CV500-ZN3AT1-E (V1.1)
MC Support Software
(For C200H-series and CV-series MC Units)
Operation Manual

Revised July 1998

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to the product.

⚠ DANGER! Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

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

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

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC” means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

Software Usage and Warranty Conditions

Use this software according to the usage and warranty conditions described below. Please fill out the enclosed software registration card and return it to OMRON. After-sale service will be based on this card.

1, 2, 3...

1. **Copyright**
   This software (including the contents of the enclosed documentation and manuals) is copyrighted by OMRON.
2. **Copies and Modifications**
   a) Do not copy this software, either in total or in part, except for purposes of backup or modification as described in clause (b) below.
   b) The purchaser of this software can change it or make modifications as long as usage of the software is confined to the purchaser alone. OMRON accepts no responsibility, however, for any defect, damage, injury, or any harm whatsoever that results from such changes or modifications.
3. **Warranty and After-sale Service**
   a) In the unlikely event that this software does not function properly, OMRON will correct or replace it free of charge.
   b) This guarantee will remain in effect for one year beginning from the date of purchase.
   c) Once the purchaser has returned the software registration card, OMRON will provide the purchaser with any essential information regarding version upgrades, program bugs that OMRON becomes aware of, and so on.
   d) OMRON accepts no responsibility, other than that which is stipulated here, for any harm to the user resulting from the use of this software.
4. **Third Party Users**
   a) OMRON does not permit the use of this software, or a copy of this software, by any third party.

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TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

About this Manual:

This manual explains the installation and operation of the MC Support Software (MCSS) and includes the sections described below. The MCSS is a programming tool developed by OMRON for controlling the CV500-MC221, CV500-MC421, and C200H-MC221 Motion Control Unit. It can be used with an IBM PC/AT-compatible personal computer. For programming, it employs G language, which is widely used in position control applications.

There are six manuals used with the CV500-MC221, CV500-MC421, and C200H-MC221 Motion Control Units (MC Units). These manuals are listed in the following table. The suffixes have been left off of the catalog numbers. Be sure you are using the most recent version for your area.

Name	Content	Cat. No.
CV500-MC221/MC421 Motion Control Unit Operation Manual: Introduction	Describes the features, applications, and basic operation of the Motion Control Units. Read this manual first before using a Motion Control Unit.	W254
CV500-MC221/MC421 Motion Control Unit Operation Manual: Details	Describes operation of the Motion Control Units in detail. Read the *Operation Manual: Introduction*, above, before attempting to read this manual.	W255
C200H-MC221 Motion Control Unit Operation Manual: Introduction	Describes the features, applications, and basic operation of the Motion Control Units. Read this manual first before using a Motion Control Unit.	W314
C200H-MC221 Motion Control Unit Operation Manual: Details	Describes operation of the Motion Control Units in detail. Read the *Operation Manual: Introduction*, above, before attempting to read this manual.	W315
CVM1-PRS71 Teaching Box Operation Manual	Describes the operation of the Teaching Box connected to a Motion Control Unit.	W257
CV500-ZN3AT1-E MC Support Software Operation Manual	Describes creating control programs and setting operating parameters for MC Units using the MC Support Software.	W256

Please read this manual carefully and be sure you understand the information provided before attempting to operate this software. **Be sure to read the precautions in the following section.**

Section 19 explains the essential points that the user must understand in order to use the MC Support Software properly. Be sure to read this section thoroughly before attempting to use the MCSS.

Section 20 explains how to install the MC Support Software in a personal computer.

Section 21 explains basic operations and preliminaries that are required before programming. Be sure to read this section thoroughly before proceeding further.

Section 22 explains the operations in the MC Program Edit display. These operations include creating and editing MC programs, transferring programs between data disks and the computer, and deleting programs from the computer or MC Unit.

Section 23 explains how to set the addresses for the position data used for each task.

Section 24 explains operations for the Machine Parameter Edit screens. These operations include setting the mechanical system parameters for the encoder and motor and setting the wiring check parameters.

Section 25 explains how to set the reference and workpiece origin offset values. These offset values can be used to deviate from the origin.

Section 26 explains how to set the parameters in the Feed Rate Parameter Edit screens. These parameters include the various feed rates, acceleration/deceleration times, and MPG ratios.

Section 27 explains how to set zones. When the present value is within a set zone, the zone bit turns ON in the interface area.

Section 28 explains how to set the servo system's parameters.

Section 29 explains how to save, retrieve, clear, transfer, and verify parameters that have been set as explained in Sections 23 through 27.

Section 30 explains how to edit position data.

Section 31 explains how to display MC Unit operating conditions from programming devices (i.e., the computer).

Section 32 explains how to transfer programs, parameters, and position data between the programming device and the MC Unit, and how to verify the data.

Section 33 explains how to print out programs, parameters, and position data.

Section 34 explains how to manage the data disk files that contain programs, parameter data, and position data.

Section 35 explains the operations in the Setup menu, including setting the destination network address, the communications format, and the printer model.

Section 36 shows the error messages that might be displayed during operation of the MC Support Software and explains how to diagnose and correct the causes of these errors.

The **Appendix** provides a handy reference to the functions that can be accessed through the various menus and function keys.

⚠WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the Motion Control Units (MC Units) and related devices.

The information contained in this section is important for the safe and reliable application of the Motion Control Unit. You must read this section and understand the information contained before attempting to set up or operate a Motion Control Unit.

1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for using the MC Support Software. Be sure to read this manual before attempting to use the software and keep this manual close at hand for reference during operation.

⚠ WARNING It is extreme important that Motion Control Units and related devices be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying Motion Control Units and related devices to the above mentioned applications.

3 Safety Precautions

⚠ WARNING Never attempt to disassemble any Units while power is being supplied. Doing so may result in serious electrical shock or electrocution.

⚠ WARNING Never touch any of the terminals while power is being supplied. Doing so may result in serious electrical shock or electrocution.

4 Operating Environment Precautions

Do not operate the control system in the following places.

- Where the PC is exposed to direct sunlight.
- Where the ambient temperature is below 0°C or over 55°C.
- Where the PC may be affected by condensation due to radical temperature changes.
- Where the ambient humidity is below 10% or over 90%.
- Where there is any corrosive or inflammable gas.
- Where there is excessive dust, saline air, or metal powder.
- Where the PC is affected by vibration or shock.
- Where any water, oil, or chemical may splash on the PC.

⚠ Caution The operating environment of the MC Unit can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the MC Unit. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the MC Unit or the PC.

⚠ WARNING Failure to abide by the following precautions could lead to serious or possibly fatal injury. Always heed these precautions.

- Always ground the system to 100 Ω or less when installing the system to protect against electrical shock.
- Always turn off the power supply to the PC before attempting any of the following. Performing any of the following with the power supply turned on may lead to electrical shock:
  - Mounting or removing any Units (e.g., I/O Units, CPU Unit, etc.) or memory cassettes.
  - Assembling any devices or racks.
  - Connecting or disconnecting any cables or wiring.

⚠ Caution Failure to abide by the following precautions could lead to faulty operation or the PC or the system or could damage the PC or PC Units. Always heed these precautions.

- Use the Units only with the power supplies and voltages specified in the operation manuals. Other power supplies and voltages may damage the Units.
- Take measures to stabilize the power supply to conform to the rated supply if it is not stable.
- Provide circuit breakers and other safety measures to provide protection against shorts in external wiring.
- Do not apply voltages exceeding the rated input voltage to Input Units. The Input Units may be destroyed.
- Do not apply voltages exceeding the maximum switching capacity to Output Units. The Output Units may be destroyed.
- Always disconnect the LG terminal when performing withstand voltage tests.
- Install all Units according to instructions in the operation manuals. Improper installation may cause faulty operation.
- Provide proper shielding when installing in the following locations:
  - Locations subject to static electricity or other sources of noise.
  - Locations subject to strong electromagnetic fields.
  - Locations subject to possible exposure to radiation.
  - Locations near to power supply lines.
- Be sure to tighten Backplane screws, terminal screws, and cable connector screws securely.
- Do not attempt to take any Units apart, to repair any Units, or to modify any Units in any way.

⚠ Caution The following precautions are necessary to ensure the general safety of the system. Always heed these precautions.

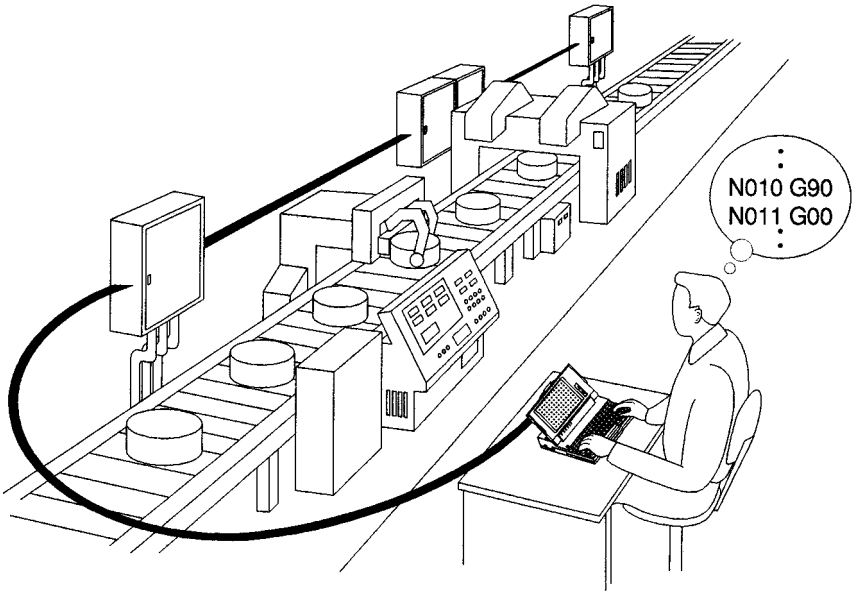
- Provide double safety mechanisms to handle incorrect signals that can be generated by broken signal lines or momentary power interruptions.
- Provide external interlock circuits, limit circuits, and other safety circuits in addition to any provided within the PC to ensure safety.

SECTION 1
Introduction

This section explains the essential points that the user must understand in order to use the MC Support Software properly. Be sure to read this section thoroughly before attempting to use the MCSS.

1-1 MC Support Software

MC Support Software (MCSS) is software that is used at an IBM PC/AT-compatible computer for controlling MC Units. This software can be used to create and apply that MC programs that control the MC Units.



MC Support Software Capabilities

Creating MC Programs MCSS can create MC programs for controlling MC Units, using G language.

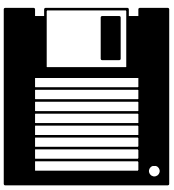
Setting Parameters MCSS can set the various parameters required for positioning using a motor.

Monitoring MCSS can be used to display the current position for each axis and and MC Unit status on the screen for monitoring.

1-2 Constituent Parts

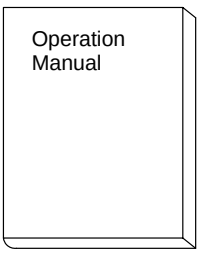
Check to be sure that the following items are included.

CV500-ZN3AT1-E MC Support Software: One system disk (3.5-inch/2HD)



System disk

MC Support Software Operation Manual (W256) (This manual.)



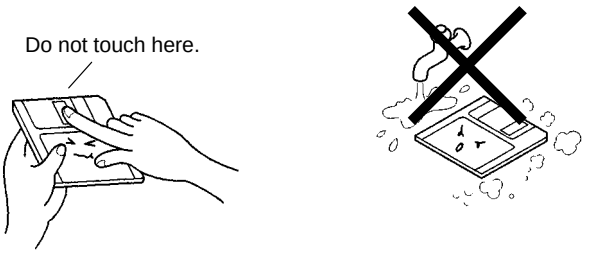
Note DOS disks and data disks must be provided separately. They do not come with the MCSS.

1-3 Handling Diskettes

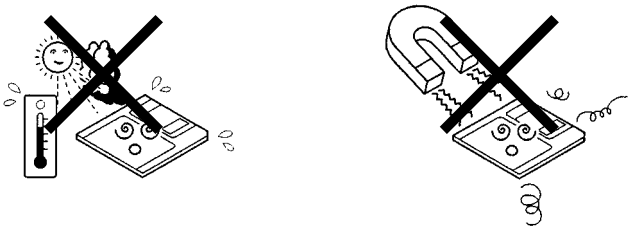
Either 3.5-inch 2HD (two-sided high-density) or 3.5-inch 2DD (two-sided double-density) diskettes can be used.

Handling Precautions

Do not touch the inner recording surface of a diskette and do not place the diskette in locations where it may come in contact with dust or water. Oil (including oil from fingers), dust, and water can cause disk errors.

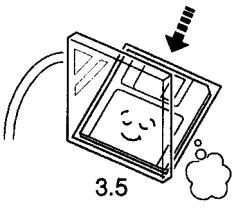


Do not leave a diskette in extremely hot or humid environments, or where it will be exposed to direct sunlight. Do not leave it near magnetic objects, or magnetically recorded data may be destroyed.



Do not write on labels after attaching them to diskettes. Using a ballpoint pen or other sharp pointed object to write on a label after it has been attached to a diskette can cause damage to the recording surface of the diskette. Also, do not stick labels one on top of another, because that can cause damage to the drive.

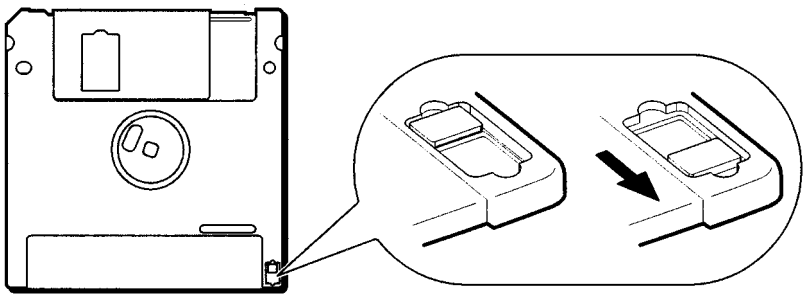
When diskettes are not in use, place them inside of their cases and stand them vertically in a box for storage.



Clearing Write Protection

Diskettes can be used for reading and writing system data and work data. A diskette can be write protected to prevent important data from being overwritten and lost. When a disk is write protected, it can be read but no data can be written to it. When the write protection is cleared, it is again possible to write data to the diskette.

To write protect a diskette, slide the tab on the back of the diskette as shown in the illustration, so that the space appears. To clear the write protection, slide the tab back to the closed position.



Writing possible Writing not possible

SECTION 2
Software Installation

This section explains how to install the MC Support Software in a personal computer.

2-1 Personal Computer Requirements

The MC Support Software has been tested on the following personal computers:

Compaq Prolinea 4/66P-M340W
80486-DX2-66 MHz CPU
4 MB RAM
3.5” Floppy Disk Drive
MS-DOS J6.2/V

IBM 5523 JVW ThinkPad 330C
PC-DOS 5.0/V

IBM	2620-3JF ThinkPad 360C 486SX 33 MHz PC-DOS J6.3/V
IBM	2405NVC 486DX2 66 MHZ DOS J5.0/V
DEL.L	XL590 Pentium 90 MHz MS-DOS J6.2/V

Minimum Specifications

The following table lists the minimum specifications required to install and operate the MC Support Software.

Item	Specification
CPU	Equivalent to 80486
Conventional memory	490 KB of available memory min.
Hard disk capacity	1 MB of available memory min.
Floppy disk drive	3.5” Floppy disk drive
Operating system	PC-DOS 5.0 and Up. MS-DOS 6.2 and Up.
Display	VGA
Keyboard	The following keys are required: Home, Escape, Control, PageUp, PageDn, Backspace, F1 to F10, End, Ins, Del, and Tab Keys

Hard Disk/RAM Upgrades

The speed and efficiency of the MC Support Software can be improved by using a hard disk and expansion RAM. The Software’s efficiency can be improved by setting expansion memory as a RAM disk or disk cache in the MC Support Software.

A RAM Disk Driver is required to use a RAM disk and a Disk Cache Driver is required to use a disk cache. These drivers must be set in the CONFIG.SYS file.

2-2 Floppy Disk Initialization

This section explains the procedure used to initialize floppy disks for backing up the system disks before installation and for storing MC Support Software data. New floppy disks must be initialized before being used.

Initialized floppy disks are available. The initialization procedure isn’t necessary if formatted disks are purchased.

An unformatted floppy disk is needed. The following example shows how to initialize a disk in drive A of a personal computer with MS-DOS.

Initialization Procedure

If a mistake is made during initialization, interrupt the procedure by pressing the Ctrl+C Key, eject the disk, and start over from step 1.

1, 2, 3... 1. Turn on the personal computer. The DOS prompt for the hard disk will be displayed.

```
C>
```

2. Enter “FORMAT A:” and press the Return Key to start the MS-DOS FORMAT command. The following message will be displayed.

```
Insert new diskette for drive A:
and press ENTER when ready...
```

3. Insert the unformatted floppy disk into drive A and press the Return Key. Formatting will begin if no errors are found on the disk. The following messages will be displayed.

```
Checking existing disk format
formatting 1.44 M
format complete.
```

4. Enter a volume label if desired. Press the Return Key if a volume label isn’t required.

```
Volume label (11 characters ENTER for none)?
```

5. A confirmation message and prompt will be displayed. Enter “Y” to format another disk or “N” to exit the FORMAT command.

```
1,457,664 bytes total space

1,457,664 bytes available on disk      512 bytes in each allocation unit
                                       2847 allocation units available on unit
Volume Serial Number  XXXX–XXXX

format another (Y/N)?
```

6. Enter “N” to exit the FORMAT command. Floppy disk initialization is completed. Backup the system disks next.

2-3 System Disk Backup

This section explains the procedure used to backup the system disk. Generally, this backup copy of the system disk is used for operations with the personal computer and the original is stored in a safe place.

The backup disk must have the same disk format as the original. For example, a 3.5” 2HD disk is required when backing up a 3.5” 2HD disk.

The original system disk and a formatted floppy disk are needed for this procedure. The following example shows how to backup a disk in a personal computer with MS-DOS.

Backup Procedure

If a mistake is made during the backup, interrupt the procedure by pressing the Ctrl+C Key, eject the disks, and start over from step 1.

1, 2, 3... 1. Turn on the personal computer. The DOS prompt for the hard disk will be displayed.

```
C>
```

2. Make sure the system disk is write-protected. (Sliding the tab on the system disk to the write-protect position will prevent any files from being deleted or overwritten accidentally.
3. Enter “DISKCOPY A: B:” and press the Return Key. The following message will be displayed.

```
Insert SOURCE diskette in drive A:
Insert Target diskette in drive B:
```

(If the computer has only one floppy disk drive, enter “DISKCOPY A: A:” and press the Return Key.)

4. Insert the original system disk into drive A and the backup disk into drive B and press the Return Key. The copy operation will begin when the Return Key is pressed.
5. The following message will be displayed when the copy operation is completed.

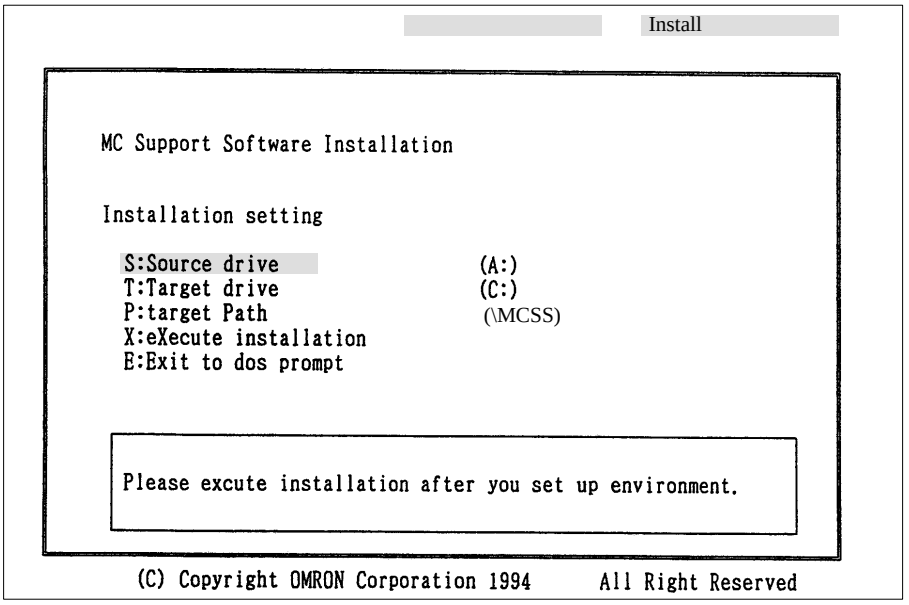
```
Copy another diskette (Y/N)?
```

6. Enter “N” to exit the DISKCOPY command and remove the disks. Write the system disk information on an adhesive label and attach it to the backup.

2-4 Setting the System Environment

This section describes the items in the installation menu, which is used to set the source drive, target drive, and target path for installation.

The following diagram shows the installation menu.



Source Drive The source drive is the name of the floppy disk drive (A to Z) containing the system disk.

Target Drive The target drive is the name of the hard or floppy disk drive (A to Z) where the MC Support Software will be installed.

Note When installing the software on a floppy disk, format the floppy disk as a system disk before installation. The "/S" option makes the disk a bootable system disk, so add this option to the FORMAT command, i.e., "FORMAT A: /S."

Target Path The target path specifies the directory in which the MC Support Software will be installed. Normally, the default directory "MCSS" is used. Users familiar with MS-DOS can change the default directory if desired.

Execute Installation This menu item starts the installation and adds the necessary lines to the CONFIG.SYS and AUTOEXEC.BAT files.

When changing the CONFIG.SYS and AUTOEXEC.BAT files again, change them after making settings. The CONFIG.BAK and AUTOEXEC.BAK files contain a backup of the previous CONFIG.SYS and AUTOEXEC.BAT files. Refer to these backup files to return the files to their original settings.

2-5 Installation Procedure

This section explains the procedure used to install the MC Support Software from the system disk in floppy disk drive A to the hard disk (C).

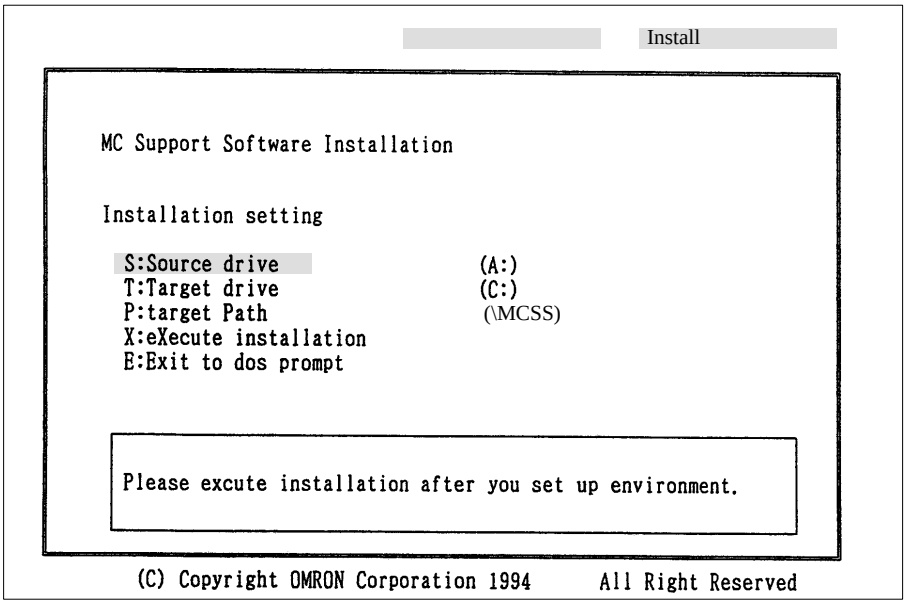
1, 2, 3...

1. Turn on the personal computer and start up MS-DOS from the hard disk. The DOS prompt for the hard disk will be displayed.

```
C>
```

2. Insert the backup system disk into drive A, enter "A: INSTALL," and press the Return Key.
3. The installation menu will be displayed with the current settings shown in parentheses on the right.

2-5-1 Step 1: Displaying the Installation Menu



Proceed to *2-5-5 Step 5: Installing the Software* if the current settings do not need to be changed.

2-5-2 Step 2: Selecting the Source Drive

1, 2, 3... 1. Select “S: Source drive” from the installation menu.

```
[Source drive]
Which Source Drive? (A–Z)
```

2. Specify the name of the floppy disk drive (A to Z) containing the system disk. In this example the floppy disk drive is drive A.

2-5-3 Step 3: Selecting the Target Drive

1, 2, 3... 1. Select “T: Target drive” from the installation menu. The current target drive setting will be displayed.

```
[ Target Drive ]
  Which Target Drive?(A-Z)
                          C
```

2. Enter the name of the hard disk drive (A to Z) and press the Return Key. In this example the hard disk drive is drive C.
3. The original installation menu will be displayed with the new setting in parentheses next to “Target drive.”

2-5-4 Step 4: Selecting the Target Path

1, 2, 3... 1. Select “P: target Path” from the installation menu. The default directory (MCSS) will be displayed. This directory is displayed automatically by the install command.

```
[ Target Path ]
  Please enter path name.
   \MCSS
```

2. Press the Return Key to accept the default directory. (Enter a different directory name if desired.)
3. The original installation menu will be displayed with the new target path in parentheses next to “Target path.”

2-5-5 Step 5: Installing the Software

1, 2, 3... 1. Select “X: eXecute installation” from the installation menu. The following confirmation prompt will be displayed.

```
[ Excute Installation ]
  Using the above setup parameters, bigin installation?(Y/N)
                                                          Y
```

2. Press the Return Key to begin the installation, or enter “N” to cancel. The following message will appear when “Y” is entered.

```
[ CONFIG.SYS and AUTOEXEC.BAT auto editting ]
  Update CONFIG.SYS and AUTOEXEC.BAT.

                OK?(Y/N)                Y
```

3. Press the Return Key to update the files, or enter “N” to continue without updating the files. The following message will be displayed if files already exist in the target directory.

   Note If “N” is entered, the user must update the CONFIG.SYS and AUTOEXEC.BAT files for the MCSS. Refer to the CONFIG.MCS and AUTOEXEC.MCS files in the MCSS directory for details.

```
[ Delete Files ]
Files exist in target path. Will be erased?

                OK?(Y/N)                Y
```

4. Press the Return Key to delete the files and continue, or enter “N” to exit to the installation menu. The installation will begin if “Y” is entered and the following message will appear when the installation is completed.

```
Installation completed.
Reboot the System..
```

5. Remove the system disk from drive A and reboot the computer by pressing the reset button or Control+Alt+Delete Keys. MS-DOS will restart.

2-6 Starting and Exiting MCSS

This section explains how to start MCSS after installation and how to exit MCSS.

2-6-1 Starting MCSS

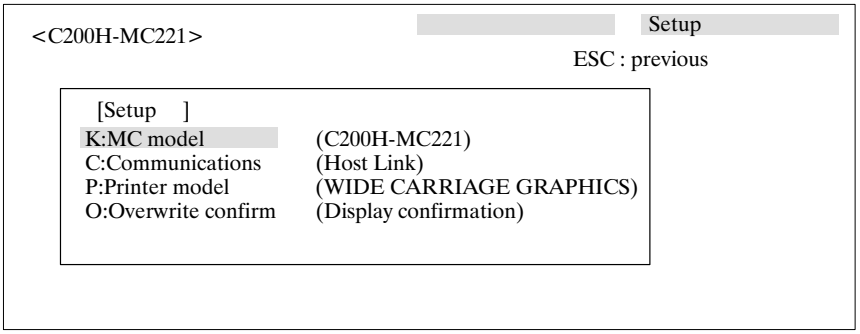
If the CONFIG.SYS and AUTOEXEC.BAT files were not updated during installation, refer to the CONFIG.MCS and AUTOEXEC.MCS files in the MCSS directory and update the CONFIG.SYS and AUTOEXEC.BAT files.

1, 2, 3... 1. Turn on the personal computer. The DOS prompt for the hard disk will be displayed.

```
C>
```

   Press the Return Key to bring up the C> prompt if the time/date setting is displayed.

2. Enter “MCSS” and press the Return Key. The Setup menu will be displayed.

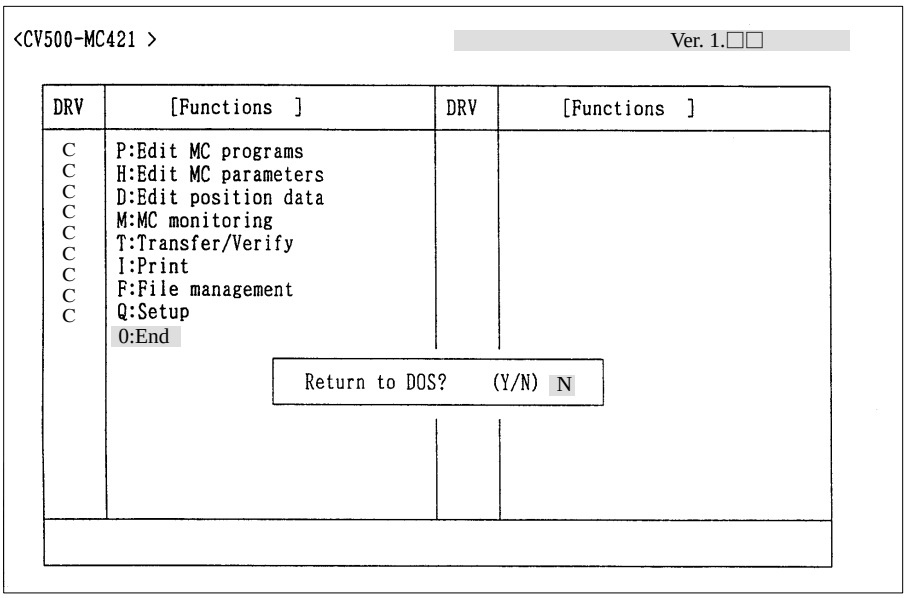


3. Press the Escape Key from the Setup menu to return to main menu.

2-6-2 Exiting MCSS

1, 2, 3...

1. Press the Escape Key on the Setup menu to return to the main menu.
2. To exit the MCSS, press “O” or move the Up (↑) and Down (↓) Keys to highlight “O: End,” and press the Return Key. The following confirmation prompt will appear.



3. Enter “Y” and press the Return Key to exit MCSS.

2-7 The CONFIG.MCS and AUTOEXEC.MCS Files

When the MCSS is installed, several lines are added to the CONFIG.SYS and AUTOEXEC.BAT files. These additional lines are in the CONFIG.MCS and AUTOEXEC.MCS files which are installed in the target directory.

CONFIG.MCS

The four lines in the CONFIG.MCS file set the maximum number of files to 20, the number of buffers to 20, and the paths for the peripheral port and Host Link device drivers. The contents of the CONFIG.MCS file are shown below.

```
FILES=20
BUFFERS=20
DEVICE=C:\MCSS\SPDTLDRV.DEV
DEVICE=C:\MCSS\SPDWADRV.DEV
```

AUTOEXEC.MCS

The five lines in the AUTOEXEC.MCS file set path to the MCSS directory and set other environment parameters necessary for MCSS. The contents of the AUTOEXEC.MCS file are shown below.

```
PATH=C:\;C:\MCSS
SET MCPSYS=C:\MCSS\DATA
SET MCPTMP=C:\MCSS\TMP
SET PRINPUT=DOS
SET PPCONFIG=C:\MCSS\PANELP.CNF
```

MCPSYS

Specifies the drive and path of the directory where data is saved and retrieved.

MCPTMP

Specifies the drive and path of the directory where temporary data (position data, system parameters, and the program) is stored. (Operation can be speeded up by setting the drive to a RAM drive, i.e., “SET MCDTMP=D:\.”)

PRINPUT

Leave this set to DOS.

PPCONFIG

Sets the directory for the PPII settings file. Leave this set to “C:\MCSS\PANELP.CNF.”

SECTION 3
Basic Operations and Preliminaries

This section explains basic operations and preliminaries that are required before programming. Be sure to read this section thoroughly before proceeding further.

3-1 Basic Operations

The MCSS has various functions for creating user programs, setting parameters, and debugging. This section explains the basic operations required for using those functions.

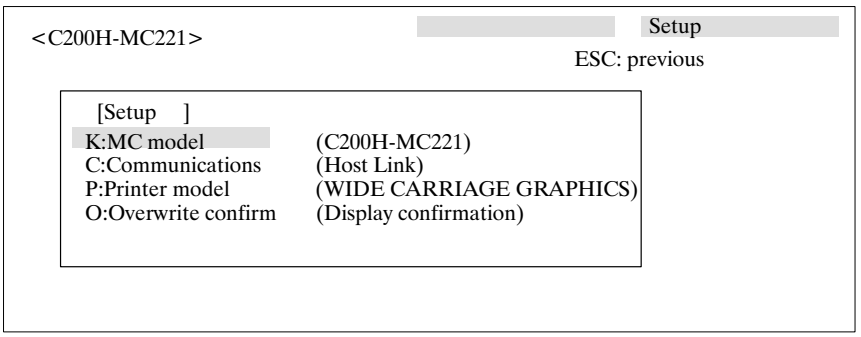
3-1-1 Starting and Exiting

1, 2, 3...

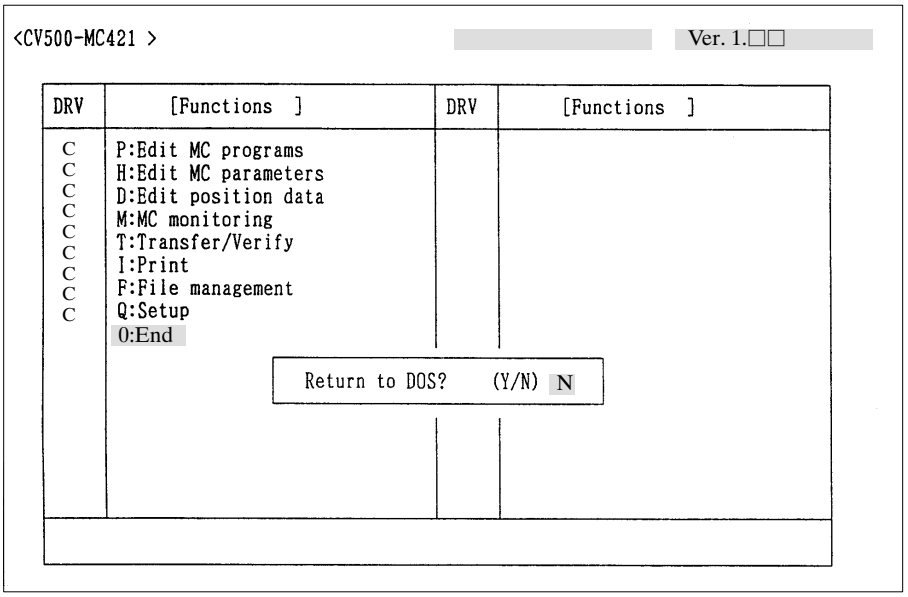
1. To start up the MCSS, first install it in the personal computer as explained in *Section 2 Software Installation*.

   Note Refer to *17-1 MC Unit Designation* to set the MC model.

2. Enter "MCSS," and press the Return Key. The Setup menu will be displayed.
3. Select "K: MC Model" to determine which MC model to be used.



4. To exit the MCSS, press the Escape Key to return to the main menu, press "O" or move the Up (↑) and Down (↓) Keys to highlight "O: End" and press the Return Key. The following confirmation prompt will appear. Enter "Y" and press the Return Key.



3-1-2 Selecting Items from the Main Menu

There are two methods for selecting items from the main menu.

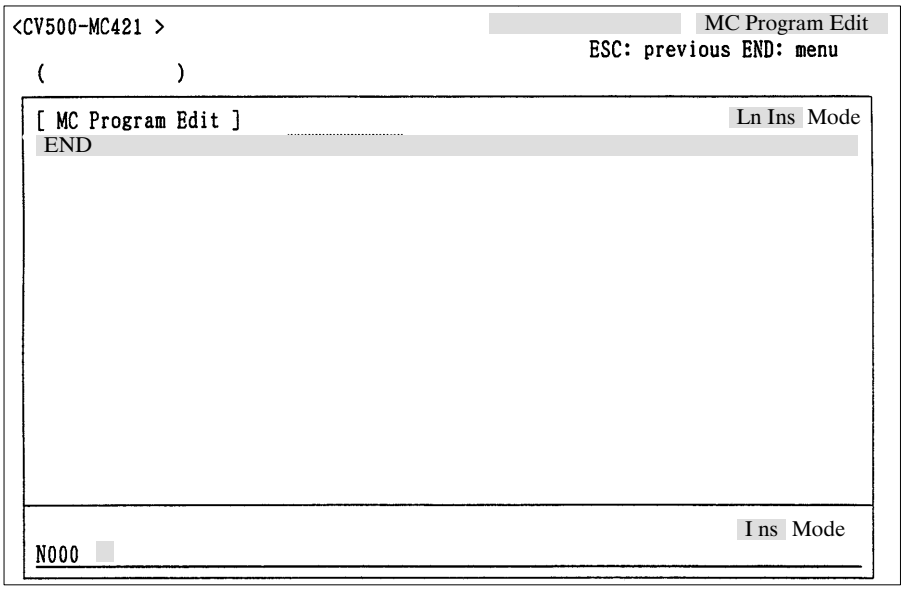
Enter the initial letter. For example, to select "H:Edit MC parameters," enter "H."

or Use the Up and Down Keys to move the cursor to the desired menu item and press the Return Key.

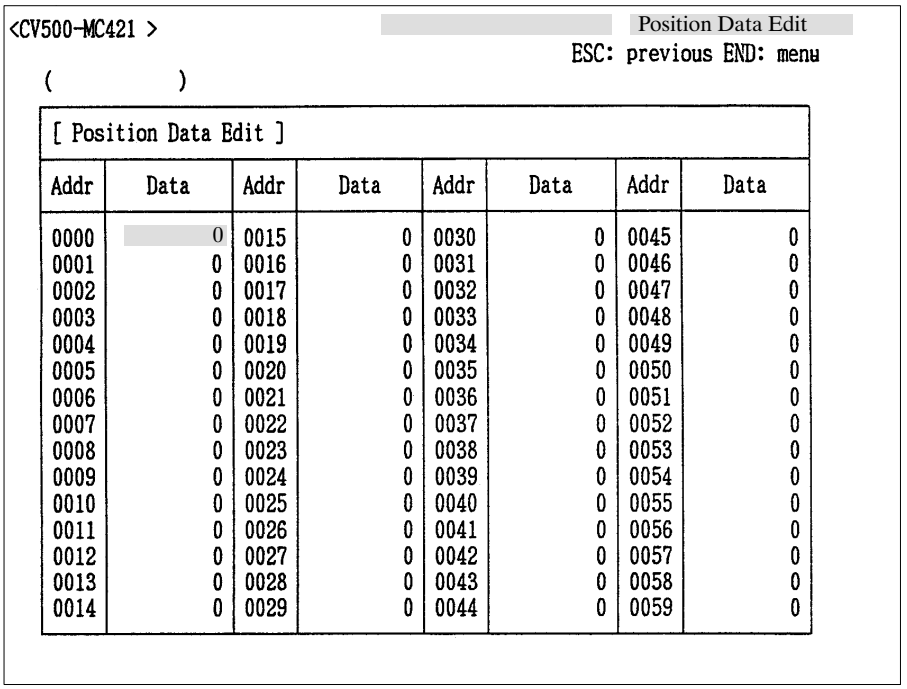
3-1-3 Edit Screens

Various basic screens can be selected from the main menu and displayed. For example, the MC Program Edit, Position Data Edit, and MC Parameter Edit screens are shown below.

MC Program Edit Screen

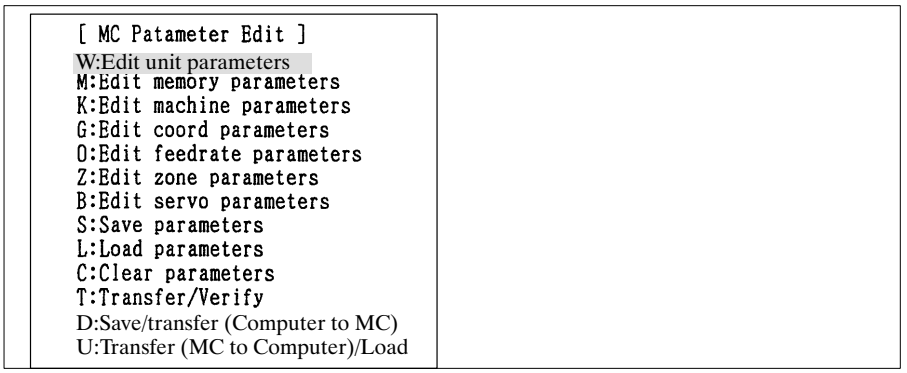


Position Data Edit Screen



Addr	Data	Addr	Data	Addr	Data	Addr	Data
0000	0	0015	0	0030	0	0045	0
0001	0	0016	0	0031	0	0046	0
0002	0	0017	0	0032	0	0047	0
0003	0	0018	0	0033	0	0048	0
0004	0	0019	0	0034	0	0049	0
0005	0	0020	0	0035	0	0050	0
0006	0	0021	0	0036	0	0051	0
0007	0	0022	0	0037	0	0052	0
0008	0	0023	0	0038	0	0053	0
0009	0	0024	0	0039	0	0054	0
0010	0	0025	0	0040	0	0055	0
0011	0	0026	0	0041	0	0056	0
0012	0	0027	0	0042	0	0057	0
0013	0	0028	0	0043	0	0058	0
0014	0	0029	0	0044	0	0059	0

MC Parameter Edit Screen



3-1-4 Menus

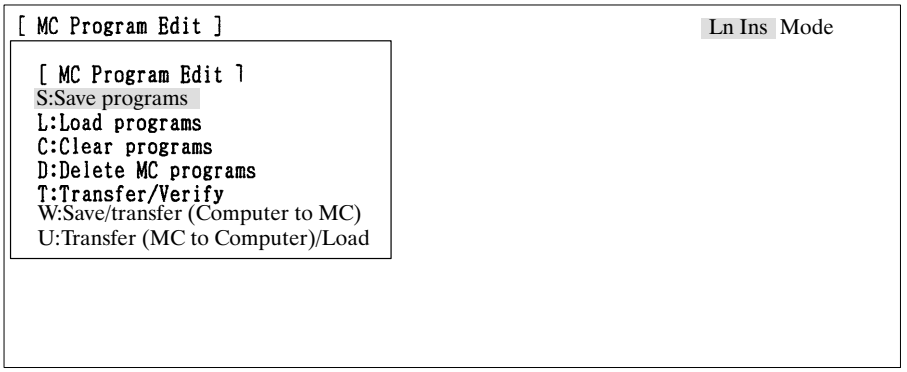
Menus have several levels, or hierarchies. Sub-menus can be selected from the main menu in order to access more detailed functions.

Press the End Key to display the menu items in an edit screen. The two methods for selecting these items are the same as for selecting items from the main menu.

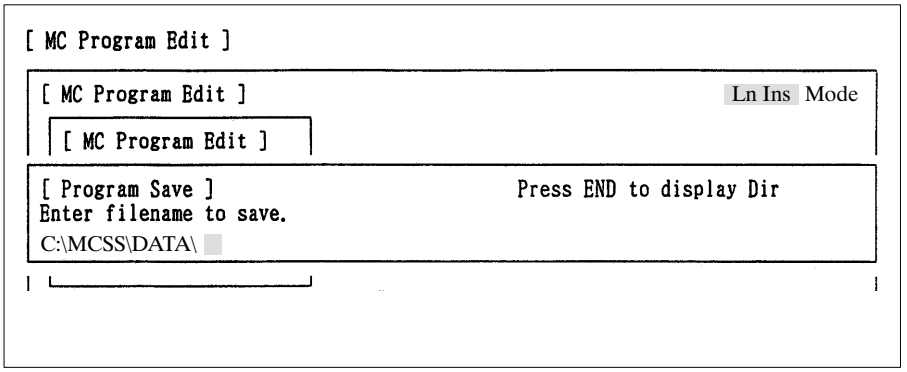
Enter the initial letter. For example, to select “S:Save program,” enter “S.”

or Use the Up and Down Keys to move the cursor to the desired item, and press the Return Key.

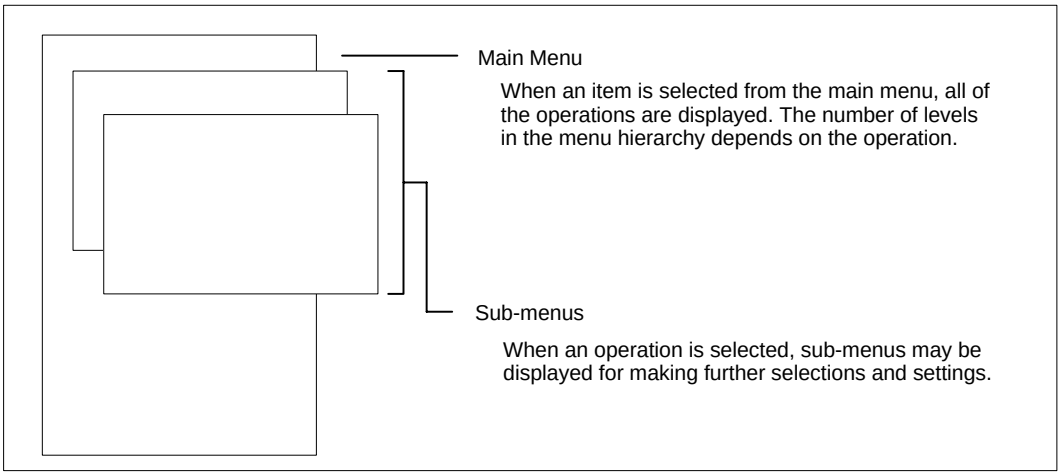
MC Program Edit Menu Example



MC Program Edit Menu Selection Example

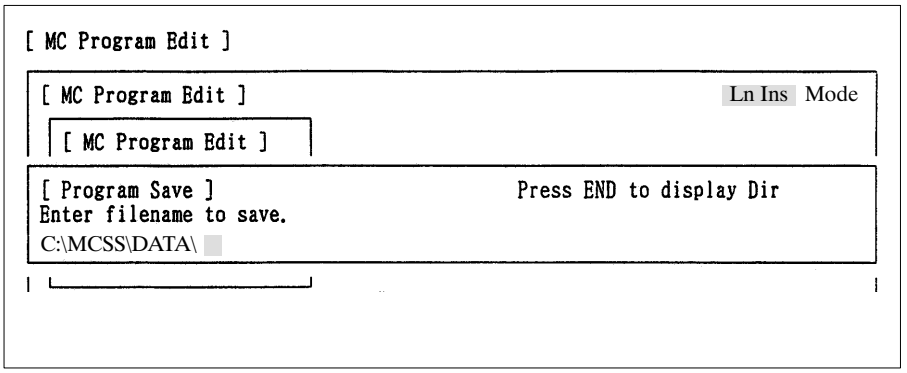


Menu Configuration The menu hierarchy is configured as shown in the following illustration.

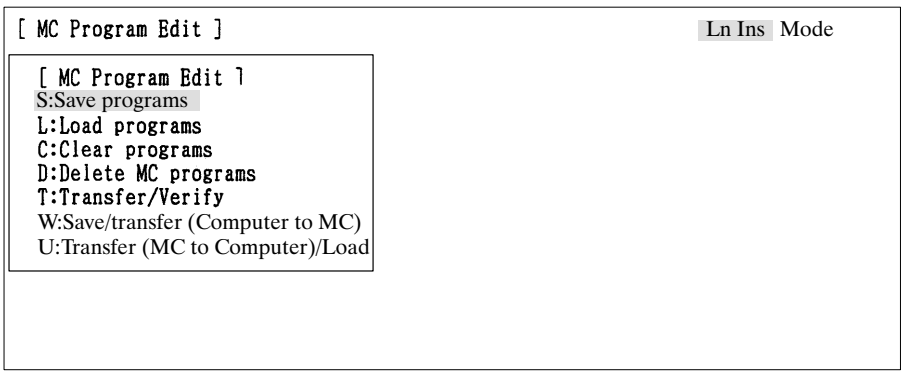


Returning to the Previous Level

1, 2, 3... 1. Press the Escape Key to return to the previous level in the menu hierarchy. For example, the following illustration shows an item in the MC Program Edit menu.



2. To return to the previous level, the MC Program Edit menu in this example, press the Escape Key.



3-1-5 Inputting Numbers

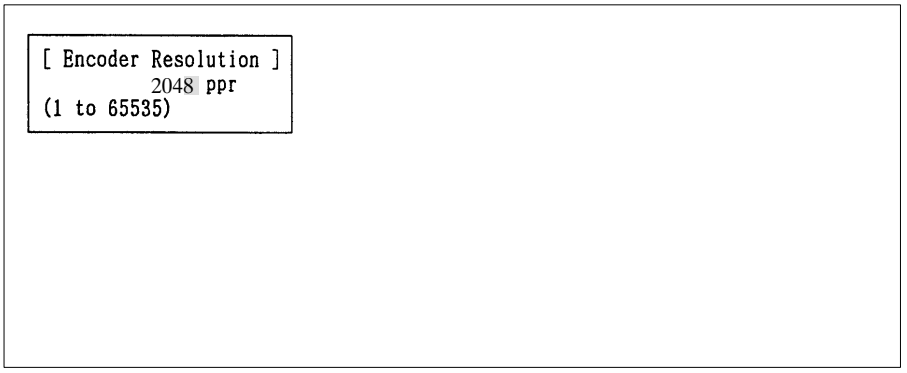
Input numbers for parameter settings, and so on, as shown below.

Encoder Resolution Example

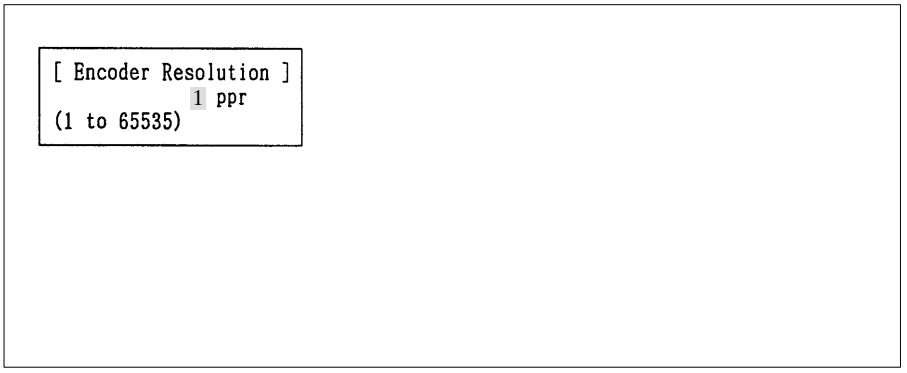
This example shows how to make the encoder resolution setting from the Machine Parameter Edit screen.

1, 2, 3...

1. The default value is shown on the screen. Enter the desired value. When the first character is entered, the default value will be deleted. Only the value that was entered will remain. In this case, up to five digits can be entered. If more than five digits are entered, then digits will be deleted beginning with the leftmost digit.



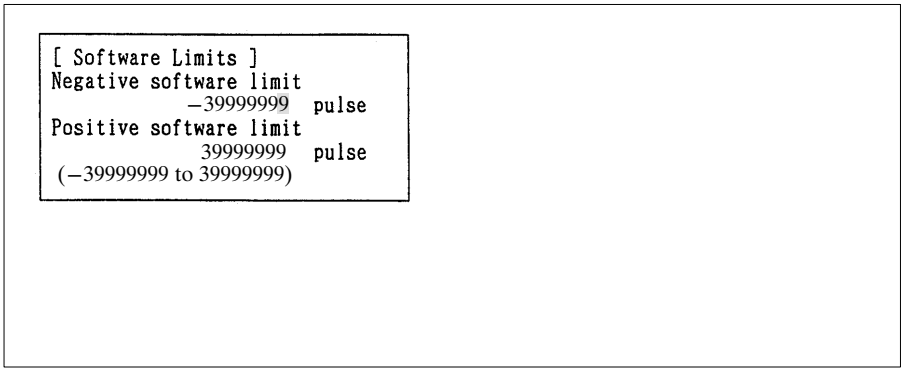
2. For example, if “1” is entered, the screen will appear as follows.



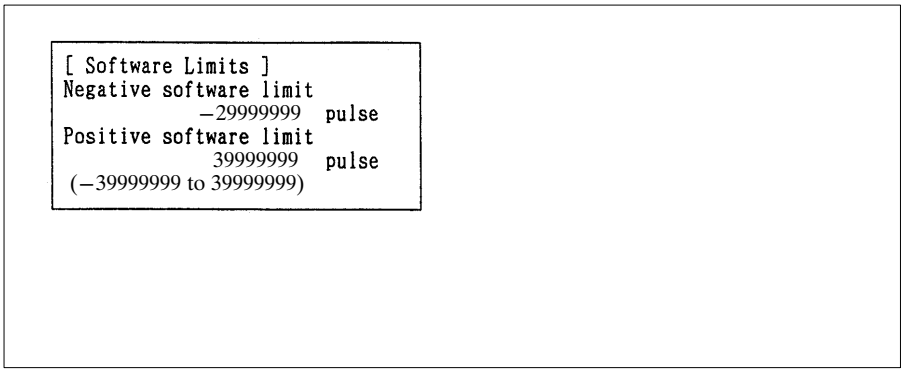
3. To set the encoder resolution to 3,000, enter “3000” and press the Return Key. (The number will not be set until the Return Key is pressed.) If the wrong number is entered by mistake, clear it by pressing the Delete Key and enter the correct number.

Entering Two Items

The following example shows how to enter the stroke limit in two directions while in the Machine Parameter Edit.



1, 2, 3... 1. Enter the stroke limit in the minus direction. To enter –2,999,999, for example, input "–2999999" and press the Return Key. If there is no need to change the value that was entered, move the cursor to the plus direction stroke limit by either pressing the Return Key again or pressing the Down Key.



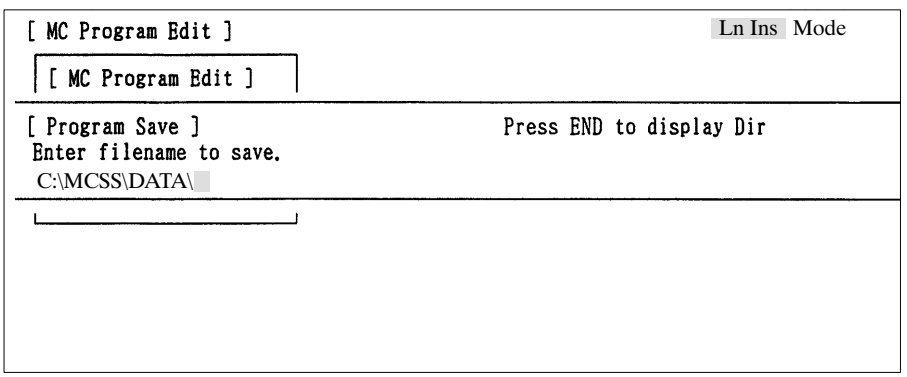
2. Enter the plus direction stroke limit. To enter 100,000, for example, input "100000" and press the Return Key.

Note The Return Key must be pressed after a number has been input. If the Return Key is not pressed, the number will not be set. In the above example, pressing the Down Key before the Return Key has been pressed will cause the cursor to move down to the plus direction stroke limit without the new minus direction stroke limit value having been set. In that case, the original minus direction stroke limit value will be restored.

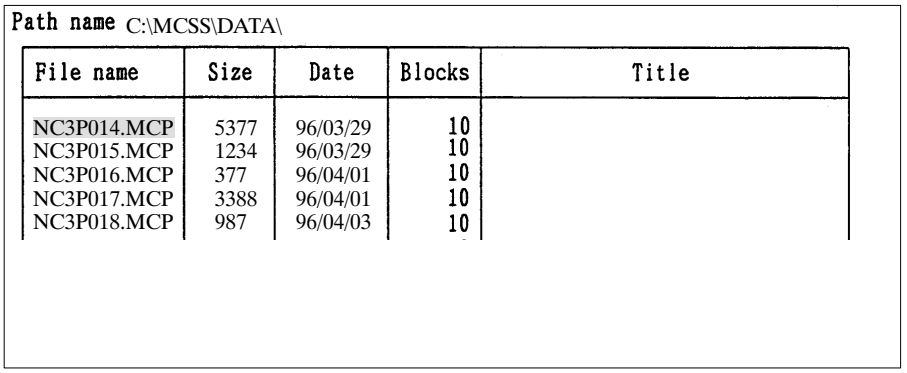
3-2 Entering Filenames

Saving and Retrieving Files When saving or retrieving programs or data, a screen such as the one shown below will be displayed for entering the filename.

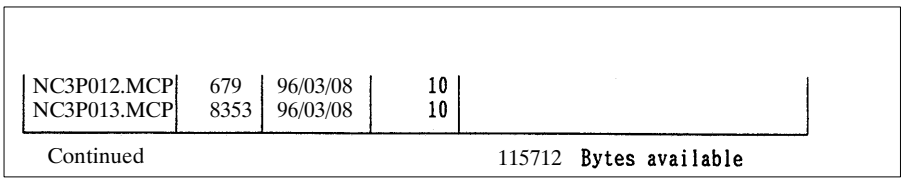
1, 2, 3... 1. In this example, "Program Save" is selected from the MC Program Edit menu.



2. A filename can be entered directly, but if the file has already been saved it can be selected from a list of files by pressing the End Key to display the filename list.



3. Use the Up and Down Keys to move the cursor to the desired filename, and press the Return Key to enter that filename.
4. If the filenames cannot all be displayed on one screen, these will be continued on the next screen. In that case, a message will be displayed at the bottom of the first screen indicating that the list continues.



5. Press the F1 or PageDown Key to display the next page, and press the F2 or Page Up Key to display the previous page.

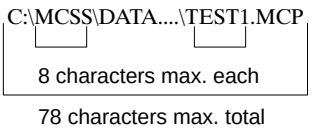
The number of bytes available is shown at the bottom right of the screen.

Filenames for Saving and Retrieving Files

A maximum of eight characters can be used for a filename.
(Example: FILENAME)

Directory names can also consist of up to eight characters. The total number of characters that can be handled for directory and filename combined is 78.

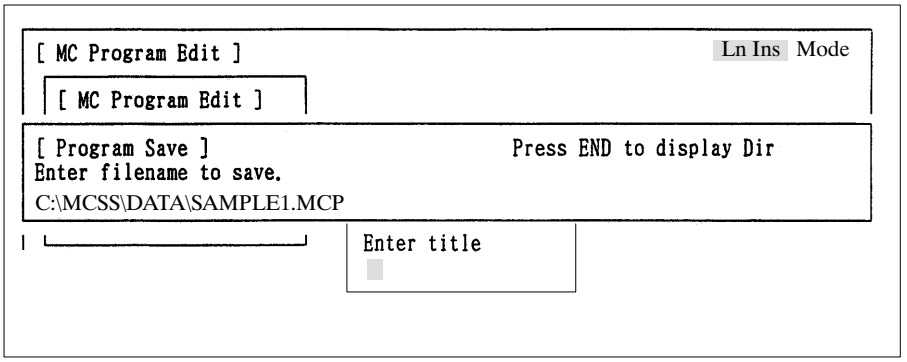
Example



When specifying a directory for saving a file, an error will be generated if the directory has not already been created on either the hard disk or data disk.

Titles

When saving a file, a title or comment can be entered after specifying the filename and pressing the Return Key. The title or comment can consist of up to 30 characters. It is also possible to skip this step by pressing the Return Key without entering anything.



Filename Extensions

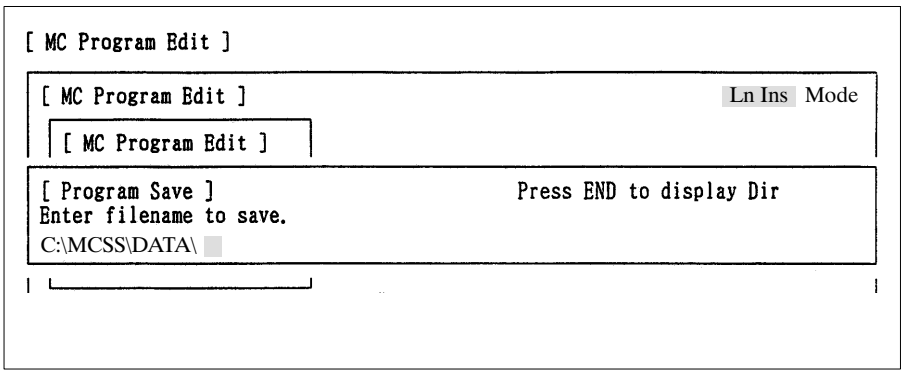
The following filename extensions can be used by the MC Unit.

Type of file	Extension
Program	MCP
Parameters	MCQ
Position data	MCA

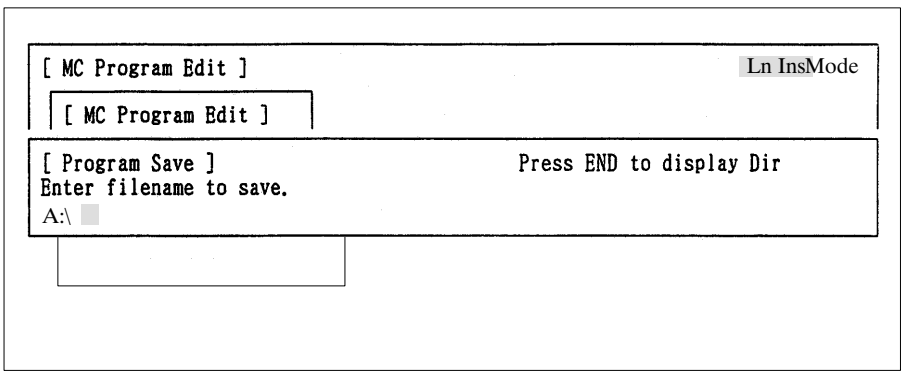
There is no need to enter the extension. It is automatically added when the filename is entered and the Return Key is pressed.

Drives and Paths

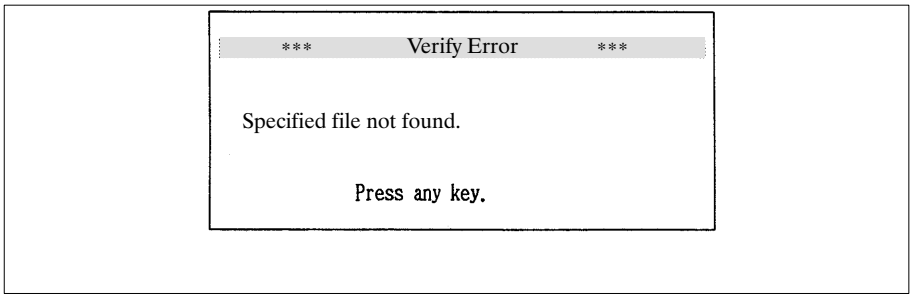
The drives and paths for saving, retrieving, transferring, and printing files are determined at the time of installation. In this example, “C:\MCSS/DATA” is displayed.



To change the drive name, use the Backspace Key or Left Key to move the cursor to “C,” and enter the new drive name directly. For example, enter “A:\.”



If a nonexistent file is designated to be retrieved, transferred, or printed, an error message will be displayed on the screen. For example, the following message would be displayed if “Load program” was specified in the MC Program Edit Screen with regard to a nonexistent file.



If the message is displayed, press any key to continue.

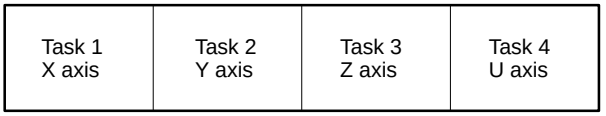
3-3 Programs and Tasks

A task is software that executes a program. Four tasks can be set for the CV500-MC421. By executing these four tasks simultaneously, the MC Unit operates like an NC controller

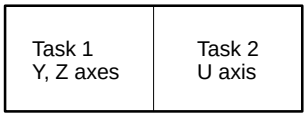
Tasks and Axes Used

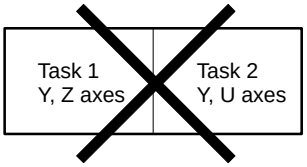
The number of tasks and the axes to be used for the tasks must be set in advance by the User Parameter Edit operation. The X, Y, Z, and U axes can all be used, but the same axis cannot be used for different tasks.

Example 1: Four Tasks, Four Axes Used

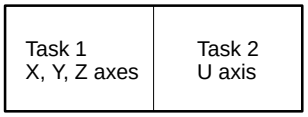


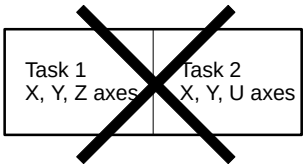
Example 2: Two Tasks, Three Axes Used



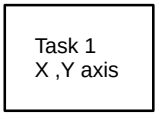


Example 3: Two Tasks, Four Axes Used





Example 4: One Tasks, Two Axes Used



A maximum of two tasks can be set for the CV500-MC221 or C200H-MC221. Only the X and Y axes can be used.

Numbers of Tasks and Blocks

The MC Unit can store a total of up to 800 program blocks. The maximum number of blocks, including sub-programs, that can be executed for each number of tasks used are shown in the following table.

Number of tasks	Maximum number of blocks
1	800 blocks
2	400 blocks/task
3	266 blocks/task
4	200 blocks/task

Numbers of Tasks and Programs

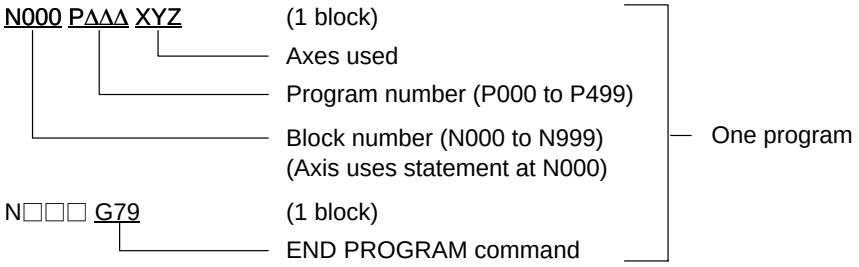
The MC Unit can manage a maximum of 100 programs. The maximum number of programs, including sub-programs, that can be executed for each number of tasks used are shown in the following table.

Number of tasks	Maximum number of programs
1	100 blocks
2	50 programs/task
3	33 programs/task
4	25 programs/task

More information regarding the numbers of blocks, programs, and sub-programs is provided in *2-4 Numbers of Blocks and Programs*.

3-4 Numbers of Blocks and Programs

The illustration below outlines a program written in G language, which is used by the MC Unit. In this illustration, only the beginning and end of the main program are shown as an example.



Programs consist of blocks, which are assigned block numbers N000 to N999. A single program begins with block number N000 and ends with the block number at which the END PROGRAM command (G79) is written.

Programs are numbered from P000 to P499. Sub-programs are numbered from P500 to P999, and are ended by the END SUB-PROGRAM command (G73).

Refer to *Section 5 G Language* of the *MC Unit Operation Manual: Details* for more details on programs and G language.

3-5 Setting the Axes to be Used

The user can set from one to four axes to be used by the CV500-MC421. The default value is four axes.

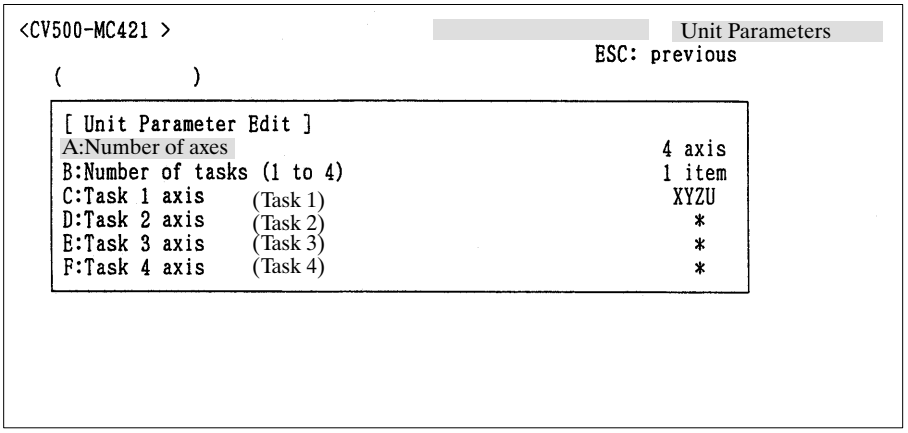
The user can set one or two axes to be used by the CV500-MC221 or C200H-MC221. The default value is two axes.

Procedure

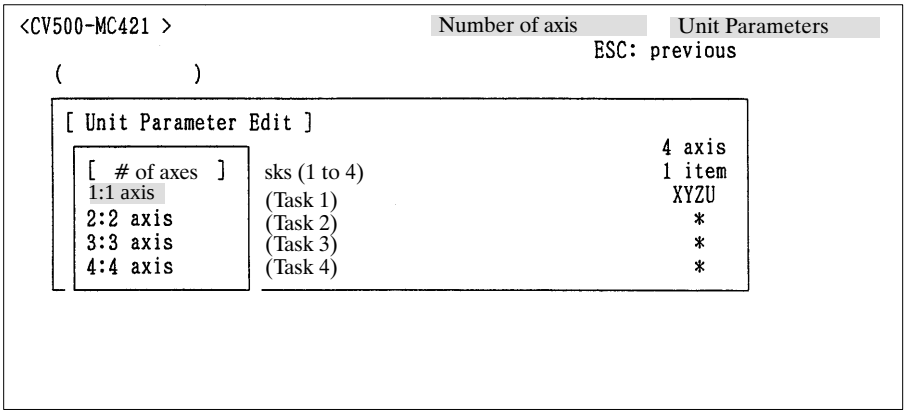
In this example, three axes are set for the CV500-MC421.

1, 2, 3...

1. Select “W:Edit unit parameters” from the MC Parameter Edit menu.



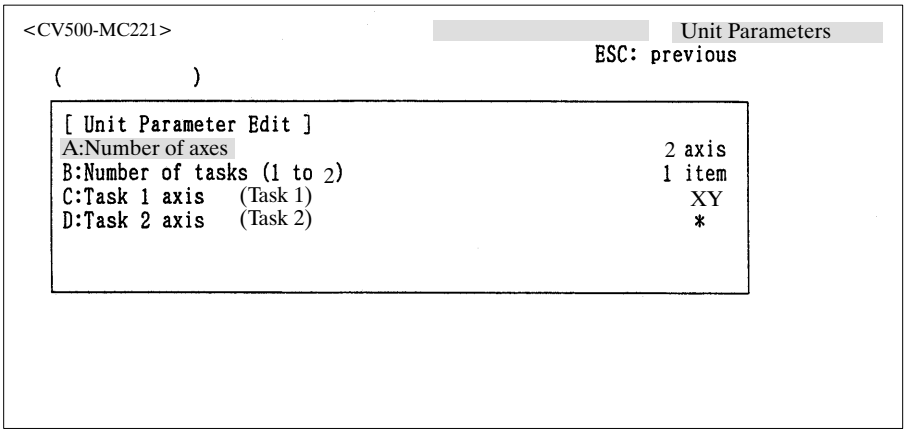
2. Select “A:Number of axes” from the Unit Parameter Edit menu.

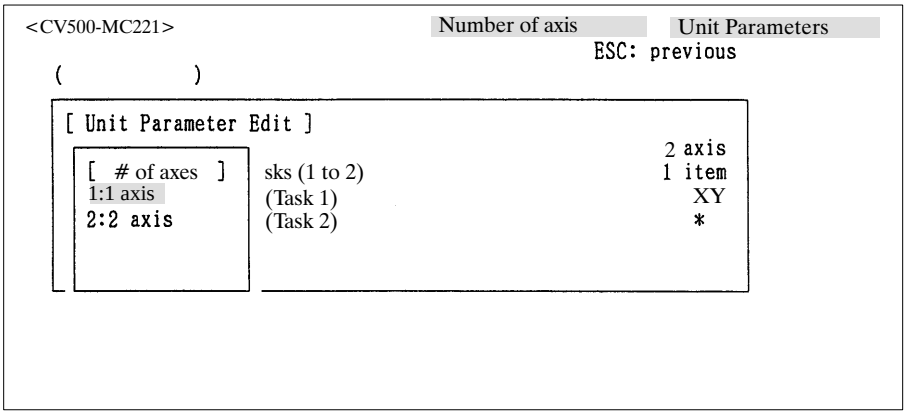


3. Select “3:3 axis” from the Number of Axes menu.

Screen Examples for the CV500-MC221 and C200H-MC221

The CV500-MC221 and C200H-MC221 display the following types of screens. Refer to the operating procedure for the CV500-MC421.





3-6 Setting the Number of Tasks

The user can set from one to four tasks to be used by the CV500-MC421. The default value is four tasks.

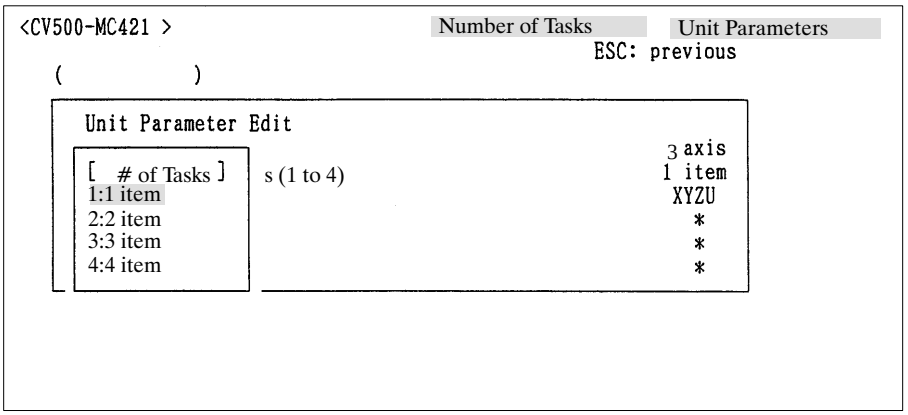
The user can set one or two tasks to be used by the CV500-MC221 or C200H-MC221. The default value is one task.

Procedure

In this example, two tasks are set for the CV500-MC421.

1, 2, 3...

1. Select “W:Edit unit parameters” from the MC Parameter Edit menu.
2. Select “B:Number of tasks (1 to 4)” from the Unit Parameter Edit menu.



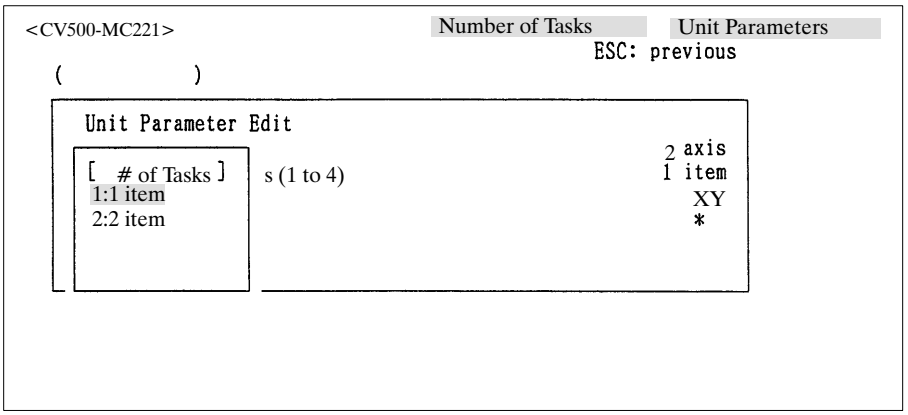
In this example, assume that “3:3 axis” has been selected from the Number of Axes menu.

3. Select “2:2 items” from the Number of Tasks menu.

Note The number of tasks that is set must be less than or equal to the number of axes to be used.

Screen Examples for the CV500-MC221 and C200H-MC221

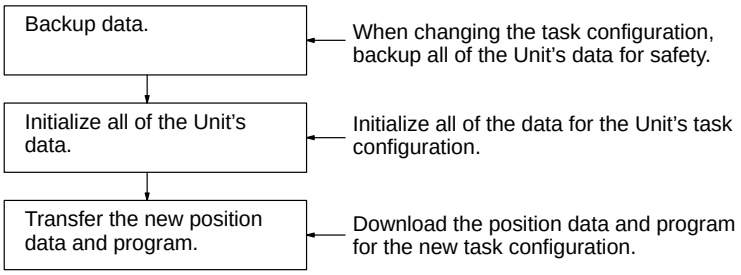
The CV500-MC221 and C200H-MC221 display the following types of screens. Refer to the operating procedure for the CV500-MC421.



3-7 Changing the Task Configuration

Use the following procedure to change the C200H-MC221’s task configuration from task 1 to task 2 or from task 2 to task 1. The Unit is set for task 1 when shipped from OMRON.

Operational Flow



Basic Operations

- **Data Backup**

Use the MC Support Software to backup the Unit’s data by transferring the system parameters, program, and position data from the Unit to the personal computer.

- **Data Initialization**

1, 2, 3...

1. Change the task number from 1 to 2 or from 2 to 1 in the MC Support Software’s Unit Parameter Edit menu. If there are other parameters that should be changed, change them and save them.
2. Transfer the parameters created in step 1 (from the personal computer to the Unit). Write “all data” to flash memory.
3. Turn the Unit’s power supply off and on again.
4. Delete the Unit’s entire program with the MC Support Software’s MC Program Edit menu. Write “all data” to flash memory.
5. Turn the Unit’s power supply off and on again.

These steps initialize the Unit for the new task configuration.

- **Data Transfer**

1, 2, 3...

1. Create the position data and program for the new task configuration and transfer the data and program from the personal computer to the Unit. If the position data and program already exist, just transfer the data and program.
2. When all of the position data and program have been transferred, write “all data” to flash memory.

These steps complete the Unit’s setup.

3-8 Setting the Number of Axes for Each Task

The axes for each task are assigned according to the number of axes and tasks to be used.

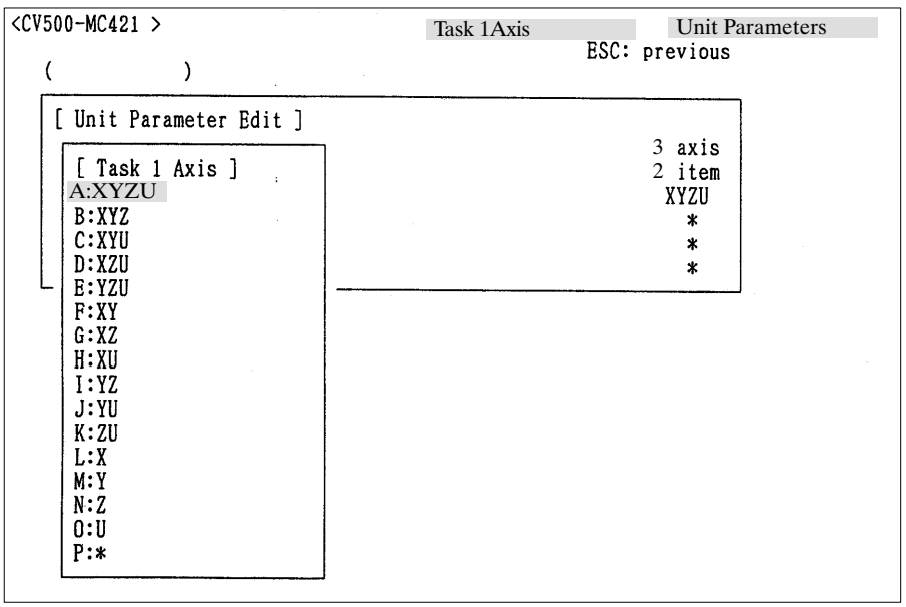
For the CV500-MC421, the default settings are for axes X, Y, Z, and U to be assigned to task 1.
For the CV500-MC221 and C200H-MC221, the default setting are for axes X and Y to be assigned to task 1.

Procedure

The following example shows how to assign axes X and Y to task 1, and axis Z to task 2 for the CV500-MC421. It is assumed that three axes and two tasks have been set.

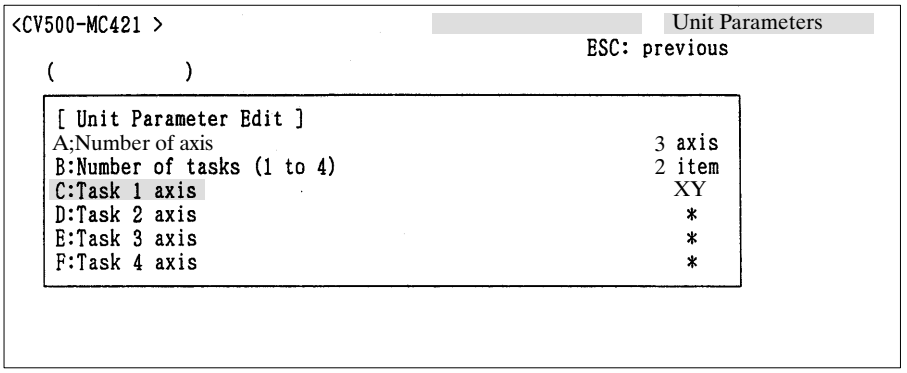
1, 2, 3...

1. Select “W:Edit unit parameters” from the MC Parameter Edit menu.
2. Select “C:Task 1 axis” from the Unit Parameter Edit menu.
3. Select “F:XY” from the Task 1 Axis menu.



As shown in the illustration,set asterisks for tasks that are not used.

4. Select “D:Task 2 axis” from the Unit Parameter Menu.



5. Select “N:Z” from the Task 2 Axis menu.

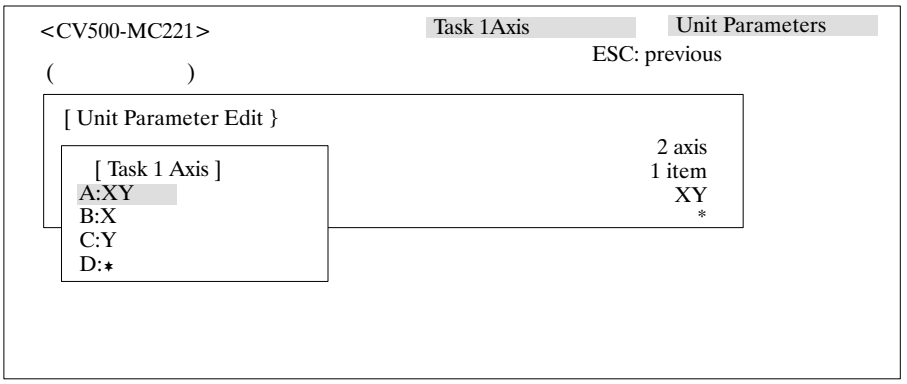
⚠ Caution Be careful about the following points when assigning axes.

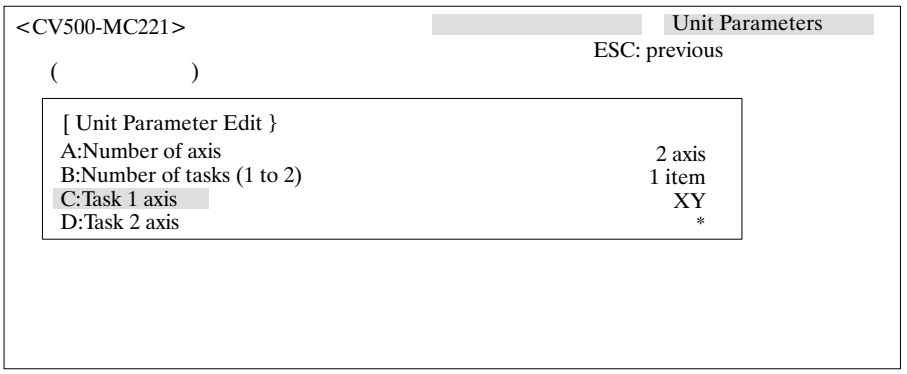
- Assigned axes must not overlap.
- The number of axes assigned must not exceed the number that has been set from the Number of Axes menu. (Refer to *2-5 Setting the Axes to be Used*.)
- The number of tasks must not exceed the number that has been set from the Number of Tasks menu. (Refer to *2-6 Setting the Number of Tasks*.)

If the axes are not selected correctly, a warning message will be displayed on the screen. If that occurs, press any key to continue and correct the axis selection.

Screen Examples for CV500-MC221 and C200H-MC221

The CV500-MC221 and C200H-MC221 display the following types of screens. Refer to the operating procedure for the CV500-MC421.





SECTION 4
Programming and Managing Programs

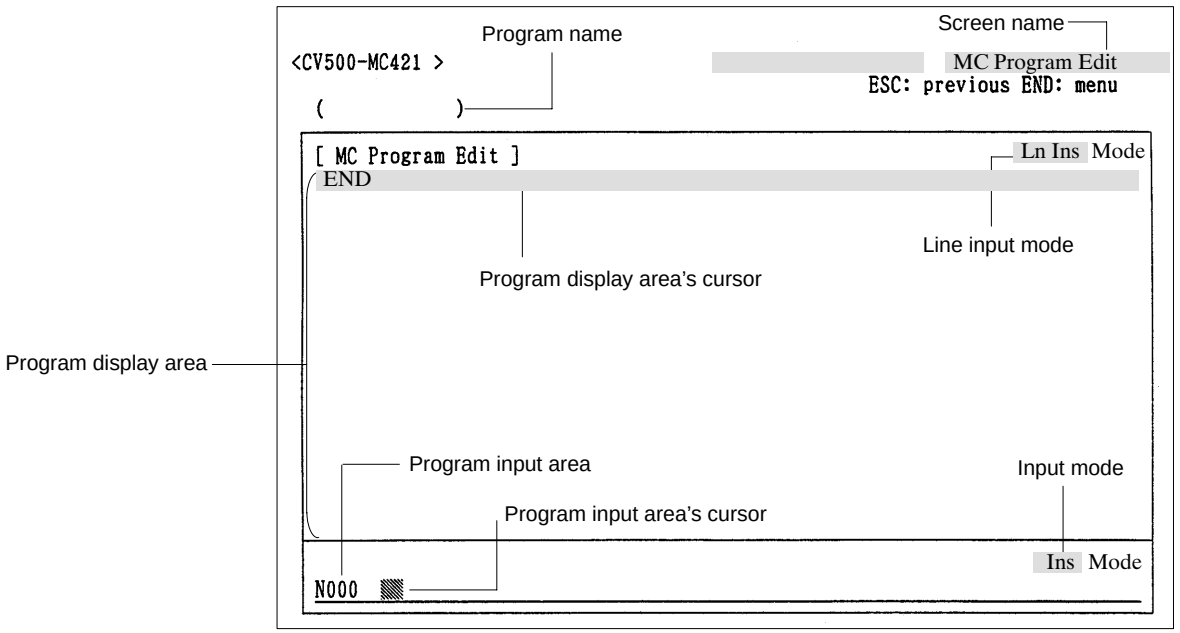
This section explains the operations in the MC Program Edit display. These operations include creating and editing MC programs, transferring programs between data disks and the computer, and deleting programs from the computer or MC Unit.

4-1 Edit MC Programs

Select “P:Edit MC programs” from the main menu to create or edit an MC program.

4-1-1 MC Program Edit Screen

The following diagram shows the MC Program Edit screen, which will appear when “P:Edit MC programs” is selected from the main menu.



The program name indicates the name of the program loaded with the “L: Load programs” operation. Access the MC Program Edit menu by pressing the End Key while the MC Program Edit screen is displayed. See *4-1-5 MC Program Edit Menu* for details.

Programs are created one block at a time at the cursor in the program input area. When the Return Key is pressed, the new program block will be inserted just before the program display area’s cursor if the software is in line insert mode.

Fifteen program blocks can be displayed in the MC Program Edit screen. If the program is longer than 15 blocks, press the F2 Key or PageDown Key to display the next 15 blocks. Press the F1 Key or PageUp to display the previous 15 blocks.

4-1-2 Function Keys

The following table shows the functions of the function keys in the MC Program Edit screen.

Key	Name	Function
F1	Page Up	These keys are used to move through programs larger than 15 blocks. Press F1 to display the previous 15 blocks, F2 to display the next 15 blocks.
F2	Page Down	
F3	Jump	Displays 15 blocks beginning at the specified block number.
F4	Insert/Over Write	Switches the line input mode between line insert and line overwrite modes.
F5	Renum	Renumbers the program blocks in ascending order.
F6	Delete	Deletes the specified range of program blocks.

4-1-3 Line Input Mode

The line input mode can be switched between line insert mode or line overwrite mode by pressing the F4 Key. The default setting is line insert mode.

Line Insert Mode
In line insert mode, the newly input program block will be inserted just before the cursor in the program display area. Use this mode when creating a new program or inserting new blocks into a program.

Line Overwrite Mode
In line overwrite mode, the program block at the cursor in the program display area will also be displayed in the program input area. Use this mode when editing existing programs.

4-1-4 Input Mode

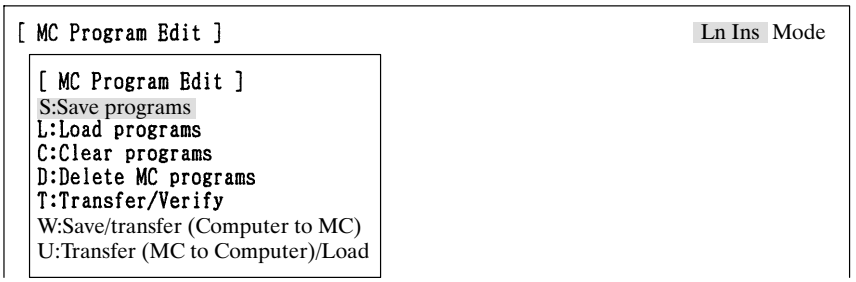
The input mode can switched between insert mode or overwrite mode by pressing the Insert Key. The default setting is insert mode.

Insert Mode
In insert mode, entered characters will be inserted just before the cursor in the program input area.

Overwrite Mode
In overwrite mode, entered characters overwrite the characters at the cursor in the program input area.

4-1-5 MC Program Edit Menu

Press the End Key to bring up the MC Program Edit menu, shown in the following diagram.



The MC Program Edit menu contains the following operations.

Name	Function	Page
S:Save programs	Stores the created or edited program on a data disk.	43
L:Load programs	Retrieves a program from a data disk.	45
C:Clear programs	Clears the program being edited.	34
D:Delete MC programs	Deletes programs stored in the MC Unit by task.	46
T:Transfer/Verify	Transfers and compares programs between the MC Unit and computer.	47
W:Save/Transfer (Computer to MC)	Stores the created program on a data disk and then transfers a copy of the created program to the MC Unit.	48
U:Transfer (MC to computer)/Load	Transfers the program from the MC Unit to a data disk and retrieves the program from the data disk.	49

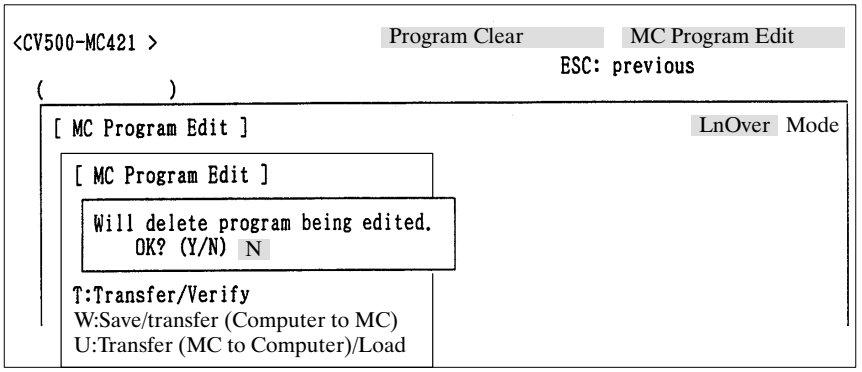
4-2 Clearing the Program

This operation clears the program being edited. Always execute this operation before creating a new program.

Use the Delete function (F6) when only a part of the program needs to be deleted. Refer to *4-7 Deleting Sections of the Program* for details.

Procedure Use the following procedure to clear the program being edited.

1, 2, 3... 1. Press the End Key to bring up the MC Program Edit menu and press C to select “C:Clear programs.” The following confirmation prompt will be displayed.



2. Enter “Y” to delete the program, “N” to cancel the operation. The MC Program Edit screen will be displayed again.

4-3 Inputting a Program

Select “C:Clear programs” before creating a new program. When editing an existing program, use “L:Load programs” to retrieve the program from the data disk.

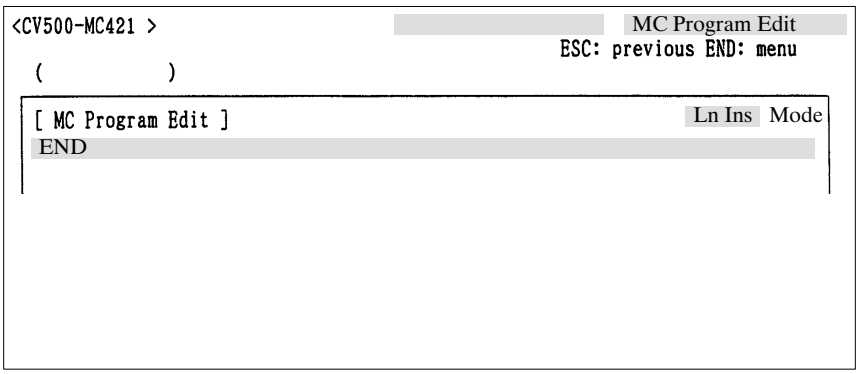
The following program will be entered as an example. Refer to *Section 5 G Language* in the *MC Unit Operation Manual: Details* for details on the G programming language.

N000	P000	XYZ	Declares program number and axes.
N001	G28	XYZ	Origin search
N002	G00	X1000	Positions X-axis at 1000.
N003	G79		Ends the program.

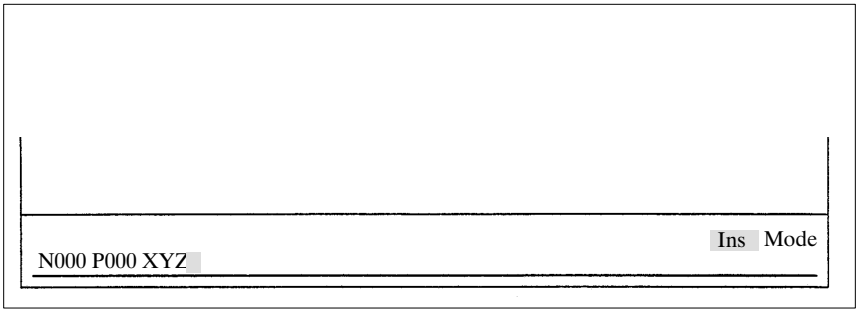
Note Be sure to save edited programs to disk with “S:Save programs.”

Procedure Use the following procedure to input the example program.

1, 2, 3... 1. Check that the MC Program Edit screen is displayed and the line input mode is set to line insert. If the mode is in line overwrite mode, press the F4 Key to switch to line insert mode.

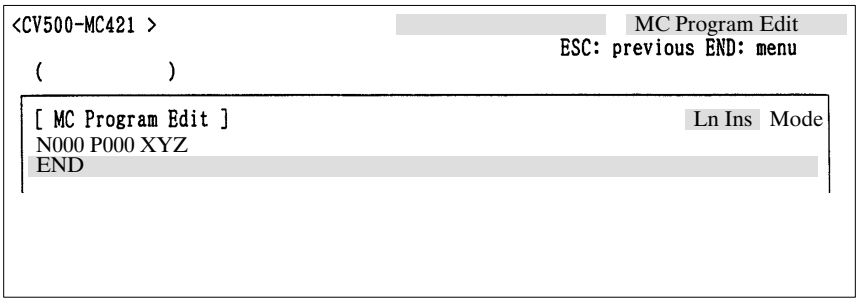


2. The first block number, N000, should be displayed in the program input area. Input the first program block by entering “P000 XYZ.”



If a mistake is made, press the Backspace Key to erase the mistake and enter the program block again.

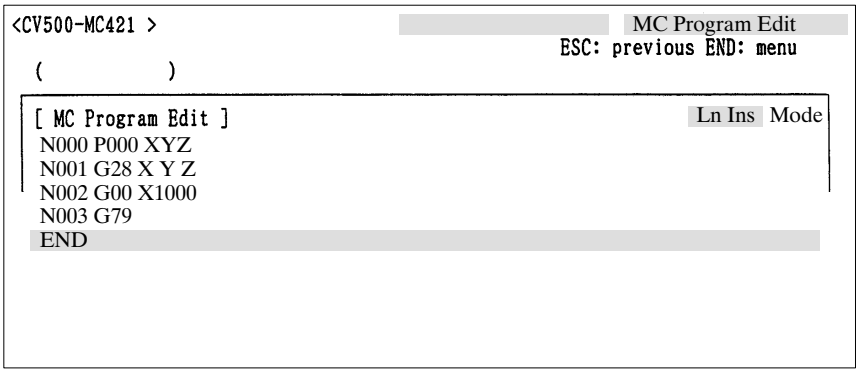
3. Press the Return Key to insert program block N000 into the program display area.



An error message will be displayed above the program if there is a mistake in the inserted block. Enter the program block again if this occurs.

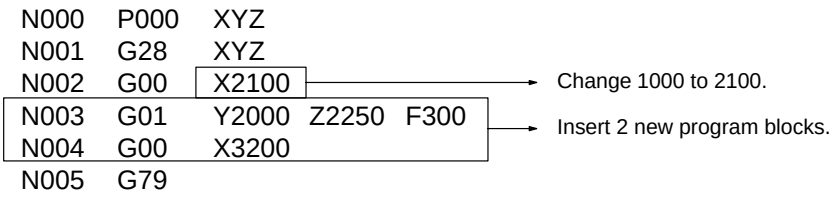
4. The same method is used to insert program blocks N001 through N003, as shown below. The block number in the program input area will be incremented automatically as each block is inserted.

G28 XYZ ↵
G00 X1000 ↵
G79 ↵



4-4 Editing a Program

This section shows how to insert new blocks into a program and edit an existing program. The program input in *4-3 Inputting a Program* will be edited as shown in the following diagram.

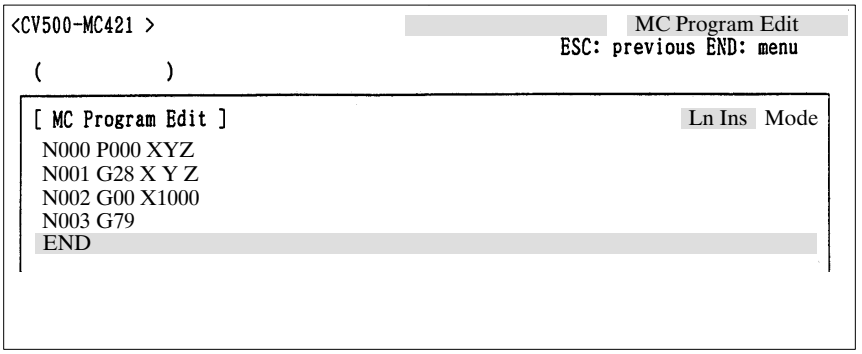


4-4-1 Inserting New Program Blocks

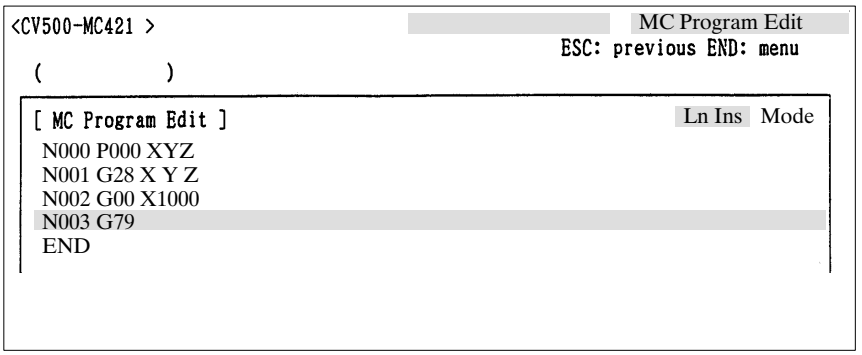
Use the procedure below to insert two new program blocks.

1, 2, 3... 1. Display the program input in *4-3 Inputting a Program*.

Check that the MC Program Edit screen is displayed and the line input mode is set to line insert. If the mode is line overwrite mode, press the F4 Key to switch to line insert mode.

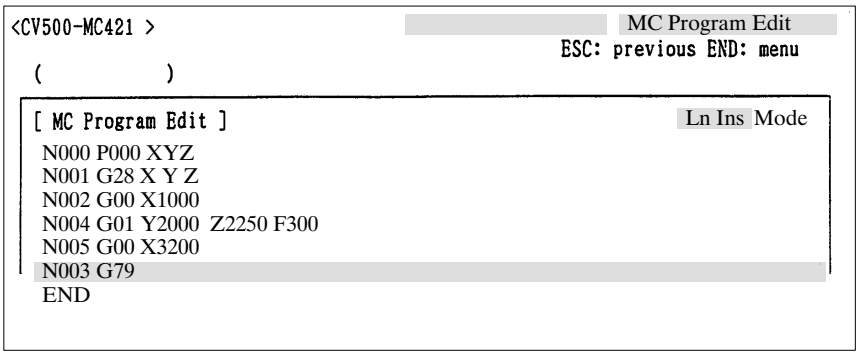


2. Press the Up Key (↑) to highlight block N003.

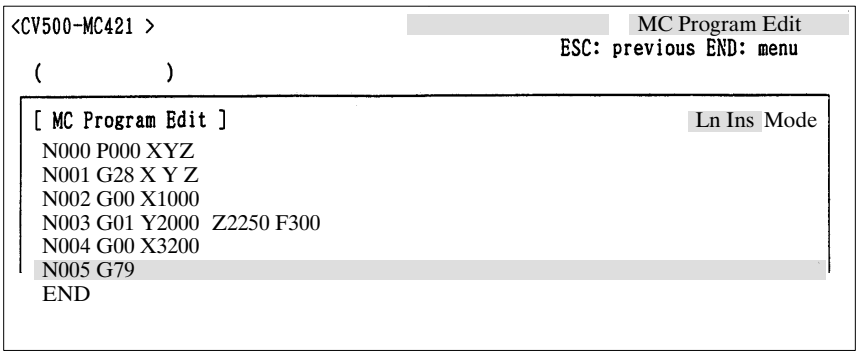


3. Block number N004 should be displayed in the program input area. Enter the program blocks to be inserted, as shown in the following.

   G01 Y2000 Z2250 F300 ↵
   G00 X3200 ↵



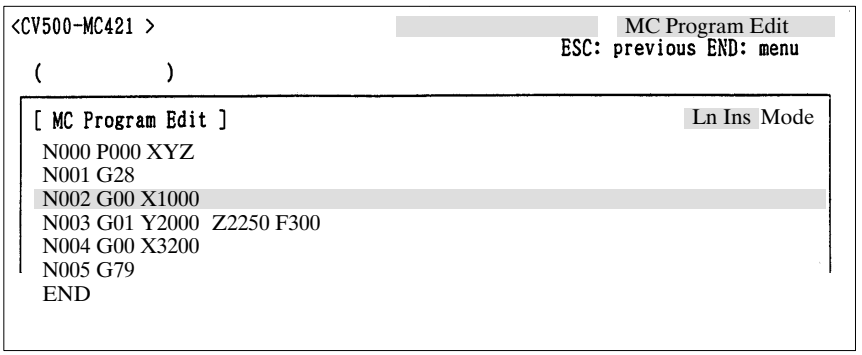
4. Blocks N004 and N005 were inserted before block N003. Press the F5 Key to renumber the program blocks in the order they appear in the program.



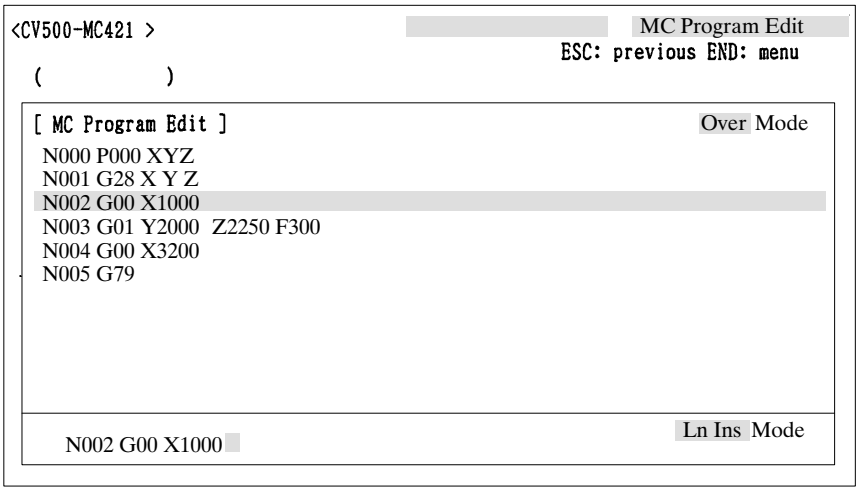
4-4-2 Editing a Program Block

Use the procedure below to change a program block.

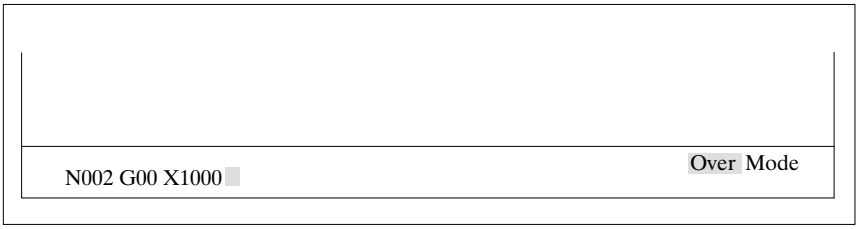
1, 2, 3... 1. Press the Up Key (↑) three times to highlight block N002.



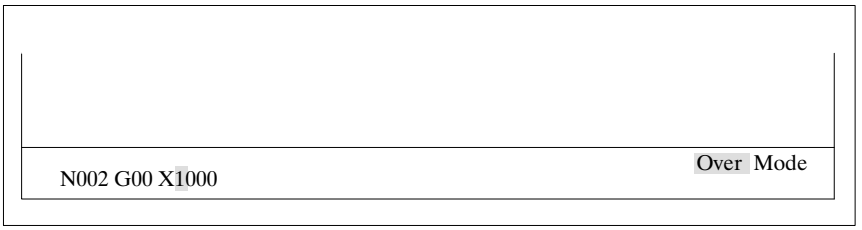
2. Press the F4 Key to switch to line overwrite mode. The highlighted program block will be displayed in the program input area.



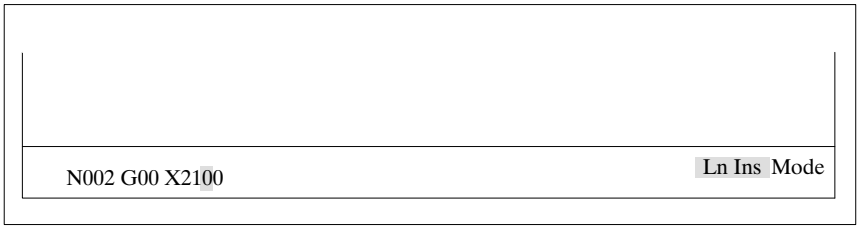
3. Press the Insert Key to switch to the input mode to overwrite mode.



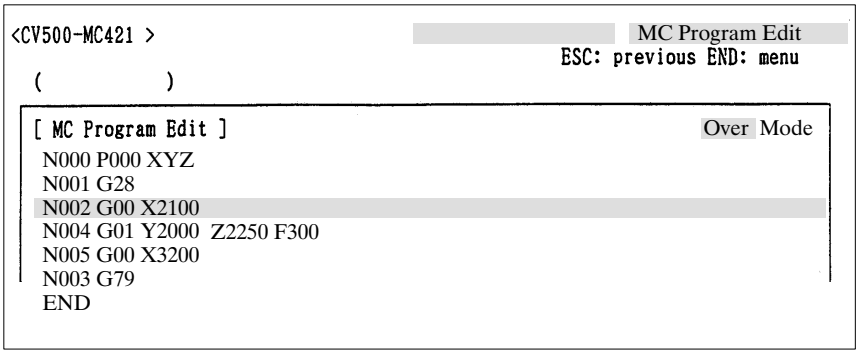
4. Press the Left Key (←) 5 times to move the cursor to the “1.”



5. Enter “21” to change X1000 to X2100.

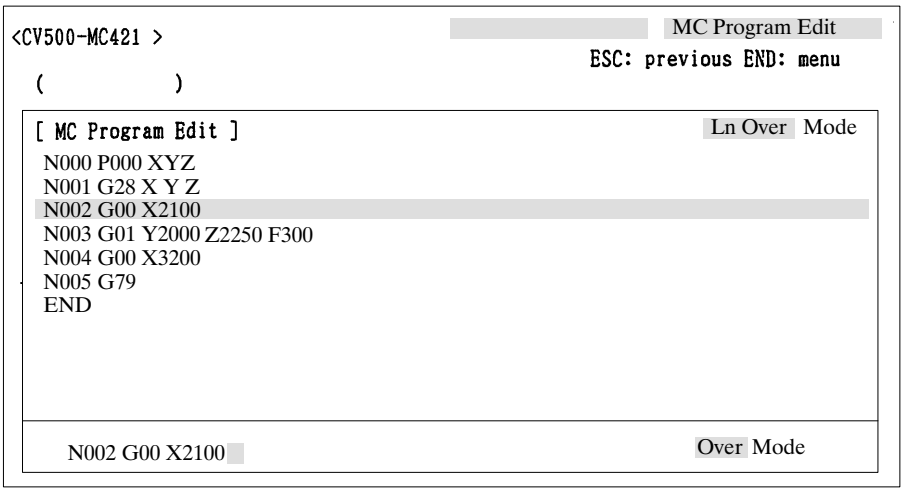


6. Press the Return Key to write the changes to the program display area.



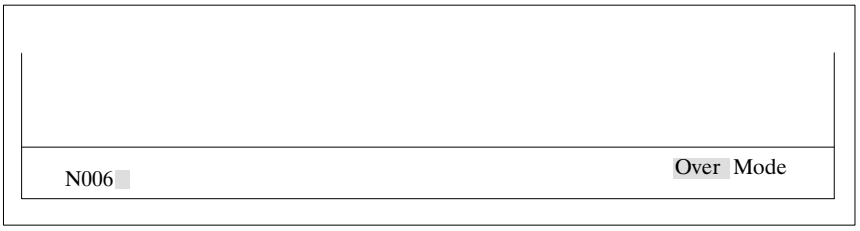
4-5 Inputting Comments

If the first character in a block (N) is replaced with an asterisk, the block will become a comment. As an example, a comment will be inserted after block N000 in the following program.

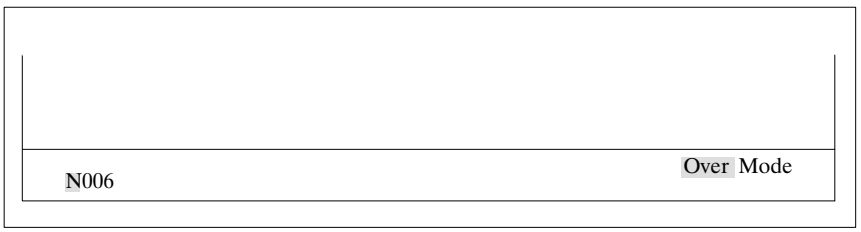


1, 2, 3...

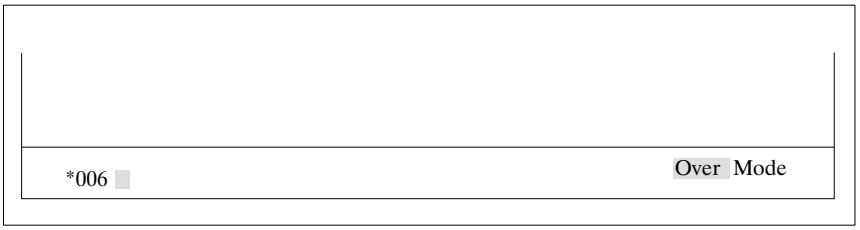
1. Press the Up Key (↑) once to highlight block N001.
2. Press the F4 Key to switch to line insert mode. The next program block (N006) will be displayed in the program input area.



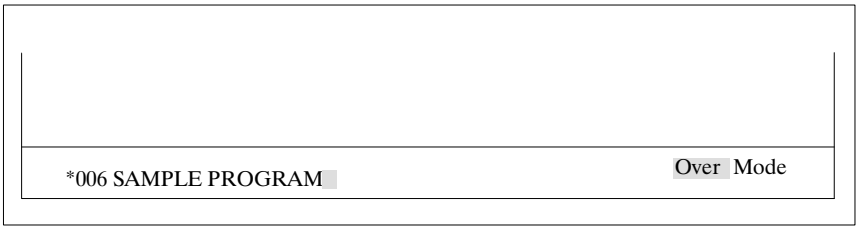
3. Press the Left Key (←) 5 times to move the cursor to the "N."



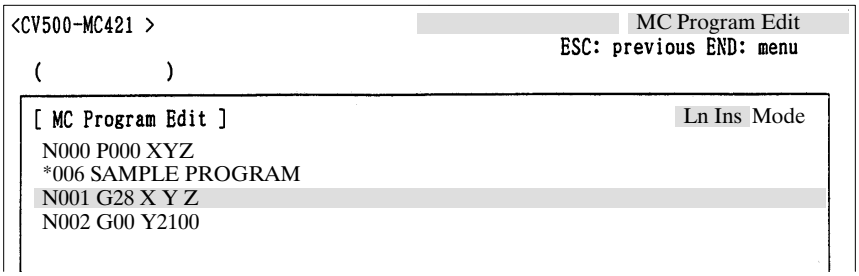
4. Enter "*" to change N006 to *006 and press the Right Key (→) 4 times.



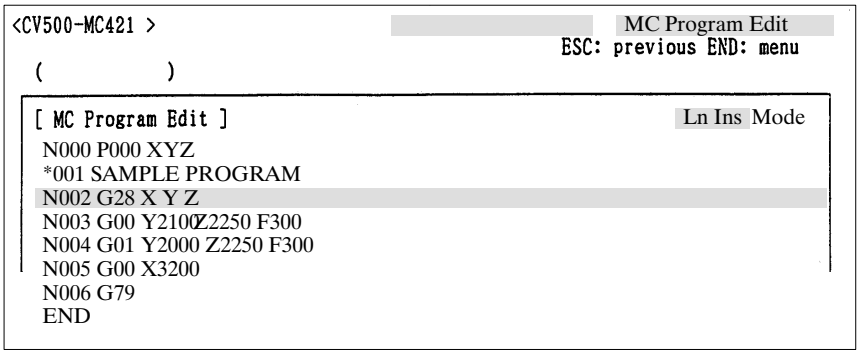
5. Enter the desired comment. "SAMPLE PROGRAM" in this case.



6. Press the Return Key to write the changes to the program display area.



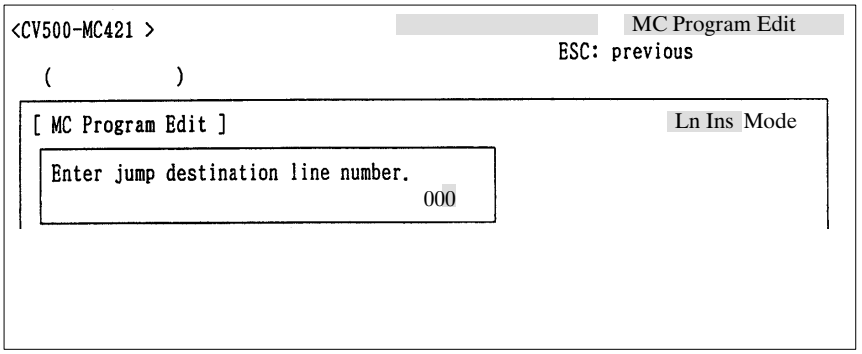
7. Press the F5 Key to renumber the program blocks in the order that they appear in the program.



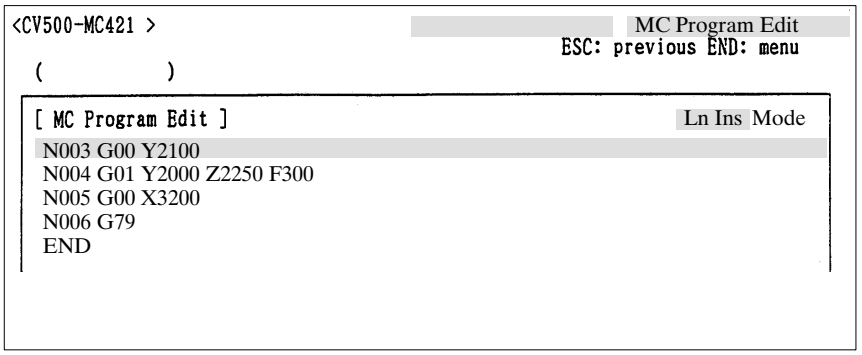
4-6 Jumping to a Specified Program Block

The F3 Key can be pressed to move the MC Program Edit screen to a specified program block. The specified block will be highlighted.

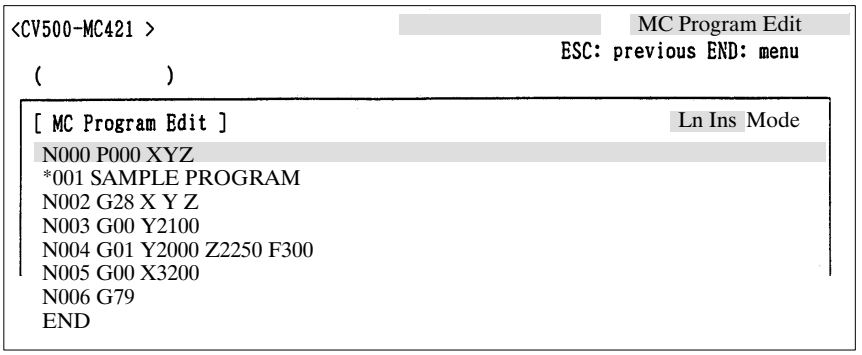
1, 2, 3... 1. Press the F3 Key while the MC Program Edit screen is displayed. An input area for the destination block number will be displayed.



2. Enter the desired block number (3 in this case). Block N003 will be highlighted and appear at the top of the screen.



3. Press the Up Key (↑) to highlight the previous program block. The Up Key was pressed 3 times in this example.

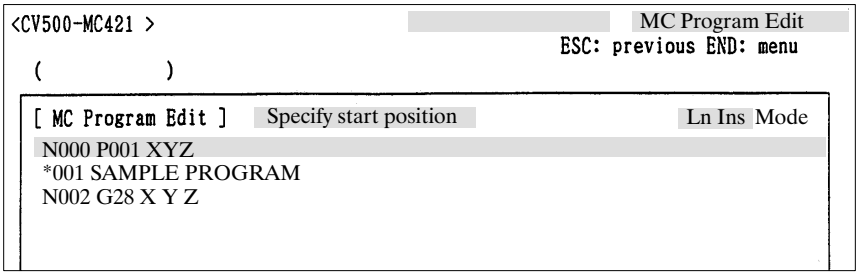


4-7 Deleting Sections of the Program

The F6 Key can be pressed to delete a specified range of the program. The first and last blocks of the range must be specified.

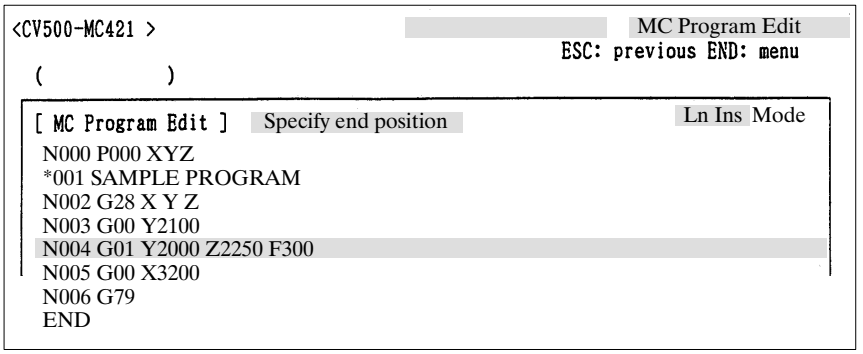
1, 2, 3...

1. Press the F6 Key while the MC Program Edit screen is displayed. A message will be displayed requesting that the first block in the range be specified.

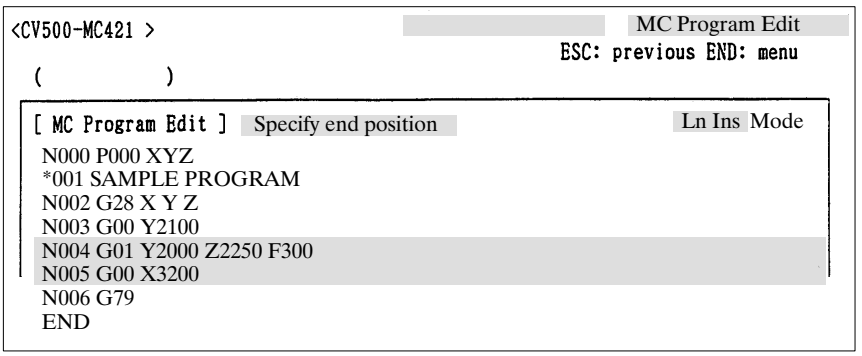


2. Press the Up and Down Keys to highlight the first program block in the range that will be deleted. The Down Key was pressed 4 times in this example.

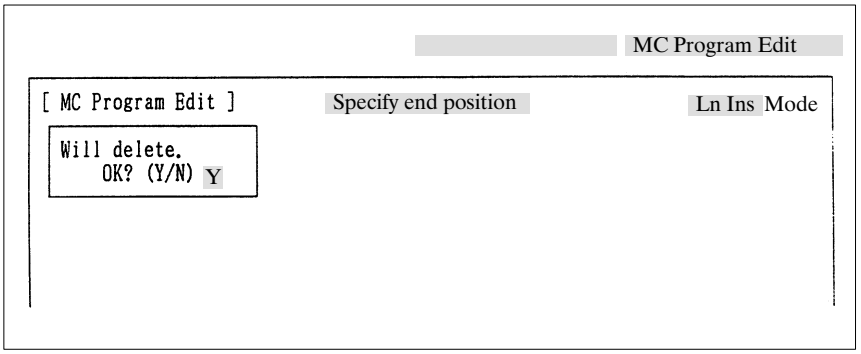
   Press the Return Key to select the highlighted program block.



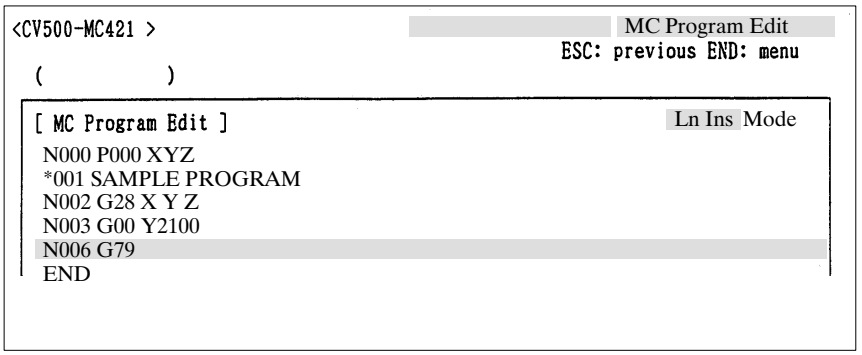
3. Press the Up and Down Keys to highlight the last program block in the range. The Down Key was pressed once in this example.



4. The following confirmation prompt will appear when the Return Key is pressed to select the last block in the range.



5. Enter “Y” to delete the specified range of the program, “N” to cancel the operation. “Y” was entered in this case.

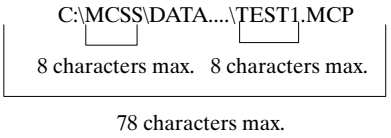


4-8 Saving the Program to Disk

“S:Save programs” saves the edited program on a data disk.

File Names

A file name and path must be entered when storing the program. Directory names and file names can be up to 8 characters long each and the total length of the path and filename can be up to 78 characters. Lower-case characters are not distinguished from upper-case characters.



The title can be up to 30 characters long.

Floppy Disks

When storing programs on floppy disks, make sure that the disk has been formatted and that its write-protect switch is off. Prepare new data disks. Programs cannot be save on a disk with insufficient available space.

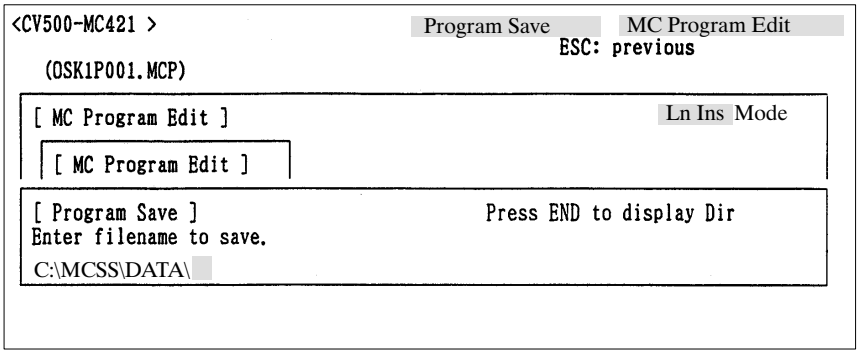
Note Refer to *16-3 Formatting Data Disks* for details on formatting floppy disks for use as data disks.

Procedure

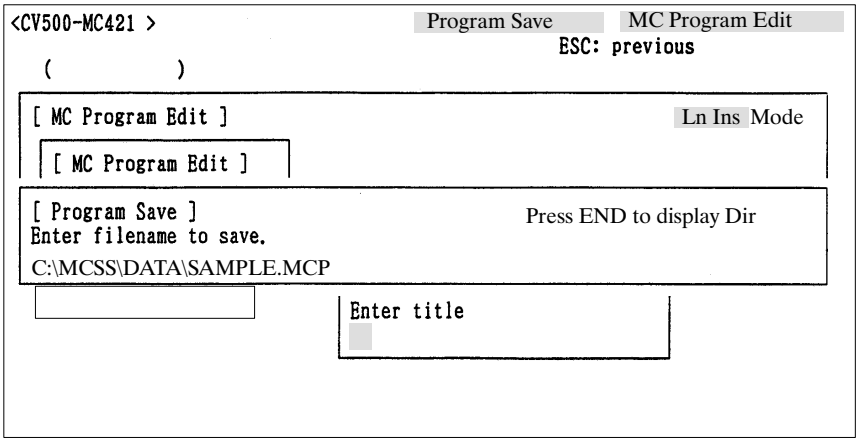
Use the following procedure to save programs.

1, 2, 3...

1. Press the End Key to bring up the MC Program Edit menu and press “S” to select “S:Save programs.” The following input area will be displayed.



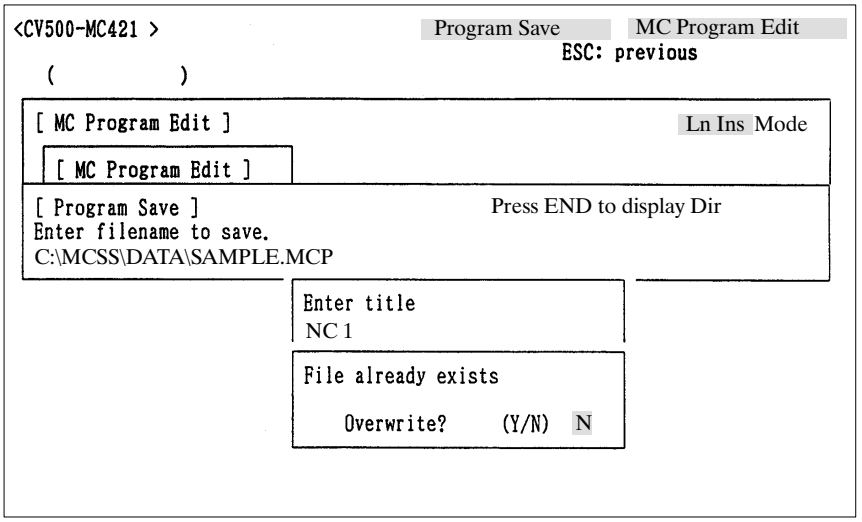
2. Enter the filename for the program. In this example, the filename “SAMPLE” has been entered.



If files have been saved already, press the End Key to display a list of filenames. A filename can be selected from the list. Refer to *3-2 Entering Filenames* for details.

3. Enter a title if desired or press the Return Key to leave the title blank. In this example, the title “NC1” has been entered.

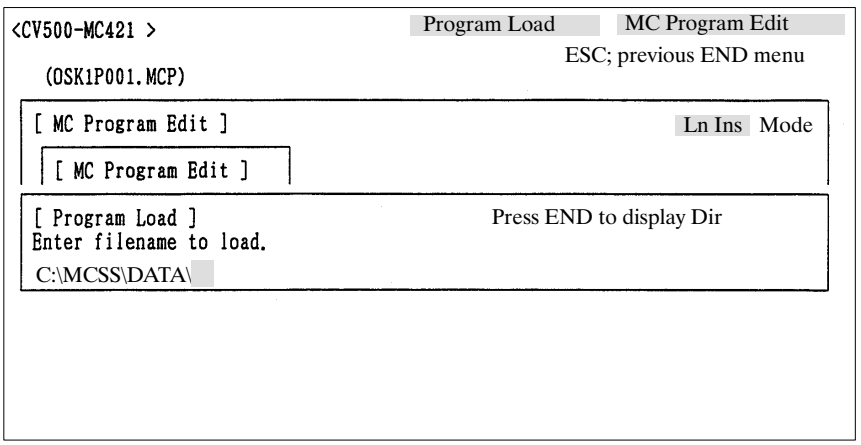
   A confirmation prompt will be displayed if the specified filename already exists, as shown in the following diagram. Enter “Y” to overwrite the existing file, “N” to cancel. The time required to save the file depends on the size of the program.



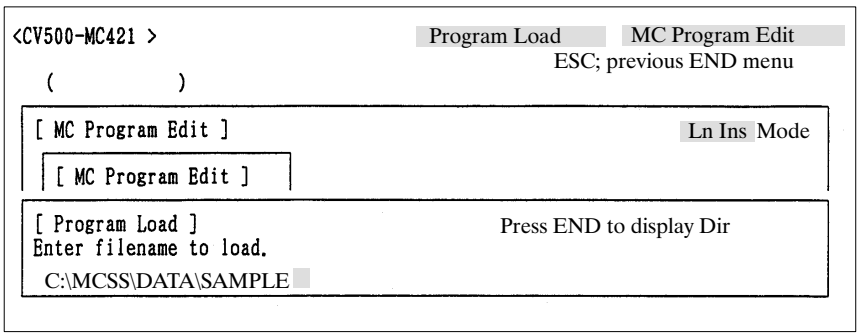
4-9 Retrieving a Program from Disk

“L:Load programs” retrieves programs from a data disk.

1, 2, 3... 1. Press the End Key to bring up the MC Program Edit menu and press L to select “L:Load programs.” The following input area will be displayed.



2. Enter the filename for the program. In this example, the filename “SAMPLE” has been entered.



The End Key can be pressed to display a list of filenames so a filename can be selected from the list. Refer to *3-2 Entering Filenames* for details.

3. Press the Return Key to start retrieving the program. The MC Program Edit screen will be displayed again when the program has been retrieved.

4-10 Deleting MC Programs

"D:Delete MC programs" deletes programs from the MC Unit. Programs are deleted by specifying the task number and program number (P000 to P999).

Online Operations

This operation is an online operation. Make sure the computer is connected to the PC and the computer's communications specifications are correct.

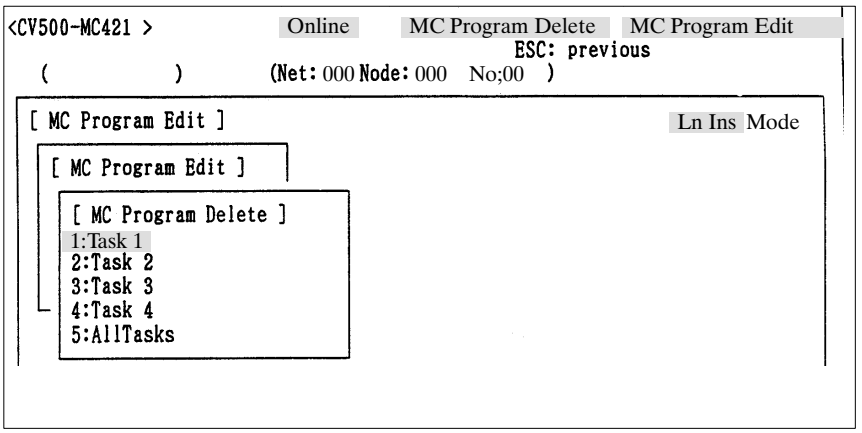
Check the MC model on the Setup menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

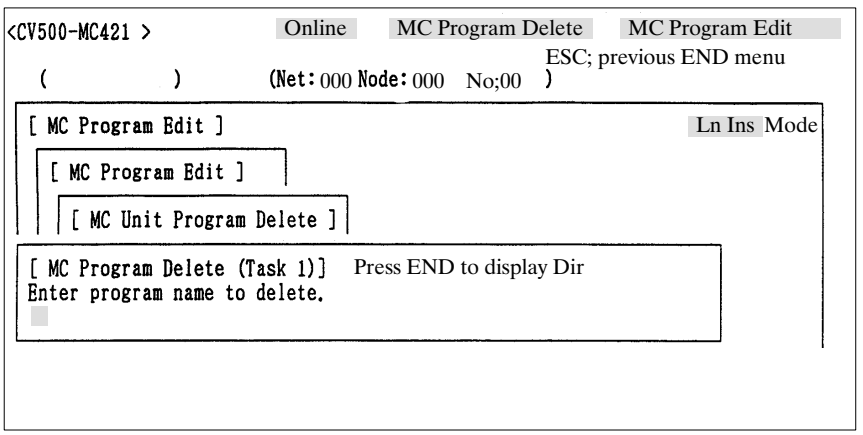
Use the following procedure to delete the program from MC Unit (displays for the CV500-MC421).

1, 2, 3...

1. Press the End Key to bring up the MC Program Edit menu and press "D" to select "D:Delete MC programs." The following screen will appear.



2. Enter the task number of the program to be deleted. In this example, task number 2 has been entered.

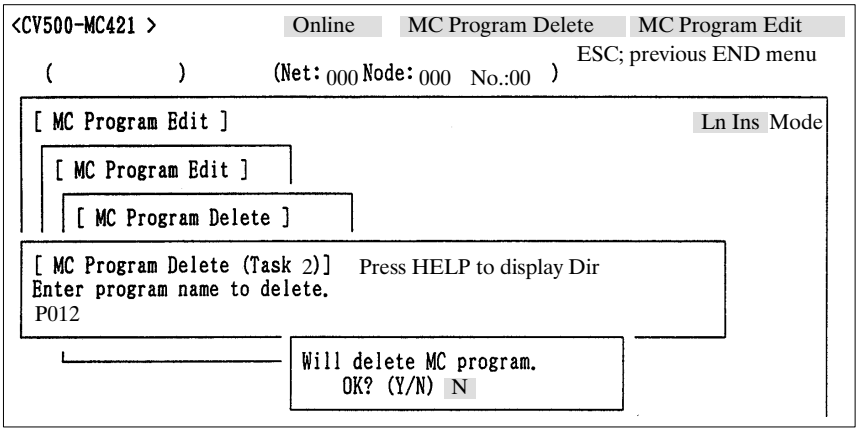


Note Select "5:All Tasks" when deleting all programs from the MC Unit.

3. Enter the program number of the program to be deleted. In this example, program number P012 has been entered.

   A wildcard (*) can be used when specifying program numbers. For example "*" or "P*" would specify P000 to P999, "P1*" would specify P100 to P199, and "P2*" would specify P200 to P299. The wildcard can be input by entering the asterisk or pressing the F1 Key.

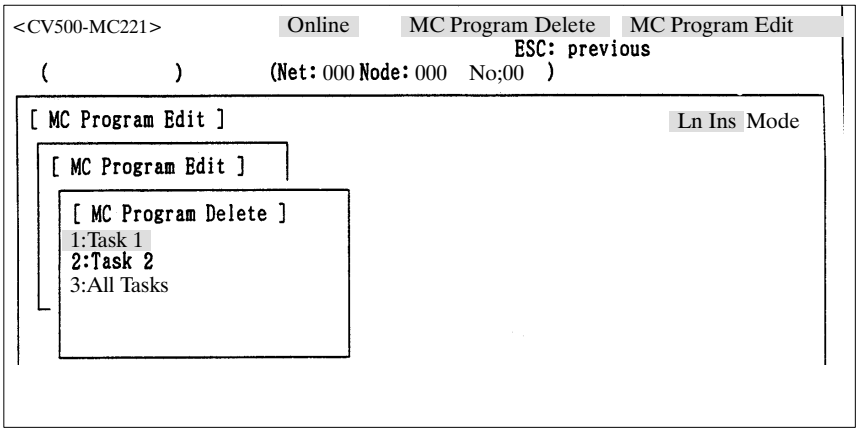
   The End Key can be pressed to display a list from which the program number can be selected.



4. A confirmation prompt will be displayed. Enter "Y" to delete the program(s), "N" to cancel.

Screen Example for the CV500-MC221 and C200H-MC221

The following screen will be displayed because a maximum of two tasks are available. Refer to the operating procedure for the CV500-MC421.



4-11 Transferring and Comparing Programs

"T:Transfer/Verify" is used to transfer and compare programs between the computer and the MC Unit. Programs are transferred and compared between the MC Unit and computer. The C200H-MC221 allows programs to be written to its flash memory.

Online Operations

This operation must be performed online. Make sure the computer is connected to the PC and the computer's communications specifications are correct.

Check the MC model on the Setup menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

Press the End Key to bring up the MC Program Edit menu and press "T" to select "T:Transfer/Verify." The rest of this procedure is identical to the procedure described in *Section 14 Transferring and Verifying Data*.

4-12 Save/Transfer (Computer to MC)

For this procedure, a program created on the computer is stored on a data disk and also transferred to the MC Unit.

Note Be sure to confirm that the created program, parameters, and position data are correct.

⚠ **Caution** Before transferring the program, parameters, or position data to another node, be sure to confirm the safety conditions at the destination node. Otherwise, an injury may occur.

Online Operations

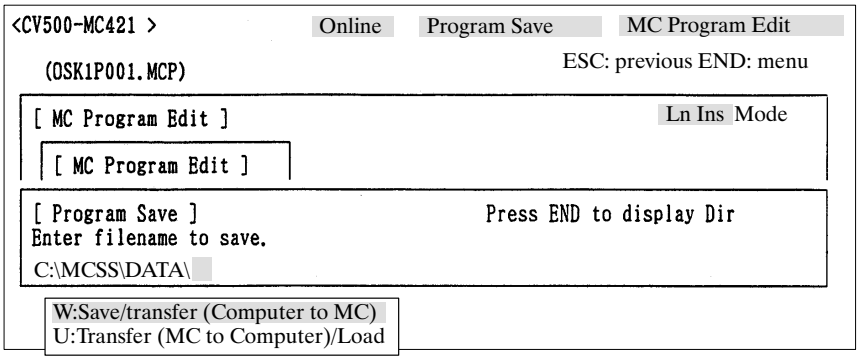
This operation must be performed online. Make sure the computer is connected to the PC or the MC Unit and the computer's communications specifications are correct.
Check the MC model on the Setup menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

Use the following procedure to save and transfer the program.

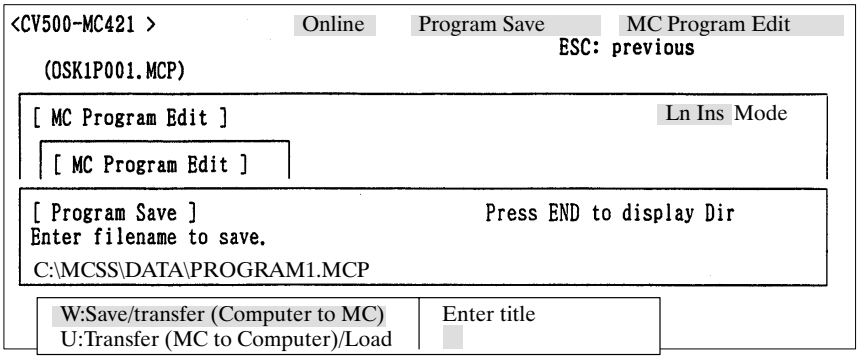
1, 2, 3...

1. Press "W" to select "W:Save/Transfer (Computer to MC)" in the MC Program Edit Menu.

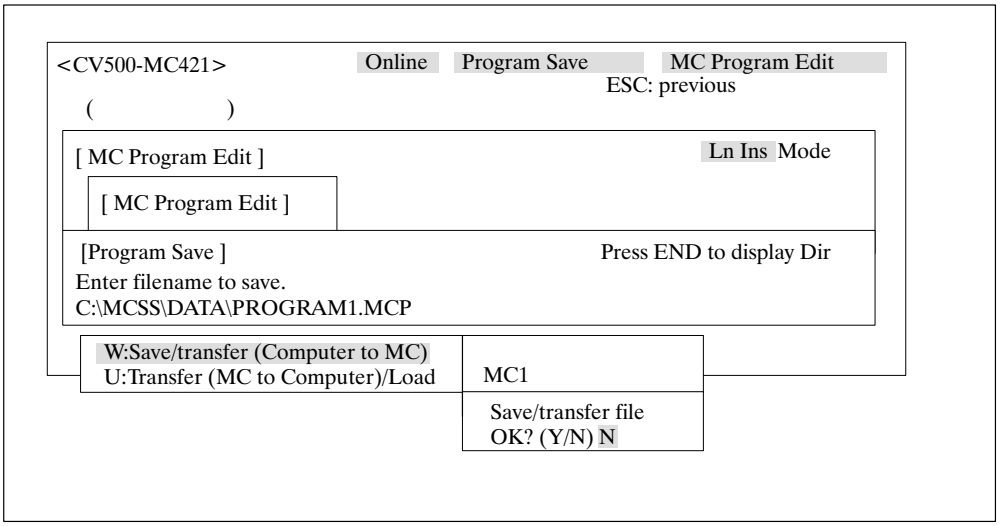


2. Input a file name. In this example, PROGRAM1 has been entered.

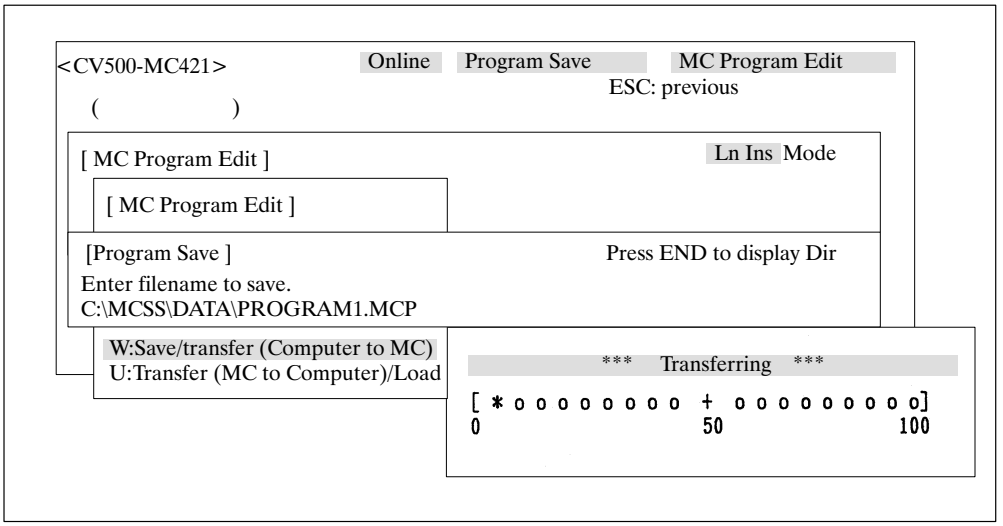
   The End Key can be pressed to display a list from which the name can be selected.



3. Input the title of the program. In this example, MC1 has been entered.



4. The above confirmation message will be displayed on the bottom of the screen. Press “Y” and Enter Key to execute Save/Transfer or press Enter Key to abort Save/Transfer. When Save/Transfer is executed, the program will be stored on the data disk and the program will be transferred to the MC Unit while the screen displays the progress of the transfer.



5. After the screen displays “Transfer completed,” press any key to return to the MC Program Edit screen.

4-13 Transfer (MC to Computer)/Load

For this procedure, the program is transferred from the MC Unit to a data disk and then retrieved from the data disk.

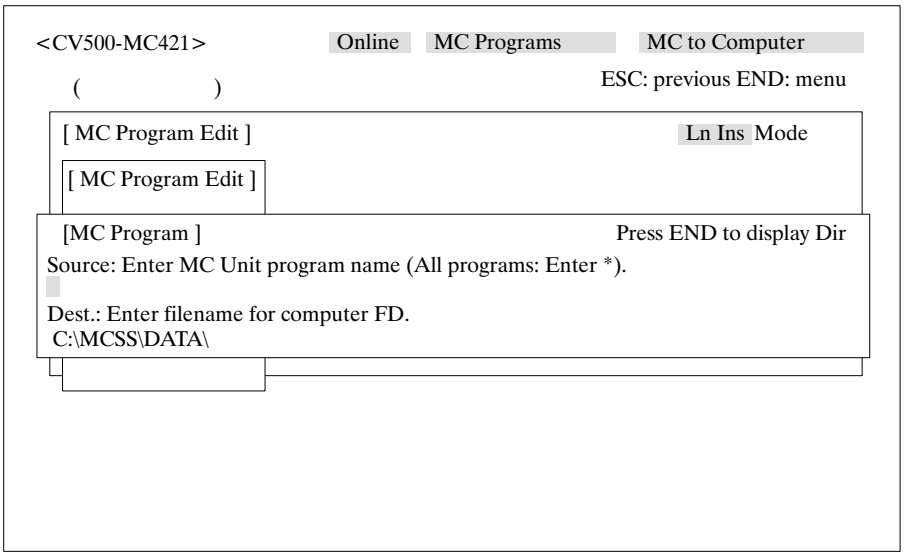
Online Operations

This operation must be performed online. Make sure the computer is connected to the PC and the computer’s communications specifications are correct. Check the MC model on the Setup menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

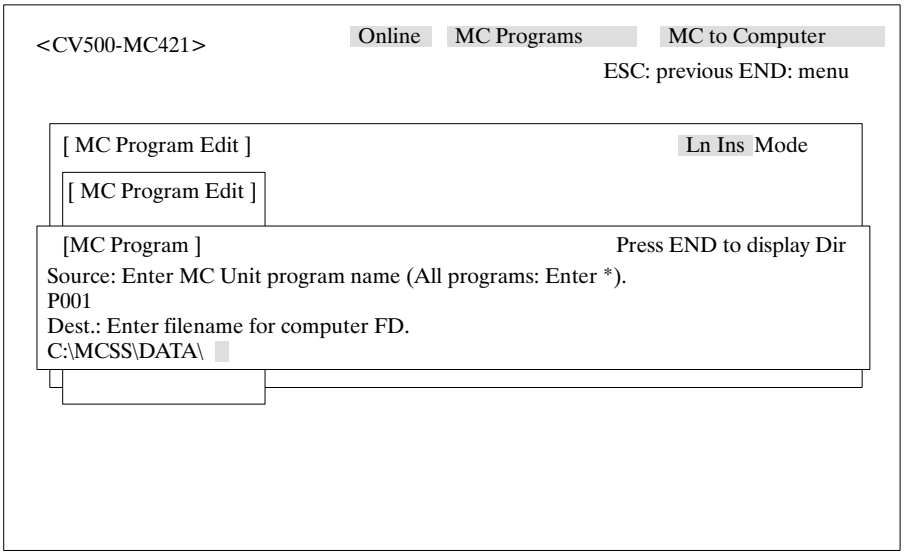
Use the following procedure to transfer the program from the MC Unit to a data disk and then receive the program to the computer.

1, 2, 3... 1. Press “U” to select “U:Transfer (MC to computer)/Load” in the MC Program Edit Menu.



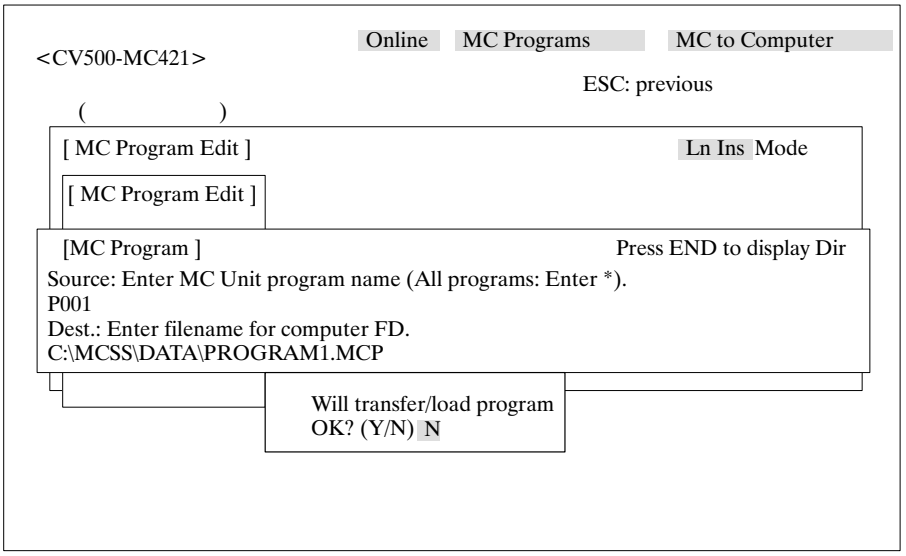
2. Designate the name of the program in the MC Unit from P001 to P999. In this example, P001 has been entered.

   The End Key can be pressed to display a list from which the program number can be selected.

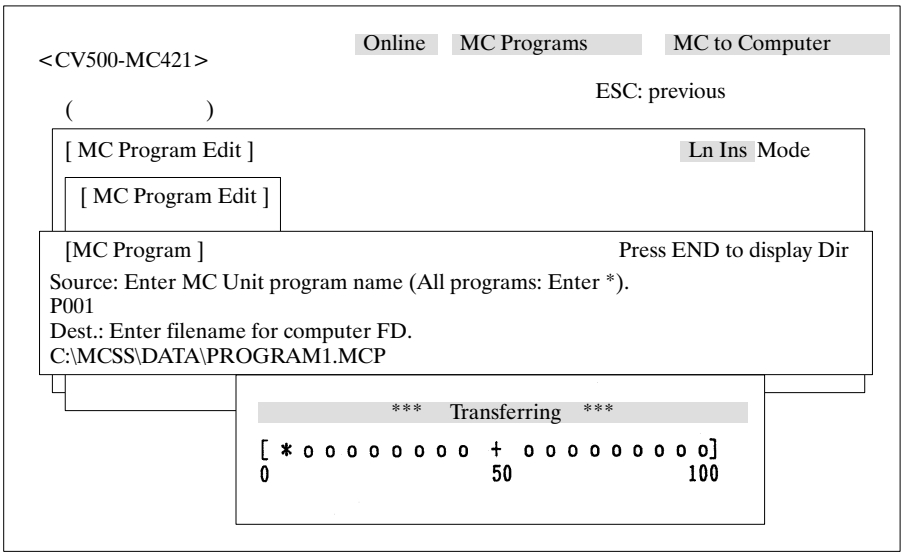


3. Input a file name for the destination. In this example, PROGRAM1 has been entered.

   The End Key can be pressed to display a list from which the name can be selected.



4. The above confirmation message will be displayed on the bottom of the screen. Press “Y” and Enter Key to execute Transfer (MC to computer)/Load or press Enter Key to abort Transfer (MC to computer)/Load. When Transfer (MC to computer)/Load is executed, the program will be transferred to the data disk and read by the computer. If more than one program are designated using the wildcard, the last program will be retrieved.



5. After the screen displays “Transfer completed,” press any key to return to the MC Program Edit screen.

SECTION 5
Editing Memory Parameters

This section explains how to set the addresses for the position data used for each task.

5-1 Editing Memory Parameters

A total of 2,000 position data addresses can be used. The position data used for tasks is set in addresses 0000 to 1999. The start and end addresses to be used are set for each task. These parameters are then referred to when teaching. For an explanation of setting position data, see *12-2 Setting Position Data*.

These parameters are used to prevent position data that is being used for another task from being erroneously taught when two or more tasks are involved.

The default setting for all tasks is 0000 to 1999.

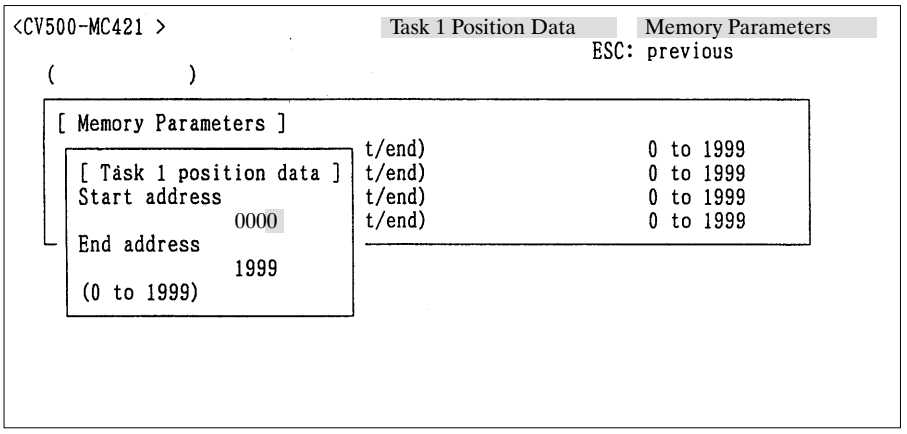
When position data is obtained by teaching, it is stored from the beginning address set here.

Procedure

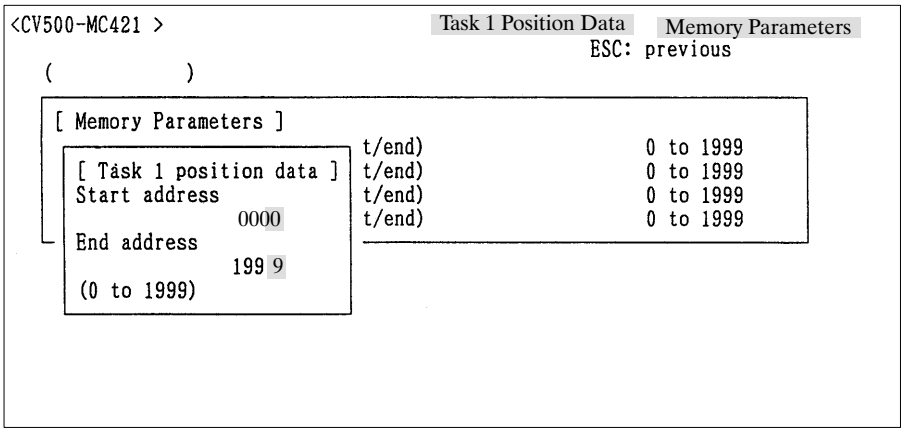
Follow this procedure to set 500 position data addresses beginning from address 0000 for tasks 1 to 4 for the CV500-MC421.

1, 2, 3...

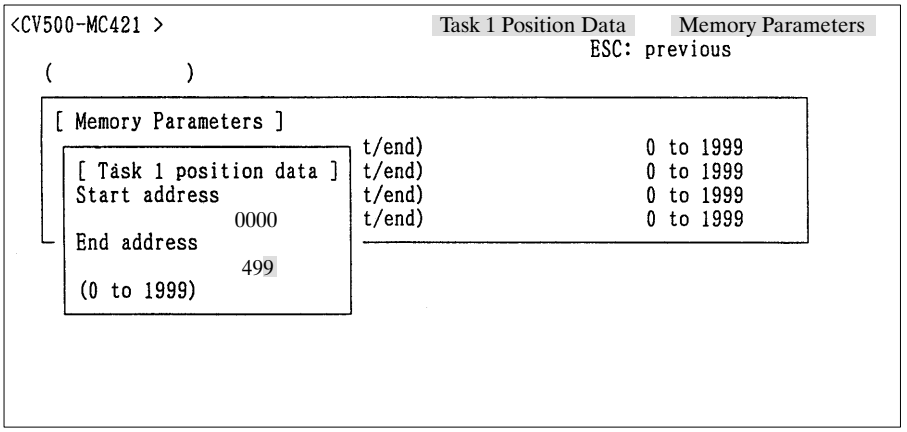
1. Select “A:Task 1 position data (start/end)” from the Memory Parameter Edit menu.



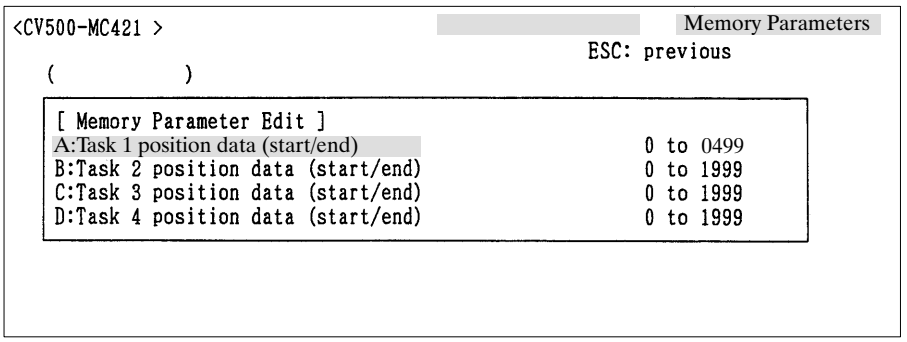
2. The start address does not need to be changed. Press the Return Key and move the cursor to the end address.



3. Enter the end address (499 in this example).



4. Press the Return Key to set the end address. The Memory Parameter Edit screen will then be restored.

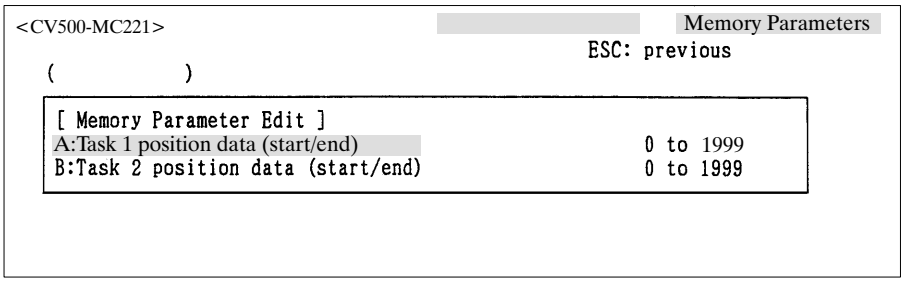


5. Repeat steps 1 through 4 above to enter the following values for tasks 2 through 4.

Task	Start address key input	End address key input
2	500 ↵	999 ↵
3	1000 ↵	1499 ↵
4	1500 ↵	↵

Screen Example for the CV500-MC221 and C200H-MC221

The following screen will be displayed because a maximum of two tasks are available. Refer to the operating procedure for the CV500-MC421.



SECTION 6
Editing Machine Parameters

This section explains the operations in the Machine Parameter Edit screens. These operations include setting the mechanical system parameters for the encoder and motor and setting the wiring check parameters.

6-1 Introduction

The following table shows the machine parameters that can be set for each axis from the Machine Parameter Edit menus.

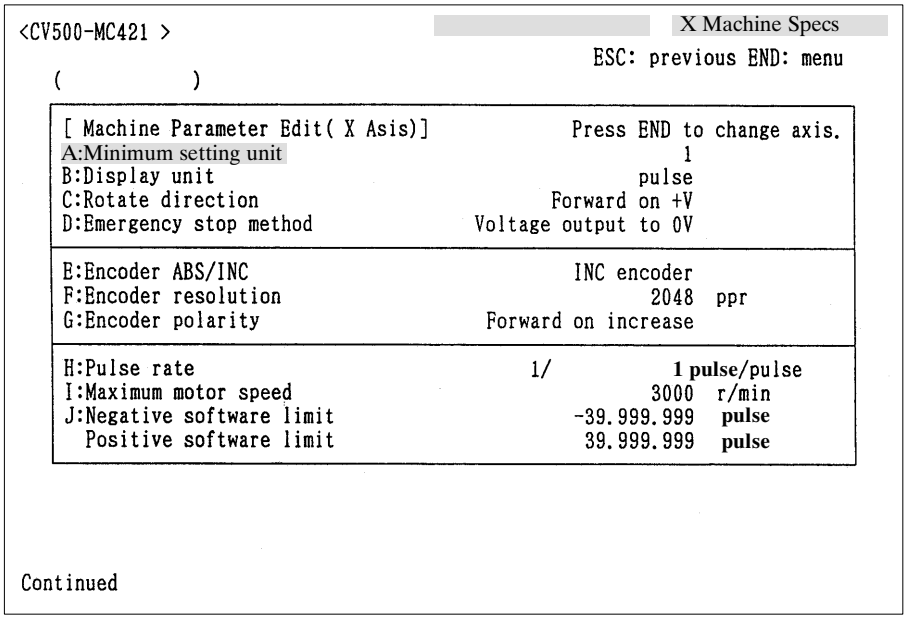
Parameter	Settings	Page
Minimum setting unit	Select a minimum setting unit appropriate for the mechanical system.	63
Display unit	Select the units that will be used when monitoring the present value: mm, inches, degrees, or pulses.	64
Rotate direction	Specify whether the motor will turn forward or reverse when the command voltage to the servomotor driver is positive.	65
Emergency stop method	Specify whether the command voltage will drop to 0 immediately or the remaining pulses in the error counter will be output when an emergency stop is input.	65
Encoder ABS/INC	Specify whether the encoder being used is absolute-type or incremental-type.	66
Encoder resolution	Set the number of pulses output per revolution of the encoder.	66
Encoder polarity	Specify whether the motor will turn forward or reverse when the feedback pulses from the encoder increase.	67
Pulse rate	Set the amount that the axis is moved per feedback pulse.	67
Maximum motor speed	Specify the maximum rpm rate for the motor.	69
Software limits	Set the positive and negative limits.	69
Origin search method	Select the origin search method. Three methods are available.	70
Origin search direction	Specify whether to move in the positive or negative direction for the origin search.	71
Origin decel. method	Select an input method when decelerating near the origin.	71
Origin prox. logic	Specify whether the origin proximity input is normally open or closed.	72
Wiring check ON/OFF	Specify whether a wiring check is to be performed when the power is turned on.	72
Wiring check time	Set the wiring check time.	73
Wiring check pulses	Set the number of pulses used in the wiring check.	74
ABS encod. initial SV	Indicates the absolute encoder's initial setting and soft reset value when the operation was executed. These values cannot be set with the MCSS.	---
ABS encod. soft reset		

The encoder initial SV and soft reset are executed by an interface bit or the Teaching Box. Refer to *6-6 Interface Bit Specifics* in the *MC Unit Operation Manual: Details* or the *MC Unit Teaching Box Operation Manual* for details.

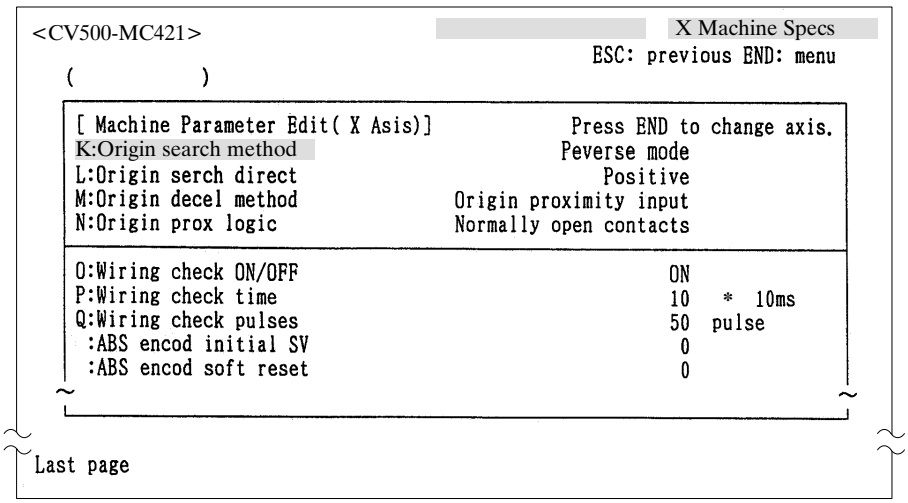
6-2 Machine Parameter Edit Screen/Menu

6-2-1 Machine Parameter Edit Screen

The Machine Parameter Edit screen will appear when “K:Edit machine parameters” is selected from the MC Parameter Edit menu. There are two pages of parameters.



The machine parameters for the X-axis will be displayed. The default settings appear on the right side of the screen. Press the F2 Key or PageDown Key to display the second page of parameters.

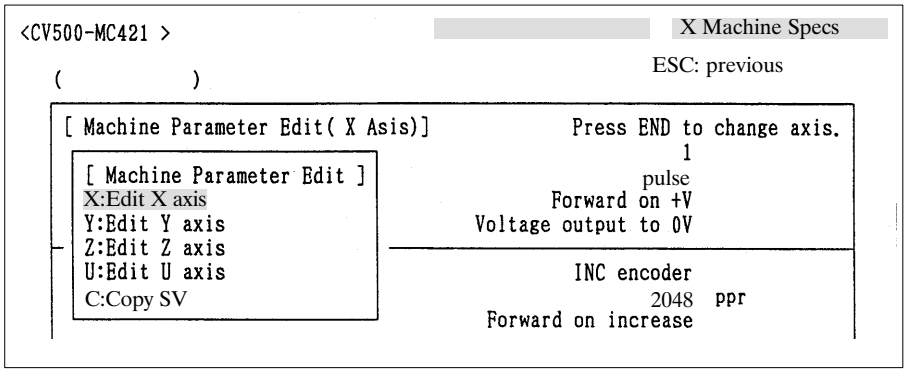


Press the F1 Key or PageUp Key to display the first page of parameters. The absolute encoder’s initial setting and soft reset value are displayed for reference only. The cursor cannot be moved to these items and they cannot be changed.

6-2-2 Machine Parameter Edit Menu

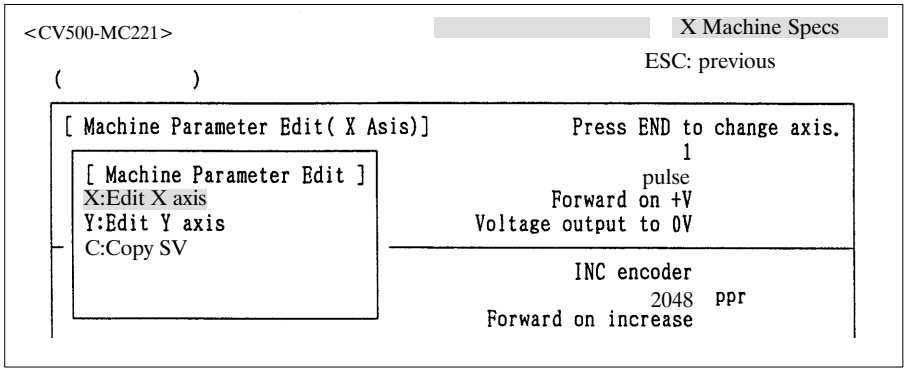
With the Machine Parameter Edit screen displayed, press the End Key to bring up the Machine Parameter Edit menu, shown in the following diagram.

CV500-MC421



Set the machine parameters for each axis. Enter “X,” “Y,” “Z,” or “U” to edit that axis’ parameters or enter “C” to copy the parameters to another axis. Refer to *6-2-3 Copying Parameters* for details on copying the machine parameters from one axis to another.

Screen Example for CV500-MC221 and C200H-MC221
Only axes X and Y are available. The display appears as follows:



6-2-3 Copying Machine Parameters

The last item in the Machine Parameter Edit menu (C:Copy SV) is used to copy the machine parameters from one axis to another.

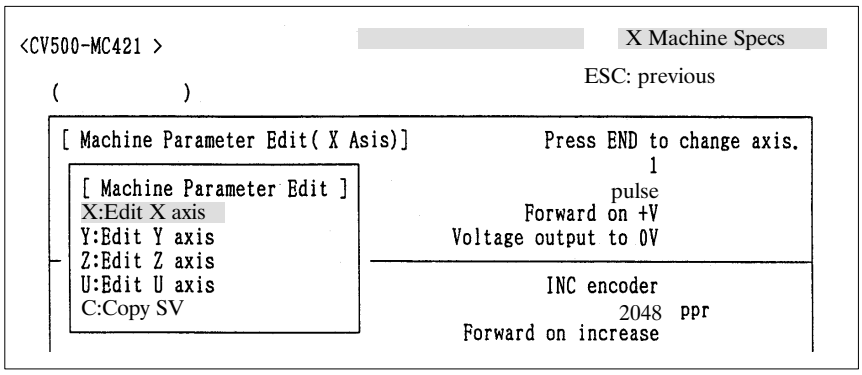
Description

This function is very convenient when many of the parameter settings for one axis can be used for another axis. For example, if for the CV500-421 the parameters have been set for the X-axis and most of the settings for the Z-axis are the same, copy the X-axis parameters to the Z-axis and change the ones that are different.

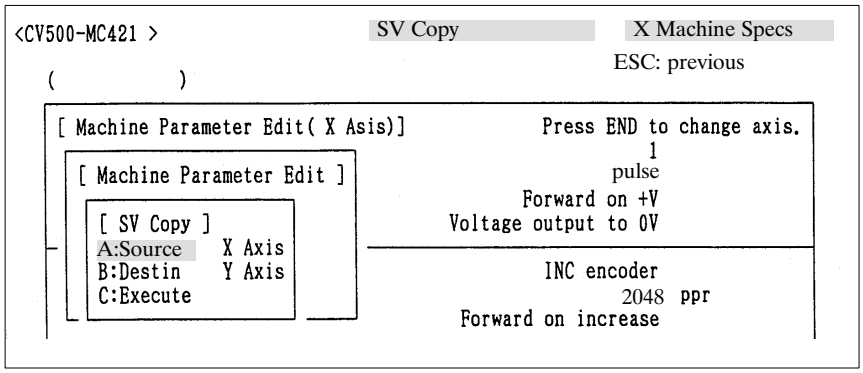
Procedure

Use the following procedure to copy machine parameters. In this example, the the machine parameters for the X-axis are copied to the Z-axis for the CV500-MC421.

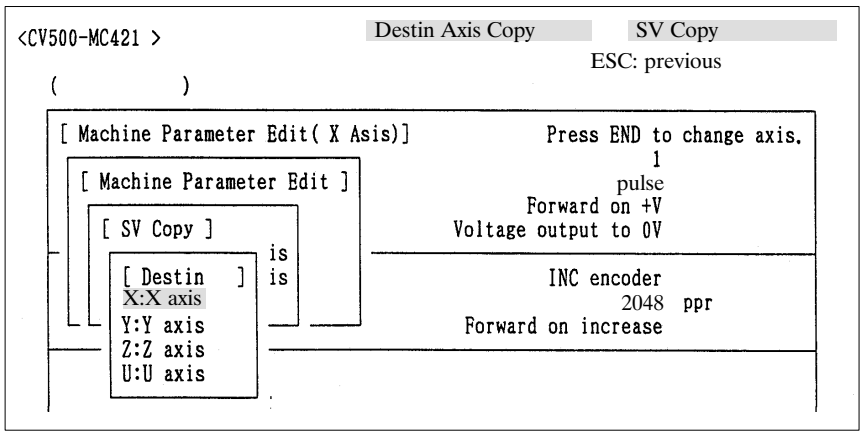
1, 2, 3... 1. Bring up the Machine Parameter Edit screen and press the End Key to display the Machine Parameter Edit menu.



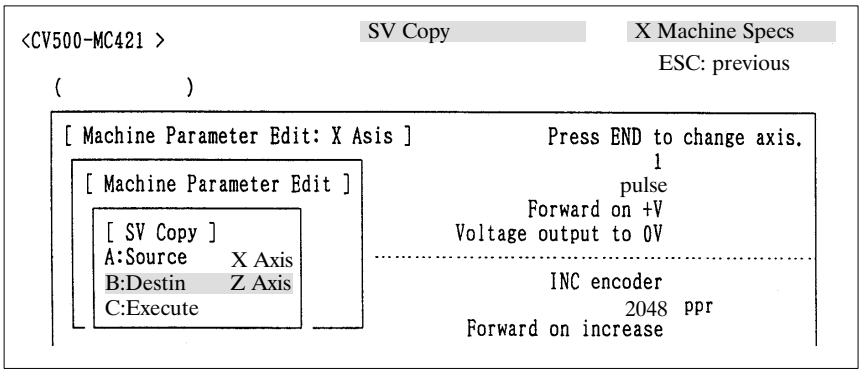
2. Select “C:Copy SV.”



3. The source axis is correct (the X-axis), enter “B” to change the destination axis.



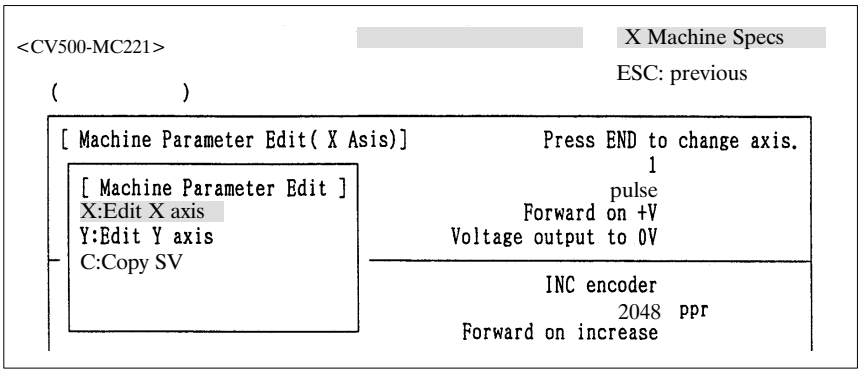
4. Enter “Z” to select the Z-axis as the destination axis.

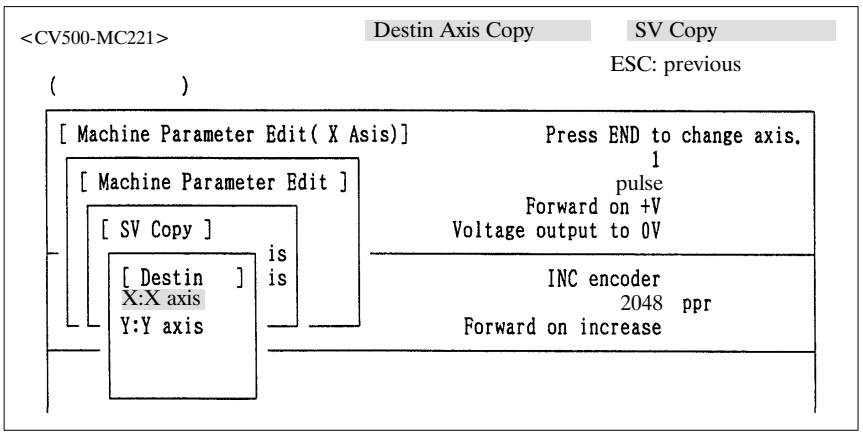


5. Select “C:Execute” and copy the parameters. The Machine Parameter Edit screen will appear when the parameters have been copied.

Screen Examples of CV500-MC221 and C200H-MC221

Only axes X and Y are available. The display will appear as shown below. Refer to the operating procedure for the CV500-MC421.





6-3 Machine Parameter Settings

This section describes the settings for the parameters in the Machine Parameter Edit menus.

6-3-1 Minimum Setting Unit

The MC Unit can manipulate position data ranging from –39,999,999 to +39,999,999 when the minimum setting unit is set to 1 (the default setting). The minimum setting unit can be set to 0.1, 0.01, 0.001, or 0.0001 to provide greater precision but a more limited range, as shown in the following table.

Min. setting unit	Range
1	–39,999,999 to +39,999,999
0.1	–3,999,999.9 to +3,999,999.9
0.01	–399,999.99 to +399,999.99
0.001	–39,999.999 to +39,999.999
0.0001	–3,999.9999 to +3,999.9999

Command Values

Depending on the pulse rate, the range of command values might be smaller than the range shown in the table above. Set the maximum command values based on the following two conditions. (P is the pulse rate in pulses/pulse, mm/pulse, degrees/pulse, or inches/pulse. C is the minimum setting unit.)

$|\text{Max. command value (C)}| \leq 1073741823 \times P$

$|\text{Max. command value (C)}| \leq 39999999(C)$

For example, when the minimum setting unit is 0.01 and the pulse rate is 0.0001:

$1073741823 \times 0.0001 = 107{,}374.1823 < 399{,}999.99$

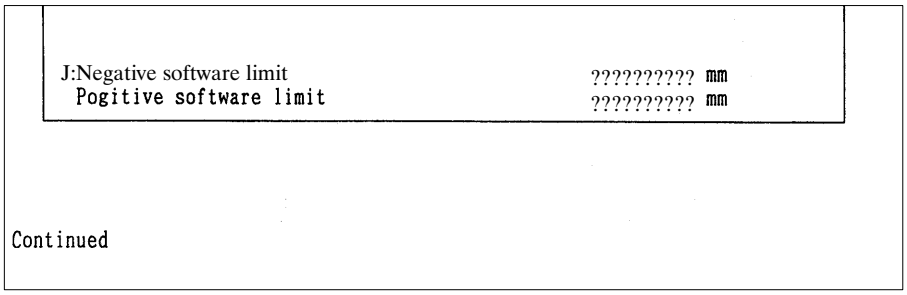
Since the minimum setting unit is 0.01, the command value range is –107,374.18 to +107,374.18.

Effect on Other Parameters

The possible setting ranges of the following parameters depends on the setting of the minimum setting unit.

Menu	Parameter
Machine Parameter Edit	Negative software limit
	Positive software limit
Coordinate Parameter Edit	Reference origin offset
	Workpiece origin offset
Feed Rate Parameter Edit	Max. high-speed feed rate
	Max. interpolation feed rate
	Origin search high speed
	Origin search low speed
	Max. jog feed rate
Zone Parameter Edit	Zone negative SV
	Zone positive SV

These parameters will display settings of "??????????" if the minimum setting unit is set to a value other than 1. The following diagram shows this effect on the software limit settings.



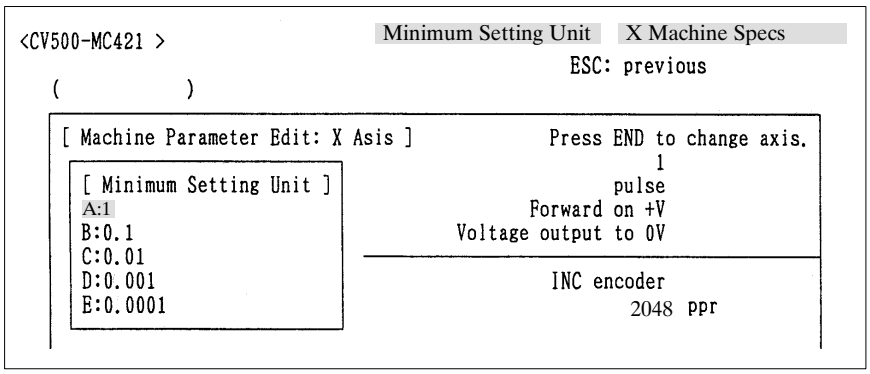
Be sure to set these parameters again after changing the minimum setting unit.

Procedure

Use the following procedure to change the minimum setting unit.

1, 2, 3...

1. Bring up the Machine Parameter Edit screen and select "A:Minimum setting unit."



2. Select the desired minimum setting unit.

6-3-2 Display Unit

While each axis is controlled by pulses, the present value can be monitored in mm, inches, degrees, or pulses. This parameter determines the units that will be used when monitoring the present value. The default setting is pulses.

When a setting other than pulses is used, change the pulse rate to match the units used for the pulse rate parameter. Refer to *6-3-8 Pulse Rate* for details on setting the pulse rate.

The units for the following parameters will change when the display unit setting is changed.

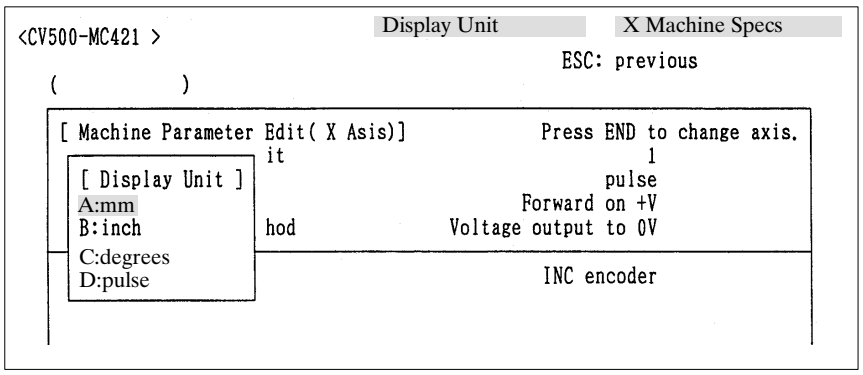
Menu	Parameter
Machine Parameter Edit	Pulse rate, software limits
Coordinate Parameter Edit	Coordinate system origin offsets
Feed Rate Parameter Edit	All feed rates
Zone Parameter Edit	Zone settings

Procedure

Use the following procedure to change the display unit.

1, 2, 3...

1. Bring up the Machine Parameter Edit display and select “B:Display unit.”



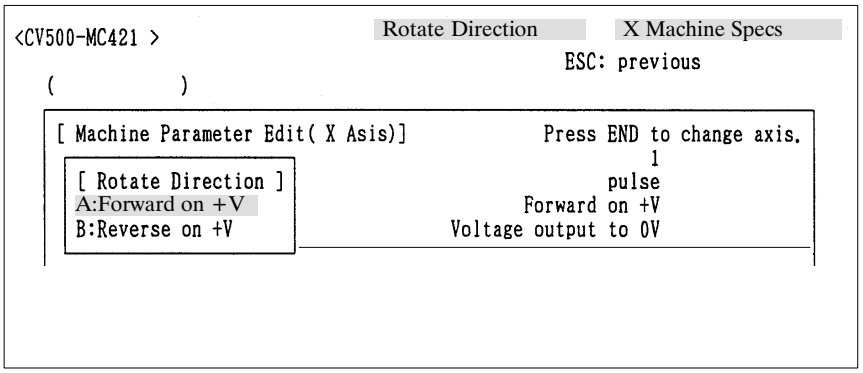
2. Select the desired display unit.

6-3-3 Rotate Direction

This parameter determines whether the motor will turn forward or reverse when the command voltage to the servodriver is positive.

1, 2, 3...

1. Bring up the Machine Parameter Edit screen and select “C:Rotate Direction.”



2. Select the desired direction.

6-3-4 Emergency Stop Method

This parameter determines how the motor will be stopped when an emergency stop input is received or an error occurs.

Description

The MC Unit is equipped with external emergency stop inputs for each axis. These input signals can be used in two ways.

1, 2, 3...

1. Immediately drop voltage output to 0 V:
   When the emergency stop input goes OFF, the run command output (output to the servodriver) will be turned OFF.
2. Stop after the remaining pulses:
   When the emergency stop input goes OFF, the motor will be stopped after the pulses remaining in the error counter are used up.

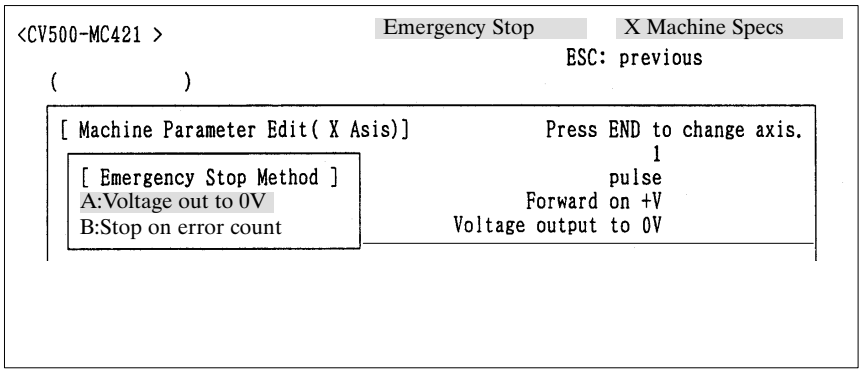
The default setting is “voltage output to 0V,” which immediately drops the output to 0 V.

Procedure

Use the following procedure to change the emergency stop method.

1, 2, 3...

1. Bring up the Machine Parameter Edit screen and select “D:Emergency stop method.”



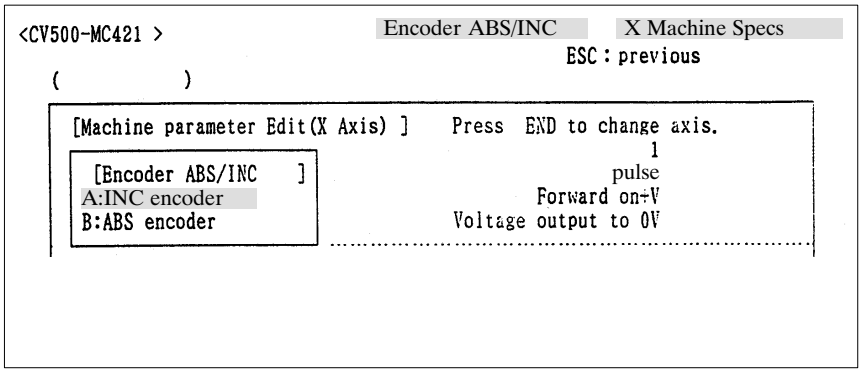
2. Select the desired emergency stop method.

6-3-5 Encoder ABS/INC

This parameter specifies whether the encoder being used is absolute-type or incremental-type; it should be set to incremental-type.

1, 2, 3...

1. Bring up the Machine Parameter Edit screen and select “E:Encoder ABS/INC.”



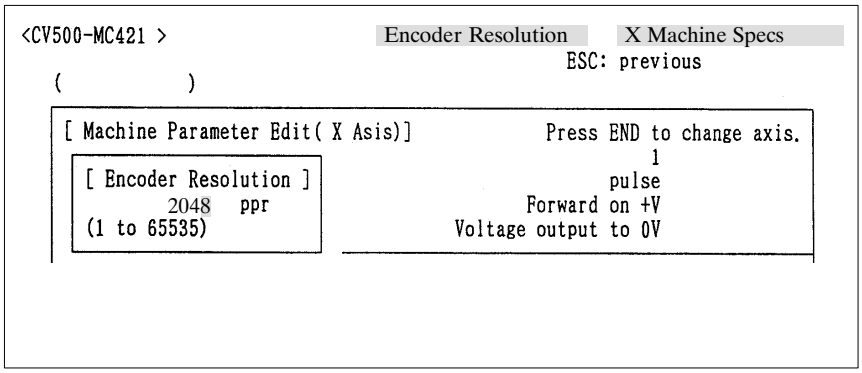
2. Select “A:INC encoder.”

6-3-6 Encoder Resolution

This parameter sets the number of pulses that can be output per revolution of the encoder; it can be set from 1 to 65,535. The default setting is 2048 ppr.

1, 2, 3...

1. Bring up the Machine Parameter Edit screen and select “F:Encoder resolution.”



2. Input the desired encoder resolution.

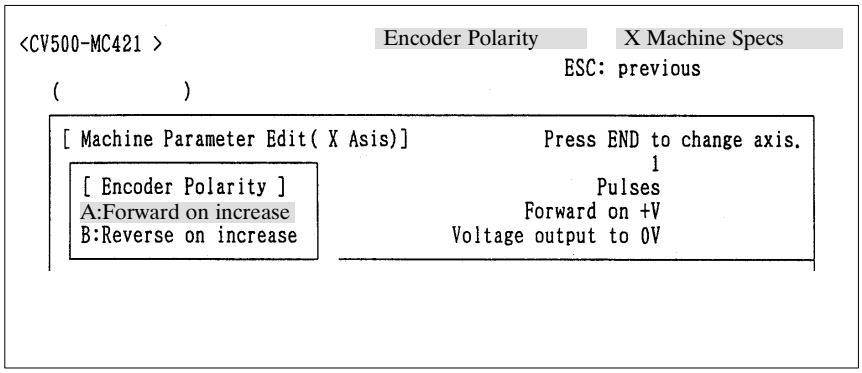
The resolution must satisfy the following conditions.

- **CV500-MC421 and CV500-MC221**
  1/60 x maximum motor speed x encoder resolution $\leq$ 170,000
- **C200H-MC221**
  1/60 x maximum motor speed x encoder resolution $\leq$ 250,000

6-3-7 Encoder Polarity

This parameter specifies whether the motor will turn forward or reverse when the feedback pulses from the encoder increase. The default setting is "forward on increase."

1, 2, 3... 1. Bring up the Machine Parameter Edit screen and select "G:Encoder polarity."



2. Select the desired polarity.

6-3-8 Pulse Rate

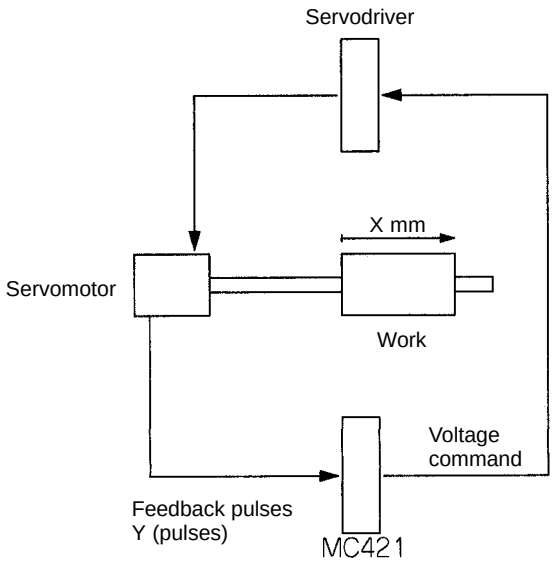
This parameter determines the amount that the work-piece is moved per feedback pulse.

Description

The pulse rate is given by the following equation if Y feedback pulses are output from the encoder when the servo motor moves the work X mm.

$$\text{Pulse rate} = \frac{\text{X (mm)}}{\text{Y (pulses) x 4}}$$

← The Y pulses are multiplied by 4 because the ratio is fixed at 4 in the MC Unit.



The pulse rates are set independently for the X and Y axes. Each can be set from 1 to 100,000. The default setting is 1. Set the X and Y pulse rates so that the X/Y ratio doesn't exceed 1.

The input ranges for the following parameters will change when the pulse rate setting is changed.

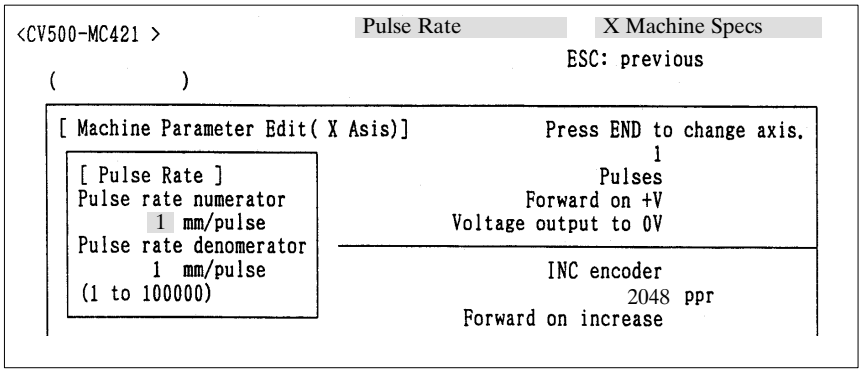
Menu	Parameter
Machine Parameter Edit	Software limits
Coordinate Parameter Edit	Coordinate system origin offsets
Feed Rate Parameter Edit	All feed rates
Zone Parameter Edit	Zone settings

Procedure

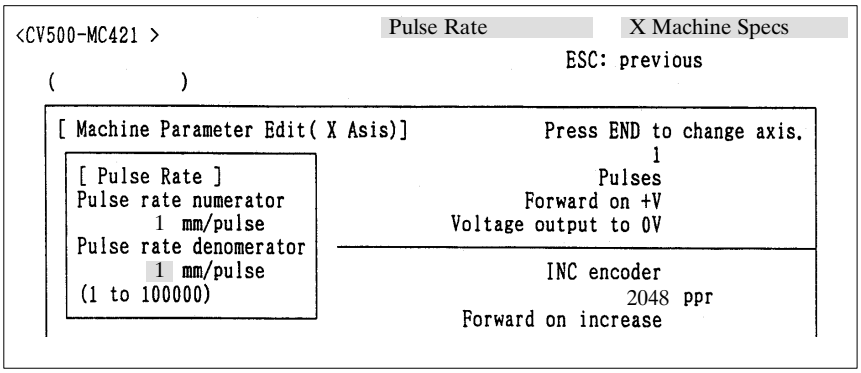
Use the following procedure to set the pulse rate. In this example the pulse rate is set to 1/1000.

1, 2, 3...

1. Bring up the Machine Parameter Edit screen and select "H:Pulse rate."



2. Since the numerator doesn't need to be changed, press the Return Key. The cursor will move to the denominator input area.



3. Enter the new setting for the denominator. (To set the pulse rate to 1/1000, enter "1000" and press the Return Key.)

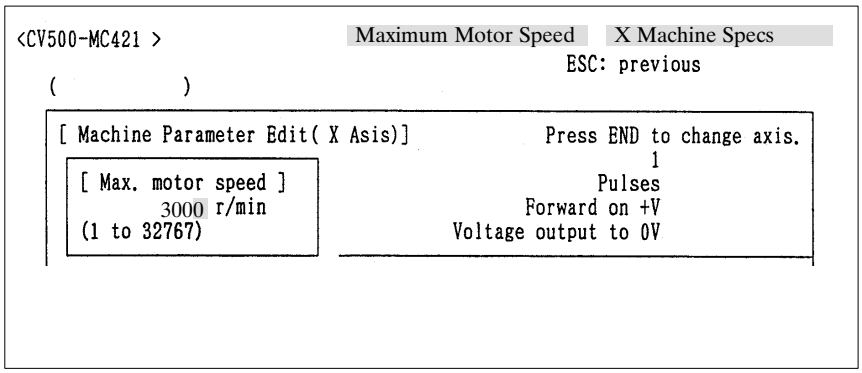
Note The software will not accept a pulse rate greater than 1. Be sure that the ratio is less than 1.

6-3-9 Maximum Motor Speed

This parameter specifies the maximum rpm rate for the motor; it can be set from 1 to 32,767. The default setting is 3,000 rpm.

The maximum motor speed set with this parameter will be equivalent to a voltage output of 10 V from the MC Unit.

1, 2, 3... 1. Bring up the Machine Parameter Edit screen and select "I:Maximum motor speed."



2. Enter the desired motor speed.

   The resolution must satisfy the following conditions.

   - **CV500-MC421 and CV500-MC221**
     1/60 x maximum motor speed x encoder resolution $\leq$ 170,000
   - **C200H-MC221**
     1/60 x maximum motor speed x encoder resolution $\leq$ 250,000

6-3-10 Software Limits

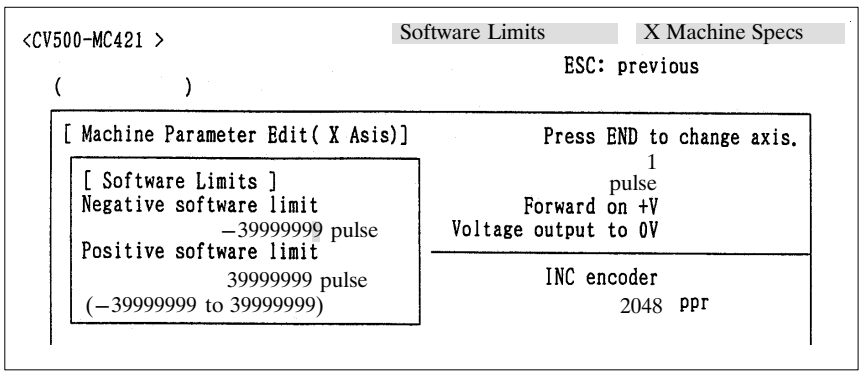
These parameters set the positive and negative software limits. The units used for these parameters are set with the display unit parameter. Refer to *6-3-2 Display Unit* for details.

The possible range for the settings is determined by the minimum setting unit parameter. The default range is –39,999,999 to +39,999,999. Refer to *6-3-1 Minimum Setting Unit* for details.

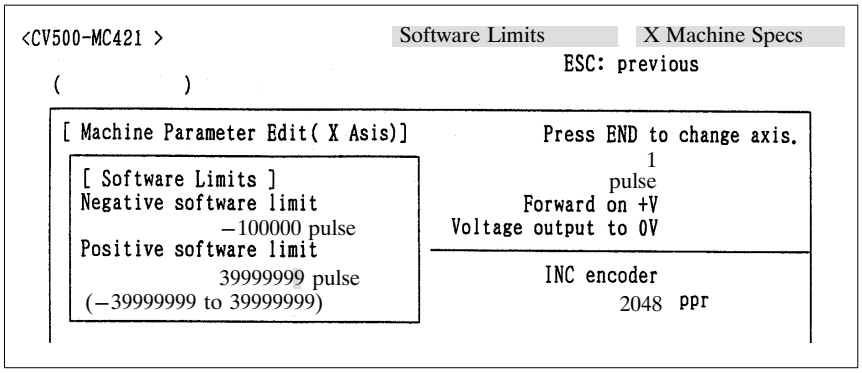
Procedure

Use the following procedure to set the negative and positive software limits. In this example the negative software limit is set to –100,000 pulses and the positive software limit is set to 150,000 pulses.

1, 2, 3... 1. Bring up the Machine Parameter Edit screen and select "J:Negative software limit."



2. Enter the desired negative software limit. (In this example, "–100000" was entered.)



3. Enter the desired positive software limit. (In this example, "150000" was entered.)

6-3-11 Origin Search Method

This parameter sets the origin search method. The following three methods (modes) are available.

Mode	Description
Set origin at power ON	The position of the motor when power is turned on is automatically defined as the origin.
Reverse mode	The motor is reversed if a limit sensor goes ON before an origin proximity sensor.
1 direction mode	The origin search is performed in the direction set with the origin search direction parameter. An error will occur if a limit sensor goes ON before an origin proximity sensor.

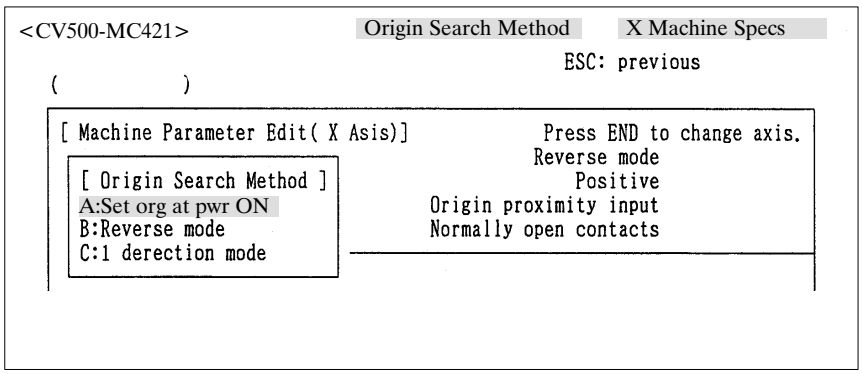
The default setting is reverse mode. (This parameter is invalid if an absolute-type encoder is used.)

Procedure

Use the following procedure to set the origin search method.

1, 2, 3...

1. Bring up the second page of the Machine Parameter Edit screen and select "K:Origin search method."

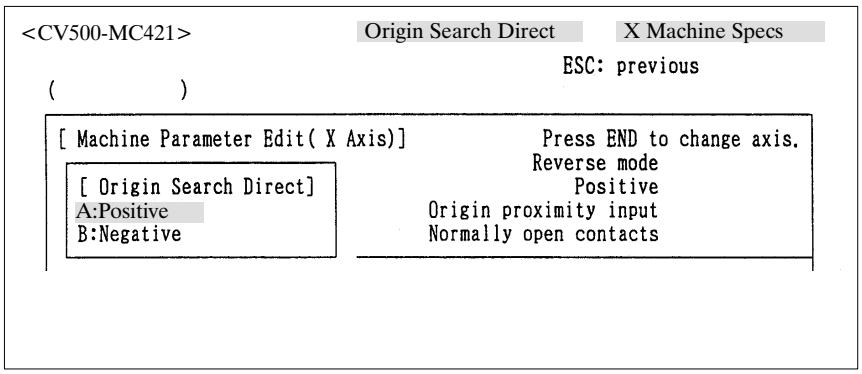


2. Select the desired mode.

6-3-12 Origin Search Direction

This parameter specifies whether to move in the positive or negative direction for the origin search. The default setting is the positive direction. (This parameter is invalid if an absolute-type encoder is used.)

1, 2, 3... 1. Bring up the second page of the Machine Parameter Edit screen and select "L:Origin search direct."



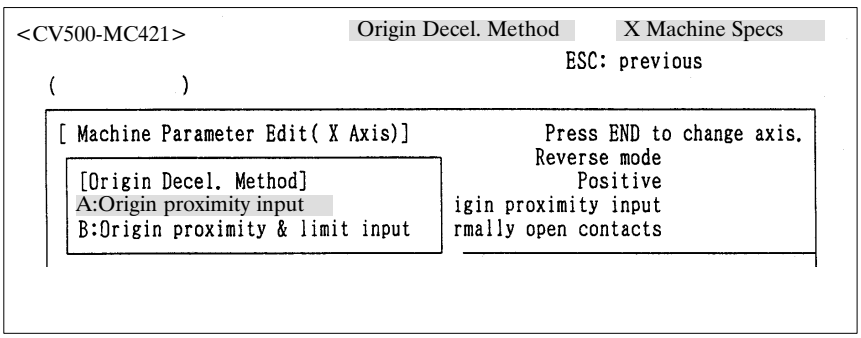
2. Select the desired direction.

6-3-13 Origin Deceleration Method

This parameter determines the input signal(s) used to switch from high-speed to low-speed origin search. The origin proximity input can be used alone or together with the limit input. The default setting is the origin proximity input alone.

When an origin proximity sensor is not being used, the limit input will be used as the origin proximity input, so select "B:Origin proximity & limit input" in this case. (This parameter is invalid if an absolute-type encoder is used.)

1, 2, 3... 1. Bring up the second page of the Machine Parameter Edit screen and select "M:Origin decel. method."

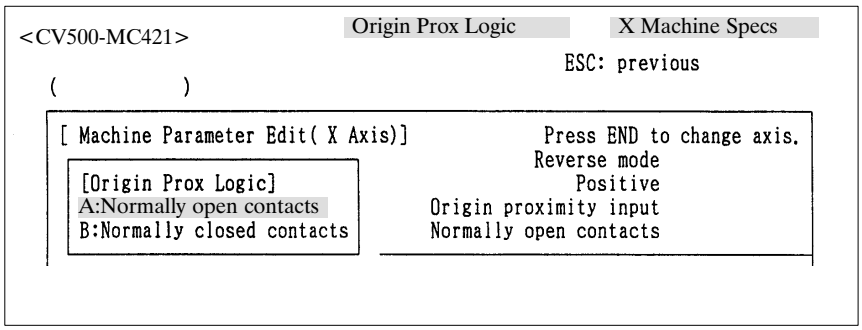


2. Select the desired setting.

6-3-14 Origin Proximity Logic

This parameter specifies whether the origin proximity input is normally open or closed; it must be set if an origin proximity sensor is being used. The default setting is a normally open input. (This parameter is invalid if an absolute-type encoder is used.)

1, 2, 3... 1. Bring up the second page of the Machine Parameter Edit screen and select "N:Origin prox. logic."



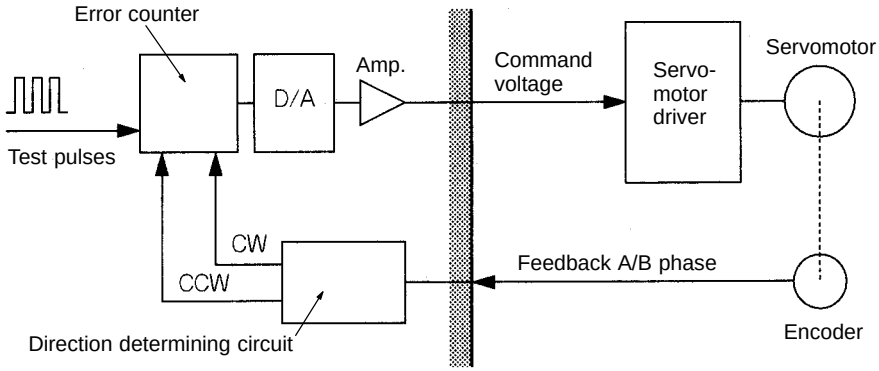
2. Select the desired setting.

6-3-15 Wiring Check ON/OFF

This parameter determines whether a wiring check is to be performed when the power is turned on.

Description

The wiring check function outputs a predetermined number of pulses in a predetermined direction and checks whether the correct number of feedback pulses is received. The default setting for this parameter is "ON."



The prescribed number of test pulses are set in the error counter, the contents of the error counter are checked for a fixed interval (the wiring check time), and the direction and number of the returned test pulses are checked for accuracy.

The following two error checks are performed simultaneously. Neither of these checks will be performed if the wiring check ON/OFF parameter is set to "OFF."

Reversed-wiring Error

If clockwise test pulses have been set, only the set number of clockwise feedback pulses should be returned. If the direction is reversed, a reversed-wiring error will occur, the servolock will be cleared, and the output voltage will be cut to 0 V.

To correct a reversed-wiring error, either turn off the power and correct the reversed wiring or change the setting for the encoder polarity parameter.

Disconnection Error

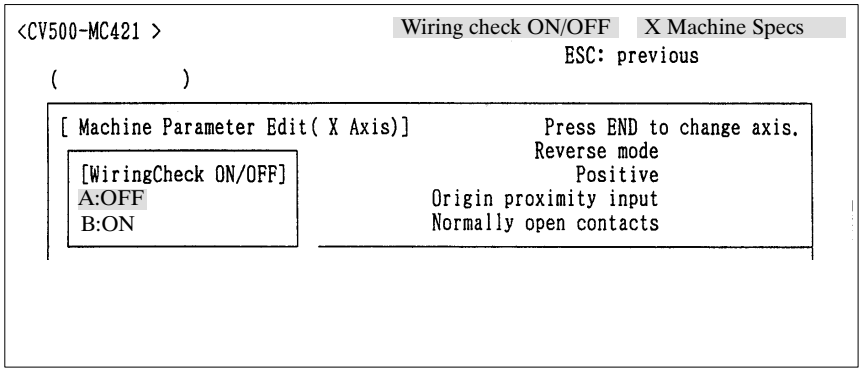
If the test pulses aren't returned normally within the wiring check time, a disconnection error will occur, the servolock will be cleared, and the output voltage will be cut to 0 V. To correct a disconnection error, turn off the power and locate and correct the broken/disconnected wiring.

Procedure

Use the following procedure to enable/disable the wiring check.

1, 2, 3...

1. Bring up the second page of the Machine Parameter Edit screen and select "O:Wiring check ON/OFF."



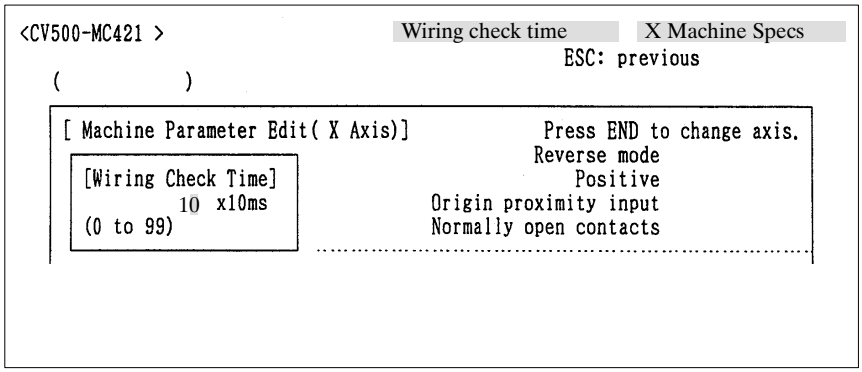
2. Select the desired setting.

6-3-16 Wiring Check Time

This parameter determines how long the Unit waits before checking the feedback pulses when a wiring check is performed. The wiring check time can be set from 0 to 99 (0 to 990 ms). The default setting is 10 (100 ms).

1, 2, 3...

1. Bring up the second page of the Machine Parameter Edit screen and select "P:Wiring check time."



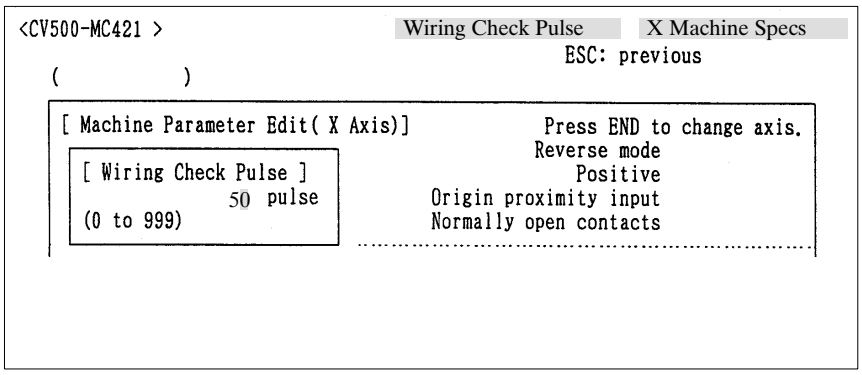
2. Input the desired time setting (×10 ms).

6-3-17 Wiring Check Pulses

This parameter determines how many test pulses will be output when a wiring check is performed. The number of pulses can be set from 0 to 999. The default setting is 50 pulses.

1, 2, 3...

1. Bring up the second page of the Machine Parameter Edit screen and select "Q:Wiring check pulses."



2. Input the desired number of pulses.

SECTION 7
Editing Coordinate System Parameters

This section explains how to set the reference and workpiece origin offset values. These offset values can be used to create an offset from the origin.

7-1 Coordinate Parameter Edit Screen

The following screen will be appear when “G:Edit coordinate parameters” is selected from the MC Parameter Edit menu.

```
<CV500-MC421 >                                          Coord Params
                                                   ESC: previous
  (          )
  [ Coord Parameter Edit      ]
  A:Reference origin offset X Axis                      0  pulse
  B:Workpiece origin offset X Axis                      0  pulse
  C:Reference origin offset Y Axis                      0  pulse
  D:Workpiece origin offset Y Axis                      0  pulse
  E:Reference origin offset Z Axis                      0  pulse
  F:Workpiece origin offset Z Axis                      0  pulse
  G:Reference origin offset U Axis                      0  pulse
  H:Workpiece origin offset U Axis                      0  pulse
```

The default settings are shown at the right of the screen. The offset default values are all “0.” Set the offset values for the required axes.

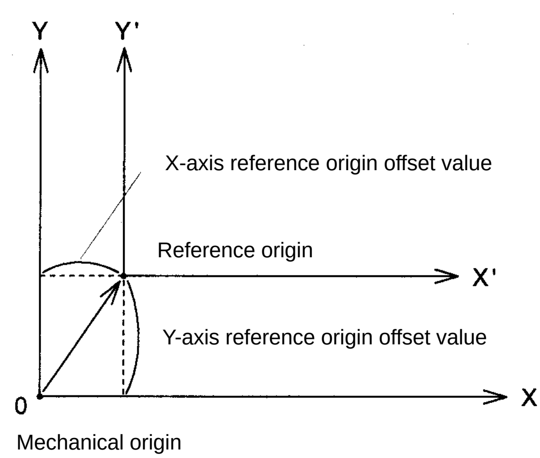
Screen Example for the CV500-MC221 and CV500-MC221
The following screen will be displayed because only axes X and Y are available.

```
<CV500-MC221>                                           Coord Params
                                                   ESC: previous
  (          )
  [ Coord Parameter Edit      ]
  A:Reference origin offset X Axis                      0  pulse
  B:Workpiece origin offset X Axis                      0  pulse
  C:Reference origin offset Y Axis                      0  pulse
  D:Workpiece origin offset Y Axis                      0  pulse
```

7-2 Reference and Workpiece Origin Offset Values

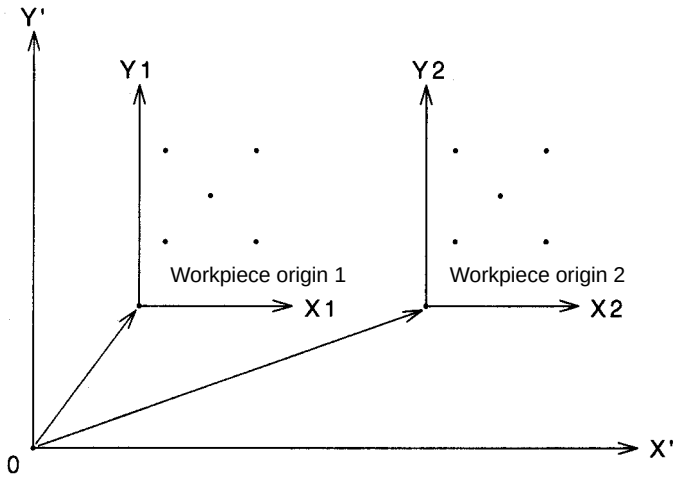
7-2-1 Reference Origin Offset Values

A reference origin offset value is an offset value that is offset from the mechanical origin.



7-2-2 Workpiece Origin Offset Values

A workpiece origin offset value is an offset value that is offset from the reference origin.



Reference origin

This can be useful, for example, in carrying out an operation such as drilling holes in the positions shown above.

1, 2, 3...

1. Move the workpiece origin to the workpiece origin 1 position by changing the workpiece origin offset value. Carry out the positioning for drilling the holes by selecting the workpiece coordinate system.
2. Move the workpiece origin to the workpiece origin 2 position, and execute the same program.

7-3 Setting Reference Origin Offset Values

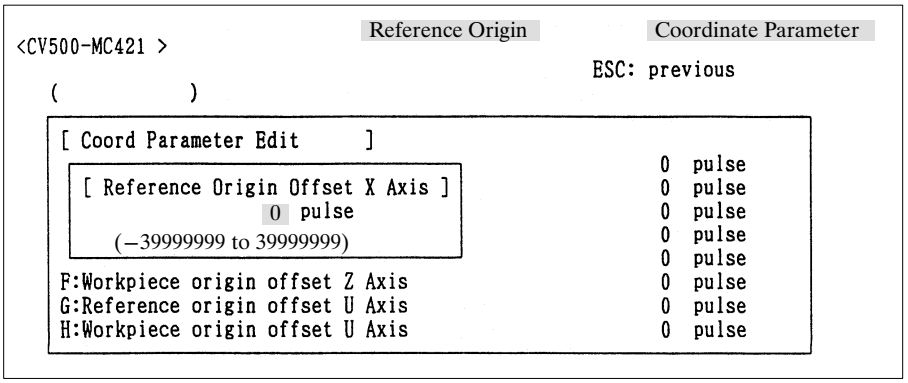
The range of possible settings for reference origin offset values depends on the minimum setting unit and the pulse rate that are set in the Machine Parameter Edit menu.

Procedure

In this example, the X-axis reference origin offset value is set to –1,000 pulses.

1, 2, 3...

1. Select “A:Reference origin offset X axis” from the Coordinate Parameter Edit menu.



2. Enter the offset value (–1000 in this example) and press the Return Key.

7-4 Setting Workpiece Origin Offset Values

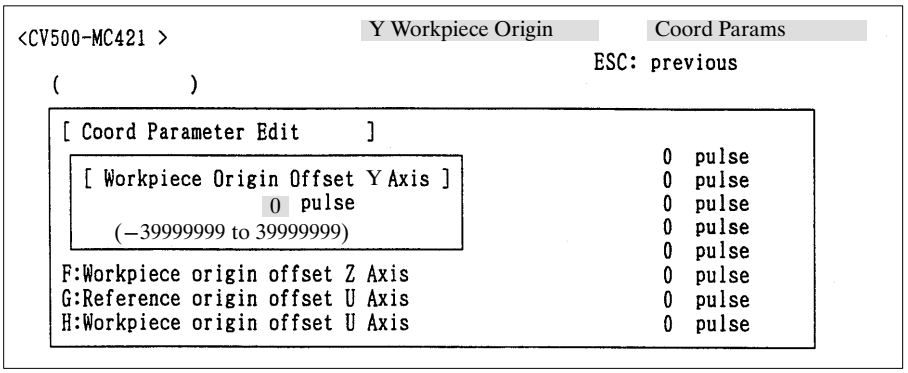
The range of possible settings for workpiece origin offset values depends on the minimum setting unit and the pulse rate that are set in the Machine Parameter Edit menu.

Procedure

In this example, the Y-axis workpiece origin offset value is set to 150 pulses.

1, 2, 3...

1. Select “D:Workpiece origin offset Y axis” from the Coordinate Parameter Edit menu.



2. Enter the offset value (150 in this example) and press the Return Key

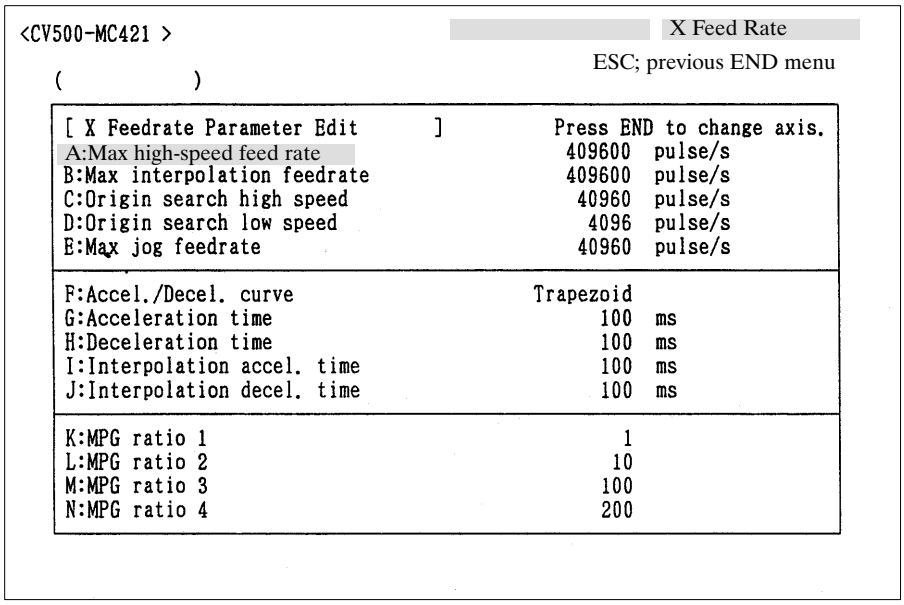
SECTION 8
Editing Feed Rate Parameters

This section explains how to set the parameters in the Feed Rate Parameter Edit screens. These parameters include the various feed rates, acceleration/deceleration times, and MPG ratios.

8-1 Introduction

8-1-1 The Feed Rate Parameter Edit Screen

Select “O:Edit feed rate parameters” from the MC Parameter Edit menu to bring up the Feed Rate Parameter Edit screen, shown in the following diagram.

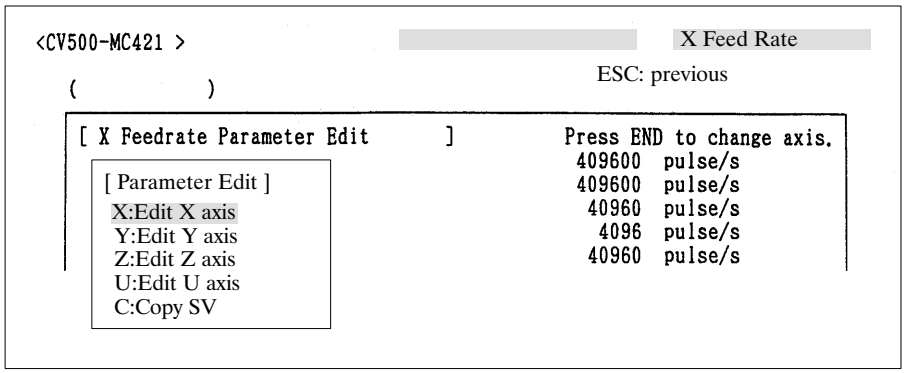


The following table briefly describes the parameters that can be set from the Feed Rate Parameter Edit screen.

Parameter	Settings	Page
Max. high-speed feed rate	Sets the maximum speed for PTP operation in each axis.	82
Max. interpolation feed rate	Sets the maximum speed for interpolation operations.	
Origin search high speed	During an origin search, the axis will be moved at this speed until an origin proximity input is received.	83
Origin search low speed	During an origin search, the speed will be decreased to this speed when an origin proximity input is received.	
Max. jog feed rate	Sets the maximum speed for jog feed.	82
Accel./Decel. curve	Specifies whether the acceleration/deceleration curve is trapezoidal or S-shaped.	84
Acceleration time	Sets the time required for the set speed to be attained when starting operation.	85
Deceleration time	Sets the time required for the speed to be reduced to zero when stopping.	
Interpolation accel. time	Sets the time required for the set speed to be attained when starting operation.	
Interpolation decel. time	Sets the time required for the speed to be reduced to zero when stopping.	
MPG ratios	Sets the ratio when MPG is used.	87

8-1-2 The Feed Rate Parameter Edit Menu

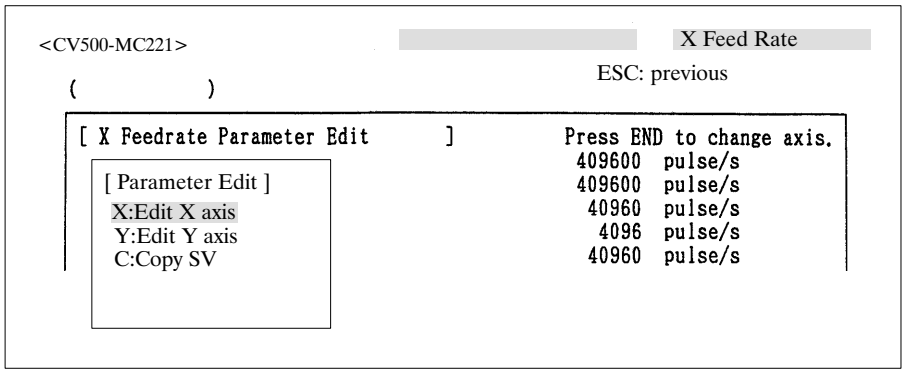
With the Feed Rate Parameter Edit screen displayed, press the End Key to bring up the Feed Rate Parameter Edit menu, shown in the following diagram.



Set the feed rate parameters for each axis. Enter "X," "Y," "Z," or "U" to edit that axis' parameters or enter "C" to copy the parameters to another axis. Refer to *6-2-3 Copying Machine Parameters* for details on copying parameters from one axis to another.

Screen Example for the CV500-MC221 and C200H-MC221

The following screen will be displayed because only axes X and Y are available.



8-2 Feed Rate Setting Ranges

The following equation provides the possible ranges for the feed rates set from the Feed Rate Parameter Edit screen, including the maximum high-speed feed rate, maximum interpolation feed rate, origin search high-speed feed rate, and origin search low-speed feed rate.

$$1 \leq SV \leq Vm \times Ep \times 4 \times \frac{Prate}{60}$$

Vm: Max. motor frequency
Ep: Encoder resolution
4: Encoder ratio (fixed at 4)
Prate: Pulse rate

Example

When Vm=1000 rpm, Ep=300 ppr, and Prate=0.01 mm/pulse:

$$1000 \text{ rpm} \times 300 \text{ ppr} \times 4 \times 0.01 \text{ mm/pulse} \div 60 = 200 \text{ mm/sec}$$

Therefore, the setting range would be 1 to 200. When the minimum setting unit is 0.01, the possible setting range would be 0.01 to 200.00.

In the example above, the display units are mm. The SV units would be pulses/sec if the display units were pulses.

Feed Rate Relationships

If the following conditions aren't met, an error will occur when the parameters are transferred.

1, 2, 3...

1. Max. high-speed feed rate ≥ maximum interpolation feed rate
   Max. high-speed feed rate ≥ maximum jog feed rate
   Max. high-speed feed rate ≥ origin search high-speed feed rate
   Max. high-speed feed rate ≥ origin search low-speed feed rate
2. Origin search high-speed feed rate ≥ origin search low-speed feed rate

8-3 Feed Rate Parameter Settings

This section describes the settings for the parameters in the Feed Rate Parameter Edit screen.

8-3-1 Maximum Feed Rates

This section explains how to set the parameters for each axis's maximum high-speed feed rate, maximum interpolation feed rate, and maximum jog feed rate. Set these parameters for each axis being used.

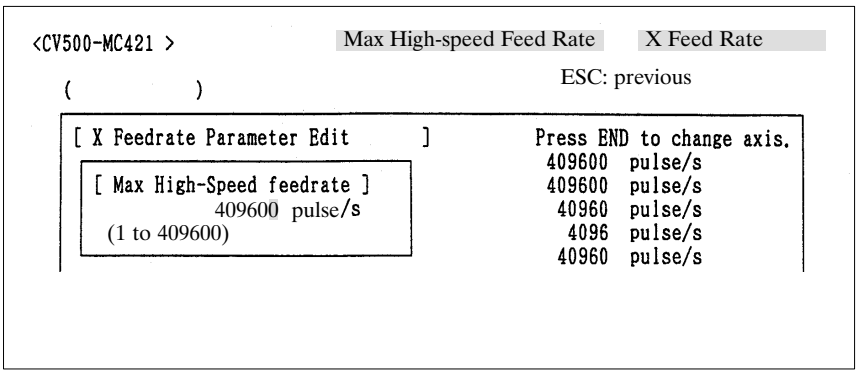
Refer to *8-1-2 Feed Rate Parameter Menu* for details on selecting the axis. Refer to *6-2-3 Copying Machine Parameters* for details on copying parameters from one axis to another.

Example 1: Max. High-speed Feed Rate

Use the following procedure to set the X-axis' maximum high-speed feed rate.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "A:Max high-speed feed rate."



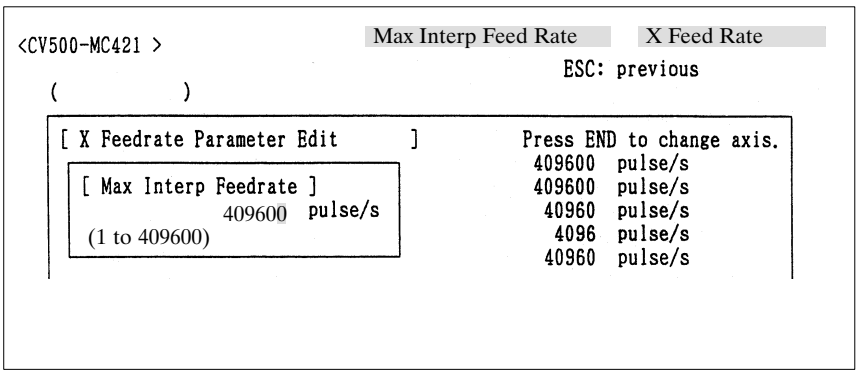
2. Enter the desired maximum high-speed feed rate.

Example 2: Max Interpolation Feed Rate

Use the following procedure to set the X-axis' maximum interpolation feed rate.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "B:Max interpolation feed rate."



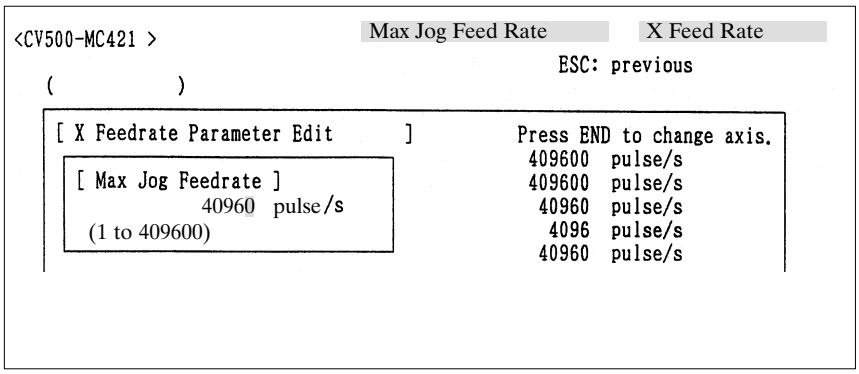
2. Enter the desired maximum interpolation feed rate.

Example 3: Max. Jog Feed Rate

Use the following procedure to set the X-axis' maximum jog feed rate.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "E:Max jog feed rate."



2. Enter the desired maximum jog feed rate.

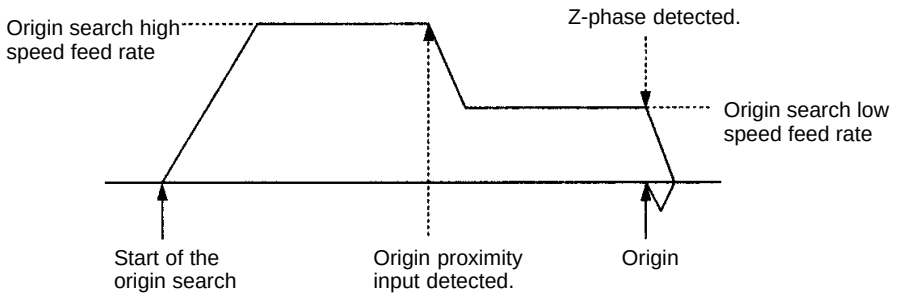
8-3-2 Origin Search Feed Rates

This section explains how to set the parameters for each axis's origin search high speed feed rate and origin search low speed feed rate. Set these parameters for each axis being used.

Description

The origin search high speed feed rate is the speed at which the axis is moved until an origin proximity input is received. The axis is moved at the origin search low speed feed rate after an origin proximity input is received and continues at this speed until a Z-phase is detected.

In an origin search the Unit accelerates to the origin search high speed feed rate and searches for the origin proximity input. When the origin proximity input is found, the Unit decelerates to the origin search low speed feed rate and searches for the Z-phase.

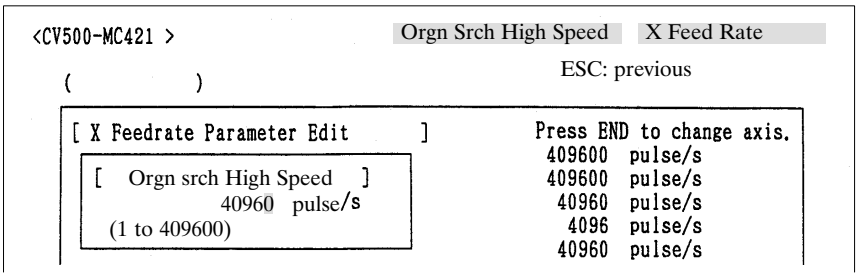


Example 1: Origin Search High Speed Feed Rate

Use the following procedure to set the X-axis' origin search high speed feed rate.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "C:Origin search high speed."



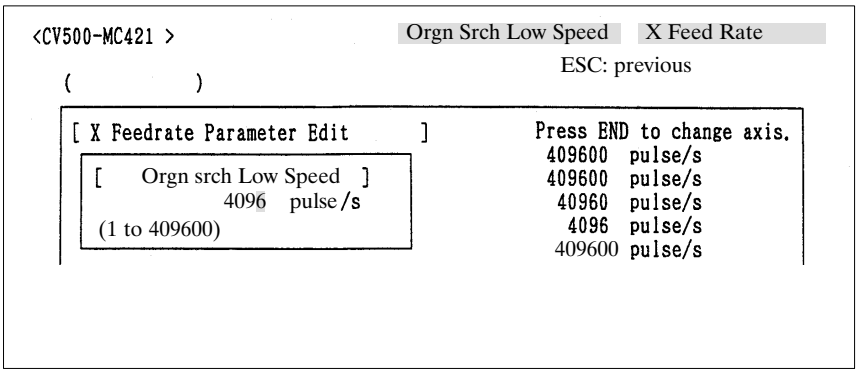
2. Enter the desired high-speed feed rate.

Example 2: Origin Search Low Speed Feed Rate

Use the following procedure to set the X-axis' origin search low speed feed rate.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "D:Origin search low speed."



2. Enter the desired low-speed feed rate.

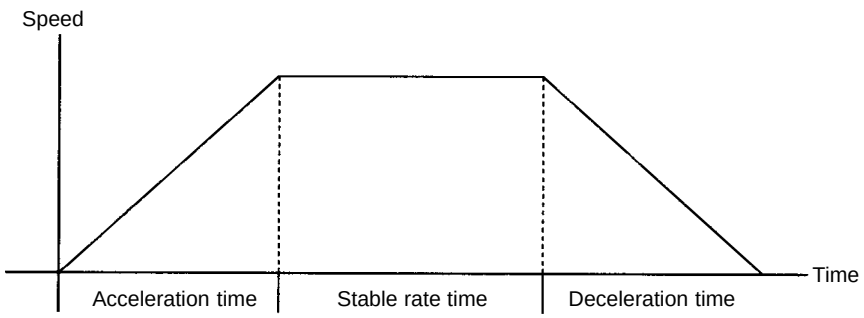
8-3-3 Acceleration and Deceleration Curves

This parameter determines whether the acceleration/deceleration curve is trapezoidal or S-shaped. The default setting is trapezoidal.

Refer to *5-6 Acceleration and Deceleration Curves* in the *MC Unit Operation Manual: Basics* for more details.

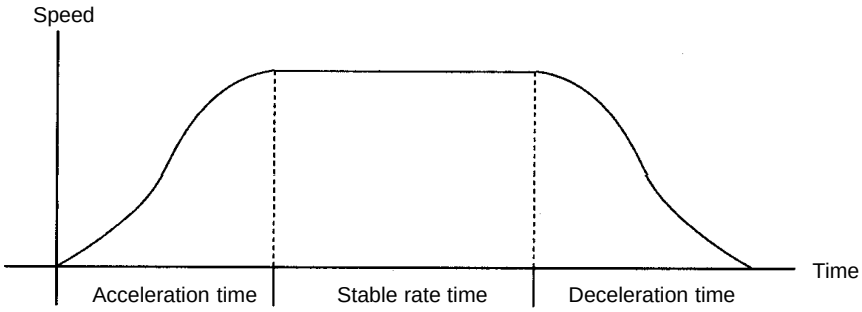
Trapezoidal Curve

The following diagram shows the trapezoidal curve. The acceleration and deceleration rates are fixed in the trapezoidal curve.



S-shaped Curve

The following diagram shows the S-shaped curve. The acceleration and deceleration rates vary with time in the S-shaped curve.

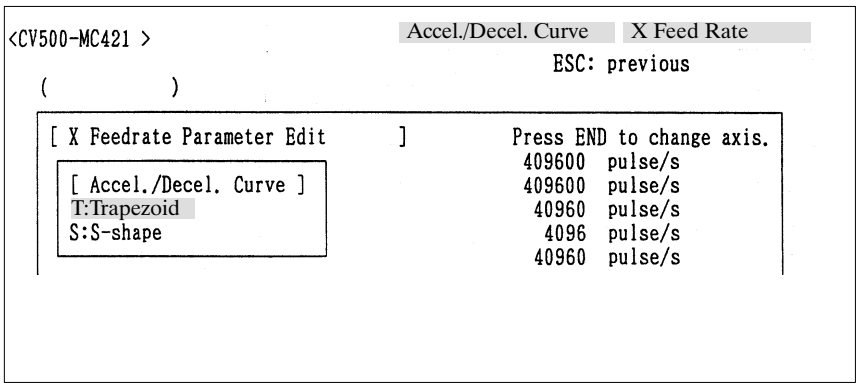


Procedure

Use the following procedure to set the X-axis' acceleration/deceleration curve.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "F:Accel./Decel. curve."



2. Enter "A" to select trapezoidal, "B" to select S-shaped.

8-3-4 Acceleration and Deceleration Times

This section explains how to set the parameters for each axis's acceleration time, deceleration time, interpolation acceleration time, and interpolation deceleration time. The acceleration/deceleration times can be set from 0 to 9,999 ms. Set these parameters for each axis being used.

The acceleration time (interpolation acceleration time) specify the time required for the maximum high-speed feed rate (maximum interpolation feed rate) to be reached.

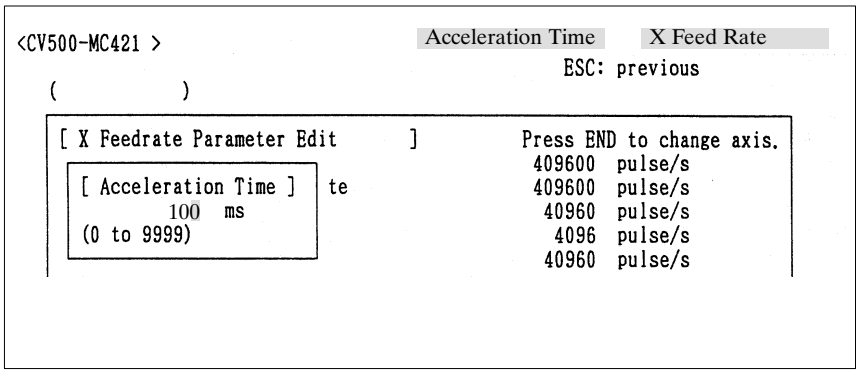
The deceleration time (interpolation deceleration time) specify the time required to decelerate from the maximum feed rate to zero.

Example 1: Acceleration Time

Use the following procedure to set the X-axis' acceleration time.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "G:Acceleration time."



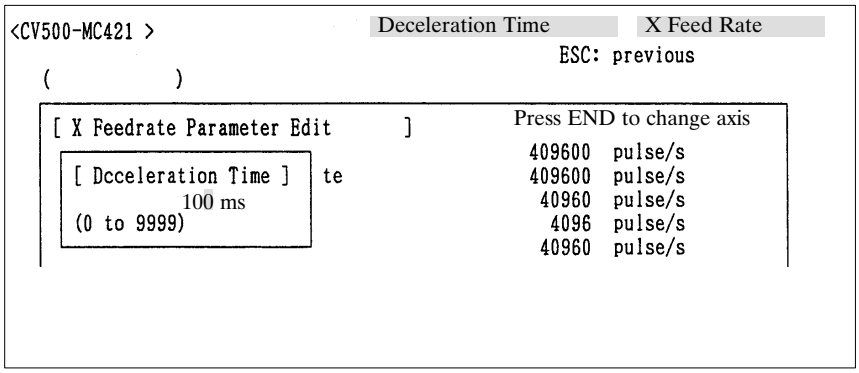
2. Enter the desired acceleration time.

Example 2: Deceleration Time

Use the following procedure to set the X-axis' deceleration time.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "H:Deceleration time."



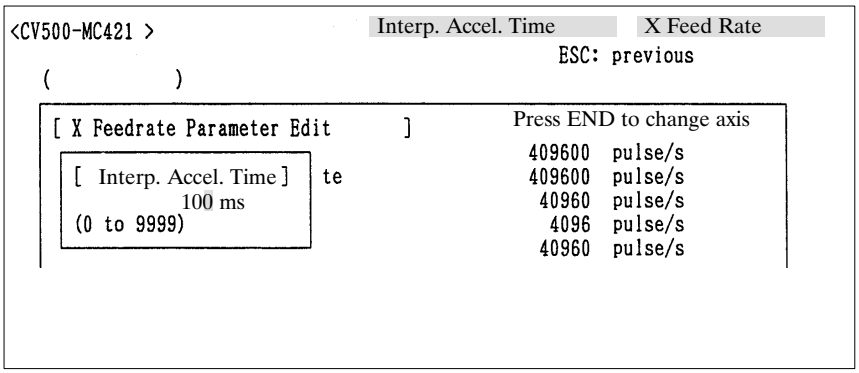
2. Enter the desired deceleration time.

Example 3: Interpolation Acceleration Time

Use the following procedure to set the X-axis' interpolation acceleration time.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "I:Interpolation accel. time."



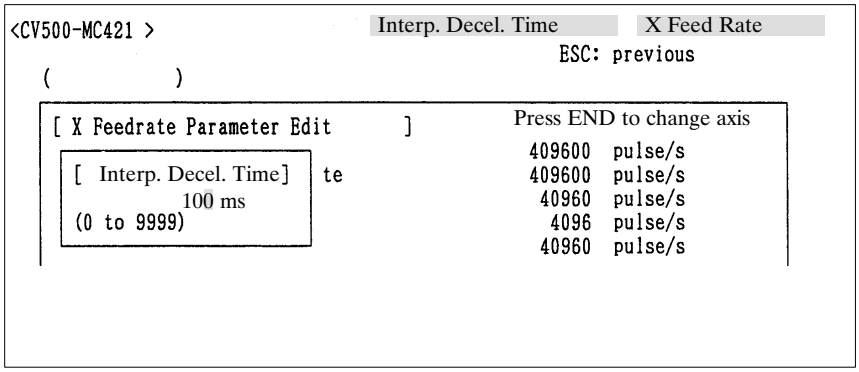
2. Enter the desired interpolation acceleration time.

Example 4: Interpolation Deceleration Time

Use the following procedure to set the X-axis' interpolation deceleration time.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "J:Interpolation decel. time."



2. Enter the desired interpolation deceleration time.

8-3-5 MPG Ratios

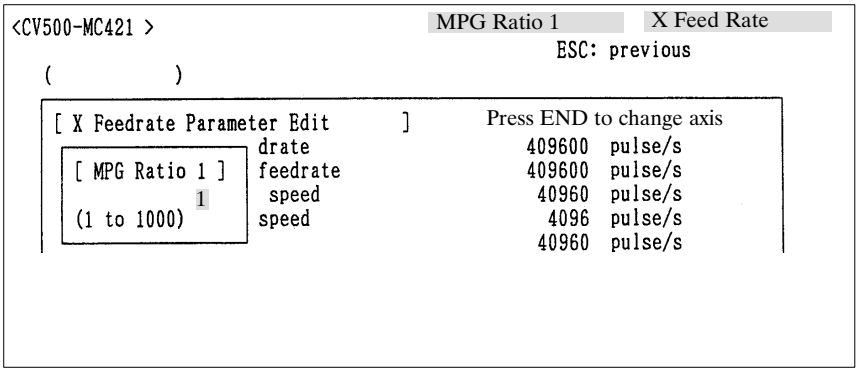
These parameters set the ratios for MPGs 1 through 4 when MPGs are used. The MPG ratios can be set from 1 to 1000. Up to four ratios (MPG ratio 1 through MPG ratio 4) can be set for each axis. Set these parameters for each axis being used.

Procedure

Use the following procedure to set MPG ratio 1 for the X-axis.

1, 2, 3...

1. Bring up the Feed Rate Parameter Edit screen and select "K:MPG ratio 1."



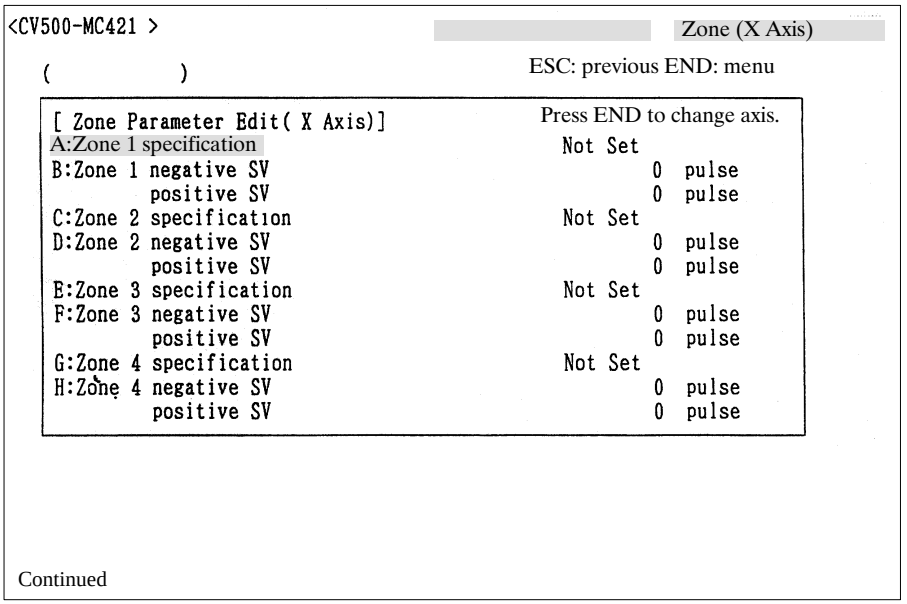
2. Enter the desired MPG ratio.

SECTION 9
Editing Zone Parameters

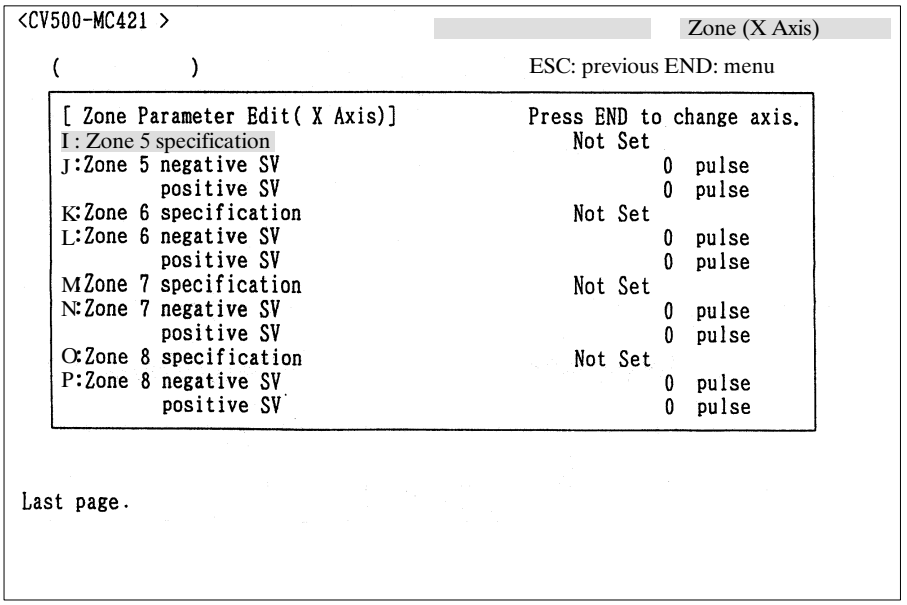
This section explains how to set zones. When the present value is within a set zone, the zone bit turns ON in the interface area.

9-1 Zone Parameter Edit Screen

Selecting “Z:Edit zone parameters” from the MC Parameter Edit menu brings up the following screen.



This screen shows the zone parameters for the X axis. The values displayed on the right side of the screen are the default values for the various parameters. A total of eight zones can be set for each of the eight axes. To view zones 5 through 8, use the F2 Key or the PageDown Key to scroll to the next screen. Use the F1 Key or the PageUp Key to scroll back to the previous screen.

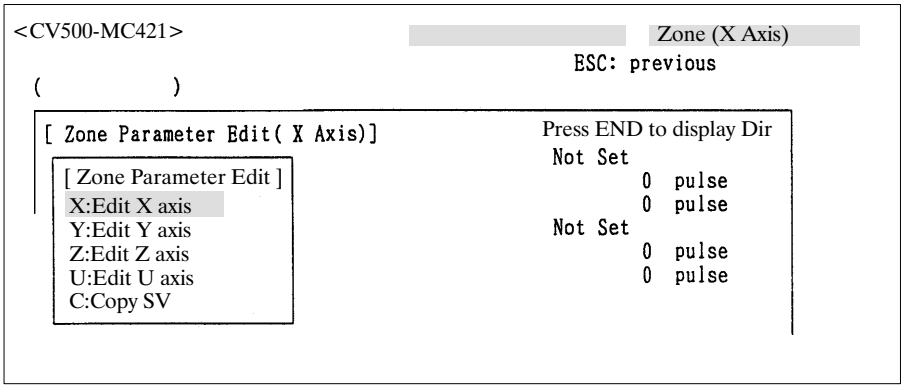


The following items are set for each zone.

Item	Contents
Zone specification	Specifies whether or not the zone is to be set.
Positive SV, negative SV	Sets the upper and lower limits for the zone.

Menu Display

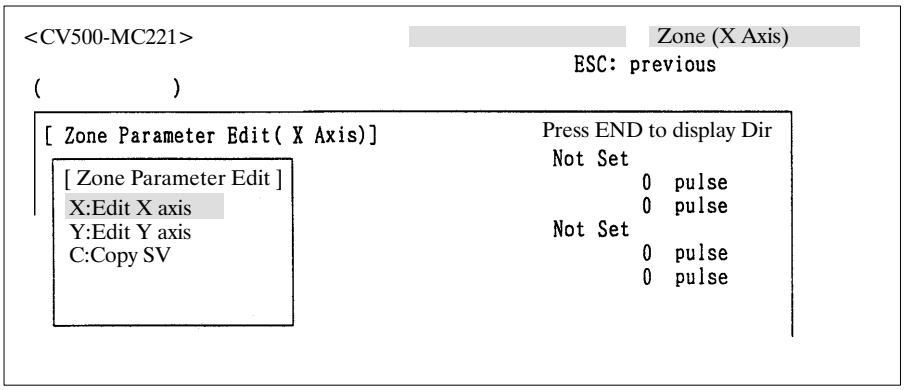
Pressing the End Key while the Zone Parameter Edit screen is displayed brings up the following menu for the CV500-MC421.



Zone parameters can be set for each axis, and axes can be selected from the menu for editing and for copying parameters from one axis to another. (For explanations of how to select axes for editing and how to copy parameters from one axis to another, refer to *Section 6 Editing Machine Parameters*.)

Screen Example for the CV500-MC221 and C200H-MC221

The following screen will be displayed because only axes X and Y are available.



9-2 Enabling Zone Settings

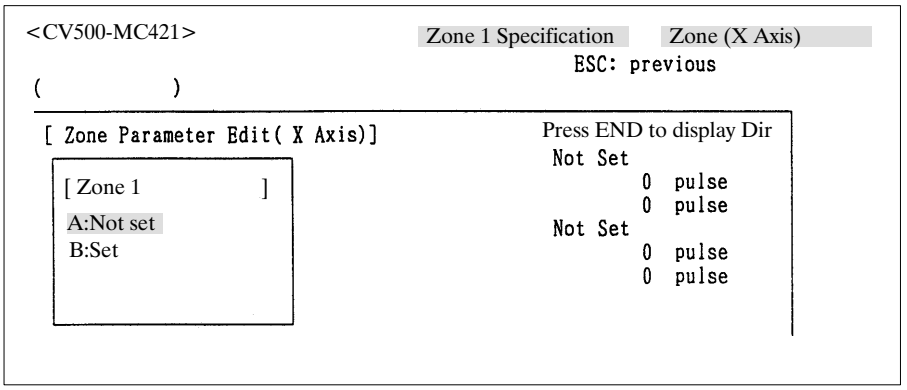
When making zone settings, first enable the settings and then set the range. (For an explanation of how to set the range, refer to *2-3 Setting Zones*.)

Procedure

This example shows how to enable the zone settings for zone 1.

1, 2, 3...

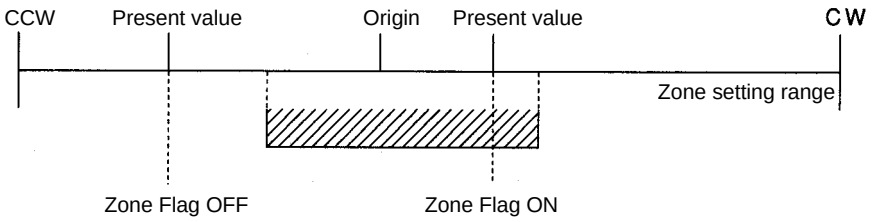
1. Select “A:Zone 1 specification” from the Zone Parameter Edit screen.



2. Select “B:Set.”

9-3 Setting Zones

When the present value is within the range set here, the zone bit in the interface area turns ON. (For details regarding zone bits, refer to *6-6 Interface Bit Specifics* in the *MC Unit Operation Manual: Details.*)



X-axis zone bits are allocated to bits 08 (zone 1) to 15 (zone 8) of word n+17. Y, Z, and U-axis zone bits are allocated to the same bits in words n+19, n+21, and n+23 respectively.

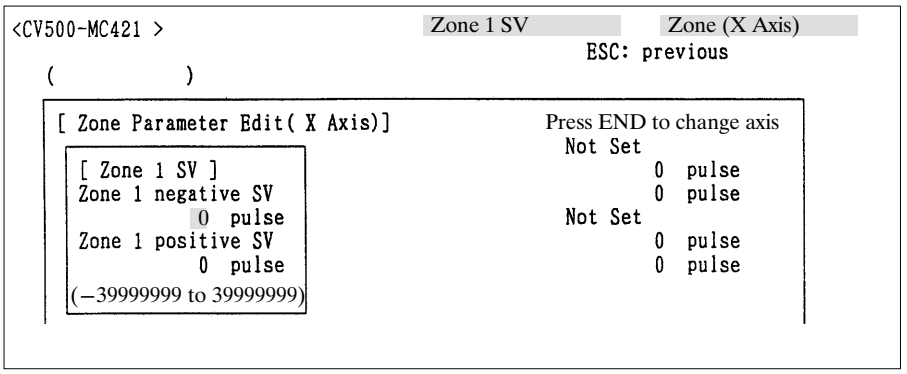
The zone ranges that can be set depend on the machine parameter minimum setting unit and pulse rate.

Procedure

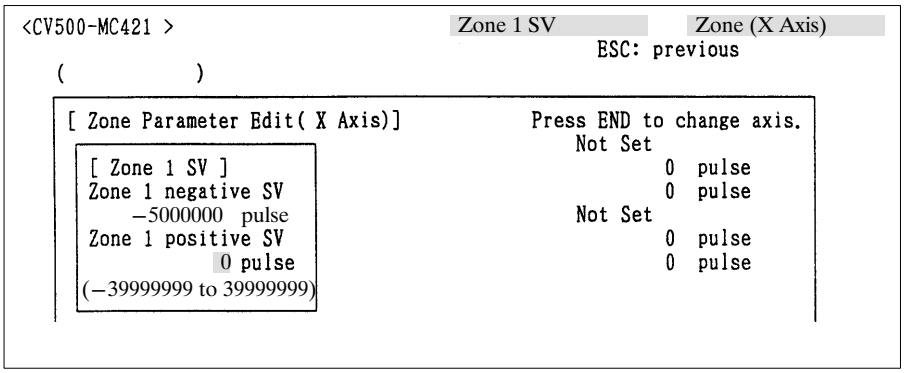
This example shows how to set a zone range of –5,000,000 to 3,000,000.

1, 2, 3...

1. Select “B:Zone 1 negative SV” from the Zone Parameter Edit screen. (For explanations of how to select axes for editing and how to copy parameters from one axis to another, refer to *Section 6 Editing Machine Parameters*.)



2. Set the negative value for the zone. (In this example, enter –5,000,000.)



3. Set the positive value for the zone. (In this example, enter 3,000,000.) After the setting has been made, the Zone Parameter Edit screen will be restored.

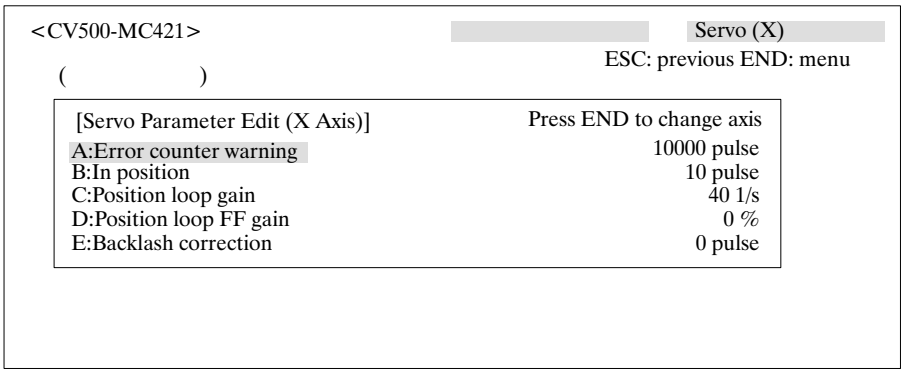
SECTION 10
Editing Servo Parameters

This section explains how to set the servo system's parameters.

10-1 Introduction

10-1-1 The Servo Parameter Edit Screen

Select “B:Edit servo parameters” from the MC Parameter Edit menu to bring up the Servo Parameter Edit screen, shown in the following diagram.



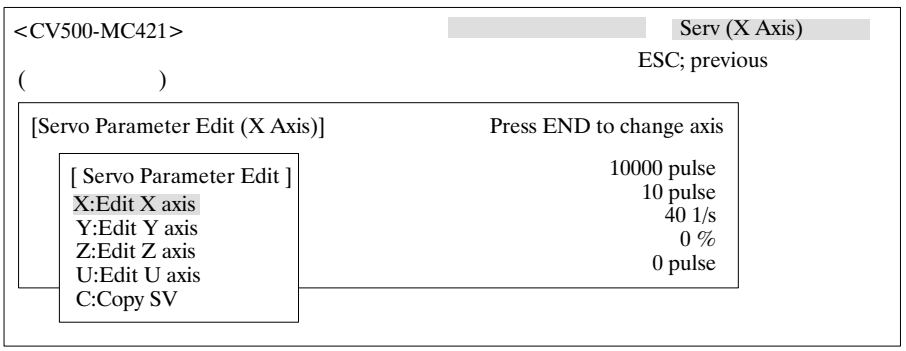
The default settings for the X-axis’s parameters are shown on the right side of the screen. The following table briefly describes the parameters that can be set from the Servo Parameter Edit screen.

Parameter	Settings	Page
Error counter warning	The Error Counter Alarm Flag will be turned ON if the number of accumulated pulses in the error counter exceeds this set value.	95
In position	Set this parameter to check the accumulated pulses in the error counter.	96
Position loop gain	Sets the position loop gain.	97
Position loop FF gain	Sets the position loop FF gain.	98
Backlash correction	Sets the backlash correction.	99

10-1-2 The Servo Parameter Edit Menu

Screen Example for the CV500-MC421

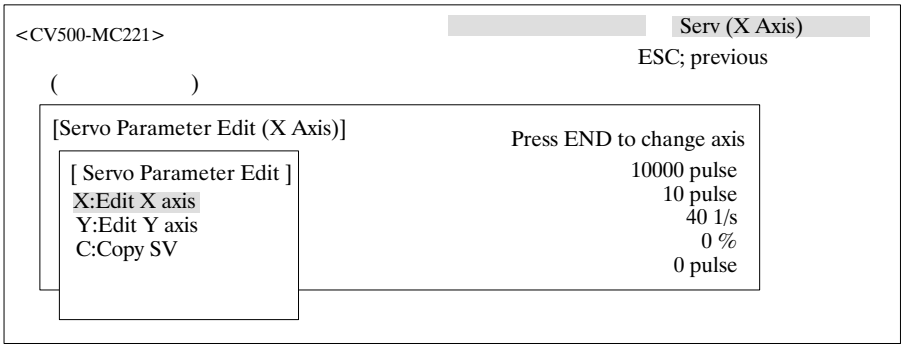
With the Servo Parameter Edit screen displayed, press the End Key to bring up the Servo Parameter Edit menu, shown in the following diagram.



Set the servo parameters for each axis. Enter “X,” “Y,” “Z,” or “U” to edit that axis’s parameters or enter “C” to copy the parameters to another axis. Refer to *6-2-3 Copying Machine Parameters* for details on copying parameters from one axis to another.

Screen Example for the CV500-MC221 and C200H-MC221

The following screen will be displayed because only axes X and Y are available.



10-2 Servo Parameter Settings

This section describes the settings for the parameters in the Servo Parameter Edit screen.

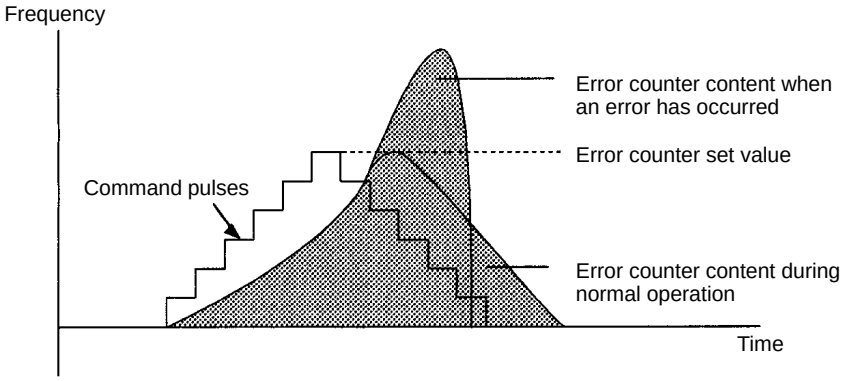
10-2-1 Error Counter Warning

The Error Counter Alarm Flag in the PC data area interface will be turned ON if the number of accumulated pulses in the error counter exceeds the value set in this parameter.

Description

Set the error warn count about 20% above the level of pulses that accumulate during normal operation. When a problem occurs in the machine system or motor, the accumulated pulses in the error counter will exceed the set value so the error can be detected.

In an origin search the Unit accelerates to the origin search high speed feed rate and searches for the origin proximity input. When the origin proximity input is found, the Unit decelerates to the origin search low speed feed rate and searches for the Z-phase.



The Error Counter Alarm Flag for the X-axis is bit 7 of word n+18, the flag for the Y-axis is in word n+20, the flag for the Z-axis is in word n+22, and the flag for the U-axis is in word n+24.

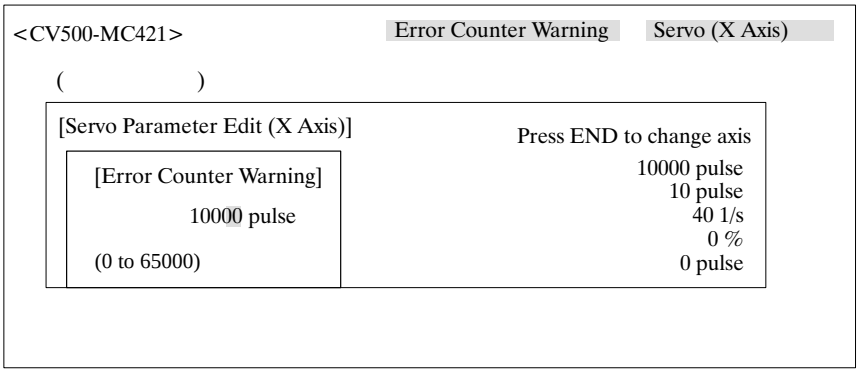
Set this parameter for each axis being used. The setting range is 0 to 65,000 and the default setting is 10,000.

Note Refer to *6-6 Interface Bit Specifics* in the *MC Unit Operation Manual: Details* for more details on the Error Counter Alarm Flag.

Procedure

Use the following procedure to set the X-axis' error warn count.

1, 2, 3... 1. Bring up the Servo Parameter Edit screen and select “A:Error Counter Warning.”



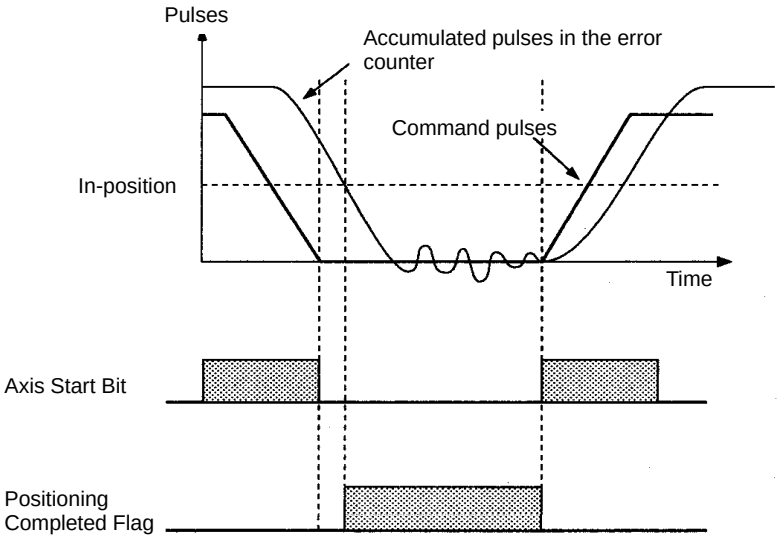
2. Enter the desired set value.

10-2-2 In Position

Checks the accumulated pulses in the servo system’s error counter. The reference origin bits and work-piece origin bits are also checked with the in-position set here.

Description

When positioning each axis, the Positioning Completed Flag in the PC data area interface is turned ON when pulse distribution is completed and the axis is in-position.



The Axis Start Bit for the X-axis is bit 2 and the Positioning Completed Flag is bit 3 of word n+18, the flags for the Y-axis are in word n+20, the flags for the Z-axis are in word n+22, and the flags for the U-axis are in word n+24.

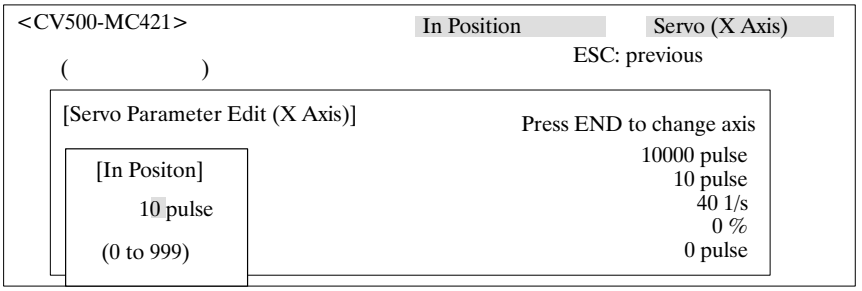
The setting range is 0 to 999 and the default setting is 10 pulses.

Note Refer to *6-6 Interface Bit Specifics* in the *MC Unit Operation Manual: Details* for more details on the Axis Start Bit and the Positioning Completed Flag.

Procedure

Use the following procedure to set the X-axis’ in-position.

1, 2, 3... 1. Bring up the Servo Parameter Edit screen and select “B:In position.”



2. Enter the desired number of pulses.

10-2-3 Position Loop Gain

Description

Sets the position loop gain, which can be determined from the following equation.

$$\text{Position loop gain [1/s]} = \frac{\text{Feed rate [pulses/sec]}}{\text{Accumulated pulses [pulses]}}$$

If the position loop gain is too low, the motor’s responsiveness will deteriorate because there will be too many accumulated pulses. If the position loop gain is too high, oscillations and noise might occur.

In general, the setting should be 50 to 70 (1/s) for NC machine tools, 30 to 50 (1/s) for multi-purpose machinery and assembly machines, and 10 to 30 (1/s) for industrial robots.

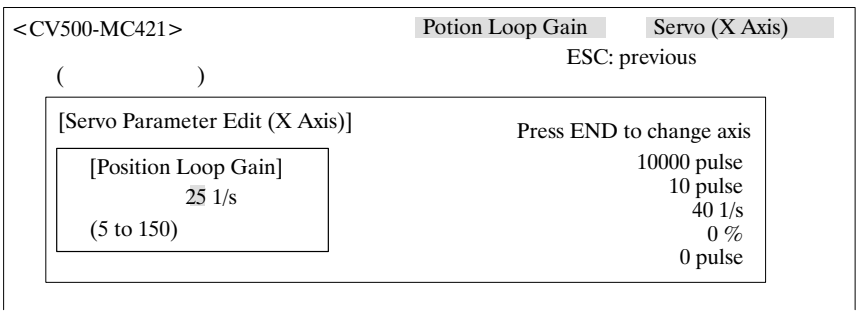
CV500-MC421 and CV500-MC221
The setting range is 5 to 150 and the default setting is 40 (1/s).

C200H-MC221
The setting range is 5 to 250 and the default setting is 40 (1/s).

Procedure

Use the following procedure to set the position loop gain.

1, 2, 3... 1. Bring up the Servo Parameter Edit screen and select “C:Position loop gain.”



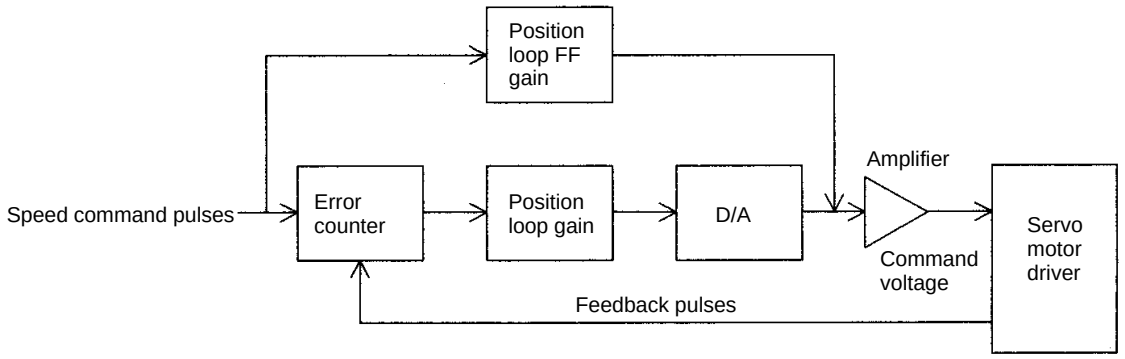
2. Enter the desired setting.

10-2-4 Position Loop FF Gain

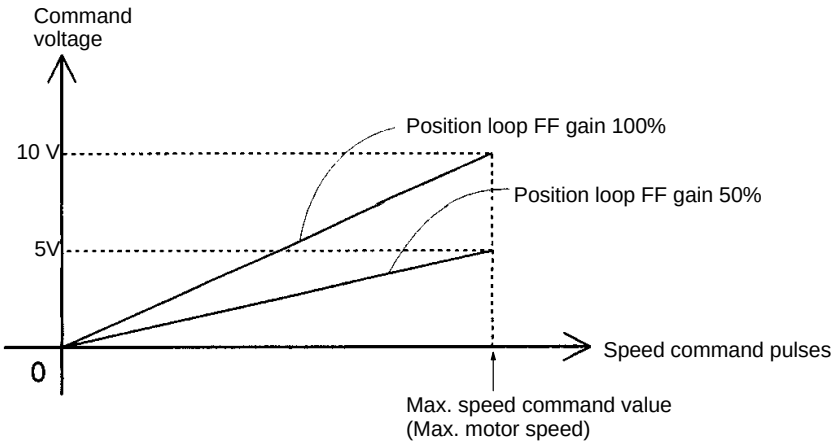
Description

Sets the position loop FF (feed-forward) gain. The setting range is 0 to 100 and the default setting is 0%.

The position loop FF gain process the speed command pulses and reduces the positioning time by adding directly to the command voltage.



The following diagram shows the relationship between the position loop FF gain and the speed command pulses.

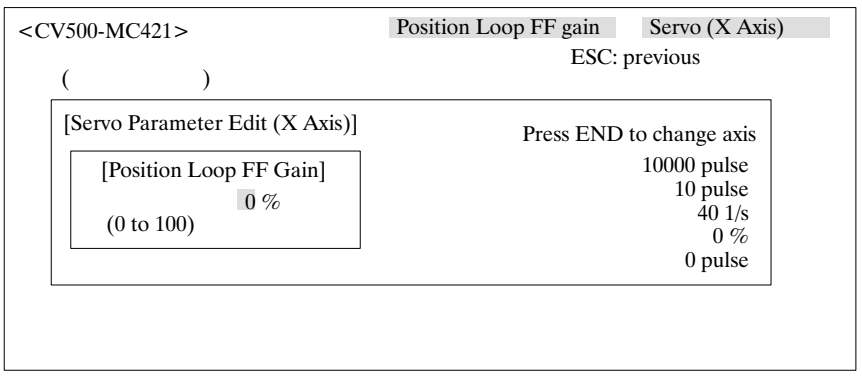


Procedure

Use the following procedure to set the position loop FF gain.

1, 2, 3...

1. Bring up the Servo Parameter Edit screen and select “D:Position loop FF gain.”



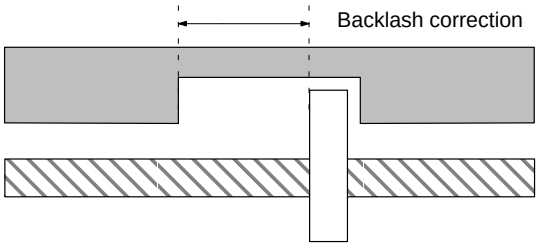
2. Enter the desired setting.

10-2-5 Backlash Correction

Backlash correction can be set.

Description

The backlash correction can be set from 0 to 999 pulses. The default value is 0 pulses. The backlash correction value is used to compensate the backlash of the machine to be used.

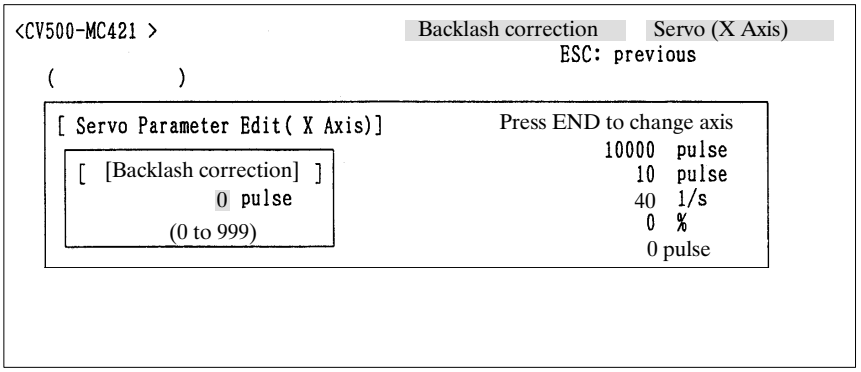


Procedure

The following procedure shows how to set the backlash correction to 10 pulses.

1, 2, 3...

1. Press “E” to select “E:Backlash correction” in the Servo Parameter Edit Menu.



2. Input “10” and press Enter Key.

SECTION 11
Parameter Operations

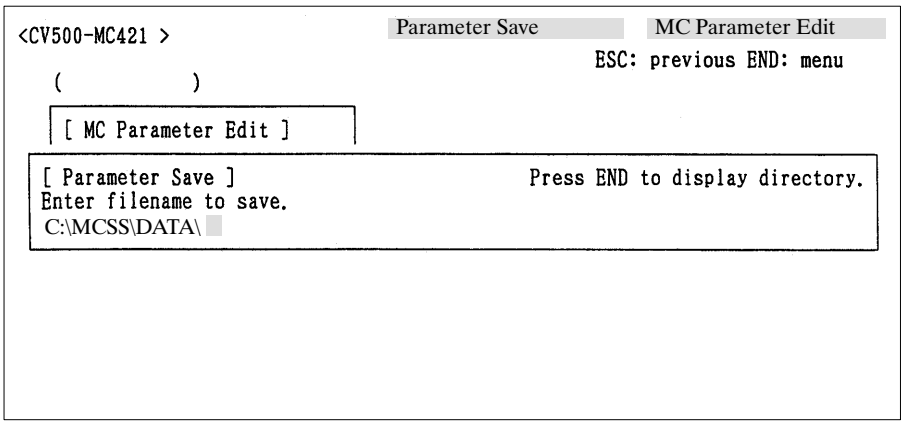
This section explains how to save, retrieve, clear, transfer, and verify parameters that have been set as explained in Sections 6 through 10.

11-1 Saving Parameters

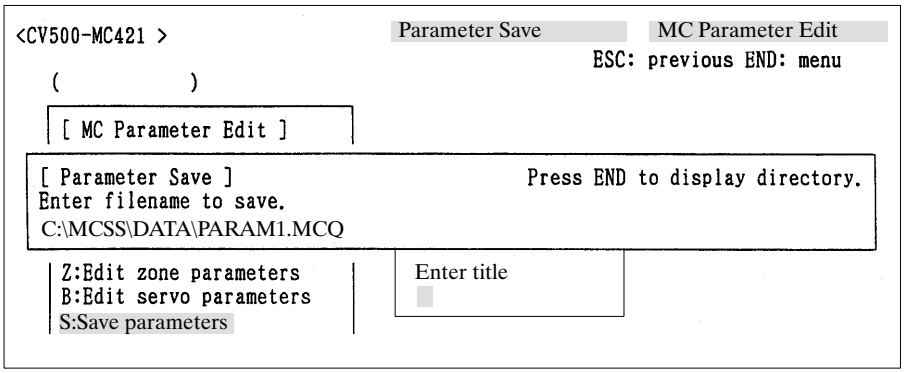
This section explains how to save parameter data to a data disk. A filename can consist of up to eight characters. Up to 74 characters can be specified from a directory. Titles must be within 30 characters.

Procedure

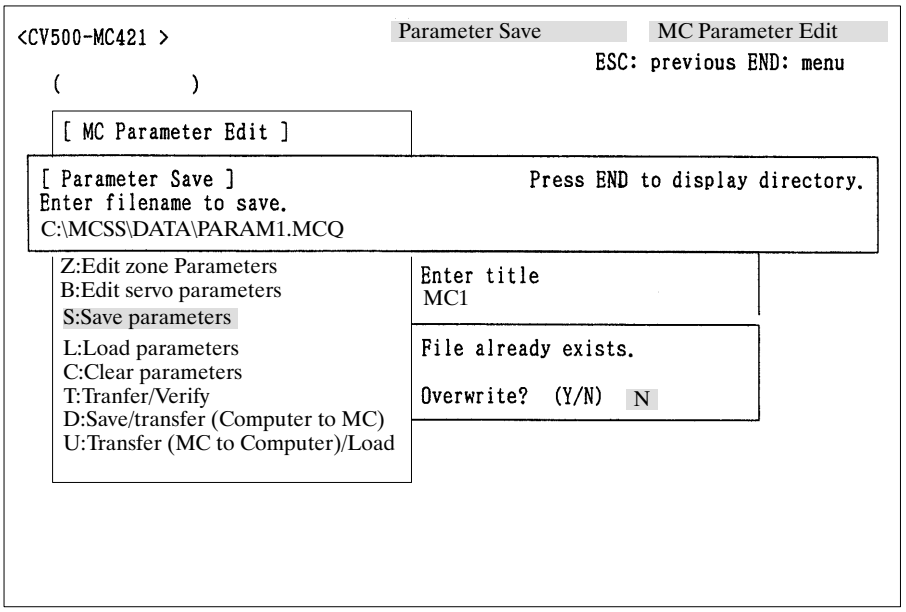
1, 2, 3... 1. Select “S:Save parameters” from the MC Parameter Edit menu.



2. Enter the filename (“PARAM1” for example) and press the Return Key. (It is also possible to press the End Key to display a list of files and select the desired file.)



3. Enter the title (“MC1” for example) and press the Return Key. If the same filename already exists, a message will be displayed for confirmation. To overwrite the existing file, enter “Y” and then press the Return Key. To cancel the operation, press the Return Key.

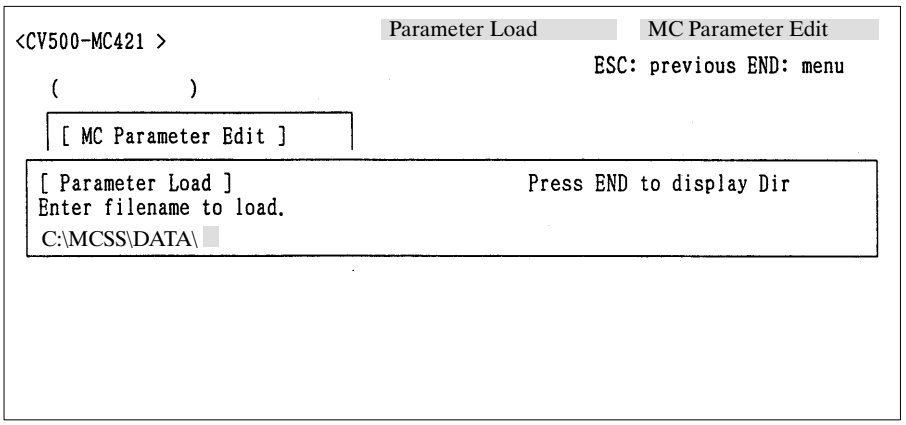


11-2 Retrieving Parameters

This section explains how to retrieve parameters that have been saved.

Procedure

1, 2, 3... 1. Select “L:Load parameters” from the MC Parameter Edit menu.



2. Enter the filename (“PARAM1” for example) and press the Return Key. (It is also possible to press the End Key to display a list of files and select the desired file.)

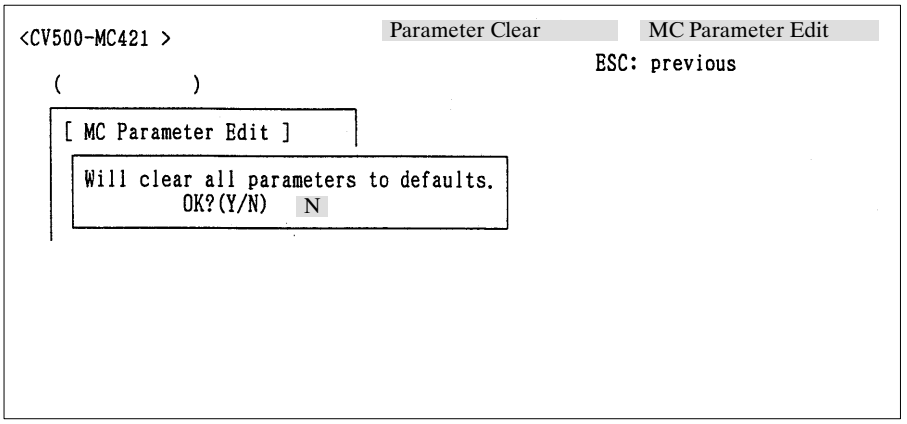
Note For a more detailed explanation of how to select files from a list, refer to *3-2 Entering Filenames*.

11-3 Clearing Parameters

This section explains how to clear parameters that have been saved. The operation described here returns the parameters to their default settings.

Procedure

1, 2, 3... 1. Select “C:Clear parameters” from the MC Parameter Edit menu.



2. To clear the parameter data, enter “Y” and press the Return Key. To cancel the operation, press the Return Key.

11-4 Transferring and Verifying Parameters

This section explains how to transfer parameters between the MC Unit and the programming device, and how to verify those parameters. Parameters are transferred and compared between the MC Unit and computer. The C200H-MC221 allows the parameters to be written to its flash memory.

This operation must be carried out in online mode.

Procedure

1, 2, 3... 1. First, check to be sure that both the programming device and the Programmable Controller or MC Unit are connected.
2. Check the MC model on the Setup Menu and make sure that the designated MC model coincides with the model of MC Unit in use.
3. Set the communications specifications and format in the System Setup to match those of the programming device that is to be used. (For information regarding communications specifications and formats, refer to *Section 17 System Setup*.)
4. Select “T:Transfer/Verify” from the MC Parameter Edit menu. (The procedure from this point on is the same as that explained in *Section 14 Transferring and Verifying Data*.)

11-5 Save/Transfer (Computer to MC)

For the following procedure, the parameters created on the computer are stored on a data disk and also transferred to the MC Unit.

Note Be sure to confirm that the created program, parameters, and position data are correct.

⚠ Caution Before transferring the program, parameters, or position data to another node, be sure to confirm the safety conditions at the destination node. Otherwise, an injury may occur.

Online Operations

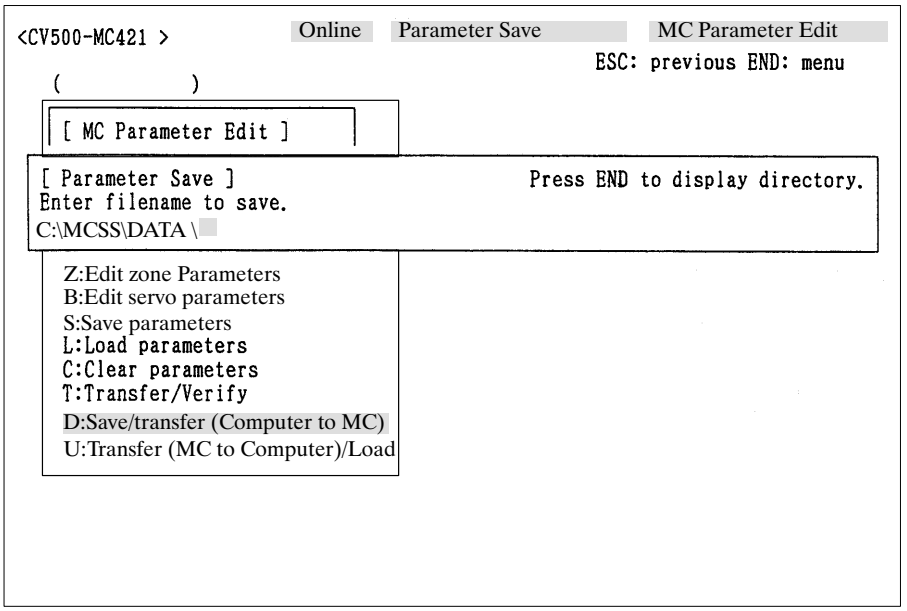
This operation must be performed online. Make sure the computer is connected to the PC or MC Unit and the computer's communications specifications are correct. Check the MC model on the Setup Menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

Use the following procedure to store the parameters on a data disk and also transfer them to the MC Unit.

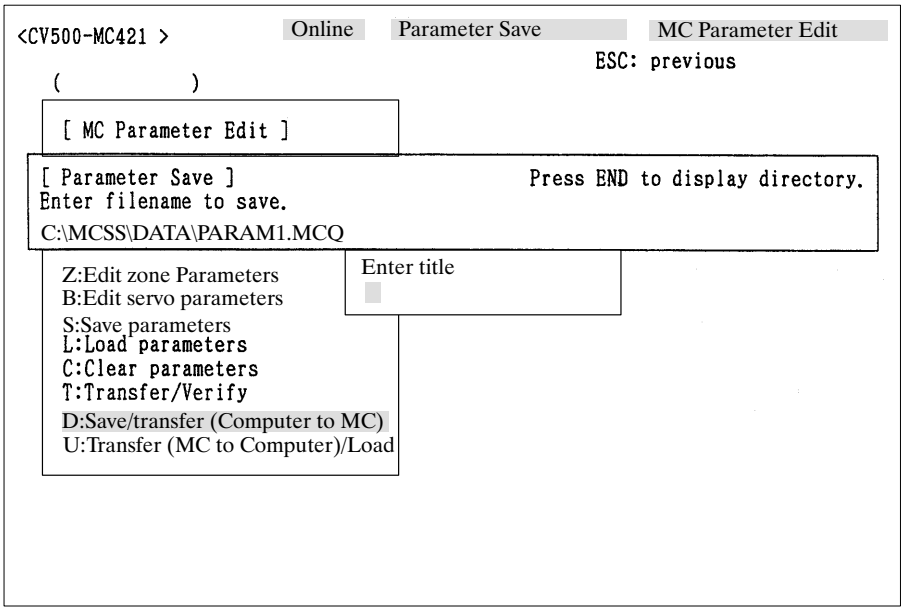
1, 2, 3...

1. Press "D" to select "D:Save/Transfer (Computer to MC)" in the MC Parameter Edit Menu.

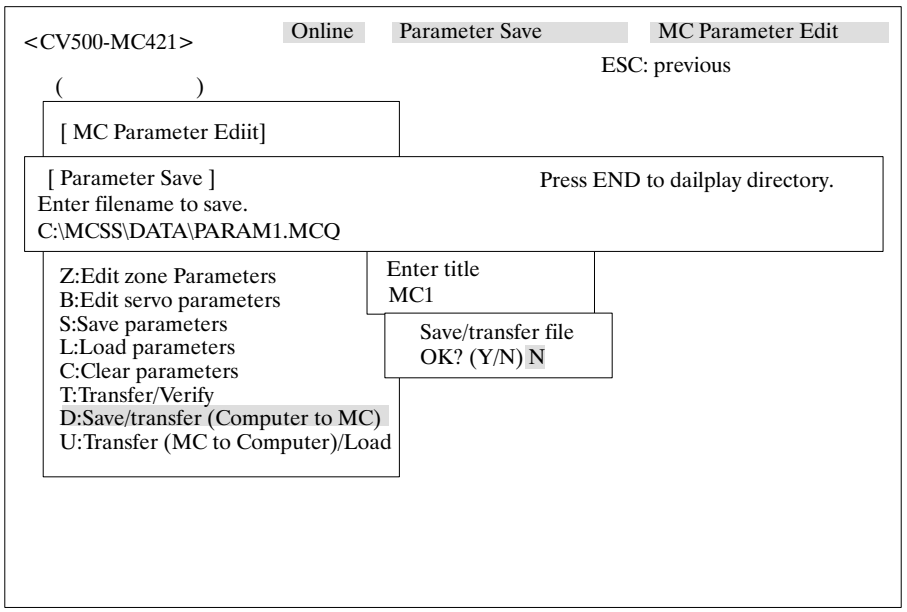


2. Input a file name. In this example, PARAM1 has been entered.

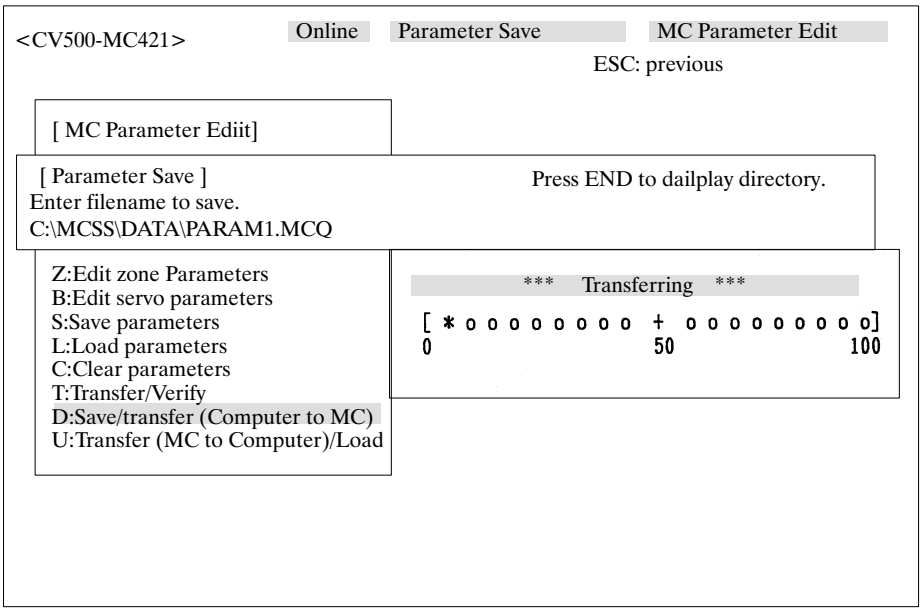
   The End Key can be pressed to display a list from which the name can be selected.



3. Input the title of the program. In this example, MC1 has been entered.



4. The above confirmation message will be displayed on the bottom of the screen. Press “Y” and Enter Key to execute Save/Transfer or press Enter Key to abort Save/Transfer. When Save/Transfer is executed, the program will be stored on the data disk and it will also be transferred to the MC Unit while the screen displays the progress of the transfer.



5. After the screen displays “Transfer completed,” press any key to return to the MC Parameter Edit screen.

11-6 Transfer (MC to Computer)/Load

For the following procedure, the parameters are transferred from the MC Unit to a data disk and then retrieved from the data disk to the computer.

Online Operations

This operation must be performed online. Make sure the computer is connected to the PC and the computer’s communications specifications are correct. Check

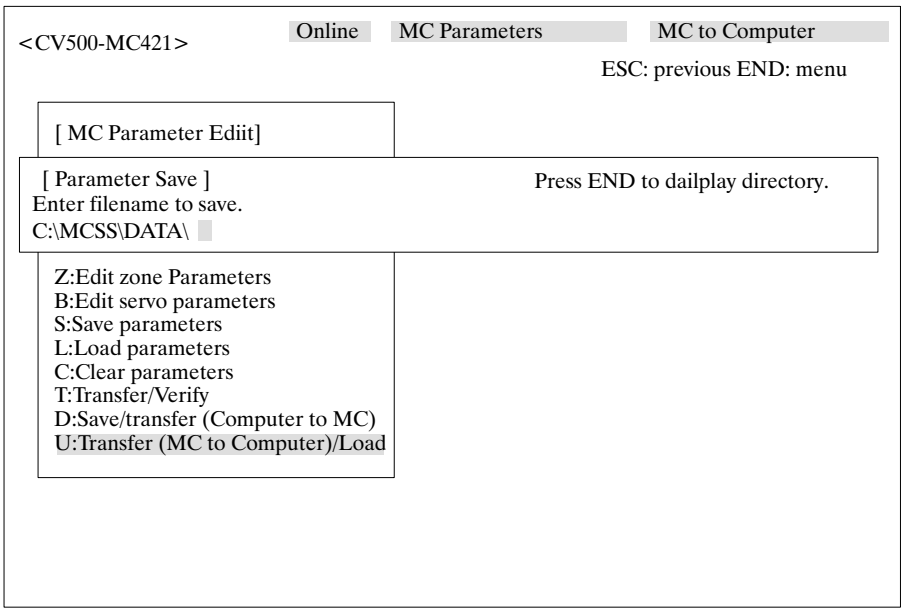
the MC model on the Setup Menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

Use the following procedure to transferred the parameters from the MC Unit to a data disk and then retrieve them from the data disk to the computer.

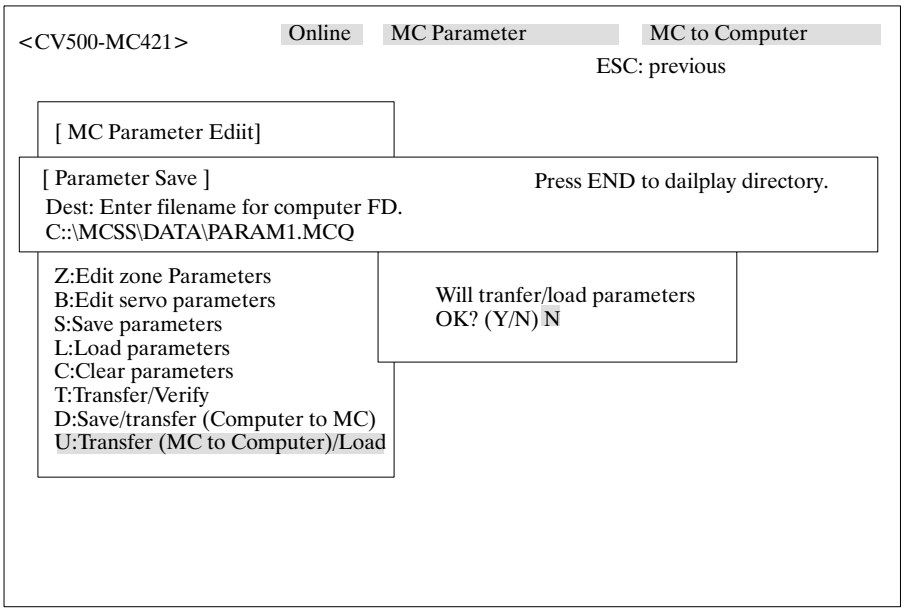
1, 2, 3...

1. Press “U” to select “U:Transfer (MC to computer)/Load” in the MC Parameter Edit Menu.

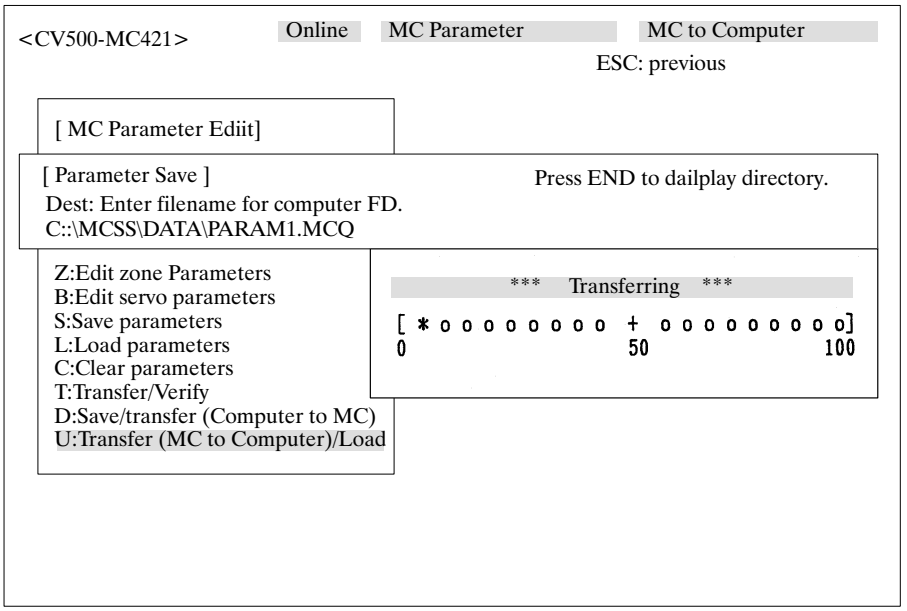


2. Input a file name for the destination. In this example, PARAM1 has been entered.

   The End Key can be pressed to display a list from which the name can be selected.



3. The above confirmation message will be displayed on the bottom of the screen. Press “Y” and Enter Key to execute Transfer (MC to computer)/Load or press Enter Key to abort Transfer (MC to computer)/load.



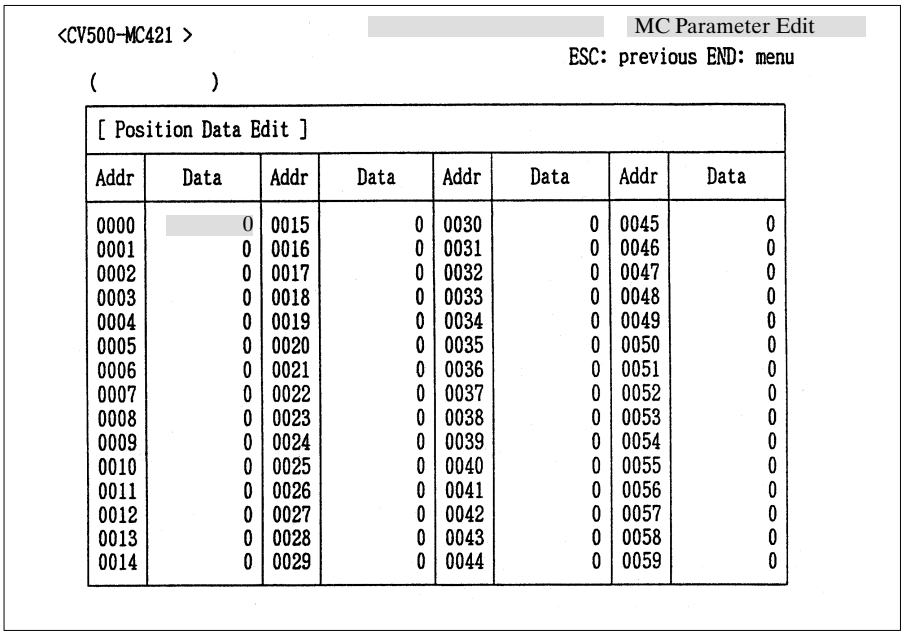
4. After the screen displays “Transfer completed,” press any key to return to the MC Parameter Edit screen.

SECTION 12
Editing Position Data

This section explains how to edit position data.

12-1 Position Data Edit Screen

When “D:Edit position data” is selected from the main menu, the following screen will be displayed.



<CV500-MC421 > MC Parameter Edit

ESC: previous END: menu

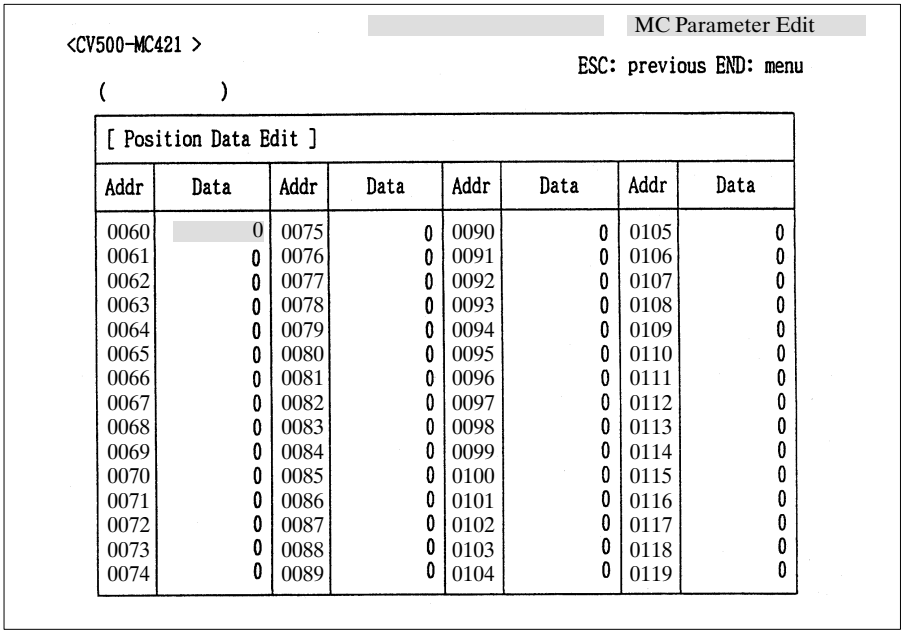
( )

[Position Data Edit]

Addr	Data	Addr	Data	Addr	Data	Addr	Data
0000	0	0015	0	0030	0	0045	0
0001	0	0016	0	0031	0	0046	0
0002	0	0017	0	0032	0	0047	0
0003	0	0018	0	0033	0	0048	0
0004	0	0019	0	0034	0	0049	0
0005	0	0020	0	0035	0	0050	0
0006	0	0021	0	0036	0	0051	0
0007	0	0022	0	0037	0	0052	0
0008	0	0023	0	0038	0	0053	0
0009	0	0024	0	0039	0	0054	0
0010	0	0025	0	0040	0	0055	0
0011	0	0026	0	0041	0	0056	0
0012	0	0027	0	0042	0	0057	0
0013	0	0028	0	0043	0	0058	0
0014	0	0029	0	0044	0	0059	0

Position data addresses are numbered from 0000 to 1999, for a total of 2,000 addresses. Up to 60 items can be displayed at one time on the screen.

To view the next screen, press the F2 Key or the PageDown Key. To return to the previous screen, press the F1 Key or the PageUp Key.



<CV500-MC421 > MC Parameter Edit

ESC: previous END: menu

( )

[Position Data Edit]

Addr	Data	Addr	Data	Addr	Data	Addr	Data
0060	0	0075	0	0090	0	0105	0
0061	0	0076	0	0091	0	0106	0
0062	0	0077	0	0092	0	0107	0
0063	0	0078	0	0093	0	0108	0
0064	0	0079	0	0094	0	0109	0
0065	0	0080	0	0095	0	0110	0
0066	0	0081	0	0096	0	0111	0
0067	0	0082	0	0097	0	0112	0
0068	0	0083	0	0098	0	0113	0
0069	0	0084	0	0099	0	0114	0
0070	0	0085	0	0100	0	0115	0
0071	0	0086	0	0101	0	0116	0
0072	0	0087	0	0102	0	0117	0
0073	0	0088	0	0103	0	0118	0
0074	0	0089	0	0104	0	0119	0

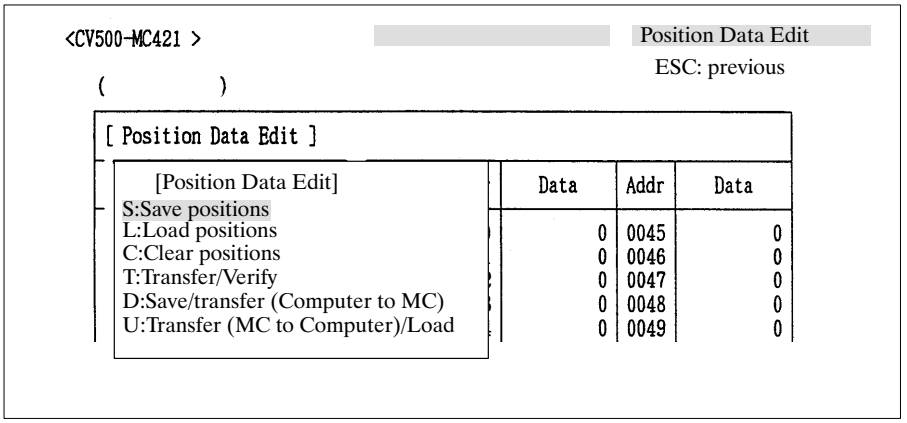
Use the Up, Down, Right, and Left Keys to move the cursor for entering position data.

For an explanation of how to set position data to be used for specific tasks, refer to *5-1 Editing Memory Parameters*.

The F3 Key can be used for displaying specified position data on the screen. (For details, refer to *2-2 Setting Position Data*.)

Menu Display

The following menu can be brought up by pressing the End Key while the Position Data Edit screen is being displayed.



The Position Data Edit menu contains the following functions.

Name	Function	Page
S:Save positions	Saves position data to data disk.	113
L:Load positions	Retrieves position data from data disk.	115
C:Clear positions	Clears specified range of position data to “0.”	115
T:Transfer/Verify	Transfers and verifies parameters between MC Unit and programming device.	116
D:Save/Transfer (Computer to MC)	Stores the created position data on a data disk and also transfers a copy of the created program to the MC Unit.	117
U:Transfer (MC to computer)/Load	Transfers position data from the MC Unit to a data disk and then retrieves the program from the data disk.	118

12-2 Setting Position Data

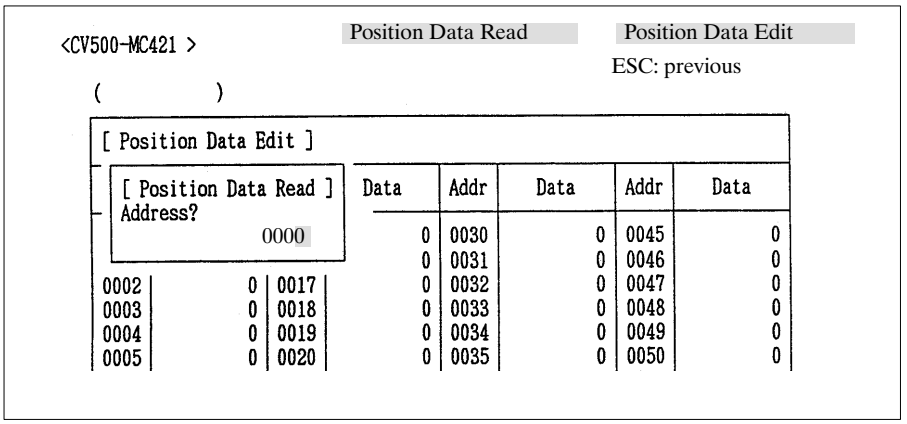
Position data can be displayed on the screen and edited. First display the data that is to be set or changed, and then enter the addresses.

Procedure 1

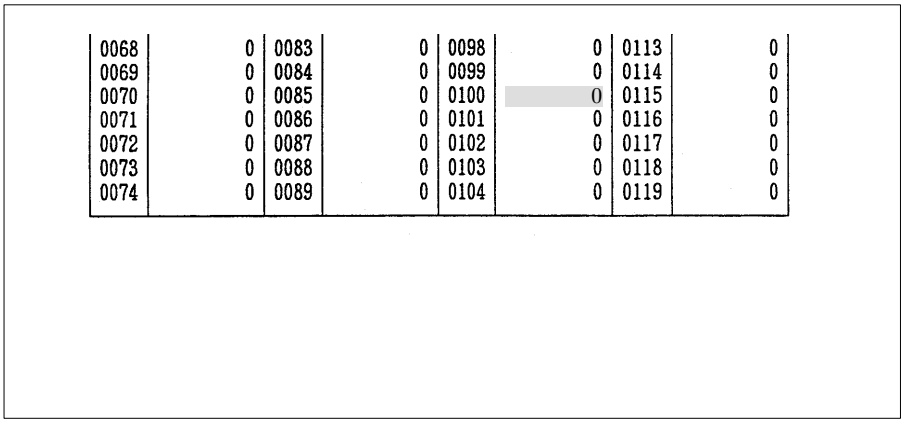
This example procedure shows how to set position data no. 100 to “180,000.”

1, 2, 3...

1. Press the F3 Key while the Position Data Edit screen is displayed.



2. Enter the position data address (“100” in this example).



0068	0	0083	0	0098	0	0113	0
0069	0	0084	0	0099	0	0114	0
0070	0	0085	0	0100	0	0115	0
0071	0	0086	0	0101	0	0116	0
0072	0	0087	0	0102	0	0117	0
0073	0	0088	0	0103	0	0118	0
0074	0	0089	0	0104	0	0119	0

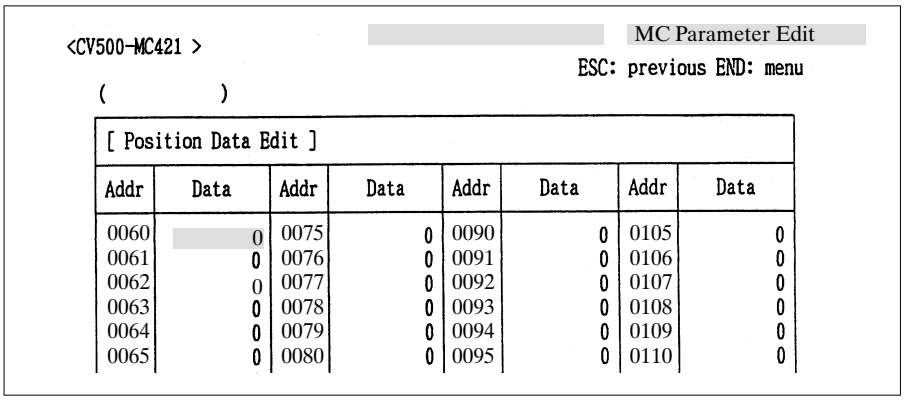
3. Enter “180000.”
4. Press the F1 Key to return to the initial screen.

Procedure 2

This example procedure shows how to set position data no. 62 to “250,000” and position data 92 to “–1,500,000.”

1, 2, 3...

1. Press the F2 Key while the Position Data Edit screen is displayed.



<CV500-MC421 >

MC Parameter Edit

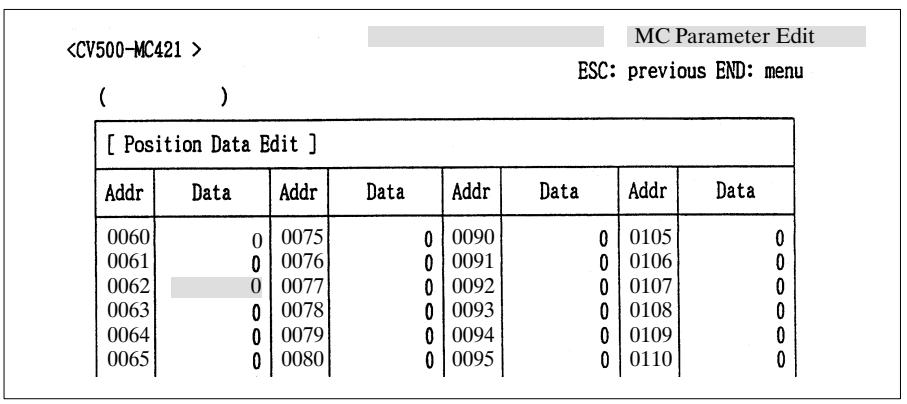
ESC: previous END: menu

( )

[Position Data Edit]

Addr	Data	Addr	Data	Addr	Data	Addr	Data
0060	0	0075	0	0090	0	0105	0
0061	0	0076	0	0091	0	0106	0
0062	0	0077	0	0092	0	0107	0
0063	0	0078	0	0093	0	0108	0
0064	0	0079	0	0094	0	0109	0
0065	0	0080	0	0095	0	0110	0

2. Press the Down Key twice to move the cursor to position address 0062.



<CV500-MC421 >

MC Parameter Edit

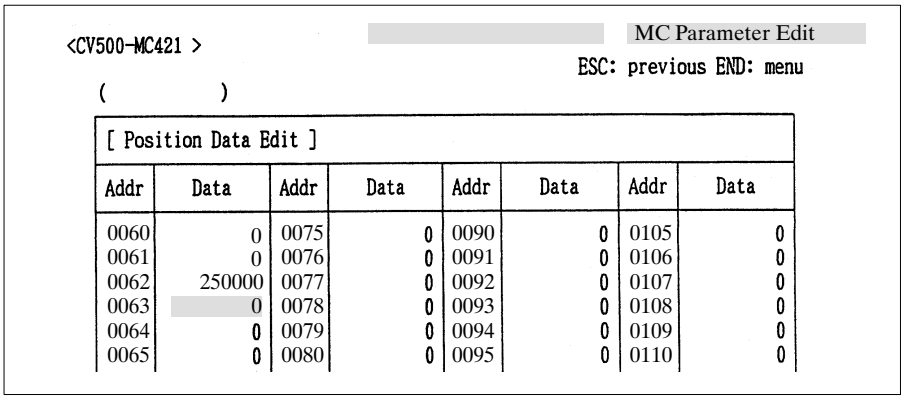
ESC: previous END: menu

( )

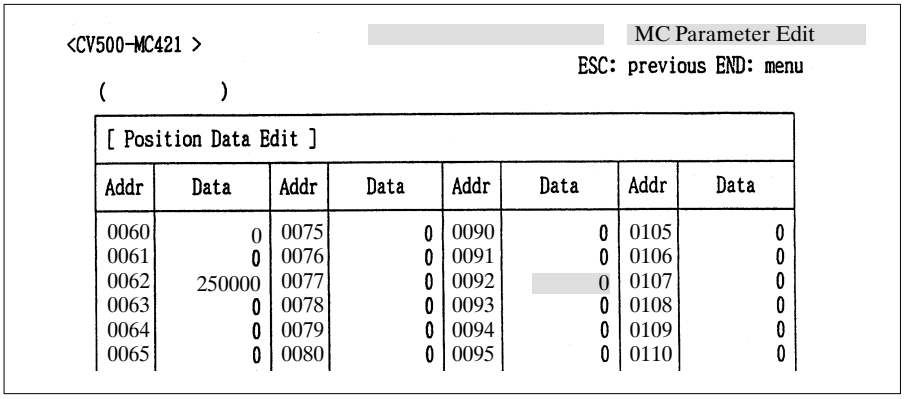
[Position Data Edit]

Addr	Data	Addr	Data	Addr	Data	Addr	Data
0060	0	0075	0	0090	0	0105	0
0061	0	0076	0	0091	0	0106	0
0062	0	0077	0	0092	0	0107	0
0063	0	0078	0	0093	0	0108	0
0064	0	0079	0	0094	0	0109	0
0065	0	0080	0	0095	0	0110	0

3. Enter “250000.”



4. Press the Right Key twice and the Up Key once to move the cursor to position data address 0092.



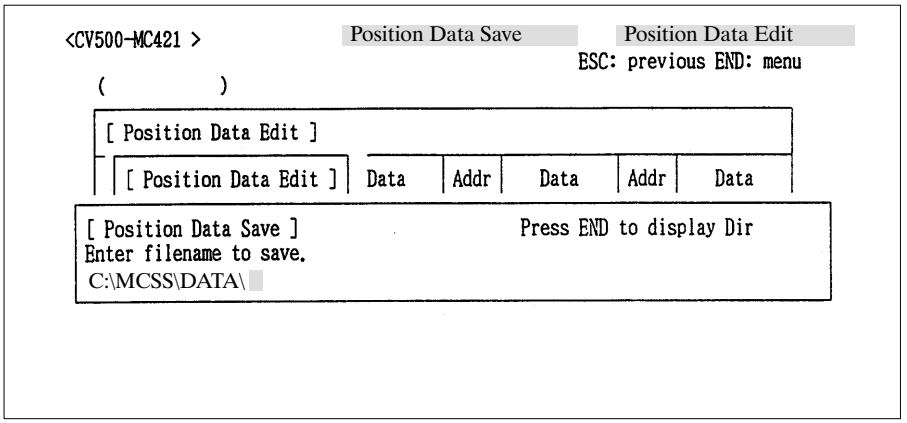
5. Enter “–1500000.”

12-3 Saving Position Data

This section explains how to save position data to a data disk. A filename can consist of up to eight characters. Up to 74 characters can be specified from a directory. Titles must be within 30 characters.

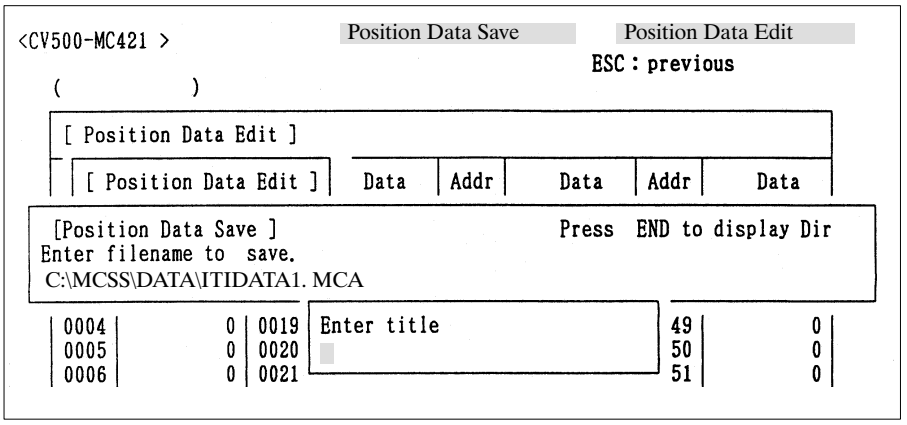
Procedure

1, 2, 3... 1. Select “S:Save parameters” from the Position Data Edit menu.

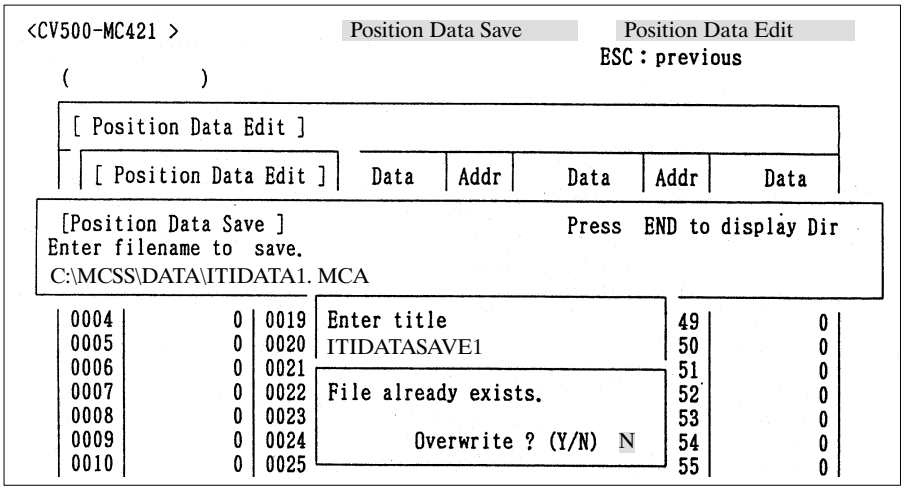


2. Enter the filename (“ITIDATA1” for example) and press the Return Key. (It is also possible to press the End Key to display a list of files and select the desired file.)

Note For a more detailed explanation of how to select files from a list, refer to *3-2 Entering Filenames*.



3. Enter the title (“ITIDATASAVE1” for example) and press the Return Key. If the same filename already exists, a message will be displayed for confirmation. To overwrite the existing file, enter “Y” and press the Return Key. To cancel the operation, press the Return Key.

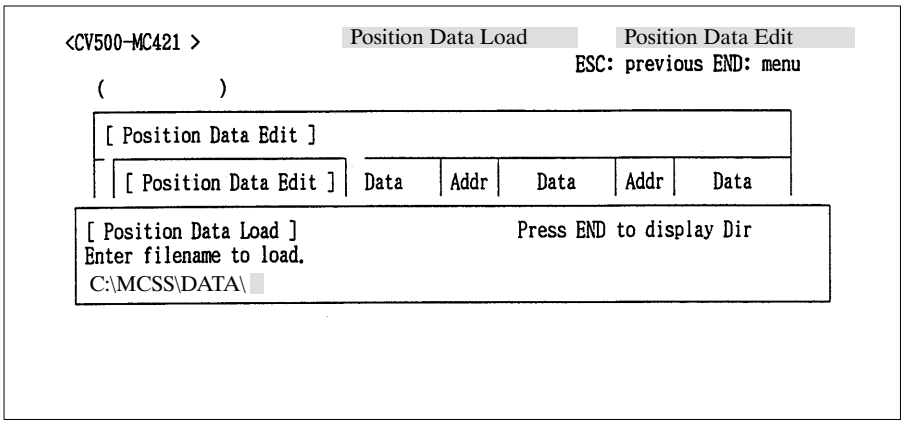


12-4 Retrieving Position Data

This section explains how to retrieve position data from a data disk after it has been saved.

Procedure

1, 2, 3... 1. Select “L:Load parameters” from the Position Data Edit menu.



2. Enter the filename (“ITIDATA1” for example) and press the Return Key. (It is also possible to press the End Key to display a list of files and select the desired file.)

Note For a more detailed explanation of how to select files from a list, refer to *3-2 Entering Filenames*.

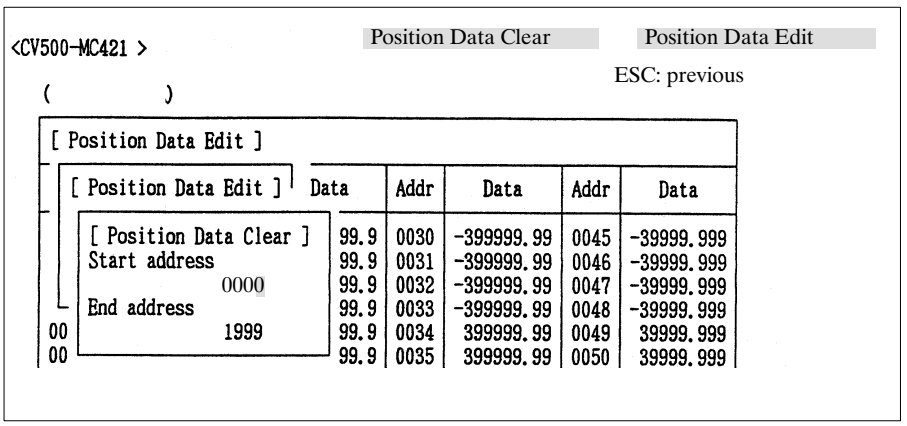
12-5 Clearing Position Data

This section explains how to clear parameters that have been saved. The operation described here clears a specified range of parameters to “0.”

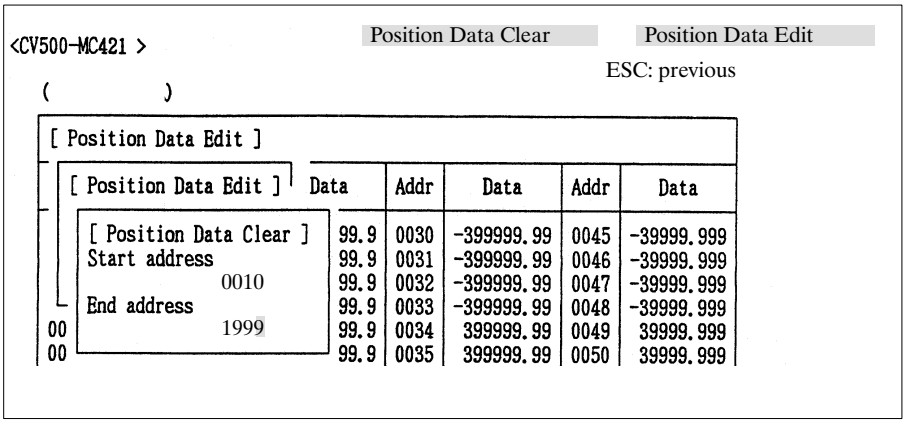
Procedure

This example procedure clears position data addresses 10 through 40 to “0.”

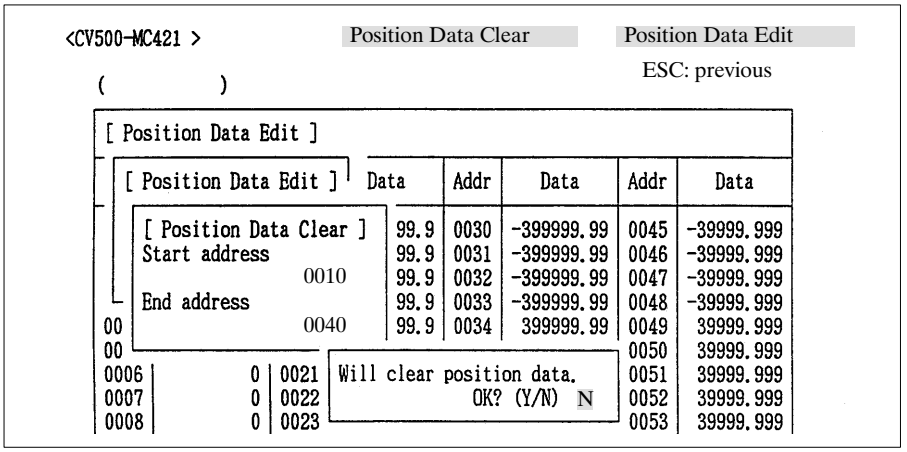
1, 2, 3... 1. Select “C:Clear positions” from the Position Data Edit menu. Enter the starting address of the position data range that is to be cleared (“10” in this example).



2. Enter the ending address of the position data range that is to be cleared (“40” in this example).



3. A message will be displayed asking for confirmation. To clear the range of position data, enter “Y” and press the Return Key. To cancel the operation, press the Return Key.



12-6 Transferring and Verifying Position Data

This section explains how to transfer position data between the MC Unit and the programming device, and how to verify that data. Position data is transferred and compared between the MC Unit and computer. The C200H-MC221 allows position data to be written to its flash memory.

This operation must be carried out in online mode.

Procedure

1, 2, 3...

1. Check to be sure that both the programming device and the Programmable Controller or MC Unit are connected.
2. Check the MC model on the Setup Menu and make sure that the designated MC model coincides with the model of MC Unit in use.
3. Set the communications specifications and format in the System Setup to match those of the programming device that is to be used. (For information regarding communications specifications and formats, refer to *Section 17 System Setup*.)
4. Select “T:Transfer/Verify” from the MC Parameter Edit menu. (The procedure from this point on is the same as that which is explained in *Section 14 Transferring and Verifying Data*.)

12-7 Save/Transfer (Computer to MC)

For the following procedure, position data created on the computer is stored on a data disk and then transferred to the MC Unit.

Note Be sure to confirm that the created program, parameters, and position data are correct.

⚠ Caution Before transferring the program, parameters, or position data to another node, be sure to confirm the safety conditions at the destination node. Otherwise, an injury may occur.

Online Operations

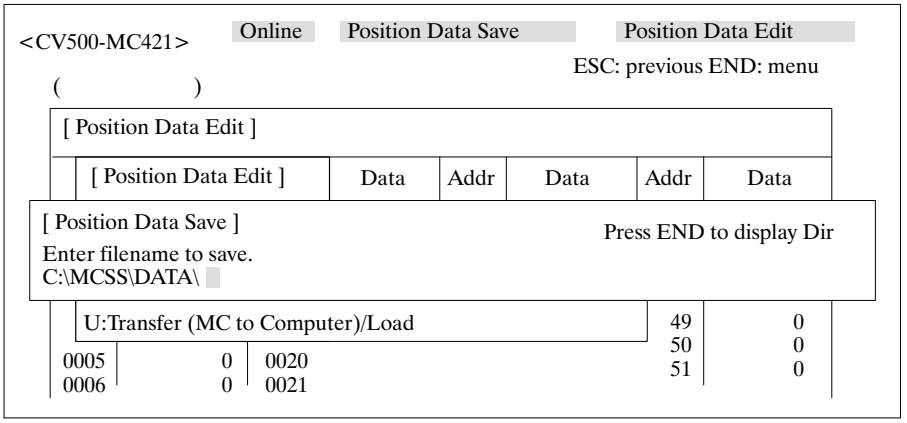
This operation must be performed online. Make sure the computer is connected to the PC or the MC Unit and the computer's communications specifications are correct. Check the MC model on the Setup Menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

Use the following procedure to store position data created on the computer to a data disk and then transfer it to the MC Unit.

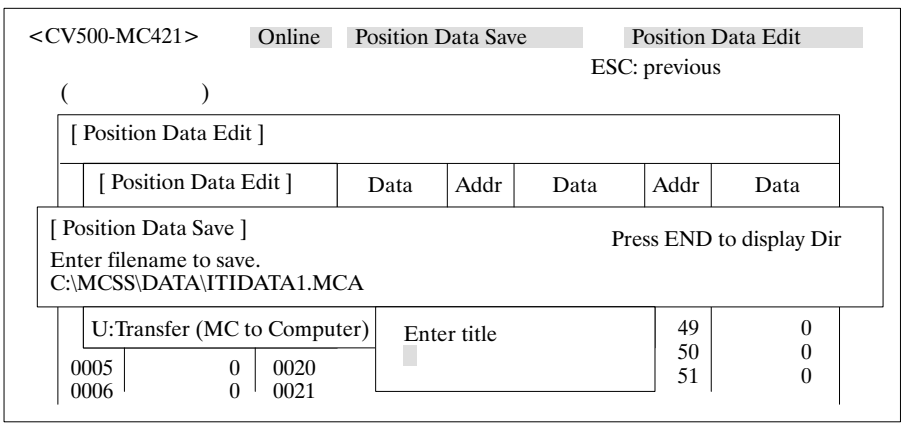
1, 2, 3...

1. Press "D" to select "D:Save/Transfer (Computer to MC)" in the Position Data Edit Menu.

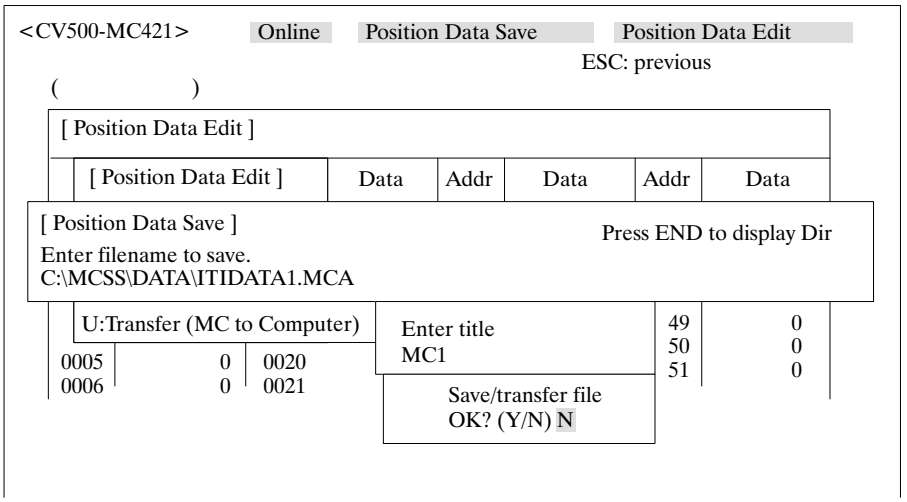


2. Input a file name. In this example, ITIDATA1 has been entered.

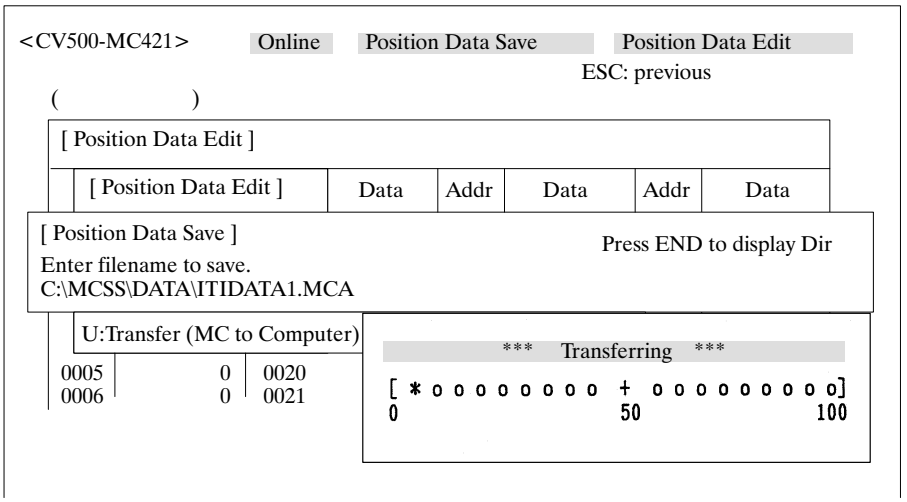
   The End Key can be pressed to display a list from which the name can be selected.



3. Input the title of the program. In this example, MC1 has been entered.



4. The above confirmation message will be displayed on the bottom of the screen. Press “Y” and Enter Key to execute Save/Transfer or press Enter Key to abort Save/Transfer. When Save/Transfer is executed, the position data will be stored on the data disk and will be transferred to the MC Unit while the screen displays the progress of the transfer.



5. After the screen displays “Transfer completed,” press any key to return to the Position Data Edit screen.

12-8 Transfer (MC to Computer)/Load

For the following procedure, position data is transferred from the MC Unit to a data disk and then retrieved from the data disk to the computer.

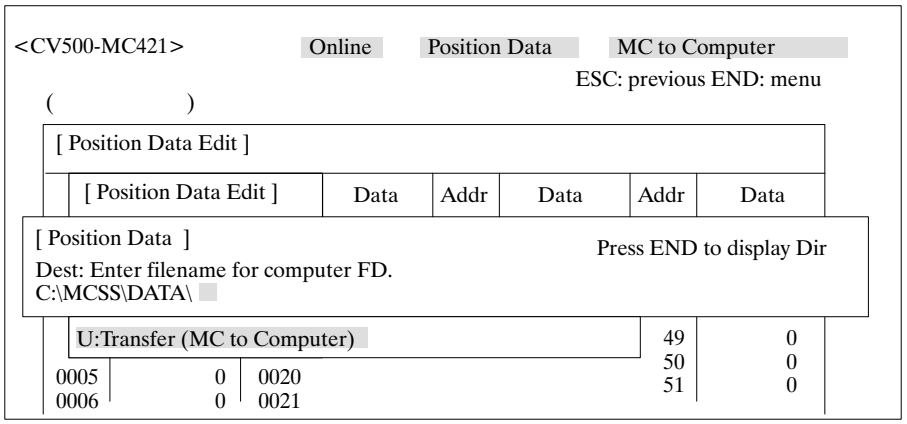
Online Operations

This operation must be performed online. Be sure the computer is connected to the PC and the computer’s communications specifications are correct. Check the MC model on the Setup Menu and make sure that the designated MC model coincides with the model of MC Unit in use. Refer to *17-3 Communications Format* for details.

Procedure

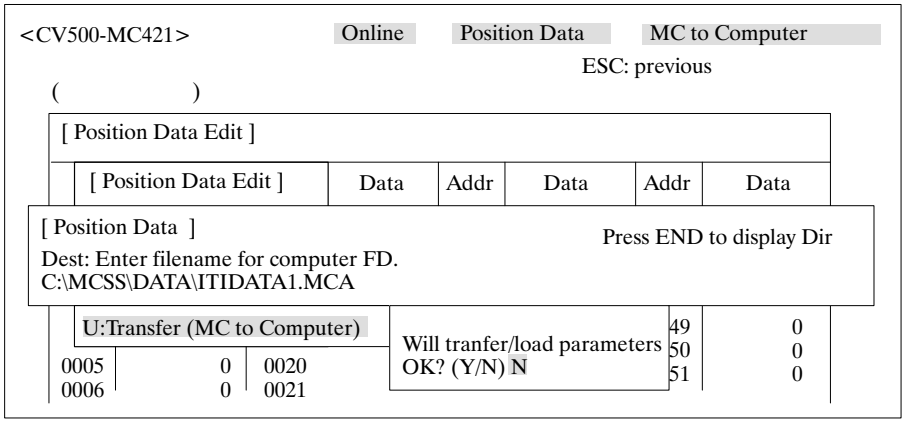
Use the following procedure to transfer the position data from the MC Unit to a data disk and then retrieve it from the data disk to the computer.

1, 2, 3... 1. Press “U” to select “U:Transfer (MC to computer)/Load” in the Position Data Edit Menu.

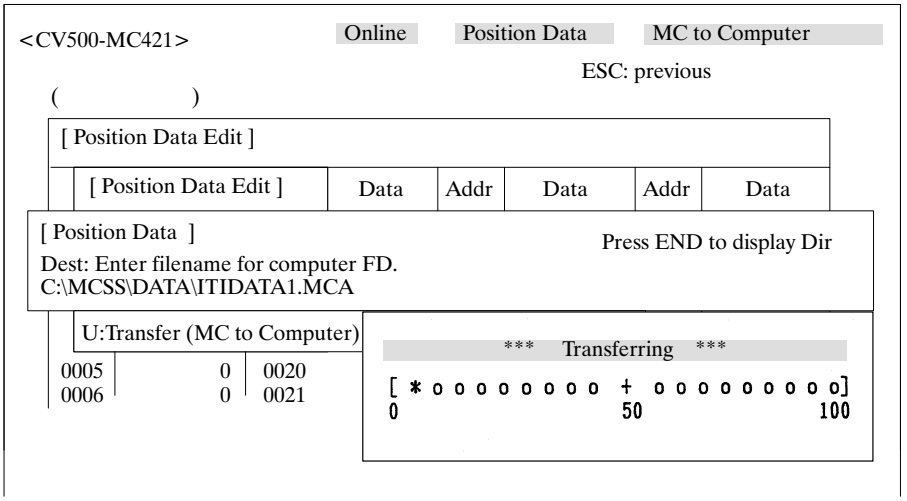


2. Input a file name for the destination. In this example, ITIDATA1 has been entered.

   The End Key can be pressed to display a list from which the name can be selected.



3. The above confirmation message will be displayed on the bottom of the screen. Press Enter Key to execute Transfer (MC to computer)/Load or press “N” and Enter Key to abort Transfer (MC to computer)/load. When Transfer (MC to computer)/Load is executed, the position data will be transferred to the data disk and read by the computer.



4. After the screen displays “Transfer completed,” press any key to return to the Position Data Edit screen.

SECTION 13
MC Monitoring

This section explains how to display MC Unit operating conditions at the programming device (i.e., on the computer screen).

13-1 Preliminaries

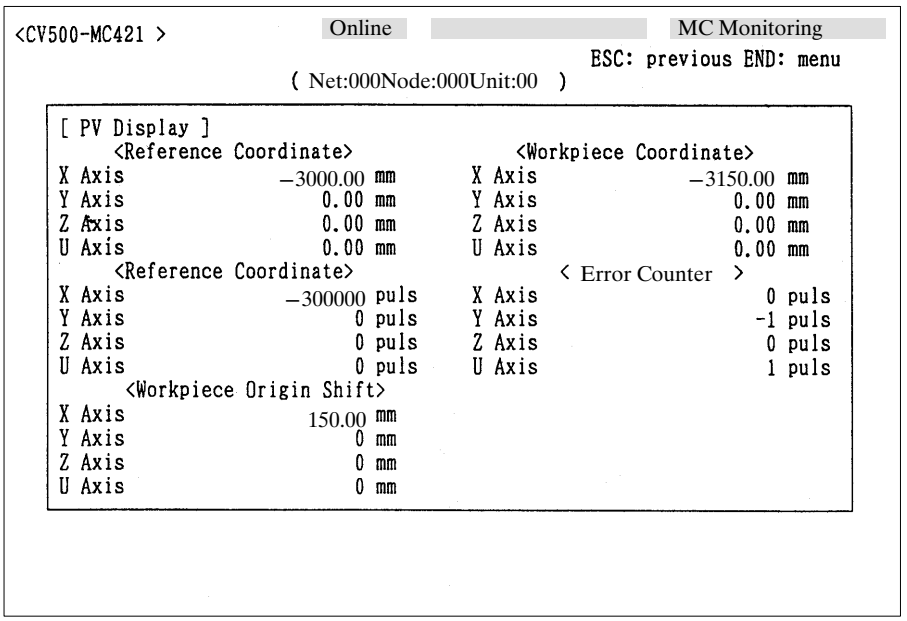
Monitoring operations must be executed in the online mode. First check to be sure that the programming device (i.e., the personal computer) and the Programmable Controller are connected. Then set the communications format and specifications in the System Setup so that they match those of the programming device. Also check the MC model on the Setup Menu and be sure it coincides with the MC Unit actually in use.

For an explanation of how to set the communications format and specifications, refer to *Section 17 System Setup*.

13-2 MC Monitoring Screen

When “M:MC monitoring” is selected from the main menu, the following screen will be displayed.

Screen Example for the CV500-MC421



The present values of the MC Unit specified by the destination network address in the System Setup are displayed on the screen. The following present values are displayed:

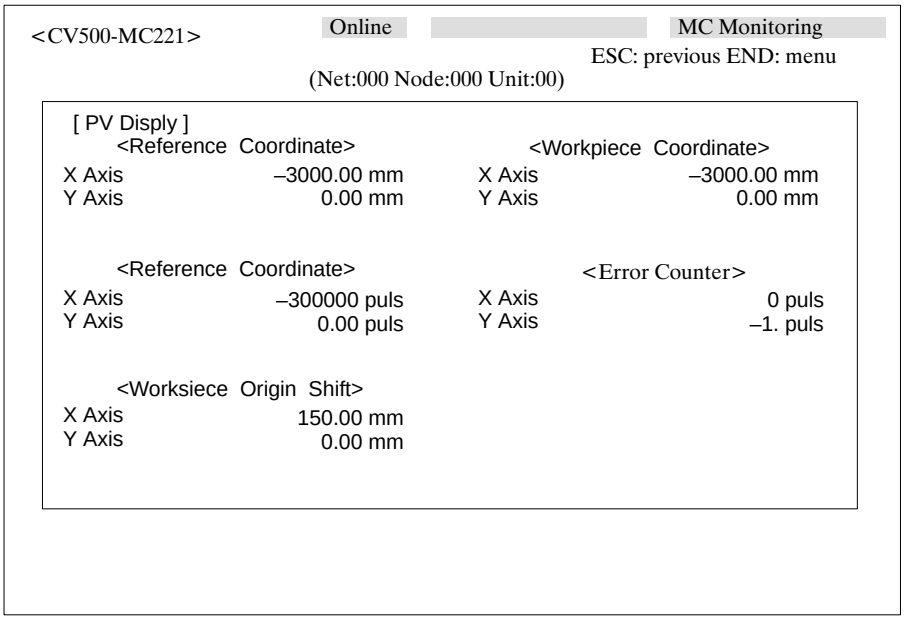
- Reference coordinate system present values (user-set display units and pulses)
- Workpiece origin shift amount
- Workpiece coordinate system present values
- Error counter values

The network address is displayed at the top of the screen.

The destination network address can be changed using the MC Monitoring menu. For details, refer to *2-7 Setting the Destination Network Address*.

Screen Example for the CV500-MC221

Axes Z and U will not be displayed because only axes X and Y are available.

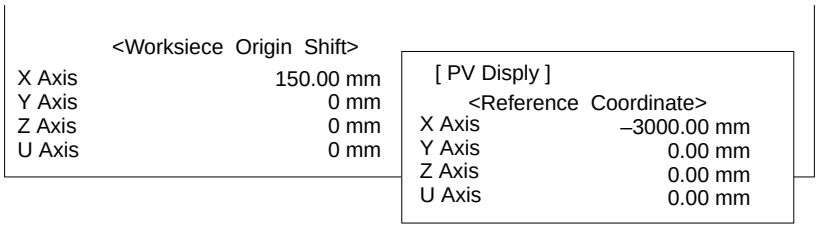


C200H-MC221

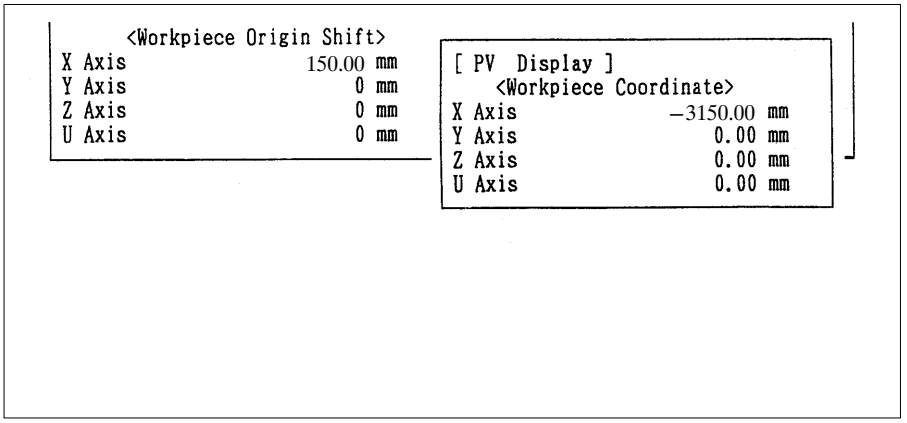
Axes Z and U will not be displayed because only axes X and Y are available. No network address will be displayed.

Pressing the F1 Key successively displays the following items in the lower right-hand corner of the screen.

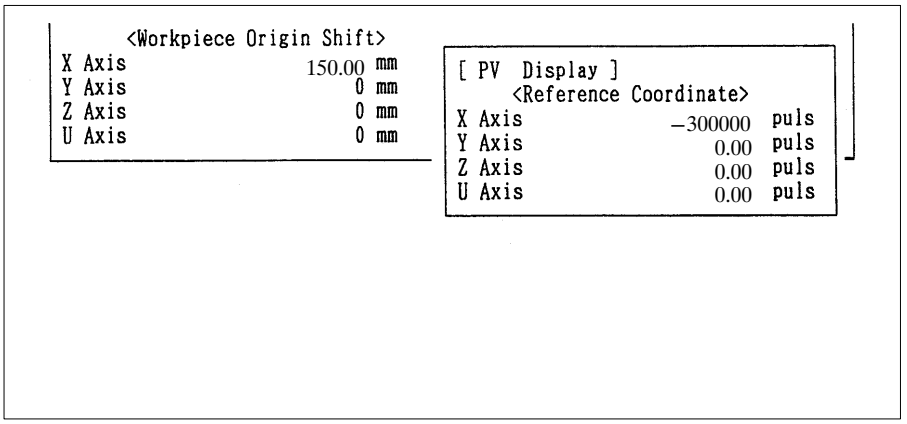
The following are screens of the CV500-MC421. Axis Z or U will not be displayed on the screen of the CV500-MC221 or C200H-MC221.



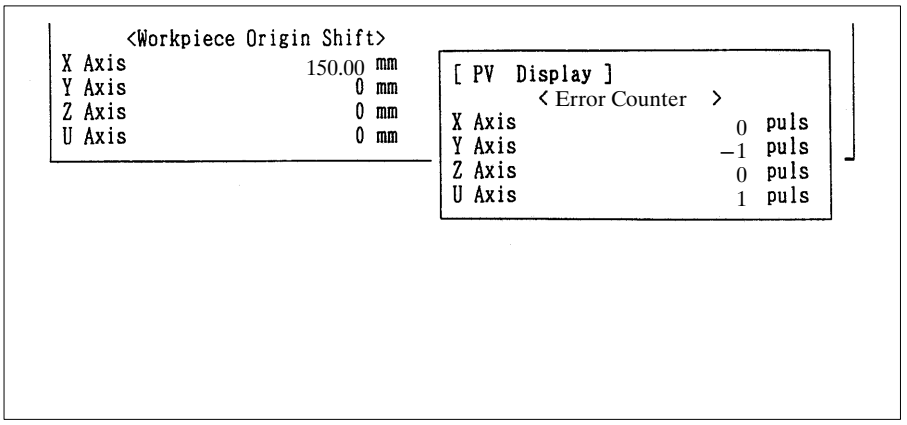
(Press the F1 Key.)



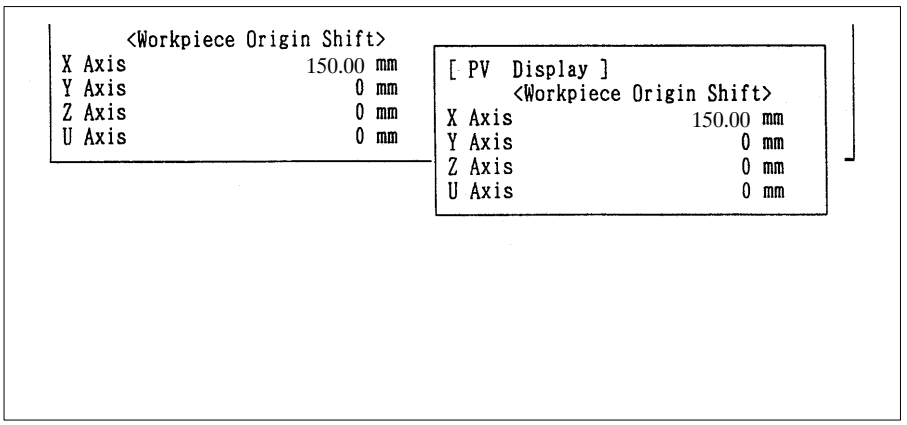
(Press the F1 Key.)



(Press the F1 Key.)



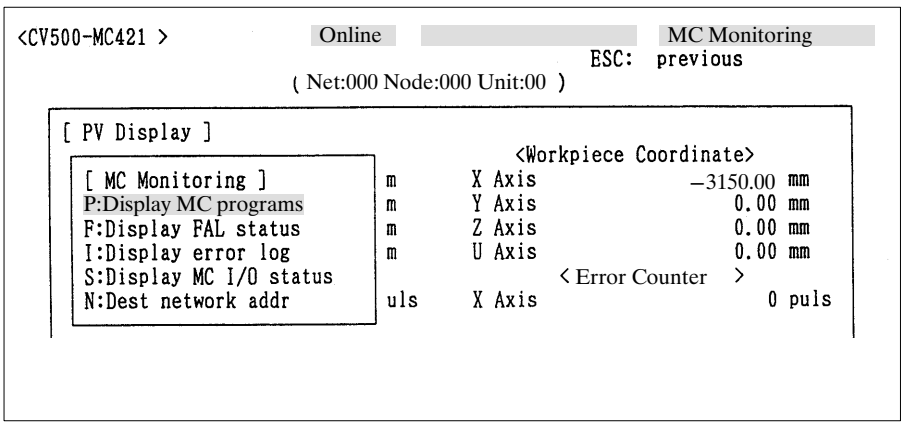
(Press the F1 Key.)



Menu Display

Screen Example for the CV500-MC421 and CV500-MC221

The following menu can be brought up by pressing the End Key while the MC Monitoring screen is displayed.



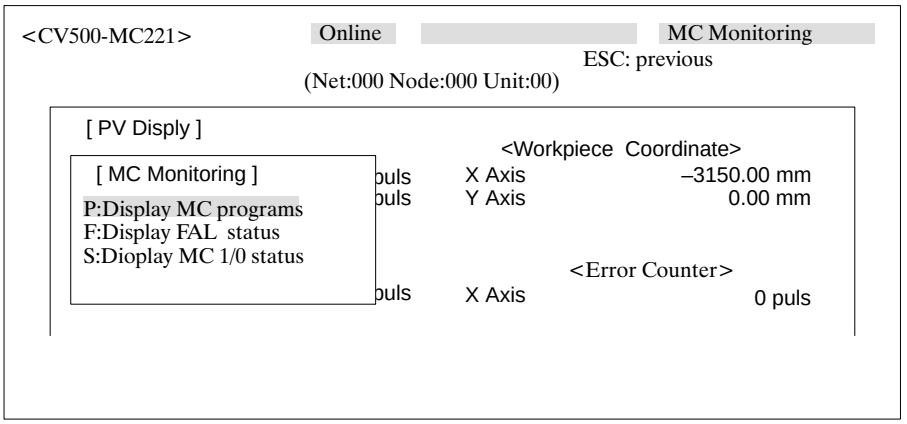
The MC Monitoring menu contains the following functions.

Name	Function	Page
P:Display MC programs	Displays MC currently executing programs separately for each task.	126
F:Display FAL status	Displays MC Unit, task, and axis FAL status.	128
I:Display error log	Displays the error log.	130

Name	Function	Page
S:Display MC I/O status	Displays MC input and output status separately.	130
N:Destination network address	Sets the network address of the MC Unit for which the present values are to be displayed.	133

Screen Example for the C200H-MC221

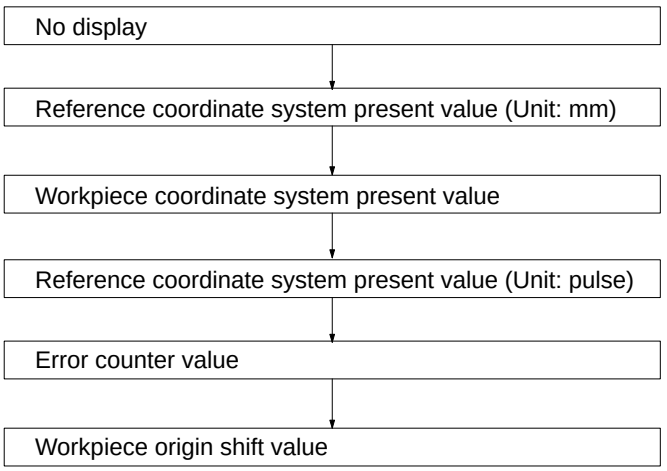
There is no error log display or destination network address setting menu. The following screen will be displayed.



13-3 Displaying Programs

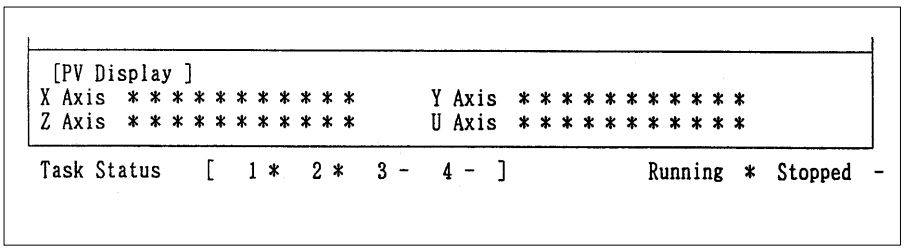
MC programs can be displayed separately task by task. The block currently being executed is highlighted in reverse video.

The present value display at the bottom of the screen changes as follows as the F1 Key is pressed.



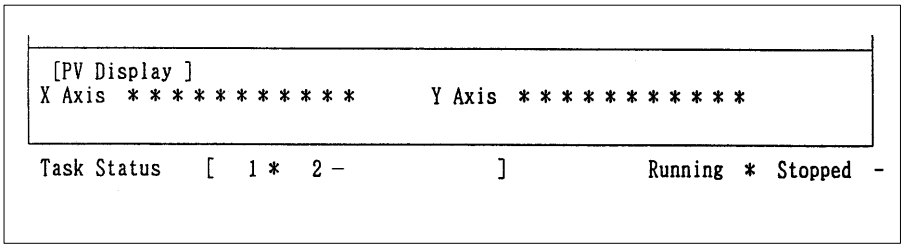
The order of display is the same as with the MC Monitoring screen.

Screen Example for the CV500-MC421



Screen Example for the CV500-MC221 and C200H-MC221

The following screen will be displayed because only tasks 1 and 2 and axes X and Y are available.

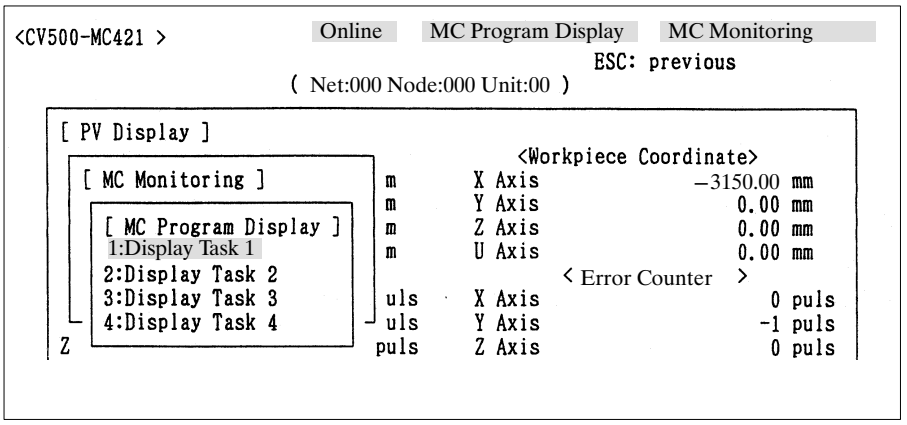


Procedure

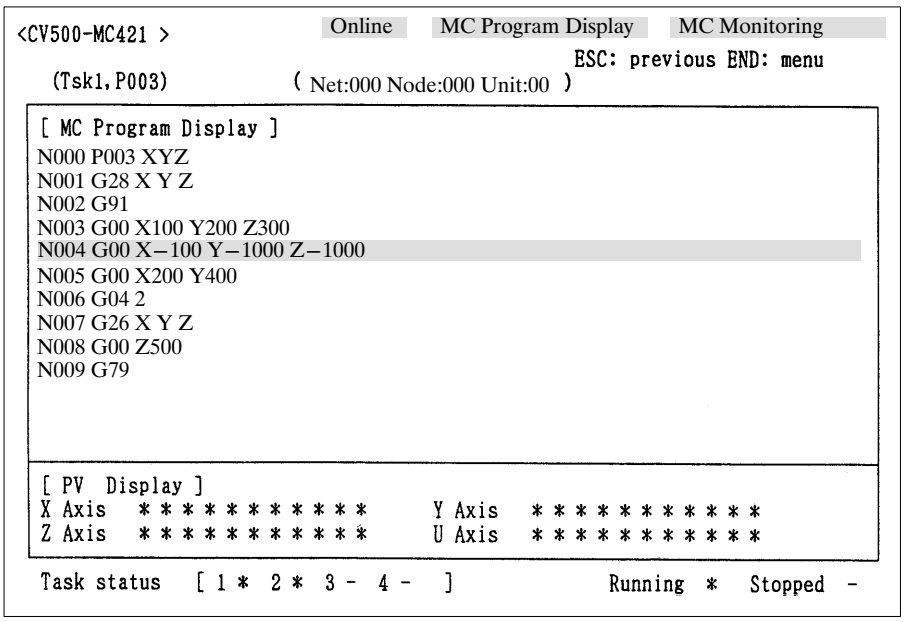
This example procedure displays the program being executed for task 1 for the CV500-MC421.

1, 2, 3...

1. Select “P:Display MC programs” from the MC Monitoring menu.



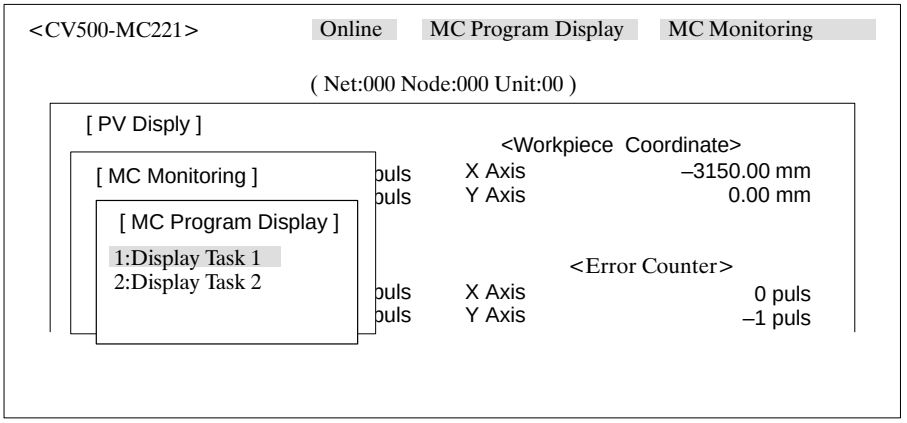
2. Select “1:Display Task 1” from the MC Monitoring menu. The program currently being executed will be displayed, and the block currently being executed will highlighted.



The tasks that are being carried out are marked by asterisks.

Screen Example for the CV500-MC221 and C200H-MC221

The following MC Program Menu will be displayed because only tasks 1 and 2 are available. Refer to the operating procedure for the CV500-MC421.



13-4 Displaying FAL Status

MC Unit FAL, task FAL, and axis FAL status can be displayed by reading the various tasks from the MC Unit and displaying messages corresponding to those tasks. If there are no errors, nothing will be displayed on the screen.

CV500-MC421 and CV500-MC221

MC Unit FAL

MC Unit FAL information is read from word m+45 (system error codes) and messages corresponding to those codes are displayed. (For details regarding word allocations, refer to *6-5 DM Word Usage* in the *MC Unit Operation Manual: Details*.)

Task FAL

Task FAL information is read from words m+46 through m+49 (task error codes) and messages corresponding to those codes are displayed. Only tasks 1 and 2 are available for the CV500-MC221.

m+46: Task 1 error codes

m+47: Task 2 error codes

m+48: Task 3 error codes

m+49: Task 4 error codes

Axis FAL

Axis FAL information is read from words m+50 through m+53 (axis error codes) and messages corresponding to those codes are displayed. Only axis X and Y are available for the CV500-MC221.

m+50: Axis X error codes

m+51: Axis Y error codes

m+52: Axis Z error codes

m+53: Axis U error codes

"m" is determined by the following formula:

m = 2,000 + Unit No. x 100

Note For an explanation of how to set the Unit number, refer to *1-3 Setting the Unit Number* in the *MC Unit Operation Manual: Details*.

C200H-MC221

MC Unit FAL

MC Unit FAL information is read from word m+12 (system error codes) and messages corresponding to those codes are displayed. (For details regarding word allocations, refer to *6-5 DM Word Usage* in the *MC Unit Operation Manual: Details*.)

Task FAL

Task FAL information is read from words m+13 through m+14 (task error codes) and messages corresponding to those codes are displayed.

m+13: Task 1 error codes

m+14: Task 2 error codes

Axis FAL

Axis FAL information is read from words m+15 through m+16 (axis error codes) and messages corresponding to those codes are displayed.

m+15: Axis X error codes

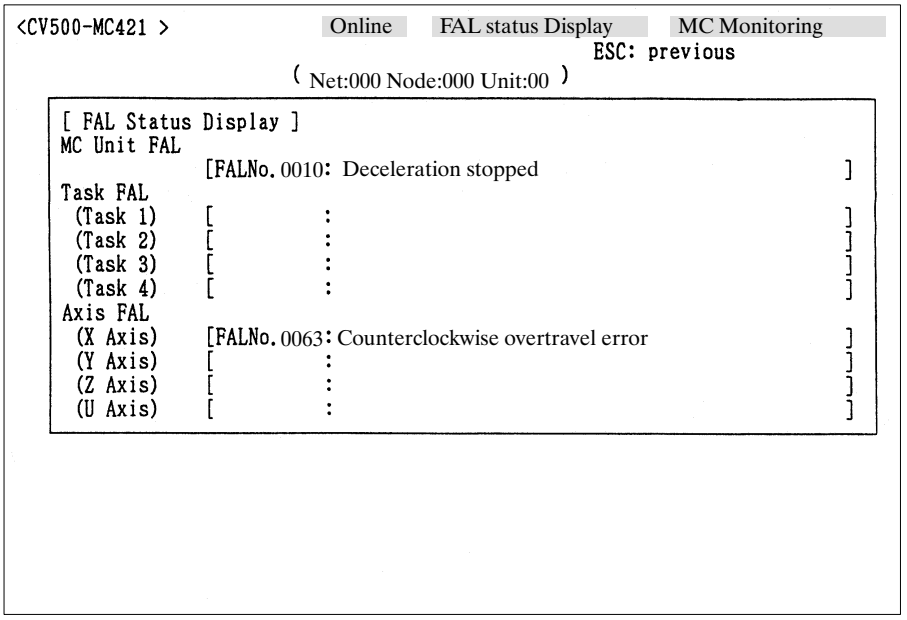
m+16: Axis Y error codes

m = First address of expansion data area defined by default area

Note For an explanation of how to set the Unit number, refer to *1-3 Setting the Unit Number* in the *MC Unit Operation Manual: Details*.

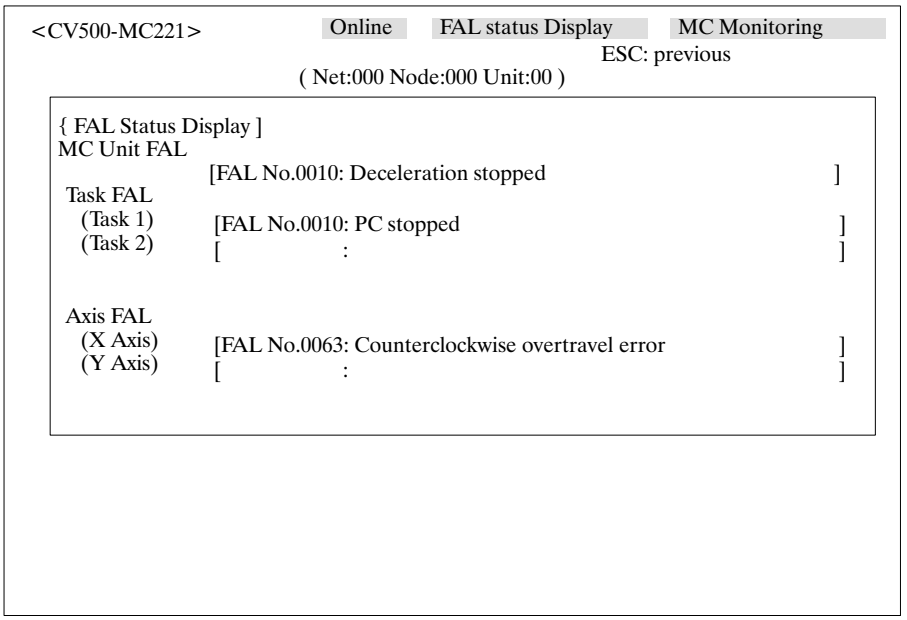
Procedure

To display the FAL status, select “F:Display FAL status” from the MC Monitoring menu. The following display is for the CV500-MC421.



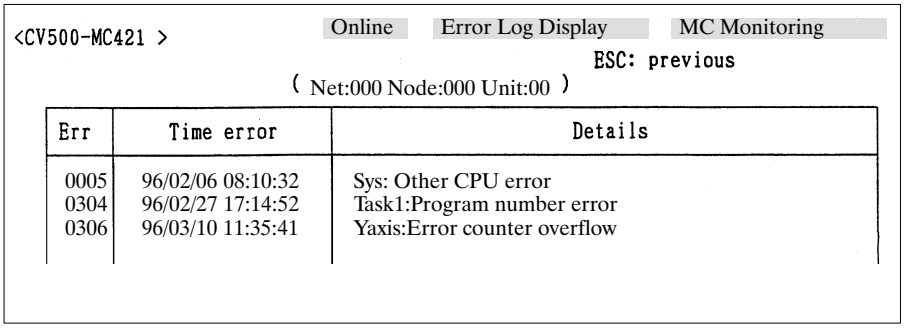
Screen Example for the CV500-MC221 and C200H-MC221

No error codes and messages for the error codes for task 3 or 4 or axis Z or U are displayed.



13-5 Displaying Error Logs

To display the error log, select “I:Display error log” from the MC Monitoring menu. This function is not supported for the C200H-MC221.



Up to 16 items can be displayed on the screen at one time. Any items that cannot fit on the screen will be displayed on the following screen. Press the PageDown Key to scroll to the next screen. Press the PageUp Key to return to the previous screen.

Press the F3 Key to clear the error log.

13-6 Displaying MC I/O Status

MC input and output status can be displayed separately on the screen. “MC I/O status” means the current operations and operating conditions of the MC Unit.

CV500-MC421 and CV500-MC221

Among the bits allocated to the interface area, the ones shown in the following table are used for MC I/O status by the MCSS and are displayed on the screen.

For details regarding word allocations, refer to *6-2 Allocation of the PC Data Interface* in the *MC Unit Operation Manual: Details*. For details regarding individual bits, refer to *6-4 Interface Bits* and *6-5 DM Word Usage* in the *MC Unit Operation Manual: Details*.

Unit-related Status

Signal name	Word	Bit
General-purpose input 1	n+12	0
General-purpose input 2		1
General-purpose input 3		2
General-purpose input 4		3
General-purpose output 1		4
General-purpose output 2		5
General-purpose output 3		6
General-purpose output 4		7

Task-related Status (CV500-MC221: Only tasks 1 and 2 are supported.)

Signal name	Word				Bit
	Task 1	Task 2	Task 3	Task 4	
Memory operating	n+13	n+14	n+15	n+16	4
Memory operation completed					5

Axis-related Status (CV500-MC221: Only axes X and Y are supported.)

Signal name	Word				Bit
	X axis	Y axis	Z axis	U axis	
CCW limit input	n+18	n+20	n+22	n+24	8
CW limit input					9
Origin proximity input					10
Emergency stop input					11
Driver alarm input					12
Operation command input					13
Driver alarm reset output					14
Sensor-on output					15

"n" (the I/O address) is determined by the following formula:

n = 1,500 + Unit No. x 25

Note For an explanation of how to set the Unit number, refer to *1-3 Setting the Unit Number* in the *MC Unit Operation Manual: Details*.

C200H-MC221

The following items will be displayed on screen. All the following items will not be allocated as bits in the interface area.

Unit-related Status

Signal name	Word	Bit
General-purpose input 1	Not allocated in the interface area.	
General-purpose input 2		

Task-related Status

Signal name	Word		Bit
	Task 1	Task 2	
Memory operating	n+11	n+13	4
Memory operation completed			5

Axis-related Status

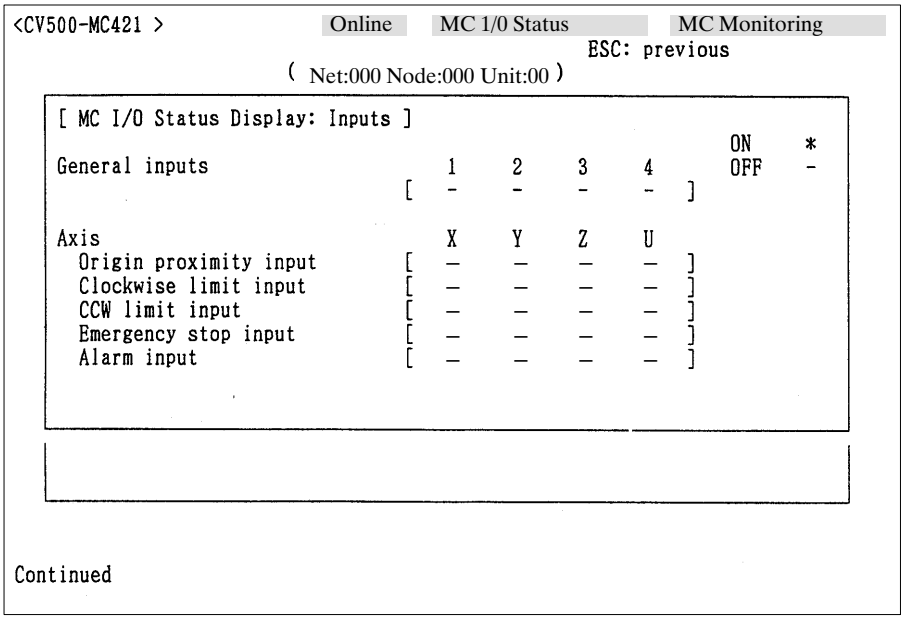
Signal name	Word		Bit
	X axis	Y axis	
Driver alarm input	n+16	n+19	7
CCW limit input	Not allocated in the interface area.		
CW limit input			
Origin proximity input			
Emergency stop input			
Operation command input			
Driver alarm reset output			
Sensor-on output			

The address (n) of the Special I/O Unit area can be obtained from the following equation:

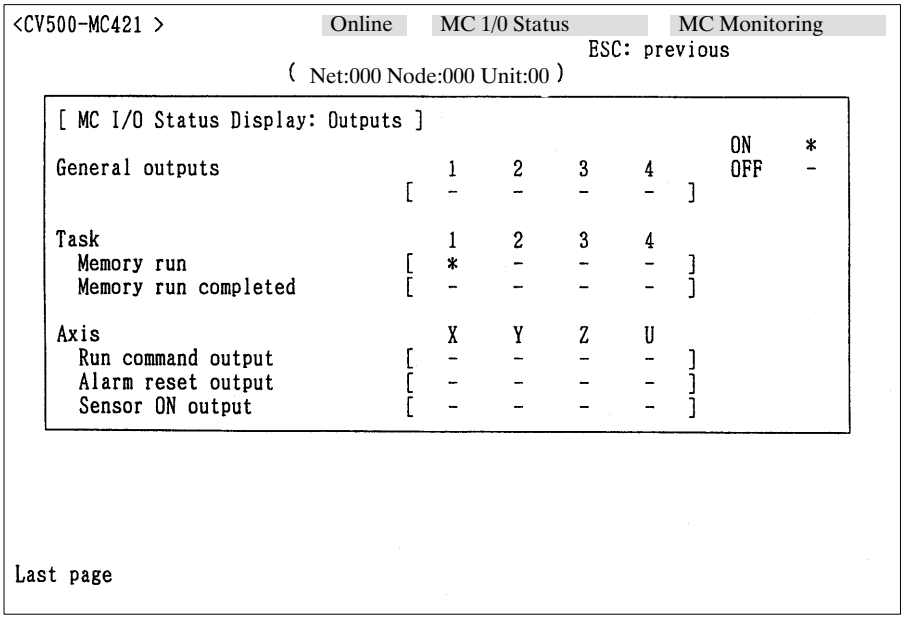
n = 100 + unit no. x 20

Procedure

To display the MC I/O status, select “S:Display MC I/O status” from the MC Monitoring menu. The input status will be displayed first. The following displays are for the CV500-MC421.



Press either the F2 Key or the PageDown Key to display the MC output status.



Press either the F1 Key or the PageUp Key to return to the MC input status.

CV500-MC221
Tasks 3 and 4, and axis Z and U are not displayed.

C200H-MC221
Tasks 3 and 4, axes Z and U, and general-purpose outputs are not be displayed. Only general-purpose inputs 1 and 2 will be displayed.

13-7 Setting the Destination Network Address

The destination network address must be specified in order to monitor an MC Unit or to transfer data over the SYSMAC NET or SYSMAC LINK networks. This function is not supported by the C200H-MC221.

⚠ Caution Before transferring the program, parameters, or position data to another node, be sure to confirm the safety conditions at the destination node. Otherwise, an injury may occur.

The following three items must be set.

Network Address
The network address can be set within a range of 0 to 127. Set this to “0” when the programming device and the MC Unit are in the same network. The default setting is “0.”

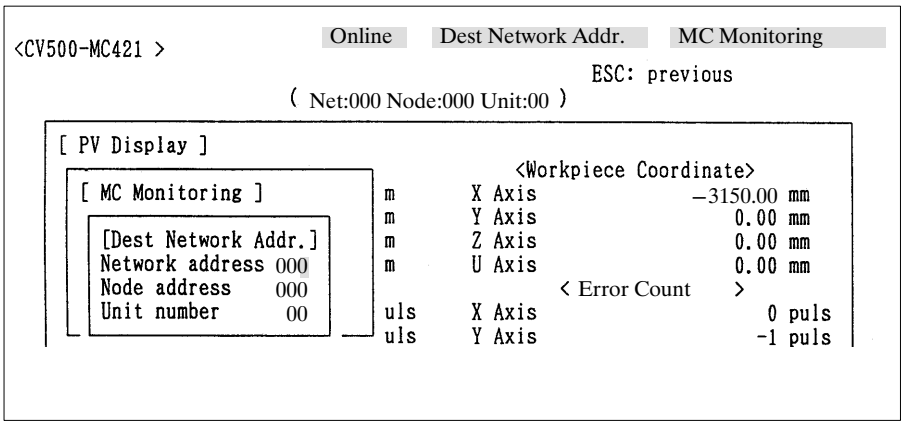
Node Number (Address)
The node address can be set within a range of 0 to 126 (for SYSMAC NET) or 0 to 62 (for SYSMAC LINK). The default setting is “0.”

Unit Number
Set the unit number of the MC Unit within a range of 0 to 15. The default setting is “0.”

Note For information concerning network configuration, refer to the *CV Support Software Operation Manual: Online*.

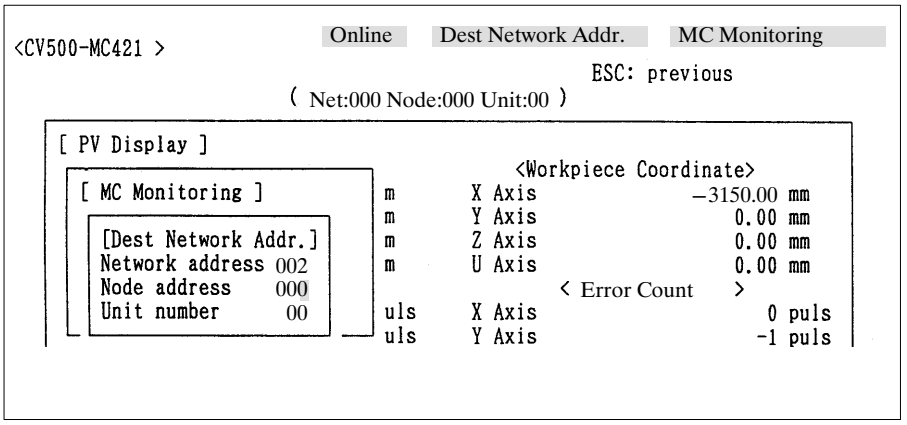
Procedure This procedure sets the destination network address.

1, 2, 3... 1. Select “N:Destination network address” from the MC Monitoring menu.

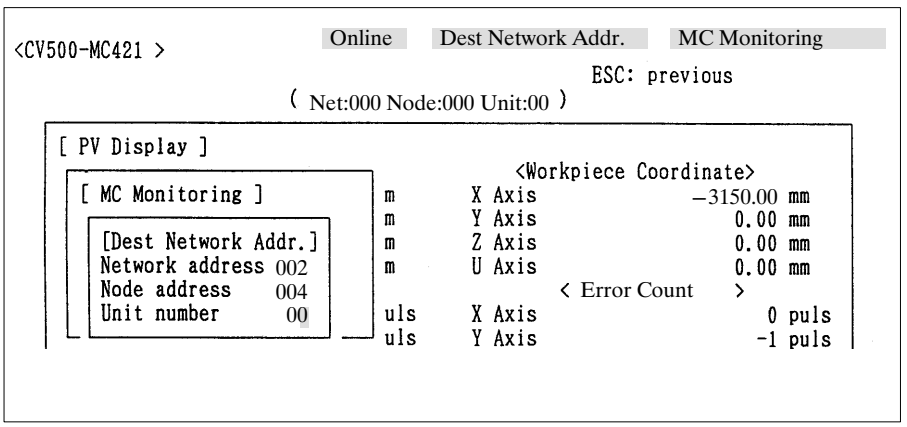


Note If a communications error occurs at this time, the destination network address will not be set. In that case, set the destination network address by means of the System Setup. (Refer to *Section 17 System Setup*.)

2. Set the network address (to “2,” for example) and press the Return Key.



3. Set the node address (to “4,” for example) and press the Return Key.



4. Set the Unit number (to “3,” for example) and press the Return Key.

SECTION 14
Transferring and Verifying Data

This section explains how to transfer programs, parameters, and position data between the programming device and the MC Unit, and how to verify the data.

The C200H-MC221 allows programs, parameters, and position data to be written to its flash memory.

14-1 Preliminaries

These operations must be executed in the online mode. First check to be sure that the programming device (i.e., the personal computer) and the Programmable Controller are connected. Then set the communications format and specifications in the System Setup so that they match those of the programming device.

Check the MC model on the Setup Menu and make sure that the designated MC model coincides with the model of MC Unit in use.

For an explanation of how to set the communications format and specifications, refer to *Section 17 System Setup*.

14-2 Transferring Programs, Parameters, and Position Data

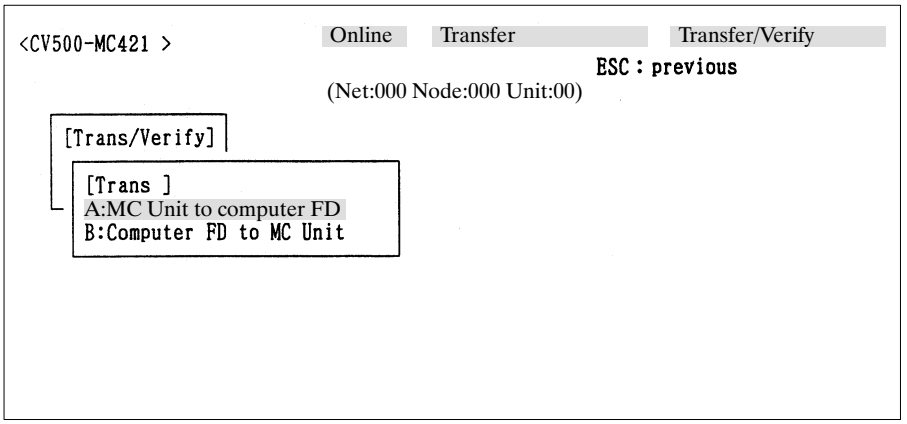
This section explains how to transfer programs, parameters, and position data.

Procedure 1

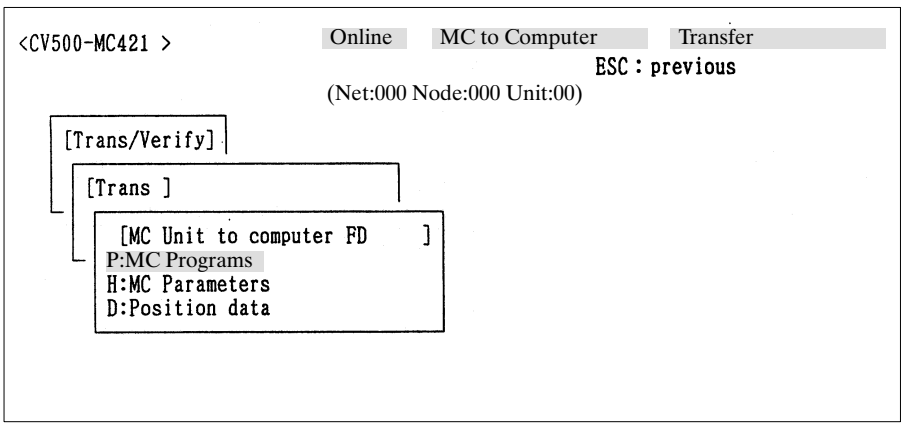
This procedure transfers a program from the MC Unit to a data disk at the personal computer.

1, 2, 3...

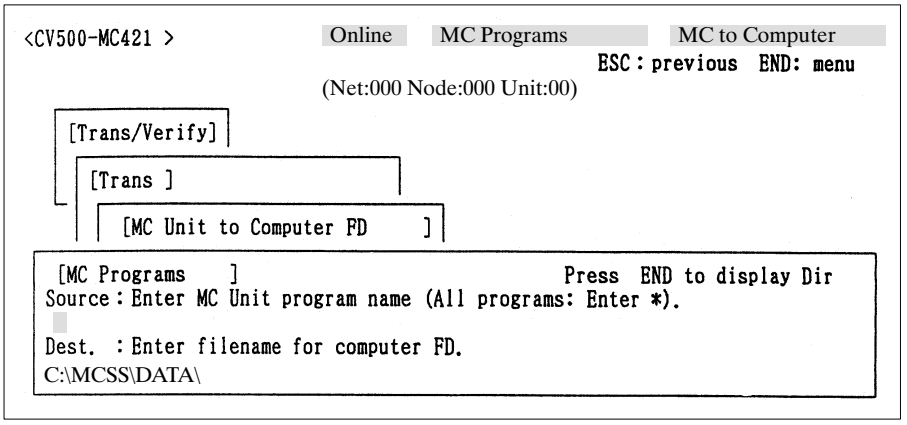
1. Select “M:Transfer” from the Transfer/Verify menu.



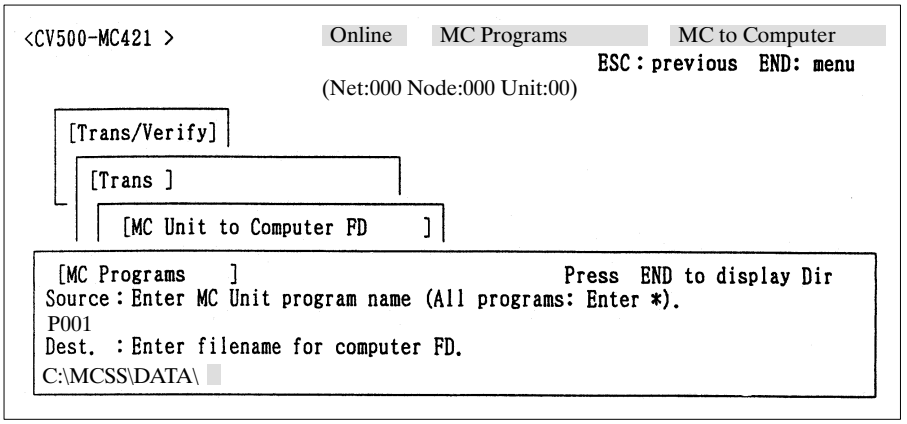
2. Select “A:MC Unit to computer FD” from the Transfer menu.



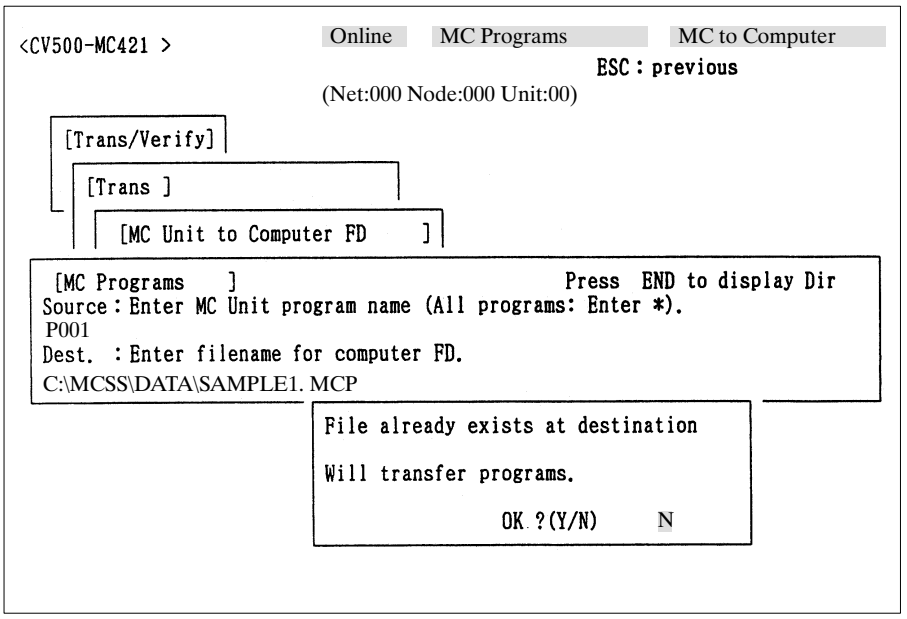
3. Select “P:MC programs” from the MC Unit to Computer FD menu.



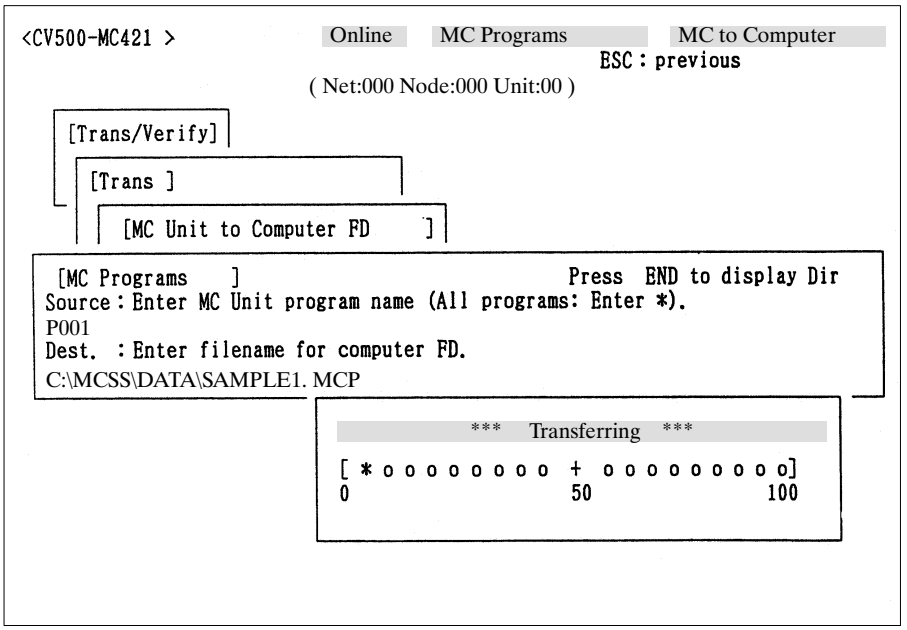
4. Specify the MC Unit’s program with a number from P000 to P999, and press the Return Key. (For example, enter “P001” and press the Return Key.) It is also possible to press the End Key to display a list of program names and select the desired program.



5. Enter the name of the destination file (“SAMPLE1” for example) and press the Return Key. It is also possible to press the End Key to display a list of file names and select the desired file.



6. A message will be displayed asking for confirmation. To transfer the data, enter "Y" and press the Return Key. To cancel the operation, press the Return Key. When "Y" is entered, the following screen will be displayed to show the transfer status.

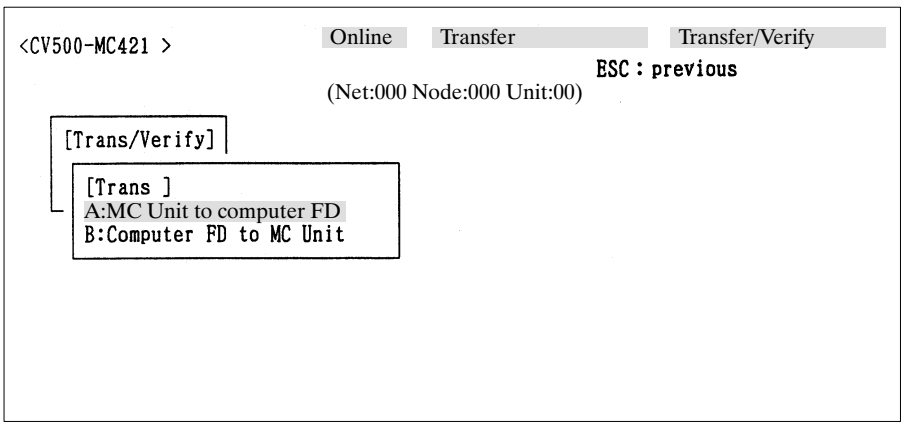


Procedure 2

This procedure transfers parameters or position data from the MC Unit to a data disk at the personal computer.

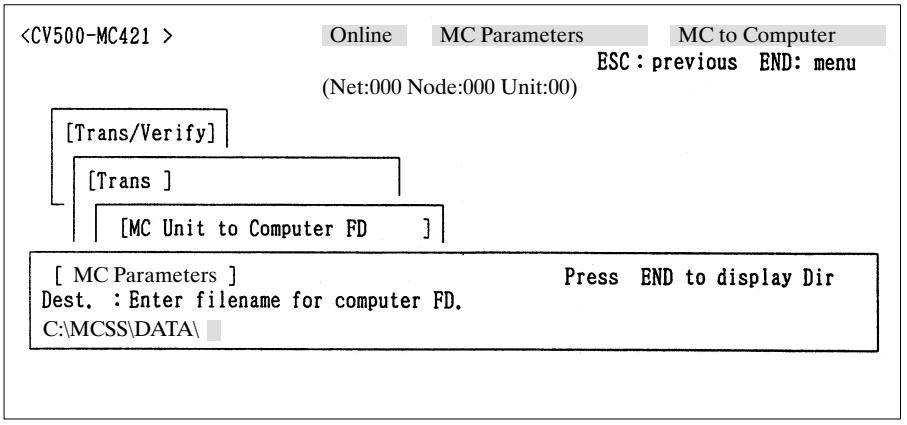
1, 2, 3...

1. Select "M:Transfer" from the Transfer/Verify menu.

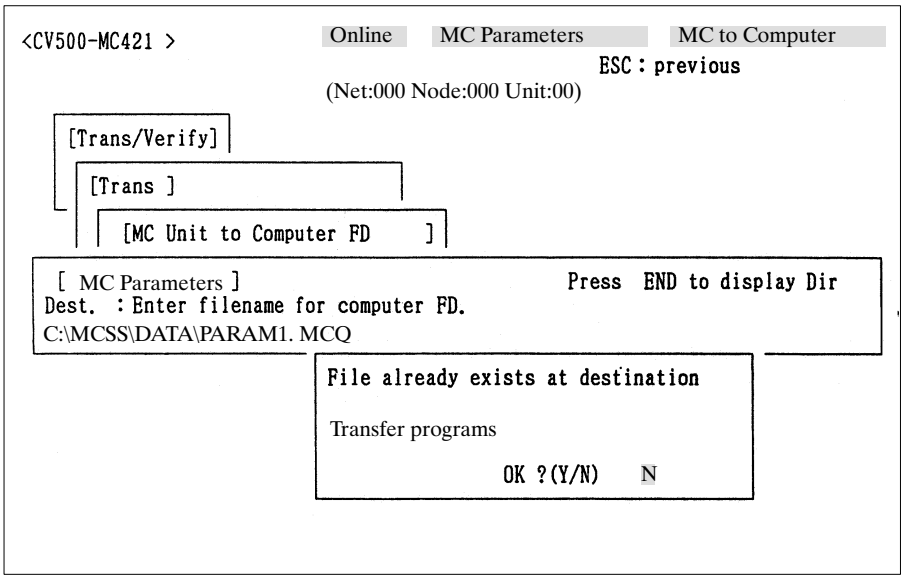


2. Select "A:MC Unit to computer FD" from the Transfer menu.

3. Select “H:MC parameters” or “D:Position data” from the MC Unit to Computer FD menu. (In this example, “H:MC parameters” is selected.)



4. Enter the name of the destination file (“PARAM1” for example) and press the Return Key. It is also possible to press the End Key to display a list of file names and select the desired file.
5. A message will be displayed asking for confirmation. To transfer the data, enter “Y” and press the Return Key. To cancel the operation, press the Return Key. If the same filename already exists at the destination, a message will be displayed to confirm that the existing file is to be overwritten.



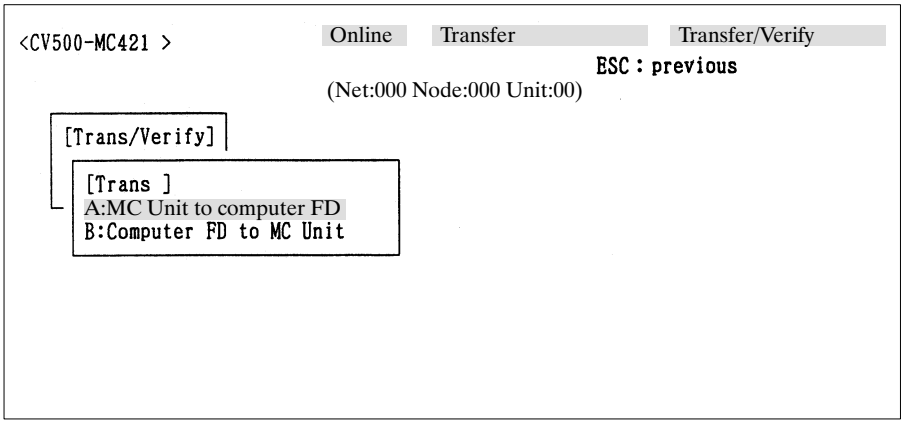
6. To overwrite the existing file, enter “Y” and press the Return Key. To cancel the operation, press the Return Key. When “Y” is entered, a screen will be displayed to show the transfer status as in Procedure 1.

Procedure 3 This procedure transfers programs, parameters, or position data from a data disk to the MC Unit.

Note Be sure to confirm that the created program, parameters, and position data are correct.

⚠ Caution Before transferring the program, parameters, or position data to another node, be sure to confirm the safety conditions at the destination node. Otherwise, an injury may occur.

1, 2, 3... 1. Select “M:Transfer” from the Transfer/Verify menu.



2. Select “B:Computer FD to MC Unit” from the Transfer menu.
3. Select “P:MC programs,” “H:MC parameters,” or “D:Position data” from the Computer FD to MC Unit menu. The steps in the procedure from this point on are the same as for Procedure 2.

Note Be sure to power up the MC Unit again after parameters have been transferred. If this is not done, the Unit parameters and machine parameters will not be changed. The following parameters will be changed even if the MC Unit is not powered up again.

- Memory control parameters
- Coordinate system parameters
- Speed parameters
- Zone parameters
- Servo parameters

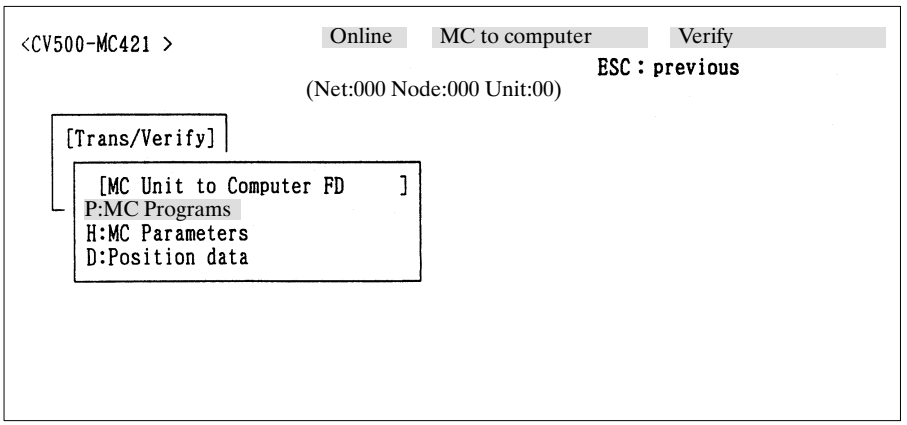
14-3 Verifying Programs, Parameters, and Position Data

This section explains how to verify programs, parameters, and position data.

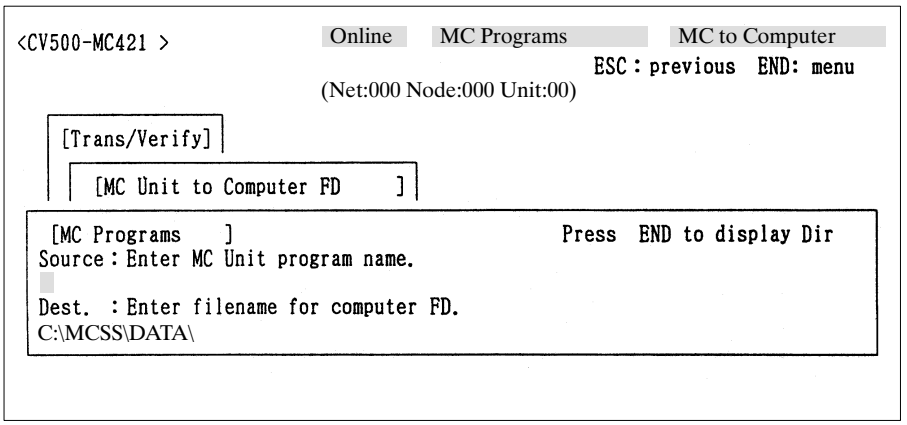
Procedure 1

This procedure compares and verifies the programs at the MC Unit and the data disk.

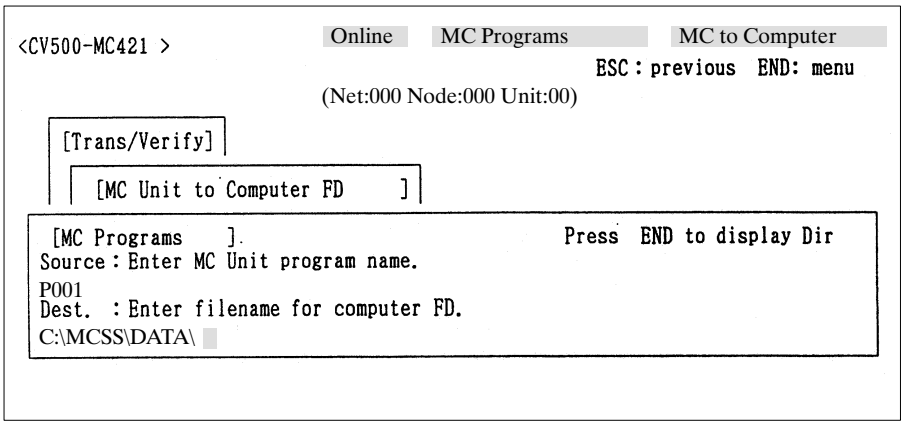
1, 2, 3... 1. Select “C:Verify” from the Transfer/Verify menu.



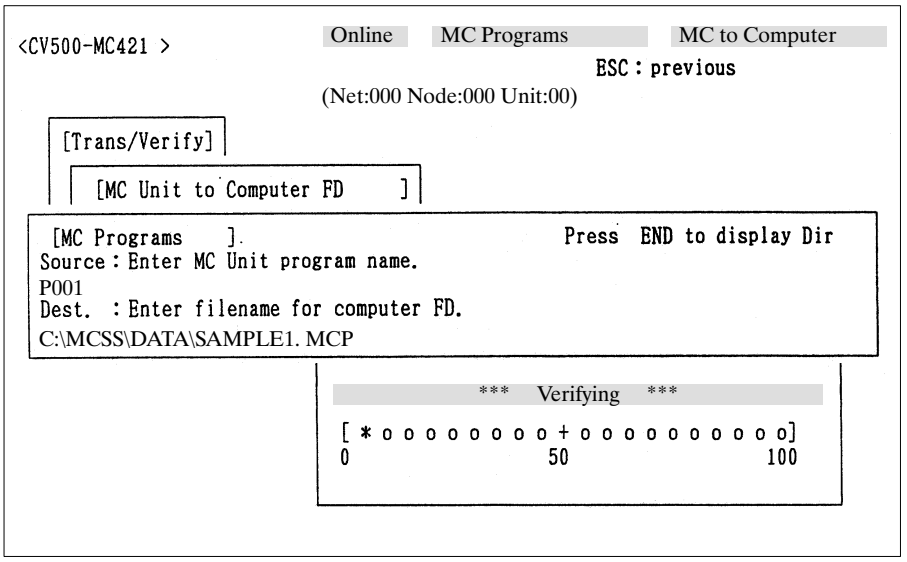
2. Select “P:MC programs” from the MC Unit to computer FD menu.



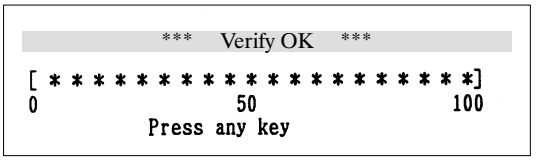
3. Specify the verification source program with a number from P000 to P999, and press the Return Key. (For example, enter “P001” and press the Return Key.) It is also possible to press the End Key to display a list of program names and select the desired program.



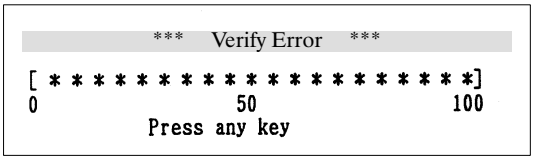
4. Specify the verification destination file, and press the Return Key. (For example, enter “SAMPLE1” and press the Return Key.) It is also possible to press the End Key to display a list of filenames and select the desired file. While the programs are being verified, a screen will be displayed to show the status of the verification.



5. If the verification shows that the programs are the same, a “Verify OK” message will be displayed at the bottom of the screen.



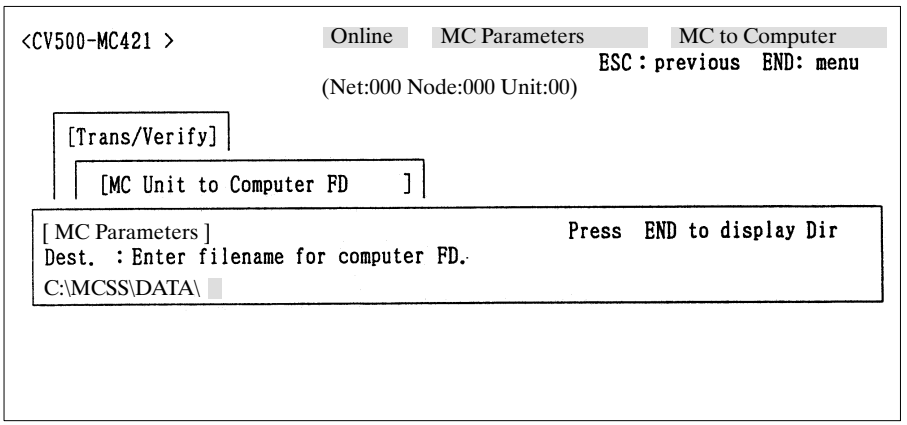
If the programs are not the same, a “Verify Error” message will be displayed.



Procedure 2 This procedure compares and verifies the parameters or position data at the MC Unit and the data disk.

1, 2, 3... 1. Select “C:Verify” from the Transfer/Verify menu.

2. Select “H:MC parameters” or “D:Position data” from the MC Unit to Computer FD menu. (In this example, “H:MC parameters” is selected.)



3. Enter the name of the verification destination file (“PARAM1” for example) and press the Return Key. It is also possible to press the End Key to display a list of file names and select the desired file.

4. When the Return Key is pressed, the “Verifying” message will be displayed as in Procedure 1. If the verification shows that the parameters are the same, a “Verify OK” message will be displayed at the bottom of the screen. If the parameters are not the same, a “Verify Error” message will be displayed.

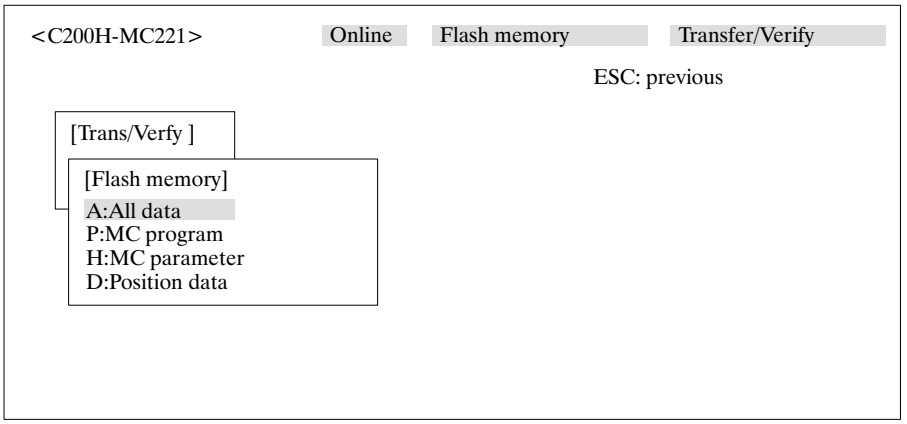
14-4 Flash Memory Write

Programs, parameters, and positioning data can be written to the flash memory of the C200H-MC221.

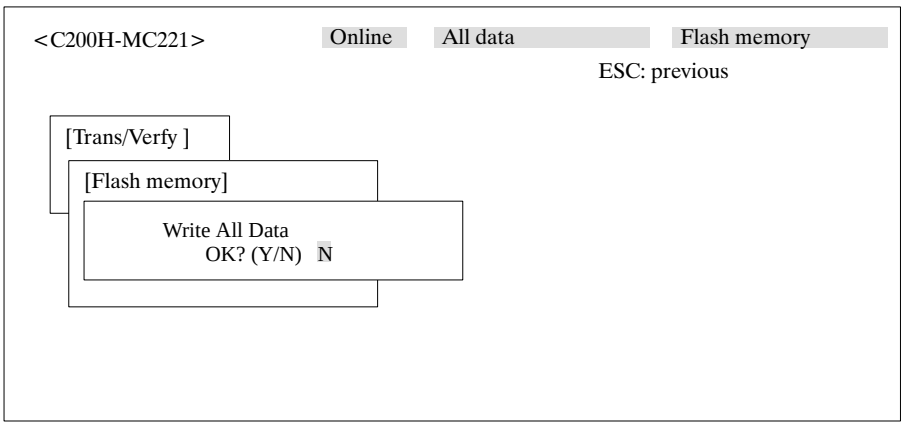
⚠ Caution After transferring, be sure to save back-up data to the flash memory. Otherwise, the MC Unit will return to the state that existed before the data was transferred when the power is turned ON again.

Procedure 1 Use the following procedure to write all data (programs, parameters, and position data) to flash memory.

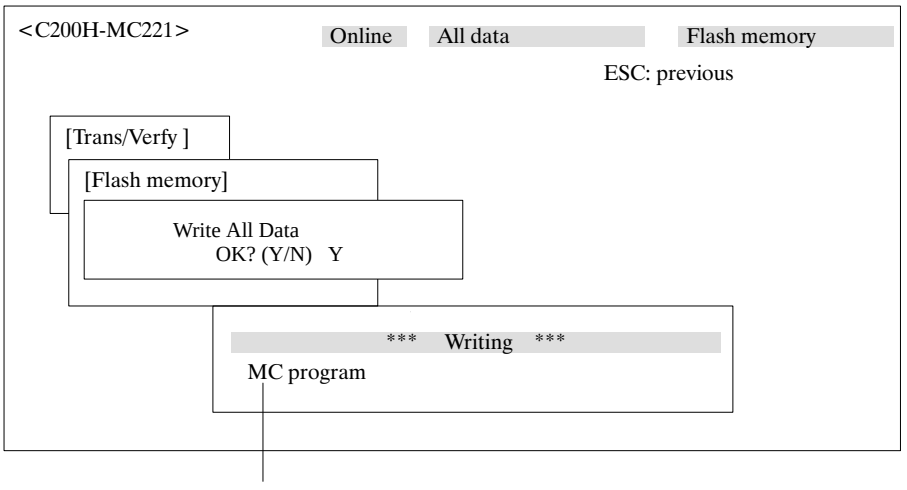
1, 2, 3... 1. Press “W” to select “W:Flash memory” from the Transfer/Verify Menu.



2. Press “A” to select “A:All data.”



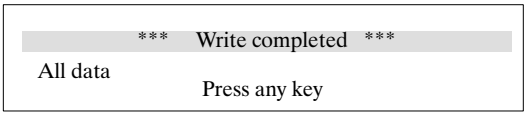
3. The above confirmation message will be displayed on the bottom of the screen. Press “Y” and Enter Key to write all the data or press Enter Key not to write the data.
4. The writing progress of the data will be displayed on the screen. MC programs, MC parameters, and position data are written in this order.



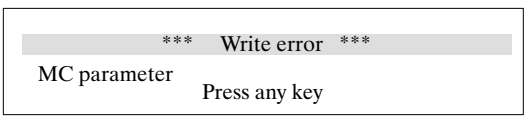
The type of data being written will be displayed.

5. If the data has been written without any error, “***Write completed***” will be displayed. If any error results while the data is being written, “***Write error***” will be displayed and the writing of the remaining data will be aborted.

Data written without any error



Error resulted



Procedure 2

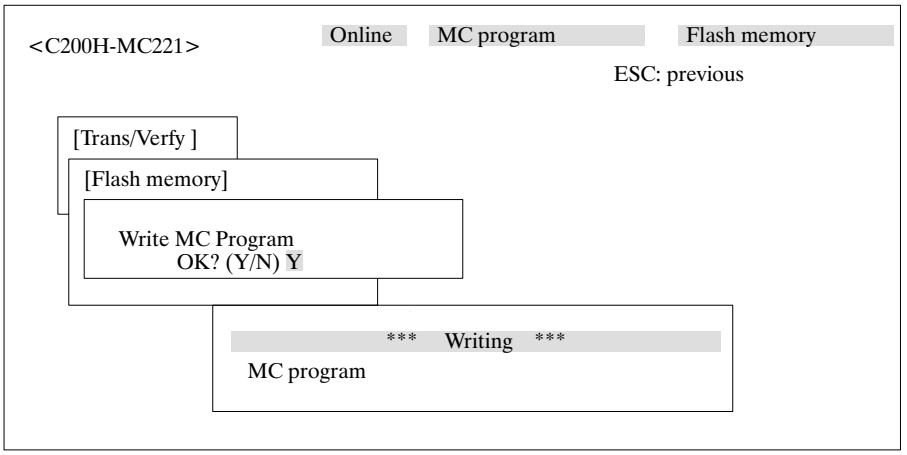
Use the following procedure to write programs, parameters, or position data of MC Unit to flash memory.

1, 2, 3...

1. Press “W” to select “W:Flash memory” from the Transfer/Verify Menu.
2. Press “P” to select “P:MC programs,” press “H” to select “H:MC parameters,” or press “D” to select “D:Positioning data.”

   There is no difference in operation and displays between this operation and the writing operation of all data to the flash memory.

   Example: Screen while the MC program is being written



SECTION 15
Printing

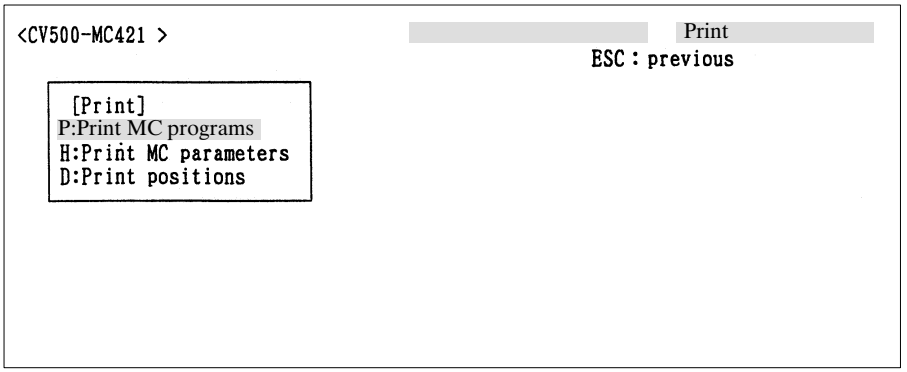
This section explains how to print out programs, parameters, and position data.

15-1 Printing Programs, Parameters, and Position Data

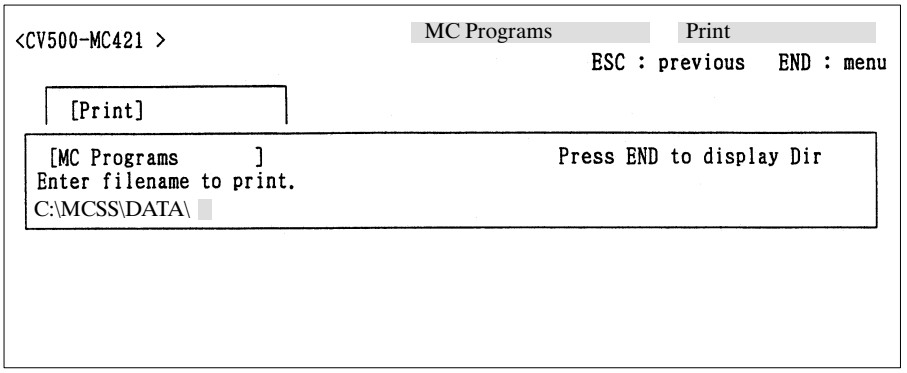
To print out programs, parameters, or position data, connect a printer to the computer and follow the procedure described below.

Procedure

1, 2, 3... 1. Select “I:Print” from the main menu.

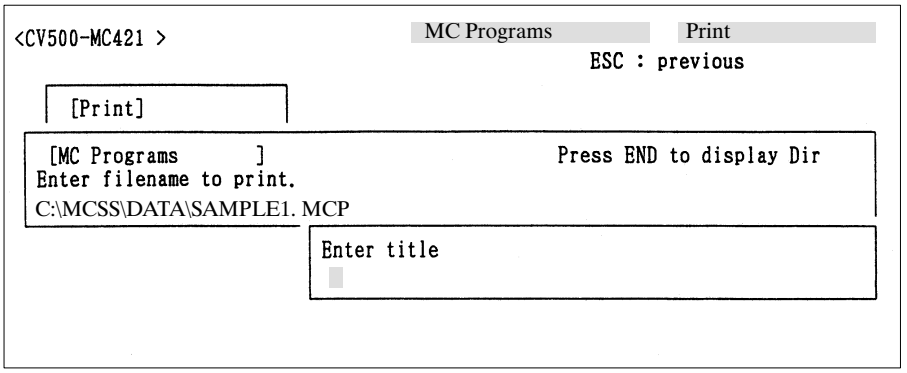


2. Select the type of data that is to be printed. (In this example, “P:Print MC programs” is selected.)

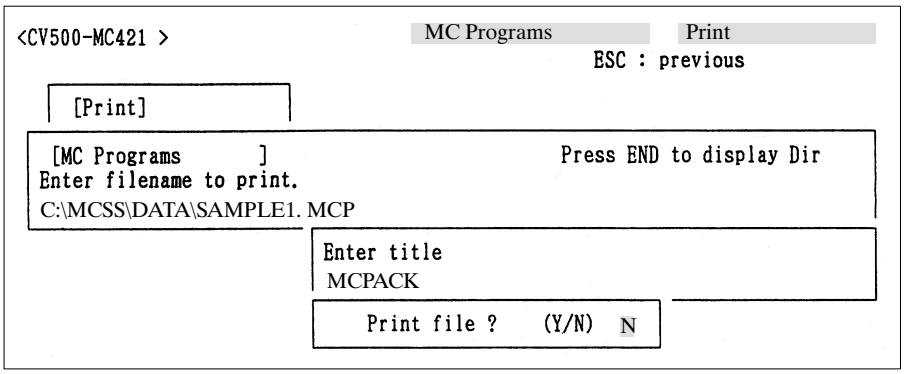


3. Enter the name of the file that is to be printed (“SAMPLE1,” for example), and press the Enter Key.

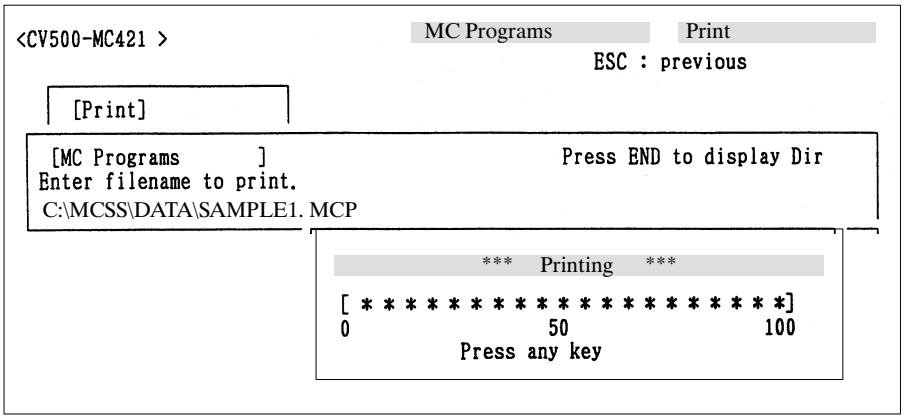
   Wild cards ✳ can be used when designating file names. To input the wild card, press ✳ or F1.



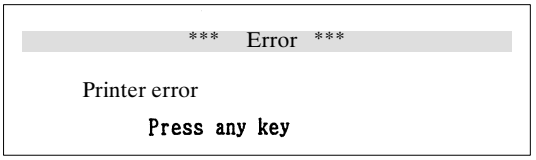
4. Enter a title of 50 characters or less. (For example, enter “MCPACK.”)



5. When the Return Key is pressed, a confirmation message will be displayed. To print the data, enter “Y” and press the Return Key. To cancel the operation, press the Return Key. Printing will begin when “Y” and the Return Key are pressed, and a “Printing” message will be displayed while the printing is underway. Another message will be displayed to indicate when the printing has been completed.



If the printer is not connected, or if the printer is not ready to print, the following error message will be displayed at the bottom of the screen.



SECTION 16
File Management

This section explains how to manage the data disk files that contain programs, parameter data, and position data.

16-1 Listing Files

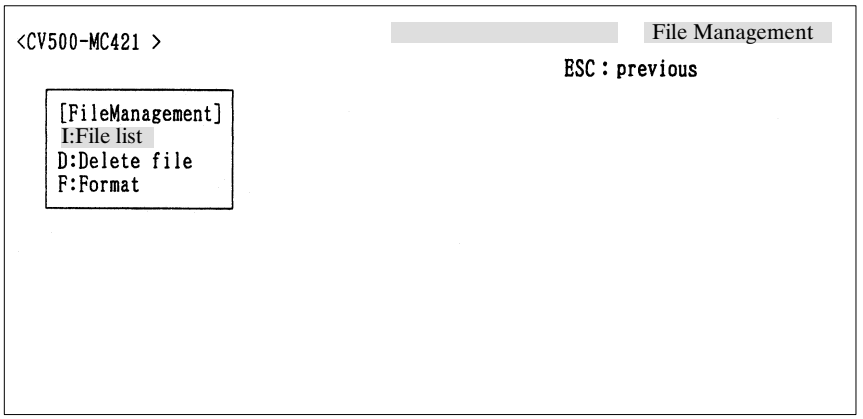
The “file list” function displays a list of the program, parameter, or position data files that are on the data disk.

Procedure

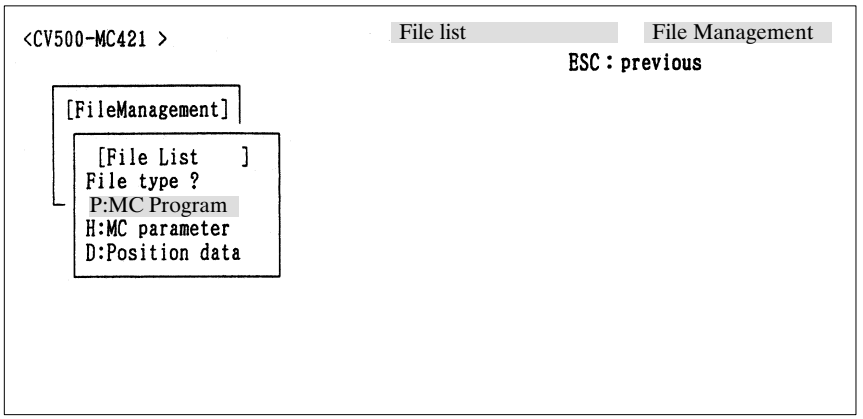
Use the following procedure to display a directory of files on the data disk.

1, 2, 3...

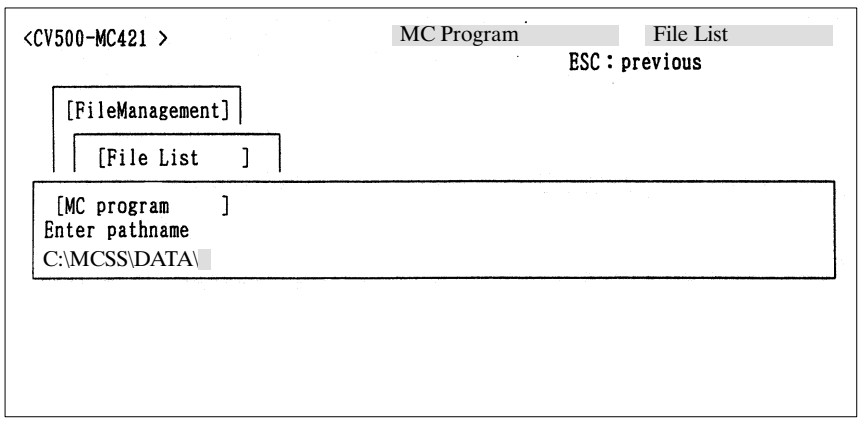
1. Select “F:File management” from the main menu.



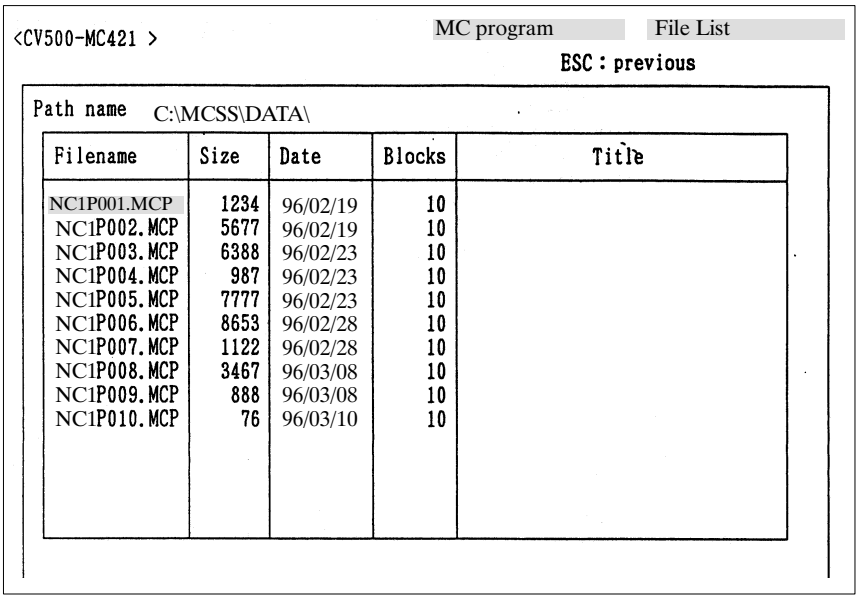
2. Select “I:File list” from the File Management menu. The following sub-menu will be displayed.



3. Select the type of files to be listed. In this case “P:MC program” was selected.



4. Enter the path name (up to 76 characters long). In this example, the path C:\MCSS\DATA has been entered.



16-2 Deleting Files

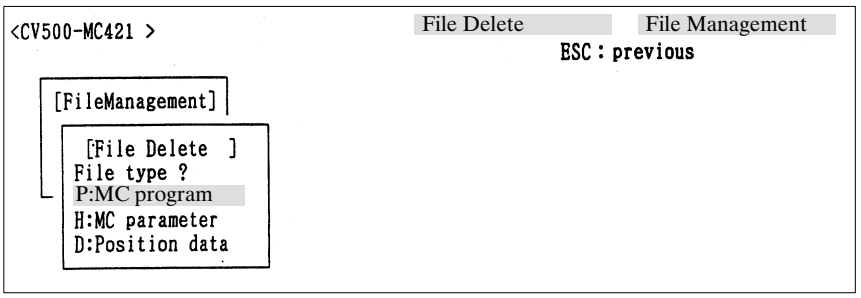
The “delete file” function is used to delete program, parameter, or position data files from the data disk.

Procedure

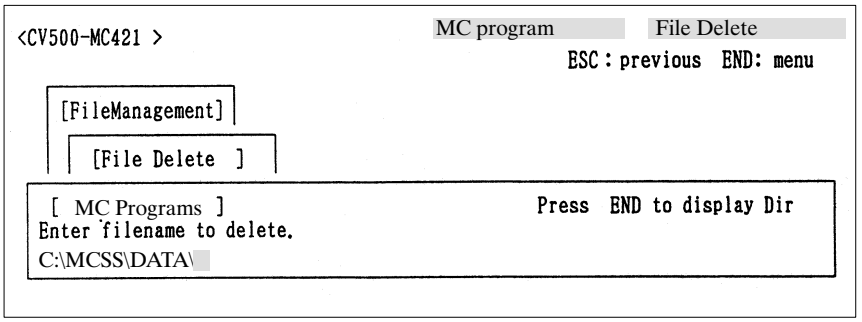
Use the following procedure to delete files.

1, 2, 3...

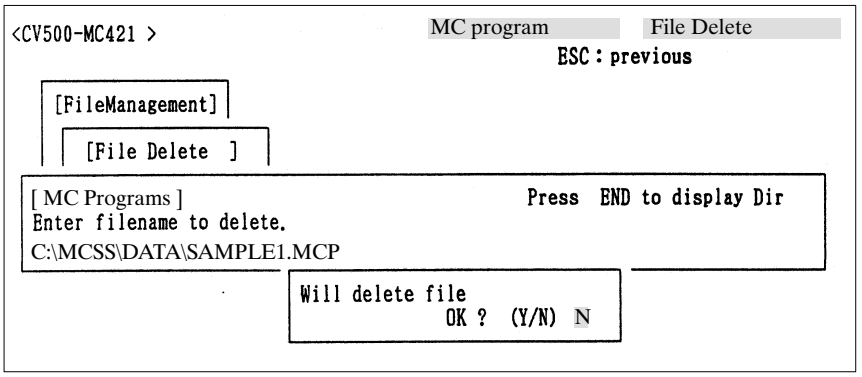
1. Select “D:Delete file” from the File Management menu.



2. Specify the type of file to be deleted. In this case “P:MC program” was selected.



3. Enter the name of the file to be deleted. In this case “SAMPLE1” was entered. (It is also possible to press the End Key to display a list of the files and then select the desired file from the list.)



4. A confirmation prompt will be displayed when the filename is entered. Enter “Y” to delete the file, “N” to cancel the operation.

16-3 Formatting Data Disks

The “format” function is used to format a floppy disk for use as a data disk. Either 2HD or 2DD floppy disks can be formatted.

Note The following procedure for formatting floppy disks assumes that the DOS FORMAT.COM command is executable and that the DOS directory has been set using PATH.

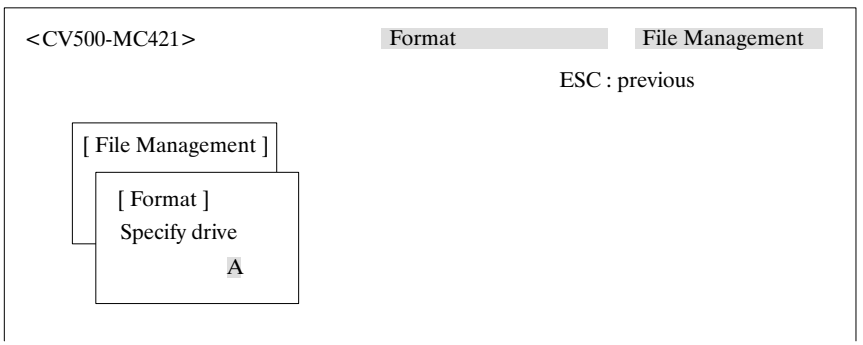
⚠ Caution Formatting a floppy disk will erase all data on the disk. Make sure that there isn't any useful data on the disk before formatting it.

Procedure

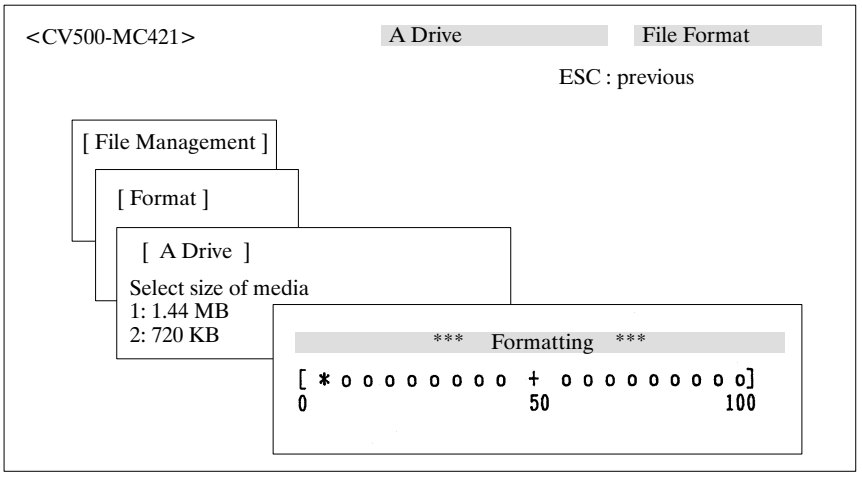
Use the following procedure to format a floppy disk. The messages shown below might be slightly different with other versions of DOS.

1, 2, 3...

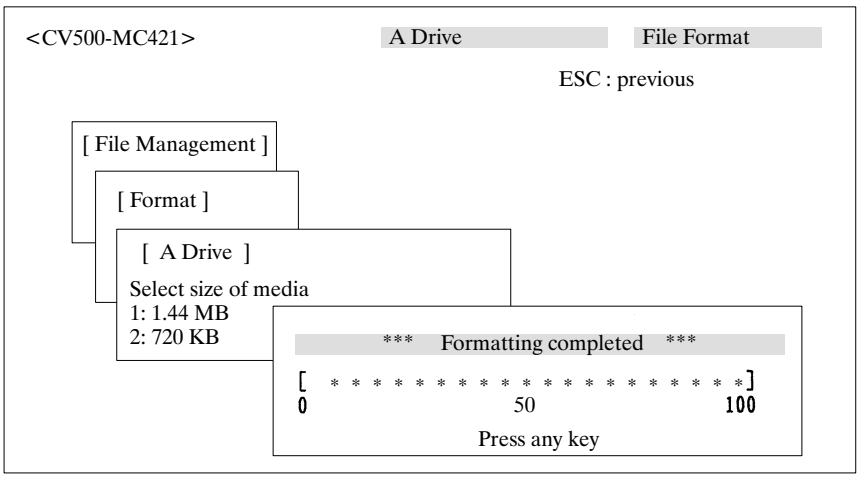
1. Select “F:Format” from the File Management menu.



2. Specify the floppy disk drive being used. Drive A was specified in this case.



3. Insert the floppy disk to be formatted. Enter “Y” and press the Return Key.
4. The disk’s format will be checked and the formatting operation will start if no errors are found.
5. When the disk has been formatted, the following screen appears. Press any key to return to the menu screen.



SECTION 17
System Setup

This section explains the operations in the Setup menu, including setting the model of MC Unit, the destination network address, the communications format, the printer model, and overwrite confirmation.

17-1 MC Unit Designation

The model of the MC Unit to be used must be designated.

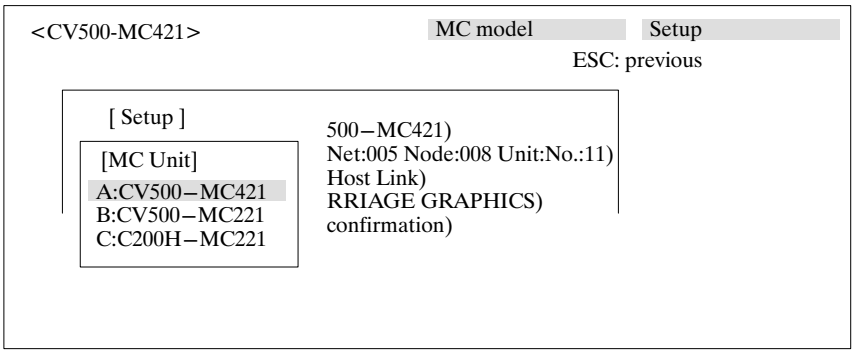
Description

The types of MC program and parameter inputs will be determined and monitored according to the designated model of MC Unit. The designated model of MC Unit must coincide with the model of MC Unit in online operation.

The Setup Menu will be displayed automatically when the MC Support Software is started. Designate the model of MC Unit to be used on the Setup Menu. The default model of MC Unit in the Setup Menu is the C200H-MC221.

Procedure

Use the following procedure to specify the model of MC Unit.



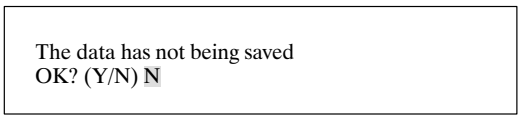
1, 2, 3...

1. Press “K” to select “K:MC model” from the Setup Menu.

2. Select from the MC Model Menu the model of MC Unit so that it coincides with the model of MC Unit in use.

   Example: Selection of the C200H-MC221

   If another model of MC Unit is selected while a MC program, MC parameter, or position data is being edited, the MC program, MC parameters, and position data will be all cleared. If any data in the MC program, MC parameter, or position data has not been saved, the following message will be displayed.



   The MC program, MC parameter, or position data being edited will be cleared if “Y” is pressed, the newly selected model of MC Unit will be designated, and the Setup Menu will be displayed. If “N” is pressed, the Setup Menu will be displayed. Then save the data and reselect the model of MC Unit.

17-2 Destination Network Address

These parameters specify the destination network address, node number (address), and unit number when monitoring or transferring data to an MC Unit through a SYSMAC NET Link or SYSMAC LINK network.

This function is not supported by the C200H-MC221.

⚠ Caution Before transferring the program, parameters, or position data to another node, be sure to confirm the safety conditions at the destination node. Otherwise, an injury may occur.

Description

The network address, node address, and unit number must be specified to identify the destination MC Unit. Refer to the *CV Support Software Operation Manual: Basics* for details on network configurations.

Network Address

Network addresses range from 0 through 127. Set the network address to 0 if the computer and MC Unit are in the same network. The default setting is 0.

Node Address

Node addresses (generally referred to as node numbers) range from 1 through 126 in a SYSMAC NET Link network and 0 through 62 in a SYSMAC LINK network. The default setting is 0.

Unit Number

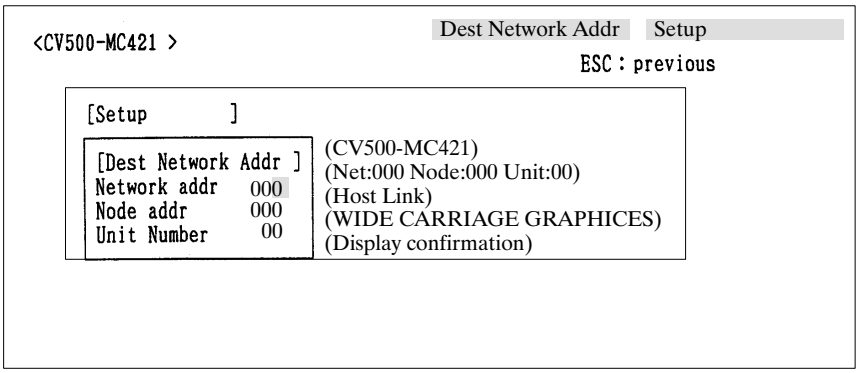
Specify the unit number (0 to 15) set on the MC Unit. The default setting is 0.

Procedure

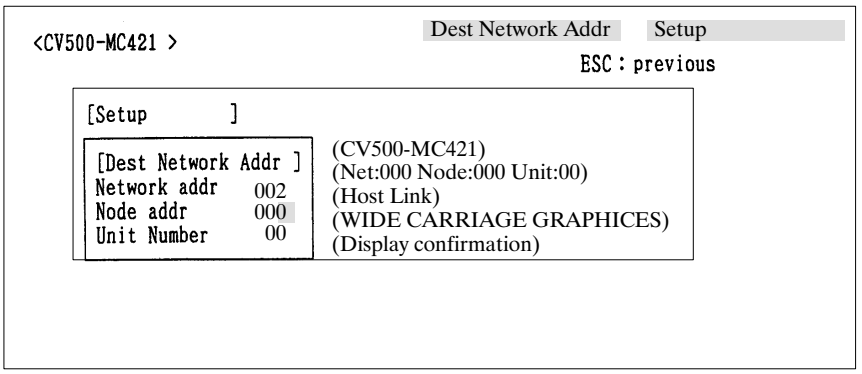
Use the following procedure to set the destination network address, node address, and unit number.

1, 2, 3...

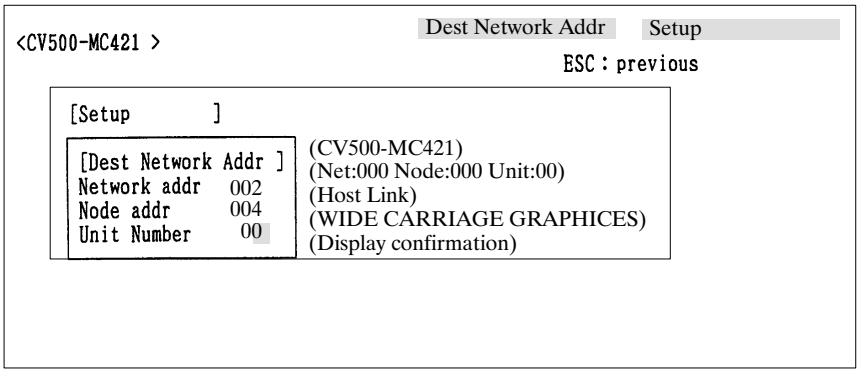
1. Select “Q:Setup” from the main menu to bring up the Setup menu and select “N:Dest network addr.”



2. Enter the destination network address. (Network address 2 was entered in this case.)



3. Enter the destination node address. (Node address 4 was entered in this case.)



4. Enter the destination unit number.

17-3 Communications Format

These parameters determine whether the computer and PC or MC Unit are connected through the Host Link or Peripheral port and set the communications protocol.

Description

The communications method of the C200H-MC221 cannot be changed except that the communications port can be selected. The other items can be confirmed only.

The possible communications settings for the Host Link and peripheral port connections are listed below. (Some computers cannot communicate at 19,200 bps; check the computer's specifications.)

CV500-MC421 and CV500-MC221

Peripheral Port
Port: COM 1 or COM 2
Baud Rate: 19,200 bps, 9,600 bps, or 4,800 bps
Response Monitoring Time: 2 to 60 s

Host Link
Port: COM 1 or COM 2
Baud Rate: 19,200 bps, 9,600 bps, 4,800 bps, 2,400 bps, or 1,200 bps
Unit Number: 0 to 31
Parity: Even, odd, or none
Data Length: 7 or 8 bits
Stop Bits: 1 or 2 bits
Response Monitoring Time: 2 to 60 s

C200H-MC221

(Confirmation Only; Settings Cannot Be Changed)

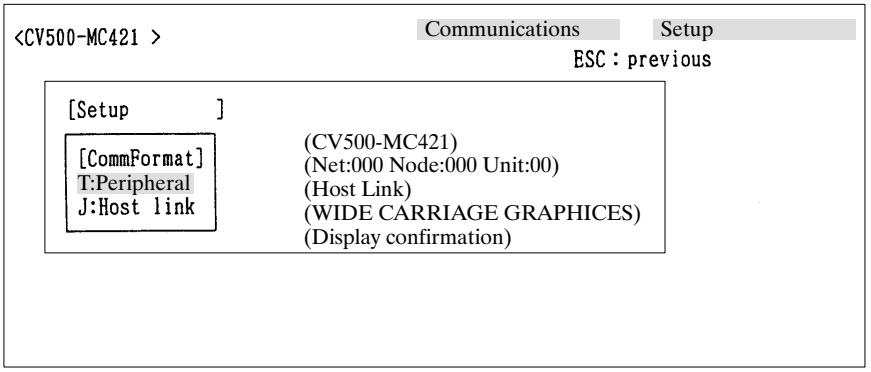
Host Link (See note)
Baud Rate: 9,600 bps
Parity: None
Data Length: 8 bits
Stop Bits: 2 bits
Response Monitoring Time: 10 s

When the C200H-MC221 is selected as the MC Unit setting on the Setup Menu, the above communications format will be automatically set. Due to this automatic setting, the communications format for the CV500-MC421/MC221 may be changed. Therefore, be sure to confirm the communications format setting when connecting to the CV500-MC421/MC221 again.

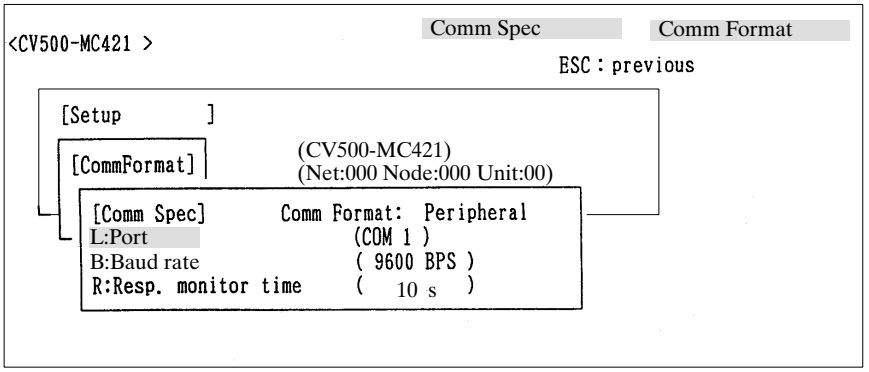
Note The Host Link is a special communications link that connects the computer to the C200H-MC221, and is not a Host Link for the PC.

Example 1: Peripheral Port Use the following procedure to set the communications format to use the peripheral port for the CV500-MC421 or CV500-MC221.

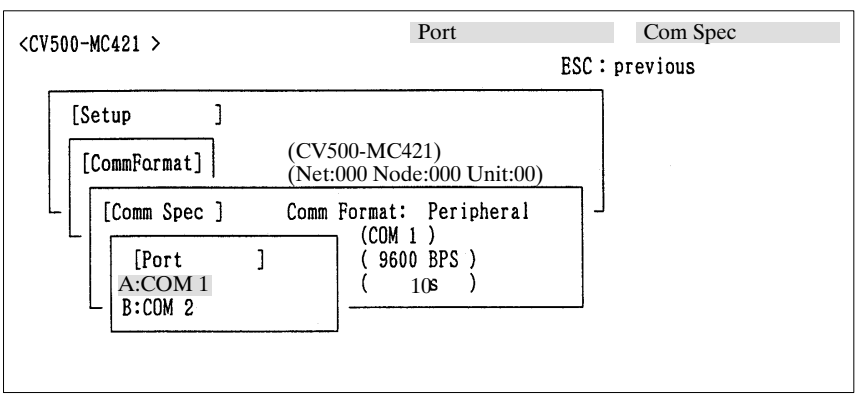
1, 2, 3... 1. Select “C:Communications” from the Setup menu.



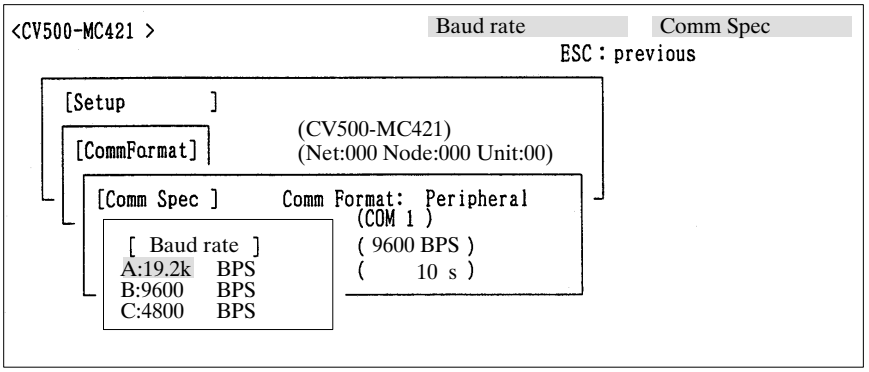
2. Select “T:Peripheral” from the CommFormat menu.



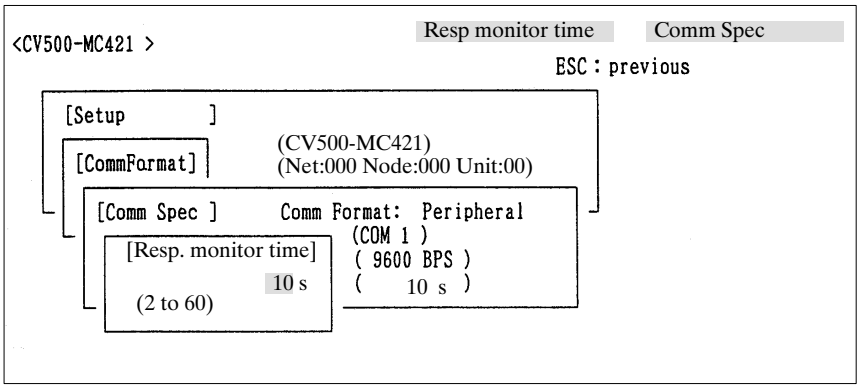
3. Enter “L” to select “L:Port” and specify which communications port to use.



4. Enter “B” to select “B:Baud rate.”



5. Set the desired baud rate.
6. Enter “R” to select “R:Resp. monitor time.”



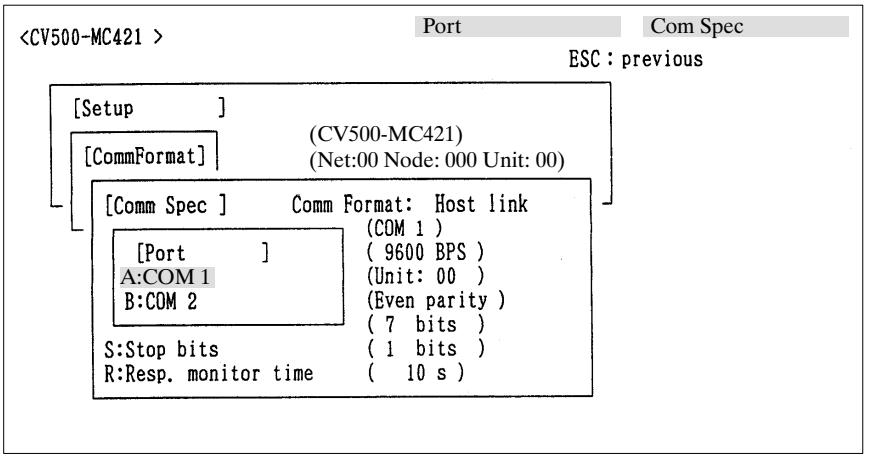
7. Enter the desired response monitoring time.
8. Set the PC’s DIP switch so the PC’s baud rate matches the communications baud rate set here.

Example 2: Host Link

Use the following procedure to set the communications format to use the Host Link port for the CV500-MC421 or CV500-MC221.

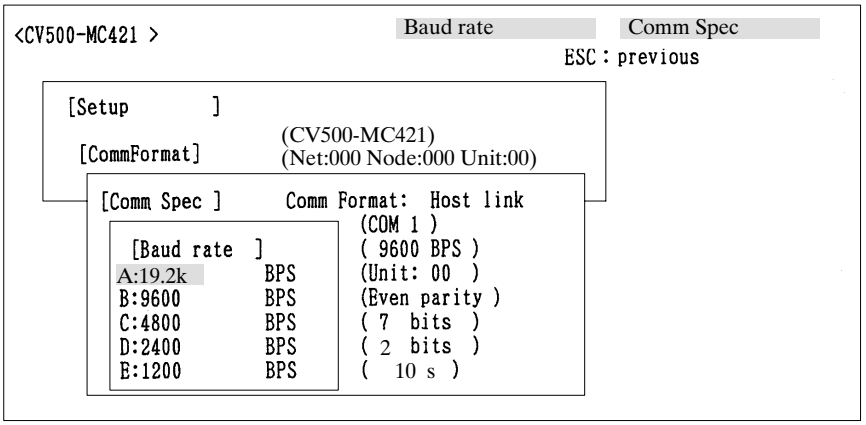
1, 2, 3...

1. Select “C:Communications” from the Setup menu.
2. Select “J:Host link” from the CommFormat menu.

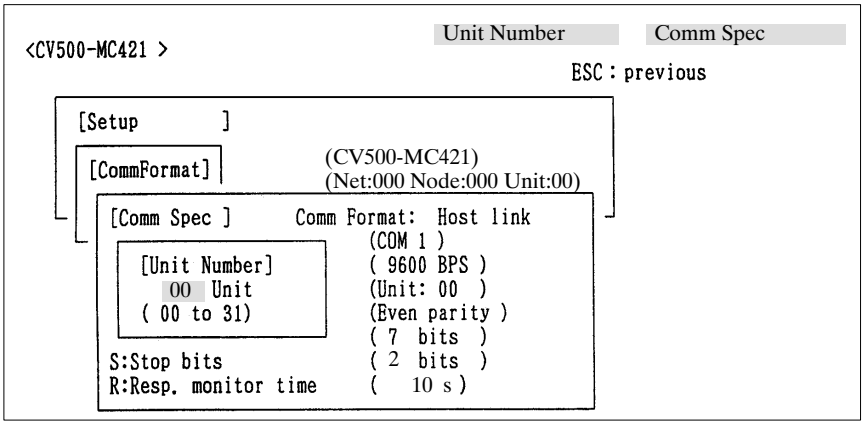


3. Enter “L” to select “L:Port.”
4. Specify which communications port to use.

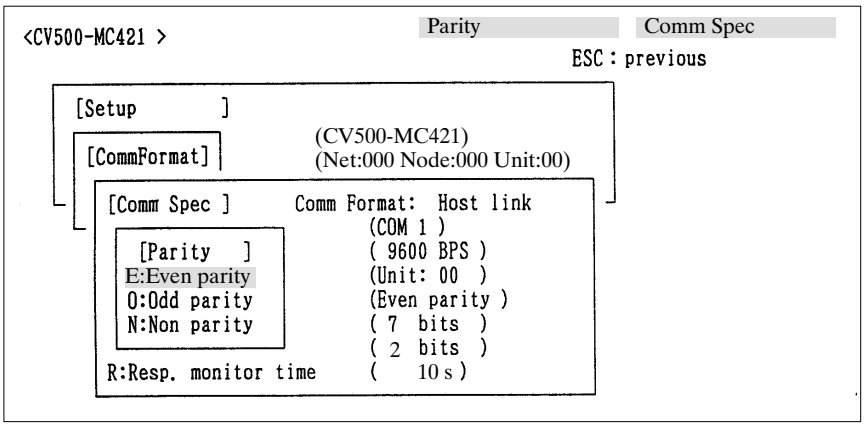
5. Enter “B” to select “B:Baud rate.”



6. Set the desired baud rate.
7. Enter “G” to select “G:Unit Number.”

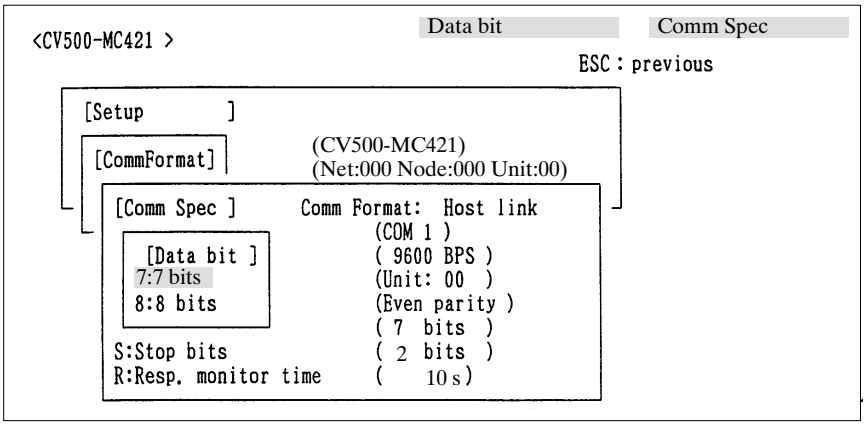


8. Enter the unit number of the PC to which the computer is connected.
9. Enter “P” to select “P:Parity.”

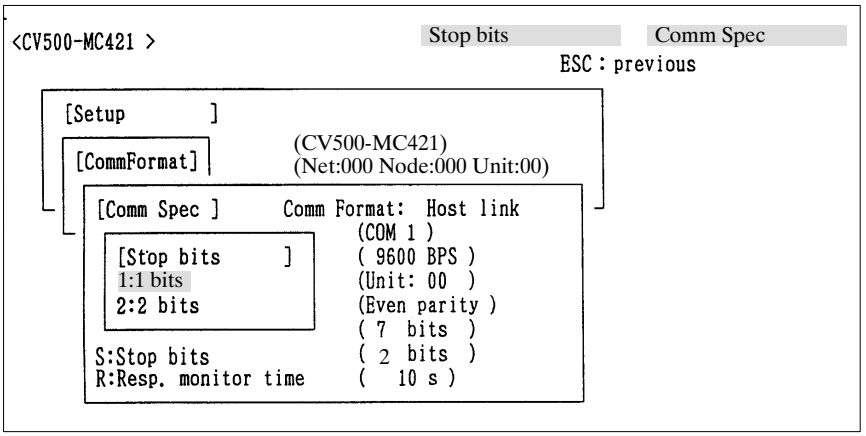


10. Set the desired parity.

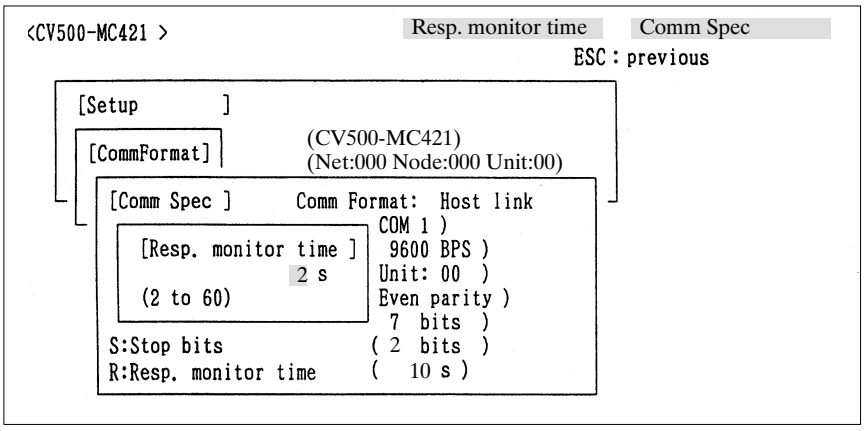
11. Enter “D” to select “D:Data bit.”



12. Set the desired number of data bits.
13. Enter “S” to select “S:Stop bits.”



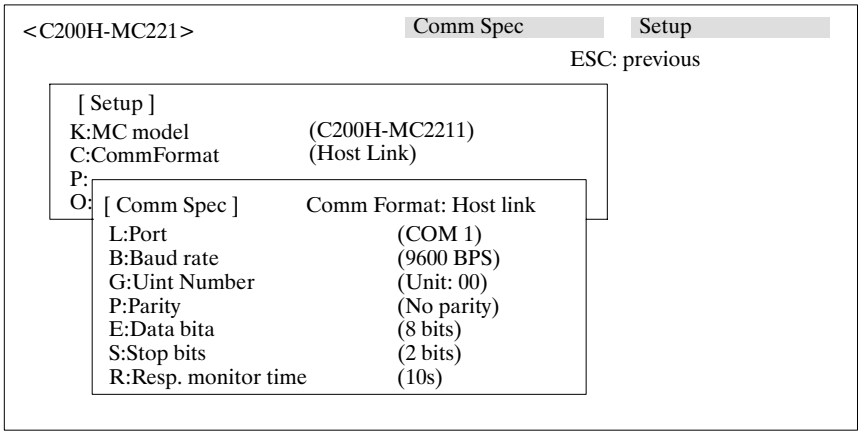
14. Set the desired number of stop bits.
15. Enter “R” to select “R:Resp. monitor time.”



16. Enter the desired response monitoring time.

Example 3: C200H-MC221 Use the following procedure to set the communications port and confirm other settings.

1, 2, 3... 1. Select “C:Communications” from the Setup menu.

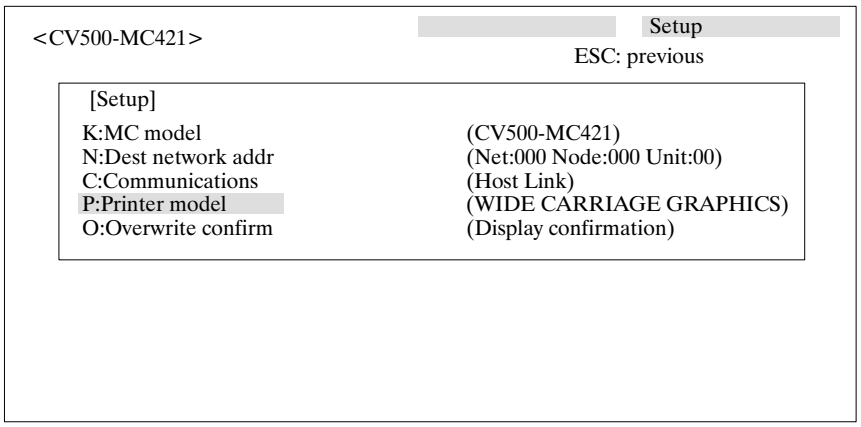


17-4 Printer Model

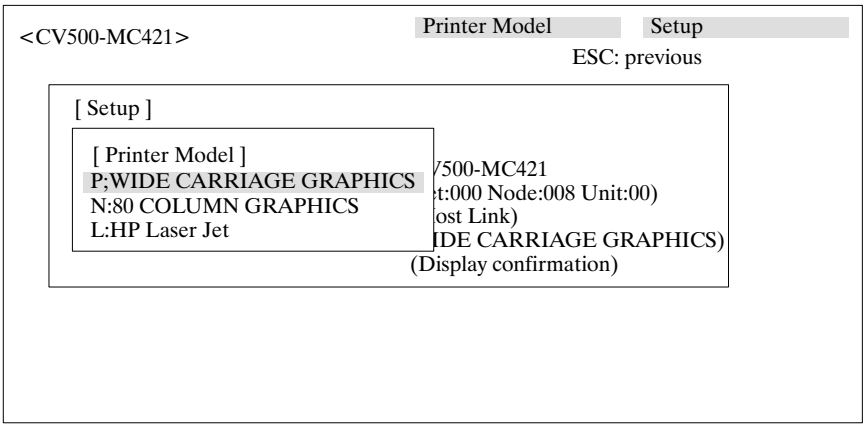
This parameter specifies the type of printer being used. Three types of printer are supported: wide-carriage graphics, 80-column graphics, or HP LaserJet. The default setting is wide-carriage graphics.

Procedure Use the following procedure to select the printer model.

1, 2, 3... 1. Select “Q:Setup” from the main menu.



2. Select “P:Printer model” from the Setup menu.



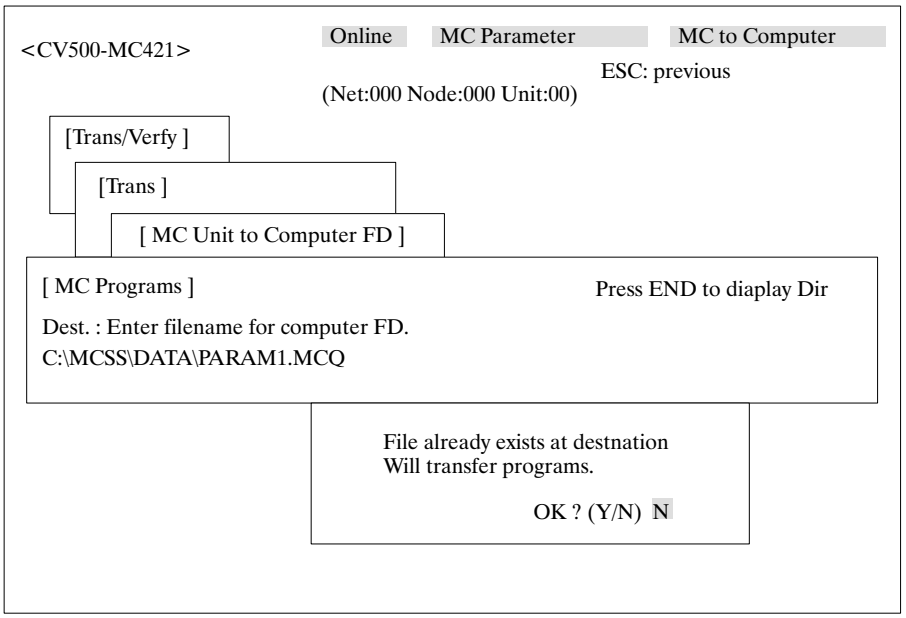
3. Select the desired printer model.

17-5 Overwrite Confirm

You can set whether or not to display confirmation messages when overwriting files when using the File Transfer (MC to computer FD) operation.

Description

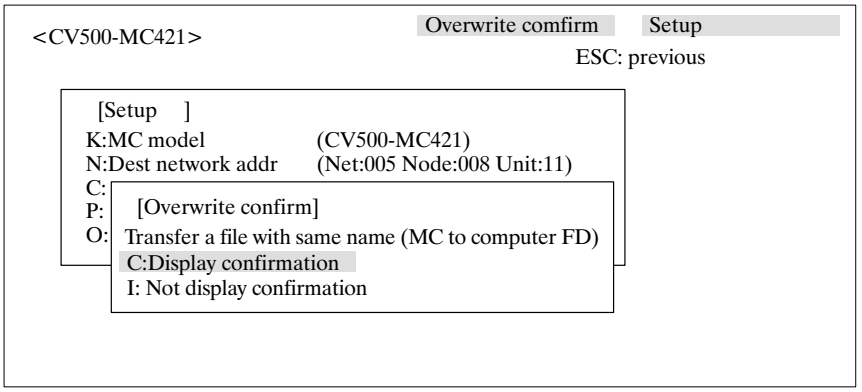
When Set to the “Display confirmation”
The following confirmation message will be displayed when File Transfer (MC to computer FD) is executed if a file with the same name already exists.



When Set to the “Not display confirmation”
The file will be overwritten without a confirmation message.

Procedure

1, 2, 3... 1. Press “O” to select “O:Overwrite” in the Setup Menu.



2. Press “C” or “I” to enable or disable the screen to display the confirmation message.

SECTION 18
Error Processing

This section shows the error messages that might be displayed during operation of the MC Support Software and explains how to diagnose and correct the causes of these errors.

18-1 Error Categories

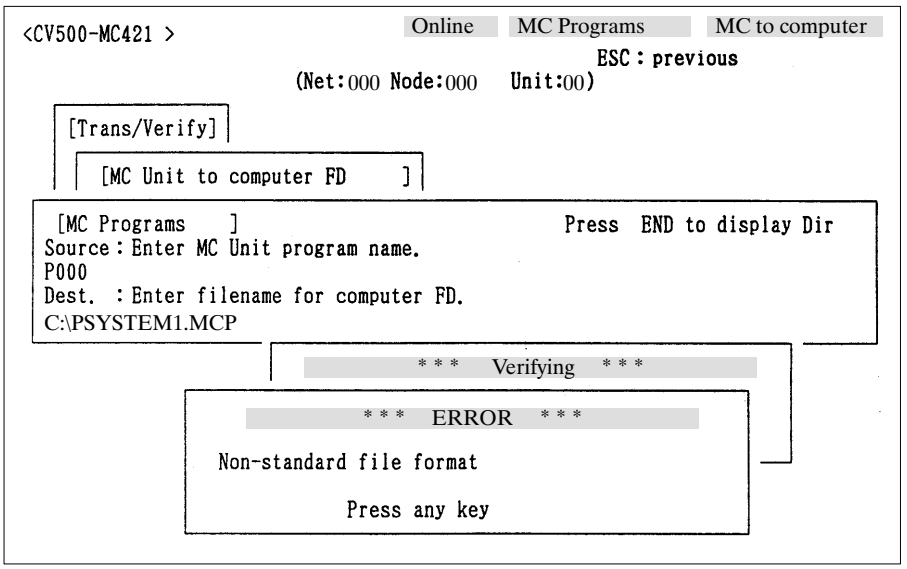
The error messages can be broadly divided into the following five categories.

1, 2, 3...

1. Common errors that occur during operation
2. Errors that occur during programming or program transfer
3. Errors that occur during transfer of the parameters
4. Errors that occur during monitoring
5. MC Unit Errors: Refer to *Section 10 Troubleshooting* in the *MC Unit Operation Manual: Details* for details on MC Unit error messages.

18-2 Common Errors

Common errors that occur during MC Support Software operations result in error messages up to 40 characters long, such as the one in the following diagram.



Error Messages

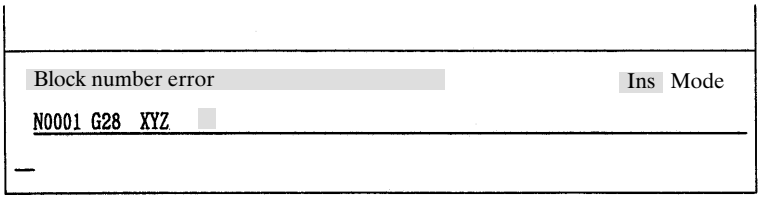
The following table lists the common errors and their likely causes.

Error message	Likely cause/solution
Cannot connect to FINS	The connecting cable is not connected or is broken, the PC is not on, or the MC Unit's communications format (network address, node address, baud rate, etc.) is incorrect.
Conflicting parameter exists	An unacceptable combination of the number of tasks and number of axes has been set in the unit parameters. Use an acceptable combination.
Destination file not found	The specified file does not exist. Try the operation again using the correct path name and filename.
Disk is write-protected.	Slide the disk's write-protection tab to the write permit position.
Drive not ready.	A floppy disk has not been inserted in the specified drive.
Environmental variable error	Re-install the software or change the environment variable to the correct value.
Illegal file format.	The specified file cannot be processed by the MC Unit or the specified file has been damaged. Specify a legal file or re-create the data.
Insufficient space on disk.	Try the operation again with a new data disk.
Non-standard file format.	The specified files exceed the number that the MC Unit can manage or the specified file has been damaged. Re-create the data.

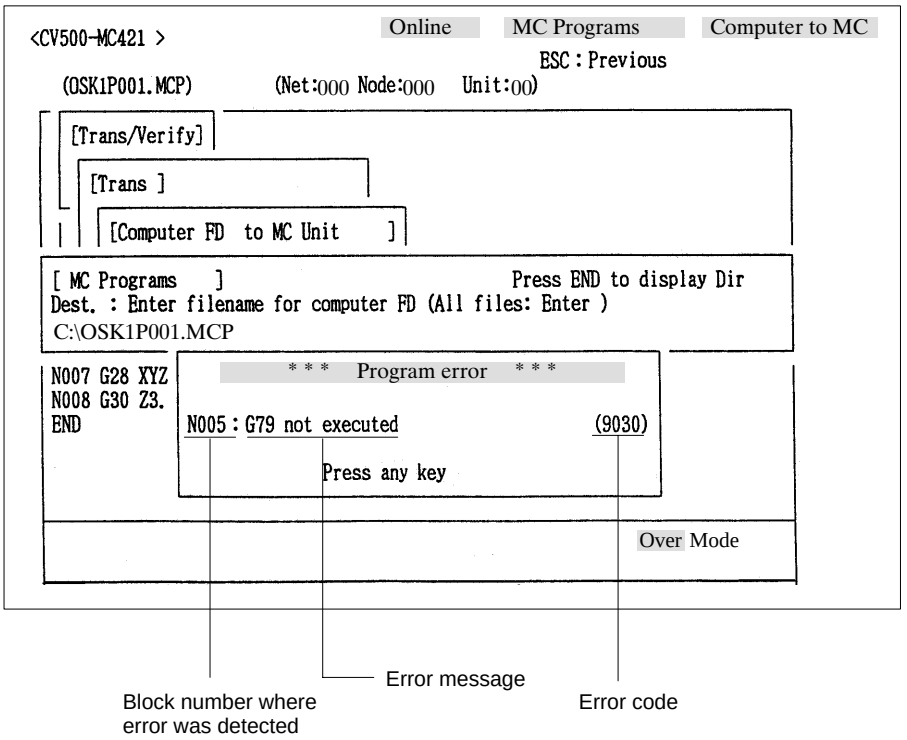
Error message	Likely cause/solution
Path name error	Use the correct path name.
Printer error	The printer is not connected, is not online, or is out of paper.
Program does not exist	The specified program does not exist in the MC Unit. Check whether the specified program is in the MC Unit.
Source file not found	The specified file does not exist. Try the operation again using the correct path name and filename.
Source program not found	The specified program does not exist in the MC Unit. Check whether the specified program is in the MC Unit.
Specified drive does not exist.	An incorrect drive name was input.
Specified drive not a FD drive	A non-floppy disk drive was specified in a format operation. Try again, but specify a floppy disk drive.
Specified file is read-only	The specified file is protected. Clear the write-protection.
Specified file not found	Use the correct path name and filename.
Temporary file is read-only.	The MC Support Software's work file is protected. Clear the write-protection.
Write error.	An error resulted when data was written to the flash memory. Replace the MC Unit.
Wrong MC model	The model of MC Unit designated with the Setup Menu does not coincide with the model of MC Unit in use. Check "MC model" setting on the Setup Menu or the MC Unit.

18-3 Programming/Program Transfer Errors

Each program block is checked while programming and an error message like the one below will be displayed if an error is detected.



When a program is transferred to the MC Unit, syntax checks are performed on all of the program blocks and an error message like the one below will be displayed if an error is detected.



Error Messages

The following table lists the programming/program transfer errors and their likely causes.

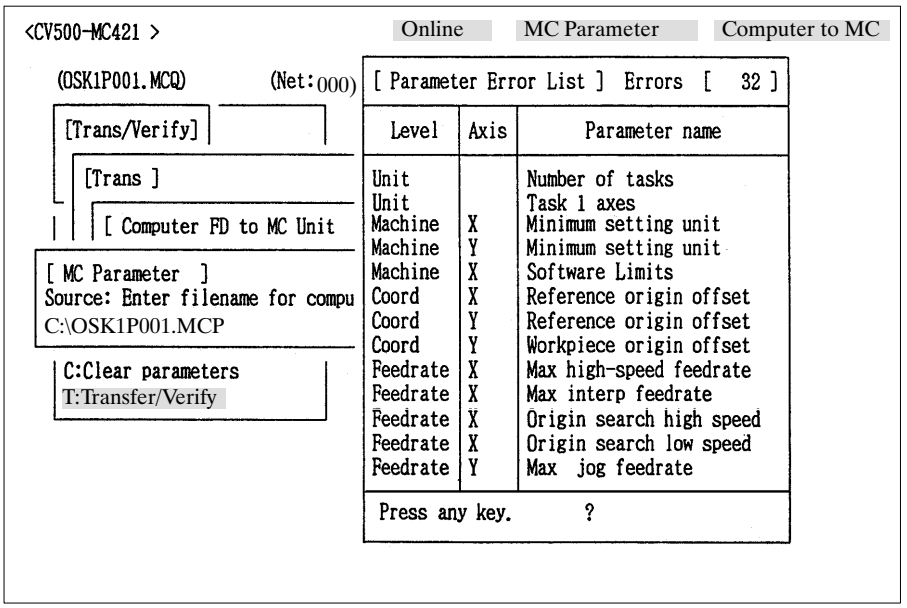
Code	Error message	Likely cause/solution
1010	Block number error: Out of range	An incorrect block number was specified. The first character must be “N” or “n” followed by a three digit decimal number (000 to 999).
1020	Block number error: Not N000	The block declaring the program number is not N000. (This error occurs if a correct program number is declared, but it is not declared in block N000.)
1030	Block number error: N000	A G code or M-code output was programmed in block N000.
2010	Data error: Axis movement command X coordinate	An incorrect value/format was used for the X-axis’ coordinate data in an axis movement command.
2020	Data error: Axis movement command Y coordinate	An incorrect value/format was used for the Y-axis’ coordinate data in an axis movement command.
2030	Data error: Axis movement command Z coordinate	An incorrect value/format was used for the Z-axis’ coordinate data in an axis movement command.
2040	Data error: Axis movement command U coordinate	An incorrect value/format was used for the U-axis’ coordinate data in an axis movement command.
2050	Data error: M code	An incorrect value/format was used for the M code.
2070	Data error: Optional number	An incorrect value/format was used for the optional number.
2080	Data error: Velocity data	An incorrect value/format was used for the speed data.
2090	Data error: Arc center, X coordinate	An incorrect value/format was used for the X-axis’ arc center coordinate data.
2100	Data error: Arc center, Y coordinate	An incorrect value/format was used for the Y-axis’ arc center coordinate data.
2110	Data error: Arc center, Z coordinate	An incorrect value/format was used for the Z-axis’ arc center coordinate data.

Code	Error message	Likely cause/solution
2120	Data error: Arc center, U coordinate	An incorrect value/format was used for the U-axis' arc center coordinate data.
2130	Data error: Radius	An incorrect value/format was used for the radius.
2140	Data error: Wait time	An incorrect value/format was used for the wait time.
2160	Data error: Number of loops	An incorrect value/format was used for the number of loops.
2170	Data error: X axis offset	An incorrect value/format was used for the X axis offset.
2180	Data error: Y axis offset	An incorrect value/format was used for the Y axis offset.
2190	Data error: Z axis offset	An incorrect value/format was used for the Z axis offset.
2200	Data error: U axis offset	An incorrect value/format was used for the U axis offset.
2210	Data error: X axis PV	An incorrect value/format was used for the X-axis' PV.
2220	Data error: Y axis PV	An incorrect value/format was used for the Y-axis' PV.
2230	Data error: Z axis PV	An incorrect value/format was used for the Z-axis' PV.
2240	Data error: U axis PV	An incorrect value/format was used for the U-axis' PV.
2250	Data error: First item	An incorrect value/format was used for the first term in an arithmetic operation.
2260	Data error: Second item	An incorrect value/format was used for the second term in an arithmetic operation.
2270	Data error: Third item	An incorrect value/format was used for the third term in an arithmetic operation.
2280	Data error: Parameter	An incorrect value/format was used for the parameter type.
2290	Data error: X axis parameter change value	An incorrect value/format was used for the X-axis' new parameter setting.
2300	Data error: Y axis parameter change value	An incorrect value/format was used for the Y-axis' new parameter setting.
2310	Data error: Z axis parameter change value	An incorrect value/format was used for the Z-axis' new parameter setting.
2320	Data error: U axis parameter change value	An incorrect value/format was used for the U-axis' new parameter setting.
3000	Illegal item	There is an illegal item (unknown format).
4010	Duplication error: Axis name	An axis name was specified more than once.
4020	Duplication error: Axis movement X coordinate	The X-axis' coordinate data was specified more than once in an axis movement command.
4030	Duplication error: Axis movement Y coordinate	The Y-axis' coordinate data was specified more than once in an axis movement command.
4040	Duplication error: Axis movement Z coordinate	The Z-axis' coordinate data was specified more than once in an axis movement command.
4050	Duplication error: Axis movement U coordinate	The U-axis' coordinate data was specified more than once in an axis movement command.
4060	Duplication error: M code data	The M code data was specified more than once. (This error won't occur for M code outputs.)
4070	Duplication error: Optional number	An optional number was specified more than once.
4080	Duplication error: Velocity data	The speed data was specified more than once.
4090	Duplication error: Arc center, X coordinate	The X-axis' arc center coordinate data was specified more than once.
4100	Duplication error: Arc center, Y coordinate	The Y-axis' arc center coordinate data was specified more than once.
4110	Duplication error: Arc center, Z coordinate	The Z-axis' arc center coordinate data was specified more than once.
4120	Duplication error: Arc center, U coordinate	The U-axis' arc center coordinate data was specified more than once.
4130	Duplication error: Radius	The radius was specified more than once.
4140	Duplication error: Arc center coordinate & radius	Arc center coordinates and radius were both used.

Code	Error message	Likely cause/solution
4150	Duplication error: X axis offset	The X axis offset was specified more than once.
4160	Duplication error: Y axis offset	The Y axis offset was specified more than once.
4170	Duplication error: Z axis offset	The Z axis offset was specified more than once.
4180	Duplication error: U axis offset	The U axis offset was specified more than once.
4190	Duplication error: X axis PV	The X-axis' PV was specified more than once.
4200	Duplication error: Y axis PV	The Y-axis' PV was specified more than once.
4210	Duplication error: Z axis PV	The Z-axis' PV was specified more than once.
4220	Duplication error: U axis PV	The U-axis' PV was specified more than once.
4230	Duplication error: X axis parameter change value	The X-axis' new parameter setting was specified more than once.
4240	Duplication error: Y axis parameter change value	The Y-axis' new parameter setting was specified more than once.
4250	Duplication error: Z axis parameter change value	The Z-axis' new parameter setting was specified more than once.
4260	Duplication error: U axis parameter change value	The U-axis' new parameter setting was specified more than once.
5000	Comment Overflow	A comment block's comment exceeded 60 characters (bytes).
6000	G code error	An incorrect G code was specified. The first character must be "G" or "g" followed by a two-digit decimal code. An unused G code cannot be specified.
7000	Program number error	An incorrect program number was specified. The first character must be "P" or "p" followed by a three-digit decimal code (000 to 999).
8000	Insufficient input item	More items are required by the specified function. This error will occur when the program is edited or transferred.
9010	Block number duplication	The same block number was used more than once. (The block numbers for comment blocks cannot be used more than once, either.)
9020	Program declaration error	The first block is not block N000.
9030	G79 not executed	The last block in a main program (P000 to P499) does not contain G79.
9040	G73 not executed	The last block in a subprogram (P500 to P999) does not contain G73.
9050	No jump destination	The jump destination block number specified in a G70 or G71 function does not exist.
9060	Loop error	The loop counter was specified in a G70 function, but the destination block number is lower than the block number containing the G70 function.
9070	Unused axis error	An axis that was not declared in block N000 was used in an axis name, axis movement command, or circular plane specification (G17 to G22).
9080	Arc usage error	Just one axis was declared in block N000, but a function requiring two axes was used (G02, G03, or G17 to G22).
9090	G73 not allowed	Function G73 was used in a main program (P000 to P499).
9100	G79 not allowed	Function G79 was used in a subprogram (P500 to P999).
9110	Too many blocks	Data was input into the 801st block or when the data was less than one block.

18-4 Parameter Transfer Errors

Each parameter's value and format is checked when the parameters are transferred and error messages like the ones below will be displayed if any errors are detected. If an error occurs, check and correct the indicated parameter.



Level

The level indicates the type of parameter in which the error occurred.

Level	Parameter type
Unit	Unit parameter
Memory	Memory parameter
Machine	Machine parameter
Coord	Coordinate parameter
Feedrate	Feedrate parameter
Zone	Zone parameter
Servo	Servo parameter

Axis

The axis indicates the parameter's axis.

Axis	Parameter type
X, Y, Z, or U	Indicates axis X, Y, Z, or U
Blank	The axis is irrelevant.

Parameter Name

Indicates the name of the parameter in which the error occurred.

Errors

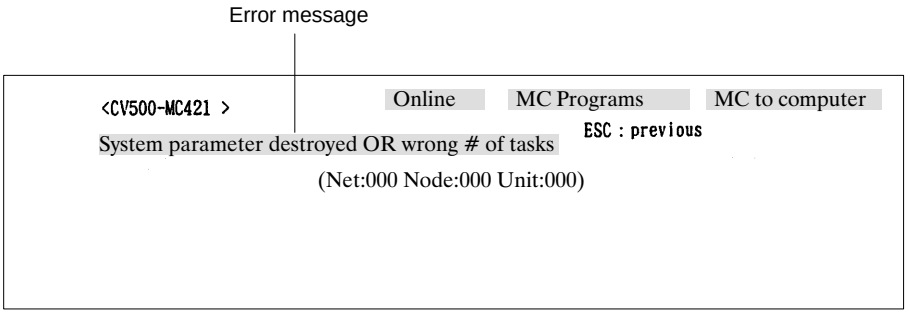
Indicates the number of errors that occurred.

Display Capacity

The display can list up to 15 errors at a time.

18-5 Monitoring Errors

The operating status of the MC Unit is monitored when using the MC Support Software's MC Monitoring function. If an error occurs in the MC Unit while its status is being monitored, an error message like the one below will be displayed.



Most monitoring errors are detected by the MC Unit and MC Support Software, but some are detected only in the MC Support Software. Refer to the *MC Unit Operation Manual: Details* for details on errors detected by the MC Unit. The following table lists the errors detected only in the MC Support Software.

Error Messages

The following table lists the monitoring errors and their likely causes.

Error message	Likely cause/solution
Axis specification error (1100)	The task configuration (combination of axes being used) in the transferred program does not match the one in the destination MC Unit. Either change the task configuration in the MC Unit or edit the program. For example, this error would occur if the following program, using 4 axes, is transferred to an MC Unit with task configuration 1 (using axes XYZ). N000 P000 XYZU In this case, transfer a program using axes X, Y, or Z only. (Example: N000 P000 X)
Communications error (FFFF)	The connecting cable is disconnected or broken, the PC is not on, the MC Unit's communications format (network address, node address, baud rate, etc.) is incorrect, or a timeout occurred.
Duplicate program number (3006)	The specified program is being used in another task. Change the program number and transfer it again.
Insufficient program area (3009)	The program cannot be stored because the specified task's program area is insufficient or too many programs have been registered. Delete some programs or shorten the program and try again.
Program destroyed (3008)	The program has been corrupted. Transfer the required programs again after deleting all programs.
Program not executed (FFFF)	Program execution cannot be monitored because the program is not being executed in the MC Unit. Automatically resets when the program is executed.
Program number out of range (1106)	The program number is not within the acceptable range (000 to 999). Check the program number.
Relay err (A, B) Network (C) Node address (D)	This message indicates that a communications error occurred beyond the relay station (SYSMAC LINK, for example) when performing an operation such as a program transfer from the local network to another network. In this case, the relay station's network address (C) and node address (D) will be displayed. The communication command (A, B) will also be displayed.
Servicing other peripheral (3001)	The specified MC Unit is communicating with another computer running MC Support Software. Wait until the MC Unit is finished communicating with the other computer.

Error message	Likely cause/solution
Specified program does not exist (3005)	The specified program does not exist in the MC Unit. Check whether the program exists in the MC Unit.
System parameter OR wrong # of tasks (2300)	The system parameters might have been corrupted. (Download the parameters again.) The number of tasks registered in the system parameters might not match the number of tasks recorded in the program. Either delete the program or download system parameters with the same number of tasks. For example, this error would occur if a program was created with 1 task and then the number of tasks was changed to 4 but the program number was not deleted.

Appendix
Menu and Function Key Summaries

This appendix provides a handy reference to the functions that can be accessed through the various menus and function keys.

MC Program Edit

Name	Function	Page
S:Save programs	Stores the created/edited program on a data disk.	43
L:Load programs	Retrieves a program from a data disk.	45
C:Clear programs	Clears the program being edited.	34
D:Delete MC programs	Deletes programs stored in the MC Unit by task.	46
T:Transfer/Verify	Transfers and compares programs between the MC Unit and computer. Can also be used to write to flash memory	47
ntlp W:Save/Transfer (Computer to MC)	Stores the created program onto a data disk and transfers it to the MC Unit.	48
ntlp U:Transfer (MC to computer)/Load	Transfers the program from the MC Unit to a data disk and then retrieves the program from the data disk to the computer.	49

Key	Name	Function	Page
F1	PageUp	These keys are used to move through programs larger than 15 blocks. Press the F1 Key to display the previous 15 blocks, F2 Key to display the next 15 blocks.	32
F2	PageDown		
F3	Jump	Displays the 15 blocks beginning at the specified block number.	41
F4	Insert	Switches the line input mode between line insert and line overwrite modes.	32
F5	Renum	Renumbers the program blocks in ascending order.	37
F6	Delete	Deletes the specified range of program blocks.	46

MC Parameter Edit

Unit Parameter Edit

Name	Function	Page
A:Number of axis	Sets the number of axes that are to be used.	26
B:Number of tasks (1 to 4)	Sets the number of tasks that are to be used.	27
C:Task 1 axis	Sets the number of axes that are to be used for task 1.	29
D:Task 2 axis	Sets the number of axes that are to be used for task 2.	
E:Task 3 axis	Sets the number of axes that are to be used for task 3.	
F:Task 4 axis	Sets the number of axes that are to be used for task 4.	

Memory Parameter Edit

Name	Function	Page
A:Task 1 position data (start/end)	Sets the beginning and ending addresses for the position data that is to be used for task 1.	54
B:Task 2 position data (start/end)	Sets the beginning and ending addresses for the position data that is to be used for task 2.	
C:Task 3 position data (start/end)	Sets the beginning and ending addresses for the position data that is to be used for task 3.	
D:Task 4 position data (start/end)	Sets the beginning and ending addresses for the position data that is to be used for task 4.	

Machine Parameter Edit

Name	Function	Page
X:Edit X axis	Edits X-axis machine parameters.	59
Y:Edit Y axis	Edits Y-axis machine parameters.	
Z:Edit Z axis	Edits Z-axis machine parameters.	
U:Edit U axis	Edits U-axis machine parameters.	
C:Copy SV	Copies machine parameters to another axis.	60

Parameter	Settings	Page
Minimum setting unit	Select a minimum setting unit appropriate for the mechanical system.	63
Display unit	Select the units that will be used when monitoring the present value: mm, inches, degrees, or pulses.	64
Rotate direction	Specify whether the motor will turn forward or reverse when the command voltage to the servo-motor driver is positive.	65
Emergency stop method	Specify whether the command voltage will drop to 0 immediately or the remaining pulses will be output when an emergency stop is input.	65
Encoder ABS/INC	Specify whether the encoder being used is absolute-type or incremental-type.	66
Encoder resolution	Set the number of pulses output per revolution of the encoder.	66
Encoder polarity	Specify whether the motor will turn forward or reverse when the feedback pulses from the encoder increase.	67
Pulse rate	Set the amount that the axis is moved per feedback pulse.	67
Maximum motor speed	Specify the maximum rpm rate for the motor.	69
Software limits	Set the positive and negative limits.	69
Origin search method	Select the origin search method. Three methods are available.	70
Origin search direction	Specify whether to move in the positive or negative direction for the origin search.	71
Origin decel. method	Select an input method when decelerating near the origin.	71
Origin prox. logic	Specify whether the origin proximity input is normally open or closed.	72
Wiring check ON/OFF	Specify whether a wiring check is to be performed when the power is turned on.	72
Wiring check time	Set the wiring check time.	73
Wiring check pulses	Set the number of pulses used in the wiring check.	74
ABS encod. initial SV	Indicates the absolute encoder's initial setting and soft reset value when the operation was executed. These values can't be set with the MCSS.	---
ABS encod. soft reset		

Coordinate Parameter Edit

Name	Function	Page
A:Reference origin offset X axis	Sets the X-axis reference origin offset value.	77
B:Workpiece origin offset X axis	Sets the X-axis workpiece origin offset value.	77
C:Reference origin offset Y axis	Sets the Y-axis reference origin offset value.	77
D:Workpiece origin offset Y axis	Sets the Y-axis workpiece origin offset value.	77
E:Reference origin offset Z axis	Sets the Z-axis reference origin offset value.	77
F:Workpiece origin offset Z axis	Sets the Z-axis workpiece origin offset value.	77
G:Reference origin offset U axis	Sets the U-axis reference origin offset value.	77
H:Workpiece origin offset U axis	Sets the U-axis workpiece origin offset value.	77

Feed Rate Parameter Edit

Name	Function	Page
X:Edit X axis	Edits X-axis feed speed parameters.	59
Y:Edit Y axis	Edits Y-axis feed speed parameters.	
Z:Edit Z axis	Edits Z-axis feed speed parameters.	
U:Edit U axis	Edits U-axis feed speed parameters.	
C:Copy SV	Copies feed speed parameters to another axis.	60

Parameter	Settings	Page
Max. high-speed feed rate	Sets the maximum speed for PTP operation in each axis.	82
Max. interpolation feed rate	Sets the maximum speed for interpolation operations.	
Origin search high speed	During an origin search, the axis will be moved at this speed until an origin proximity input is received.	83
Origin search low speed	During an origin search, the speed will be decreased to this speed when an origin proximity input is received.	
Max. jog feed rate	Sets the maximum speed for jog feed.	82
Accel./Decel. curve	Specifies whether the acceleration/deceleration curve is trapezoidal or S-shaped.	84
Acceleration time	Sets the time required for the set speed to be attained when starting operation.	85
Deceleration time	Sets the time required for the speed to be reduced to zero when stopping.	
Interpolation accel. time	Sets the time required for the set speed to be attained when starting operation.	
Interpolation decel. time	Sets the time required for the speed to be reduced to zero when stopping.	
MPG ratios	Sets the ratio when MPG is used.	87

Zone Parameter Edit

Name	Function	Page
X:Edit X axis	Edits X-axis zone parameters.	59
Y:Edit Y axis	Edits Y-axis zone parameters.	
Z:Edit Z axis	Edits Z-axis zone parameters.	
U:Edit U axis	Edits U-axis zone parameters.	
C:Copy SV	Copies zone parameters to another axis.	60

Item	Contents	Page
Zone specification	Specifies whether or not the zone is to be set.	91
Positive SV, negative SV	Sets the upper and lower limits for the zone.	92

Servo Parameter Edit

Name	Function	Page
X:Edit X axis	Edits X-axis servo parameters.	59
Y:Edit Y axis	Edits Y-axis servo parameters.	
Z:Edit Z axis	Edits Z-axis servo parameters.	
U:Edit U axis	Edits U-axis servo parameters.	
C:Copy SV	Copies servo parameters to another axis.	60

Parameter	Settings	Page
A:Error counter warning	The Error Counter Alarm Flag will be turned ON if the number of accumulated pulses in the deviation counter exceeds this set value.	95
B:In position	Set this parameter to check the accumulated pulses in the error counter.	96
C:Position loop gain	Sets the position loop gain.	97
D:Position loop FF gain	Sets the position loop FF gain.	98
E:Backlash correction	Sets the backlash correction value.	99

Parameter Save

Name	Function	Page
S:Save parameters	Saves parameters to data disk.	102

Parameter Load

Name	Function	Page
L:Load parameters	Reads saved parameters from data disk to programming device.	103

Parameter Clear

Name	Function	Page
C:Clear parameters	Returns all parameters to initial settings.	104

Transfer/Verify

Name	Function	Page
T:Transfer/Verify	Transfers parameters between the MC Unit and the computer and verifies the transferred data against the original. Can also be used to write to flash memory.	104
D:Save/Transfer (Computer to MC)	Stores created parameters onto a data disk and transfers them to the MC Unit.	104
U:Transfer (MC to computer) /Load	Transfers parameters from the MC Unit to a data disk and then retrieves them from the data disk to the computer	106

Position Data

Name	Function	Page
S:Save positions	Saves position data to data disk.	113
L:Load positions	Retrieves position data from data disk.	115
C:Clear positions	Clears specified range of position data to “0.”	115
T:Transfer/Verify	Transfers position data between the MC Unit and the computer and verifies the transferred data against the original. Can also be used to write to flash memory.	116
D:Save/Transfer (Computer to MC)	Stores the created position data on a data disk and transfers it to the MC Unit.	117
U:Transfer (MC to computer) /Load	Transfers position data from the MC Unit to a data disk and then retrieves it from the data disk to the computer.	118

Key	Name	Function	Page
F1	Page Up	Displays the previous page.	110
F2	Page Down	Displays the next page.	
F3	Read	Displays specified position data on the screen.	111

MC Monitoring

Name	Function	Page
P:Display MC programs	Displays MC currently executing programs separately for each task.	126
F:Display FAL status	Displays MC Unit, task, and axis FAL status.	128
I:Display error log	Displays the error log.	130
S:Display MC I/O status	Displays MC input and output status separately.	130
N:Destination network address	Sets the network address of the MC Unit for which the present values are to be displayed.	133

Key	Name	Function	Page
F1	Switch	Appears when MC Monitoring is selected. Switches the present value displayed in the lower right corner of the screen.	126
F2	Page Up	Appears when “I:Display error log” or “S:Display MC I/O status” is selected. Displays the previous screen.	130, 133
F3	Page Down	Appears when “I:Display error log” or “S:Display MC I/O status” is selected. Displays the next screen.	130, 133
F4	Clear	Appears when “I:Display error log” is selected. Clears error log.	130

Transfer/Verify

Name	Function	Page
M:Transfer	Transfers programs, parameters, and position data between MC Unit and programming device.	136
C:Verify	Compares and verifies programs, parameters, and position data transferred between MC Unit and programming device.	140
W:Flash memory	Writes the program, parameters, and position data from the MC Unit to the flash memory.	143

Print

Name	Function	Page
P:Print MC programs	Prints programs.	148
H:Print MC parameters	Prints parameters.	
D:Print position data	Prints position data.	

File Management

Name	Function	Page
I:File list	Displays a list of filenames of programs, parameters, and position data on the data disk.	152
D:Delete file	Deletes programs, parameters, and position data from the data disk.	153
F:Format	Initializes floppy disk so that it can be used as data disk.	154

System Setup

Name	Function	Page
K:MC model	Sets the model of the MC Unit being used.	158
N:Destination network address	Specifies the destination network address for monitoring an MC Unit in a SYSMAC NET or SYSMAC LINK network.	158
C:Communications	Specifies whether the computer and Programmable Controller or MC Unit are connected through the Host Link or Peripheral port.	160
P:Printer model	Specifies the type of printer that can be used.	165
O:Overwrite confirm	Sets whether or not to display confirmation messages when overwriting a file of the same name using the File Transfer (MC to computer FD) operation.	166

Glossary

absolute position A position given in respect to the origin rather than in respect to the present position.

acceleration/deceleration curve Curves which determine the rate of acceleration to the maximum feed rate and the rate of deceleration from the maximum feed rate.

auxiliary bit A bit in the Auxiliary Area.

Backplane A base to which Units are mounted to form a Rack. Backplanes provide a series of connectors for these Units along with buses to connect them to the CPU and other Units and wiring to connect them to the Power Supply Unit. Backplanes also provide connectors used to connect them to other Backplanes.

basic instruction A fundamental instruction used in a ladder diagram. See *advanced instruction*.

baud rate The data transmission speed between two devices in a system measured in bits per second.

BCD Short for binary-coded decimal.

binary A number system where all numbers are expressed in base 2, i.e., numbers are written using only 0's and 1's. Each group of four binary bits is equivalent to one hexadecimal digit. Binary data in memory is thus often expressed in hexadecimal for convenience.

bit The smallest piece of information that can be represented on a computer. A bit has the value of either zero or one, corresponding to the electrical signals ON and OFF. A bit represents one binary digit. Some bits at particular addresses are allocated to special purposes, such as holding the status of input from external devices, while other bits are available for general use in programming.

block number Numbers used to distinguish blocks in MC programs. Block numbers are roughly equivalent to program line numbers.

bus A communications path used to pass data between any of the Units connected to it.

channel See *word*.

CIO Area A memory area used to control I/O and to store and manipulate data. CIO Area addresses do not require prefixes.

comment block A program block that contains comments input by the programmer. Comment blocks and program blocks share the same block numbers, but comment blocks begin with an asterisk rather than an "N."

control bit A bit in a memory area that is set either through the program or via a Programming Device to achieve a specific purpose, e.g., a Restart Bit is turned ON and OFF to restart a Unit.

counter A dedicated group of digits or words in memory used to count the number of times a specific process has occurred, or a location in memory accessed through a TC bit and used to count the number of times the status of a bit or an execution condition has changed from OFF to ON.

CPU The name of the Unit in a PC that contains the main CPU and other main PC components. See also *central processing unit*.

CPU Backplane A Backplane used to create a CPU Rack.

CPU Bus Unit A special Unit used with CV-series PCs that mounts to the CPU bus. This connection to the CPU bus enables special data links, data transfers, and processing.

CPU Bus Unit Area A part of the CIO Area allocated to CPU Bus Units. The use of the words and bits in this area is determined by the Unit to which they are allocated.

CPU Rack The main Rack in a building-block PC, the CPU Rack contains the CPU, a Power Supply, and other Units. The CPU Rack, along with the Expansion CPU Rack, provides both an I/O bus and a CPU bus.

CV-mode A form of communications useable only with CV-series PCs. See *C-mode*.

CV-series PC Any of the following PCs: CV500, CV1000, CV2000, or CVM1

CVSS See *CV Support Software*.

CW and CCW Abbreviations for clockwise (CW) and counterclockwise (CCW). CW and CCW are defined for a motor shaft in reference to a viewer facing the shaft on the end of the motor from which the shaft extends from the motor for connection.

CW/CCW limits Limits on the CW and CCW sides of the origin which can be internally set to restrict rotation of the shaft.

data area An area in the PC's memory that is designed to hold a specific type of data.

decimal A number system where numbers are expressed to the base 10. In a PC all data is ultimately stored in binary form, four binary bits are often used to represent one decimal digit, via a system called binary-coded decimal.

dwell time A setting that specifies the period of time during which positioning will stop before execution of the next positioning action.

error counter A counter used to ensure positioning accuracy when positioning via pulse trains. The error counter receives a target position as a specific number of pulses in a pulse train from the Motion Control Unit and outputs analog speed voltages to drive a servomotor accordingly. The specified number of pulses in the error counter is counted down by feedback from an encoder measuring actual motor shaft movement, causing voltage output to stop when the number of pulses equals zero, i.e., when the target position has been reached.

feedback The return of a portion of the output of a circuit or device to its input. It is used in servocontrol systems to help bring actual values closer to target values.

flag A dedicated bit in memory that is set by the system to indicate some type of operating status. Some flags, such as the carry flag, can also be set by the operator or via the program.

gain The increase in signal power produced by an amplifier.

G language A programming language used widely in position control. Program functions are entered simply by entering a "G," a 2-digit numerical code, and adding any needed parameters.

hunting The tendency, in servosystems, to overcompensate when the system's momentum carries it past the target position.

IBM PC/AT or compatible A computer that has similar architecture to, that is logically compatible with, and that can run software designed for an IBM PC/AT computer.

inching Manual feeding wherein positioning is executed one pulse at a time.

incremental position A position given in respect to the present position, rather than in respect to the origin.

initial position The present position when a start command is executed.

in position The range within which the system is determined to be at the target position.

input The signal coming from an external device into the PC. The term input is often used abstractly or collectively to refer to incoming signals.

interpolation The mathematical calculation of missing values based pm known values. The Motion Control Unit uses interpolation when positioning along two or more axes simultaneously. There are three types of interpolation possible: linear, circular, and helical (a combination of linear and circular).

interface An interface is the conceptual boundary between systems or devices and usually involves changes in the way the communicated data is represented. Interface devices such as NSBs perform operations like changing the coding, format, or speed of the data.

least-significant (bit/word) See *rightmost (bit/word)*.

leftmost (bit/word) The highest numbered bits of a group of bits, generally of an entire word, or the highest numbered words of a group of words. These bits/words are often called most-significant bits/words.

linear interpolation Dual-axis, linear positioning from the present position to a point designated as the interpolation end point based on specified points.

load The processes of copying data either from an external device or from a storage area to an active portion of the system such as a display buffer. Also, an output device connected to the PC is called a load.

local In network communications, the node or device from which communications are being viewed. See *remote*.

LSS Abbreviation for Ladder Support Software.

M code An abbreviation for machine code. The user can set various M codes for various positions so that each M code will be output when the workpiece passes its respective position.

MC program A G-language program that controls the MC Unit's operation.

megabyte A unit of storage equal to one million bytes.

most-significant (bit/word) See *leftmost (bit/word).*

MS-DOS An operating system in common use on smaller computers.

NC contacts Normally-closed contacts. A pair of contacts on a relay that open when the relay is energized.

negative software limit The lower limit on the number of pulses set as a software parameter.

nesting Programming one loop within another loop, programming a call to a subroutine within another subroutine, or programming an IF–ELSE programming section within another IF–ELSE section.

NO contacts Normally-open contacts. A pair of contacts on a relay that close when the relay is energized.

OFF The status of an input or output when a signal is said not to be present. The OFF state is generally represented by a low voltage or by non-conductivity, but can be defined as the opposite of either.

offline The state in which a Programming Device is not functionally connected to the CPU, although it may be connected physically.

offset A positive or negative value added to a base value such as an address to specify a desired value.

ON The status of an input or output when a signal is said to be present. The ON state is generally represented by a high voltage or by conductivity, but can be defined as the opposite of either.

online The state in which a Programming Device is functionally connected to the CPU so that CPU data and programs can be monitored or accessed.

online edit An edit to a program made from a peripheral device connected to and currently online with a PC in PROGRAM or MONITOR mode. In MONITOR mode, this means that the program is changed while it is actually being executed.

origin proximity input A signal input to indicate that the axis is near the origin.

origin search An operation used to automatically move the axes to the origin or to define the origin.

output The signal sent from the PC to an external device. The term output is often used abstractly or collectively to refer to outgoing signals.

parameters Data which determines limits and other conditions under which an operation will be carried out.

PC An acronym for Programmable Controller.

PC Setup A group of operating parameters set in the PC from a Programming Device to control PC operation.

positive software limit The upper limit on the number of pulses set as a software parameter.

present value The current value registered in a device at any instant during its operation. Present value is abbreviated as PV. The use of this term is generally restricted to timers and counters.

program block A unit of programming in MC programs roughly equivalent to program lines.

Programmable Controller A computerized device that can accept inputs from external devices and generate outputs to external devices according to a program held in memory. Pro-

grammable Controllers are used to automate control of external devices. Although single-unit Programmable Controllers are available, building-block Programmable Controllers are constructed from separate components. Such Programmable Controllers are formed only when enough of these separate components are assembled to form a functional assembly, i.e., there is no one individual Unit called a PC.

Programming Device A Peripheral Device used to input a program into a PC or to alter or monitor a program already held in the PC. There are dedicated programming devices, such as Programming Consoles, and there are non-dedicated devices, such as a host computer.

pulses Discrete signals sent at a certain rate. The Motion Control Unit outputs pulses, each of which designates a certain amount of movement. Such pulses are converted to an equivalent control voltage in actual positioning.

pulse rate The distance moved the motor shaft divided by the number of pulses required for that movement.

pulse train A series of pulses output together.

remote In network communications, the node or device with which communications are taking place. See *local*.

retrieve The processes of copying data either from an external device or from a storage area to an active portion of the system such as a display buffer. Also, an output device connected to the PC is called a load.

rightmost (bit/word) The lowest numbered bits of a group of bits, generally of an entire word, or the lowest numbered words of a group of words. These bits/words are often called least-significant bits/words.

RUN mode The operating mode used by the PC for normal control operations.

servicing The process whereby the PC provides data to or receives data from external devices or remote I/O Units, or otherwise handles data transactions for Link Systems.

servolock An operation whereby a rotary encoder is used to maintain the position of a motor while it is stopped. Whenever the motor axis moves, the rotary encoder sends a feedback pulse to an error counter, causing a rotation voltage to be generated in the reverse direction so that the motor rotates back to its original position.

software error An error that originates in a software program.

sub-program A group of instructions that are executed independently of the main program.

target position A parameter for a positioning action that designates what position is to be reached at the completion of the action.

teaching Automatically writing the present position into memory, via the Teaching Box, as the target position for the designated positioning action.

transfer The process of moving data from one location to another within the PC, or between the PC and external devices. When data is transferred, generally a copy of the data is sent to the destination, i.e., the content of the source of the transfer is not changed.

unit address A number used to control network communications in FINS protocol. Unit addresses are computed for Units in various ways, e.g., 10 hex is added to the unit number to determine the unit address for a CPU Bus Unit.

unit number A number assigned to some Link Units, Special I/O Units, and CPU Bus Units to facilitate identification when assigning words or other operating parameters.

uploading The process of transferring a program or data from a lower-level or slave computer to a higher-level or host computer. If a Programming Devices is involved, the Programming Device is considered the host computer.

watchdog timer A timer within the system that ensures that the scan time stays within specified limits. When limits are reached, either warnings are given or PC operation is stopped depending on the particular limit that is reached.

WDT See *watchdog timer*.

wiring check A check performed automatically at startup to detect wiring problems such as reversed polarity or disconnections.

word A unit of data storage in memory that consists of 16 bits. All data areas consists of words. Some data areas can be accessed only by words; others, by either words or bits.

work bit A bit that can be used for data calculation or other manipulation in programming, i.e., a ‘work space’ in memory. Also see *work word*.

write-protect A state in which the contents of a storage device can be read but cannot be altered.

zone A range of positions or values which can be defined so that flags are turned ON whenever the present position is within the range.

Index

A

B

C

D

E

F

H–I

K–L

M

N

O

P

R

S

T

U

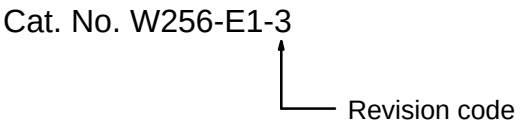
V

W

Z

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	May 1995	Original production
2	April 1996	Extensive additions related to the C200H-MC221 have been made throughout the manual.
3	July 1998	**Page 28 :** *3-7 Changing the Task Configuration* added.