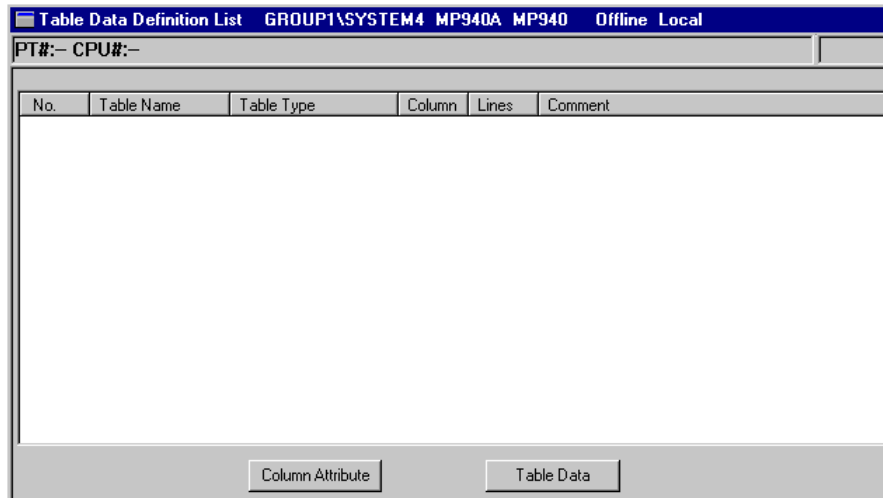
Opening from the Engineering Manager

Select *File (F)*, *Open (Q)*, *Data Table Definition (G)*, and then *Data Table Map (L)* on the Window Menu.

■ Table Data List Window Configuration

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 *7.5.2 Table Data List Windows*.

Setting Item	Explanation
Table Name	Displays table names.
Table Type	Displays table types.
Column	Displays the number of columns of table data.
Lines	Displays the number of rows of table data.
Comment	Displays the data table comments.
Column Attribute Button	Opens the Column Attribute Window.
Table Data Button	Opens the Table Data Window.

7.5.3 Table Data List Window Menus

The following table shows the functions of menu commands in the Table Data List Window.

Menu Command		Function
File (F)		
	File Manager (F)	Opens the File Manager.
	Open (O)	Opens windows for individual functions.
	New Open (N)	Creates new data tables.
	Delete (D)	Deletes data tables.
	Regist User Menu (S)	Registers shortcut keys for the Table Data List Window.
	Close (C)	Closes the Table Data List Window.
	Print (P)	Prints documents.
	Exit (X)	Exits the Engineering Manager.
View (V)		
	Tool Bar (T)	Displays the Tool Tar.
	Status Bar (S)	Displays the Status Bar.
	Column Definition (C)	Opens the Column Definition Window.
	Table Data (D)	Opens the Table Data Window.
Window (W)		
	Cascade (C)	Stacks windows in the display.
	Tile (T)	Lines up windows in the display.
	Arrange Icons (A)	Lines up icons.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

7.5.4 Manipulating Tables in Table Data List Windows

7

The following operations are provided in the Table Data List Windows to manipulate the tables.

- Opening Column Attribute Windows
- Opening Table Data Windows
- Creating new data tables
- Deleting data tables

■ Opening Column Attributes Windows

Column Attributes Windows can be opened from the Table Data List Window as follows: Data type and other attributes can be changed for each column name given in the table.

Opening from the Table Data List Window

1. Click the *No.* column of the table.

2. Select *View (V)* and then *Column Definition (C)* on the Table Data List Menu, or click the **Column Definition** Button.

   Column Attribute Windows can be opened by double-clicking the table number.

Opening from the Table Data Window

Column Attribute Windows can also be opened by selecting *File (F)* and then *Column Definition (C)* from the Table Data Menu.

■ Opening Table Data Windows

Table Data Windows can be opened from the Table Data List Window or the Column Attribute Window.

Opening from the Table Data List Window

1. Click the *No.* column in the table.

2. Select *View (V)* and then *Table Data (D)* on the Table Data List Menu, or click the **Table Data** Button.

Opening from the Column Attribute Window

Table Data Windows can also be opened by selecting *File (F)* and then *Table Data (D)* from the Column Attributes Menu.

■ Creating Data Tables

Use the following procedure to create a data table. Once the data table is created, a Column Attributes Window for that data table will be opened.

1. Select *File (F)* and then *New Open (N)* on the Table Data List Menu.

2. Enter the table definition information in the Table Definition Window, and click the **OK** Button. The Column Attribute Window for the data table will be displayed.

Table Definition Settings

Setting	Explanation
Table Name	Enter a table name of up to 8 characters. Commas (,), question marks (?), asterisks (*), inverted commas ("), and apostrophes (') cannot be used.
Table Type	Select the table type. Array:All columns have the same attributes. Record:Each column has different attributes.
Column and 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 is generated. 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.

■ Deleting Data Tables

The procedure to delete data tables is outlined below.

1. Click the *No.* column of the data table to be deleted.

2. Select *File (F)* and then *Delete (D)* on the Table Data List Menu.

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

7.5.5 Opening Column Attributes Windows

Refer to *Opening Column Attributes Windows* under *7.5.4 Manipulating Tables in Table Data List Windows* for information on how to open Column Attributes Windows.

7

7.5.6 Column Attributes Window Menus

The following table shows the functions of menu commands in Column Attributes Windows.

Table 7.3 Column Attribute Window Menus

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens each function window.
Close (C)	Closes Column Attributes Windows.
Save (S)	Saves column attribute data.
Table Data (D)	Opens Table Data Windows.
Change (H)	Changes table definitions.
Print (P)	Prints documents.
Exit (X)	Exits the Engineering Manager.
Edit (E)	
Copy (C)	Copies row data to the clipboard.
Cut (T)	Cuts row data.
Paste (P)	Reproduces data on the clipboard.
Insert (I)	Inserts a blank row.
Delete (D)	Deletes data.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Go To (J)	Moves the cursor to a specific row.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

7.5.7 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.

7

```
┌─────────────────────────────────────────────────────────────┐
│ Data table column attribute                                   │
├─────────────────────────────────────────────────────────────┤
│ Login information                                             │
│                                                               │
│                                                               │
│ Table Name[      ]   Table Type[     ]  Column[    ]  Lines[    ]│
│                                                               │
│               Table Comment  [                            ]   │
│  ┌────┬─────────────┬────────┬────────┬───────────┬──────────┐│
│  │No. │ Column Name │ Data   │ Size   │Display Type│Column Comment││
│  ├────┴─────────────┴────────┴────────┴───────────┴──────────┤│
│  │                                                          ││
│  │                                                          ││
│  │                Column attribute definition area          ││
│  │                                                          ││
│  │                                                          ││
│  │                                                          ││
│  └──────────────────────────────────────────────────────────┘│
└─────────────────────────────────────────────────────────────┘
```

Setting	Explanation
Table Definition Information	Displays the table name, table type, number of columns, number of rows, and table comments.
No.	Displays column numbers. Only one number will be displayed for array tables. For record tables, numbers 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, double-length integer, real, or character data.
Size	Enter the table data size as a number of bytes between 1 and 80. This entry, however, can only be made for character string data. The data size will be 2 bytes for integer data, 4 bytes for double-length integer data, and 4 bytes for real number data, and these values cannot be changed.
Display Type	Set the data display type. The display type cannot be changed, however, if the Data column is set to character string or real number data. Select binary, decimal, hexadecimal, real, or character display.
Column Comment	Enter a column comment of up to 32 characters.

◉ INFO ▶ In Online Mode, only data in the *Display Type* and *Column Comment* columns can be changed.

7.5.8 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

■ Inserting Column Attribute Data Rows

1. Click the column number where the row is to be inserted.

2. Select *Edit (E)* and then *Insert (I)* on the Column Attributes 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

1 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 **Yes** or **No** to confirm or cancel the insertion.

2 The actual number of rows can be increased by changing the number of columns in the table definitions. Refer to *Changing Table Definitions* later in this section.

■ Deleting Column Attribute Data Rows

Use the following procedure to delete one or more consecutive column attribute data rows.

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 (E)* and then *Delete (D)* on the Column Attributes 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 *Changing Table Definitions* later in this section.

■ Cutting Column Attribute Data

Specified ranges of data can be cut 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 (E)* and then *Cut (T)* on the Column Attributes Menu. The specified range of data will be cut.

■ Copying Column Attribute Data

Use the following procedure to copy specified range of data can be copied to the clipboard. The data on the clipboard can be pasted as many times as required.

1. Select the range of data to be copied to the clipboard.

2. Select *Edit (E)* and then *Copy (C)* from the Column Attributes Menu. The specified range of data in will be copied to the clipboard.

■ Pasting Column Attribute Data

Use the following procedure to paste column attribute data.

1. Click the column number where the data is to be pasted.

2. Select *Edit (E)* and then *Paste (P)* from the Column Attributes Menu. The data on the clipboard will be pasted at the specified position.

■ Jump to Column Attribute Rows

Use the following procedure to move the cursor to a specific row.

1. Select *View (V)* and then *Go To (J)* on the Column Attributes 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.

■ Changing Table Definitions

The procedure to change table data type and other table definitions is outlined below.

1. Select *File (F)* and then *Change (H)* on the Column Attributes Menu.

2. The Table Definition Window will be displayed. Enter the changes and click the **OK** Button.

INFO

Table definitions and table name cannot be changed if the Table Data Window is open. The only data that can be changed in Online Mode is the table comment.Refer to *Creating Data Tables* under *7.5.4 Manipulating Tables in Table Data List Windows*.

7

7.5.9 Saving Column Attributes

Use the following procedure to save column attributes.

1. Select *File (F)* and then *Save (S)* on the 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

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 retry the save operation.

7.5.10 Opening Table Data Windows

Refer to *Opening Table Data Windows* under *7.5.4 Manipulating Tables in Table Data List Windows* for the procedure to open the Table Data Window.

7.5.11 Table Data Window Menus

The following table shows the functions of menu commands in Table Data Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes Table Data Windows.
Column Definition (R)	Opens the Column Attributes Window.
Print (P)	Prints documents.
Exit (X)	Exits the Engineering Manager.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Go To (J)	Moves the cursor to a specific row.
Edit (E)	
Copy (C)	Not used with this window.
Row Insert (L)	
Row Delete (D)	
Line Insert (I)	
Line Delete (G)	
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

7.5.12 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.

Table Data				
Login information				

Table Name [____]   Columns [____]   Lines [____]

	Column 1	Column 1	· · ·	Column n
	Name	Name	· · ·	Name
Row 1				
Row 2		Table data definition area		
· · · · · ·				

Setting Item	Details
Table Name	Displays the name of the table
Columns	Displays the number of column declared in the table definitions.
Rows	Displays the number of rows declared in the table definitions.
Column No.	Displays the column numbers in order from the left.
Column Name	Displays the column names in order from the left.
Row 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.

7.5.13 Editing Table Data

Jumping the Cursor

Use the following procedure to move the cursor to a specific row or column.

1. Select *View (V)* and then *Go To (J)* 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.

7

7.5.14 Saving and Closing Table Data

■ Saving

Data entered when making table data settings is saved as soon as the Enter Key is pressed.

■ Closing

Close the Table Data Window, the Column Attributes Window, and the Table Data List Window to exit the process for creating table data.

1. Active the Table Data Window and select *File (F)* and then *Close (C)* in the window.

2. Active the Column Attributes Window and select *File (F)* and then *Close (C)* in the window.

3. Active the Table Data List Window and select *File (F)* and then *Close (C)* in the window.

7

7.6 Tools

This section describes the tools that assist programming.

- Register lists
- Tuning panels
- Cross-references
- Disable coil lists
- Comment lists
- Register number replacement

7.6.1 Register Lists

This section describes the register list structure and operations.

■ 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 in real time on a Register List Window.

A separate Register List Window is opened for each set of register display parameters that is set. More than one Register List Window can be open at the same time. When the *Register List (O)* command is executed, a child window is opened to show the contents of the registers.
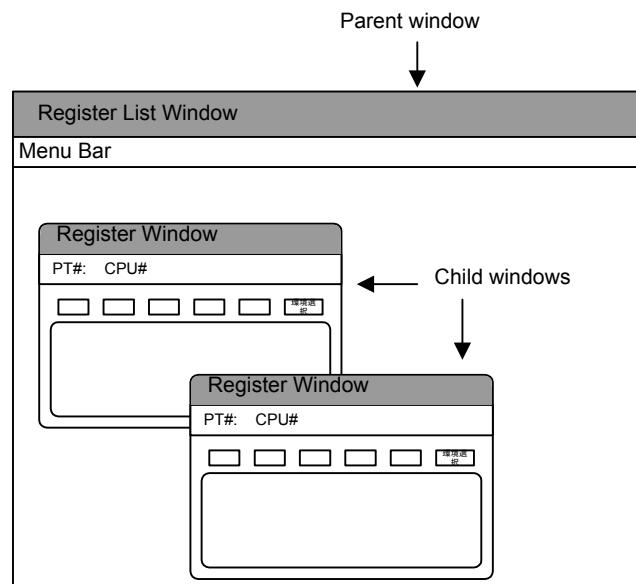
■ Opening a Register List Window

A Register List Window can be opened as a separate window from either the File Manager or the Engineering Manager.

Opening the 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

   From the File Manager, select *Tool (T)* and then *Register List (R)*.
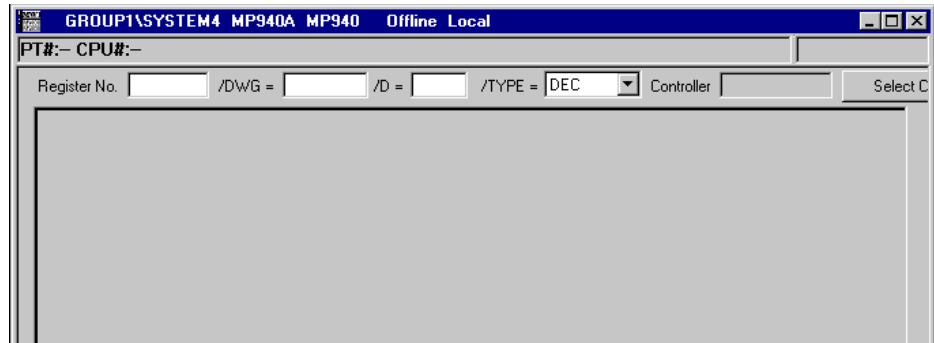
2. Opening From the Engineering Manager

   From the Engineering Manager, select *File (F)*, *Open (O)*, *Tool (T)*, and then *Register List (R)*.

Window Configuration

When the Register List Parent Window is opened, one empty Register Data Window will be opened as a child window.

Child Window	Details
Register Data Window	Displays the contents of the registers.

■ Register List Window Menus

Menu Command		Function
File (F)		
	Open Register List (O)	Displays the Register List Window.
	Close (C)*	Closes the Register List Window.
	Exit (X)	Exits the Register List.
View Mode (M)		
	DEC (D)*	Displays register list in decimal.
	HEX (H)*	Displays register list in hexadecimal.
	FLOAT (F)*	Displays register list in real numbers.
	BIN (B)*	Displays register list in binary.
	LONG (L)*	Displays register list in double-length integers.
	ASCII (A)*	Displays register list in ASCII.
View (V)		
	Tool Bar (T)	Displays the Tool Bar.
	Status Bar (S)	Displays the Status Bar.
Window (W)		
	Cascade (C)*	Stacks windows in the display.
	Tile (T)*	Lines up windows in the display.
Help (H)		
	About Application (A)	Displays version information for the CP-717.

∗ Displayed only in the Register List Window.

Tool Icons in Register List Window

Among the various menu items, those that are most commonly used are available through tool icons as shown in the following illustration.
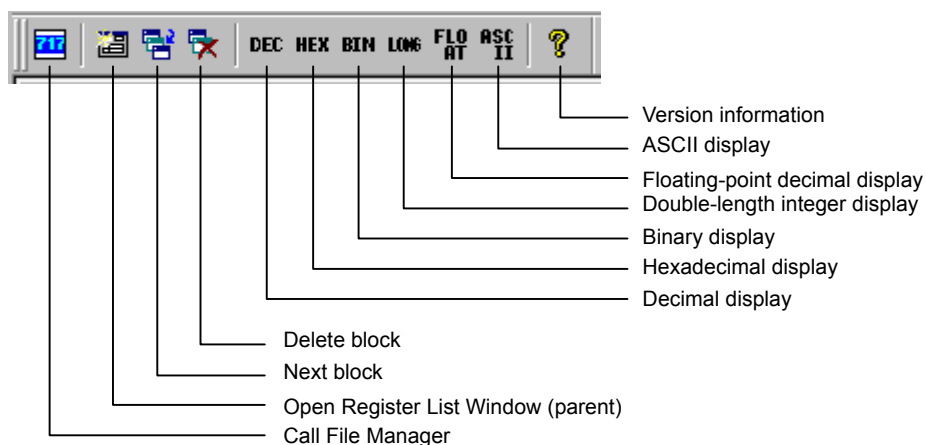
■ Opening the Register Window

One Register Window is opened automatically when the Register List Window is opened. Use the following procedure to open another Register Window when necessary.

Register contents can be displayed as integer, double-length integer, real, or bit data. The data that is display is from the Machine Controller in Online Mode and from the hard disk in Offline Mode.

To create a new Register Window, select *File (F)* and then *Register List (O)* from the Register List Window menus. A new Register Window will be displayed in the Register List Window.

```
┌──────────────────────────────────────────────────────────────────────┐
│ ▓  GROUP1\SYSTEM4 MP940A MP940   Offline  Local            _ □ ×       │
│ PT#:– CPU#:–                                                           │
│ ┌──────────────────────────────────────────────────────────────────┐ │
│ │ Register No. [      ]   /DWG = [      ]  /D = [    ]  /TYPE = │DEC ▼│ Controller [      ]  Select C │
│ │                                                                    │ │
│ │                         Register list                              │ │
│ │                                                                    │ │
│ │ ◄│ ├──┤                                                        ► │ │
│ └──────────────────────────────────────────────────────────────────┘ │
└──────────────────────────────────────────────────────────────────────┘
```
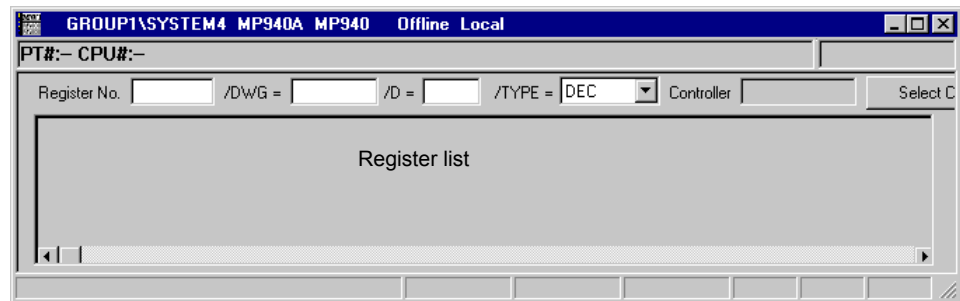
■ Displaying Registers

Set the following parameters in the Register Window and then click anywhere in the display area. The contents of the registers will be displayed.

Setting	Explanation
Register Number	Sets the register number to start the display.
/DWG=	Sets the drawing 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	Displays the model of the Machine Controller. (Setting is not possible.)

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.

The default model will normally be the Machine Controller 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 Machine Controller that is logged on to is display, and there is no need to click the **Select Controller** Button.

7

```
┌────────────────────────────────────────────────────────┐
│ Select                                                   │
├────────────────────────────────────────────────────────┤
│                                                          │
│ ┌───────────┬──────────┬────────────┬────────────┬──────────┐ │
│ │Controller N..│CPU Name│ Order Name │ Group Name │  Server  │ │
│ ├───────────┴──────────┴────────────┴────────────┴──────────┤ │
│ │                                                          │ │
│ │                                                          │ │
│ │                                                          │ │
│ │                                                          │ │
│ │                                                          │ │
│ └──────────────────────────────────────────────────────────┘ │
│                                                          │
└────────────────────────────────────────────────────────┘
```

⬤ INFO

1 If a register number other than for a D register is input for the register number setting, there is no need to input a drawing number.

2 For a register number setting, the motion program number can be input for the Drawing Number Box.

3 A register list cannot be displayed for X, Y, A, or # registers.

4 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 hard disk or a floppy disk using the file transfer function, the register list can be displayed.

Changing the Display

The numeric display mode and register type can be changed for the list register display.

Changing the Numeric Display Mode

The display mode 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 (M)* and then *DEC (C)* in the Register List Window.

- Hexadecimal Display

  Register values can be displayed in hexadecimal by selecting *View Mode (M)* and then *HEX (H)* in the Register List Window.

- Binary Display

  Register values can be displayed in binary by selecting *View Mode (M)* and then *BIN (B)* in the Register List Window.

- ASCII Display

  Register values can be displayed in ASCII by selecting *View Mode (M)* and then *ASCII (A)* in the Register List Window.

⬤ INFO

If register values that cannot be displayed as ASCII characters are set for ASCII display, undefined data will be displayed.

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 *View Mode (M)* and then either *DEC (D)* or *HEX (H)* in the Register List Window.

⬤ INFO ▶ If *DEC (D)* is selected, the integer register will be displayed in decimal. If *HEX (H)* 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 (M)* and then *LONG (L)* in the Register List Window.

- Real Numbers

    The register number and register values can be displayed as real numbers by selecting *View Mode (M)* and then *FLOAT (F)* in the Register List Window.

Changing Register Values

Use the following procedure to change register values.

1. Move the cursor to the register value that is to be changed.

2. Input the value and then press the Enter Key.

⬤ INFO ▶ 1 For integer, double-length integer, or real number register lists, input values from 0 to 9 if using decimal, 0 to 9 or A to F if using hexadecimal, or either 1 or 0 if using binary code. A negative value can be input if the register values are displayed in decimal.

2 The values that are input will be immediately saved to the Machine Controller when the Enter Key is pressed.

■ Exiting the Register List

Use the following procedure to exit the register list by closing the Register List Window and the Register Window.

1. To close the Register List Window, select *File (F)* and then *Close (C)* in the Register List Window.

2. To close the Register Data Window, select *File (F)* and then *Exit (E)* in the Register List Window.

7.6.2 Creating Tuning Panels

Names, units, and other comments are defined on tuning panels for the registers used in drawing or function programs.

In Online Mode, the current value for the defined register is displayed and this value can be changed.

■ Opening the Tuning Panel Window

The Tuning Panel Window can be opened from the File Manager or the Engineering Manager.

Opening from the File Manager

1. Click a drawing number on the directory tree.

2. Select *File (F)*, *Open (N)*, and then *Tuning Panel (P)* in the File Manager Window.

   The Tuning Panel Window will be opened.

No.	Data Name	S	Disp. Def.	CurrentValue	Unit	Lower Limit
1						
2						
3						
4						
5						
6						

[H01] Tuning Panel   GROUP1\SYSTEM4 MP940A MP940   Offline Local
PT#:– CPU#:–

Opening from the Engineering Manager

Select *File (F)*, *Open (N)*, *Drawing (R)* and then *Tuning Panel (P)* in the Engineering Manager Window.

▶ INFO

1 The Open DWG Setting Window will be displayed if the Tuning Panel Window is opened when no drawing or function program is open. Enter the drawing name and drawing type, and click the **OK** Button.

2 The tuning panel settings are made for the main drawing or function program for which the Tuning Panel Window was opened. If tuning panel settings are to be made for other drawing numbers or function symbols, the main program for that drawing number or function symbol must be opened.

7

■ Tuning Panel Window Menus

The following table shows the functions of menu commands in the Tuning Panel Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the Tuning Panel Window.
Regist User Menu (S)	Registers shortcut keys for the Tuning Panel Window.
Save (S)	Saves the tuning panel.
Delete (D)	Not used with this window.
Page Setting (M)	Sets the print margins.
Print Table (P)	Prints tuning panel definition data.
Exit (X)	Exits the Engineering Manager.
Edit (E)	
Cut (T)	Cuts data.
Copy (C)	Copies data to the clipboard.
Paste (P)	Reproduces the data on the clipboard.
Delete Row (D)	Deletes multiple consecutive rows.
Insert Row (I)	Inserts a blank row.
Input (I)	
Input Settings (S)	Switches to Settings input mode.
Input Table Definition (T)	Switches to Table Definition input mode.
Input Register (R)	Switches to Register input mode.
Direction of Cursor Movement (C)	Sets the direction for cursor movement.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Display Head Row (F)	Moves the cursor to the first row.
Display Designated Row (R)	Moves the cursor to a specific row.
Display Last Row (E)	Moves the cursor to the last row.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

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■ 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 *7.4.4 Switching Input Modes*.

■ Making Tuning Panel Settings

All definition data for tuning panels can be entered. Up to 100 definition data items can be created.

No.	Data Name	S	Disp. Def.	Current Value	Unit	Lower Limit	Upper Limit	REG-No.	DWG

	DWG No.		Input Mode	

Setting	Explanation
Data Name	Enter a data name of up to 48 characters.
S	Enter **S** to permit current values to be set. If this cell is left blank, it will not be possible to change the current value.
Disp. Def. (Display Definition)	Enter the display format for current values: "X" for numerals and "." for decimal points. Input examples for table definitions are shown in the Table Formats table following this table.
Current Value	Current values for the registers will be displayed. Register data from the Machine Controller is displayed in Online Mode, and data from the hard disk will be displayed in Offline Mode. If "x.xxx" is input in the *Disp. Def.* column, 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 *Setting Permissions* column. The input value is saved when the Enter Key is pressed. If respective values are specified in the *Lower Limit* and *Upper Limit* columns, only values in that range can be entered as the current value.
Unit	Enter the unit for the current value of up to 8 characters.
Lower Limit	Enter the lower limit for the current value. If the same value is set for both the upper and lower limits, that value is the only current value that can be entered. Enter upper and lower limits such that the lower value is equal to or less than the upper limit.

Setting	Explanation
Upper Limit	Enter the upper limit for the current value. If the same value is set for both the upper and lower limits, that value is the only current value that can be entered. Enter upper and lower limits such that the lower value 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.* column, input the D register drawing number.
DWG No.	Display the number of the drawing that is currently open.
Input Mode	Display the current input mode.

Table Formats

Current Value	Display Format	Register Type
Positive signed number	Xx.xxx	Position number, double-length positive number
Positive unsigned number	Uxx.xxx	Position number, double-length positive number*
Hexadecimal	Hxxxx	Position number, double-length positive number*
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.

■ Editing Tuning Panels

The editing methods for tuning panels are the same as for table programs. Refer to *7.4.11 Editing Table Programs*.

■ Saving Tuning Panels

If a program window for the same drawing number is opened, that program (main or other program) will be saved also.

The procedure to save tuning panels is outlined below.

1. Select *File (F)* and then *Save (S)* on the Tuning Panel Menu.

2. The Save DWG/FUNC Window will be displayed. Click the **Yes** Button.

3. The Save Normally Completed Window will be displayed. Click the **OK** Button.

IMPORTANT

1 When tuning panels are saved, a check of whether or not the definition data is correctly input is performed. An error window is displayed if an error is detected during this check.

2 Refer to *Error Window Configuration* under *7.3.11 Saving Ladder Logic Programs* for information on error windows.

■ 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 *7.3.12 Printing Ladder Logic Programs* for information on page settings and printing.

■ Exiting Tuning Panels

The process of creating tuning panels can be exited by closing the Tuning Panel Window.

Select *File (F)* and then *Close (C)* to close the Tuning Panel Window.

7.6.3 Cross References

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

■ Opening the Cross References Window

The Cross References Window is opened from the Engineering Manager.

Opening from the Engineering Manager

1. Select *File (F), Open (O), Tools (T),* and then *Cross References (X)* from the menu. The Cross Reference Condition Window will be displayed.
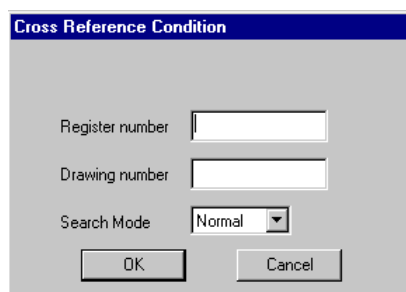
2. Set the conditions in the Cross Reference Condition Window and then click the **OK** Button. The Cross Reference Window will be opened.
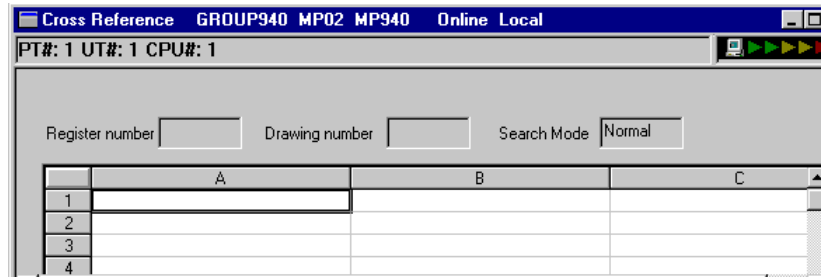
⚫ INFO ▶ If step 1. is executed when a drawing or function program is open, the Cross Reference Window will open directly based on the leading register used in the program. This will apply to all the programs that are open.

■ Cross Reference Window Menus

The following table shows the functions of the menu commands in the Cross Reference Window.

Menu Command	Function
File (F)	
File Manager (F)	Opens the File Manager.
Open (O)	Opens windows for individual functions.
Close (C)	Closes the Tuning Panel Window.
Register Set (R)	Sets the cross reference conditions.
Remake Cross Info. (X)	Updates the cross reference information.
Save (S)	Not used with this window.
Delete (D)	Not used with this window.
Print (P)	Prints the cross reference data.
Exit (X)	Exits the Engineering Manager.
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Option (O)	
Normal (N)	Displays the Normal Mode.
High-speed (H)	Displays the High-speed Mode.
Expanded (O)	Displays the Expanded Mode.
Window (W)	
Cascade (C)	Stacks windows in the display.
Tile (T)	Lines up windows in the display.
Arrange Icons (A)	Lines up icons.
Help (H)	
About Application (A)	Displays version information for the CP-717.

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■ Executing Cross References

The cross reference conditions can be reset while the Cross Reference Window is open.

- Select *File (F), Open (O), Tools (T),* and then *Cross References (X)* from the menu. The Cross Reference Condition Window will be displayed.

7

Specifying Cross Reference Conditions

Input the cross reference conditions on the Cross Reference Condition Window

Setting	Explanation	
Register Number	Input the register number to search for.	
Drawing Number	Input the drawing number of function symbol in which to search. 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 user function.
Search Mode	Set the search mode to normal, high-speed, or option. Refer to the *Search Modes*, below.	

Search Modes

1. Normal Search Mode

   Select **Option (O)** and then **Normal (N)** from the menus.

   In Online Mode, the PLC will be searched; in Offline Mode, the hard disk will be searched. Table programs and tuning panels will not be searched in Offline Mode.

2. High-speed Search Mode

   Select **Option (O)** and then **High-speed (H)** from the menus.

   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 use the following procedure to update the cross reference information before performing the search.

   Updating Cross Reference Information

   The cross reference information must be updated before executing a high-speed search.

   a) Select **File (F)** and then **Update Cross References (X)** from the menus.

   b) The Cross Reference Update Window will be display asking for confirmation. Click the **OK** Button. The most recent cross reference information will be saved on the hard disk.

3. Expanded Search Mode

   Select **Option (O)** and then **Option (O)** from the menus.

   In Online Mode, the PLC will be searched; in Offline Mode, the hard disk will be searched. In both cases, the table programs and tuning panels on the hard disk will be searched.

7

■ Search Results

The cross reference window is displayed as follows:

```
┌────────────────────────────────────────────────────────────┐
│ Cross References                                             │
├────────────────────────────────────────────────────────────┤
│ Login information                                            │
├────────────────────────────────────────────────────────────┤
│                                                              │
│  Register No. [        ]  Drawing No. [      ]  Search mode [    ] │
│                                                              │
│            ┌────┬───────────┬───────────┬───────────┐       │
│            │    │     A     │     B     │     C     │       │
│            ├────┼───────────┼───────────┼───────────┤       │
│            │ 1  │ Result A  │ Result B  │    ···    │       │
│            ├────┼───────────┼───────────┼───────────┤       │
│            │ 2  │    ···    │    ···    │    ···    │       │
│            ├────┼───────────┴───────────┴───────────┤       │
│            │··· │   ···          ···                │       │
│            └────┴───────────────────────────────────┘       │
│                                                              │
└────────────────────────────────────────────────────────────┘
```

Setting	Explanation
Login Information	Displays the port and other information when logged in online.
Register No.	Displays the register number that was searched for.
Drawing No.	Displays the drawing number of 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.
```
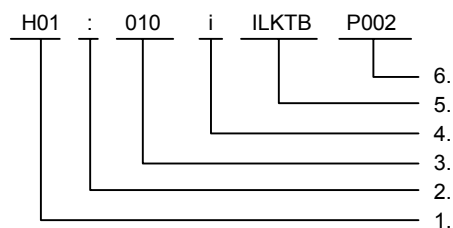
1. Drawing Number or Function Symbol

   The number of the drawing or the symbol of the function 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 drawings, 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
- IOTBL: Interlock table
- ASMTBL:Part assembly table
- TUNPNL:Tuning panel
- SYMBOL:Symbol definition

6. Table Number

The table number is displayed for interlock tables.

- P000: Tuning panel
- P001 on: Symbol definition

■ Closing Cross References

Close the Cross Reference Window to exit cross references.

Select *File (F)* and then *Close (C)* from the menu to close the window.

7.6.4 Disable Coil Lists

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

■ Opening the Disable Coil List Window

The Disable Coil List Window is opened from the Engineering Manager.

Opening from the Engineering Manager

- Select *File (F), Open (O), Tools (T),* and then *Disable Coil List (D)* from the menu. The Disable Coil List Window will be displayed.
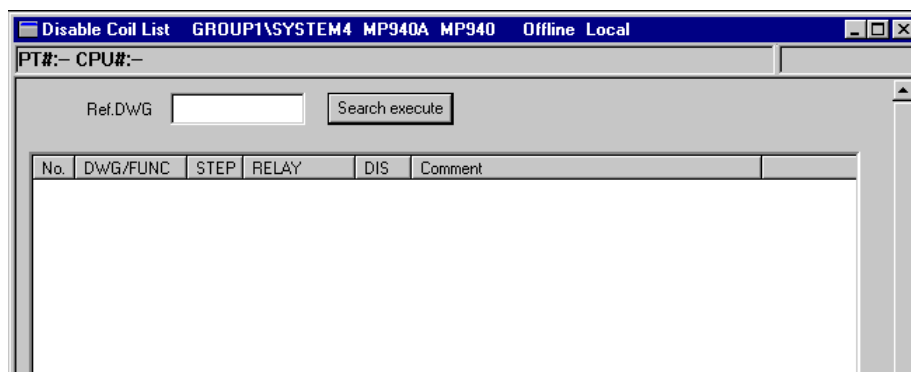
■ Setting Disable Coil Lists

Setting	Explanation
Ref. DWG	Specify the range of programs to search. Refer to *Specifying Search Program Ranges* following this table.
Search Execute Button	Executes the search.
No.	Displays the line number.
DWG/FUNC	Displays the drawing number or function symbol using the disabled coil.
STEP	Displays the step number with the disabled coil. Refer to *Step Numbers* following this table.
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.

Specifying Search Program Ranges

Drawing and function main programs, as well as SFC action blocks (online 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 user function.

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
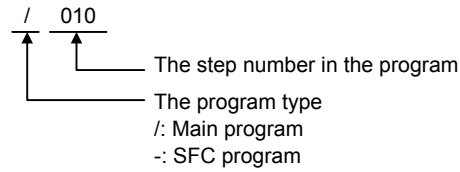
■ Exiting Disable Coil Lists

Close the Disable Coil List Window to exit disabled coil lists.

Select *File (F)* and then *Close (C)* from the menu to close the window.

7.6.5 Comment Lists

Drawing and function program titles and comments for registers in currently displayed program can be managed in at the same time.

■ Opening Comment List Windows

Opening from the Engineering Manager

Select *File (F)*, *Open (Q)*, *Tool (T)*, and then *Comment List (C)* in the window.
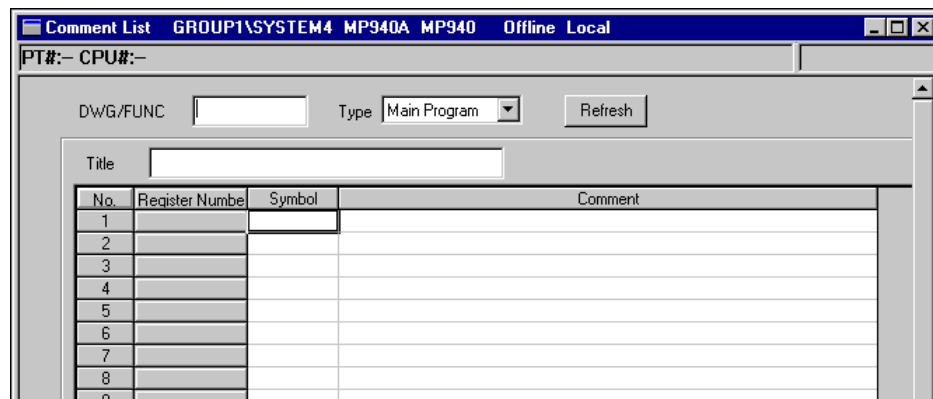
■ Setting the Comment List Window

The symbols and comments defined for register numbers are displayed in the Comment List Window.

Display Item	Details
DWG/FUNC Name	Enter the drawing number or function symbol for which comments are to be created.
Type	Select the type of comment display. Program: Drawing, function, or table programs SFC: SFC flowcharts Time Chart: SFC timecharts ABOX: SFC action boxes
DISPLAY Button	Click the **REFRESH (DISPLAY)** 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 drawing or function program title of up to 48 characters.
No. of REG. (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.

■ Creating Comments

The procedure to create register comments is outlined below.

1. Set the drawing number or function name and the display type.

2. Click the **DISPLAY** Button to display the register numbers used within the specified program.

3. Enter the title, symbols, and comments.

IMPORTANT

Comments are saved when the Enter Key is pressed after the comment has been entered in step 3.

■ Editing Comments

Comment lines can be edited by selecting cut, copy, paste, and delete from the editing menu.

Both the symbol and the comment in the selected line will be processed together.

To edit just the symbol or comment, double-click the cell, select the data with the cursor, and then edit it.

■ Exiting the Comment Creation Process

Close the Comment List Window to exit comment lists.

Click the ☒ Button in upper right corner to close the window.

7.6.6 Replacing Register Numbers

The register replacement function can be used to search and replace any register number used in a program.

IMPORTANT

1 Searching and replacing are not possible in Online Mode.

2 When register numbers are replaced, cross reference information is automatically updated. To reflect the results of register number replacement in the PLC, transfer the drawing or function program that was changed to the PLC using the file transfer function.

■ Opening the Register Number Replacement Window

The Register Number Replacement Window is opened from the Engineering Manager.

Opening from the Engineering Manager

- Select *File (F), Open (O), Tools (T),* and then *Register Replace (S)* from the menu. The Register Number Replacement Window will be displayed.
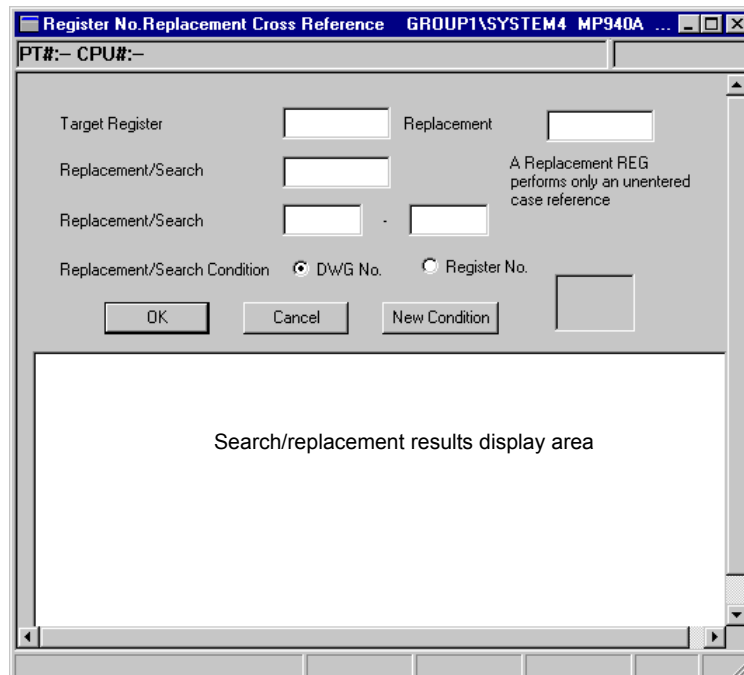
■ Executing Replacement

The register numbers that can be used depend on the Machine Controller. Refer to the *MP900 Series Machine Controller User's Manual: Design and Maintenance* for details.

Searches and replacements can be executed for drawings, functions programs, SFC program, # constant tables, M constant tables, I/O conversion tables, interlock tables, and component assembly tables.

Input the following items and click the **OK** Button to search and replace the register numbers.

Display Item	Details
Target Register	Input the register number to search for. Registers: S, I, O, M, D, C, #, X, Y, Z Register types: Integer, double-length integer, real, bit
Replacement	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 type of the leading register. If no replacement register is specified, the target register will be search for but not replaced.
Replacement/Search	Input the number of registers to search for. Specify the number of words for integer registers and the number of bits for bit registers. With bit registers, between 1 and 30,000 bits can be searched for in one operation.
Replacement/Search	Input the starting and ending drawing numbers to search. To search only one drawing, specify just the starting drawing number.
Replacement/Search Condition	Specify the order of displaying the search/replacement results as in order of drawing numbers or in order of register numbers.
OK Button	Click this button to start the search.
Cancel Button	Closes the Register Number Search/Replace Window.
New Condition Button	Clears the search/replacement data.
Search/replacement results display area	Display the results of the search/replacement operation. Refer to *Search/Replacement Results Display Format* following this table.

Search/Replacement Results Display Format

1. Search Results Display Window

	DWG No.	Register	1	2	3	···
1			Result	Result	···	···
2			Result	Result	···	···
···						

Display Item	Details
DWG No.	Search drawing number
Register	Target register
1, 2, 3, etc.	Refer to *Search/Replacement Results*.

7

2. Search/Replacement Results Display Window

	DWG No.	Before	After	1	2	⋯
1				Results	Results	⋯
2						⋯
⋯						

Display Item	Details
DWG No.	Searched or replaced drawing number or function symbol
Before	The register number before replacement
After	The register number after replacement
1, 2, 3, etc.	Refer to *Search/Replacement Results.*

Specifying Search/Replacement Ranges

The following type of wildcards can be used to specify search/replacement ranges. Wild-cards cannot be used in both the start and end specifications

Search/Replacement Range	Details
*	Searches/replaces all drawings.
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.

Search/Replacement Results

Search and replacement results are display when a search/replacement operation is executed. The results are displayed in detail in the number columns on the search/replacement results.

∗   L01. 03   /   001 $ i
                              └── 6.
                          └── 5.
                  └── 4.
          └── 3.
      └── 2.
└── 1.
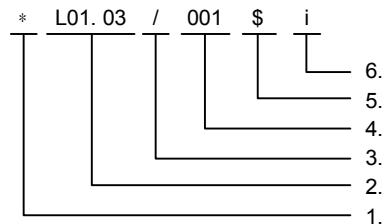
1. Replacement Result

   An asterisk (*) is displayed when the replacement is successful. Nothing is displayed if only a search was performed.

2. Drawing Number or Function Symbol

   The drawing number or function symbol is not 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 register. The step number is given for drawings, function programs, SFC flowcharts, and SFC action boxes. The row number is given for table programs.

5. Application

The application of the search register is given

- 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

■ Closing Register Number Replacement

Close the Register Number Replacement Window to exit register number replacement.

Select *File (F)* and then *Close (C)* from the menu to close the window.

A   Error Messages

A.1 System Error Messages

The following tables show the messages with error codes of the form CPDH_xxx_nnn.

```
C P D H _ x x x _ n n n
                        └──── Error number

          └──── Classification code
               CT:   Thread or other internal error
               CMP: Compiling error, e.g., for DWG
               CPU: Errors from PLC
               DRV: Device driver-level errors
               COM: Communications-related errors
```
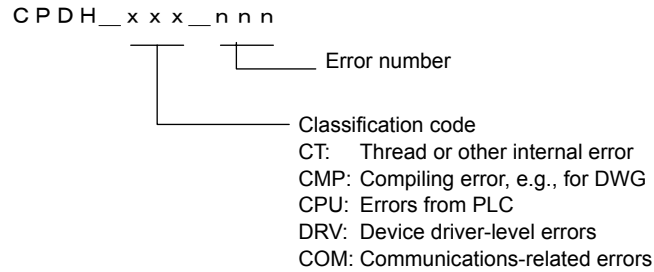
Table A.1 CPDH_CT_nnn

Error Message	Probable Cause	Possible Correction
Reception buffer release error (CPDH_CT_010)	An error has occurred in the Windows 95 memory area.	Shutdown and restart Windows 95. Contact your Yaskawa representative if the error persists.
Queuing failure (CPDH_CT_011)	An error has occurred in shared Windows 95 resources.	Shutdown and restart Windows 95. Contact your Yaskawa representative if the error persists.
Source file write error (CPDH_CT_013)	An error has occurred in shared Windows 95 resources.	Shutdown and restart Windows 95. Contact your Yaskawa representative if the error persists.
Reception buffer allocation error (CPDH_CT_00F)	An error has occurred in the Windows 95 memory area.	Shutdown and restart Windows 95. Contact your Yaskawa representative if the error persists.
Required port not initialized (CPDH_CT_02B)	Inconsistency between system and 215IF I/F card definitions.	Make 215IF I/F card and System Configuration Window data consistent.
Designated port error (CPDH_CT_02F)	The selected port cannot be used.	Change the 215IF settings in the System Configuration Window.

Table A.2 CPDH_CMP_nnn

Error Message	Probable Cause	Possible 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.

Error Message	Probable Cause	Possible Correction
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 permissible 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 CP-717. Contact your Yaskawa representative if the error persists.

Table A.3 CPDH_CPU_nnn

Error Message	Probable Cause	Possible Correction
1 DWG/FN object too large (CPDH_CPU_021)	The size of one drawing or function object is too large.	Reduce the size of the drawing or function objects.
Source memory control error (CPDH_CPU_040)	A source memory control error has occurred.	Execute the load again.
1 DWG/FN object too large (CPDH_CPU_0B1)	The size of one drawing or function object file is too large.	Reduce the size of the drawing 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)	Load operation cannot be performed because the Machine Controller is online.	Stop Machine Controller operation using 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 CP-717 (CPDH_CPU_091)	There is an error in the processing request from the CP-717.	Repeat the operation. Replace the Machine Controller or CP-717 if the error persists.
Incorrect processing request from CP-717 (CPDH_CPU_092)	There is an error in the processing request from the CP-717.	Repeat the operation. Replace the Machine Controller or CP-717 if the error persists.

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Error Message	Probable Cause	Possible Correction
Inappropriate file name (CPDH_CPU_093)	• The file name is inappropriate. • The drawing number is incorrect. • A system function symbol has been used for the user function symbol. • The drawing 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 drawing 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 communications 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.	---
CP-717 response wait time exceeded (CPDH_CPU_09F)	• The CP-717 response wait time has been exceeded. • The transmission cable is not connected. • The Machine Controller does not have enough processing time for CP-717 messaging services.	• Check that the connector is connected properly. • Check that the Unit number is set properly. • Check that there is no noise interference. • Put 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 drawing and function objects.

Error Message	Probable Cause	Possible Correction
No free program memory space (CPDH_CPU_0B3)	There is no free program memory space.	• Compress memory from the System Definition Window. • Reduce the size of all drawing and program memory areas. • Delete unused drawings or functions. • Reduce the number of steps in each drawing and function. • Reduce the number of # registers in each drawing and function. • Reduce the number of symbols in each drawing and function. • Reduce the number of comments in each drawing and function.
Another drawing or function calling the function to be deleted (CPDH_CPU_0C0)	Another drawing 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 using the System Configuration Window.
Program memory not initialized (CPDH_CPU_0F1)	The program memory has not been initialized.	Clear the memory or perform batch load operation.
Program write-protected (CPDH_CPU_0F0)	Program write protection in the system definitions are set to disable writing.	Change the write-protection setting in the System Definitions Window and retry the operation.

Table A.4 CPHD_DRV_nnn

Error Message	Probable Cause	Possible 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.

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Table A.5 CPDH_COM_nnn

Error Message	Probable Cause	Possible Correction
Transfer handle could not be obtained. Start the communications process. (CPDH_COM_012)	Communications have not been enabled.	• Start the communications process. • Correct the communications setting to match the current communications device. • Correct the settings in the personal computer for the current communications device. • Check the cable between the communications device and the PLC. It may not be corrected properly.
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 accept the transmission.	Retry sending.
Transmission error (CPDH_COM_0A0)	A transmission error has occurred.	• Repeat the operation. • Check if the connectors are set properly. • Check that there is no noise interference.
PLC is not running. (CPDH_COM_0D0)	An attempt was made to enter debug mode with the CPU stopped.	Start the CPU and then enter debug mode.
Currently in debug mode. (CPDH_COM_0D1)	• An attempt was made to enter debug mode when the debug mode was already in affect. • A normal mode source write (save) was attempted in debug mode.	• To debug a different program, switch any main motion programs currently in debug mode to another mode. • Repeat the operation. If the error persists, replace the CP-717 or PLC.
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 CP-717 or PLC.
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 attempt to a motion program that has been disabled.	• Enable the motion program before entering debug mode. • Enable the motion program 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 during debugging when the main motion program does not exist.	Repeat the operation. If the error persists, replace the CP-717 or PLC.
No such file. (CPDH_COM_0D6)	A diff transfer was attempted with illegal data.	Repeat the operation. If the error persists, replace the CP-717 or PLC.

Error Message	Probable Cause	Possible Correction
Error in SB/BP signal. (CPDH_COM_0D7)	• A step was executed for a line with no command. • A GO command was executed with SP or PB set for an illegal line.	Repeat the operation. If the error persists, replace the CP-717 or PLC.
Execution not possible. (CPDH_COM_0D8)	A compiling error occurred in the Controller. The following causes may be responsible for 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, load the motion program, and repeat the operation. If the error persists, replace the CP-717 or PLC.
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. (Leave debug mode and allocate some of the program to subroutines.)

Table A.6 Other Error Messages

Error Message	Probable Cause	Possible 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 broken 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 file 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 Manage and log in 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 Manage and log in as a user with the required permissions.
Selected environment does not match PC. Check the connected PC. PKT026	An attempt was made to log onto a PLC that is not the connected PLC.	Select the correct PLC and PLC folder.

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Error Message	Probable Cause	Possible Correction
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 hard disk.	This message is just a warning, but to be safe, save the motion program to the hard disk.

A

A.2 Motion Compile Error Messages

The following table shows a list of compile errors in motion programs. All error messages and their causes are outlined in the table. If an error occurs, refer to the table and adjust the motion program accordingly.

Error Message	Probable Cause
Syntax error	• Illegal command or no command. • Illegal = (allocation 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 language or no address.
Variable range exceeded	• The register (variable) range has been exceeded.
Arithmetic expression contains unusable variable type	• Illegal register type. • Illegal register kind.
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 acting 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. Cases where Local Variables are 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 motion 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. There are too many decimal places. • 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 motion command statement.

A

Error Message	Probable Cause
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 used an axis as an argument is incorrect in a subroutine.
No END command	• There is no END or RET command.
Maximum nesting level exceeded	• Nesting in IF statements is too deep. • Nesting in WHILE statements is too deep. • Nesting in SFORK statements is too deep.
Number of branches exceeds range	• The number of labels designated in PFORK statements exceeds the range. • The number of labels designated in SFORK statements exceeds the range.
Duplicate labels used	• Labels designated in PFORK duplicate SJOINT labels. • Labels designated in SFORK duplicate PJOINT labels.
No label	• Label designated in PFORK does not exist. • JOINTO label for PFORK does not exist. • Label designated in SFORK does not exist. • JOINTO label for SFORK does not exist. • Label designated in GOTO does not exist.
Max. number of parallel executions exceeded	• The maximum number of parallel executions has been exceeded.
Label order incorrect	• The label order in PFORK statements is incorrect. • The label order in SFORK statements is incorrect.
Program name incorrect	• The program name does not conform to MPMooo or MPSooo 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

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 (F)* and then *File Transfer (T)*, under *View (V)*, *Tool (T)*, and *Help (H)*.

B

Menu Command	Function
File (F) and then File Transfer (T)	
All File Transfer	Transfers files together.
Individual File Transfer	Transfers files separately.
Continuous File Transfer	Transfer files to several Machine Controllers.
Other	Saves data to and then compares with flash memory
View (V)	
Tool Bar (T)	Displays the Tool Bar.
Status Bar (S)	Displays the Status Bar.
Details Window (W)	Displays and hides the Detail Display Section.
Large Icons (G)	Displays large icons in the List Display Section.
Small Icons (M)	Displays small icons in the List Display Section
List (L)	Displays a list of small icons in the List Display Section.
Detail (D)	Displays a list of detailed data in the List Display Section.
Refresh (R)	Displays the latest information.
Configuration (C)	Displays system environment information for the CP-717.
Tool (T)	
User Menu Manager (U)	Not used in the current version.
Register List (R)	Displays a list of registers.
Help (H)	
About Application (A)	Displays version information for the CP-717.

B.2 Individual Menus

■ 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.

Pull-down Menus

Menu Command			Function
File (<u>F</u>)			
	New (<u>N</u>)		
		Group Folder (<u>G</u>)	Creates a new group folder.
		Order Folder (<u>O</u>)	Creates a new order folder.
	Delete (<u>D</u>)		Deletes the group folder and its subdirectories.
	Rename (<u>M</u>)		Changes the name of the group folder.
	Exit (<u>X</u>)		Closes the File Manager.
Edit (<u>E</u>)			
	Default User Set (<u>D</u>)		Sets the default user.
View (<u>V</u>)	Refer to *B.1 Common Menus*.		
Tool (<u>T</u>)	Refer to *B.1 Common Menus*.		
Help (<u>H</u>)	Refer to *B.1 Common Menus*.		

Pop-up Menus

Menu Command		Function
New (<u>N</u>)		
	Group Folder (<u>G</u>)	Creates a new group folder.
	Order Folder (<u>O</u>)	Creates a new order folder.
Rename (<u>M</u>)		Changes the name of the group folder.
Delete (<u>D</u>)		Deletes the group folder and its subdirectories.

■ Order Folder Menus

This section explains the pull-down and pop-up menus that are displayed when an order folder is selected.

B

Pull-down Menus

Menu Command	Function
File (F)	
New (N)	
Controller Folder (C)	Creates a new PLC folder.
Delete (D)	Deletes the order folder and its subdirectories.
Rename (M)	Changes the name of the order folder.
Exit (X)	Closes the File Manager.
Edit (E)	
Default User Set (D)	Sets the default user.
View (V) Refer to *B.1 Common Menus*.	
Tool (T) Refer to *B.1 Common Menus*.	
Help (H) Refer to *B.1 Common Menus*.	

Pop-up Menus

Menu Command	Function
New (N)	
Controller Folder (C)	Creates a new PLC folder.
Rename (M)	Changes the name of the order folder.
Delete (D)	Deletes the order folder and its subdirectories.

■ PLC Folder Menus

This section explains the pull-down and pop-up menus that are displayed a PLC folder is selected.

Pull-down Menus

Menu Command	Function
File (F)	
Log On (G)	Logs on to the Machine Controller.
Delete (D)	Deletes the PLC folder and its subdirectories.
Property (R)	Changes Machine Controller information.
Logoff (U)	Logs off from the Machine Controller.
File Transfer (T)	Refer to *B.1 Common Menus*.
Print (P)	Opens the Print Manager.
Exit (X)	Closes the File Manager.
Edit (E)	
Default User Set (D)	Sets the default user.
User Manager (U)	Used to manage users.
CPU Control (C)	Changes the CPU status.
View (V) Refer to *B.1 Common Menus*.	

Menu Command	Function
Tool (T)	Refer to *B.1 Common Menus*.
Help (H)	Refer to *B.1 Common Menus*.

Pop-up Menus

Menu Command	Function
Online (O)	Switches between online and offline modes.
Log On (G)	Logs on to the Machine Controller.
Property (R)	Changes the Machine Controller information.
Logoff (U)	Logs off from the Machine Controller.
File Transfer (T)	Refer to *B.1 Common Menus*.
Delete (D)	Deletes the PLC folder and its subdirectories.
CPU Control (C)	Changes the CPU status.

◼ C Register and Table Data Folder Menus

This section explains the pull-down and pop-up menus that are displayed a C register, program, definition, or table data folder is selected.

Pull-down Menu

Menu Command		Function
File (F)		
	Logoff (U)	Logs off from the Machine Controller.
	Regist User Menu (S)	Creates a shortcut icon.
	File Transfer (T)	Refer to *B.1 Common Menus*.
	Print (P)	Opens the Print Manager.
	Exit (X)	Closes the File Manager.
Edit (E)		
	Default User Set (D)	Sets the default user.
	User Manager (U)	Used to manage users.
	CPU Control (C)	Changes the CPU status.*
View (V)	Refer to *B.1 Common Menus*.	
Tool (T)	Refer to *B.1 Common Menus*.	
Help (H)	Refer to *B.1 Common Menus*.	

∗ Valid only in online mode.

Pop-up Menus

Menu Command	Function
File Transfer (T)	Refer to *B.1 Common Menus*.
Regist User Menu (S)	Creates a shortcut icon.
CPU Control (C)	Changes the CPU status.*

Menu Command	Function
Logoff (<u>U</u>)	Logs off from the Machine Controller.

∗ Valid only in online mode.

■ Program Folder Menus

This section explains the pull-down and pop-up menus that are displayed when an interrupt program, function program, high-speed scan program, initialization program, or low-speed scan program folder is selected.

Pull-down Menus

B

Menu Command			Function
File (<u>F</u>)			
	Make New DWG (<u>N</u>)		Opens a new program.
	Logoff (<u>U</u>)		Logs off from the Machine Controller.
	Print (<u>P</u>)		Opens the Print Manager.
	Exit (<u>X</u>)		Closes the File Manager.
Edit (<u>E</u>)			
	Default User Set (<u>D</u>)		Sets the default user.
	User Manager (<u>U</u>)		Used to manage users.
View (<u>V</u>)			
	List Display (<u>V</u>)		
		Display All DWG (<u>L</u>)	Sets the data files to be displayed in the List Display Section.
		SFC Flow Chart (<u>S</u>)	
		Constant Table (# Reg) (<u>#</u>)	
		Constant Table (M Reg) (<u>M</u>)	
		I/O Convert Table (<u>O</u>)	
		Interlock Table (<u>I</u>)	
		Parts Assembling Table (<u>A</u>)	
		Tuning Panel (<u>P</u>)	
	Tool Bar (<u>T</u>)		Refer to *B.1 Common Menus*.
	. . .		Refer to *B.1 Common Menus*.
Tool (<u>T</u>) Refer to *B.1 Common Menus*.			
Help (<u>H</u>) Refer to *B.1 Common Menus*.			

Pop-up Menu

Menu Command	Function
Make New DWG (<u>N</u>)	Opens a new program.
List Display (<u>V</u>)	
Display All DWG (<u>L</u>)	Selects the data file type to be displayed in the List Display section.
. . .	
CPU Control (<u>C</u>)	Changes the CPU status.*
Logoff (<u>U</u>)	Logs off from the Machine Controller.

∗ Valid only in online mode.

■ Program File Menus

This section explains the pull-down and pop-up menus that are displayed a program file is selected.

Pull-down Menu

Menu Command	Function
File (<u>F</u>)	
Make New DWG (<u>N</u>)	Opens a new program.
Open (<u>O</u>)	
DWG Properties (<u>R</u>)	Opens the Properties Window.
Main Program (<u>N</u>)	Opens the Main Program Window.
SFC Flow Chart (<u>S</u>)	Opens the SFC Flowchart Window.
Constant Table (# Reg) (<u>#</u>)	Opens the Constant Tables (# register) Window.
Constant Table (M Reg) (<u>M</u>)	Opens the Constant Tables (M register) Window.
I/O Convert Table (<u>O</u>)	Opens the I/O Conversion Tables Window.
Interlock Table (<u>I</u>)	Opens the Interlock Tables Window.
Parts Assembling Table (<u>A</u>)	Opens the Parts Assembling Tables Window.
Tuning Panel (<u>P</u>)	Opens the Tuning Panel Window.
Delete (<u>D</u>)	Deletes the program file.
Logoff (<u>U</u>)	Logs off from the Machine Controller.
Regist User Menu (<u>S</u>)	Creates a shortcut icon on the desktop.*
Print (<u>P</u>)	Opens the Print Manager.
Exit (<u>X</u>)	Closes the File Manager.
Edit (<u>E</u>)	
Default User Set (<u>D</u>)	Sets the default user.
User Manager (<u>U</u>)	Used to manage users.
Enable/Disable (<u>E</u>)	Enables or disables the program.

B

Menu Command	Function
View (V)	
List Display (V)	
Display All DWG (L)	Sets the data files to be displayed in the List Display Section.
SFC Flow Chart (S)	
Constant Table (# Reg) (#)	
Constant Table (M Reg) (M)	
I/O Convert Table (O)	
Interlock Table (I)	
Parts Assembling Table (A)	
Tuning Panel (P)	
Tool Bar (T)	Refer to *B.1 Common Menus*.
. . .	Refer to *B.1 Common Menus*.
Tool (T) Refer to *B.1 Common Menus*.	
Help (H) Refer to *B.1 Common Menus*.	

Pop-up Menus

Menu Command	Function
Make New DWG (N)	Opens a new program.
Open (O)	
DWG Properties (R)	Opens the Properties Window.
Main Program (N)	Opens the Main Program Window.
SFC Flow Chart (S)	Opens the SFC Flowchart Window.
Constant Table (# Reg) (#)	Opens the # Constant Tables Window.
Constant Table (M Reg) (M)	Opens the M Constant Tables Window.
I/O Convert Table (O)	Opens the I/O Conversion Tables Window.
Interlock Table (I)	Opens the Interlock Tables Window.
Parts Assembling Table (A)	Opens the Component Assembling Tables Window.
Tuning Panel (P)	Opens the Tuning Panel Window.

Menu Command	Function
View Display (<u>V</u>)	
Display All DWG (<u>L</u>)	Sets the data files to be displayed in the File Display Section.
SFC Flow Chart (<u>S</u>)	
Constant Table (# Reg) (<u>#</u>)	
Constant Table (M Reg) (<u>M</u>)	
I/O Convert Table (<u>O</u>)	
Interlock Table (<u>I</u>)	
Parts Assembling Table (<u>A</u>)	
Tuning Panel (<u>P</u>)	
Regist User Menu (<u>S</u>)	Creates a shortcut icon.
DWG Delete (<u>D</u>)	Deletes the program file.
Enable/Disable (<u>E</u>)	Enables and disables programs.
DWG Copy (<u>C</u>)	Copies the program.
CPU Control (<u>C</u>)	Changes the CPU status.*
Logoff (<u>U</u>)	Logs off from the Machine Controller.

∗ Valid only in online mode.

B

■ Motion Program Folder Menus

This section explains the pull-down and pop-up menus that are displayed when a motion program folder is selected.

B

Pull-down Menus

Menu Command			Function
File (F)			
	Open (O)		
		Group Definition (G)	Defines groups.
		Motion Parameter (P)	Defines and displays the motion parameters.
		Motion Editor (E)	Edits the motion program.
		Register Write Permissions (R)	Sets the number of M and O registers.
	Logoff (U)		Logs off from the Machine Controller.
	File Transfer (T)		Refer to *B.1 Common Menus*.
	Print (P)		Opens the Print Manager.
	Exit (X)		Closes the File Manager.
Edit (E)			
	Default User Set (D)		Sets the default user.
	User Manager (U)		Used to manage users.
	CPU Control (C)		Changes the CPU status.*
View (V)	Refer to *B.1 Common Menus*.		
Tool (T)	Refer to *B.1 Common Menus*.		
Help (H)	Refer to *B.1 Common Menus*.		

∗ Valid only in online mode.

Pop-up Menus

Menu Command		Function
Open (O)		
	Group Definition (G)	Defines group information.
	Motion Parameter (P)	Defines and displays the motion parameters.
	Motion Editor (E)	Edits the motion program.
	Register Write Permissions (R)	Sets the number of M an O registers.
File Transfer (T)		Refer to *B.1 Common Menus*.
CPU Control (C)		Changes the CPU status.*
Logoff (U)		Logs off from the Machine Controller.

∗ Valid only in online mode.

■ Motion Group Folder Menus

This section explains the pull-down and pop-up menus that are displayed when a motion group folder is selected.

Pull-down Menus

Menu Command			Function
File (F)			
	Make New Program (N)		Opens a new motion program.
	Open (O)		
		Motion Editor (E)	Edits motion programs.
		Position Monitor (C)	Displays the current position.*
		Motion Alarm (A)	Displays alarm information.*
	Logoff (U)		Logs off from the Machine Controller.
	Exit (X)		Closes the File Manager.
Edit (E)			
	Default User Set (D)		Sets the default user.
	User Manager (U)		Used to manage users.
View (V)	Refer to *B.1 Common Menus*.		
Tool (T)	Refer to *B.1 Common Menus*.		
Help (H)	Refer to *B.1 Common Menus*.		

∗ Valid only in online mode.

Pop-up Menus

Menu Command		Function
Make New Program (N)		Opens a new motion program.
Open (O)		
	Motion Editor (E)	Edits motion programs.
	Position Monitor (C)	Displays the current position.*
	Motion Alarm (A)	Displays alarm information.*
CPU Control (C)		Changes the CPU status.*
Logoff (U)		Logs off from the Machine Controller.

∗ Valid only in online mode.

B

B

■ Motion Program File Menus

This section explains the pull-down and pop-up menus that are displayed when a motion program file is selected.

Pull-down Menus

Menu Command			Function
File (<u>F</u>)			
	Make New Program (<u>N</u>)		Opens a new motion program.
	Open (<u>O</u>)		
		Motion Editor (<u>E</u>)	Edits the motion program.
		Position Monitor (<u>C</u>)	Displays the current position.*1
		Motion Alarm (<u>A</u>)	Displays alarm information.*1
	Delete (<u>D</u>)		Deletes motion program files.
	Logoff (<u>U</u>)		Logs off from the Machine Controller.
	Regist User Menu (<u>U</u>)		Creates a shortcut icon.*2
	Copy (C)		Copies a motion program file.
	Print (<u>P</u>)		Opens the Print Manager.
	Exit (<u>X</u>)		Closes the File Manager.
Edit (<u>E</u>)			
	Default User Set (<u>D</u>)		Sets the default user.
	User Manager (<u>U</u>)		Used to manage users.
View (<u>V</u>)	Refer to *B.1 Common Menus*.		
Tool (<u>T</u>)	Refer to *B.1 Common Menus*.		
Help (<u>H</u>)	Refer to *B.1 Common Menus*.		

∗ 1. Valid only in online mode.

∗ 2. Refer to *2.5 User Menu Manager*.

Pop-up Menus

Menu Command		Function
Make New Program (<u>N</u>)		Opens a new motion program.
Open (<u>O</u>)		
	Motion Editor (<u>E</u>)	Edits the motion program.
	Position Monitor (<u>C</u>)	Displays the current position.*
	Motion Alarm (<u>A</u>)	Displays alarm information.*
Register in User Menu (S)		Creates a shortcut icon.
Delete (<u>D</u>)		Deletes the motion program file.
Copy (<u>C</u>)		Copies the motion program file.
CPU Control (<u>C</u>)		Changes the CPU status.*
Logoff (<u>U</u>)		Logs off from the Machine Controller.

∗ Valid only in online mode.

■ Group Definition File Menus

This section explains the pull-down and pop-up menus that are displayed when a group definition file is selected.

Pull-down Menus

Menu Command		Function
File (F)		
	Logoff (U)	Logs off from the Machine Controller.
	Regist User Menu (S)	Creates a shortcut icon on the desktop.*1
	File Transfer (T)	Refer to *B.1 Common Menus*.
	Print (P)	Prints the contents of the selected file.
	Exit (X)	Closes the File Manager.
Edit (E)		
	Default User Set (D)	Sets the default user.
	User Manager (U)	Used to manage users.
	CPU Control (C)	Changes the CPU status.*2
View (V)	Refer to *B.1 Common Menus*.	
Tool (T)	Refer to *B.1 Common Menus*.	
Help (H)	Refer to *B.1 Common Menus*.	

∗ 1. Refer to *2.5 User Menu Manager*.

∗ 2. Valid only in online mode.

Pop-up Menus

Menu Command	Function
File Transfer (T)	Refer to *B.1 Common Menus*.
Regist User Menu (S)	Creates a shortcut icon.
CPU Control (C)	Changes the CPU status.*
Logoff (U)	Logs off from the Machine Controller.

∗ Valid only in online mode.

C Drawing and Function Instructions

C

C.1 Auxiliary Input Keys for Drawings and Function Programs

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

C

■ Program Control Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	
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]

■ Direct I/O Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	
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]

■ Sequence Program Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	
NO CONTACT	...	][	[RELAY(R)]-[NO CONTACT(A)]	1[...]
NC CONTACT	...	]/	[RELAY(R)]-[NC CONTACT(B)]	2[...]
COIL	...	@	[RELAY(R)]-[COIL(O) . COIL(C)]	10[...]
SET COIL	...	@s	[RELAY(R)]-[COIL(O) . SET COIL(S)]	9[...]
RESET COIL	...	@R	[RELAY(R)]-[COIL(O) . RESET COIL(R)]	10[...]
ON PULSE	...	]P	[RELAY(R)]-[ONPULSE(P)]	8[...]
OFF PULSE	...	]N	[RELAY(R)]-[OFFPULSE(Q)]	9[...]
10-MS ON-DELAY	....	[ON	[RELAY(R)]-[ONDELAY[10MS](N)]	6[ONDLY]
10-MS OFF-DELAY	....	[OFF	[RELAY(R)]-[OFFDELAY[10MS](F)]	7[OFFDLY]
1-S ON-DELAY	....	[SON	[RELAY(R)]-[ONDELAY[1S](S)]	6[ONSDL]
1-S OFF-DELAY	....	[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[.]

■ Logic Operation Instructions

Instruction	Display	Function Bar		
		Mnemonics	Pull-down Menu	
AND	^	&	[LOGIC(L)]-[AND]	2[^]
OR	v	|	[LOGIC(L)]-[OR]	3[v]
XOR	.	^	[LOGIC(L)]-[XOR]	4[.]

C

■ Numeric Operation Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
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	x	*	[ART(A)]-[x]	4[x]
DIVISION	³	/	[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]

■ Numeric Conversion Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
SIGN INVERSION	INV	INV	[ART(A)]-[INV]	7[INV]
1'S COMPLEMENT	COM	COM	[ART(A)]-[COM]	8[COM]
ABSOLUTE VALUE CONVERSION	ABS	ABS	[ART(A)]-[ABS]	1[ABS]
BINARY CONVERSION (BCD→BIN)	BIN	BIN	[ART(A)]-[BIN]	8[BIN]
BCD CONVERSION (BIN→BCD)	BCD	BCD	[ART(A)]-[BCD]	9[BCD]
PARITY CONVERSION	PARITY	PARITY	[ART(A)]-[PARITY]	7[PARITY]
ASCII CONVERSION 1	ASCII	ASCII	[ART(A)]-[ASCII]	1[ASCII]
ASCII CONVERSION 2	BINASC	BINASC	[ART(A)]-[BINASC]	2[BINASC]
ASCII CONVERSION 3	ASCBIN	ASCBIN	[ART(A)]-[ASCBIN]	3[ASCBIN]

■ Numeric Comparison Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
COMPARE (<)	<	<	[LOGIC(L)]-[<]	5[<]
COMPARE (≤)	£	<=	[LOGIC(L)]-[<=]	6[≤]
COMPARE (=)	=	=	[LOGIC(L)]-[=]	7[=]
COMPARE (≠)	¼	<>	[LOGIC(L)]-[!=]	8[≠]
COMPARE (≥)	Š	>=	[LOGIC(L)]-[>=]	9[≥]
COMPARE (>)	>	>	[LOGIC(L)]-[>]	10[>]
RANGE CHECK	RCHK	RCHK	[LOGIC(L)]-[RCHK]	5[RCHK]

■ Data Operation Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
BIT ROTATION LEFT	ROTL	ROTL	[MOVE(M)]-[ROTL]	6[ROTL]
BIT ROTATION RIGHT	ROTR	ROTR	[MOVE(M)]-[ROTR]	7[ROTR]
MOVE BITS	MOVB	MOVB	[MOVE(M)]-[MOVB]	2[MOVB]
MOVE WORD	MOVW	MOVW	[MOVE(M)]-[MOVW]	1[MOVW]
EXCHANGE	XCHG	XCHG	[MOVE(M)]-[XCHG]	3[XCHG]
SET WORDS	SETW	SETW	[MOVE(M)]-[SETW]	4[SETW]
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]

■ Basic Function Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
SQUARE ROOT	SQRT	SQRT	[FUNCTION(F)]-[SQRT]	2[SQRT]
SINE	SIN	SIN	[FUNCTION(F)]-[SIN]	3[SIN]
COSINE	COS	COS	[FUNCTION(F)]-[COS]	4[COS]
TANGENT	TAN	TAN	[FUNCTION(F)]-[TAN]	5[TAN]

C

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
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]

■ DDC Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
DEAD ZONE A	DZ_A	DZA	[DDC(D)]-[DZA]	2[DZA]
DEAD ZONE B	DZ_B	DZB	[DDC(D)]-[DZB]	3[DZB]
UPPER/LOWER LIMIT	LIMIT	LIMIT	[DDC(D)]-[LIMIT]	4[LIM]
PI CONTROL	PI	PI	[DDC(D)]-[PI]	2[PI]
PD CONTROL	PD	PD	[DDC(D)]-[PD]	3[PD]
PID CONTROL	PID	PID	[DDC(D)]-[PID]	4[PID]
FIRST-ORDER LAG	LAG	LAG	[DDC(D)]-[LAG]	5[LAG]
PHASE LEAD/LAG	LLAG	LLAG	[DDC(D)]-[LLAG]	6[LLAG]
FUNCTION GENERATOR	FGN	FGN	[DDC(D)]-[FGN]	6[FGN]
INVERSE FUNCTION 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]

■ Table Data Operation Instructions

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
TABLE READ	TBLBR	TBLBR	[TABLE(T)]-[TBLBR]	1[TBLBR]
TABLE WRITE	TBLBW	TBLBW	[TABLE(T)]-[TBLBW]	2[TBLBW]
ROW SEARCH	TBLSRL	TBLSRL	[TABLE(T)]-[TBLSRL]	3[TBLSRL]
COLUMN SEARCH	TBLSRC	TBLSRC	[TABLE(T)]-[TBLSRC]	4[TBLSRC]
TABLE CLEAR	TBLCL	TBLCL	[TABLE(T)]-[TBLCL]	5[TBLCL]
TABLE BLOCK MOVE	TBLMV	TBLMV	[TABLE(T)]-[TBLMV]	6[TBLMV]
QUEUE TABLE READ	QTBLR	QTBLR	[TABLE(T)]-[QTBLR]	1[QTBLR]

C

Instruction	Display	Function Bar		
		Pull-down Menu		
		Mnemonics		
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 AND INCREMENT	QTBLCL	QTBLCL	[TABLE(T)]-[QTBLCL]	5[QTBLCL]

C

D MECHATROLINK Devices

D

D.1 MECHATROLINK Devices

Slave Module Classification	Name	Model	MP910	MP920	MP930	MP940
Servo Modules	S-series SGD Servodrives	SGD-oooN	Y	Y	Y	N
	S-series SGDB Servodrives	SGDB-oooN	Y	Y	Y	N
	S-series SGDH Servodrives	SGDH-oooE + JUSP-NS100	Y	Y	Y	N
Digital I/O Modules	64-point I/O Module	JEPMC-IO350	Y	Y	Y	Y
	16-point I/O Module	87816-1100X	Y	Y	Y	Y
	16-point I/O Module	87816-1600X-Soloy	Y	Y	Y	Y
	Wide-voltage 8-point Output Module	120DRA83030	Y	Y	Y	Y
	100-VAC 8-point Input Module	120DAI53330	Y	Y	Y	Y
	200-VAC 8-point Input Module	120DAI73330	Y	Y	Y	Y
	12/24-VDC 16-point Input Module	120DDI34330	Y	Y	Y	Y
	12/24-VDC 16-point Output Module	120DDO34340	Y	Y	Y	Y
	100/200-VAC 8-point Output Module	120DAO83330	Y	Y	Y	Y
	Wildcard I/O Module	-	Y	Y	Y	Y
	Absoluter	CDR001028 CDR000264	Y	Y	Y	Y
Analog I/O Modules	±10-V Analog Voltage Input Module	120AVI02030	Y	Y	Y	Y
	±10-V Analog Voltage Output Module	120AVO01030	Y	Y	Y	Y
Special Modules	Preset Reversible Counter Module	120EHC21140	Y	Y	Y	N
	Pulse MC	120MMB20230	Y	Y	Y	N
	VS-676H5	-	Y	Y	Y	N
	VS-616G5	-	Y	Y	Y	N
PLC Module	MP940	-	Y	Y	Y	Y

Note: Y = Connection possible, N = Connection not possible.

INFO

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

Machine Controller MP900 Series
Programming Panel Software
USER'S MANUAL

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