GE Fanuc Automation Europe

Computer Numerical Controls



Ethernet Board
Data Server Board

Operator's Manual

B-63354 EN / 04

FANUC

TECHNOLOGY AND MORE

- No part of this manual may be reproduced in any form.
- All specifications and designs are subject to change without notice.

The export of this product is subject to the authorization of the government of the country from where the product is exported.

In this manual we have tried as much as possible to describe all thevarious matters.
However, we cannot describe all the matters which must not be done,or which cannot be done, because there are so many possibilities.
Therefore, matters which are not especially described as possible inthis manual should be regarded as ”impossible”.

* Ethernet is a registered trademark of Xerox.

SAFETY PRECAUTIONS

This manual includes safety precautions for protecting the user and preventing damage to the machine. Precautions are classified into Warnings and Cautions according to their bearing on safety. Also, supplementary information is described as Notes. Read the Warnings, Cautions, and Notes thoroughly before attempting to use the machine.

> ⚠ **WARNING**
> Applied when there is a danger of the user being injured or when there is a danger of both the user being injured and the equipment being damaged if the approved procedure is not observed.

> ⚠ **CAUTION**
> Applied when there is a danger of the equipment being damaged, if the approved procedure is not observed.

> **NOTE**
> Notes is used to indicate supplementary information other than Warnings and Cautions.

- Read this manual carefully, and store it in a safe place.

1.1 GENERAL WARNINGS AND CAUTIONS

⚠ WARNING

1 Before operating the machine, thoroughly check the entered data. Operating the machine with incorrectly specified data may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

2 Never attempt to machine a workpiece without first checking the programmed value, compensation value, current position, and external signal settings. Also, never attempt to machine a workpiece without first checking the operation of the machine. Before starting a production run, ensure that the machine is operating correctly by performing a trial run using, for example, the single block, feedrate override, or machine lock function, or by operating the machine with neither a tool nor workpiece mounted. Failure to confirm the correct operation of the machine may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

3 Ensure that the specified feedrate is appropriate for the intended operation. Generally, for each machine, there is a maximum allowable feedrate. The appropriate feedrate varies with the intended operation. Refer to the manual provided with the machine to determine the maximum allowable feedrate. If a machine is run at other than the correct speed, it may behave unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

4 When using a tool compensation function, thoroughly check the direction and amount of compensation. Operating the machine with incorrectly specified data may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

5 The parameters for the CNC and PMC are factory-set. Usually, there is no need to change them. When, however, there is no alternative other than to change a parameter, ensure that you fully Failure to set a parameter correctly may result in the machine behaving unexpectedly, possibly causing damage to the workpiece and/or machine itself, or injury to the user.

⚠ CAUTION

1 Immediately after switching on the power, do not touch any of the keys on the MDI panel until the position display or alarm screen appears on the CNC unit. Some of the keys on the MDI panel are dedicated to maintenance or other special operations. Pressing any of these keys may place the CNC unit in other than its normal state. Starting the machine in this state may cause it to behave unexpectedly.

2 The operator's manual for Ethernet board describes all the basic functions of the CNC, including the optional functions. The selected optional functions vary with the machine. Some functions described in this manual may not, therefore, be supported by your machine. Check the machine specifications before using Ethernet board.

3 Some machine operations and screen functions are implemented by the machine tool builder. For an explanation of their usage and related notes, refer to the manual provided by the machine tool builder.
For example:
- On some machines, executing a tool function causes the tool change unit to operate. When executing a tool function on such a machine, stand well clear of the tool change unit. Otherwise, there is a danger of injury to the operator.
- Many auxiliary functions trigger physical operations, such as rotation of the spindle. Before attempting to use an auxiliary function, therefore, ensure that you are fully aware of the operation to be triggered by that function.

NOTE

Command programs, parameters, and variables are stored in nonvolatile memory in the CNC. Generally, the contents of memory are not lost by a power on/off operation. However, the contents of memory may be erased by mistake, or important data in nonvolatile memory may have to be erased upon recovering from a failure.
To enable the restoration of data as soon as possible if such a situation arises, always make a backup of the data in advance.

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I. GENERAL

1 GENERAL

This part explains the organization of this manual.

1.1 Organization

This manual consists of the following parts:

SAFETY PRECAUTIONS
This section describes the precautions to be observed when reading this manual.

I GENERAL
This section describes the chapter organization, applicable models, and related manuals.

II SPECIFICATION
This section describes the specifications related to using the Ethernet functions.

III SETTING
This section describes the settings needed to use the Ethernet functions.

IV OPERATION
This section describes the procedures for using the Ethernet functions.

V CONNECTION
This section describes the specifications related to connecting devices for using the Ethernet functions, and related precautions.

VI MAINTENANCE
This section describes the Ethernet board drawing numbers, and the meanings of the LED indications.

APPENDIXES
These appendixes describe additional information such as that related to troubleshooting, the operation of the FTP client, and how to set up the FTP server.

1.2 Applicable Models

This Operator's Manual covers the following models.
The abbreviations in the following table are sometimes used in text descriptions.

Product name	Abbreviations		
FANUC Series 15*i*-MA	15*i*-MA	Series 15*i*-A	15*i*
FANUC Series 16*i*-TA	16*i*-TA	Series 16*i*-A	16*i*
FANUC Series 16*i*-MA	16*i*-MA		
FANUC Series 18*i*-TA	18*i*-TA	Series 18*i*-A	18*i*
FANUC Series 18*i*-MA	18*i*-MA		
FANUC Series 21*i*-TA	21*i*-TA	Series 21*i*-A	21*i*
FANUC Series 21*i*-MA	21*i*-MA		
FANUC Series 16*i*-TB	16*i*-TB	Series 16*i*-B	16*i*
FANUC Series 16*i*-MB	16*i*-MB		
FANUC Series 18*i*-TB	18*i*-TB	Series 18*i*-B	18*i*
FANUC Series 18*i*-MB	18*i*-MB		
FANUC Series 21*i*-TB	21*i*-TB	Series 21*i*-B	21*i*
FANUC Series 21*i*-MB	21*i*-MB		
FANUC Power Mate *i*-D	Power Mate *i*-D	Power Mate *i*	PM*i*
FANUC Power Mate *i*-H	Power Mate *i*-H		

1.3 Related Manuals

The table below lists manuals related to this Operator's Manual.
Refer to these manuals when you use this Operator's Manual.

Series 15*i*-MA related manuals

Manual name	Specification number
DESCRIPTIONS	B-63322EN
CONNECTION MANUAL (hardware)	B-63323EN
CONNECTION MANUAL (function)	B-63323EN-1
OPERATOR'S MANUAL (programming)	B-63324EN
OPERATOR'S MANUAL (operation)	B-63324EN-1
MAINTENANCE MANUAL	B-63325EN
PARAMETERS MANUAL	B-63330EN

Series 16*i*/18*i*-TA/MA related manuals

Manual name	Specification number
DESCRIPTIONS	B-63002EN
CONNECTION MANUAL (hardware)	B-63003EN
CONNECTION MANUAL (function)	B-63003EN-1
OPERATOR'S MANUAL (for lathe)	B-63004EN
OPERATOR'S MANUAL (for machining center)	B-63014EN
MAINTENANCE MANUAL	B-63005EN
PARAMETERS MANUAL	B-63010EN

Series 21*i*-TA/MA related manuals

Manual name	Specification number
DESCRIPTIONS	B-63002EN
CONNECTION MANUAL (hardware)	B-63083EN
CONNECTION MANUAL (function)	B-63003EN-1
OPERATOR'S MANUAL (for lathe)	B-63084EN
OPERATOR'S MANUAL (for machining center)	B-63094EN
MAINTENANCE MANUAL	B-63085EN
PARAMETERS MANUAL	B-63090EN

Series 16*i*/18*i*-TB/MB related manuals

Manual name	Specification number
DESCRIPTIONS	B-63522EN
CONNECTION MANUAL (hardware)	B-63523EN
CONNECTION MANUAL (function)	B-63523EN-1
OPERATOR'S MANUAL (for lathe)	B-63524EN
OPERATOR'S MANUAL (for machining center)	B-63534EN
MAINTENANCE MANUAL	B-63525EN
PARAMETERS MANUAL	B-63530EN

Series 21*i*-TA/MA related manuals

Manual name	Specification number
DESCRIPTIONS	B-63522EN
CONNECTION MANUAL (hardware)	B-63523EN
CONNECTION MANUAL (function)	B-63523EN-1
OPERATOR'S MANUAL (for lathe)	B-63604EN
OPERATOR'S MANUAL (for machining center)	B-63614EN
MAINTENANCE MANUAL	B-63525EN
PARAMETERS MANUAL	B-63610EN

Power Mate *i* related manuals

Manual name	Specification number
DESCRIPTIONS	B-63172EN
CONNECTION MANUAL (hardware)	B-63173EN
CONNECTION MANUAL (function)	B-63017EN-1
OPERATOR'S MANUAL	B-63084EN
MAINTENANCE MANUAL	B-63175EN
PARAMETERS MANUAL	B-63180EN

FACTOLINK function, FA system for PC related manuals

Manual name	Specification number
FACTOLINK Script Function, OPERATOR'S MANUAL	B-75054EN
FA SYSTEM for PC WindowsNT Version, OPERATOR'S MANUAL	B-75044EN

II. SPECIFICATION

1 ETHERNET FUNCTIONS

Function lists

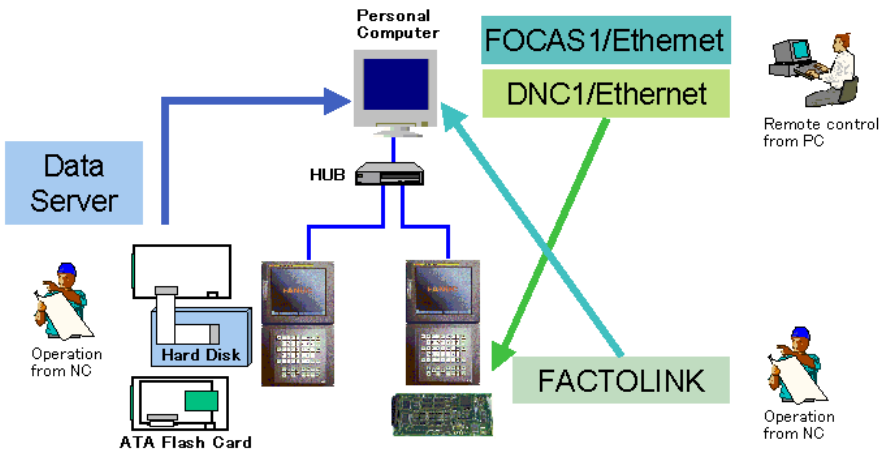
The Ethernet board can use the following functions:

Function name	Applicable model
FACTOLINK function	Series 16*i*/18*i*/21*i*-A
DNC1/Ethernet function	Series 16*i*/18*i*/21*i*-A Power Mate *i*
FOCAS1/Ethernet function	Series 16*i*/18*i*/21*i*-A Power Mate *i*

The data server board can use the following functions:

Function name	Applicable model
FACTOLINK function	Series 16*i*/18*i*/21*i*-A
DNC1/Ethernet function	Series 16*i*/18*i*/21*i*-A
FOCAS1/Ethernet function	Series 16*i*/18*i*/21*i*-A
Data server function	Series 15*i*/16*i*/18*i*-A/21*i*-A

These functions can be used at the same time.



1.1 FACTOLINK Function

The FACTOLINK function displays a work instruction on the CNC screen or transfers NC data, using the NC.
For details, refer to "FANUC FACTOLINK Script Function, OPERATOR'S MANUAL (B-75054EN)."

Screen display

You can display a work instruction created on a personal computer on the NC screen, using the NC.

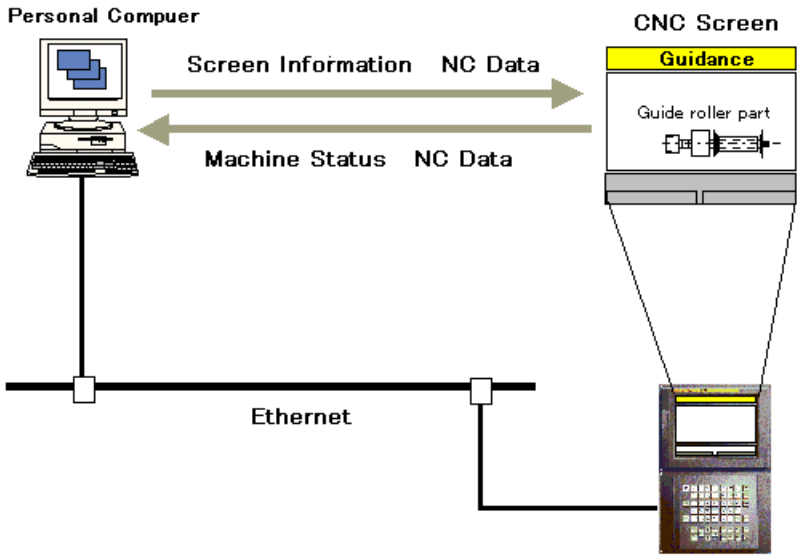
NC data transfer

The following NC data can be transferred by using the NC:

- NC program
- NC file data
  - Parameter
  - Ladder program
  - C executor in executable form
  - Macro executor in executable form
  - NC system file
- PMC data
  - Address T, K, C, D

Logging

The status of the machine can be automatically sent to a personal computer.



1.2 DNC1/Ethernet Function

The DNC1/Ethernet function enables the remote control and monitoring of the CNC from a personal computer.
For details, refer to "FANUC FA SYSTEM for PC WindowsNT Version, OPERATOR'S MANUAL (B-75044EN)."

NC data transfer

The following data can be transferred using a personal computer:

- NC program
- Directory information of tape memory
- NC file data
  - Parameter
  - Tool offset value
  - Custom macro variable
- Alarm information
- NC system identifying information
- PMC data
  - Address G, F, Y, X, A, R, T, K, C, D

Remote control

The following operations can be controlled remotely using a personal computer:

- Selection of NC program
- Deletion of NC program
- External rerset

Operation

The following operation can be controlled remotely using a personal computer:

- DNC operation

1.3 FOCAS1/Ethernet Function

The FOCAS1/Ethernet function enables the remote control and monitoring of the CNC from a personal computer.
For details, refer to "FANUC Open CNC FOCAS1/Ethernet CNC/PMC Data Window Library."

NC data transfer

The following data can be transferred using a personal computer:

- Deletion of NC program Data related to the controlled axis and spindle
  - Absolute position
  - Relative position
  - Machine position
  - Distance to go
  - Actual feedrate
- Deletion of NC program NC program
- Deletion of NC program Directory information of tape memory
- Deletion of NC program NC file data
  - Parameter
  - Tool offset value
  - Custom macro variable
  - Workpiece origin offset
  - Setting data
  - P-code macro variable
  - Pitch error compensation data
- Deletion of NC program Tool life management data
- Deletion of NC program History data
  - Operation history data
  - Alarm history data
- Deletion of NC program Data related to servo and spindle
- Deletion of NC program Data related to waveform diagnosis
- Deletion of NC program Modal data
- Deletion of NC program Diagnosis data
- Deletion of NC program A/D conversion parameter
- Deletion of NC program Alarm information
- Deletion of NC program NC system-identifying information
- Deletion of NC program PMC data
  - Address G, F, Y, X, A, R, T, K, C, D
  - Extended maintenance type data

Remote control

The following operations can be controlled remotely using a personal computer:

- Selection of NC program
- Deletion of NC program
- External reset

Operation

The following operation can be controlled remotely using a personal computer:

- DNC operation

1.4 Data Server Function

The data server function uses FTP to transfer NC data or operate the DNC.
This function is mainly used as an FTP client, but is also used as an FTP server.
This function uses a hard disk or ATA flash card (hard disk) mounted on (connected to) the data server board as the storage area for the NC data.

NC data transfer [Personal computer ↔ Hard disk on the data server board] <FTP client>

The data server function is used as an FTP client, by using the NC, thus providing the following services:

- GET
- MGET
- PUT
- MPUT
- DIR
- DEL

NC data transfer [Personal computer ↔ Hard disk on the data server board] <FTP server>

The data server function is used as an FTP server, using a personal computer, thus providing the following services:

- GET
- MGET
- PUT
- MPUT
- DIR
- DEL

NC data transfer [Hard disk on the data server board ↔ Tape memory]

The data server function can transfer the following data, using the NC:

- NC program
- NC file data
  - Parameter
  - Tool offset value
  - Custom macro variable
  - Workpiece origin offset value
  - Pitch error compensation data
  - M-code group (for Series 16*i*/18*i*-A/B only)
- History data
  - Operation history data
  -

Operation [Hard disk on the data server board ↔ Tape memory]

The following operations can be performed using the NC:

- DNC operation
- DNC operation by calling a subprogram (M198)

Operation [Personal computer ↔ Tape memory]

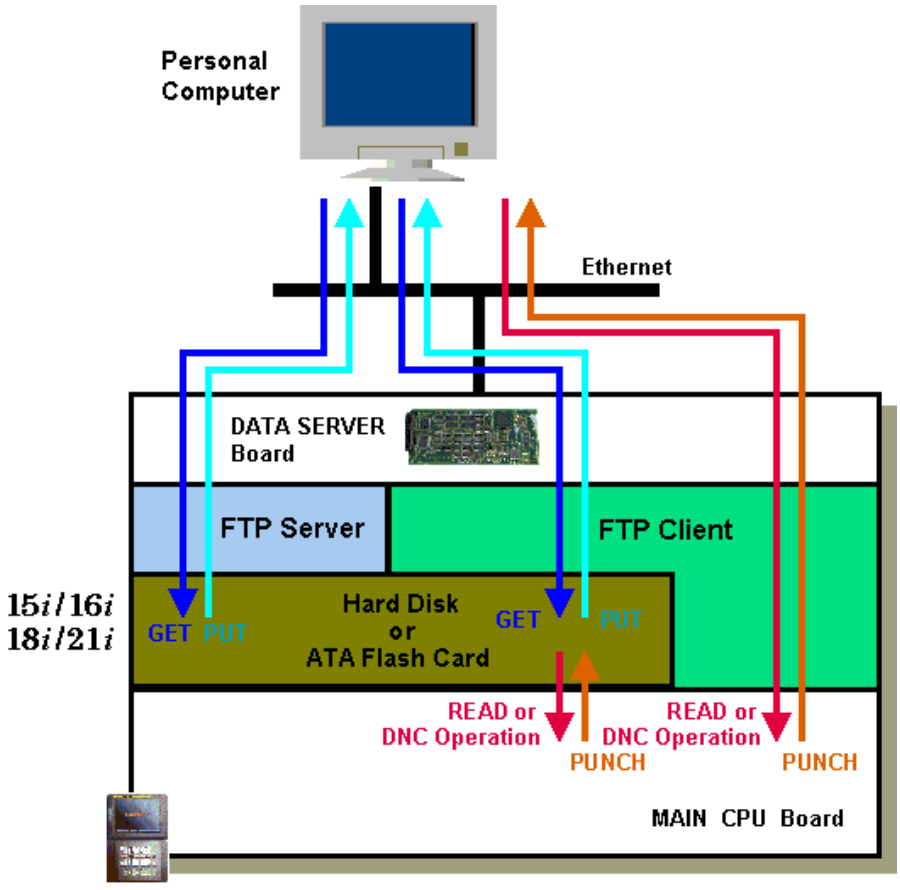
The following operations can be performed using the NC:

- DNC operation
- DNC operation by calling the subprogram (M198)

Hard disk management

The following hard disk management can be performed, using the NC:

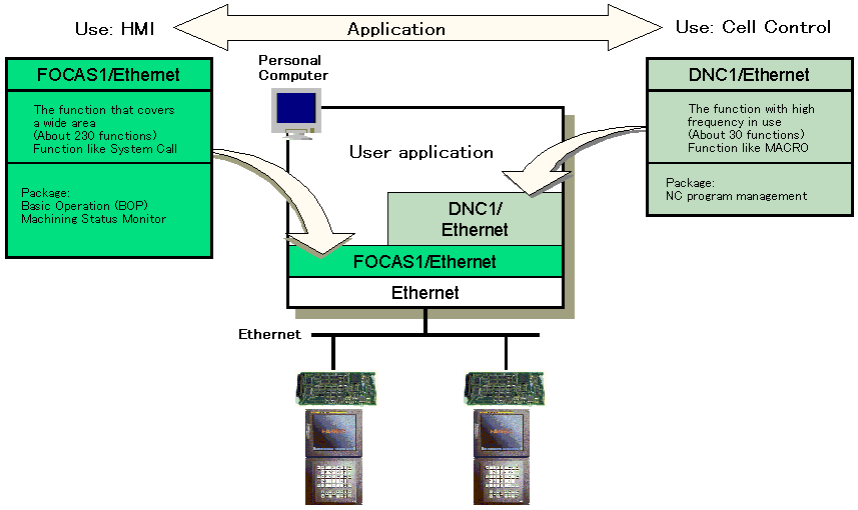
- Formatting of the hard disk
- Checking of the hard disk
- Displaying a list of files on the hard disk



NOTE

The file names on the hard disk in the data server conform to the 8.3 format (eight-character name and three-character extension). When specifying these file names, make sure that they are in the 8.3 format.

1.5 Difference between the FOCAS1/Ethernet Function and DNC1/Ethernet Function



III. SETTING

1 FACTOLINK FUNCTIONS FOR THE 16*i*/18*i*/21*i*

This section describes the settings needed to use the FACTOLINK functions with the Series 16*i*/18*i*/21*i*-A/B.

1.1 PRECAUTIONS WHEN USING THE ETHERNET BOARD FOR THE FIRST TIME

⚠ CAUTION

When the Ethernet board is used for the first time, consult with your company's network administrator to determine the IP addresses and other settings. Then, conduct a communications test.
If incorrect IP addresses and other settings are set, communications may be interfered with or the entire network might be adversely affected.
Particularly, if a duplicate IP address is set, communication errors are caused intermittently. This may result in a CNC's system error. To check whether the IP address duplicates any one already in use, see "Checking IP addresses for duplication" in Appendix A.4, "Checking Communication."

NOTE

1 One of the following option functions is needed when the FACTOLINK functions are used:

Series16*i*-TA	**A02B-0236-S708**
Series 16*i*-MA	**A02B-0237-S708**
Series 18*i*-TA	**A02B-0238-S708**
Series 18*i*-MA	**A02B-0239-S708**
Series 21*i*-TA	**A02B-0247-S708**
Series 21*i*-MA	**A02B-0248-S708**
Series16*i*-TB	**A02B-0281-S708**
Series 16*i*-MB	**A02B-0282-S708**
Series 18*i*-TB	**A02B-0283-S708**
Series 18*i*-MB	**A02B-0284-S708**
Series 21*i*-TB	**A02B-0285-S708**
Series 21*i*-MB	**A02B-0286-S708**

2 Only one server can be connected to one CNC unit by the FACTOLINK function.

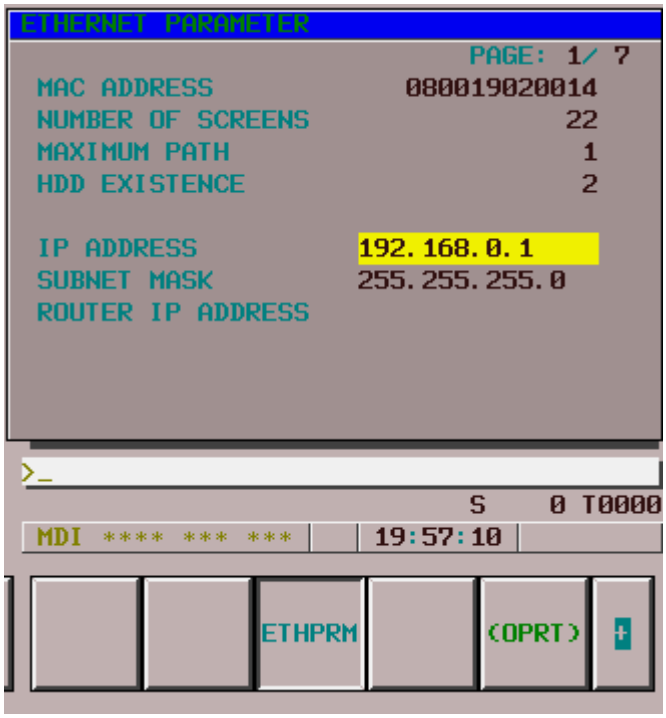
1.2 ETHERNET PARAMETER SCREEN

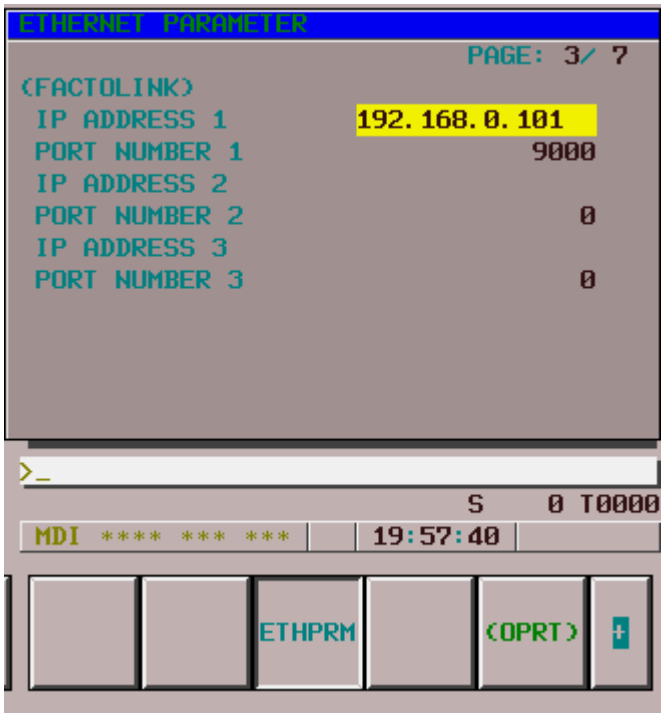
The Ethernet Parameter screen is used to set the parameters that are needed to use the FACTOLINK functions.

Display

Procedure

1 Place the CNC in MDI mode.
2 Press function key SYSTEM.
3 Press the Continuation menu key at the bottom right of the soft key menu.
4 When you press soft key [ETHPRM], the "Ethernet Parameter" screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the "Ethernet Parameter" screen, press soft key [ETHPRM] and then soft key [BOARD].
If parameters have already been registered, those parameter settings are displayed.
5 Enter or update the data using the MDI or soft keys.
6 Select the desired page using the PAGE ↑ PAGE ↓ page keys.




ETHERNET PARAMETER
PAGE: 3/ 7
(FACTOLINK)
IP ADDRESS 1
192.168.0.101
PORT NUMBER 1
9000
IP ADDRESS 2
PORT NUMBER 2
0
IP ADDRESS 3
PORT NUMBER 3
0
>_
S 0 T0000
MDI **** *** ***
19:57:40
ETHPRM
(OPRT)

Display items and setting items

Display items related to Ethernet functions

Those items related to Ethernet functions are displayed.

Item	Description
MAC ADDRESS	MAC address of the Ethernet board
NUMBER OF SCREENS	Total number of Ethernet error message screens used by the Ethernet functions
MAXIMUM PATH	Number of control systems in the CNC
HDD EXISTENCE	Indicates whether a hard disk or ATA flash card is mounted on the Ethernet board. 0: Not mounted. 2: Mounted.

TCP/IP setting items for the CNC

Set the TCP/IP items for the CNC.

Item	Description
IP ADDRESS	Specifies the IP address of the CNC. (Format: "192.168.0.1")
SUBNET MASK	Specifies the mask address of the network IP address. (Format: "255.255.255.0")
ROUTER IP ADDRESS	Specifies the router IP address. Specify this address when the network incorporates a router. (Format: "192.168.0.99")

FACTOLINK setting items

Set the items related to the host computer on which the FACTOLINK server runs.

Item	Description
IP ADDRESS 1	Specifies the IP address of the personal computer to be accessed by the FACTOLINK functions. (Format: "192.168.0.101")
PORT NUMBER 1	Specifies the port No. to be used by the FACTOLINK functions within a range of 5001 to 65535. This port No. must match "ocsnc" in the personal computer's "services" file. For details of how to set this, refer to the " FACTOLINK Script Function, OPERATOR'S MANUAL (B-75054EN)."
IP ADDRESS 2	Specifies the IP address of the personal computer to be accessed by the FACTOLINK functions. (Format: "192.168.0.102")
PORT NUMBER 2	Specifies the port No. to be used by the FACTOLINK functions within a range of 5001 to 65535. This port No. must match "ocsnc" in the personal computer's "services" file. For details of how to set this, refer to the "FANUC FACTOLINK Script Function, OPERATOR'S MANUAL (B-75054EN)."

Item	Description
IP ADDRESS 3	Specifies the IP address of the personal computer to be accessed by the FACTOLINK functions. (Format: "192.168.0.103")
PORT NUMBER 3	Specifies the port No. to be used by the FACTOLINK functions within a range of 5001 to 65535. This port No. must match "ocsnc" in the personal computer's "services" file. For details of how to set this, refer to the "FANUC FACTOLINK Script Function, OPERATOR'S MANUAL (B-75054EN)."

NOTE
When the "TCP/IP setting items for the CNC" have been changed, the power must be turned off then on again.

Entering data

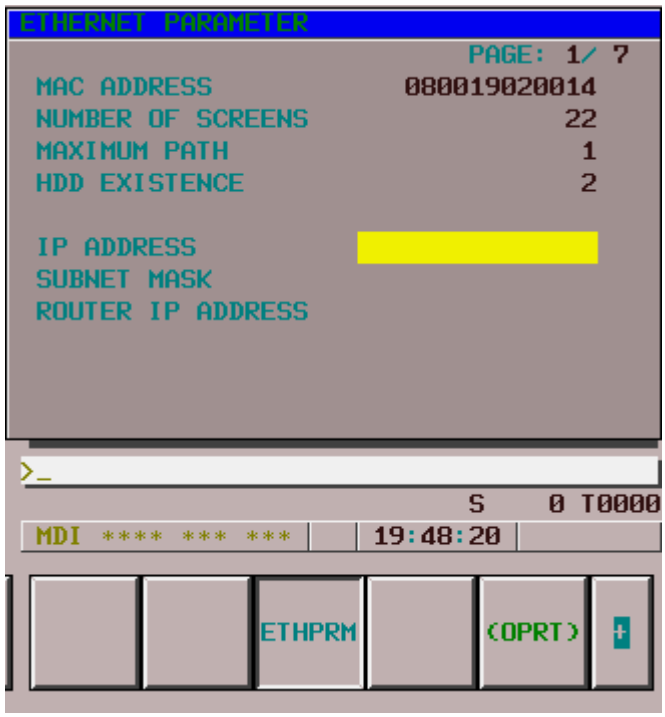
Procedure

The following describes the basic method for entering data.

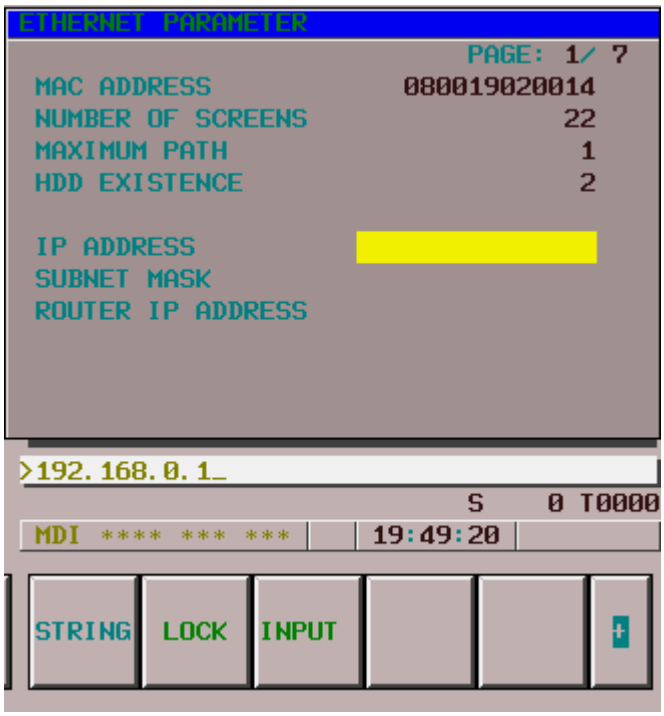
1 Place the CNC in MDI mode.
2 Display the "Ethernet Parameter" screen.
3 Position the cursor to the desired item by using the cursor movement keys.
4 Enter the desired data by using the MDI keys.
5 Press soft key [INPUT] or function key INPUT to fix the data.

NOTE
Already-set data can be deleted. To delete numerical data, enter 0. To delete character data, enter a space (SP).

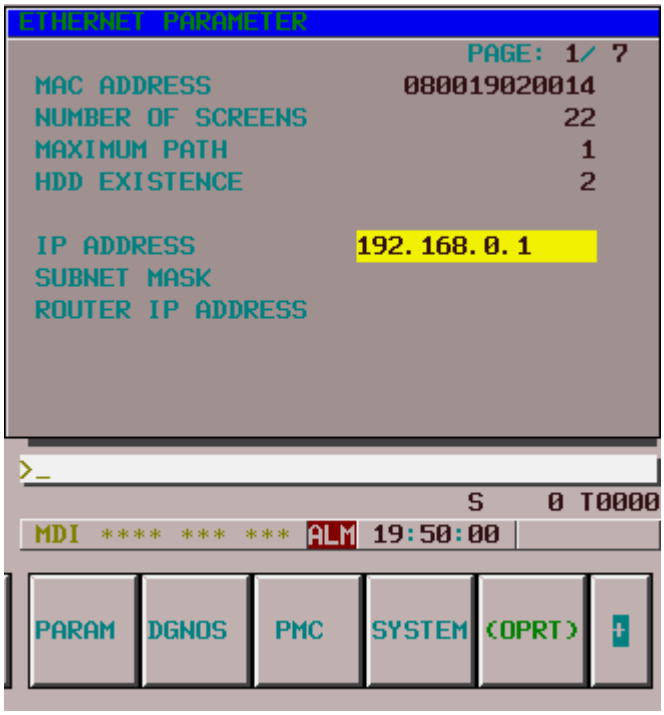
Example: To set the IP address to "192.168.0.1"
(a) Position the cursor to "IP ADDRESS."



(b) Enter "192.168.0.1" using the MDI keys.



(c) Press soft key [INPUT] or function key INPUT to fix the data. This causes the parameters to be saved to the non-volatile memory of the CNC.



1.3 PARAMETERS

The following describes the parameters related to the FACTOLINK functions.

Parameters

0802	Communication channel

[Data type] Byte
[Valid data range] 11 to 13
11: Selects IP address 1.
12: Selects IP address 2.
13. Selects IP address 3.

	#7	#6	#5	#4	#3	#2	#1	#0
0810			MONO	TIME				BGS

[Data type] Bit

BGS Performs the following when the FACTOLINK screen is not displayed.
1: Enables logging in the background.
0: Disables logging.

TIME Selects the time display format.
1: "97/11/12 00:00" format
0: "Wed Nov 12 00:00:00" format

MONO FACTOLINK screen display color
1: Monochrome
0: Color

0811	Communication channel

[Data type] Byte
[Valid data range] 0, 1, 10, 20, 21
0 : "D" address area
1 : "R" address area
10 : Fixed data only
20 : "D" address area + fixed data
21 : "R" address area + fixed data

0812	PMC address of logging data

[Data type] Word
[Valid data range] 0 to 65535
Sets the leading PMC address value where logging data is stored.

0813	Length of logging data

[Data type] Word
[Unit of data] Number of bytes
[Valid data range] 0 to 65535
Sets the length of the logging data.

0814	Logging trigger PMC address

[Data type] Word
[Valid data range] 0 to 65535
Sets the PMC address that constitutes the trigger for instructing the transfer of logging data.

0815	Transmission interval of logging data

[Data type] Double-word
[Unit of data] Second
[Valid data range] 0 to 4294967295
Specifies the time interval at which logging data (fixed data only) is sent. When "0" is specified, the logging data is sent only at connection.

0820	Name of machine to be reported to host (1st byte)
0821	Name of machine to be reported to host (2nd byte)
0822	Name of machine to be reported to host (3rd byte)
0823	Name of machine to be reported to host (4th byte)
0824	Name of machine to be reported to host (5th byte)
0825	Name of machine to be reported to host (6th byte)
0826	Name of machine to be reported to host (7th byte)
0827	Name of machine to be reported to host (8th byte)
0828	Name of machine to be reported to host (9th byte)

[Data type] Byte
[Valid data range] 32 to 126
Sets the machine name unique to each CNC that is needed so that the host computer can identify each CNC. Set an alphanumeric and blank ASCII code, in decimal.

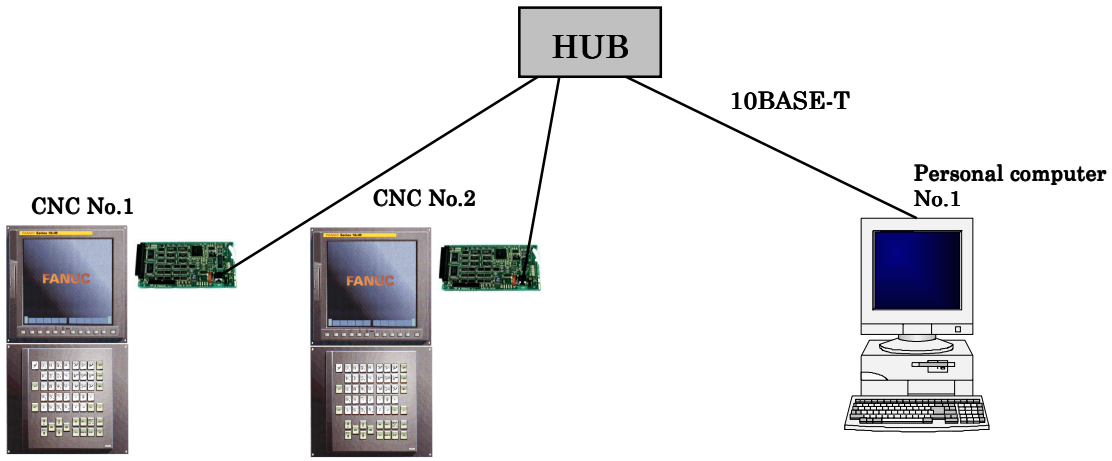
	#7	#6	#5	#4	#3	#2	#1	#0
3111	NPA							

[Data type] Bit
NPA Performs the following if an alarm occurs while the FACTOLINK screen is displayed.
1: Does not switch to the Alarm screen.
0: Switches to the Alarm screen.

1.4 CONFIGURING A SMALL-SCALE NETWORK

The following shows an example of the minimum settings needed to run the FACTOLINK functions on a small-scale network.
These settings allow a personal computer to be connected to two CNCs, using the FACTOLINK functions.

- The FACTOLINK function server runs on personal computer No.1.
- The FACTOLINK function client runs on CNCs No.1 and No.2.



	No.1 CNC	No.2 CNC
IP address	192.168.0.1	192.168.0.2
Subnet mask	255.255.255.0	255.255.255.0
Router IP address	None	None
IP address 1	192.168.0.101	192.168.0.101
Port No.1	9000	9000
IP address 2	None	None
Port No.2	None	None
IP address 3	None	None
Port No.3	None	None
Parameter No.802	11	11
Parameter No.820	67 'C'	67 'C'
Parameter No.821	78 'N'	78 'N'
Parameter No.822	67 'C'	67 'C'
Parameter No.823	49 '1'	50 '2'

→ Set these items in the "Ethernet Parameters screen.

→ Set this item in the Parameters Screen. See IV

	No.1 Personal computer
IP address	192.168.0.101
Subnet mask	255.255.255.0
Default gateway	None
ocsnc	9000/tcp
ocscomm	9001/tcp
ocsapplication	9002/tcp

→ Set these items in "Microsoft TCP/IP Property" on the personal computer (WindowsNT).

→ See 2.3.2 of the "FACTOLINK Script Function, OPERATOR'S MANUAL."

1.5 CONFIGURING A LARGE-SCALE NETWORK

Before you configure a large-scale network or add such a network to an existing network, consult with your company's network administrator to determine IP addresses, subnet masks, and router IP addresses.

2 DNC1/ETHERNET FUNCTIONS FOR THE 16*i*/18*i*/21*i*/PM*i*

The following describes the settings needed to use the DNC1/Ethernet functions with the Series 16*i*/18*i*/21*i*-A/B and Power Mate *i*.

2.1 PRECAUTIONS WHEN USING THE DNC1/ETHERNET FOR THE FIRST TIME

⚠ **CAUTION**
When the Ethernet board is used for the first time, consult with your company's network administrator to determine the IP addresses and other settings. Then, conduct a communications test.
If incorrect IP addresses and other settings are set, communications may be interfered with or the entire network might be adversely affected.
Particularly, if a duplicate IP address is set, communication errors are caused intermittently. This may result in a CNC's system error. To check whether the IP address duplicates any one already in use, see "Checking IP addresses for duplication" in Appendix A.4, "Checking Communication."

NOTE
1 One of the following option functions is needed when the DNC1/Ethernet functions are used:

Series16*i*-TA	**A02B-0236-S707**
Series 16*i*-MA	**A02B-0237-S707**
Series 18*i*-TA	**A02B-0238-S707**
Series 18*i*-MA	**A02B-0239-S707**
Series 21*i*-TA	**A02B-0247-S707**
Series 21*i*-MA	**A02B-0248-S707**
Power Mate *i*	**A02B-0259-J862**
Series16*i*-TB	**A02B-0281-S707**
Series 16*i*-MB	**A02B-0282-S707**
Series 18*i*-TB	**A02B-0283-S707**
Series 18*i*-MB	**A02B-0284-S707**
Series 21*i*-TB	**A02B-0285-S707**
Series 21*i*-MB	**A02B-0286-S707**

2 Up to ten clients can be connected to one CNC unit by the DNC1/Ethernet function.

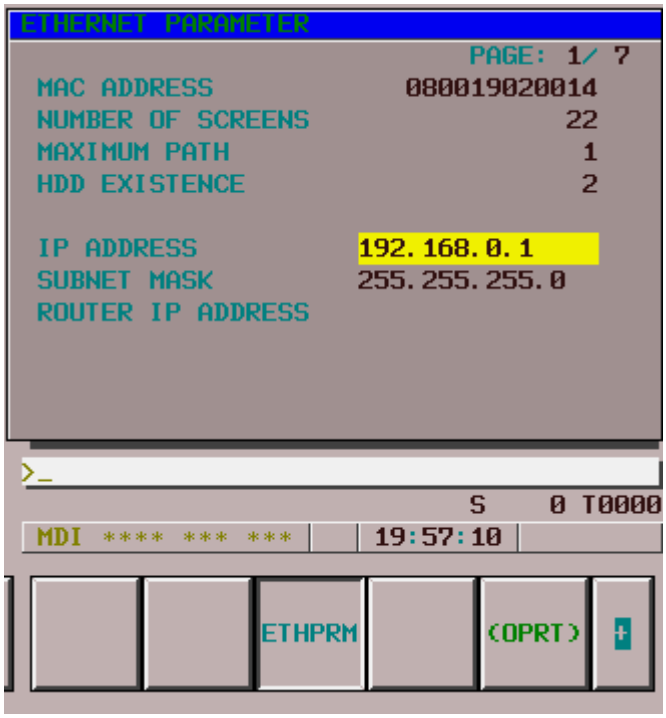
2.2 ETHERNET PARAMETER SCREEN

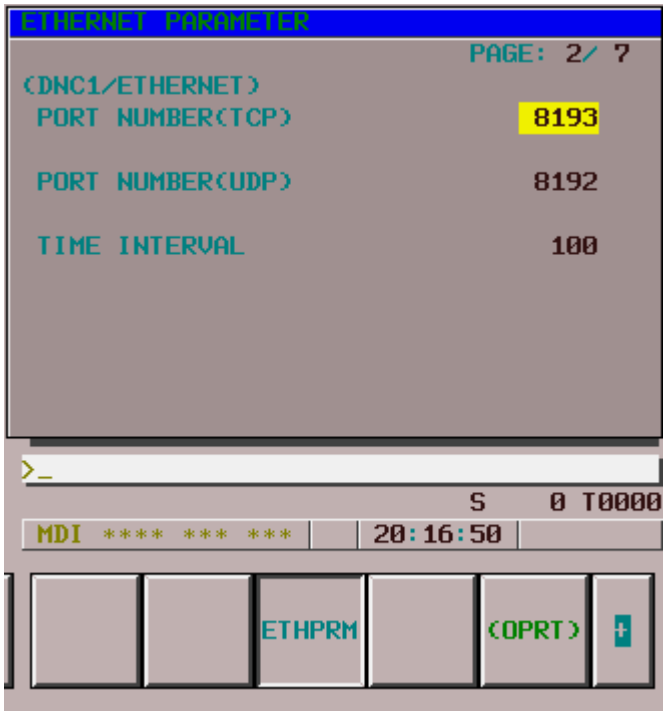
The Ethernet Parameter screen is used to set the parameters that are needed to use the DNC1/Ethernet functions.

Display

Procedure

1 Place the CNC in MDI mode.
2 Press function key [SYSTEM].
3 Press the Continuation menu key at the bottom right of the soft key menu.
4 When you press soft key [ETHPRM], the "Ethernet Parameter" screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the "Ethernet Parameter" screen, press soft key [ETHPRM] and then soft key [BOARD].
If parameters have already been registered, the parameter settings are displayed.
5 Enter or update the data using the MDI or soft keys.
6 Select the desired page using the [PAGE↑] [PAGE↓] page keys.




ETHERNET PARAMETER
PAGE: 2/ 7
(DNC1/ETHERNET)
PORT NUMBER(TCP) 8193
PORT NUMBER(UDP) 8192
TIME INTERVAL 100
>_
S 0 T0000
MDI **** *** ***
20:16:50
ETHPRM
(OPRT)

Display items and setting items

Display items related to the Ethernet functions

The items related to the Ethernet functions are displayed.

Item	Description
MAC ADDRESS	MAC address of the Ethernet board
NUMBER OF SCREENS	Total number of Ethernet error message screens used by the Ethernet functions
MAXIMUM PATH	Number of control systems in the CNC
HDD EXISTENCE	Indicates whether a hard disk or ATA flash card is mounted on the Ethernet board. 0: Not mounted. 2: Mounted.

TCP/IP setting items for the CNC

Set the TCP/IP items for the CNC.

Item	Description
IP ADDRESS	Specifies the IP address of the CNC. (Format: "192.168.0.1")
SUBNET MASK	Specifies the mask address of the network IP address. (Format: "255.255.255.0")
ROUTER IP ADDRESS	Specifies the router IP address. Specify this address when the network incorporates a router. (Format: "192.168.0.99")

DNC1/Ethernet setting items

Set the items related to the DNC1/Ethernet server.

Item	Description
PORT NUMBER (TCP)	Specifies the port No. to be used by the DNC1/Ethernet functions within a range of 5001 to 65535. This port No. must match the "NC TCP port No." on the personal computer's Machine Setup screen. For details of how to set this, refer to the " FA SYSTEM for PC WindowsNT version, OPERATOR'S MANUAL (B-75044EN)."
PORT NUMBER (UDP)	Specifies the port No. to be used by the DNC1/Ethernet functions, within a range of 5001 to 65535. This port No. must match that of the "FANUC_C4_SERVER" in the personal computer's "services" file. For details of how to set this, refer to the "FANUC FA SYSTEM for PC WindowsNT version OPERATOR'S MANUAL (B-75044EN)."
TIME INTERVAL	Specifies the interval at which broadcasting is performed in 10 ms units within a range of 0 to 65535. If "0" to "9" is set as the interval, broadcasting is not performed. In other words, an interval of less than 100 ms cannot be set. Example: 100: Broadcasting is carried out every one second [1000 ms] (= 100 × 10).

NOTE
1 When the "TCP/IP setting items for the CNC" have been changed, the power must be turned off then on again.
2 The value set for "TIME INTERVAL," described under "DNC1/Ethernet setting items," may cause the communications load to increase, and adversely affecting network performance.

Entering data

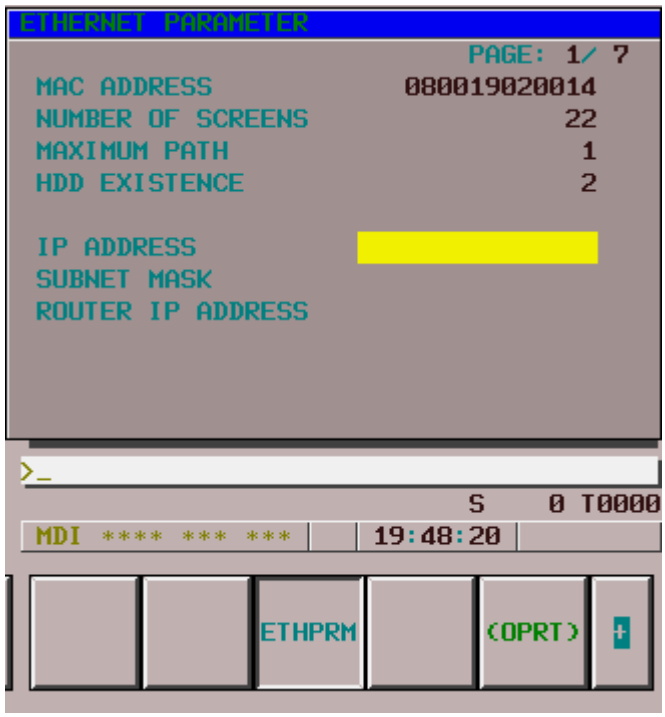
Procedure

The following describes the basic method for entering data.

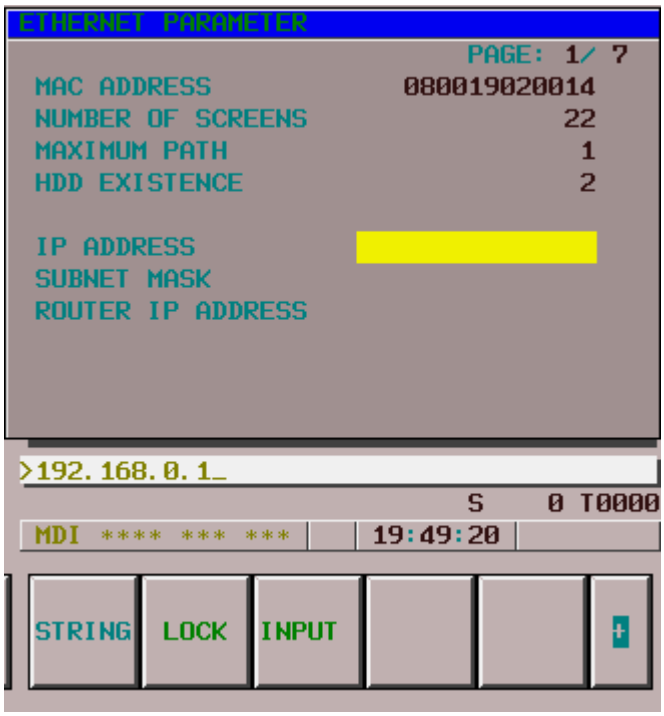
1 Place the CNC in MDI mode.
2 Display the "Ethernet Parameter" screen.
3 Position the cursor to the desired item using the cursor movement keys.
4 Enter the desired data using the MDI keys.
5 Press soft key [INPUT] or function key INPUT to fix the data.

NOTE
Already-set data can be deleted. To delete numerical data, enter 0. To delete character data, enter a space (SP).

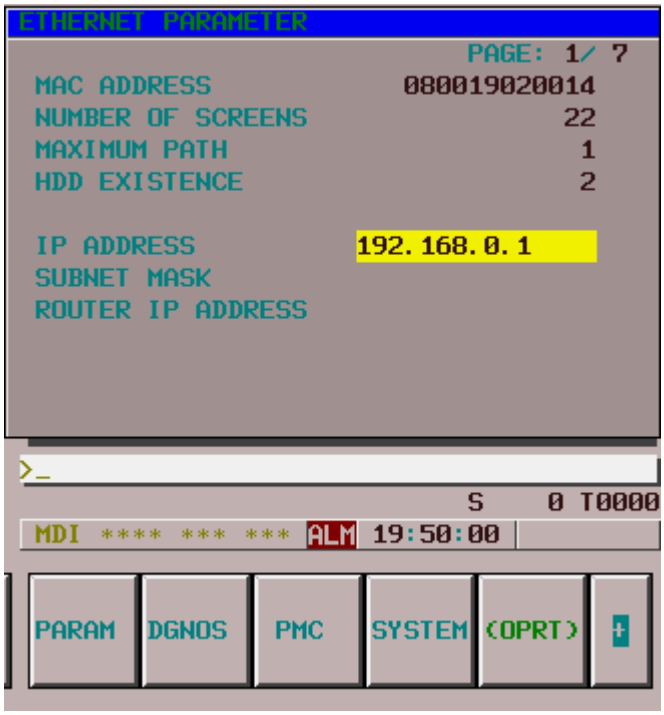
Example: To set the IP address to "192.168.0.1"
(a) Move the cursor to "IP ADDRESS."



(b) Enter "192.168.0.1" using the MDI keys.



(c) Press soft key [INPUT] or function key INPUT to fix the data. This causes the parameter to be saved into the non-volatile memory of the CNC.



2.3 PARAMETERS

The following describes the parameter related to the DNC1/Ethernet functions.

Parameter

0020	I/O CHANNEL: Selects the I/O device.

[Data type] Byte
[Valid data range] 0 to 35
6: Selects DNC1/Ethernet for the I/O device. Note that this is needed only for DNC operation.

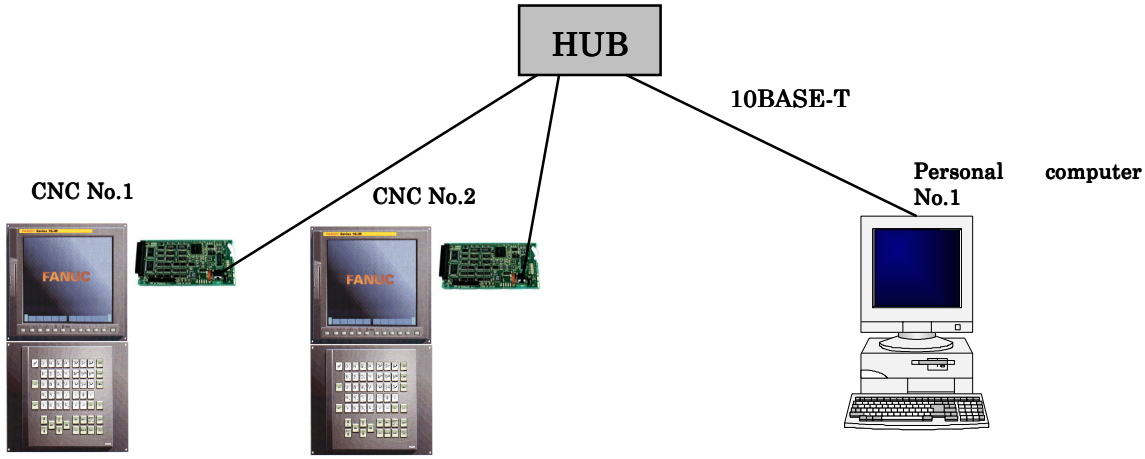
924	DNC1/Ethernet or FOCAS1/Ethernet wait time

[Data type] Byte
[Unit of data] ms
[Valid data range] 0 to 255
Specifies the wait time (in ms units) for the DNC1/Ethernet or FOCAS1/Ethernet service when it is used together with the data server function.
If any value between 0 and 2 is specified, a wait time of 2 ms is assumed.

2.4 CONFIGURING A SMALL-SCALE NETWORK

The following shows an example of the minimum settings needed to use the DNC1/Ethernet functions with a small-scale network.
These settings allow a personal computer to be connected to two CNCs, using the DNC1/Ethernet functions.

- The DNC1/Ethernet function client runs on personal computer No.1.
- The DNC1/Ethernet function server runs on CNCs No.1 and No.2.



	CNC No.1	CNC No.2
IP address	192.168.0.1	192.168.0.2
Subnet mask	255.255.255.0	255.255.255.0
Router IP address	None	None
TCP port No.	8193	8193
UDP port No.	8192	8192
Time interval	100	100
Parameter No.20	6	6

Set these items on the "Ethernet Parameter" screen.

Set this item on the "Parameter" screen.

	Personal computer No.1
IP address	192.168.0.101
Subnet mask	255.255.255.0
Default gateway	None
FANUC_C4_SERVER	8192/udp
CNC No.1	Machine No. 1
NC IP address	192.168.0.1
NC TCP port number	8193
CNC No.2	Machine No. 2
NC IP address	192.168.0.2
NC TCP port number	8193

Set these items in "Microsoft TCP/IP Property" on the personal computer (WindowsNT).

Refer to the "FANUC FA SYSTEM for PC WindowsNT version OPERATOR'S MANUAL."

2.5 CONFIGURING A LARGE-SCALE NETWORK

Before you configure a large-scale network or add such a network to an existing network, consult with your company's network administrator to determine IP addresses, subnet masks, and router IP addresses.

3 FOCAS1/ETHERNET FUNCTIONS FOR THE 16*i*/18*i*/21*i*/PM*i*

The following describes the settings needed to run the FOCAS1/Ethernet functions for the Series 16*i*/18*i*/21*i*-A/B and Power Mate *i*.

3.1 PRECAUTIONS TO BE OBSERVED WHEN USING THE FOCAS1/ETHERNET FUNCTIONS FOR THE FIRST TIME

⚠ CAUTION
When the Ethernet board is used for the first time, consult with your company's network administrator to determine the IP addresses and other settings. Then, conduct a communications test.
If incorrect IP addresses and other settings are set, communication and other faults may adversely affect the entire network.

NOTE
1 One of the following option functions is needed when the FOCAS1/Ethernet functions are used:

Series16*i*-TA	**A02B-0236-S707**
Series 16*i*-MA	**A02B-0237-S707**
Series 18*i*-TA	**A02B-0238-S707**
Series 18*i*-MA	**A02B-0239-S707**
Series 21*i*-TA	**A02B-0247-S707**
Series 21*i*-MA	**A02B-0248-S707**
Power Mate *i*	**A02B-0259-J862**
Series16*i*-TB	**A02B-0281-S707**
Series 16*i*-MB	**A02B-0282-S707**
Series 18*i*-TB	**A02B-0283-S707**
Series 18*i*-MB	**A02B-0284-S707**
Series 21*i*-TB	**A02B-0285-S707**
Series 21*i*-MB	**A02B-0286-S707**
Series16*i*/18*i*/21*i*-A	**A02B-0207-J800**
Power Mate *i*	**A02B-0259-J862**

2 Up to ten FOCAS1/Ethernet clients can be connected to one CNC by the FOCAS1/Ethernet functions.

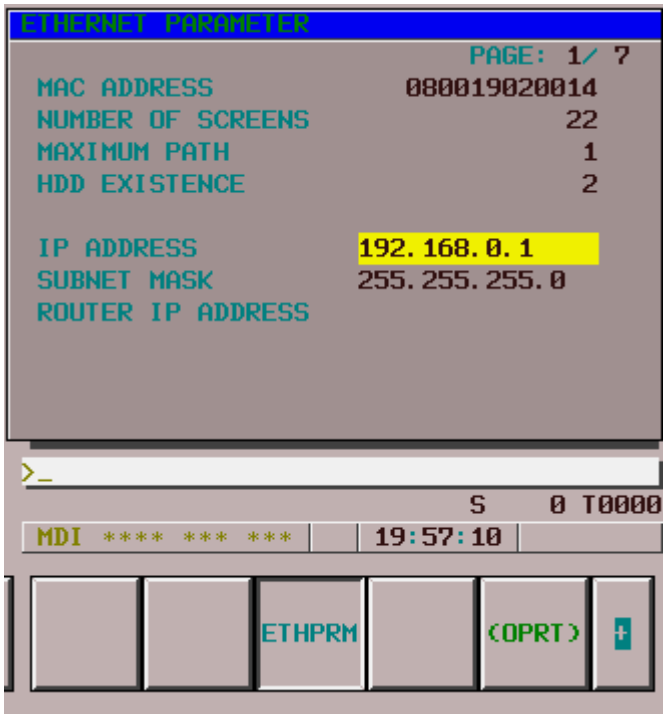
3.2 ETHERNET PARAMETER SCREEN

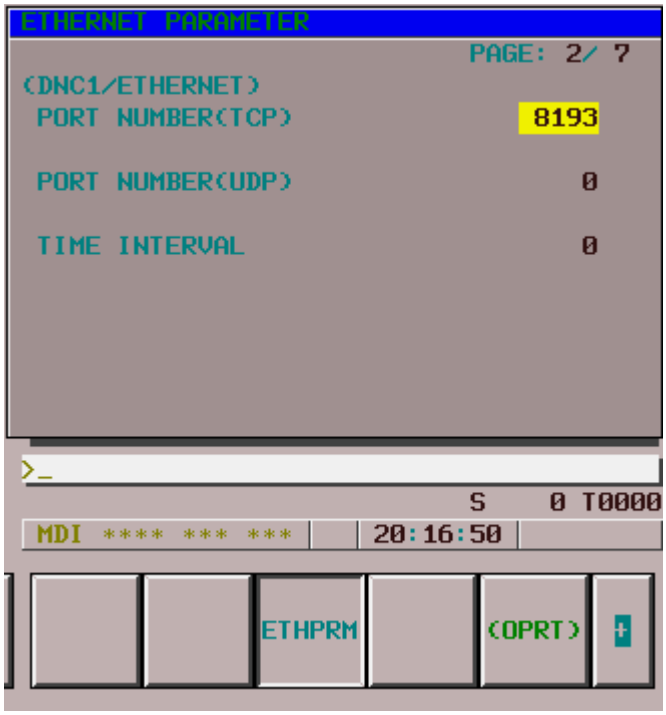
The Ethernet Parameter screen is used to set parameters that are needed to run the FOCAS1/Ethernet functions.

Display

Procedure

1 Place the CNC in MDI mode.
2 Press function key [SYSTEM].
3 Press the Continuation menu key at the bottom right of the soft key menu.
4 When you press soft key [ETHPRM], the "Ethernet Parameter" screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the "Ethernet Parameter" screen, press soft key [ETHPRM] and then soft key [BOARD].
If parameters have already been registered, the parameter settings are displayed.
5 Enter or update the data using the MDI or soft keys.
6 Select the desired page using the [PAGE↑] [PAGE↓] page keys.




ETHERNET PARAMETER
PAGE: 2/ 7
(DNC1/ETHERNET)
PORT NUMBER(TCP) 8193
PORT NUMBER(UDP) 0
TIME INTERVAL 0
>_
S 0 T0000
MDI **** *** ***
20:16:50
ETHPRM
(OPRT)
+

Display items and setting items

Display items related to the Ethernet functions

The items related to the Ethernet functions are displayed.

Item	Description
MAC ADDRESS	MAC address of the Ethernet board
NUMBER OF SCREENS	Total number of Ethernet error message screens used by the Ethernet functions
MAXIMUM PATH	Number of control systems in the CNC
HDD EXISTENCE	Indicates whether a hard disk or ATA flash card is mounted on the Ethernet board. 0: Not mounted. 2: Mounted.

TCP/IP setting items for the CNC

Set the TCP/IP items for the CNC.

Item	Description
IP ADDRESS	Specifies the IP address of the CNC. (Format: "192.168.0.1")
SUBNET MASK	Specifies the mask address of the network IP address. (Format: "255.255.255.0")
ROUTER IP ADDRESS	Specifies the router IP address. Specify this address when the network incorporates a router. (Format: "192.168.0.99")

FOCAS1/Ethernet setting items

Set the items related to the FOCAS1/Ethernet server.

Item	Description
PORT NUMBER (TCP)	Specifies the port No. to be used by the FOCAS1/Ethernet functions, within a range of 5001 to 65535.
PORT NUMBER (UDP)	Not used by the FOCAS1/Ethernet functions. Set 0.
TIME INTERVAL	Not used by the FOCAS1/Ethernet functions. Set 0.

NOTE

When the "TCP/IP setting items for the CNC" have been changed, the power must be turned off then on again.

Entering data

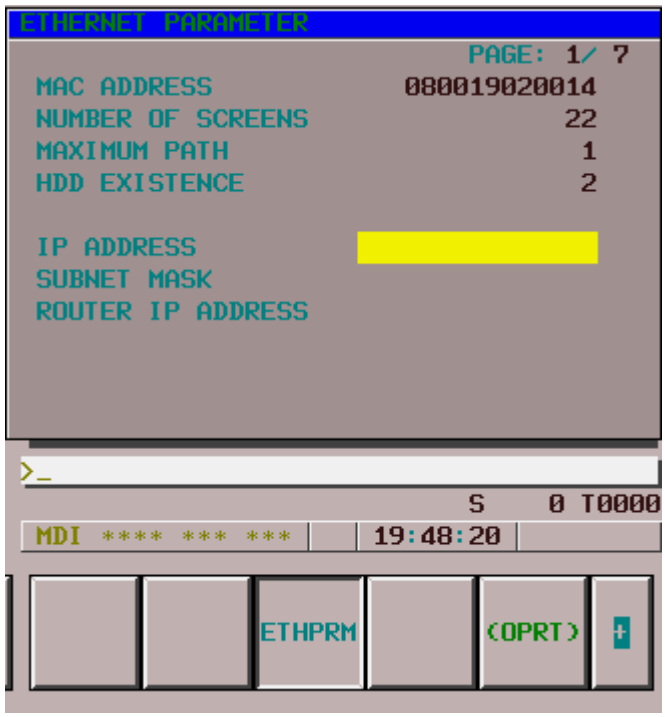
Procedure

The following describes the basic method for entering data.

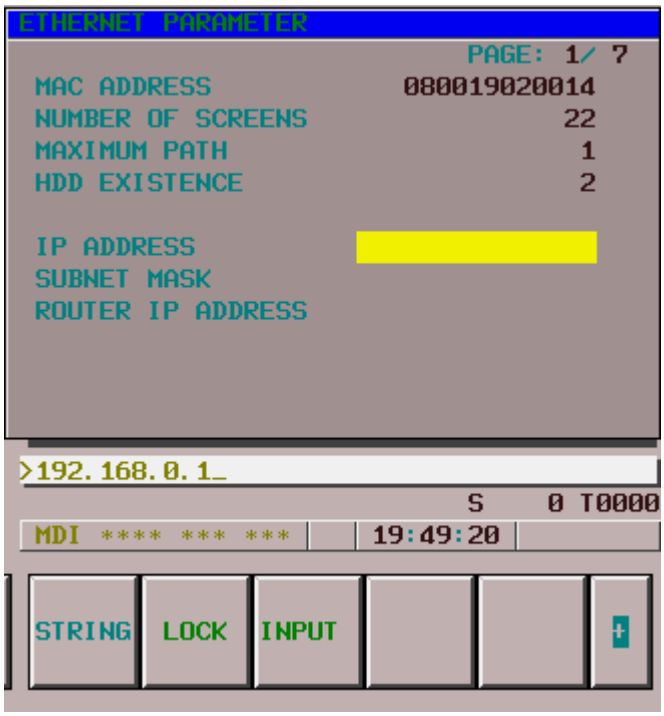
1 Place the CNC in MDI mode.
2 Display the "Ethernet Parameter" screen.
3 Position the cursor to the desired item by using the cursor movement keys.
4 Enter the desired data using the MDI keys.
5 Press soft key [INPUT] or function key INPUT to fix the data.

NOTE
Already-set data can be deleted. To delete numerical data, enter 0. To delete character data, enter a space (SP).

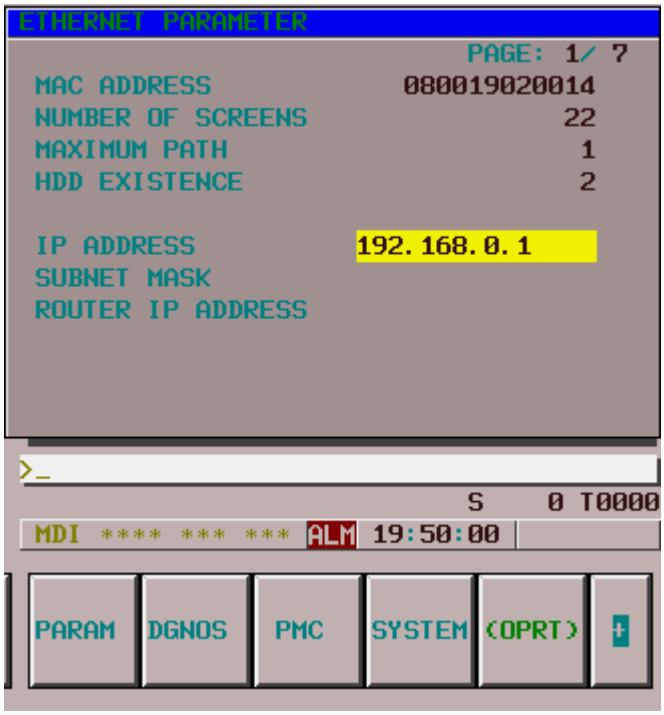
Example: To set the IP address to "192.168.0.1"
(a) Position the cursor to "IP ADDRESS."



(b) Enter "192.168.0.1" using the MDI keys.



(c) Press soft key [INPUT] or function key INPUT to fix the data. This causes the parameter to be saved into the non-volatile memory of the CNC.



3.3 PARAMETERS

The following describes the parameters related to the FOCAS1/Ethernet functions.

Parameters

0020	I/O CHANNEL: Selects I/O device.

[Data type] Byte
[Unit of data] Bytes
[Valid data range] 0 to 35

6: Selects FOCAS1/Ethernet for the I/O device. Note that this is needed only for DNC operation.

924	DNC1/Ethernet or FOCAS1/Ethernet wait time

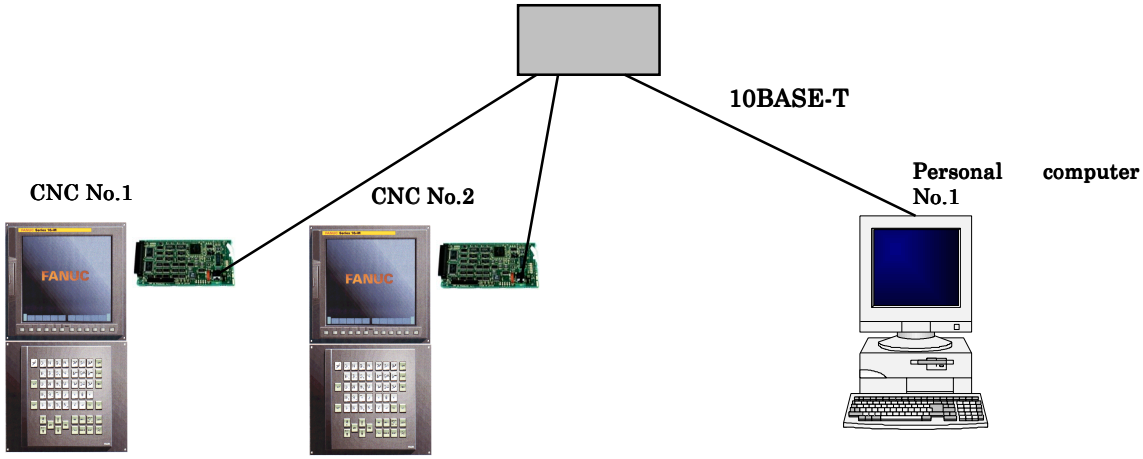
[Data type] Byte
[Unit of data] ms
[Valid data range] 0 to 255

Specifies the wait time (in ms units) for the DNC1/Ethernet or FOCAS1/Ethernet service when it is used together with the data server function.
If any value between 0 and 2 is specified, a wait time of 2 ms is assumed.

3.4 CONFIGURING A SMALL-SCALE NETWORK

The following shows an example of the minimum settings needed to run the FOCAS1/Ethernet functions on a small-scale network.
These settings allow a personal computer to be connected to two CNCs by the FOCAS1/Ethernet functions.

- The FOCAS1/Ethernet function client runs on personal computer No.1.
- The FOCAS1/Ethernet function server runs on CNCs No.1 and No.2.



	CNC No.1	CNC No.2
IP address	192.168.0.1	192.168.0.2
Subnet mask	255.255.255.0	255.255.255.0
Router IP address	None	None
TCP port No.	8193	8193
UDP port No.	0	0
Time interval	0	0
Parameter No.20	6	6

Set these items on the "Ethernet Parameter" screen.

Set this item on the "Parameter" screen.

		Personal computer No.1
IP address		192.168.0.101
Subnet mask		255.255.255.0
Default gateway		None
CNC No.1	IP address	192.168.0.1
	Port number	8193
CNC No.2	IP address	192.168.0.2
	Port number	8193

Set these items in "Microsoft TCP/IP Property" on the personal computer (Windows95/98/NT).

Specify these items with the arguments of the data window library function "cnc_allclibhnd13."

3.5 CONFIGURING A LARGE-SCALE NETWORK

Before you configure a large-scale network or add such a network to an existing network, consult your company's network administrator to determine IP addresses, subnet masks, and router IP addresses.

4 DATA SERVER FUNCTIONS FOR THE 16*i*/18*i*/21*i*

The following describes the settings needed to run the data server functions for the Series 16*i*/18*i*/21*i*–A/B.

4.1 PRECAUTIONS TO BE OBSERVED WHEN USING THE DATA SERVER FUNCTIONS FOR THE FIRST TIME

⚠ CAUTION

1 When the data server board is used for the first time, format the hard disk, set the appropriate parameters, and turn the power off then on again. If the data server functions are used without performing these operations, normal operation cannot be guaranteed.
2 When Ethernet FTP communication is performed for the first time, consult with your company's network administrator to determine the network addresses and other settings. Then, conduct a communications test.
If incorrect network addresses and other settings are set, communication and other faults may adversely affect the entire network.
3 Never turn off the power to the CNC while the hard disk is being accessed (while a data server function service is being executed). Otherwise, the data on the hard disk may be destroyed.
4 Never turn off the power to the CNC while using its functions, especially the FTP server functions.
5 To guard against hard disk failure, back up the files on the hard disk of the host computer.

NOTE

1 One of the following option functions is needed when the data server functions are used:

Series16*i*-TA	**A02B-0236-S737**
Series 16*i*-MA	**A02B-0237-S737**
Series 18*i*-TA	**A02B-0238-S737**
Series 18*i*-MA	**A02B-0239-S737**
Series 21*i*-TA	**A02B-0247-S737**
Series 21*i*-MA	**A02B-0249-S737**
Series16*i*-TB	**A02B-0281-S737**
Series 16*i*-MB	**A02B-0282-S737**
Series 18*i*-TB	**A02B-0283-S737**
Series 18*i*-MB	**A02B-0284-S737**
Series 21*i*-TB	**A02B-0285-S737**
Series 21*i*-MB	**A02B-0286-S737**

2 Using the data server function in the buffer mode needs options that match the CNC used.
The Series 21*i*-A/B cannot use the buffer mode.

Series16*i*-TA	**A02B-0236-J728**
Series 16*i*-MA	**A02B-0237-J728**
Series 18*i*-TA	**A02B-0238-J728**
Series 18*i*-MA	**A02B-0239-J728**
Series16*i*-TB	**A02B-0281-J728**
Series 16*i*-MB	**A02B-0282-J728**
Series 18*i*-TB	**A02B-0283-J728**
Series 18*i*-MB	**A02B-0284-J728**

3 Only one FTP client can be connected to one CNC by the data server functions. One CNC can be connected to only one FTP server.

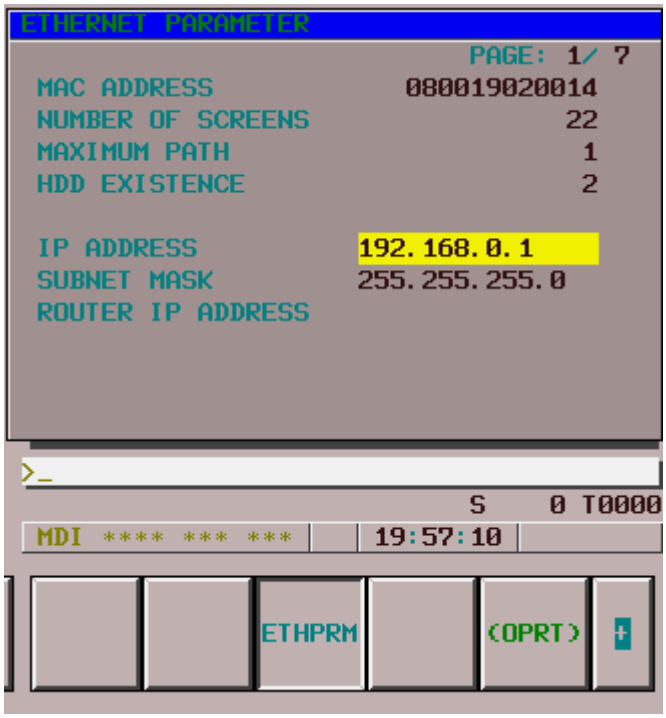
4.2 ETHERNET PARAMETER SCREEN

The Ethernet Parameter screen is used to set the parameters that are needed for the data server functions.

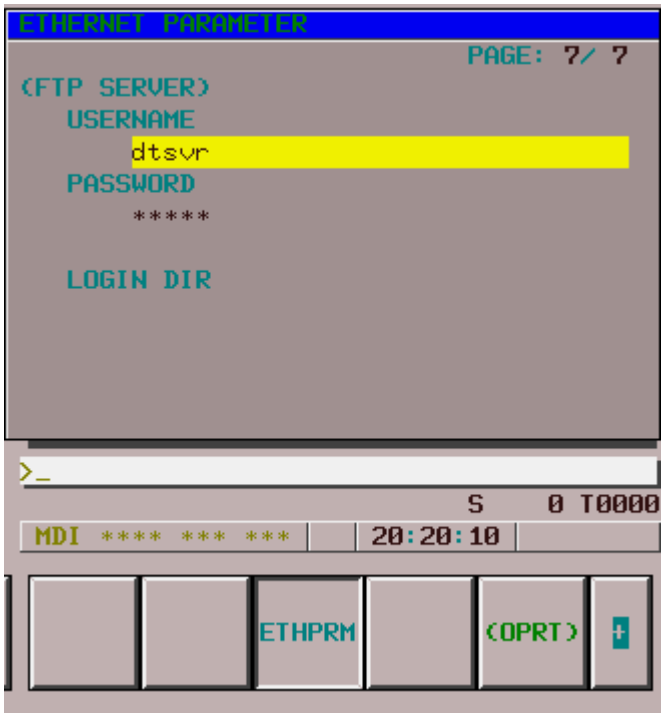
Display

Procedure

1 Place the CNC in MDI mode.
2 Press function key SYSTEM.
3 Press the Continuation menu key at the bottom right of the soft key menu.
4 When you press soft key [ETHPRM], the "Ethernet Parameter" screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the "Ethernet Parameter" screen, press soft key [ETHPRM] and then soft key [BOARD].
If parameters are already registered, the parameter settings are displayed.
5 Enter or update the data using the MDI or soft keys.
6 Select the desired page using the PAGE ↑ PAGE ↓ page keys.




ETHERNET PARAMETER
(DATA SERVER) PAGE: 4/ 7
1.PORT NUMBER 21
IP ADDRESS 192.168.0.101
USERNAME
dtsvr
PASSWORD
*****
LOGIN DIR
DATASERVER
>_
S 0 T0000
MDI **** *** *** 20:19:31
ETHPRM
(OPRT)


ETHERNET PARAMETER
PAGE: 7/ 7
(FTP SERVER)
USERNAME
dtsvr
PASSWORD
*****
LOGIN DIR
>_
S 0 T0000
MDI **** *** *** 20:20:10
ETHPRM
(OPRT)

Display items and setting items

Display items related to the Ethernet functions

The items related to the Ethernet functions are displayed.

Item	Description
MAC ADDRESS	MAC address of the Ethernet board
NUMBER OF SCREENS	Total number of Ethernet error message screens used by the Ethernet functions
MAXIMUM PATH	Number of control systems in the CNC
HDD EXISTENCE	Indicates whether a hard disk or ATA flash card is mounted on the Ethernet board. 0: Not mounted. 2: Mounted.

TCP/IP setting items for the CNC

Set the TCP/IP items for the CNC.

Item	Description
IP ADDRESS	Specifies the IP address of the CNC. (Format: "192.168.0.1")
SUBNET MASK	Specifies the mask address of the network IP address. (Format: "255.255.255.0")
ROUTER IP ADDRESS	Specifies the router IP address. Specify this address when there is a router on the network. (Format: "192.168.0.99")

Setting items for connected host 1, host 2, and host 3

Set the items related to the host computer on which the FTP server runs.

Item	Description
PORT NUMBER	Specifies the port No. to be used by the data server functions. Usually, set 21 because the FTP service is used.
IP ADDRESS	Specifies the IP address of the host computer. (Format: "192.168.0.101")
USERNAME	Specifies the name of the user to log on to the host computer using FTP. (A user name of up to 31 characters can be specified.)
PASSWORD	Specifies the password for the above user name. The password must always be specified. (A password of up to 31 characters can be specified.)
LOGIN DIR	Specifies the directory on the host computer to which the data server functions are to log in. (A name of up to 127 characters can be specified.)

Setting items for the FTP server

Set the items related to the FTP server.

Item	Description
USERNAME	Specifies the user name on the data server that is to be used when the host computer logs in using FTP. (A user name of up to 31 characters can be specified.)
PASSWORD	Specifies a password for the above user name. A password must always be specified. (A password of up to 31 characters can be specified.)
LOGIN DIR	Specifies the directory on the data server to which the host computer is to log in. (A name of up to 127 characters can be specified.)

NOTE
1 When the "TCP/IP setting items for the CNC" have been changed, the power must be turned off then on again.
2 Note that the system differentiates between upper- and lower-case characters in "USERNAME" and "PASSWORD," described under "Setting items for the FTP server."
3 The default for "LOGIN DIR," described under "Setting items for the FTP server," is the \NCDATA directory. Only a directory under the \NCDATA directory can be specified for "LOGIN DIR."

Entering data

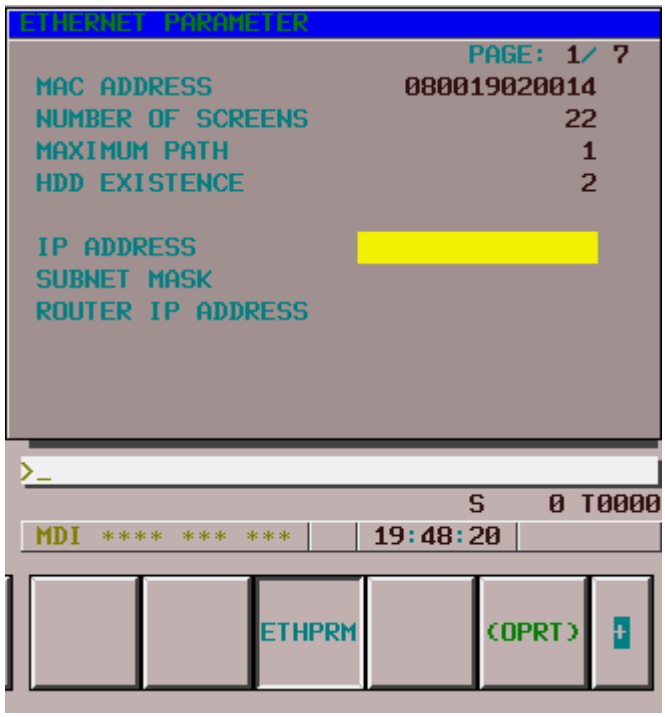
Procedure

The following describes the basic method for entering data.

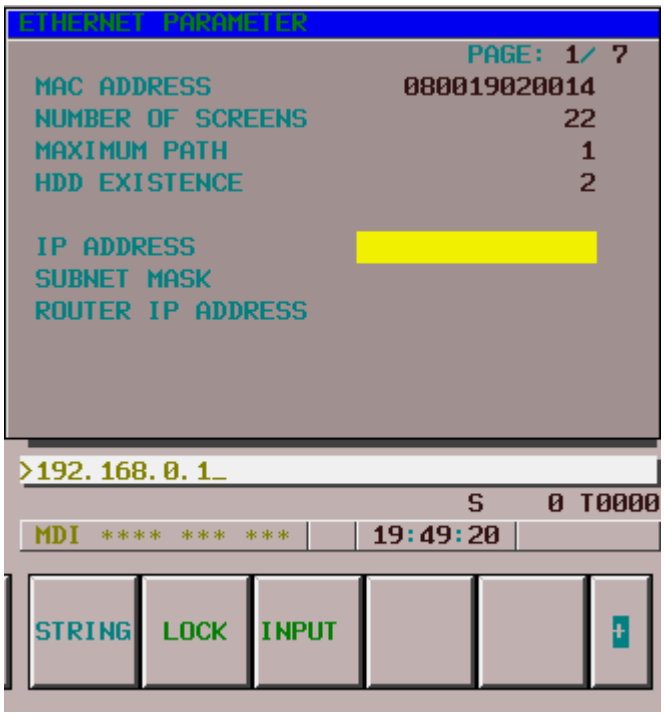
1 Place the CNC in MDI mode.
2 Display the "Ethernet Parameter" screen.
3 Position the cursor to the desired item by using the cursor movement keys.
4 Enter the desired data using the MDI keys.
5 Press soft key [INPUT] or function key INPUT to fix the data.

NOTE
Already-set data can be deleted. To delete numerical data, enter 0. To delete character data, enter a space (SP).

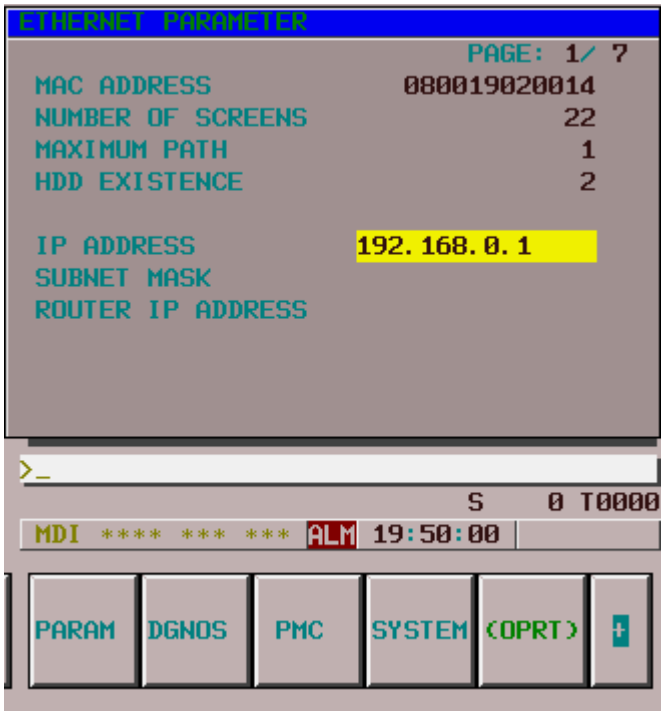
Example: To set the IP address to "192.168.0.1"
(a) Position the cursor to "IP ADDRESS."



(b) Enter "192.168.0.1" using the MDI keys.



(c) Press soft key [INPUT] or function key INPUT to fix the data. This causes the parameter to be saved into the non-volatile memory of the CNC.

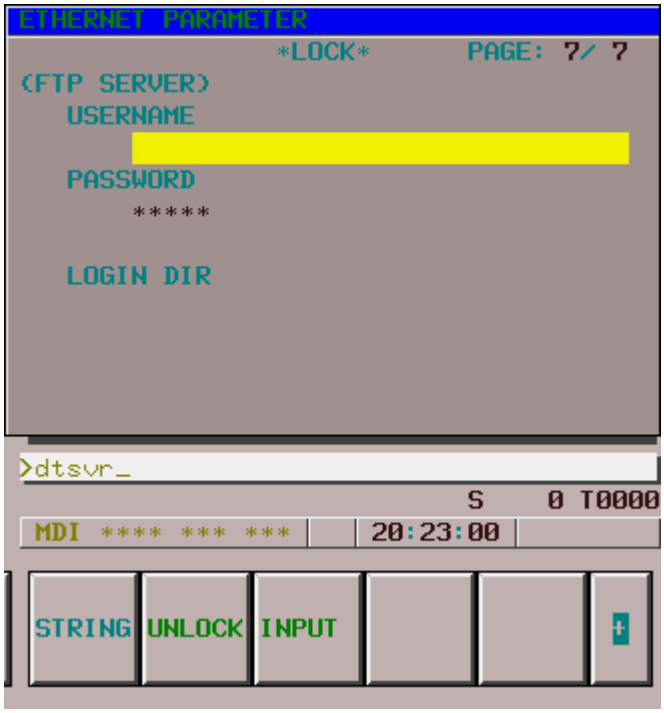


Entering lowercase characters

Procedure

The following describes the method for entering lowercase characters.

1 Place the CNC in MDI mode.
2 Display the "Ethernet Parameter" screen.
3 Position the cursor to the desired item by using the cursor movement keys.
4 When soft key [LOCK] is displayed, the characters entered using the MDI keys are in uppercase. To enter lowercase characters, press soft key [LOCK]. Soft key [LOCK] then changes to [UNLOCK]. In addition, "LOCK" is displayed on the screen.
5 Then, all the characters entered using MDI keys "A" to "Z" will be in lowercase.



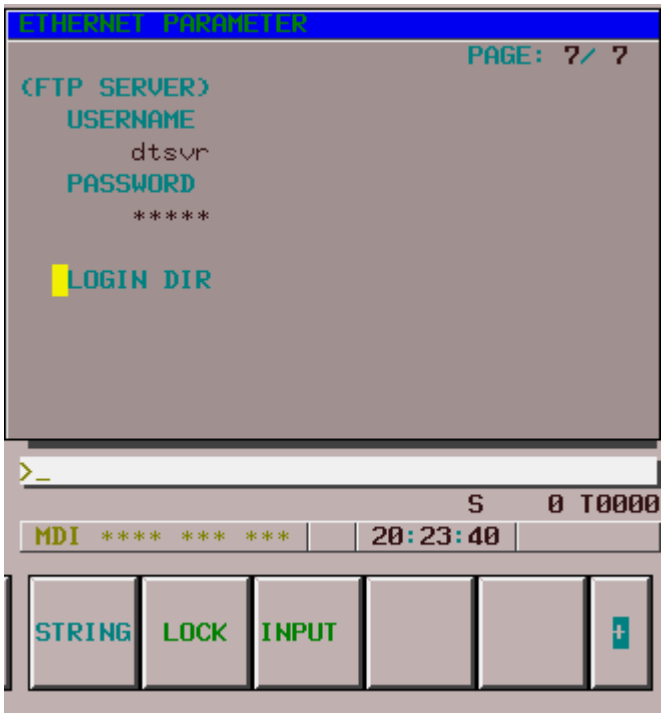
6 To enter uppercase characters, press soft key [UNLOCK].

Entering long character strings

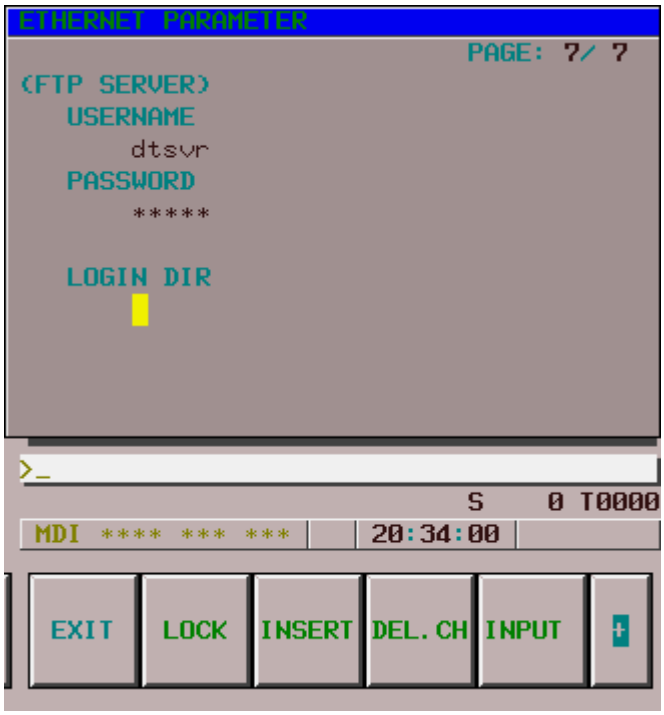
The following describes the method for entering long character strings. In the following explanation, the string "/DATASERVER/NCPROGRAM/LINE001/GROUP0002" is entered as an example.

Procedure

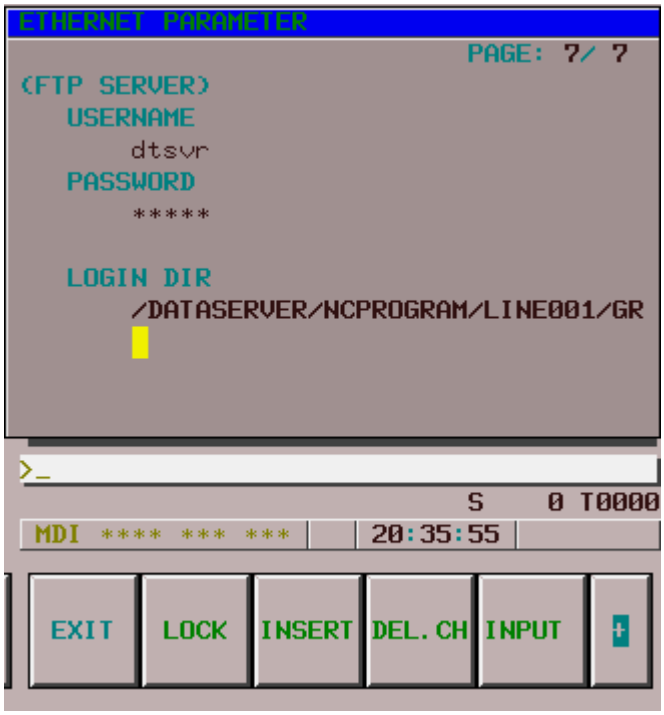
1 Place the CNC in MDI mode.
2 Display the "Ethernet Parameter" screen.
3 Position the cursor to "LOGIN DIR" using the cursor movement keys.



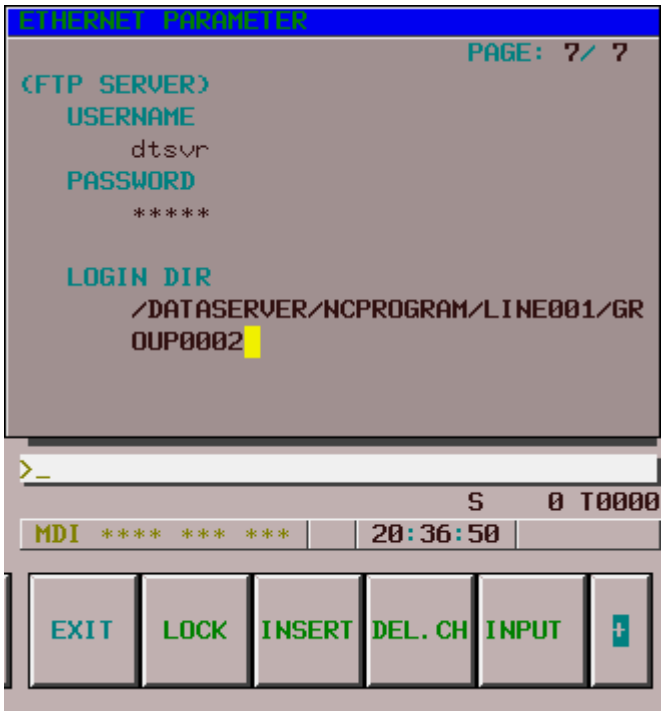
4 Press soft key [STRING]. The cursor position and soft key menu change as follows.



5 Enter "/DATASERVER/NCPROGRAM/LINE001/GR" using the MDI keys and then press soft key [INPUT].



6. Enter the subsequent part of the string, "OUP0002," using the MDI keys and then press soft key [INPUT].



[Reference]
The character string can also be entered as different parts such as "/DATASERVER/NCPROGRAM" and "/LINE001/GROUP0002," instead of entering 32 characters first, which is the maximum number of characters that can be input at a time.

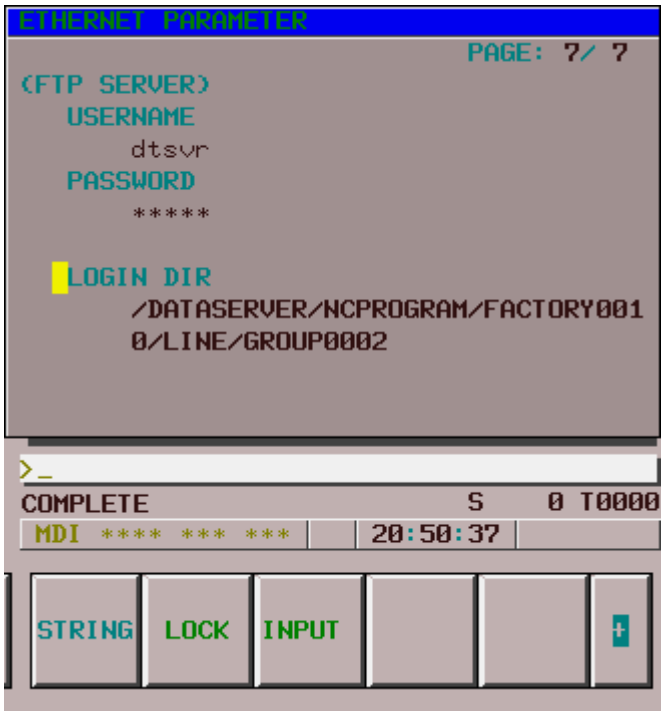
7 To insert "FACTORY0010" between "NCPROGRAM" and "LINE001," position the cursor to the "/" before "LINE001" and enter "/FACTORY0010" using the MDI keys. Then, press soft key [INSERT].



8 To delete a character, position the cursor to that character and press soft key [DEL.CH]. This operation deletes the character at the cursor position.

9 To overwrite a character, position the cursor to be overwritten, enter a new character using an MDI key, and then press soft key [INPUT]. This operation overwrites the character at the cursor position.

10 Upon the completion of character string entry, press soft key [EXIT]. This operation returns the cursor and the soft key menu to the state shown under "Procedure 1." The data is saved into the non-volatile memory of the CNC.



Entering special characters

Procedure

The following describes the method for entering special characters. In the following explanation, the string "PROG$" is entered as an example.

1 Place the CNC in MDI mode.
2 Display the "Ethernet Parameter" screen.
3 Position the cursor to "LOGIN DIR" using the cursor movement keys.
4 Enter "PROG" using the MDI keys and press soft key [CONT] at the bottom right of the soft key menu.

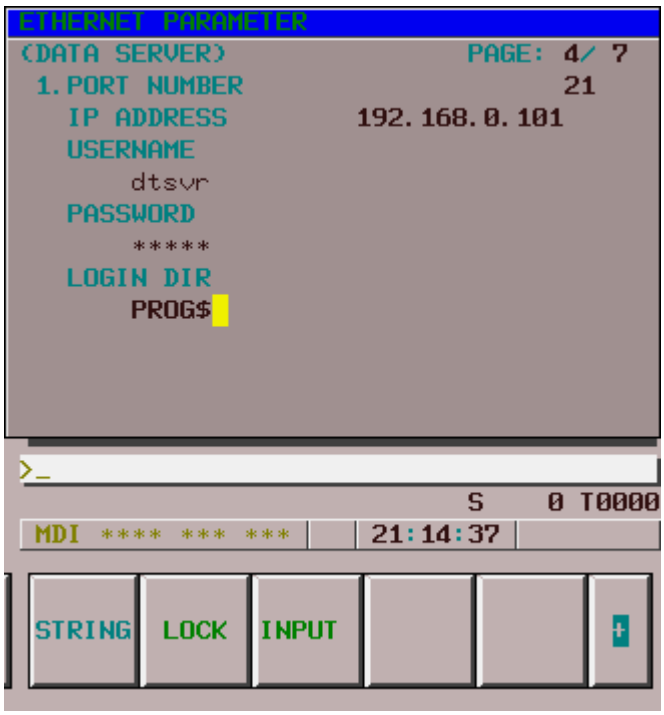


[Reference]
Of those characters that cannot be entered using the MDI keys, those characters likely to be used frequently ([:], [¥], [$], and [_]) can be entered. To enter a special character other than these, set the ASCII code of that special character for any of parameters Nos. 931 to 935. For details, refer to section 4.3 " Parameters ".

5 Press soft key [$].



6 Press soft key [INPUT].



4.3 PARAMETERS

The following describes the parameters related to the data server functions.

Parameters

0020	I/O CHANNEL: Selects an I/O device.

[Data type] Byte
[Valid data range] 0 to 35
5: Selects the data server for the I/O device.

	#7	#6	#5	#4	#3	#2	#1	#0
904	LCK							BWT

[Data type] Bit

LCK Specifies whether to check if there is a duplicate file name specification in a list file when the LIST-GET data server function is used, as follows:
1: To check.
0: Not to check.

BWT Specifies whether to detect an error if the FTP communication is not finished in time when the DNC operation is in the data server function buffer mode, as follows:
1: Not to detect an error; the DNC operation is continued after the FTP communication is finished.
0: To detect an error.

921	Selects the host computer OS.

[Data type] Byte
[Valid data range] 0 and 1
1: UNIX/VMS.
0: Windows 95/98/NT.

922	Selects the host computer 2 OS.

[Data type] Byte
[Valid data range] 0 and 1
1: UNIX/VMS.
0: Windows 95/98/NT.

923	Selects the host computer 3 OS.

[Data type] Byte
[Valid data range] 0 and 1
1: UNIX/VMS.
0: Windows 95/98/NT.

924	DNC1/Ethernet or FOCAS1/Ethernet wait time

[Data type] Byte
[Unit of data] ms
[Valid data range] 0 to 255

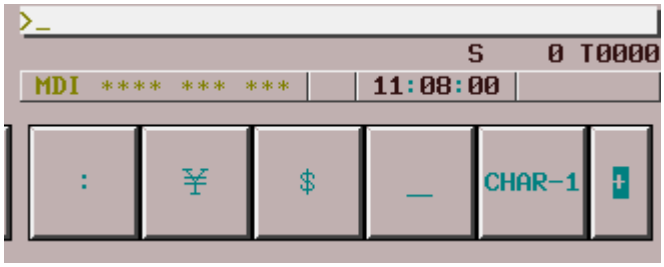
Specifies the wait time (in ms units) for the DNC1/Ethernet or FOCAS1/Ethernet service when it is used together with the data server function.
If any value between 0 and 2 is specified, a wait time of 2 ms is assumed.

0931	Special character (No. 1)
0932	Special character (No. 2)
0933	Special character (No. 3)
0934	Special character (No. 4)
0935	Special character (No. 5)

[Data type] Byte
[Unit of data] Bytes
[Valid data range] 32 to 126

NC parameters Nos. 931 to 935 enable characters that cannot be entered using MDI keys to be entered using soft keys.
Enter non-zero numbers for these parameters. [CHAR-1] to [CHAR-5] are displayed as the special character input soft keys.

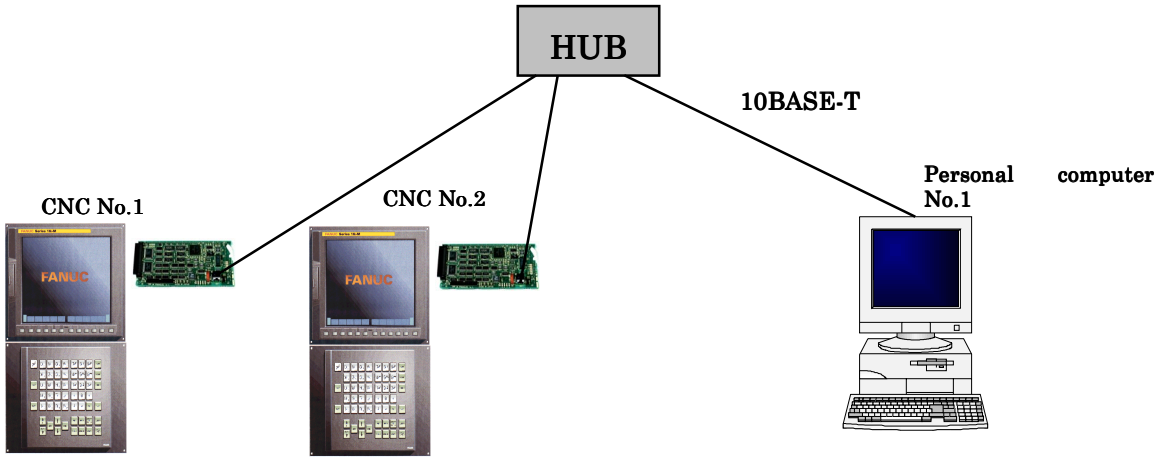
Example: When "33" is entered for parameter No. 931, pressing soft key [CHAR-1] causes a "!" to be entered.



4.4 CONFIGURING A SMALL-SCALE NETWORK

The following shows an example of the minimum settings needed to use the data server functions on a small-scale network.
These settings allow a personal computer to be connected to one CNC by the data server functions.

- The FTP client and server run on personal computer No.1.
- The FTP client and server run on CNCs No.1 and No.2.



		CNC No.1	CNC No.2
IP address		192.168.0.1	192.168.0.2
Subnet mask		255.255.255.0	255.255.255.0
Router IP address		None	None
Connected host 1	Port No.	21	21
	IP address	192.168.0.101	192.168.0.101
	User name	dtsvr	dtsvr
	Password	dtsvr	dtsvr
	Login DIR	None	None
FTP server	User name	dtsvr	dtsvr
	Password	dtsvr	dtsvr
	Login DIR	None	None
Parameter No.20		5	5

Set these items on the "Ethernet Parameter" screen.

Set this item on the "Parameter"

	Personal computer No.1
IP address	192.168.0.101
Subnet mask	255.255.255.0
Default gateway	None
User name	dtsvr
Password	dtsvr
Login DIR	Default

Set these items in "Microsoft TCP/IP Property" on the personal computer (WindowsNT).

Set these items in "User Manager" on the personal computer (WindowsNT).

Set this item in "Internet Service Manager" on the personal computer (WindowsNT).
For Peer Web Services

4.5 CONFIGURING A LARGE-SCALE NETWORK

Before you configure a large-scale network or add such a network to an existing network, consult with your company's network administrator to determine IP addresses, subnet masks, and router IP addresses.

5 FOCAS1/ETHERNET FUNCTIONS FOR THE 15*i*

The following describes the settings needed to run the FOCAS1/Ethernet functions for the Series 15*i*.

5.1 PRECAUTIONS TO BE OBSERVED WHEN USING THE FOCAS1/ETHERNET FUNCTIONS FOR THE FIRST TIME

⚠ CAUTION
When the Ethernet board is used for the first time, consult with your company's network administrator to determine the IP addresses and other settings. Then, conduct a communications test.
If incorrect IP addresses and other settings are set, communication and other faults may adversely affect the entire network.

NOTE
1 One of the following option functions is needed when the FOCAS1/Ethernet functions are used:
Series15*i*-MA **A02B-0207-J647**
A02B-0207-J801
2 Up to ten FOCAS1/Ethernet clients can be connected to one CNC by the FOCAS1/Ethernet functions.

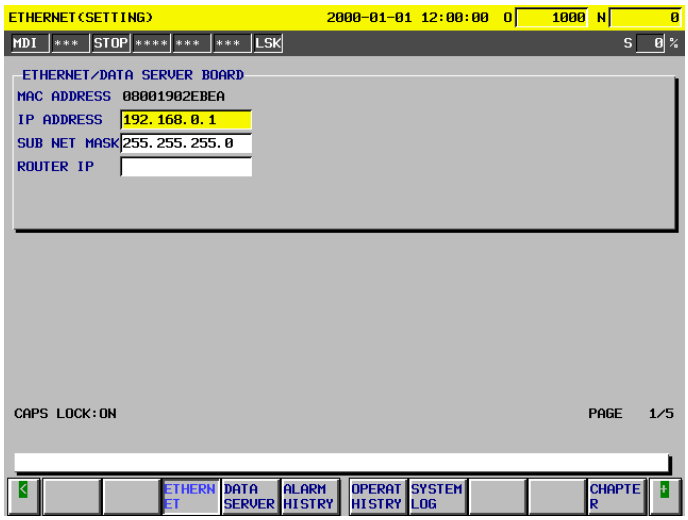
5.2 ETHERNET PARAMETER SCREEN

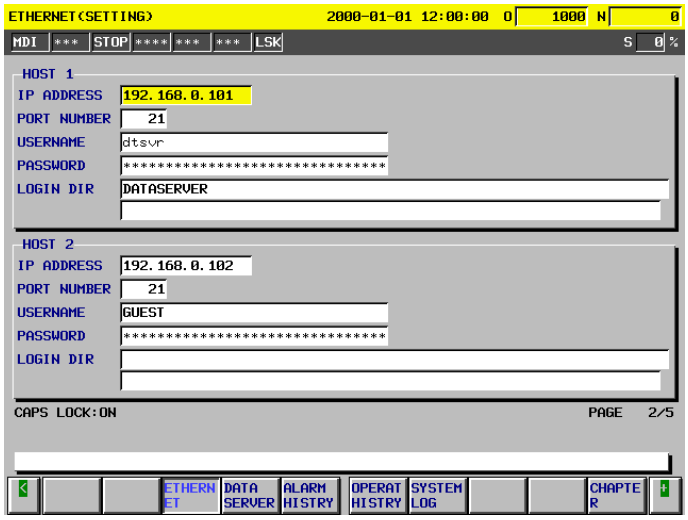
The Ethernet Parameter screen is used to set parameters that are needed to run the FOCAS1/Ethernet functions.

Display

Procedure

1 Place the CNC in MDI mode.
2 Press function key [SYSTEM].
3 Press soft key [CHAPTER].
4 When you press soft key [ETHERNET], the "Ethernet (Setting)" screen appears.
If parameters have already been registered, the parameter settings are displayed.
5 Enter or update the data using the MDI or soft keys.
6 Select the desired page using the [PAGE ↑] [PAGE ↓] page keys.




ETHERNET(SETTING)
2000-01-01 12:00:00
O 1000
N 0
MDI
***
STOP
****
***
***
LSK
S 0 %
HOST 1
IP ADDRESS 192.168.0.101
PORT NUMBER 21
USERNAME dtsvr
PASSWORD **********
LOGIN DIR DATASERVER
HOST 2
IP ADDRESS 192.168.0.102
PORT NUMBER 21
USERNAME GUEST
PASSWORD **********
LOGIN DIR
CAPS LOCK:ON
PAGE 2/5
ETHERNET
DATA SERVER
ALARM HISTRY
OPERAT HISTRY
SYSTEM LOG
CHAPTER

Display items and setting items

Items related to the Ethernet functions

The items related to the Ethernet functions are displayed.

Item	Description
MAC ADDRESS	MAC address of the data server board

TCP/IP setting items for the CNC

Set the TCP/IP items for the CNC.

Item	Description
IP ADDRESS	Specifies the IP address of the CNC. (Format: "192.168.0.1")
SUBNET MASK	Specifies the mask address of the network IP address. (Format: "255.255.255.0")
ROUTER IP ADDRESS	Specifies the router IP address. Specify this address when the network incorporates a router. (Format: "192.168.0.99")

FOCAS1/Ethernet setting items

Set the items related to the FOCAS1/Ethernet server.

Item	Description
PORT NUMBER (TCP)	Specifies the port No. to be used by the FOCAS1/Ethernet functions, within a range of 5001 to 65535.
PORT NUMBER (UDP)	Not used by the FOCAS1/Ethernet functions. Set 0.
TIME INTERVAL	Not used by the FOCAS1/Ethernet functions. Set 0.

NOTE
1 When the "TCP/IP setting items for the CNC" have been changed, the power must be turned off then on again.
2 Press soft key [SAVE] to save the parameter settings into the non-volatile memory of the CNC.

Entering data

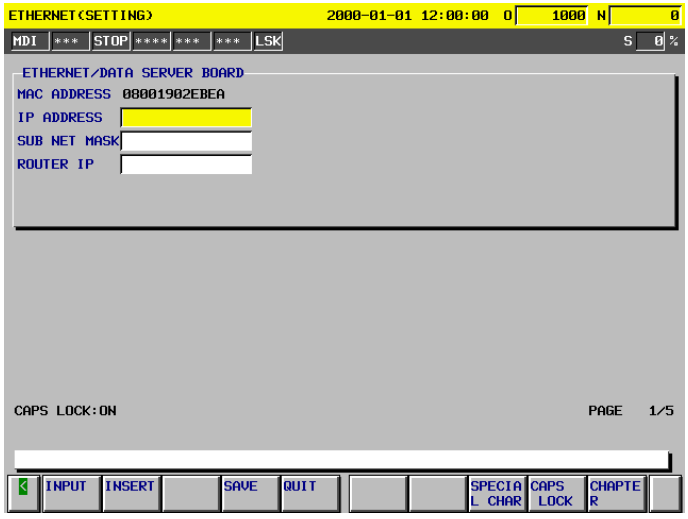
Procedure

The following describes the basic method for entering data.

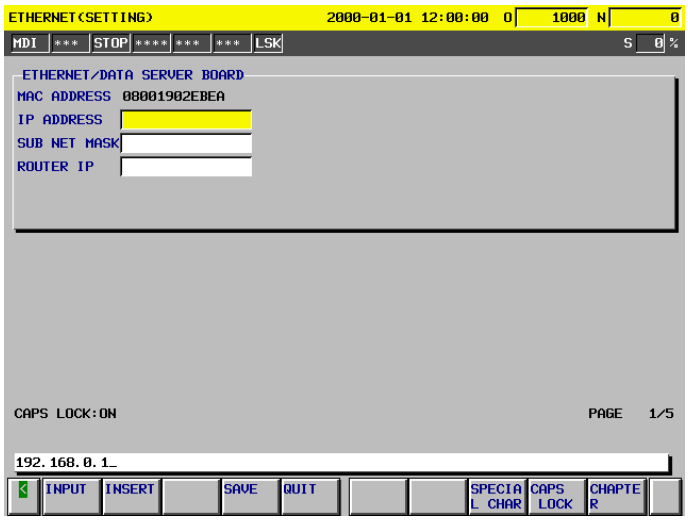
1 Place the CNC in MDI mode.
2 Display the "Ethernet (Setting)" screen.
3 Position the cursor to the desired item using the cursor movement keys.
4 Enter the desired data using the MDI keys.
5 Press soft key [INPUT] or function key INPUT to fix the data.
6 Press soft key [SAVE] to save the parameter settings to the non-volatile memory of the CNC.

NOTE
Already-set data can be deleted. To delete numerical data, enter 0. To delete character data, enter a space (SP).

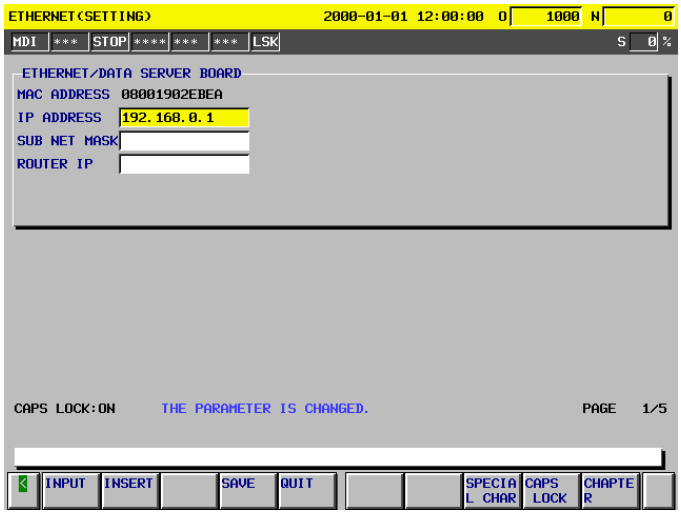
Example: To set the IP address to "192.168.0.1"
(a) Position the cursor to "IP ADDRESS."



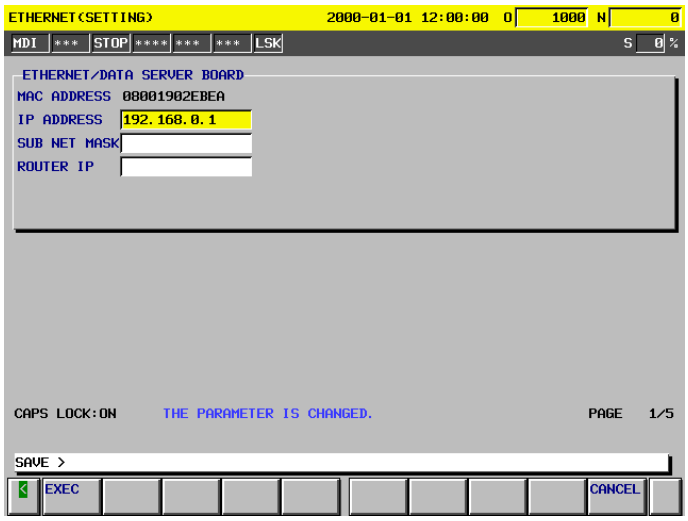
(b) Enter "192.168.0.1" using the MDI keys.



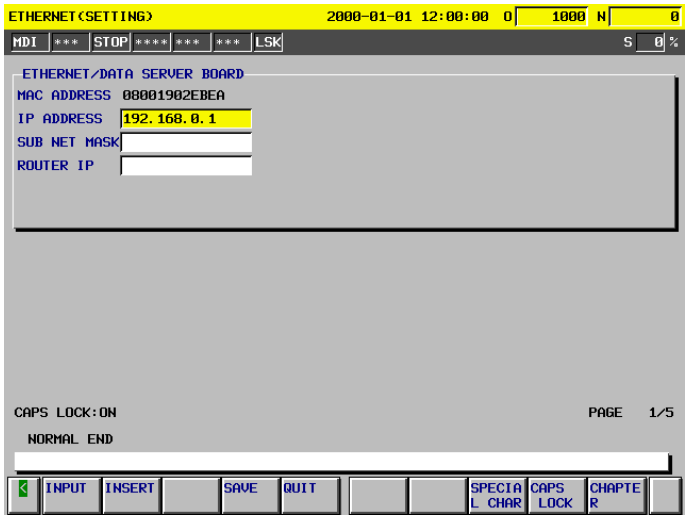
(c) Press soft key [INPUT] or function key INPUT to fix the data.



(d) Press soft key [SAVE].



(e) Press soft key [EXEC]. This saves the parameters into the non-volatile memory of the CNC.



5.3 PARAMETERS

The following describes the parameters related to the FOCAS1/Ethernet functions.

Parameters

0020 **Interface number of input device for foreground**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
6: Selects the FOCAS1/Ethernet as the I/O device to perform DNC operation.
7: Selects the FOCAS1/Ethernet as the I/O device.

0021 **Interface number of output device for foreground**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
7: Selects the FOCAS1/Ethernet as the I/O device.

0022 **Interface number of input device for background**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
7: Selects the FOCAS1/Ethernet as the I/O device.

0023 **Interface number of output device for background**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
7: Selects the FOCAS1/Ethernet as the I/O device.

5029 **Selects host 2 OS.**

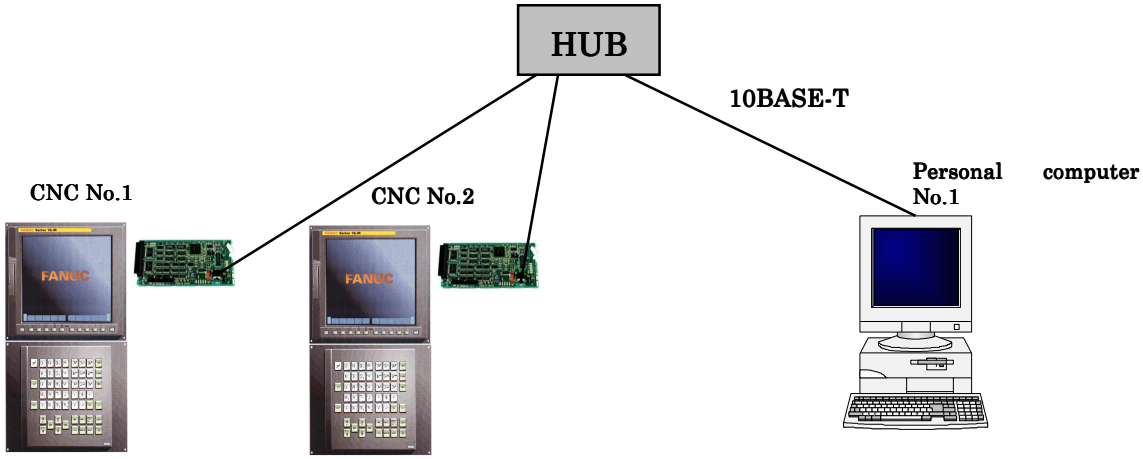
[Data type] Byte
[Valid data range] ms
[Valid data range] 0 to 255
Specifies the wait time in ms for each service of the FOCAS1/Ethernet when it is used together with the data server function.
If a value between 0 and 2 is specified, a wait time of 2 ms is assumed.

NOTE
When the FOCAS1/Ethernet function is used to download or upload normal NC data, specify 7 as the I/O device number.
Only when performing DNC operation, specify 6.

5.4 CONFIGURING A SMALL-SCALE NETWORK

The following shows an example of the minimum settings needed to run the FOCAS1/Ethernet functions on a small-scale network.
These settings allow a personal computer to be connected to two CNCs by the FOCAS1/Ethernet functions.

- The FOCAS1/Ethernet function client runs on personal computer No.1.
- The FOCAS1/Ethernet function server runs on CNCs No.1 and No.2.



	CNC No.1	CNC No.2
IP address	192.168.0.1	192.168.0.2
Subnet mask	255.255.255.0	255.255.255.0
Router IP address	None	None
TCP port No.	8193	8193
UDP port No.	0	0
Time interval	0	0
Parameter No.20	6 or 7	6 or 7

Set these items on the "Ethernet Parameter" screen.

Set this item on the "Parameter" screen.

		Personal computer No.1
IP address		192.168.0.101
Subnet mask		255.255.255.0
Default gateway		None
CNC No.1	IP address	192.168.0.1
	Port number	8193
CNC No.2	IP address	192.168.0.2
	Port number	8193

Set these items in "Microsoft TCP/IP Property" on the personal computer (Windows95/98/NT).

Specify these items with the arguments of the data window library function "cnc_allclibhnd13."

5.5 CONFIGURING A LARGE-SCALE NETWORK

Before you configure a large-scale network or add such a network to an existing network, consult your company's network administrator to determine IP addresses, subnet masks, and router IP addresses.

6 DATA SERVER FUNCTIONS FOR THE 15*i*

The following describes the settings needed to use the data server functions with the Series 15*i*-A.

6.1 PRECAUTIONS TO BE OBSERVED WHEN USING THE DATA SERVER FUNCTIONS FOR THE FIRST TIME

⚠ CAUTION

1 When the data server board is used for the first time, format the hard disk, set the appropriate parameters, and turn the power off then on again. If the data server functions are used without first performing these operations, normal operation cannot be guaranteed.
2 When Ethernet FTP communication is carried out for the first time, consult with your company's network administrator to determine the network addresses and other settings. Then, conduct a communications test.
If incorrect network addresses and other settings are set, communication and other faults may adversely affect the entire network.
Particularly, if a duplicate IP address is set, the data server causes communication errors intermittently. This may result in a CNC's system error. To check whether the IP address duplicates any one already in use, see "Checking IP addresses for duplication" in Appendix A.4, "Checking Communication."
3 Never turn off the power to the CNC while the hard disk is being accessed (a data server function service is being executed). Otherwise, the data saved on the hard disk may be destroyed.
4 Never turn off the power to the CNC while using the functions, especially the FTP server functions.
5 To guard against hard disk failure, back up the files on the hard disk of the host computer.

NOTE

1 The following option parameter is needed when the data server functions are used:
Series15*i*-MA **A02B-0261-J827**
2 The following options are required to use buffer mode for data server features:
Series15*i*-MA **A02B-0261-J697**
3 Only one FTP client can be connected to one CNC by the data server functions. One CNC can be connected to only one FTP server.

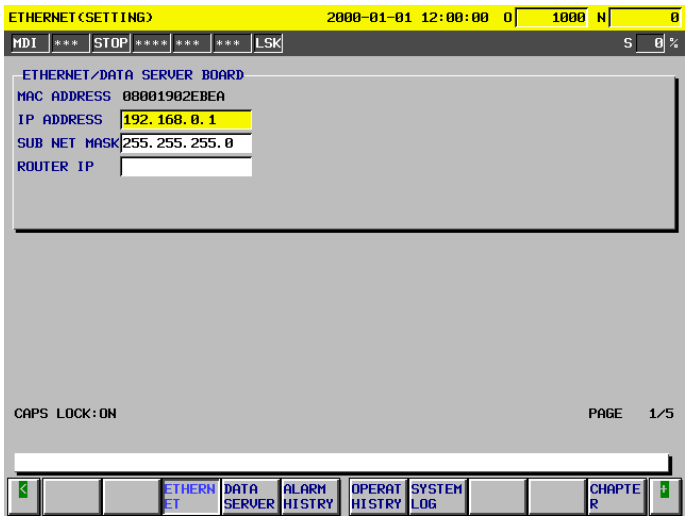
6.2 ETHERNET PARAMETER SCREEN

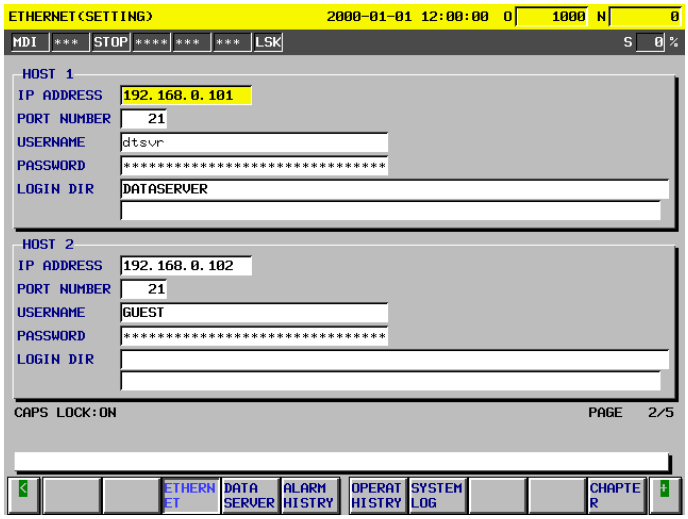
The Ethernet Parameter screen is used to set the parameters needed for the data server functions.

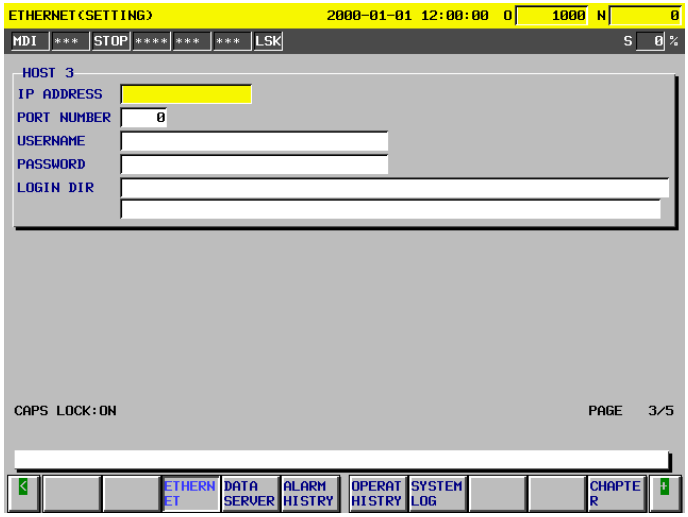
Display

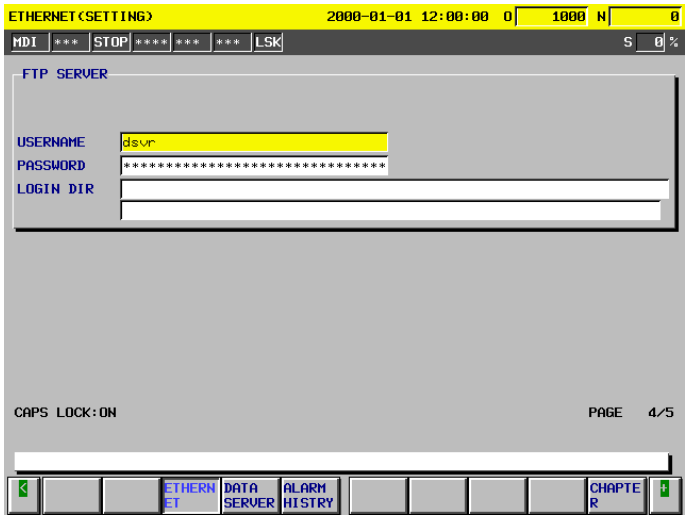
Procedure

1 Place the CNC in MDI mode.
2 Press function key [SYSTEM].
3 Press soft key [CHAPTER].
4 When you press soft key [ETHERNET], the "Ethernet (Setting)" screen appears.
If parameters have already been registered, the parameter settings are displayed.
5 Enter or update the data using the MDI or soft keys.
6 Select the desired page using the [PAGE ↑] [PAGE ↓] page keys.









NOTE
If the CNC software series is the F001 or F601, the setting cannot be performed for host 2 or 3.

Display items and setting items

Items related to the Ethernet functions

The items related to the Ethernet functions are displayed.

Item	Description
MAC ADDRESS	MAC address of the data server board

TCP/IP setting items for the CNC

Set the TCP/IP items for the CNC.

Item	Description
IP ADDRESS	Specifies the IP address of the CNC. (Format: "192.168.0.1")
SUBNET MASK	Specifies the mask address of the network IP address. (Format: "255.255.255.0")
ROUTER IP ADDRESS	Specifies the router IP address. Specify this address when the network incorporates a router. (Format: "192.168.0.99")

Setting items for hosts 1, 2, and 3

Set the items related to the host computer on which the FTP server runs.

Item	Description
PORT NUMBER	Specifies the port No. to be used by the data server functions. Usually, set 21 because the FTP service is used.
IP ADDRESS	Specifies the IP address on the host computer. (Format: "192.168.0.101")
USERNAME	Specifies the name of the user to log on to the host computer using FTP. (A user name of up to 31 characters can be specified.)
PASSWORD	Specifies the password for the above user name. The password must always be specified. (A password of up to 31 characters can be specified.)
LOGIN DIR	Specifies the directory on the host computer to which the data server functions are to log in. (A name of up to 127 characters can be specified.)

Setting items for the FTP server

Set the items related to the FTP server.

Item	Description
USERNAME	Specifies the user name on the data server that is to be used when the host computer logs in using FTP. (A user name of up to 31 characters can be specified.)
PASSWORD	Specifies the password for the above user name. The password must always be specified. (A password of up to 31 characters can be specified.)
LOGIN DIR	Specifies the directory on the data server to which the host computer is to log in. (A name of up to 127 characters can be specified.)

NOTE
1 When the "TCP/IP setting items for the CNC" have been changed, the power must be turned off then on again.
2 Note that the system differentiates between upper- and lower-case characters in "USERNAME" and "PASSWORD," described under "Setting items for the FTP server."
3 The default for "LOGIN DIR," described under "Setting items for the FTP server," is the \NCDATA directory. Only a directory under the \NCDATA directory can be specified for "LOGIN DIR."
4 Press soft key [SAVE] to save the parameter settings into the non-volatile memory of the CNC.

Entering data

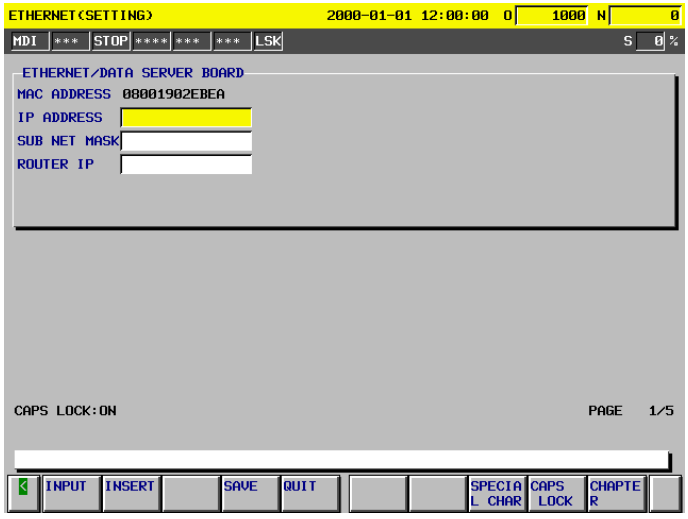
Procedure

The following describes the basic method for entering data.

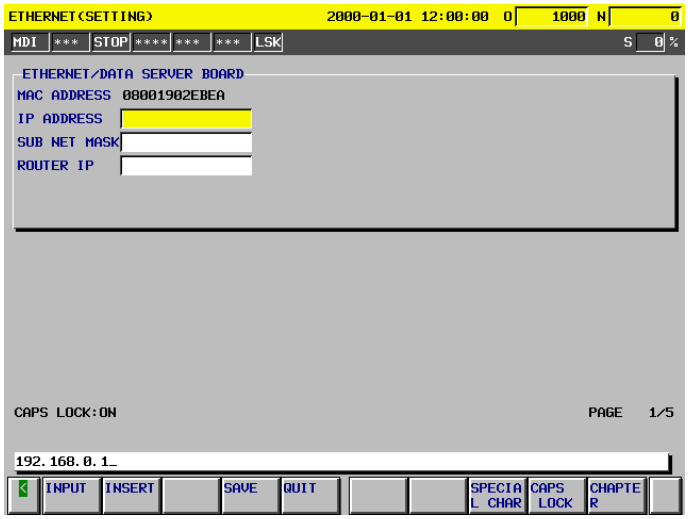
1 Place the CNC in MDI mode.
2 Display the "Ethernet (Setting)" screen.
3 Position the cursor to the desired item using the cursor movement keys.
4 Enter the desired data using the MDI keys.
5 Press soft key [INPUT] or function key INPUT to fix the data.
6 Press soft key [SAVE] to save the parameter settings to the non-volatile memory of the CNC.

NOTE
Already-set data can be deleted. To delete numerical data, enter 0. To delete character data, enter a space (SP).

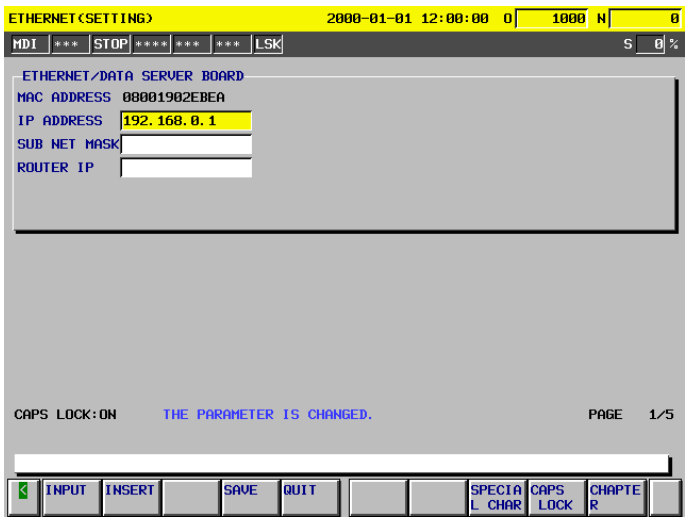
Example: To set the IP address to "192.168.0.1"
(a) Position the cursor to "IP ADDRESS."



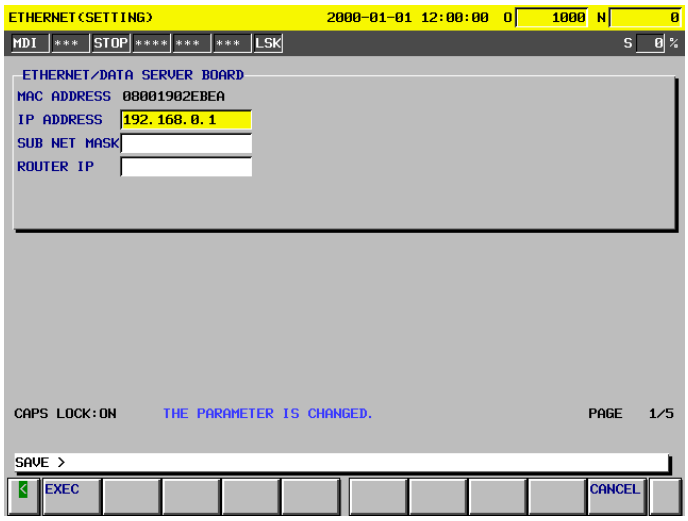
(b) Enter "192.168.0.1" using the MDI keys.



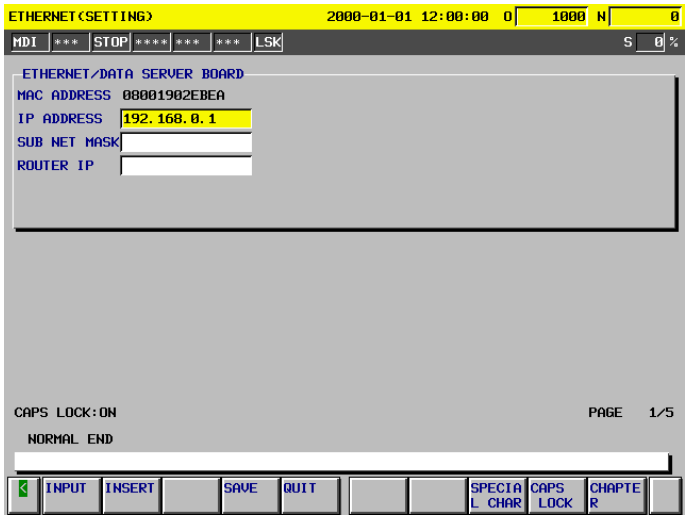
(c) Press soft key [INPUT] or function key INPUT to fix the data.



(d) Press soft key [SAVE].



(e) Press soft key [EXEC]. This saves the parameters into the non-volatile memory of the CNC.



6.3 PARAMETERS

The following describes the parameters related to the data server functions.

Parameters

0020 **Interface number of input device for foreground**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
14: Selects the data server for the input device.

0021 **Interface number of output device for foreground**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
14: Selects the data server for the output device.

0022 **Interface number of input device for background**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
14: Selects the data server for the input device.

0023 **Interface number of output device for background**

[Input section] Setting input
[Data type] Integer
[Valid data range] 0 to 16
14: Selects the data server for the output device.

5028 **Selects host 1 OS.**

[Input section] Parameter input
[Data type] Integer
[Valid data range] 0 and 1
1: UNIX/VMS.
0: Windows 95/98/NT.

5029 **Selects host 2 OS.**

[Input section] Parameter input
[Data type] Integer
[Valid data range] 0 and 1
1: UNIX/VMS.
0: Windows 95/98/NT.

5030	Selects host 3 OS.

[Input section] Parameter input
[Data type] Integer
[Valid data range] 0 and 1
1: UNIX/VMS.
0: Windows 95/98/NT.

	#7	#6	#5	#4	#3	#2	#1	#0
5038	LCK							BWT

[Input section] Parameter input
[Data type] Bit

LCK Specifies whether to check if there is a duplicate file name specification in a list file when the LIST-GET data server function is used, as follows:
1: To check.
0: Not to check.

BWT Specifies whether to detect an error if the FTP communication is not finished in time when the DNC operation is in the data server function buffer mode, as follows:
1: Not to detect an error; the DNC operation is continued after the FTP communication is finished.
0: To detect an error.

	#7	#6	#5	#4	#3	#2	#1	#0
5040								DSW

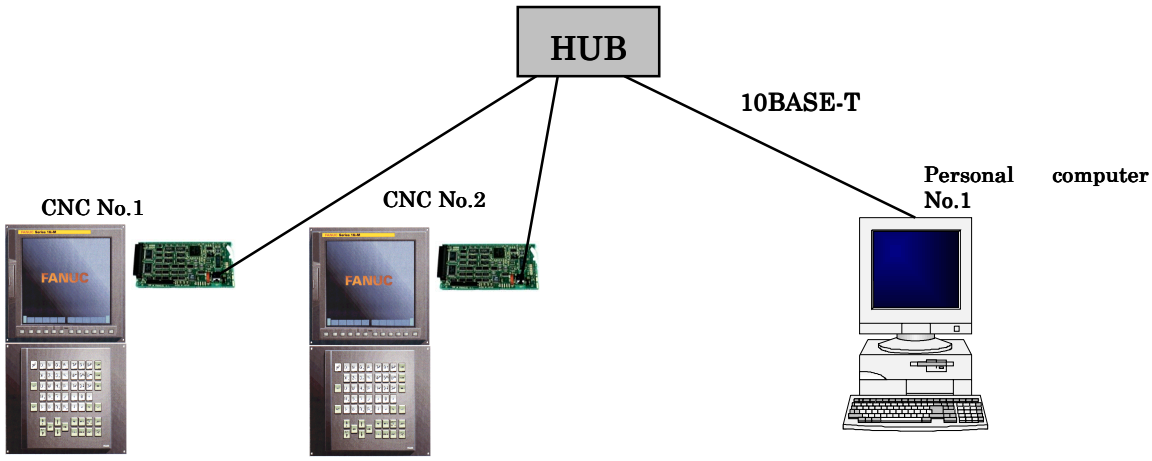
[Input section] Parameter input
[Data type] Bit

DSW Specifies the output if an error occurs during a data server operation (except reading and punching operations).
1: Warning
0: BG alarm

6.4 CONFIGURING A SMALL-SCALE NETWORK

The following shows an example of the minimum settings needed to use the data server functions on a small-scale network.
These settings allow a personal computer to be connected to one CNC by the data server.

- The FTP client and server run on the No.1 personal computer.
- The FTP client and server run on the No.1 and No.2 CNCs.



		CNC No.1	CNC No.2
IP address		192.168.0.1	192.168.0.2
Subnet mask		255.255.255.0	255.255.255.0
Router IP address		None	None
Connected host 1	Port No.	21	21
	IP address	192.168.0.101	192.168.0.101
	User name	dtsvr	dtsvr
	Password	dtsvr	dtsvr
	Login DIR	None	None
FTP server	User name	dtsvr	dtsvr
	Password	dtsvr	dtsvr
	Login DIR	None	None
Parameter No.20		5	5

Set these items on the "Ethernet Parameter" screen.

Set this item on the "Parameter" screen.

	Personal computer No.1
IP address	192.168.0.101
Subnet mask	255.255.255.0
Default gateway	None
User name	dtsvr
Password	dtsvr
Login DIR	Default

Set these items in "Microsoft TCP/IP Property" on the personal computer (WindowsNT).

Set these items in "User Manager" on the personal computer (WindowsNT).

Set this item in "Internet Service Manager" on the personal computer (WindowsNT).
For Peer Web Services

6.5 CONFIGURING A LARGE-SCALE NETWORK

Before you configure a large-scale network or add such a network to an existing network, consult with your company's network administrator to determine IP addresses, subnet masks, and router IP addresses.

IV. OPERATION

1 16*i*/18*i*/21*i* FACTOLINK FUNCTIONS

This section describes how to use the series 16*i*/18*i*/21*i*-A/B FACTOLINK functions.

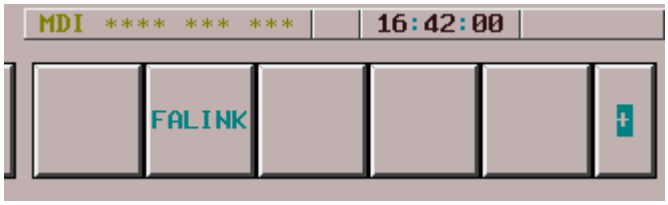
1.1 FACTOLINK SCREEN

Display

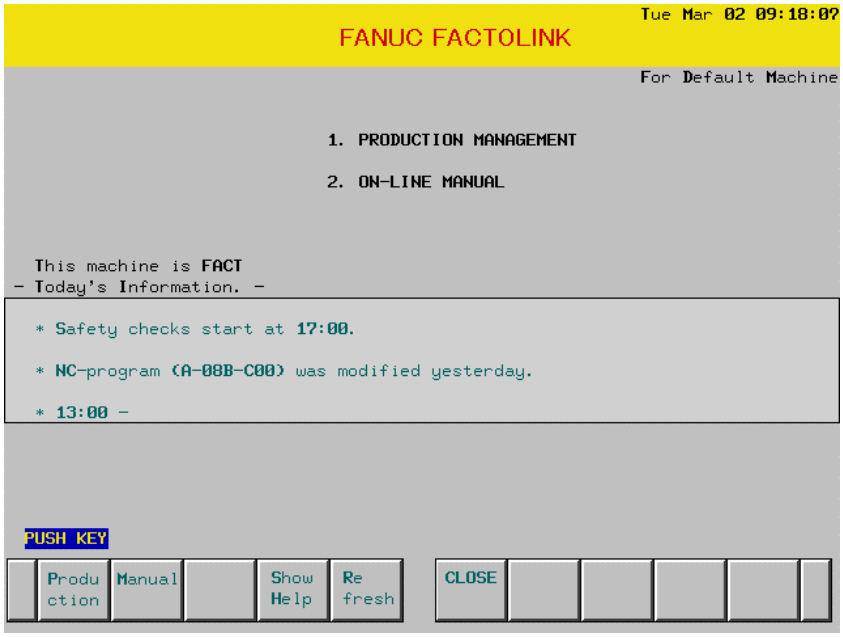
Procedure

1 Press function key MESSAGE.

2 Press the continuation menu key at the right end of the soft key menu.



3 When you press soft key [FALINK], the FACTOLINK screen appears.
The following is a sample FACTOLINK screen.



1.2 ETHERNET ERROR MESSAGE SCREEN

If an error related to the FACTOLINK functions occurs, an error message appears on the error message screen dedicated to the Ethernet functions.

Display

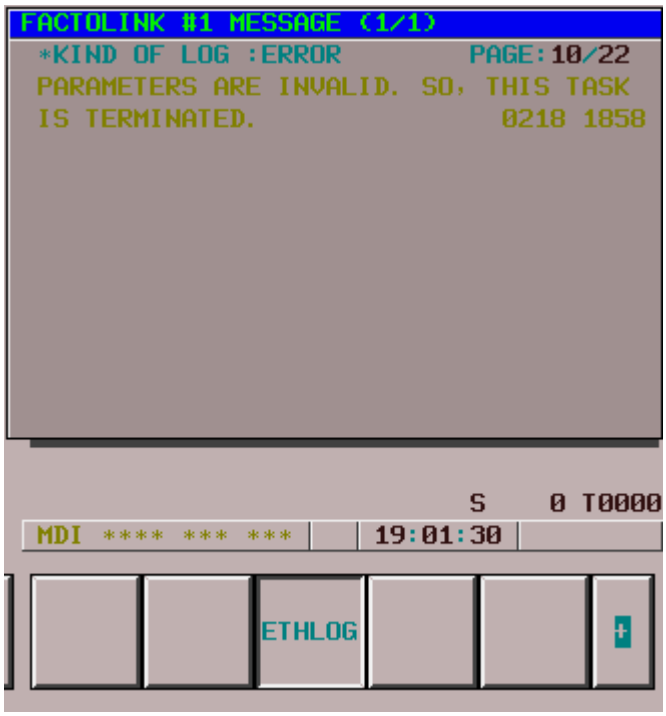
Procedure

1 Press function key MESSAGE.

2 Press the continuation menu key at the right end of the soft key menu.

3 When you press soft key [ETHLOG], the Ethernet Error Message screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the Ethernet Error Message screen, press soft key [ETHLOG] and then soft key [BOARD].

4 Select the desired page using the PAGE ↑ PAGE ↓ page keys.



[Reference]

The latest error message is displayed at the top of the screen. The day and time at which the error occurred are displayed at the right end of the error message. The format of the day and time is mmdd hhMM (mm: month, dd: day, hh: hour, MM: minute).

Configuration

The following titles are provided for the Ethernet error message screen:

- SYSTEM ERROR screen
- TCP/IP STACK ERROR screen
- PARAMETER ERROR screen
- FACTOLINK #1 MESSAGE screen
- FACTOLINK #2 MESSAGE screen
- FACTOLINK #3 MESSAGE screen

2 16*i*/18*i*/21*i*/PM*i* DNC1/Ethernet FUNCTIONS

This section describes how to use the Series 16*i*/18*i*/21*i*-A/B, Power Mate *i* , DNC1/Ethernet functions.

2.1 ETHERNET ERROR MESSAGE SCREEN

If an error related to the DNC1/Ethernet functions occurs, an error message appears on the error message screen dedicated to the Ethernet functions.

Display

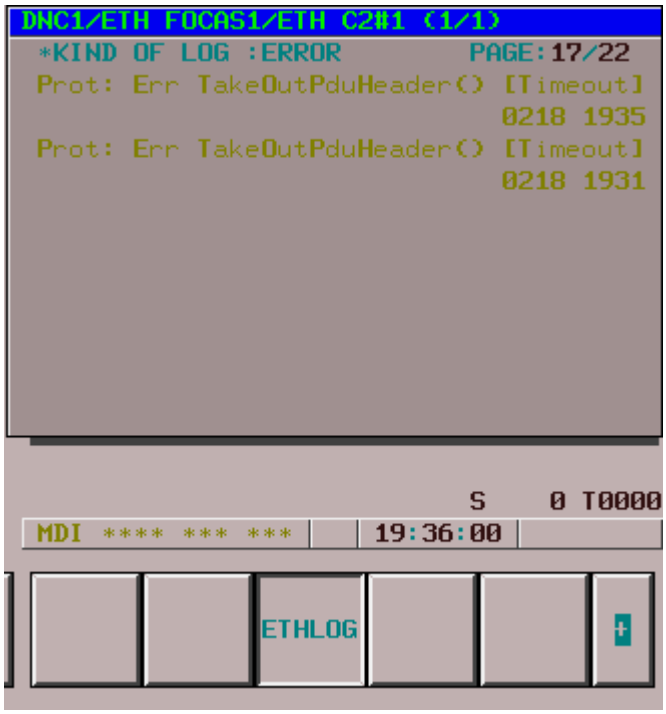
Procedure

1 Press function key MESSAGE.

2 Press the continuation menu key at the right end of the soft key manu.

3 When you press soft key [ETHLOG], the Ethernet Error Message screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the Ethernet Error Message screen, press soft key [ETHLOG] and then soft key [BOARD].

4 Select the desired page using the PAGE ↑ PAGE ↓ page keys.



[Reference]

The latest error message is displayed at the top of the screen. The day and time at which the error occurred are displayed at the right end of the error message. The format of the day and time is mmdd hhMM (mm: month, dd: day, hh: hour, MM: minute).

Configuration

The following titles are provided for the Ethernet error message screen:

- SYSTEM ERROR screen
- TCP/IP STACK ERROR screen
- PARAMETER ERROR screen
- DNC1/ETH FOCAS1/ETH C0 screen
- DNC1/ETH FOCAS1/ETH C1 screen
- DNC1/ETH FOCAS1/ETH C2 screen
- DNC1/ETH FOCAS1/ETH C3 screen
- DNC1/ETH FOCAS1/ETH C4 screen
- DNC1/ETH FOCAS1/ETH C5 screen

3 16*i*/18*i*/21*i*/PM*i* FOCAS1/Ethernet FUNCTIONS

This section describes how to use the Series 16*i*/18*i*/21*i*-A/B and Power Mate *i* FOCAS1/Ethernet functions.

3.1 ETHERNET ERROR MESSAGE SCREEN

If an error occurs for the FOCAS1/Ethernet functions, an error message is displayed on the error message screen dedicated to the Ethernet functions.

Display

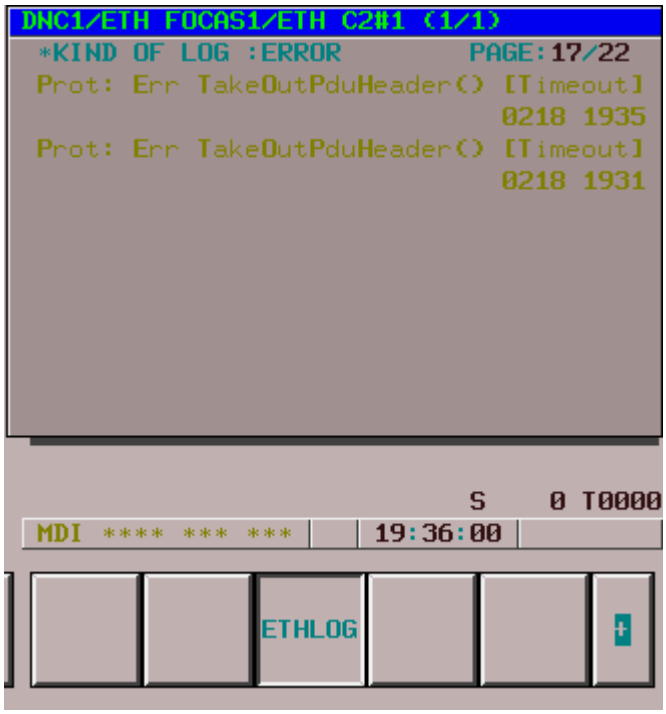
Procedure

1 Press function key MESSAGE.

2 Press the continuation menu key at the right end of the soft key menu.

3 When you press soft key [ETHLOG], the Ethernet Error Message screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the Ethernet Error Message screen, press soft key [ETHLOG] and then soft key [BOARD].

4 Select the desired page using the PAGE ↑ PAGE ↓ page keys.



[Reference]

The latest error message is displayed at the top of the screen. The day and time at which the error occurred are displayed at the right end of the error message. The format of the day and time is mmdd hhMM (mm : month, dd : day, hh : hour, MM : minute).

Configuration

The following titles are provided for the Ethernet error message screen:

- SYSTEM ERROR screen
- TCP/IP STACK ERROR screen
- PARAMETER ERROR screen
- DNC1/ETH FOCAS1/ETH C0 screen
- DNC1/ETH FOCAS1/ETH C1 screen
- DNC1/ETH FOCAS1/ETH C2 screen
- DNC1/ETH FOCAS1/ETH C3 screen
- DNC1/ETH FOCAS1/ETH C4 screen
- DNC1/ETH FOCAS1/ETH C5 screen
- DNC1/ETH FOCAS1/ETH C6 screen

4 16*i*/18*i*/21*i* DATA SERVER FUNCTIONS

This section describes how to use the series 16*i*/18*i*/21*i*-A/B data server functions.

4.1 RULES GOVERNING THE USE OF THE DATA SERVER FUNCTIONS

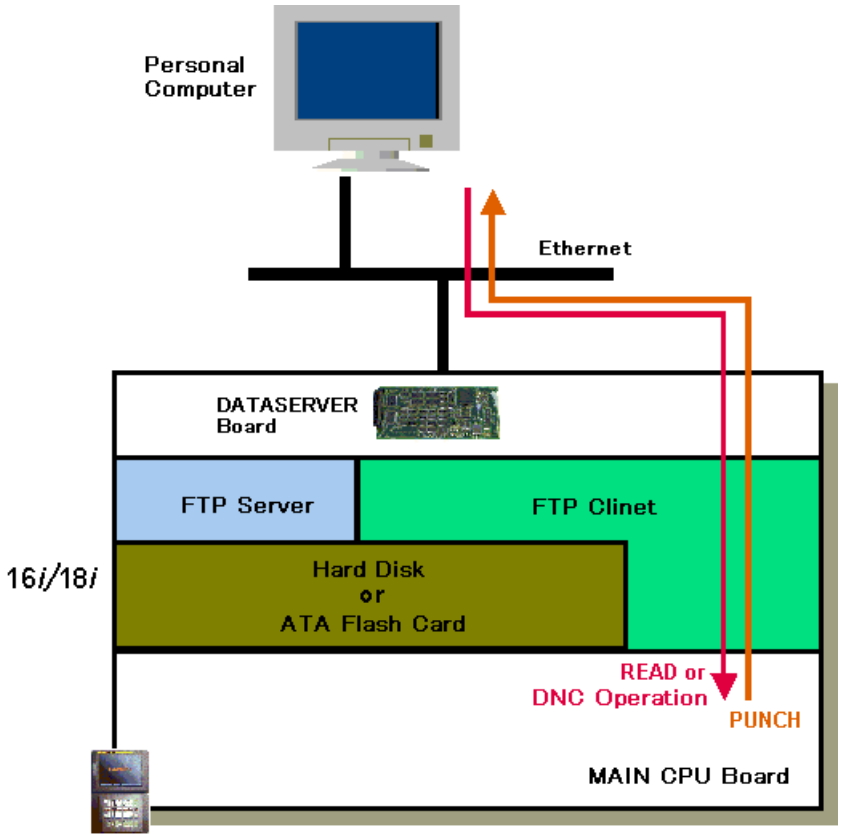
This section describes the rules governing the use of the data server functions.

4.1.1 Data Server Modes

The data server function can run in three modes when it transfers NC data (such as NC programs and NC parameters) between the CNC and data server board.

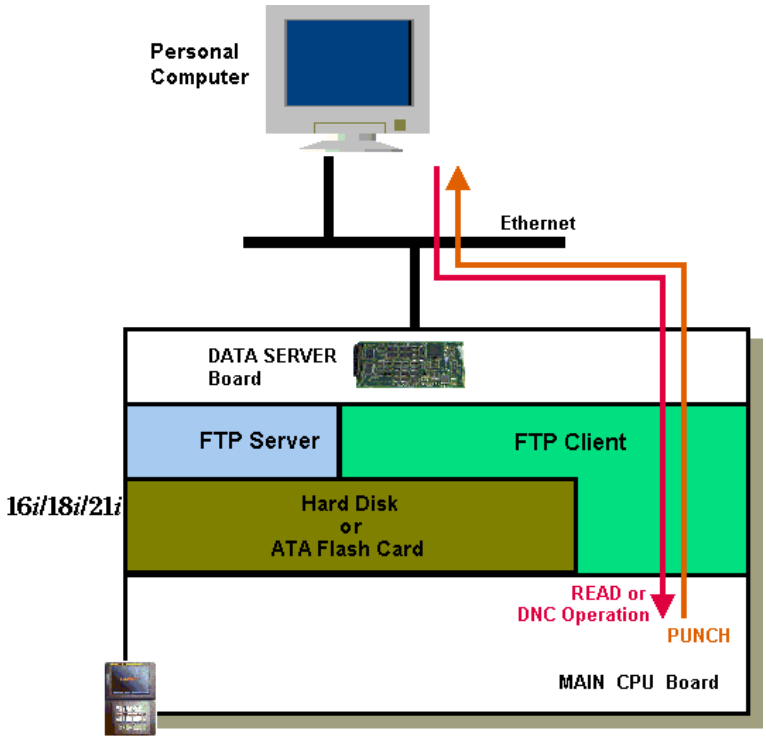
Storage mode

In the storage mode, data is transferred between the data server board built-in hard disk and CNC part program storage.
For example, DNC operations including a DNC operation by a subprogram call (M198) require that the related NC programs be stored on the data server board built-in hard disk. If an NC program is output, it will be stored on that hard disk.



FTP mode

In the FTP mode, data is transferred between the host computer built-in hard disk and CNC part program storage.
For example, DNC operations including a DNC operation by a subprogram call (M198) require that the related NC programs be stored on the host computer (personal computer) built-in hard disk. If an NC program is output, it will be stored on that hard disk.



⚠ CAUTION

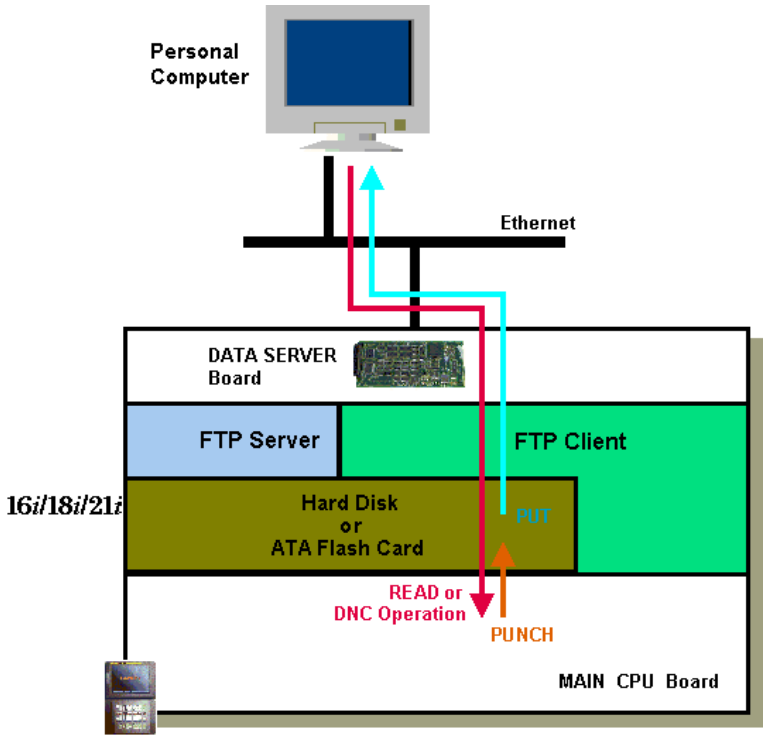
1 In FTP mode, CNC data is transferred from the host computer hard disk to the CNC part program storage memory. So, if the line is disconnected during communication due to network noise or any other reason, the line disconnection has a direct effect on CNC operations with compared to the storage mode.
2 If communication between the CNC and host computer is interrupted, for example, by putting the CNC on feed hold during a DNC operation in the FTP mode, the host computer may disconnect the communication. Perform trial run to put the CNC on feed hold and make sure that communication with the host computer is not interrupted.

Buffer mode

In the buffer mode, an NC program that is larger than the capacity of the data server board built-in hard disk can run more safely than in the FTP mode. To be specific, if an NC program that is too large to fit on the data server board built-in hard disk is to run in the buffer mode, the NC program is previously divided to several files when it is on the host computer (personal computer) built-in hard disk, and the resulting files are listed. Each file is selected from the list and sent sequentially to the data server board built-in hard disk for execution. In the FTP mode, a communication failure can affect directly the machining controlled by the CNC. In the buffer mode, to the contrary, the CNC operation can be stopped between the files if a communication failure occurs, because the data server board built-in hard disk functions as a buffer. When the machine program is divided into several files, an operation such as tool retracting can be inserted at the end of each of these files. Doing so enables safer continuous operations.

See Subsection, 4.1.8, "Buffer Mode Specifications," for detailed explanations about the buffer mode.

When an NC program is output in the buffer mode, the CNC behaves in the same manner as in the storage mode.



NOTE
The Series 21*i*-A/B cannot use the buffer mode.

4.1.2 Differences Between a File Number, O Number, and File Name

This subsection explains the differentiation between a file number, O number, and file name described in this manual.

- **File number**

Used to identify a file (data) stored in the data server board hard disk or host computer hard disk.

- **O number**

Used to identify the NC program stored in the CNC part program storage memory.

- **File name**

Used to identify a file (data) stored on the data server board hard disk or host computer hard disk.

4.1.3 Entering a File Number, O Number, and File Name

This subsection explains how to enter a file number, O number, and file name using the MDI keys.

- File number : Enter a numeral only.
- O number : Enter O plus numerals.
- File name : Enter / plus characters. Characters other than numerals only, as well as O plus numerals, are also used as file names.

Example:

Input	Meaning	Content
O1	O number	O0001
O0123	O number	O0123
/O1	File name	O1
1	File number	1
/1	File name	1
/ABC	File name	ABC

NOTE
A file name has an 8.3 format. In other words, the file name consists of an eight-character name + three-character extension.

4.1.4 Differences Between a Hard Disk File and Host File

This subsection explains the differentiation between a hard disk file and host file described in this manual.

- **Hard disk file**

  Stored on the hard disk of the CNC data server board (hereafter called a data server board built-in hard disk).

- **Host file**

  Stored on the hard disk of the host computer (hereafter called the host computer built-in hard disk).

4.1.5 Hard Disk File Names

The name of any file on the data server board built-in hard disk is represented using the 8.3 file name format (8 characters in the file name and 3 characters in the file name extension) originally adopted for MS-DOS.
If a file to be subjected to an FTP transfer is specified only with a file name that is not in the 8.3 format, it is converted to an 8.3-format file name according to the following conversion rules.

Rules for conversion to 8.3-format file names

1 The first 8 characters in the specified file name are used as a post-conversion file name.
2 The 3 characters in the specified file name between the first and second periods are used as a post-conversion file name extension.
3 Any blank character in the specified file name is ignored.

Examples of converting to 8.3-format file names

1 "NCPROGRAM.DAT" → "NCPROGRA.DAT"
Because the file name has more than 8 characters, the first 8 characters are accepted as valid, and the post-conversion file name becomes as stated above.
2 "NCFILE.TEXT" → "NCFILE.TEX"
Because the file name extension has more than 3 characters, the first 3 characters in the file name extension are accepted as valid, and the post-conversion file name becomes as stated above.
3 "NCFILE.PRG.TXT" → "NCFILE.PRG"
The characters between the first and second periods are accepted as valid, and the post-conversion file name becomes as stated above.
4 "NC PROGRAM.DATA.TXT" → "NCPROGRA.DAT"
Because the first 8 characters, excluding the blank character, in the file name are accepted as valid, and the first 3 characters between the first and second periods are accepted as an file name extension, the post-conversion file name becomes as stated above.

NOTE
If the file names of different files on the host computer built-in hard disk are converted to 8.3-format file names for registration with the data server board built-in hard disk automatically as described above, the post-conversion file names may become identical.

4.1.6 NC Program Format

The NC program prepared by the host computer must conform to the format shown below.

```
% TITLE ;
O0001(COMMENT) ;
       .
       .
       .
M30 ;
%
```

The NC program begins with % (start file mark). A comment (title, etc.) can be inserted, as required, into the reader part between % and EOB (;, program start).
Always specify an O number at the beginning of the program part. Use this O number to register the program on the hard disk.
If the O number in the NC program differs from that of the file name, the O number of the file name is used first.
Note that ";" at the end of each block indicates the end of block (EOB). In fact, it becomes LF (LF: 0A in hexadecimal) or LF-CR-CR (CR: 0D in hexadecimal).
The NC program must end with "M code ; %."
To perform binary input, enclose it in the binary input operation start code and end code and insert it into the ... section in the above figure. For details of binary input, refer to each CNC operator's manual.

> ⚠ **WARNING**
> If the NC program prepared by the host computer is of a format not specified by the CNC, an unexpected operation may occur when the NC program is executed. Take great care when preparing the NC program on the host computer.

4.1.7 List File Formats

Use one of the following list formats for the LIST-GET, LIST-PUT, and LIST-DELETE functions, which are described later.

Format 1

```
% ;
O0001(COMMENT) ;
N111 ;
N222 ;
N333 ;
  :
  :
N999 ;
%
```

Format 2

```
% ;
O0001(COMMENT) ;
N111 (PC-File) ;
N222 (PC-File) ;
N333 (PC-File) ;
  :
  :
N999 (PC-File) ;
%
```

Format 3

```
% ;
O0001(COMMENT) ;
(Dtsvr-File) ;
(Dtsvr-File) ;
(Dtsvr-File) ;
  :
  :
(Dtsvr-File) ;
%
```

Format 4

```
% ;
O0001(COMMENT) ;
(Dtsvr-File, PC-File) ;
(Dtsvr-File, PC-File) ;
(Dtsvr-File, PC-File) ;
  :
  :
(Dtsvr-File, PC-File) ;
%
```

Specifications common to all formats

<1> The list file begins with "%" (start file mark).
<2> An O number must be specified in the next block. The list file must be named using the same O number.
A comment enclosed in parentheses "(" and ")" can be inserted between the O number and an EOB.
<3> Process files are specified in the subsequent blocks.
<4> The list file must end with "%."

Specifications of format 1

The specifications of the format-1 list file are as follows:

<1> In this format, process files are identified using "Oxxxx" (where "xxxx" represents a four-digit number). File names are specified by substituting "N" for "O" in "Oxxxx." Zeros in the four-digit number can be suppressed. The process files included in this example are treated as "O0111," "O0222," "O0333," ..., and "O0999" sequentially.
<2> The LIST-GET service transfers "Oxxxx" files from the host computer built-in hard disk to the data server board built-in hard disk without renaming them. The LIST-PUT service transfers "Oxxxx" files from the data server board built-in hard disk to the host computer built-in hard disk without renaming them. The LIST-DELETE service deletes "Oxxxx" files from the data server board built-in hard disk.

Specifications of format 2

The specifications of the format-2 list file are as follows:

<1> In this format, process files are identified using "Oxxxx" (where "xxxx" represents a four-digit number) when they are on the data server board built-in hard disk and arbitrary names when they are on the host computer built-in hard disk. The file names used on the data server board built-in hard disk are specified by substituting "N" for "O" in "Oxxxx." Zeros in the four-digit number can be suppressed. The process files included in this example are treated as "O0111," "O0222," "O0333," ..., and "O0999" sequentially.
On the host computer built-in hard disk, files can be assigned an arbitrary name enclosed in parentheses "(" and ")" after the corresponding "Nxxxx," provided that the name consists of a combination of those selected from the following 76 different ASCII characters:
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . (period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~
<2> The LIST-GET service transfers files having the arbitrary name "PC-File" from the host computer built-in hard disk to the data server board built-in hard disk as "Oxxxx" files. The LIST-PUT service transfers "Oxxxx" files from the data server board built-in hard disk to the host computer built-in hard disk as files having the arbitrary name "PC-File." The LIST-DELETE service deletes "Oxxxx" files from the data server board built-in hard disk.

Specifications of format 3

The specifications of the format-3 list files are as follows:

<1> In this format, process files have an arbitrary name. It is assumed that each file has the same name when it is on the data server board built-in hard disk and when it is on the host computer built-in hard disk.
The "arbitrary" file name is specified in parentheses "(" and ")" and must consist of a combination of characters selected from the following 76 different ASCII characters:
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . (period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~

<2> The LIST-GET service transfers files having the arbitrary name "Dtsvr-File" from the host computer built-in hard disk to the data server board built-in hard disk without renaming them.
The LIST-PUT service transfers files having the arbitrary name "Dtsvr-File" from the data server board built-in hard disk to the host computer built-in hard disk without renaming them.
The LIST-DELETE service deletes "Dtsvr-File" files from the data server board built-in hard disk.

Specifications of format 4

The specifications of the format-4 list file are as follows:

<1> In this format, process files have an arbitrary name. It is assumed that each file has a different name between when it is on the data server board built-in hard disk and when it is on the host computer built-in hard disk.
An "arbitrary" file name used on the data server board built-in hard disk and that on the host computer built-in hard disk are both specified in parentheses "(" and ")." They must be separated from each other using a comma "," and must consist of a combination of characters selected from the following 76 different ASCII characters:
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~

<2> The LIST-GET service transfers files having the arbitrary name "PC-File" from the host computer built-in hard disk to the data server board built-in hard disk as "Dtsvr-File" files.
The LIST-PUT service transfers files having the arbitrary name "Dtsvr-File" from the data server board built-in hard disk to the host computer built-in hard disk as files having the arbitrary file name "PC-File."
The LIST-DELETE service deletes "Dtsvr-File" files from the data server board built-in hard disk.

Restrictions on file names in the list file

The following restrictions apply when file names are specified in the list file.

<1> Only the following 76 different ASCII characters can be used in arbitrary file names.
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . (period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~
This restriction applies also when the name of a file held on the host computer built-in hard disk is specified.

<2> The arbitrary file name can be up to 255 characters. If an attempt is made to specify a larger arbitrary file name, an error is detected.

<3> Any file to be used on the data server board built-in hard disk must be in the 8.3 format. If an "arbitrary" file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically according to the following rule:

- If the first 8 characters in the original "arbitrary" file name include no period, they are used as the post-conversion file name. If they include a period, the characters before the period are used as the post-conversion file name. If the first 3 characters after the period include no period, they are used as the post-conversion file extension. If they contain periods, a characters between the first and second periods are used as the post-conversion file name extension.
  Example 1) If the original file name is "LONGFILENAME.LONGEXT," the post-conversion file name is: "LONGFILE.LON"
  Example 2) If the original file name is "ABCD.EFGH.TXT," the post-conversion file name is: "ABCD.EFG"

NOTE
The names of files handled in the data server must be in the 8.3 format. If "arbitrary" file names are not in the 8.3 format, they are converted to this format automatically when they are handled in the data server. Different "arbitrary" file names may be converted to the same file name in the 8.3 format; therefore, they will be regarded as the same file.

List file storage location

The LIST-GET, LIST-PUT, and LIST-DELETE services are useful to manage more than one NC program in a group.
The storage location for the list file varies depending on what service is to be executed.
If the LIST-GET service is to be used, the list file is to be prepared on the host computer built-in hard disk, because the NC programs to be executed are on that hard disk.
If the LIST-PUT or LIST-DELETE service is to be used, the list file is to be prepared on the data server board built-in hard disk, because the NC programs to be executed are on that hard disk.

4.1.8 Buffer Mode Specifications

The buffer mode is designed to handle NC programs larger than the capacity of the data server board built-in hard disk. In this mode, the data server board built-in hard disk is used as a temporary, intermediate buffer.

In the buffer mode, two areas (A and B) are previously prepared on the hard disk. While an NC program is being supplied from one (A) of the areas to the CNC, the rest of the NC program is read from the host computer into the other area (B), using the FTP. When the data transfer from area A ends, a data transfer from area B to the CNC is started, and the NC program transfer from the host computer to the emptied area (A) is resumed, using the FTP.

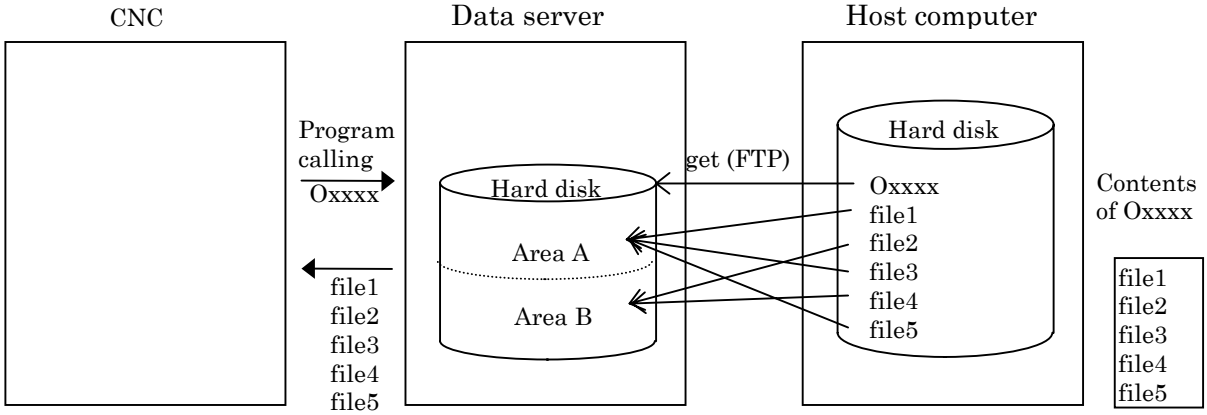
Repeating this sequence enables an NC program larger than the capacity of the data server board built-in hard disk to be handled. Using the buffer mode, however, requires that the NC program be previously divided into several files in the host computer.

The size of resulting smaller files must not be larger than half the remaining capacity of the data server board built-in hard disk. If the file size is very large (for example, not smaller than 100 MB), it will take a fairly long time to read the first file from the host computer, thus delaying the start of the operation.

NOTE
The Series 21*i*-A/B cannot use the buffer mode.

4.1.8.1 How to use the buffer mode

The buffer mode is designed to handle an NC program larger than the capacity of the data server board built-in hard disk. This mode can be used with DNC operations (Section 4.6) including a DNC operation by a subprogram call (M198) (Section 4.7).
In the buffer mode, the Oxxxx file called during a DNC operation or by subprogram calling is a file list, which is a list of file names arranged in the sequence in which they are to be called. In this mode, the data server board calls the files specified according to this file list sequentially and supplies data from them to the NC. (See the following figure.)



As seen from the above figure, the contents of the files (file1 to file5) specified in the file list in the host computer are fetched into the data server board built-in hard disk, using the FTP, then the data is supplied to the CNC. In the buffer mode, after the CNC requests the data server to read the NC program, the specified file list is read from the host computer, and the contents of the first file in the file list are read, then the data is supplied to the CNC. Note, therefore, that a time lag occurs between the read request and the data supply sequence. In addition, while data is being supplied from one of the areas to the CNC, data is fetched into the other area, using the FTP. Therefore, the original data must be divided to such a size that the resulting two consecutive files can fit on the data server board built-in hard disk.
When a data transfer from one of the areas to the CNC is completed, if the FTP communication with the other area has not ended, another data supply sequence cannot be performed, and therefore, the program call ends in an error. This error can be suppressed, using a parameter, however. See Section 4.3, "Parameters," of Part III, "Setting," for details. For a DNC operation by a subprogram call (M198), the name of the file list must be Oxxxx (where xxxx represents a four-digit number). For other DNC operations, however, the name of the file list is arbitrary. The name of each file specified in the file list can be any name permitted in the host computer, provided that it does no exceed 255 alphanumeric characters. In the file list, each file name must be followed by at least one LF (0A in hexadecimal) or CR (0D in hexadecimal).

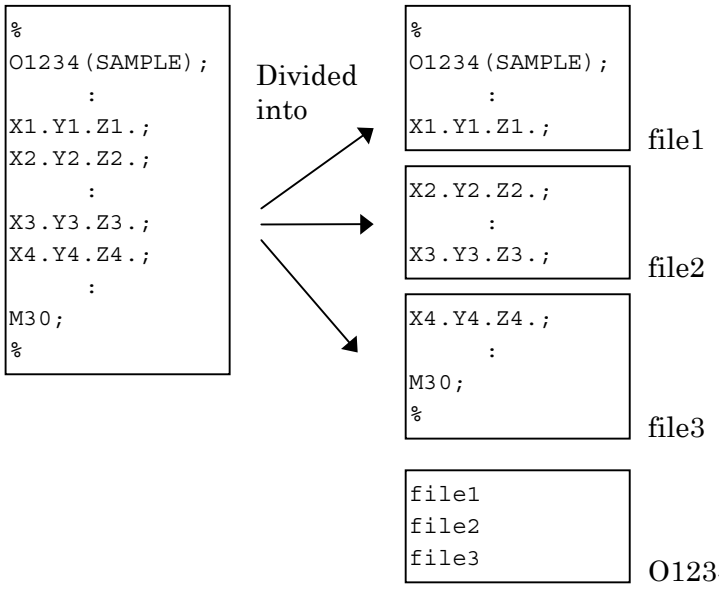
NOTE

Even in the buffer mode, it is possible to newly register files on the data server board built-in hard disk, using operations such as "NC program GET" and "output to NC program." These operations, however, may cause a buffer mode DNC operation error, if the capacity of the data server board built-in hard disk necessary for buffer mode operations is used up. Therefore, do not register new files on the data server board built-in hard disk during buffer mode operations. Always make sure that there remains an enough free space.

4.1.8.2 How to divide an NC program into several files

In buffer mode operations, the host computer must previously divide an NC program into several files and create a list of these files arranged in the sequence in which they are to be transferred.

Example) Dividing an NC program into three files



As shown above, the NC program is divided into three files (file1, file2, and file3). These file names are specified in the file list (named O1234).

> ⚠ **CAUTION**
> In the above example, the original NC program is not divided in the middle of a block. In reality, however, the NC program can be divided in the middle of a block. In this case, make sure that no extra character is inserted at the end of any of the resulting files. Otherwise, an unexpected operation may occur when the NC program is executed. Be very careful when creating and editing NC programs in the host computer.

NOTE

1 The size of files into which an NC program is divided should be 20 to 30 MB. If the size is very large, there will be much idle time before the DNC operation begins. If the size is very small, data may be interrupted between files, resulting in a cutter mark being left on the workpiece.
2 An NC program can be divided in the middle of a block, but it should be divided between blocks. In addition, a tool retract operation should be inserted at the end of each file resulting from NC program division. Doing so can avoid an interruption of data between files, therefore preventing a cutter mark.
3 The file list and the files contained in the list must be stored in the same directory of the same host computer.

4.1.9 Data Server Screen Manipulation and Status Indication

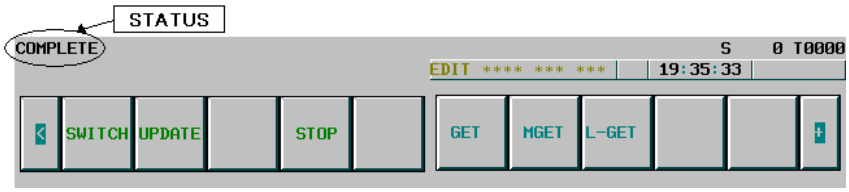
• Display during operation

During operation, the status is displayed at the lower-right of the screen.



• Display upon completion of the operation

Upon the completion of this operation, the status is displayed at lower-left of the screen.



• Operation and statuses

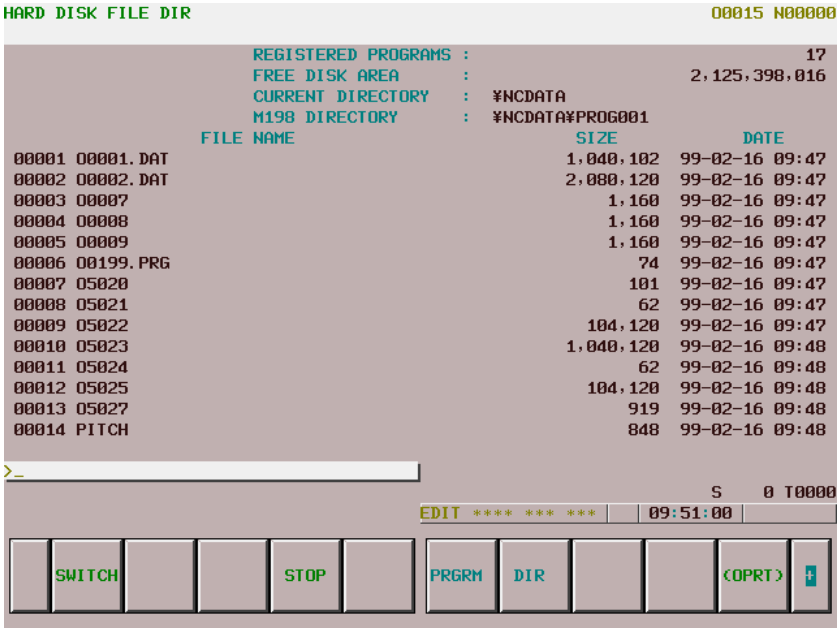
The following table lists the statuses displayed for the operations listed below:

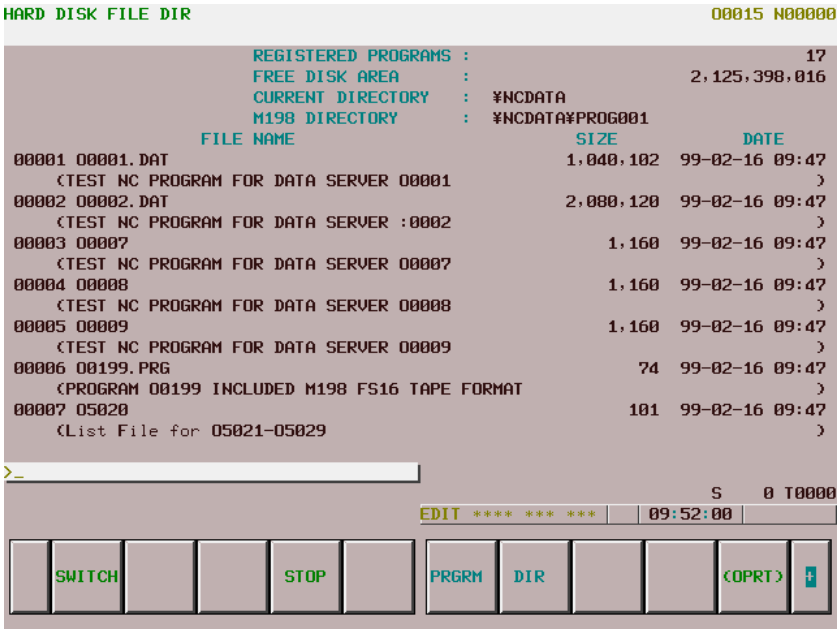
Operation	Screen	Status
SWITCH UPDATE DISPLAY	Hard Disk File Dir screen HOST FILE DIR screen	SEARCH
GET	HOST FILE DIR screen	GET
PUT	Hard Disk File Dir screen	PUT
MGET	HOST FILE DIR screen	M GET
MPUT	Hard Disk File Dir screen	M PUT
L-GET	HOST FILE DIR screen	L-GET
L-PUT	Hard Disk File Dir screen	L-PUT
L-DEL	Hard Disk File Dir screen	L-DEL
F COPY	Hard Disk File Dir screen	COPY
READ	Hard Disk File Dir screen HOST FILE DIR screen	INPUT
PUNCH	Hard Disk File Dir screen HOST FILE DIR screen	OUTPUT
F DEL	Hard Disk File Dir screen HOST FILE DIR screen	DELETE
FD CHA	Hard Disk File Dir screen	RENAME
D MAKE	Hard Disk File Dir screen	MAKE
D MOVE	Hard Disk File Dir screen	MOVE
D DEL	Hard Disk File Dir screen	DELETE
M198 D M198 H DNC SET	Hard Disk File Dir screen HOST FILE DIR screen	SETTING

Operation	Screen	Status
CONECT 1, CONECT 2, CONECT3	Connection Host Change screen	CONNECT
FORMAT	Data Server Maintenance screen	FORMAT
CHKDSK	Data Server Maintenance screen	HD CHECK
INPUT	Ethernet parameters screen	SETTING

4.2 HARD DISK FILE DIR SCREEN

The Hard Disk File Dir screen is used to list the files on the data server board built-in hard disk.







Display items

- **REGISTERED PROGRAMS**

  Displays the number of files stored in the current work directory.

- **FREE DISK AREA**

  Displays the amount of free space, in bytes, on the data server board built-in hard disk.

- **CURRENT DIRECTORY**

  Displays the work directory of the data server board built-in hard disk.

- **M198 DIRECTORY**

  Displays the directory (folder) for a DNC operation by a subprogram call (M198).

- **DNC FILE NAME**

  Displays the name of the file for which DNC operation is performed.

- **SIZE**

  Displays the file size, in bytes.

- **DATE**

  Displays the date and time at which the file was created.

- **COMMENT**

  Displays a comment statement appearing immediately after an O number in the NC program. If this statement does not exist, the contents are displayed from the beginning of the NC program or file. The comment is displayed only on the Hard Disk File Dir screen (detailed display).

Operations

- **SWITCH**

  Switches between normal display and detailed display.

- **STOP**

  Stops [F COPY], [F DEL], [PUT], [MPUT], [L-PUT], and [L-DEL] operations.

- **DISPLAY**

  Updates the screen, using the file specified by the file number or name as the first one.

- **DNC SET**

  Specifies the files needed for DNC operation. This operation is possible only when the data server is in the storage mode and the CNC is in the RMT mode.

- **F COPY**

  Copies files from the data server board built-in hard disk.

- **FD CHA**

  Changes file names on the data server board built-in hard disk.

- **F DEL**

  Deletes files from the data server board built-in hard disk.

- **PUT**

  Transfers a single file from the data server board built-in hard disk to the host computer built-in hard disk.

- **MPUT**

  Transfers two or more files from the data server board built-in hard disk to the host computer built-in hard disk. The file names can be specified by using wild cards (*, ?).

- **D MAKE**

  Creates a directory (folder) on the data server board built-in hard disk.

- **D MOVE**

  Moves to another work directory (folder) on the data server board built-in hard disk.

- **D DEL**

  Deletes a directory (folder) from the data server board built-in hard disk.

- **L-PUT**

  Transfers files from the data server board built-in hard disk to the host computer built-in hard disk according to the list file.

- **L-DEL**

  Deletes files from the data server board built-in hard disk according to the list file.

- **M198 D**

  Specifies a directory (folder) for a DNC operation by a subprogram call (M198). This operation is possible only when the data server is in the storage mode.

- **READ**

  Inputs files from the data server board built-in hard disk to the CNC tape memory. This operation is possible only in Storage mode of Data sever mode and in EDIT mode of CNC mode.

- **PUNCH**

  Outputs files from the CNC tape memory to the data server board built-in hard disk. This operation is possible only in Storage mode of Data sever mode and in EDIT mode of CNC mode.

4.2.1 Displaying a List of Hard Disk Files

Display a list of the files stored on the data server board built-in hard disk.

Procedure

1 Press function key PROG.
2 Press the continuation menu key at the right end of the soft key menu.
3 When you press soft key [HD-DIR], the Hard Disk File Dir screen appears.
4 Select the desired page using the PAGE↑ PAGE↓ page keys.
5 When you press soft key [SWITCH], the Hard Disk File Dir screen (details) appears.

4.2.2 Searching for a Hard Disk File

Display a list of the files stored on the data server board built-in hard disk by using the specified file as the first. Specify the file with the file number or name.

Procedure

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press soft key [DISPLAY].
4 Enter the number or name of the file to be searched, starting using the MDI keys.
[Input format]
<file-number> or <file-name>
5 Press soft key [EXEC].
6 During search, "SEARCH" blinks in the lower-right part of the screen.

NOTE
1 If the specified file does not exist on the data server board built-in hard disk, the file list is displayed using the file following the specified file as the first, in ASCII character order.
2 The data server function contains the FTP server function. As a result, a new file may be transferred to the data server board built-in hard disk. Alternatively, a file for which operation was made may be deleted inadvertently. So, the file number indicating the specified file may be changed inadvertently. Before manipulating a file by specifying it with a file number, perform this operation to make sure that the file number corresponds to the target file name.

4.2.3 Deleting a Hard Disk File

Delete files stored on the data server board built-in hard disk.

Deleting a single file

Procedure

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press soft key [F DEL].
4 Enter the number or name of the file to be deleted using the MDI keys.
[Input format]
<file-number> or <file-name>
5 Press soft key [EXEC].
6 During deletion, "DELETE" blinks in the lower-right part of the screen.

NOTE
Specifying a file to be deleted with its file number is valid only for those files displayed on the Hard Disk File Dir screen.

Deleting two or more files

Procedure

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press soft key [F DEL].
4 Enter the names of the files (including wild cards) to be deleted using the MDI keys.
[Input format]
<file-name (including wild cards)>
5 Press soft key [EXEC].
6 When "FILE DELETE" is displayed in the lower-left part of the screen, press soft key [EXEC]. To cancel the deletion, press soft key [CAN].
7 During deletion, "DELETE" blinks in lower-right part of the screen.
8 To stop the deletion, press soft key [STOP].

[Example]
Enter the file name as *.* to delete all the files displayed on the Hard Disk File Dir screen from the data server board built-in hard disk.

NOTE
When two or more files are being deleted, if soft key [STOP] is pressed, the files deleted prior to soft key [STOP] being pressed cannot be restored.

4.2.4 Copying a Hard Disk File

Procedure

Copy files stored in the data server board built-in hard disk.

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press soft key [F COPY].
4 Enter the number or name of the copy source file and the name of the copy destination file using the MDI keys.
[Input format]
<copy-source-file-number>, <copy-destination-file-name>
or <copy-source-file-name>, <copy-destination-file-name>
5 Press soft key [EXEC].
6 During the copy operation, "COPY" blinks in the lower-right part of the screen.

NOTE
1 The copy source file number or name must be separated from the copy destination file name by a comma (,).
2 An error occurs if the name of a file stored on the data server board built-in hard disk is specified as the copy destination file name.
3 Specifying a copy source file with its file number is valid only for those files displayed on the Hard Disk File Dir screen.

4.2.5 Changing a Hard Disk File Name

Change the name of a file stored on the data server board built-in hard disk.

Procedure

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press soft key [FD CHA].
4 Enter the number or name of the old file and the new file name using the MDI keys.
[Input format]
<old-file-number>, <new-file-name> or <old-copy-source-file-name>, <new-file-name>
5 Press soft key [EXEC].
6 During the change operation, "RENAME" blinks in the lower-right part of the screen.

NOTE
1 The old file number or name must be separated from the new file name by a comma (,).
2 An error occurs if the name of the file stored on the data server board built-in hard disk is specified as a new file name.
3 Specifying an old file with its file number is valid only for those files displayed on the Hard Disk File Dir screen.

4.2.6 Creating a Directory on the Data Server Board Built-in Hard Disk

Procedure

Create a directory (folder) on the data server board built-in hard disk.

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [D MAKE].
5 Enter the name of a directory (folder) to be created on the data server board built-in hard disk, using the MDI keys.
[Input format]
<Directory name>
6 Press soft key [EXEC].
7 During the meke operation, " MAKE " blinks in the lower-right part of the screen.

4.2.7 Deleting a Directory from the Data Server Board Built-in Hard Disk

Procedure

Delete a directory (folder) from the data server board built-in hard disk.

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [D DEL].
5 Enter the name of a directory (folder) to be deleted from the data server board built-in hard disk, using the MDI keys.
[Input format]
<Directory number>
or
<Directory name>
6 Press soft key [EXEC].
7 During deletion, "DELETE" blinks in lower-right part of the screen.

NOTE
1 If a directory (folder) contains files, an attempt to delete it ends in an error. Before deleting a directory, delete all files from the directory.
2 A directory to be deleted can be specified using a directory number only if the directory is displayed on the Hard Disk File Directory screen.

4.2.8 Moving to Another Directory on the Data Server Board Built-in Hard Disk

Procedure

Changes the work directory on the data server board built-in hard disk.

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [D MOVE].
5 Enter the name or number of a work directory (folder) to be changed on the data server board built-in hard disk, using the MDI keys.
[Input format]
<Directory number>
or
<Directory name>
6 Press soft key [EXEC].
7 During the copy operation, "MOVE" blinks in the lower-right part of the screen.

NOTE
1 If a directory contains many files, it may take much time to move to that directory.
2 A destination directory can be specified using a directory number only if the directory is displayed on the Hard Disk File Directory screen.

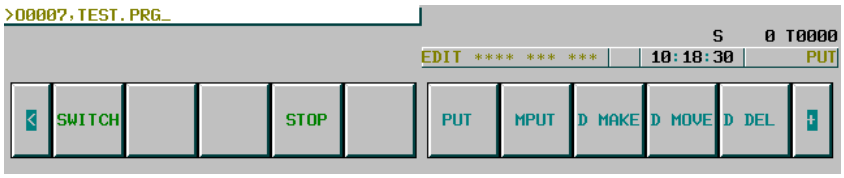
4.2.9 Executing Hard Disk File PUT

Procedure

Using FTP, transfer files from the data server board built-in hard disk to the host computer built-in hard disk.

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [PUT].
5 Enter the following items using the MDI keys: number or name of the file on the transfer source data server board built-in hard disk, and name of the file on the transfer destination host computer built-in hard disk.
[Input format]
Use one of the following:
<transfer-source-file-number>, <transfer-destination-file-name> or
<transfer-source-file-name>, <transfer-destination-file-name> or
<transfer-source-file-number> or
<transfer-source-file-name>
6 Press soft key [EXEC].
7 During PUT operation, "PUT" blinks in the lower-right part of the screen.
8 To stop a PUT operation, press soft key [STOP].

[Example]
Enter O0007,TEST.PRG to take file O0007, with file name TEST.PRG, from the data server board built-in hard disk and put in on the host computer built-in hard disk.



NOTE
1 The transfer source file number or name must be separated from the transfer destination file name by a comma (,).
2 The transfer destination file name and delimiter (,) can be omitted. In such a case, the transfer destination file name is the same as the transfer source file name.
3 If an error occurs, determine the cause of the error from the Ethernet Error Message screen.
4 Specifying the file to be transferred with the file number is valid only for those files displayed on the Hard Disk File Dir screen.

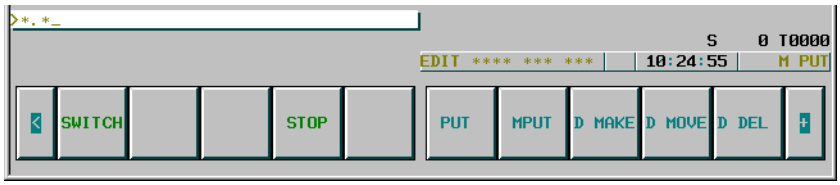
4.2.10 Executing Hard Disk File MPUT

Using FTP and wild cards (*, ?), transfer two or more files at one time from the data server board built-in hard disk to the host computer built-in hard disk.

Procedure

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [MPUT].
5 Enter the names of files (including wild cards) on the transfer source data server board built-in hard disk using the MDI keys.
[Input format]
<transfer-source-file-name>
6 Press soft key [EXEC].
7 During MPUT operation, "M PUT" blinks in the lower-right part of the screen.
8 To stop MPUT, press soft key [STOP].

[Example]
Enter the file name as *.* to transfer all the files in the work directory from the data server board built-in hard disk to the host computer built-in hard disk.



NOTE
1 If an error occurs, check the cause of the error using the Ethernet Error Message screen.
2 When two or more files are being transferred, and soft key [STOP] is pressed, those files which had not been completely transferred when soft key [STOP] was pressed may remain on the host computer built-in hard disk.

4.2.11 Executing Hard Disk File LIST-PUT

Transfer files from the data server board built-in hard disk to the host computer built-in hard disk according to the contents of the list file, using the FTP.

Procedure

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [L-PUT].
5 Enter the name of the list file held on the data server board built-in hard disk, using the MDI keys.
[Input format]
<name-of-list-file>
6 Press soft key [EXEC].
7 During LIST-PUT operation, " L-PUT " blinks in the lower-right part of the screen.
8 To stop LIST-PUT, press soft key [STOP].

NOTE
1 If an error occurs, check the cause of the error using the Ethernet Error Message screen.
2 If more than one file is specified to be transferred, pressing soft key [STOP] before the completion of the file transfer may allow transferred files to be left on the host computer built-in hard disk even after the soft key is pressed.
3 See Subsection 4.1.7, "List File Formats," for explanations about the formats of the list file.

4.2.12 Executing Hard Disk File LIST-DELETE

Delete files from the data server board built-in hard disk according to the contents of the list file.

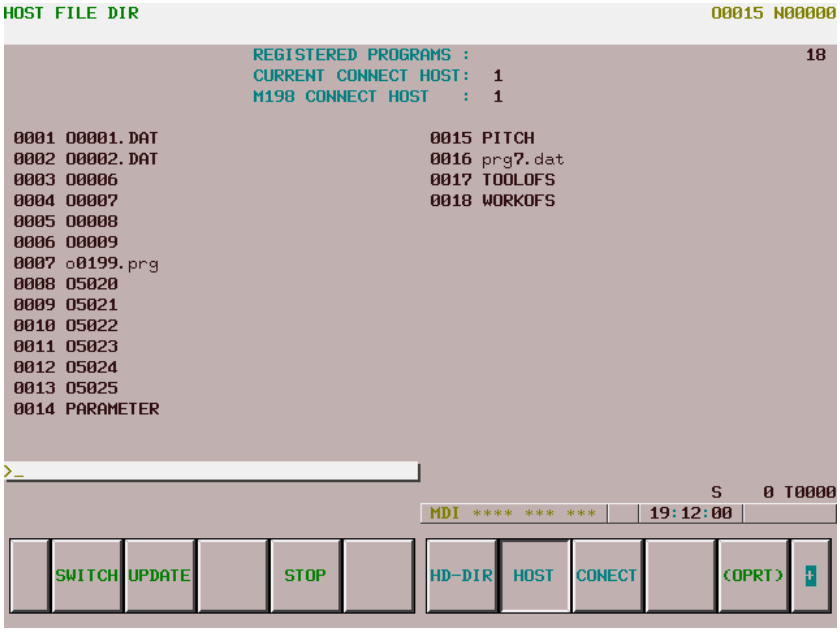
Procedure

1 Display the Hard Disk File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [L-DEL].
5 Enter the name of the list file held on the data server board built-in hard disk, using the MDI keys.
[Input format]
<name-of-list-file>
6 Press soft key [EXEC].
7 During LIST-DELET operation, " L-DEL " blinks in the lower-right part of the screen.
8 To stop LIST-DELET, press soft key [STOP].

NOTE
1 If an error occurs, check the cause of the error using the Ethernet Error Message screen.
2 If more than one file is specified to be deleted, pressing soft key [STOP] before the completion of the file deletion makes it impossible to restore the deleted file(s).
3 See Subsection 4.1.7, "List File Formats," for explanations about the formats of the list file.

4.3 HOST FILE DIR SCREEN

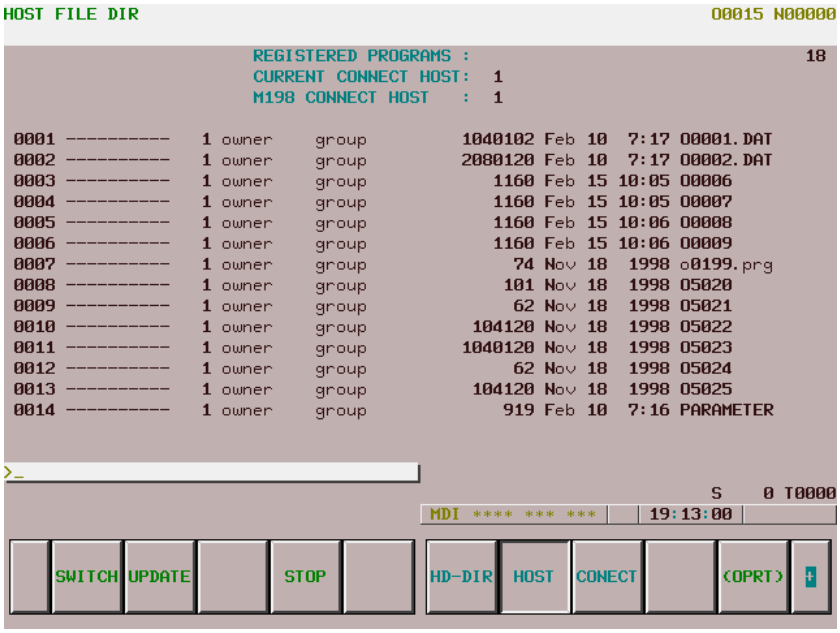
The Host File Dir screen is used to display a file list for the host computer built-in hard disk.



NOTE

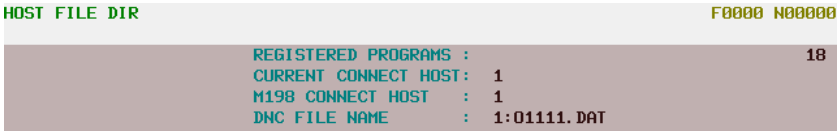
1 A file name containing kanji, hiragana, and katakana characters is not displayed correctly.

2 The number of programs displayed on the above HOST FILE DIR screen may not match that on the HOST FILE DIR (detail) screen shown on the next page, depending on the type of the FTP server software.



NOTE

The above HOST FILE DIR (detail) screen is one display example. The display contents depend on the specifications of the FTP server used by the host computer.



Display items

- **REGISTERED PROGRAMS**

  Displays the number of files registered with the currently connected host.

- **CURRENT CONNECT HOST**

  Displays the number of the currently connected host. The host number is currently fixed to No. 1.

- **M198 CONNECT HOST**

  Displays the host number for a DNC operation by a subprogram call (M198).

- **DNC FILE NAME**

  Displays the file name for which DNC operation is performed.

Operations

- **SWITCH**

  Switches between normal display and detailed display.

- **UPDATE**

  Updates the display contents.

- **STOP**

  Stops the [GET], [MGET], and [L-GET] operations.

- **DISPLAY**

  Updates the screen using the file specified by the file number or name as the first.

- **DNC SET**

  Specifies the file for which DNC operation is performed. This operation is possible only when the data server and CNC are in the FTP and RMT modes, respectively.

- **M198 H**

  Specifies the host number for a DNC operation by a subprogram call (M198). This operation is possible only when the data server is in the FTP mode.

- **F DEL**

  Deletes files from the host computer built-in hard disk.

- **GET**

  Transfers a single file from the host computer built-in hard disk to the data server board built-in hard disk.

- **MGET**

  Transfers two or more files from the host computer built-in hard disk to the data server board built-in hard disk. File names can be specified by using wild cards (*, ?).

- **L-GET**

  Transfers files from the host computer built-in hard disk to the data server board built-in hard disk according to the list file.

- **READ**

  Inputs files from the built-in hard disk of the host computer to the part program storage memory of the CNC. This operation is possible only when the data server is in FTP mode and the CNC is in EDIT mode.

- **PUNCH**

  Outputs files from the part program storage memory of the CNC to the built-in hard disk of the host computer. This operation is possible only when the data server is in FTP mode and the CNC is in EDIT mode.

4.3.1 Displaying a List of Host Files

Procedure

Display a list of files stored on the host computer built-in hard disk.

1 Press function key PROG.
2 Press the continuation menu key at the right end of the soft key menu.
3 When you press soft key [HOST], the Host File Dir screen appears.
4 Select the desired page using the PAGE ↑ PAGE ↓ page keys.
5 When you press soft key [UPDATE], the contents of the Host File Dir screen are updated.
6 When you press soft key [SWITCH], the HOST FILE DIR (detail) screen appears.

4.3.2 Searching for a Host File

Display a list of files stored on the host computer built-in hard disk by using the file specified with the file number as the first.

Procedure

1 Display the Host File Dir screen.
2 Press soft key [(OPRT)].
3 Press soft key [DISPLAY].
4 Enter the number of the file to be searched for using the MDI keys.
[Input format]
<file-number>
5 Press soft key [EXEC].
6 During search, "SEARCH" blinks in the lower-right part of the screen.

4.3.3 Deleting a Host File

Procedure

Delete files stored on the host computer built-in hard disk.

1 Display the Host File Dir screen.
2 Press soft key [(OPRT)].
3 Press soft key [F DEL].
4 Enter the number or name of the file to be deleted using the MDI keys.
[Input format]
<file-number> or <file-name>
5 Press soft key [EXEC].
6 During deletion, "DELETE" blinks in the lower-right part of the screen.

NOTE
1 Specifying the file to be deleted with its file number is valid only for those files displayed on the Host File Dir screen.
2 Information displayed at the right end of the HOST FILE DIR (detail) screen is recognized as a file name. Therefore, when deleting a host file by specifying its file number from the HOST FILE DIR (detail) screen, confirm that the file name is displayed at the right end of the screen, then specify the file number.
3 If a host file name contains kanji, hiragana, or katakana characters, switch the HOST FILE DIR (detail) screen to the HOST FILE LIST screen, specify the file number, then delete the host file.

4.3.4 Executing Host File GET

Using FTP, transfer files from the host computer built-in hard disk to the data server board built-in hard disk.

Procedure

1 Display the Host File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [GET].
5 Enter the following items using the MDI keys: number or name of the file in the transfer source host computer built-in hard disk, and name of the file on the transfer destination data server board built-in hard disk.
[Input format]
Select one of the following:
<transfer-source-file-number>, <transfer-destination-file-name> or
<transfer-source-file-name>, <transfer-destination-file-name> or
<transfer-source-file-number> or
<transfer-source-file-name>
6 Press soft key [EXEC].
7 During the GET operation, "GET" blinks in the lower-right part of the screen.
8 To stop GET, press soft key [STOP].

[Example]
Enter prg7.dat,O0007 to get file prg7.dat, with file name O0007, from the host computer built-in hard disk and place it on the data server board built-in hard disk.



NOTE

1 The number or name of a transfer source file must be separated from a transfer destination file name by a comma (,).
2 The transfer destination file name and delimiter "," can be omitted. In this case, the transfer destination file name is the same as the transfer source file name.
3 If an error occurs, check the cause of the error using the Ethernet Error Message screen.
4 Specify a file name that does not exist on the data server board built-in hard disk, as the transfer destination file name. An error occurs if the name of an existing file is specified.
5 Information displayed at the right end of the HOST FILE DIR (detail) screen is recognized as a file name. Therefore, to get a host file from the HOST FILE DIR (detail) screen by specifying the file number, confirm that the file name is displayed at the right end of the screen, then specify the file number.
6 If a file name contains kanji, hiragana, or katakana characters, switch the HOST FILE DIR (detail) screen to the Host File Dir screen, specify the file number, then get the host file. Be sure to specify the <transfer-destination-file-name>.
7 When only the transfer source file name is specified, if the file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically in order to GET the data onto the data server board built-in hard disk. See Subsection 4.1.5, "Hard Disk File Names," for explanations about the rules for converting file names to 8.3-format file names.

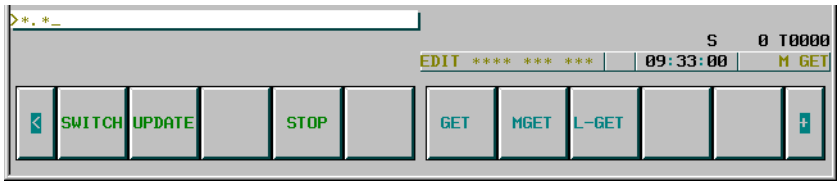
4.3.5 Executing Host File MGET

Using wild cards (*, ?) and FTP, transfer two or more files at one time from the host computer built-in hard disk to the data server board built-in hard disk.

Procedure

1 Display the Host File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [MGET].
5 Using the MDI keys, enter the names of the files (containing wild cards) contained on the transfer source data server board built-in hard disk.
[Input format]
<transfer-source-file-name>
6 Press soft key [EXEC].
7 During MGET operation, "M GET" blinks in the lower-right part of the screen.
8 To stop MGET, press soft key [STOP].

[Example]
Enter the file name as *.* to transfer all files from the host computer built-in hard disk to the data server board built-in hard disk.



NOTE
1 Wild card interpretation depends on the host computer specifications.
2 If a work directory on the host computer built-in hard disk contains a subdirectory, and a wild card that can represent the subdirectory is used to specify a transfer source file name, an error may be detected or the files may be transferred from the subdirectory as directed by GET, depending on the type of the host computer.
3 If an error occurs, determine the cause of the error from the Ethernet Error Message screen.
4 If the data server board built-in hard disk contains a file having the same name as the file that was to be transferred, the file is not transferred.
5 If the transfer source file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically in order to GET the data onto the data server board built-in hard disk. See Subsection 4.1.5, "Hard Disk File Names," for explanations about the rules for converting file names to 8.3-format file names.

4.3.6 Executing Host File LIST-GET

Transfer files from the host computer built-in hard disk to the data server board built-in hard disk according to the contents of the list file, using the FTP.

Procedure

1 Display the Host File Dir screen.
2 Press soft key [(OPRT)].
3 Press the continuation menu key at the right end of the soft key menu.
4 Press soft key [L-GET].
5 Enter the name of the list file held on the host computer built-in hard disk, using the MDI keys.
[Input format]
<name-of-list-file>
6 Press soft key [EXEC].
7 During LIST-GET operation, "L-GET" blinks in the lower-right part of the screen.
8 To stop LIST-GET, press soft key [STOP].

NOTE
1 If an error occurs, determine the cause of the error from the Ethernet Error Message screen.
2 If the transfer destination file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically in order to GET the data onto the data server board built-in hard disk. See Subsection 4.1.7, "List File Formats," for explanations about the list file.

4.4 INPUTTING AN NC PROGRAM

Input a file (NC program) from the data server board built-in hard disk or host computer built-in hard disk to the tape memory.

For the Hard Disk File Dir screen or Host File Dir screen

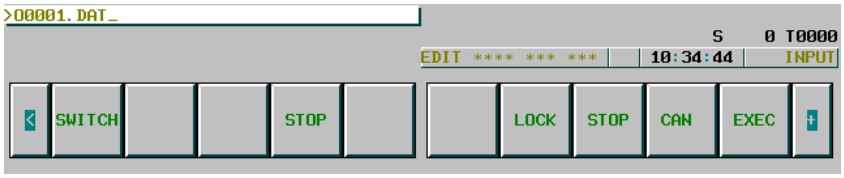
Procedure

1 Place the CNC in EDIT mode.
2 In storage mode, the Hard Disk File Dir screen is displayed. In FTP mode, the Host File Dir screen is displayed.
3 Press soft key [(OPRT)].
4 Press the continuation menu key at the right end of the soft key menu.
5 Press soft key [READ].
6 Enter the file number or name of the NC program using the MDI keys.
[Input format]
<file-number> or <file-name>
7 Press soft key [EXEC].
8 During input, "INPUT" blinks in the lower-right part of the screen.

NOTE
1 When bit 2 of parameter No.3201 is 1, if an NC program having the same O number as the NC program to be input is already contained in the tape memory, it is overwritten.
2 When bit 0 of parameter No.3201 is 1, if an NC program is input, all NC programs are automatically eliminated from the tape memory. Afterwards, the NC program is input.

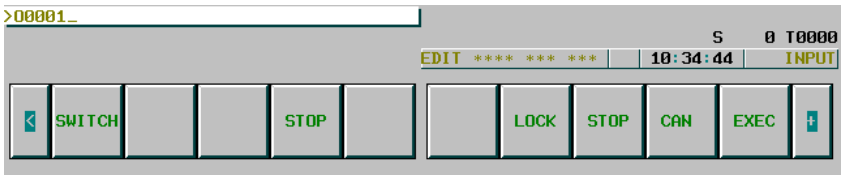
[Example 1]

Enter O0001.DAT to input file O0001.DAT from the data server board built-in hard disk to the tape memory. However, the O number to be input into tape memory depends on the O number described in file O0001.DAT.



[Example 2]

Enter O0001 to input file O0001 from the data server board built-in hard disk to the tape memory. However, the O number to be input into tape memory is O0001.



NOTE

1 NC program input cannot be executed simultaneously with NC program output, DNC operation, and DNC operation by a subprogram call (M198).
2 An O number used for input to the tape memory is determined according to the following rules:
   - If the file name is Oxxxx (xxxx: numeral), it is input as Oxxxx.
   - If the file name is other than Oxxxx, it is input with the O number described in the file.
3 In the buffer mode, neither the Hard Disk File Directory screen nor the Host File Directory screen can be used for NC program input.

For the program screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key PROG.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [PRGRM], the Program screen is displayed.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [READ].
8 Enter the O number of the NC program to be entered using the MDI keys.
[Input format]
<O-number>
9 Press soft key [EXEC].
10 During input, "INPUT" blinks in the lower-right part of the screen.

⚠ CAUTION
1 When bit 2 of parameter No.3201 is 1, if the NC program having the same O number as the NC program to be input exists in the tape memory, it is overwritten.
2 When bit 0 of parameter No.3201 is 1, if an NC program is input, all NC programs in the tape memory are automatically cleared. Subsequently, the NC program is input.

NOTE
1 NC program input cannot be executed simultaneously with NC program output, DNC operation, and DNC operation by a subprogram call (M198).
2 The O number used for input to the tape memory is valid only for file name Oxxxx (xxxx: numeral).
3 In the buffer mode, a specified O number is assumed to represent a list of files resulting from NC program division. Therefore, an NC program is input by regarding the files in the file list as a virtually single continuous file.

4.5 OUTPUTTING AN NC PROGRAM

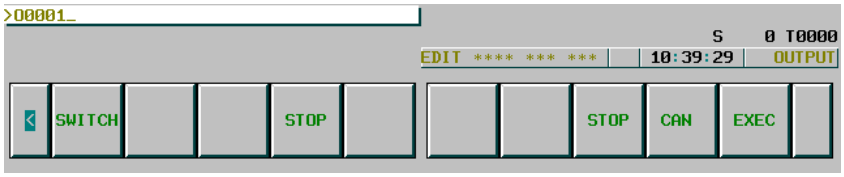
A file (NC program) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Hard Disk File Dir screen or Host File Dir screen

Procedure

1 Place the CNC in EDIT mode.
2 In storage mode, the HARD DISK FILE LIST screen is displayed. In FTP mode, the Host File Dir screen is displayed.
3 Press soft key [(OPRT)].
4 Press the continuation menu key at the right end of the soft key menu.
5 Press soft key [PUNCH].
6 Using the MDI keys, enter the O number of the NC program to be output.
[Input format]
<O-number>
7 Press soft key [EXEC].
8 During output, "OUTPUT" blinks in the lower-right part of the screen.

[Example]
Enter O0001 to output NC program (O0001) from the tape memory to the data server board built-in hard disk.



NOTE
1 NC program output cannot be executed simultaneously with NC program input, DNC operation, or DNC operation by a subprogram call (M198).
2 The name of the file to be output to the data server board built-in hard disk becomes Oxxxx.
3 In NC program output in the storage mode, an attempt to output an NC program that is already stored on the data server built-in hard disk ends in an error.
4 In the buffer mode, neither the Hard Disk File Directory screen nor the Host File Directory screen can be used for NC program output.

For the program screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key PROG.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [PRGRM], the Program screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Using the MDI keys, enter the O number of the NC program to be output.
[Input format]
<O-number>
9 Press soft key [EXEC].
10 During output, "OUTPUT" blinks in the lower-right part of the screen.

NOTE
1 NC program output is executed simultaneously with NC program input, DNC operation, and DNC operation by a subprogram call (M198).
2 The name of the file to be output to the data server board built-in hard disk becomes Oxxxx.
3 In the buffer mode, the output destination of NC programs is the data server built-in hard disk.
4 In NC program output in either the storage or buffer mode, an attempt to output an NC program that is already stored on the data server built-in hard disk ends in an error.

4.6 DNC OPERATIONS

DNC operation is performed using an NC program stored on the data server board built-in hard disk or on the host computer built-in hard disk.

For DNC operation in storage mode

Procedure

1 Place the CNC in RMT mode.
2 Display the Hard Disk File Directory screen and move to the directory holding an NC program used to perform a DNC operation.
3 Press soft key [(OPRT)].
4 Press soft key [DNC SET].
5 Using the MDI keys, enter the file number or file name of the NC program for which DNC operation is to be executed.
[Input format]
<file-number> or <file-name>
6 Press soft key [EXEC]. The file name of the NC program for which DNC operation is to be performed is displayed in DNC FILE NAME in the upper part of the screen.
7 When the cycle start is executed, DNC operation is executed.

⚠ CAUTION
For multipath control, DNC operation cannot be simultaneously executed for two or more paths.

NOTE
DNC operation cannot be executed simultaneously with NC program input, NC program output, or DNC operation by a subprogram call (M198).

For DNC operation in FTP mode

Procedure

1 Place the CNC in RMT mode.
2 Select the host number for the host holding a file list to be used for an DNC operation according to the procedure described in Subsection 4.9.2, "Reconnecting the Host," to display the Host File Directory screen.
3 Press soft key [(OPRT)].
4 Press soft key [DNC SET].
5 Using the MDI keys, enter the file number or name of the NC program for which DNC operation is to be performed.
[Input format]
<file-number> or <file-name>
6 Press soft key [EXEC]. The connect host number and file name of the NC program for which DNC operation is to be performed is displayed in DNC FILE NAME at the top of the screen.
7 When cycle start is executed, DNC operation is executed.

> ⚠ **CAUTION**
> For multipath control, DNC operation cannot be simultaneously executed for two or more paths.

> **NOTE**
> DNC operation cannot be executed simultaneously with NC program input, NC program output, or DNC operation by a subprogram call (M198).

For DNC operation in buffer mode

Procedure

1 Place the CNC in RMT mode.
2 Select the host number for the host holding a file list to be used for an DNC operation according to the procedure described in Subsection 4.9.2, "Reconnecting the Host," to display the Host File Directory screen.
3 Press soft key [(OPRT)].
4 Press soft key [DNC SET].
5 Using the MDI keys, enter the file number or name of the file list for which DNC operation is to be performed.
[Input format]
<file-number> or <file-name>
6 Press soft key [EXEC]. The connect host number and file name of the file list for which DNC operation is to be performed is displayed in DNC FILE NAME at the top of the screen.
7 When cycle start is executed, DNC operation is executed.

⚠ CAUTION
For multipath control, DNC operation cannot be simultaneously executed for two or more paths.

NOTE
DNC operation cannot be executed simultaneously with NC program input, NC program output, or DNC operation by a subprogram call (M198).

4.7 DNC OPERATION BY A SUBPROGRAM CALL (M198)

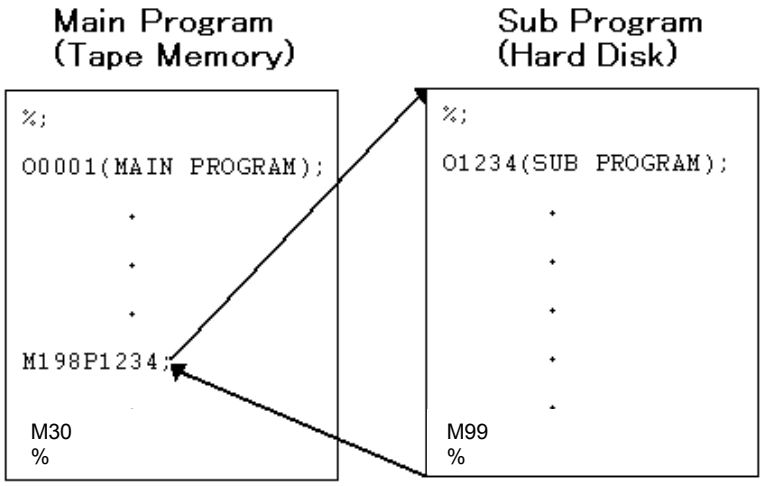
Format for calling a subprogram from the main program

(1) For Series 15 command format
M198PΔΔΔΔLxxxx;
ΔΔΔΔ : NC program number on the hard disk
(4-digit numeral following O of the O number)
xxxx: Repetition count (1 to 9999) (optional, default: 1)

(2) For a format other than the Series 15 command format
M198PxxxxΔΔΔΔ;
ΔΔΔΔ : NC program number on the hard disk
(4-digit numeral following O of the O number. In this case, always use 4 digits.)
xxxx: Repetition count (1 to 9999) (optional, default: 1)

The items relating to the M198 command conform to the program call function within general external input/output equipment. For details, Refer to the corresponding CNC operator's manual.

Example: For the Series 15 command format



DNC operation by a subprogram call (M198) in the storage mode

Procedure

1 Place the CNC in MEM mode.
2 Display the Hard Disk File Directory screen and move to the directory holding an NC program to be called by a subprogram.
3 Press soft key [(OPRT)].
4 Press soft key [M198 D].
5 Press soft key [EXEC]. The name of the current work directory is displayed to the right of "M198 DIRECTORY" on the screen.
6 An automatic operation is performed based on the NC program containing the M198 command.

NOTE
1 DNC operation by a subprogram call (M198) cannot be executed simultaneously with NC program input, NC program output, or DNC operation.
2 The file name of the subprogram to be called by DNC operation by a subprogram call (M198) must be Oxxxx.
3 Assume that there is a subprogram called by DNC operation by a subprogram call (M198) and that a subprogram call is further executed in this subprogram. If the subprogram to be called exists on the tape memory, the subprogram can be executed. If, however, the subprogram exists on the hard disk, it cannot be executed as a subprogram.
4 When viewed from the CNC, the data server function is handled in the same way as for other input/output equipment. Therefore, the subprogram call restrictions are the same as those for other input/output equipment.
5 Multipath control can be performed on DNC operations by a subprogram call (M198) on multiple paths at a time; however, the programs must be in the same work directory.

DNC operation by a subprogram call (M198) in the FTP mode

Procedure

1 Place the CNC in MEM mode.
2 Select the host number for the host holding an NC program to be called by a subprogram according to the procedure described in Subsection 4.9.2, "Reconnecting the Host," to display the Host File Directory screen.
3 Press soft key [(OPRT)].
4 Press soft key [M198 H].
5 Press soft key [EXEC]. The host number of the currently connected host is displayed to the right of "M198 CONNECT HOST" on the screen.
6 An automatic operation is performed based on the NC program containing the M198 command.

NOTE
1 DNC operation by a subprogram call (M198) cannot be executed simultaneously with NC program input, NC program output, or DNC operation.
2 The file name of the subprogram to be called by DNC operation by a subprogram call (M198) must be Oxxxx.
3 Assume that there is a subprogram called by DNC operation by a subprogram call (M198) and that a subprogram call is further executed in this subprogram. If the subprogram to be called exists on the tape memory, the subprogram can be executed. If, however, the subprogram exists on the hard disk, it cannot be executed as a subprogram.
4 When viewed from the CNC, the data server function is handled in the same way as for other input/output equipment. Therefore, the subprogram call restrictions are the same as those for other input/output equipment.
5 Multipath control can be performed on DNC operations by a subprogram call (M198) on multiple paths at a time; however, the programs must be in the same work directory.

DNC operation by a subprogram call (M198) in the buffer mode

Procedure

1 Place the CNC in MEM mode.
2 Select the host number for the host holding a file list to be called by a subprogram according to the procedure described in Subsection 4.9.2, "Reconnecting the Host," to display the Host File Directory screen.
3 Press soft key [(OPRT)].
4 Press soft key [M198 D].
5 Press soft key [EXEC]. The host number of the currently connected host is displayed to the right of "M198 CONNECT HOST" on the screen.
6 An automatic operation is performed based on the NC program containing the M198 command.

NOTE
1 DNC operation by a subprogram call (M198) cannot be executed simultaneously with NC program input, NC program output, or DNC operation.
2 The file name of the subprogram to be called by DNC operation by a subprogram call (M198) must be Oxxxx.
3 Assume that there is a subprogram called by DNC operation by a subprogram call (M198) and that a subprogram call is further executed in this subprogram. If the subprogram to be called exists on the tape memory, the subprogram can be executed. If, however, the subprogram exists on the hard disk, it cannot be executed as a subprogram.
4 When viewed from the CNC, the data server function is handled in the same way as for other input/output equipment. Therefore, the subprogram call restrictions are the same as those for other input/output equipment.
5 Multipath control can be performed on DNC operations by a subprogram call (M198) on multiple paths at a time; however, the programs must be in the same work directory.

4.8 DATA INPUT/OUTPUT

The data listed below can be transferred between the data server board and CNC. How to transfer the data is explained later.

1 NC parameter
2 Tool offset value
3 Custom macro value
4 Workpiece zero point offset value
5 Pitch error compensation data
6 M code group
7 operation history data

NOTE
The transfer of the data listed above cannot be performed simultaneously with NC program input, NC program output, DNC operation, or DNC operation by a subprogram call (M198).

4.8.1 Inputting the Parameter

Input files (NC parameters) from the data server built-in hard disk or host computer built-in hard disk to part program storage.

For the Parameter screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [PARAM], the Parameter screen is displayed.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [READ].
8 Press soft key [EXEC].
9 During input, "INPUT" blinks in the lower-right part of the screen.

File name

Fixed to PRAMETER.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Input source

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

4.8.2 Outputting the Parameter

Output files (NC parameters) from part program storage to the data server built-in hard disk or host computer built-in hard disk.

For the Parameter screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [PARAM], the Parameter screen is displayed.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Press soft key [EXEC].
9 During output, "OUTPUT" blinks in the lower-right part of the screen.

File name

Fixed to PRAMETER.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Output destination

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Data server board built-in hard disk

4.8.3 Inputting Tool Offsets

A file (tool offset value) is input from the data server board built-in hard disk or host computer built-in hard disk to the part program storage memory.

For the Tool Compensation screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key [OFFSET SETTING].
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [OFFSET], the Tool Compensation screen is displayed.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [READ].
8 Press soft key [EXEC].
9 During input, "INPUT" blinks in the lower-right part of the screen.

File name

Fixed to TOOLOFS.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Input source

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

4.8.4 Outputting Tool Offsets

A file (tool offset value) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Tool Compensation screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key [OFFSET SETTING].
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [OFFSET], the Tool Compensation screen is displayed.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Press soft key [EXEC].
9 During output, "OUTPUT" blinks in the lower-right part of the screen.

File name

Fixed to TOOLOFS.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Output destination

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Data server board built-in hard disk

4.8.5 Inputting Custom Macro Variables

A file (custom macro variables) is input from the data server board built-in hard disk or host computer built-in hard disk to the tape memory. Custom macro variable input is executed in the same way as for DNC operation.

To input custom macro variables

Procedure

1 Place the CNC in RMT mode.
2 In storage mode, the Hard Disk File Dir screen is displayed. In FTP mode or buffer mode, the Host File Dir screen is displayed.
3 Press soft key [(OPRT)].
4 Press soft key [DNC SET].
5 Using the MDI keys, enter custom macro variable file name MACRO to be input.
6 Press soft key [EXEC]. MACRO is displayed in DNC FILE NAME on the screen.
7 When the cycle start is executed, custom macro variable input is executed.

File name

Fixed to MACRO.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Input source

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

4.8.6 Outputting Custom Macro Variables

A file (custom macro variables) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Macro Variable screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key [OFFSET SETTING].
3 Press the continuation menu key at the right end of the soft key menu.
4 When soft key [MACRO] is pressed, the Macro Variable screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Press soft key [EXEC].
9 During output, "OUTPUT" blinks in the lower-right part of the screen.

File name

Fixed to MACRO.

File formats and restrictions

Refer to each CNC operator' manual.

Output destination

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Data server board built-in hard disk

4.8.7 Inputting Workpiece Origin Offsets

A file (workpiece origin offset) is input from the data server board built-in hard disk or host computer built-in hard disk to the tape memory.

For the WORK COORDINATES screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key OFFSET SETTING.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [WORK], the WORK COORDINATES screen is displayed.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [READ].
8 Press soft key [EXEC].
9 During input, "INPUT" blinks in the lower-right part of the screen.

File name

Fixed to WORKOFS.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Input source

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

4.8.8 Outputting Workpiece Origin Offsets

A file (workpiece origin offset) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the WORK COORDINATES screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key [OFFSET SETTING].
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [WORK], the WORK COORDINATES screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Press soft key [EXEC].
9 During output, "OUTPUT" blinks in the lower-right part of the screen.

File name

Fixed to WORKOFS.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Output destination

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

4.8.9 Inputting Pitch Error Compensation Data

A file (pitch error compensation data) is output from the data server board built-in hard disk or host computer built-in hard disk to the part program storage memory.

For the PIT-ERROR SETTING screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [PITCH], the PIT-ERROR SETTING screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [READ].
8 Press soft key [EXEC].
9 During input, "INPUT" blinks in the lower-right part of the screen.

File name

Fixed to PITCH.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Input source

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

4.8.10 Outputting Pitch Error Compensation Data

A file (pitch error compensation data) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the PIT-ERROR SETTING screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [PITCH], the PIT-ERROR SETTING screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Press soft key [EXEC].
9 During output, "OUTPUT" blinks in the lower-right part of the screen.

File name

Fixed to PITCH.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Output destination

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Data server board built-in hard disk

4.8.11 Inputting an M-Code Group

A file (M-code group) is input from the data server board built-in hard disk or host computer built-in hard disk to the part program storage memory.

For the M-Code Group Setting screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [M-CODE], the M-Code Group Setting screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [READ].
8 Press soft key [EXEC].
9 During input, "INPUT" blinks in the lower-right part of the screen.

File name

Fixed to M-CODE.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Input source

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

4.8.12 Outputting an M-Code Groupv

A file (M-code group) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the M-Code Group Setting screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [M-CODE], the M-Code Group Setting screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Press soft key [EXEC].
9 During output, "OUTPUT" blinks in the lower-right part of the screen.

File name

Fixed to M-CODE.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Output destination

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Data server board built-in hard disk

4.8.13 Inputting Operation History Data

A file (operation history data) is input from the data server board built-in hard disk or host computer built-in hard disk to the part program storage memory.

For the Operation History screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [OPEHIS], the Operation History screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [READ].
8 Press soft key [EXEC].
9 During input, "INPUT" blinks in the lower-right part of the screen.

File name

Fixed to HISTORY.

File formats and restrictions

Refer to the corresponding CNC operator's manual.

Input source

In storage mod : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

4.8.14 Outputting Operation History Data

A file (operation history data) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Operation History screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [OPE HIS], the Operation History screen appears.
5 Press soft key [(OPRT)].
6 Press the continuation menu key at the right end of the soft key menu.
7 Press soft key [PUNCH].
8 Press soft key [EXEC].
9 During output, "OUTPUT" blinks in the lower-right part of the screen.

File name

Fixed to HISTORY.

File formats and restrictions

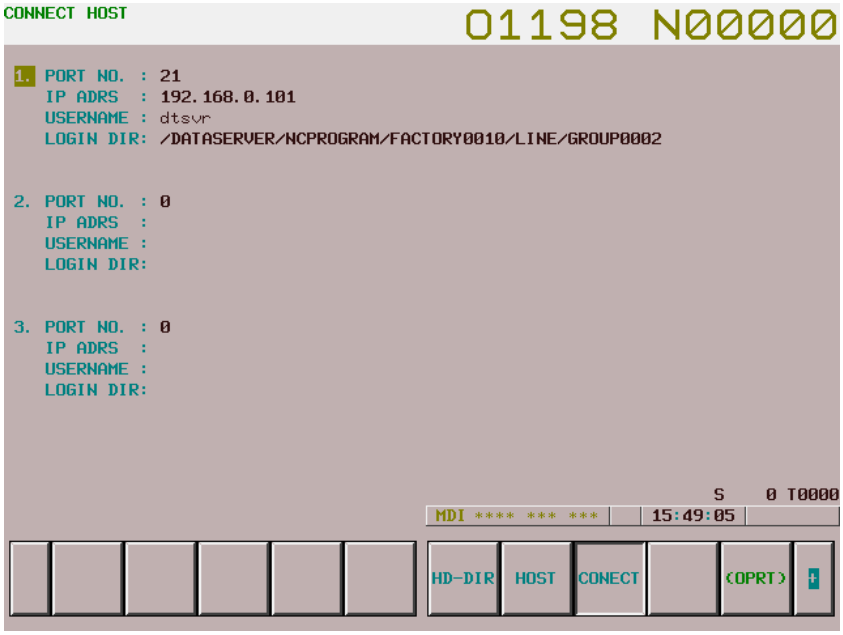
Refer to the corresponding CNC operator's manual.

Output destination

In storage mode : Data server board built-in hard disk
In FTP mode : Host computer built-in hard disk
In buffer mode : Data server board built-in hard disk

4.9 CONNECT HOST SCREEN

The Connect Host screen is used to check or change the host computer on which the FTP server is running.



Display items

- **PORT NO., IP ADRS, USERNAME, and LOGIN DIR**

  Display the values set from the Ethernet Parameter screen.

Operations

The following keys currently cannot be used:

- **CONECT 1**

  Change the connected host to host 1.

- **CONECT 2**

  Change the connected host to host 2.

- **CONECT 3**

  Change the connected host to host 3.

> **NOTE**
> Some versions of the CNC system software allow only host 1 to be specified for connection.

4.9.1 Checking the Connected Host

Procedure

Check the host computer on which the FTP server, or the communication destination of the current data server board, is running.

1 Press function key PROG.
2 Press the continuation menu key at the right end of the soft key menu.
3 When you press soft key [CONECT], the Connection Host screen appears.

[Reference]
The title of the host computer, or the communication destination of the current data server board, is displayed in reverse video.

NOTE
Some versions of the CNC system software allow only host 1 to be specified for connection.

4.9.2 Changing the Connected Host

Procedure

Check the host computer on which the FTP server, or the communication destination of the current data server board, is running.

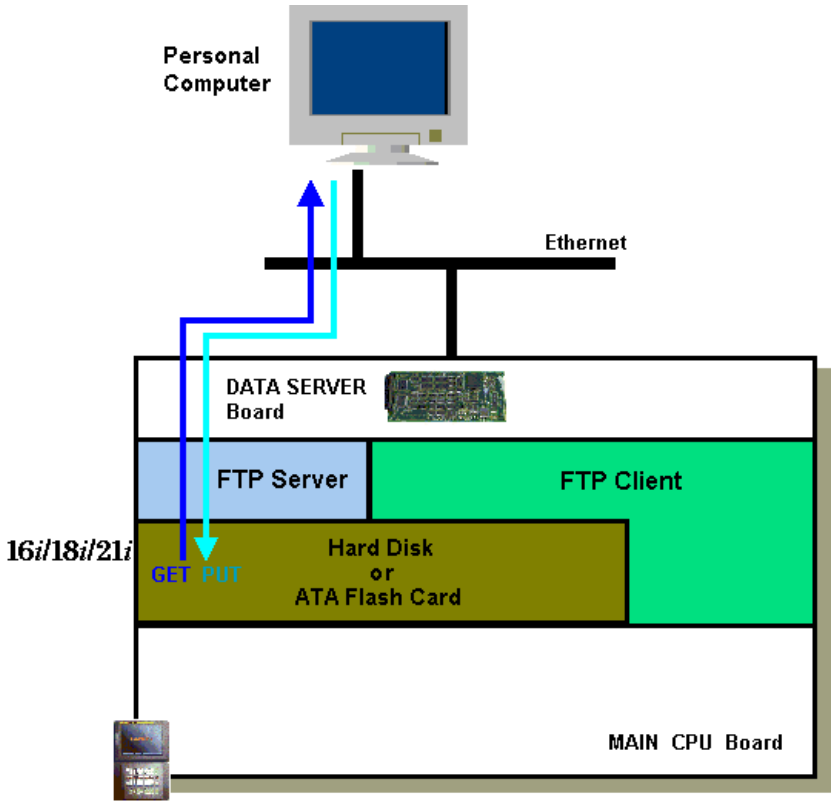
1 Press function key PROG.
2 Press the continuation menu key at the right end of the soft key menu.
3 When you press soft key [CONECT], the Connection Host screen appears.
4 Press the continuation menu key at the right end of the soft key menu.
5 Press soft key [CONECT 1], [CONECT 2], and [CONECT 3].

[Reference]
The title of the host computer, or the communication destination of the current data server board, is displayed in reverse video.

NOTE
Some versions of the CNC system software allow only host 1 to be specified for connection.

4.10 FTP SERVER FUNCTIONS

Communication is possible with the FTP client that runs on the host computer (personal computer).



NOTE

1 Only one FTP client can be connected to the FTP server. If an attempt is made to connect two or more FTP clients to the FTP server, the second and subsequent FTP clients enter the connection wait status. Two or more of the FTP clients having a GUI attempt to connect to the FTP server; however, such FTP clients cannot be used.

2 If the FTP client specifies a non-8.3-format file for registration with the FTP server, it is registered using an 8.3-format file name obtained from automatic conversion. See Subsection 4.1.5, "Hard Disk File Names," for explanations about the rules for converting file names to 8.3-format file names.

4.11 MAINTENANCE OF DATA SERVER SCREEN

The Maintenance of Data Server screen is used to format (initialize) a data server board built-in hard disk, check for hard disk errors, switch between data server modes, and display the error examination data.



Display items

- **STORAGE MODE, BUFFER MODE, and FTP MODE**

Display the current data server modes.

- **EMPTY COUNTER**

Displays the number of times that the data buffer becomes empty during transfer of the NC program from the data server board to the CNC. This item is initialized to 0 at power-on. After being initialized, the item is counted when the conditions are satisfied. When DNC operation or DNC operation by a subprogram call (M198) is being executed, this item may be counted up. This indicates that the data supply from the data server board to the CNC is insufficient.

- **TOTAL SIZE**

Indicates the total number of bytes when a single NC program is transferred from the data server board to the CNC.

- **READ POINTER and WRITE POINTER**

Pointer used to manage the internal buffer for supplying the NC program between the data server board and CNC.

Operations

- **STORAGE**

  Changes the current mode to the storage mode.

- **FTP**

  Changes the current mode to the FTP mode.

- **BUFFER**

  Changes the current mode to the buffer mode.

4.11.1 Checking the Hard Disk

Procedure

Check whether the hard disk contains a faulty sector.

1 Place the CNC in MDI mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [DS-MIN], the Maintenance of Data Server screen appears.
5 Press soft key [MIN].
6 When you press soft key [CHK DSK], the results are displayed on the screen.
   - Normal : "CHECK DISK:NORMAL"
   - Abnormal: "CHECK DISK:ABNORMAL"

⚠ CAUTION
If an abnormal condition occurs, check the cause of the error by referencing the error message displayed on the Ethernet Error Message screen. Back up the files on the hard disk as quickly as possible. Subsequently, format the hard disk.

NOTE
An error is likely to occur if hard disk check is performed concurrently with other data server functions.

4.11.2 Formatting the Hard Disk

Procedure

Format (initialize) the hard disk.

1 Place the CNC in MDI mode.
2 Press function key SYSTEM.
3 Press the continuation menu key at the right end of the soft key menu.
4 When you press soft key [DS-MIN], the Maintenance of Data Server screen appears.
5 Press soft key [MIN].
6 Press soft key [FORMAT].
7 Press soft key [EXEC].
8 The message "DISK FORMAT" appears at the bottom of the screen. Press soft key [EXEC] again.
9 During formatting, "DISK FORMAT" blinks at the bottom of the screen.
10 Upon the completion of formatting, the blinking "DISK FORMAT" message disappears.



⚠ CAUTION

1 If the CNC power is turned off during hard disk formatting, the hard disk may be destroyed. Never turn off the CNC power while formatting the hard disk.
2 If the hard disk is formatted, all the files on the hard disk are erased. Back up the hard disk files as required, then format the hard disk.

NOTE

An error is likely to occur if hard disk formatting is performed concurrently with other data server functions.

4.11.3 Switching Data Server Modes

Procedure

Switch data server modes.

1 Press function key SYSTEM.
2 Press the continuation menu key at the right end of the soft key menu.
3 When you press soft key [DS-MIN], the Maintenance of Data Server screen appears.
For the Series 16*i*/18*i*/21*i*-B, to display the Ethernet Error Message screen, press soft key [ETHLOG] and then soft key [BOARD].
4 To change to storage mode, press soft key [STORAGE].
To change to FTP mode, press soft key [FTP].
To change to buffer mode, press soft key [BUFFER].
5 Press soft key [EXEC].

NOTE
1 Operations in the buffer mode need the optional buffer mode functions.
2 The Series 21*i*-A/B cannot use the buffer mode.

4.11.4 Displaying Error Examination Data

Display data as the key to error examination if an error occurs during DNC operation using the data server function, DNC operation by a subprogram call (M198), or NC program input.

Procedure

1 Press function key SYSTEM.

2 Press the continuation menu key at the right end of the soft key menu.

3 When you press soft key [DS-MIN], the Maintenance of Data Server screen appears.



4.12 ETHERNET ERROR MESSAGE SCREEN

If an error related to the data server function occurs, an error message appears on the error message screen dedicated to the Ethernet functions.

Display

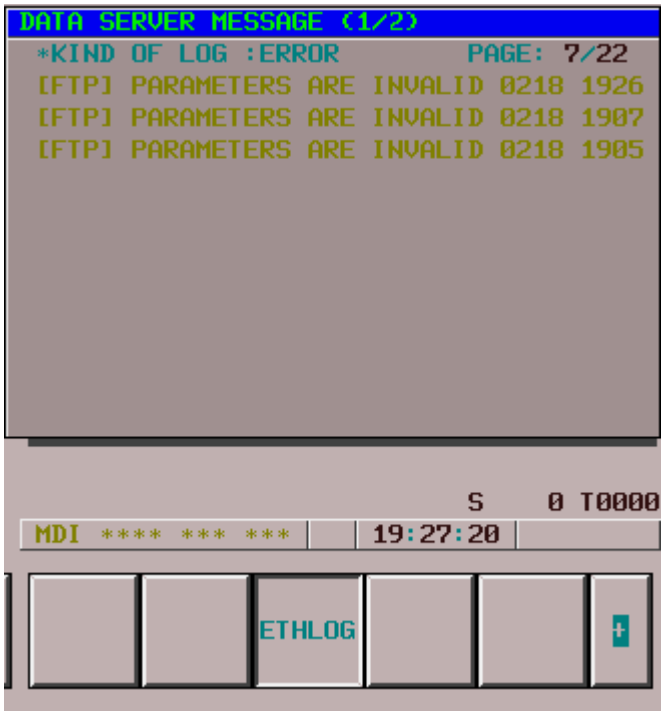
Procedure

1 Press function key MESSAGE.

2 Press the continuation menu key at the right end of the soft key menu.

3 When you press soft key [ETHLOG], the Ethernet Error Message screen appears.

4 Select the desired page using the PAGE ↑ PAGE ↓.



[Reference]

The latest error message is displayed at the top of the screen. The date and time at which the error occurred are displayed at the right end of the error message. The date and time are displayed in mmdd hhMM (mm : month, dd : day, hh : hour, MM : minute) format.

Configuration

The following titles are provided for the Ethernet Error Message screen:

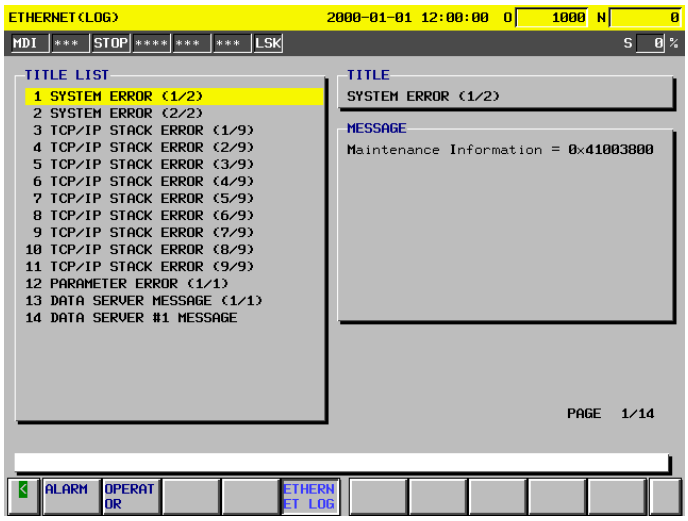
- SYSTEM ERROR screen
- TCP/IP STACK ERROR screen
- PARAMETER ERROR screen
- FTP SERVER MESSAGE screen
- DATA SERVER MESSAGE screen
- DATA SERVER#1 MESSAGE screen

5 15*i* FOCAS1/Ethernet FUNCTIONS

This section describes how to use the Series 15*i* FOCAS1/Ethernet functions.

5.1 ETHERNET ERROR MESSAGE SCREEN

If the FOCAS1/Ethernet function causes an error, an error message appears on the error message screen specific to the Ethernet functions.



Display items

- Title list

Lists all titles on the Ethernet error message screens.

- Title

Displays the title of the Ethernet error message screen displayed on the current page.

- Message

Displays the message on the Ethernet error message screen displayed on the current page.

Display

Procedure

1 Press function key MESSAGE.

2 Press soft key [CHAPTER].

3 When you press soft key [ETHERNET LOG], the "Ethernet (Log)" screen appears.

4 Select the desired page using the PAGE ↑ PAGE ↓ page keys.

[Reference]

The latest error message is displayed at the top of the screen. The date and time at which the error occurred are displayed at the right end of the error message. The date and time are displayed in mmdd hhMM (mm : month, dd : day, hh : hour, MM : minute) format.

6 15*i* DATA SERVER FUNCTIONS

This section describes how to operate the Series 15*i*-A data server functions.

NOTE
As for this Data Server function, the "LIST-GET", "LIST-PUT", "LIST-DELETE" and "Buffer Mode" function are not supported.

6.1 RULES GOVERNING THE USE OF THE DATA SERVER FUNCTIONS

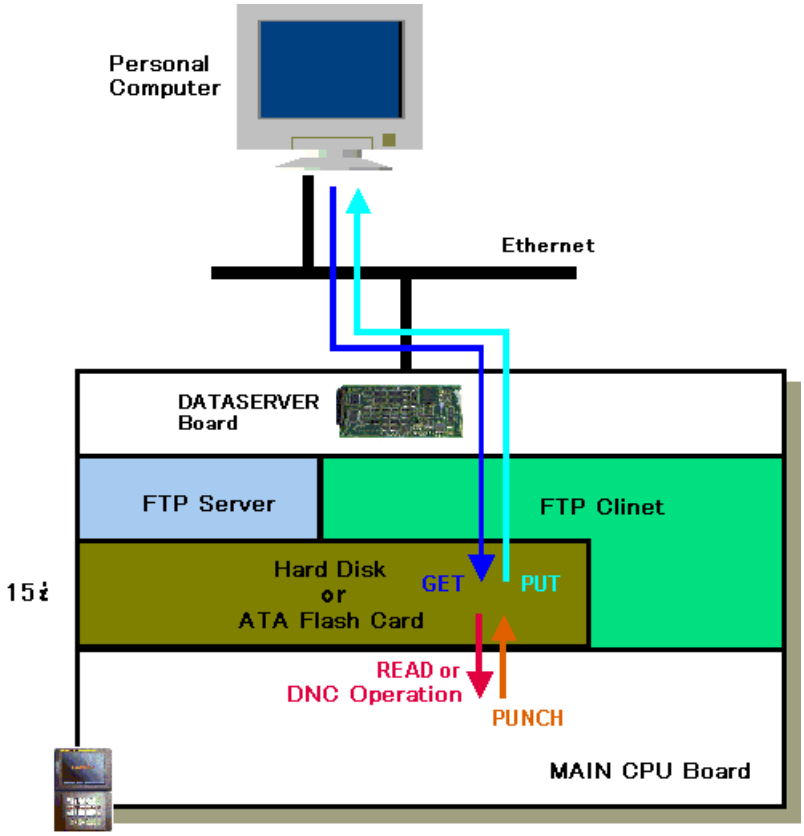
This section explains the rules governing the use of the data server functions.

6.1.1 Data Server Modes

The data server function can run in three modes when it transfers NC data (such as NC programs and NC parameters) between the CNC and data server board.

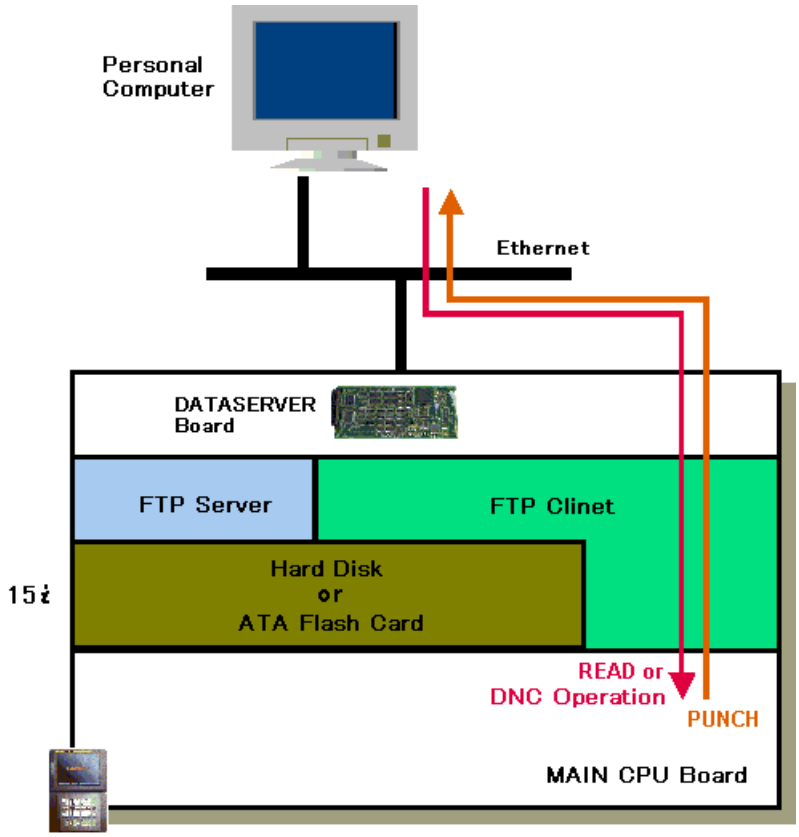
Storage mode

In the storage mode, data is transferred between the data server board built-in hard disk and CNC part program storage.
For example, DNC operations including a DNC operation by a subprogram call (M198) require that the related NC programs be stored on the data server board built-in hard disk. If an NC program is output, it will be stored on that hard disk.



FTP mode

In the FTP mode, data is transferred between the host computer built-in hard disk and CNC part program storage.
For example, DNC operations including a DNC operation by a subprogram call (M198) require that the related NC programs be stored on the host computer (personal computer) built-in hard disk. If an NC program is output, it will be stored on that hard disk.



⚠ CAUTION

1 In FTP mode, CNC data is transferred from the host computer hard disk to CNC tape memory. So, if a line is disconnected during communication due to network noise or any other reason, the line disconnection has a direct effect on the CNC operation, unlike in storage mode.
2 If communication between the CNC and host computer is interrupted, for example, by putting the CNC on feed hold during a DNC operation in the FTP mode, the host computer may disconnect the communication. Perform trial run to put the CNC on feed hold and make sure that communication with the host computer is not interrupted.

6.1.2 Differences Between a File Number, O Number, and File Name

This subsection explains the differences between a file number, O number, and file name, as described in this manual.

- **File number**

Used to identify a file (data) stored on the data server board hard disk or host computer hard disk.

- **O number**

Used to identify the NC program stored in CNC tape memory.

- **File name**

Used to identify a file (data) stored on the data server board hard disk or host computer hard disk.

6.1.3 Entering a File Number, O Number, and File Name

This subsection explains how to enter a file number, O number, and file name using the MDI keys.

- File number : Enter N + numeral.
- O number : Enter O + numeral.
- File name : Enter a character string enclosed in double quotation marks ("").

Example)

Input	Meaning	Content
O1	O number	O0001
O0123	O number	O0123
O12345	O number	O0012345
"O1"	File name	O1
N1	File number	1
"1"	File name	1
"ABC"	File name	ABC

NOTE
The file name is of 8·3 format. In other words, the file name consists of an eight-character name and three-character extension.

6.1.4 Differences Between a Hard Disk File and Host File

This subsection explains the differences between a hard disk file and host file described in this manual.

- **Hard disk file**

The hard disk file is stored on the hard disk built into the CNC data server board (hereafter called a data server board built-in hard disk).

- **Host file**

The host file is stored on the host computer hard disk (hereafter called a host computer built-in hard disk).

6.1.5 Hard Disk File Names

The name of any file on the data server board built-in hard disk is represented using the 8.3 file name format (8 characters in the file name and 3 characters in the file name extension) originally adopted for MS-DOS.
If a file to be subjected to an FTP transfer is specified only with a file name that is not in the 8.3 format, it is converted to an 8.3-format file name according to the following conversion rules.

Rules for conversion to 8.3-format file names

1 The first 8 characters in the specified file name are used as a post-conversion file name.
2 The 3 characters in the specified file name between the first and second periods are used as a post-conversion file name extension.
3 Any blank character in the specified file name is ignored.

Examples of converting to 8.3-format file names

1 "NCPROGRAM.DAT" → "NCPROGRA.DAT"
Because the file name has more than 8 characters, the first 8 characters are accepted as valid, and the post-conversion file name becomes as stated above.
2 "NCFILE.TEXT" → "NCFILE.TEX"
Because the file name extension has more than 3 characters, the first 3 characters in the file name extension are accepted as valid, and the post-conversion file name becomes as stated above.
3 "NCFILE.PRG.TXT" → "NCFILE.PRG"
The characters between the first and second periods are accepted as valid, and the post-conversion file name becomes as stated above.
4 "NC PROGRAM.DATA.TXT" → "NCPROGRA.DAT"
Because the first 8 characters, excluding the blank character, in the file name are accepted as valid, and the first 3 characters between the first and second periods are accepted as an file name extension, the post-conversion file name becomes as stated above.

NOTE
If the file names of different files on the host computer built-in hard disk are converted to 8.3-format file names for registration with the data server board built-in hard disk automatically as described above, the post-conversion file names may become identical.

6.1.6 NC Program Format

The NC program provided by the host computer must conform to the following format:

```
% TITLE ;
O0001(COMMENT) ;
      .
      .
      .
M30 ;
%
```

The NC program begins with % (start file mark). A comment (title, etc.) can be inserted, as required, into the reader part between % and EOB (;, program start).
Always specify an O number at the beginning of the program part. Store the NC program onto the hard disk by using this specified O number.
If the O number in the NC program differs from that of the file name, the former is used first.
A semicolon (;) used at the end of each block indicates the end of block (EOB). In fact, it becomes LF (LF: 0A in hexadecimal) or LF-CR-CR (CR: 0D in hexadecimal).
The NC program must end with M code;%.

> ⚠ **WARNING**
> Assume that the NC program provided by the host computer is not in the program format specified by the CNC. If such an NC program is executed, an unexpected operation may occur. So, take great care to ensure that the NC program is prepared on the host computer.

6.1.7 List File Formats

Use one of the following list formats for the LIST-GET, LIST-PUT, and LIST-DELETE functions, which are described later.

Format 1

```
% ;
O0001(COMMENT) ;
N111 ;
N222 ;
N333 ;
  :
  :
N999 ;
%
```

Format 2

```
% ;
O0001(COMMENT) ;
N111 (PC-File) ;
N222 (PC-File) ;
N333 (PC-File) ;
  :
  :
N999 (PC-File) ;
%
```

Format 3

```
% ;
O0001(COMMENT) ;
(Dtsvr-File) ;
(Dtsvr-File) ;
(Dtsvr-File) ;
  :
  :
(Dtsvr-File) ;
%
```

Format 4

```
% ;
O0001(COMMENT) ;
(Dtsvr-File, PC-File) ;
(Dtsvr-File, PC-File) ;
(Dtsvr-File, PC-File) ;
  :
  :
(Dtsvr-File, PC-File) ;
%
```

Specifications common to all formats

<1> The list file begins with "%" (start file mark).
<2> An O number must be specified in the next block. The list file must be named using the same O number. A comment enclosed in parentheses "(" and ")" can be inserted between the O number and an EOB.
<3> Process files are specified in the subsequent blocks.
<4> The list file must end with "%."

Specifications of format 1

The specifications of the format-1 list file are as follows:

<1> In this format, process files are identified using O-number (see NOTE). File names are specified by substituting "N" for "O" in "Oxxxx." Zeros in the digit number can be suppressed. The process files included in this example are treated as "O0111," "O0222," "O0333," ..., and "O0999" sequentially.
<2> The LIST-GET service transfers "Oxxxx" files from the host computer built-in hard disk to the data server board built-in hard disk without renaming them. The LIST-PUT service transfers "Oxxxx" files from the data server board built-in hard disk to the host computer built-in hard disk without renaming them. The LIST-DELETE service deletes "Oxxxx" files from the data server board built-in hard disk.

Specifications of format 2

The specifications of the format-2 list file are as follows:

<1> In this format, process files are identified using O-number (see NOTE) when they are on the data server board built-in hard disk and arbitrary names when they are on the host computer built-in hard disk. The file names used on the data server board built-in hard disk are specified by substituting "N" for "O" in "Oxxxx." Zeros in the digit number can be suppressed. The process files included in this example are treated as "O0111," "O0222," "O0333," ..., and "O0999" sequentially.
On the host computer built-in hard disk, files can be assigned an arbitrary name enclosed in parentheses "(" and ")" after the corresponding "Nxxxx," provided that the name consists of a combination of those selected from the following 76 different ASCII characters:
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . (period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~
<2> The LIST-GET service transfers files having the arbitrary name "PC-File" from the host computer built-in hard disk to the data server board built-in hard disk as "Oxxxx" files.
The LIST-PUT service transfers "Oxxxx" files from the data server board built-in hard disk to the host computer built-in hard disk as files having the arbitrary name "PC-File."
The LIST-DELETE service deletes "Oxxxx" files from the data server board built-in hard disk.

Specifications of format 3

The specifications of the format-3 list files are as follows:

<1> In this format, process files have an arbitrary name. It is assumed that each file has the same name when it is on the data server board built-in hard disk and when it is on the host computer built-in hard disk.
The "arbitrary" file name is specified in parentheses "(" and ")" and must consist of a combination of characters selected from the following 76 different ASCII characters:
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . (period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~

<2> The LIST-GET service transfers files having the arbitrary name "Dtsvr-File" from the host computer built-in hard disk to the data server board built-in hard disk without renaming them.
The LIST-PUT service transfers files having the arbitrary name "Dtsvr-File" from the data server board built-in hard disk to the host computer built-in hard disk without renaming them.
The LIST-DELETE service deletes "Dtsvr-File" files from the data server board built-in hard disk.

Specifications of format 4

The specifications of the format-4 list file are as follows:

<1> In this format, process files have an arbitrary name. It is assumed that each file has a different name between when it is on the data server board built-in hard disk and when it is on the host computer built-in hard disk.
An "arbitrary" file name used on the data server board built-in hard disk and that on the host computer built-in hard disk are both specified in parentheses "(" and ")." They must be separated from each other using a comma "," and must consist of a combination of characters selected from the following 76 different ASCII characters:
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~

<2> The LIST-GET service transfers files having the arbitrary name "PC-File" from the host computer built-in hard disk to the data server board built-in hard disk as "Dtsvr-File" files.
The LIST-PUT service transfers files having the arbitrary name "Dtsvr-File" from the data server board built-in hard disk to the host computer built-in hard disk as files having the arbitrary file name "PC-File."
The LIST-DELETE service deletes "Dtsvr-File" files from the data server board built-in hard disk.

Restrictions on file names in the list file

The following restrictions apply when file names are specified in the list file.

<1> Only the following 76 different ASCII characters can be used in arbitrary file names.
Digits 0 to 9
Lowercase letters a to z
Uppercase letters A to Z
14 different special characters . (period), ! , #, $, %, &, -, @, ^, _, ', {, }, and ~
This restriction applies also when the name of a file held on the host computer built-in hard disk is specified.

<2> The arbitrary file name can be up to 255 characters. If an attempt is made to specify a larger arbitrary file name, an error is detected.

<3> Any file to be used on the data server board built-in hard disk must be in the 8.3 format. If an "arbitrary" file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically according to the following rule:

- If the first 8 characters in the original "arbitrary" file name include no period, they are used as the post-conversion file name. If they include a period, the characters before the period are used as the post-conversion file name. If the first 3 characters after the period include no period, they are used as the post-conversion file extension. If they contain periods, a characters between the first and second periods are used as the post-conversion file name extension.
  Example 1) If the original file name is "LONGFILENAME.LONGEXT," the post-conversion file name is: "LONGFILE.LON"
  Example 2) If the original file name is "ABCD.EFGH.TXT," the post-conversion file name is: "ABCD.EFG"

NOTE

1 The names of files handled in the data server must be in the 8.3 format. If "arbitrary" file names are not in the 8.3 format, they are converted to this format automatically when they are handled in the data server. Different "arbitrary" file names may be converted to the same file name in the 8.3 format; therefore, they will be regarded as the same file.

2 If the O number is anywhere between 1 and 9999, the O number-format file name is represented by "Oxxxx." If it is anywhere between 10000 and 9999999, the O number-format file name is represented by "Oxxxxxxx." If it is anywhere between 10000000 and 99999999, the O number-format file name is represented by "xxxxxxxx." ("xxxx" means a number.)

List file storage location

The LIST-GET, LIST-PUT, and LIST-DELETE services are useful to manage more than one NC program in a group.
The storage location for the list file varies depending on what service is to be executed.
If the LIST-GET service is to be used, the list file is to be prepared on the host computer built-in hard disk, because the NC programs to be executed are on that hard disk.
If the LIST-PUT or LIST-DELETE service is to be used, the list file is to be prepared on the data server board built-in hard disk, because the NC programs to be executed are on that hard disk.

6.1.8 Buffer Mode Specifications

The buffer mode is designed to handle NC programs larger than the capacity of the data server board built-in hard disk. In this mode, the data server board built-in hard disk is used as a temporary, intermediate buffer.

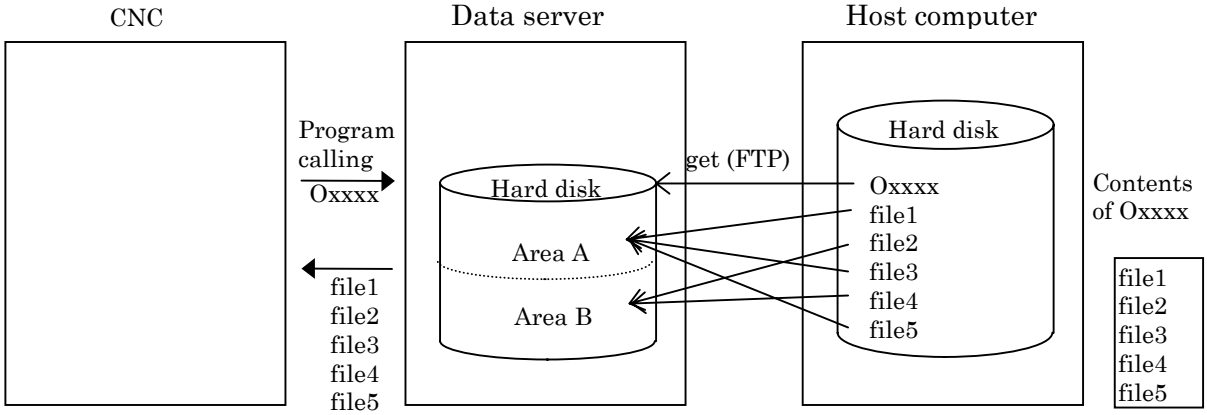
In the buffer mode, two areas (A and B) are previously prepared on the hard disk. While an NC program is being supplied from one (A) of the areas to the CNC, the rest of the NC program is read from the host computer into the other area (B), using the FTP. When the data transfer from area A ends, a data transfer from area B to the CNC is started, and the NC program transfer from the host computer to the emptied area (A) is resumed, using the FTP.

Repeating this sequence enables an NC program larger than the capacity of the data server board built-in hard disk to be handled. Using the buffer mode, however, requires that the NC program be previously divided into several files in the host computer.

The size of resulting smaller files must not be larger than half the remaining capacity of the data server board built-in hard disk. If the file size is very large (for example, not smaller than 100 MB), it will take a fairly long time to read the first file from the host computer, thus delaying the start of the operation.

6.1.8.1 How to use the buffer mode

The buffer mode is designed to handle an NC program larger than the capacity of the data server board built-in hard disk. This mode can be used with DNC operations (Section 5.6) including a DNC operation by a subprogram call (M198) (Section 5.7).
In the buffer mode, the Oxxxx file called during a DNC operation or by subprogram calling is a file list, which is a list of file names arranged in the sequence in which they are to be called. In this mode, the data server board calls the files specified according to this file list sequentially and supplies data from them to the NC. (See the following figure.)



As seen from the above figure, the contents of the files (file1 to file5) specified in the file list in the host computer are fetched into the data server board built-in hard disk, using the FTP, then the data is supplied to the CNC. In the buffer mode, after the CNC requests the data server to read the NC program, the specified file list is read from the host computer, and the contents of the first file in the file list are read, then the data is supplied to the CNC. Note, therefore, that a time lag occurs between the read request and the data supply sequence. In addition, while data is being supplied from one of the areas to the CNC, data is fetched into the other area, using the FTP. Therefore, the original data must be divided to such a size that the resulting two consecutive files can fit on the data server board built-in hard disk.
When a data transfer from one of the areas to the CNC is completed, if the FTP communication with the other area has not ended, another data supply sequence cannot be performed, and therefore, the program call ends in an error. This error can be suppressed, using a parameter, however. See Section 5.3, "Parameters," of Part III, "Setting," for details.
For a DNC operation by a subprogram call (M198), the name of the file list must be O-number format. For other DNC operations, however, the name of the file list is arbitrary.
The name of each file specified in the file list can be any name permitted in the host computer, provided that it does no exceed 255 alphanumeric characters. In the file list, each file name must be

followed by at least one LF (0A in hexadecimal) or CR (0D in hexadecimal).

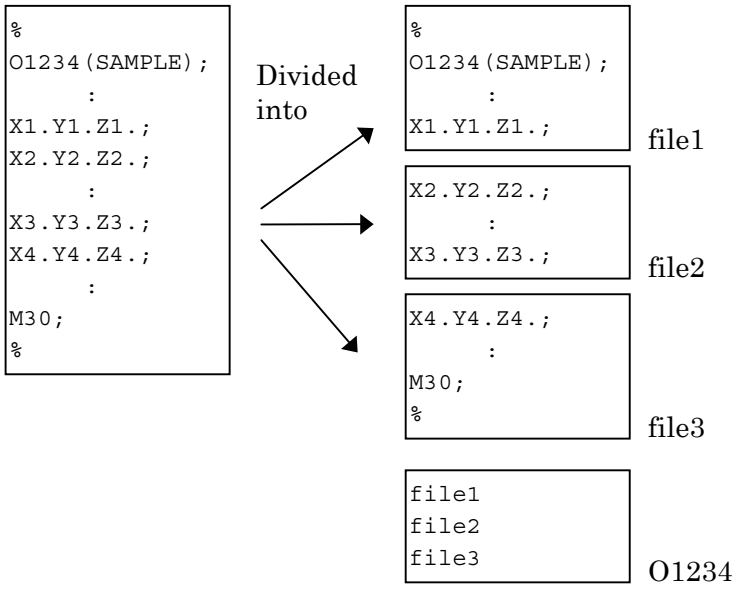
NOTE

Even in the buffer mode, it is possible to newly register files on the data server board built-in hard disk, using operations such as "NC program GET" and "output to NC program." These operations, however, may cause a buffer mode DNC operation error, if the capacity of the data server board built-in hard disk necessary for buffer mode operations is used up. Therefore, do not register new files on the data server board built-in hard disk during buffer mode operations. Always make sure that there remains an enough free space.

6.1.8.2 How to divide an NC program into several files

In buffer mode operations, the host computer must previously divide an NC program into several files and create a list of these files arranged in the sequence in which they are to be transferred.

Example) Dividing an NC program into three files



As shown above, the NC program is divided into three files (file1, file2, and file3). These file names are specified in the file list (named O1234).

> ⚠ **CAUTION**
> In the above example, the original NC program is not divided in the middle of a block. In reality, however, the NC program can be divided in the middle of a block. In this case, make sure that no extra character is inserted at the end of any of the resulting files. Otherwise, an unexpected operation may occur when the NC program is executed. Be very careful when creating and editing NC programs in the host computer.

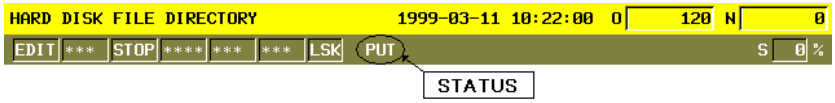
NOTE

1 The size of files into which an NC program is divided should be 20 to 30 MB. If the size is very large, there will be much idle time before the DNC operation begins. If the size is very small, data may be interrupted between files, resulting in a cutter mark being left on the workpiece.
2 An NC program can be divided in the middle of a block, but it should be divided between blocks. In addition, a tool retract operation should be inserted at the end of each file resulting from NC program division. Doing so can avoid an interruption of data between files, therefore preventing a cutter mark.
3 The file list and the files contained in the list must be stored in the same directory of the same host computer.

6.1.9 Data Server Screen Manipulation and Status Indication

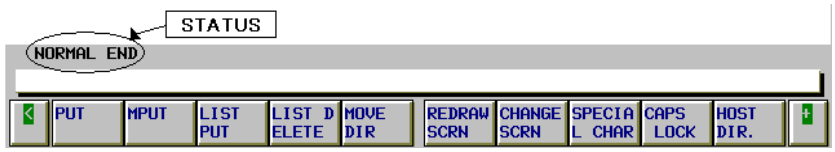
• Display during operation

During operation, the status is displayed at the top of the screen.



• Display at the end of operation

Upon the completion of operation, the status is displayed at the bottom of the screen.



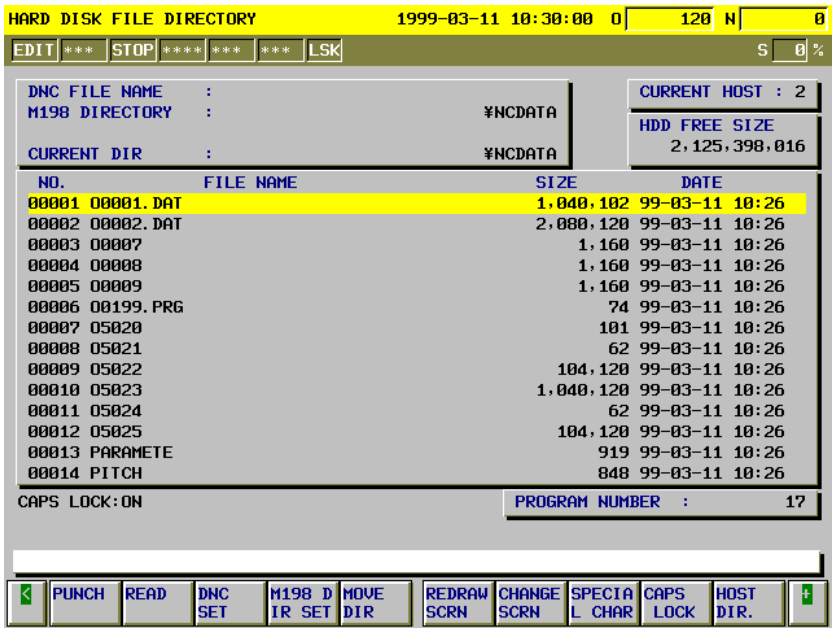
• Operation and statuses

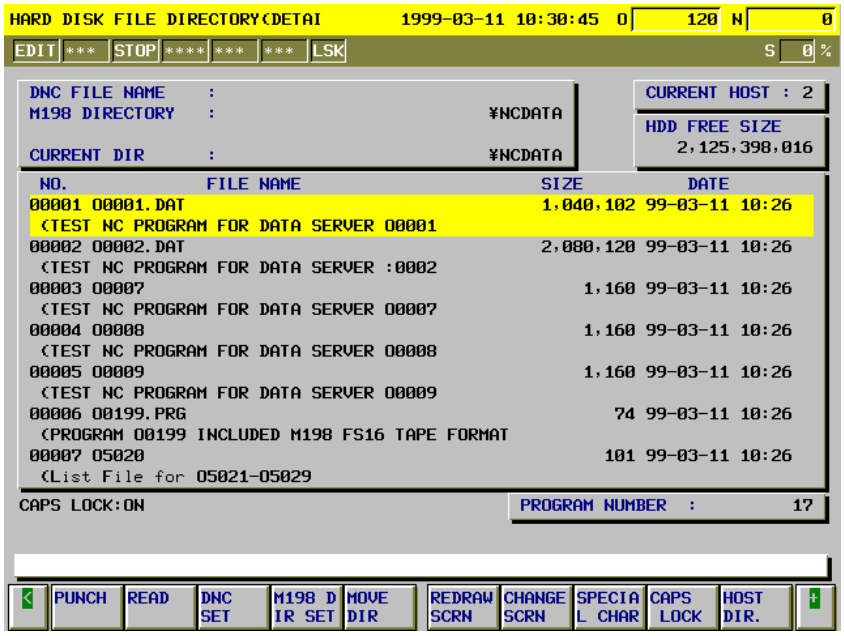
The following table lists the statuses to be displayed on each screen for the operations listed below:

Operation	Screen	Status
SRCH FILE M198 DIR SET M198 HOST SET DNC SET SCRL UP SCRL DOWN SWITCH PAGE	Hard Disk File Directory screen Host Directory screen	SRCH
GET	Host Directory screen	GET
PUT	Hard Disk File Directory screen	PUT
MGET	Host Directory screen	MGET
MPUT	Hard Disk File Directory screen	MPUT
GET LIST	Host Directory screen	LGET
PUT LIST	Hard Disk File Directory screen	LPUT
DEL LIS	Hard Disk File Directory screen	LDEL
COPY FILE	Hard Disk File Directory screen	COPY
READ	Hard Disk File Directory screen Host Directory screen	READ
PUNCH	Hard Disk File Directory screen Host Directory screen	PUNCH
DEL FILE	Hard Disk File Directory screen Host Directory screen	DEL
CHNG FILE NAME	Hard Disk File Directory screen	REN
MAKE DIR	Hard Disk File Directory screen	MD
MOVE DIR	Hard Disk File Directory screen	MV
DEL DIR	Hard Disk File Directory screen	RM
CHANGE HOST HOST 1, HOST 2, HOST 3	Connection Host screen	HCHG
FORMAT	Maintenance screen	FRMT
CHECK DISK	Maintenance screen	CHCK

6.2 HARD DISK FILE DIRECTORY SCREEN

The Hard Disk File Directory screen is used to display a list of files on the data server board built-in hard disk.





Display items

- **DNC FILE NAME**

  Displays the file name for which DNC operation is performed.

- **M198 DIRECTORY**

  Displays the directory for DNC operation to be performed by a subprogram call (M198).

- **CURRENT DIR**

  Displays the current work directory of the data server board built-in hard disk.

- **CURRENT HOST**

  Displays the number of the currently connected host.

- **PROGRAM NUMBER**

  Displays the number of files stored in the current work directory.

- **HDD FREE SIZE**

  Displays the free size (in bytes) of the data server board built-in hard disk.

- **SIZE**

  File size, in bytes

- **DATE**

  Displays the date and time when a file was created.

- **COMMENT**

  Displays the comment statement appearing immediately after the O number in the NC program. If this comment statement does not exist, the contents are displayed from the beginning of the NC program or file. The comment is displayed only on the Hard Disk File Directory (Detailed) screen.

Operations

- **PUNCH**

  Inputs a file from the Ethernet built-in hard disk to the CNC tape memory. This operation is possible only when the data server is in storage mode and the CNC is in EDIT mode.

- **READ**

  Outputs a file from the CNC tape memory to the Ethernet built-in hard disk file. This operation is possible only when the data server is in storage mode and the CNC is in EDIT mode.

- **DNC SET**

  Specifies the file for which DNC operation is to be performed. This operation is possible only when the data server is in the storage mode.

- **M198 DIR SET**

  Specifies the directory for the DNC operation by a subprogram call (M198). This operation is possible only when the data server is in the storage mode.

- **PUT**

  Transfers a single file from the data server board built-in hard disk to the host computer built-in hard disk.

- **MPUT**

  Transfers two or more files from the data server board built-in hard disk to the host computer built-in hard disk. Wild cards (*, ?) can be used to specify file names.

- **PUT LIST**

  Transfers files from the data server board built-in hard disk to the host computer built-in hard disk according to the list file.

- **DEL LIST**

  Deletes files from the data server board built-in hard disk according to the list file.

- **COPY FILE**

  Copies a file from the data server board built-in hard disk.

- **DEL FILE**

  Deletes a file from the data server board built-in hard disk.

- **CHANGE FILE NAME**

  Changes a file name on the data server board built-in hard disk.

- **SRCH FILE**

  Searches the data server board built-in hard disk for a file by using a file number or name.

- **MAKE DIR**

  Creates the directory on the data server board built-in hard disk.

- **DEL DIR**

  Deletes a directory from the data server board built-in hard disk.

- **MOVE DIR**

  Moves the work directory on the data server board built-in hard disk.

- **REDRAW SCRN**

  Updates the Hard Disk File Directory screen.

- **CHANGE SCRN**

  Switches between normal display and detailed display.

- **SPECIAL CHAR**

  Enables highly-used characters to be entered when not supported by the MDI keys.

- **CAPS LOCK**

  Switches the alphabetic character input mode (uppercase letter input mode and lowercase letter input mode).

- **HOST DIR.**

  Switches the current screen to the Host Directory screen.

NOTE
If the CNC software series is the F001 or F601, the following keys cannot be used:
- M198 DIR SET
- MAKE DIR
- DELETEDIR
- MOVE DIR

6.2.1 Displaying a List of Hard Disk Files

Procedure

Display a list of files stored on the data server board built-in hard disk.

1 Press function key PROG.
2 Press soft key [CHAPTER].
3 When you press [HDD DIR.], the Hard Disk File Directory screen appears.
4 Press the operation menu key at the right end of the soft key menu.
5 When you press [REDRAW SCRN], the contents of the Hard Disk File Directory screen appear.
6 Select the desired page using the PAGE ↑ PAGE ↓ page keys.
7 When you press soft key [CHANGE SCRN], the Hard Disk File Directory (Detail) screen appears.

6.2.2 Searching for a Hard Disk File

To display a list of files stored on the data server board built-in hard disk, select the first file by specifying its number or name.

Procedure

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the end of the soft key menu.
3 Press soft key [SRCH FILE].
4 Using the MDI keys, enter the number or name of the file to be searched for. Alternatively, select this file using the cursor.
[Input format]
<file-number>, <file-name>, or <cursor>
5 Press soft key [EXEC].
6 During search, SRCH blinks at the top of the screen.

NOTE
1 If the specified file does not exist on the data server board built-in hard disk, a file list appears, in ASCII character order of file names, using the file following the specified file as the first.
2 The data server functions contain the FTP server function. As a result, the following may occur without being noticed by an operator: a new file is transferred to the data server board built-in hard disk or the file for which a search was being made is deleted. So, the file number indicating the specified file may be changed without being noticed by the operator. When specifying the file number, check the file name before operation.

6.2.3 Deleting a Hard Disk File

Delete a file stored on the data server board built-in hard disk.

To delete a single file:

Procedure

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [DEL FILE].
4 Using the MDI keys, enter the number or name of the file to be deleted. Alternatively, select this file using the cursor keys.
[Input format]
<file-number>, <file-name>, or <cursor>
5 Press soft key [EXEC].
6 During deletion, DEL blinks at the top of the screen.

NOTE
Deleting a file by specifying its file number is valid only for those files displayed on the Hard Disk File Directory screen.

To delete two or more files

Procedure

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [DEL FILE].
4 Using the MDI keys, enter the name of the file to be deleted (including wild cards).
[Input format]
<file-name (including wild cards)>
5 Press soft key [EXEC].
6 If "FILE DELETE?" is displayed at the lower-left corner of the screen, press soft key [EXEC]. To cancel the deletion, press soft key [CAN].
7 During deletion, DEL blinks at the top of the screen.
8 To stop the deletion, press soft key [STOP].

[Example]
Enter * for the file name to delete all the files displayed on the Hard Disk File Directory screen from the data server board built-in hard disk.

NOTE
When two or more files are being deleted, and soft key [STOP] is pressed, the files deleted until soft key [STOP] is pressed cannot be restored.

6.2.4 Copying a Hard Disk File

Procedure

Copy a file stored on the data server board built-in hard disk.

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [COPY FILE].
4 Using the MDI keys, enter the number or name of the copy source file and the name of the copy destination file. The copy source file can also be selected using the cursor.
[Input format]
Select one of the following:
<copy-source-file-number>, <copy-destination-file-name>
<copy-source-file-name>, <copy-destination-file-name>
<cursor>, <copy-destination-file-name>
5 Press soft key [EXEC].
6 During the copy operation, COPY blinks at the top of the screen.

NOTE
1 An error occurs if the name of a file stored on the data server board built-in hard disk is specified as the copy destination file name.
2 Specifying the copy source file with a file number is valid only for those files displayed on the Hard Disk File Directory screen.

6.2.5 Changing a Hard Disk File Name

Change the name of a file stored on the data server board built-in hard disk.

Procedure

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [CHNG FILE NAME].
4 Using the MDI keys, enter the original number or name of the file and the name to which it is to be changed. The file can also be selected using the cursor keys.
[Input format]
Select one of the following:
<pre-change-file-number>, <post-change-file-name>
<pre-change-file-name>, <post-change-file-name>
<cursor>, <post-change-file-name>
5 Press soft key [EXEC].
6 During the change operation, REN blinks at the top of the screen.

NOTE
1 An error occurs if the name of a file stored on the data server board built-in hard disk is specified as the post-change file name.
2 Specifying the pre-change file with a file number is valid only for those files displayed on the Hard Disk File Directory screen.

6.2.6 Creating a Directory on the Data Server Board Built-in Hard Disk

Procedure

Create a directory(folder) on the data server board built-in hard disk.

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [MAKE DIR].
4 Enter a directory name using the MDI keys.
[Input format]
<directory-name>
5 Press soft key [EXEC].
6 During creation, MD blinks at the top of the screen.

NOTE
If the CNC software series is the F001 or F601, this operation cannot be used.

6.2.7 Deleting a Directory from the Data Server Board Built-in Hard Disk

Delete a directory(folder) from the data server board built-in hard disk.

Procedure

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [DEL DIR].
4 Using the MDI keys, enter the number or name of the directory to be deleted. This directory can also be selected using the cursor keys.
[Input format]
<directory-number>, <directory-name>, or <cursor>
5 Press soft key [EXEC].
6 During deletion, RM blinks at the top of the screen.

NOTE
1 If a directory (folder) contains files, an attempt to delete it ends in an error. Before deleting a directory, delete all files from the directory.
2 A directory to be deleted can be specified using a directory number only if the directory is displayed on the Hard Disk File Directory screen.
3 If the CNC software series is the F001 or F601, this operation cannot be used.

6.2.8 Moving a Directory on the Data Server Board Built-in Hard Disk

Procedure

Move a work directory on the data server board built-in hard disk.

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [MOVE DIR].
4 Using the MDI keys, enter the number or name of the movement destination directory. Alternatively, select this directory using the cursor keys.
[Input format]
<directory-number>, <directory-name>, or <cursor>
5 Press soft key [EXEC].
6 During movement, MV blinks at the top of the screen.

NOTE
1 If a directory contains many files, it may take much time to move to that directory.
2 A destination directory can be specified using a directory number only if the directory is displayed on the Hard Disk File Directory screen.
3 If the CNC software series is the F001 or F601, this operation cannot be used.

6.2.9 Executing Hard Disk File PUT

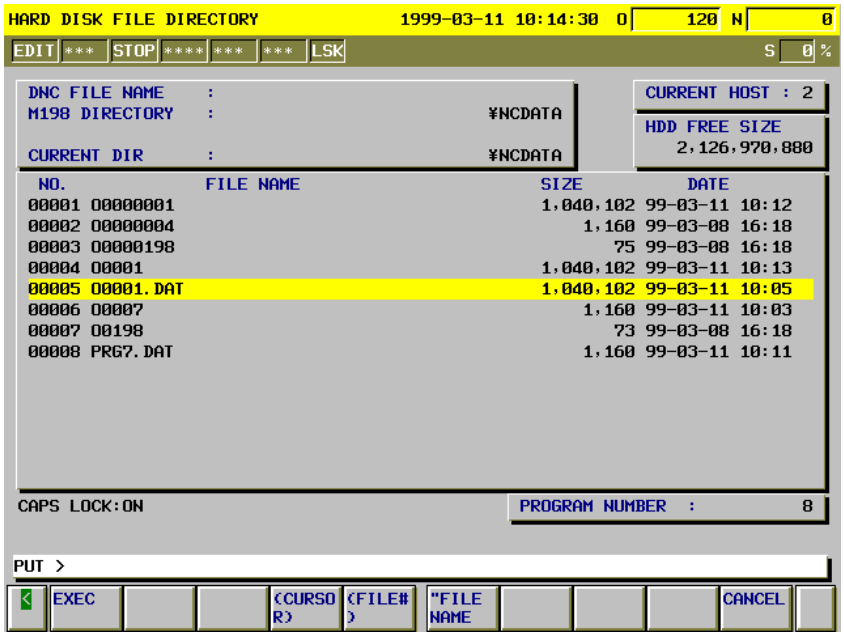
Using FTP, transfer a file from the data server board built-in hard disk to the host computer built-in hard disk.

Procedure

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [PUT].
4 Using the MDI keys, enter the number or name of the file on the transfer source data server board built-in hard disk and the name of the file on the transfer destination host computer built-in hard disk. The file on the transfer source data server board built-in hard disk can also be selected by using the cursor keys.
[Input format]
Select one of the following:
<transfer-source-file-number>, <transfer-destination-file-name>
<transfer-source-file-name>, <transfer-destination-file-name>
<cursor>, <transfer-destination-file-name>
<transfer-source-file-name>
<transfer-source-file-number>
<cursor>
5 Press soft key [EXEC].
6 During the PUT operation, PUT blinks at the top of the screen.
7 To stop the PUT operation, press soft key [CAN].

[Example]
This example explains how to move file O0001.DAT, with file name PROG1.DAT, from the data server board built-in hard disk and put it on the host computer built-in hard disk.

1. Press soft key [PUT].



2. Enter the transfer source file name by using <file-name>, <file-number>, or <cursor>.

A. File name
Press soft key ["FILE NAME].



Enter file name O0001.DAT.



Press soft key [FILE NAME"].



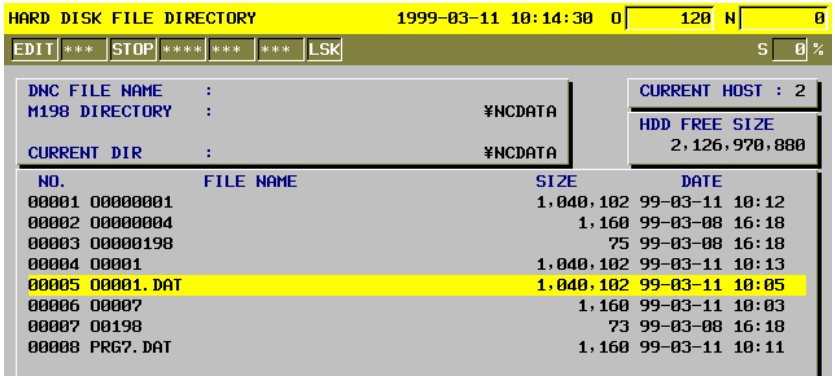
B. File number
Press soft key [(FILE#)].



Enter file number 5.



C. Cursor
Position the cursor to the transfer source file.



Press soft key [(CURSOR)].



3. Enter the transfer destination file name. If the transfer destination name is omitted, the transfer source file name is used.

Press soft key [,"FILE NAME].



Press file name PROG1.DAT.



Press soft key [FILE NAME"].



4. Press soft key [EXEC].

NOTE
1 The transfer destination file name can be omitted. In this case, it becomes the transfer source file name.
2 If an error occurs, check the cause of the error by referencing the Ethernet Error Message screen.
3 Specifying a file to be transferred with a file number is valid only for those files displayed on the Hard Disk File Directory screen.

6.2.10 Executing Hard Disk File MPUT

Using wild cards (*, ?) and FTP, transfer two or more files from the data server board built-in hard disk to the host computer built-in hard disk.

Procedure

1 Display the Hard Disk File Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [MPUT].
4 Using the MDI keys, enter the name of the file (including wild cards) on the transfer source data server board built-in hard disk.
[Input format]
<transfer-source-file-name>
5 Press soft key [EXEC].
6 During an MPUT operation, MPUT blinks at the top of the screen.
7 To stop an MPUT operation, press soft key [STOP].

[Example]
Enter *.* for the file name to transfer all work directory files from the data server board built-in hard disk to the host computer built-in hard disk.



NOTE
1 If an error occurs, determine the cause of the error by referring to the Ethernet Error Message screen.
2 When two or more files are being transferred, if soft key [STOP] is pressed, incomplete files that were being transferred when soft key [STOP] was pressed may remain on the host computer built-in hard disk.

6.2.11 Executing Hard Disk File LIST-PUT

Transfer files from the data server board built-in hard disk to the host computer built-in hard disk according to the contents of the list file, using the FTP.

Procedure

1 Display the Hard Disk File Dir screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [PUT LIST].
4 Enter the name of the list file held on the data server board built-in hard disk, using the MDI keys.
[Input format]
<number-of-list-file>
or
<name-of-list-file>
or
<Cursor>
5 Press soft key [EXEC].
6 During LIST-PUT operation, " LPUT " blinks in the lower-right part of the screen.
7 To stop LIST-PUT, press soft key [STOP].

NOTE
1 If an error occurs, check the cause of the error using the Ethernet Error Message screen.
2 If more than one file is specified to be transferred, pressing soft key [STOP] before the completion of the file transfer may allow transferred files to be left on the host computer built-in hard disk even after the soft key is pressed.
3 A method of using a file number to specify a file to be transferred can be used only for files displayed on the Hard Disk File Directory screen.
4 See Subsection 5.1.7, "List File Formats," for explanations about the formats of the list file.

6.2.12 Executing Hard Disk File LIST-DELETE

Delete files from the data server board built-in hard disk according to the contents of the list file.

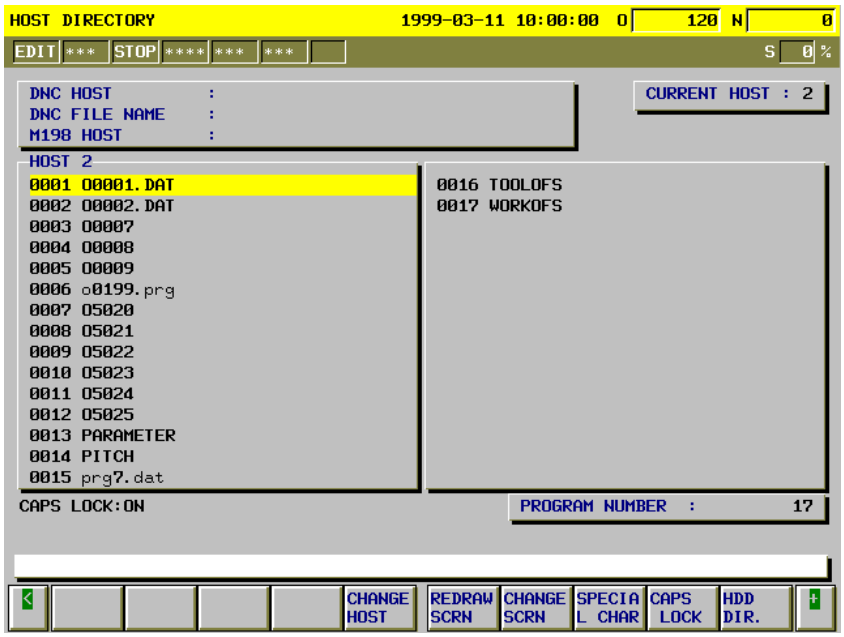
Procedure

1 Display the Hard Disk File Dir screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [DEL LIST].
4 Enter the name of the list file held on the data server board built-in hard disk, using the MDI keys.
[Input format]
<number-of-list-file>
or
<name-of-list-file>
or
<Cursor>
5 Press soft key [EXEC].
6 During LIST-DELET operation, " LDEL " blinks in the lower-right part of the screen.
7 To stop LIST-DELET, press soft key [STOP].

NOTE
1 If an error occurs, check the cause of the error using the Ethernet Error Message screen.
2 If more than one file is specified to be deleted, pressing soft key [STOP] before the completion of the file deletion makes it impossible to restore the deleted file(s).
3 A method of using a file number to specify a file to be deleted can be used only for files displayed on the Hard Disk File Directory screen.
4 See Subsection 5.1.7, "List File Formats," for explanations about the formats of the list file.

6.3 HOST DIRECTORY SCREEN

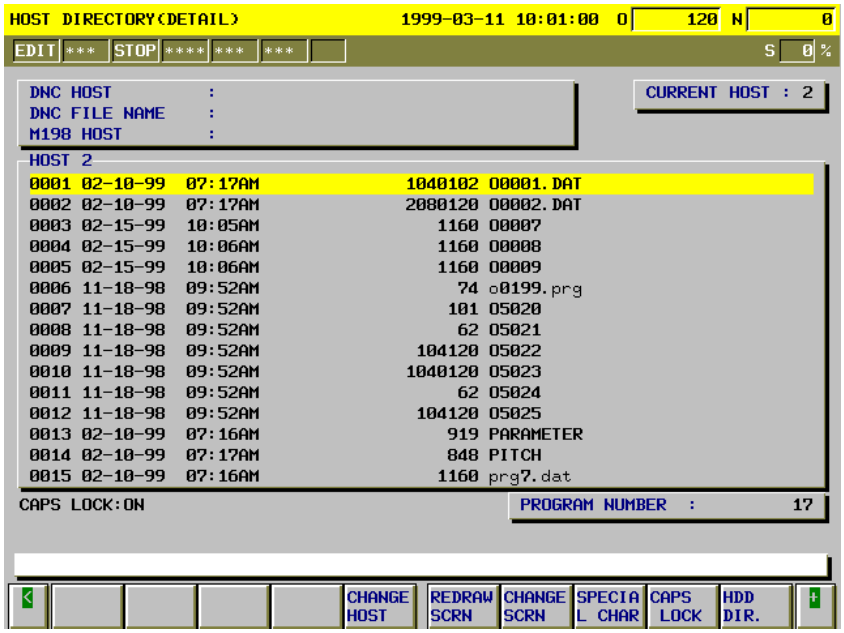
The Host Directory screen is used to display a list of the files stored on the host computer built-in hard disk.



NOTE

1 A file name containing kanji, hiragana, and katakana characters is not displayed correctly.

2 The number of programs displayed on the above HOST FILE DIR screen may not match that on the HOST FILE DIR (detail) screen shown on the next page, depending on the type of the FTP server software.



NOTE

The above Host Directory (Detail) screen is one display example. The display contents depend on the specifications of the FTP server used by the host computer.

Display items

- **DNC HOST**

  Displays the host number for DNC operation.

- **DNC FILE NAME**

  Displays the file name for DNC operation.

- **M198 HOST**

  Displays the host number for DNC operation by a subprogram call (M198).

- **CURRENT HOST**

  Displays the number of the currently connected host.

- **PROGRAM NUMBER**

  Displays the number of files contained in the current directory.

- **SIZE**

  Displays the file size, in bytes.

- **DATE**

  Displays the date and time at which the file was created.

Operations

- **PUNCH**

  Inputs a file from the Ethernet built-in hard disk to CNC tape memory. This operation is possible only when the data server is in storage mode and the CNC is in EDIT mode.

- **READ**

  Outputs a file from CNC tape memory to an Ethernet built-in hard disk file. This operation is possible only when the data server is in storage mode and the CNC is in EDIT mode.

- **DNC SET**

  Specifies the file for which DNC operation is to be performed. This operation is possible only when the data server is in the FTP mode or buffer mode.

- **M198 HOST SET**

  Specifies the host number for the DNC operation by a subprogram call (M198). This operation is possible only when the data server is in the FTP mode or buffer mode.

- **GET**

  Transfers a single file from the host computer built-in hard disk to the data server built-in hard disk.

- **MGET**

  Transfers two or more files from the host computer built-in hard disk to the data server built-in hard disk. Wild cards (*, ?) can be used to specify file names.

- **GET LIST**

  Transfers files from the host computer built-in hard disk to the data server board built-in hard disk according to the list file.

- **SRCH FILE**

  Searches the host computer built-in hard disk for a file with the file number.

- **DEL FILE**

  Deletes files from the host computer built-in hard disk.

- **CHANGE HOST**

  Switches the current screen to the Connection Host screen.

- **REDRAW SCRN**

  Updates the Host Directory screen.

- **CHANGE SCRN**

  Switches between normal display and detailed display.

- **SPECIAL CHAR**

  Enables highly-used characters to be entered when not supported by the MDI keys.

- **CAPS LOCK**

  Switches between alphabetic character input modes (uppercase letter input mode and lowercase input mode).

- **HDD DIR.**

  Switches the current screen to the Hard Disk File Directory screen.

NOTE
If the CNC software series is the F001 or F601, the following keys cannot be used:
- M198 HOST SET
- CHANGE HOST

6.3.1 Displaying a List of Host Files

Display a list of the files stored on the host computer built-in hard disk.

Procedure

1 Press function key PROG.
2 Press soft key [CHAPTER].
3 When you press soft key [HOST DIR.], the Host Directory screen is displayed.
4 Press the operation menu key at the right end of the soft key menu.
5 When you press soft key [REDRAW SCRN], the contents of the Host Directory screen are displayed.
6 Select the desired page using the PAGE ↑ PAGE ↓ page keys.
7 When you press soft key [CHANGE SCRN], the Host Directory (Detail) screen appears.

6.3.2 Searching for a Host File

To display a list of files stored on the host computer built-in hard disk, specify the file number of the first file.

Procedure

1 Display the Host Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [SRCH FILE].
4 Using the MDI keys, enter the number or name of the file for which a search is to be made. Alternatively, select this file using the cursor keys.
[Input format]
<file-number>, <file-name>, or <cursor>
5 Press soft key [EXEC].
6 During search, SRCH blinks at the top of the screen.

6.3.3 Deleting a Host File

Procedure

Delete a file from the host computer built-in hard disk.

1 Display the Host Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [DEL FILE].
4 Using the MDI keys, enter the number or name of the file to be deleted. Alternatively, select this file using the cursor keys.
[Input format]
<file-number>, <file-name>, or <cursor>
5 Press soft key [EXEC].
6 During deletion, DEL blinks at the top of the screen.

NOTE
1 Specifying the file to be deleted with the file number is valid only for those files displayed on the Host Directory screen.
2 Information displayed at the right end of the Host Directory (Detail) screen is recognized as the file name. Therefore, to delete a host file from the Host Directory (Detail) screen by specifying the file number, confirm that the file name is displayed at the right end of the screen, then specify the file number.
3 If a file name contains kanji, hiragana, or katakana characters, switch the Host Directory (Detail) screen to the Host Directory screen, specify the host file number or select the file using the cursor keys, then delete it.

6.3.4 Executing Host File GET

Using FTP, transfer a file from the host computer built-in hard disk to the data server board built-in hard disk.

Procedure

1 Display the Host Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [GET].
4 Using the MDI keys, enter the number or name of the file on the transfer source host computer built-in hard disk and the name of the file on the transfer destination data server built-in hard disk. Using the cursor keys, a file on the for source host computer built-in hard disk can also be selected.
[Input format]
Select one of the following:
<transfer-source-file-number>, <transfer-destination-file-name>
<transfer-source-file-name>, <transfer-destination-file-name>
<cursor>, <transfer-destination-file-name>
<transfer-source-file-name>
<transfer-source-file-number>
<cursor>
5 Press soft key [EXEC].
6 During a GET operation, GET blinks at the top of the screen.
7 To stop a GET operation, press soft key [STOP].

[Example]
Get file prg7.dat with file name O0000007 from the host computer built-in hard disk and put it on the data server board built-in hard disk.



NOTE

1 A transfer destination file name can be omitted. In this case, the transfer source file name is used.
2 If an error occurs, determine the cause of the error by referring to the Ethernet Error Message screen.
3 As the transfer destination file name, specify the name of a file not existing on the data server board built-in hard disk. An error occurs if the name of a file existing on this hard disk is specified.
4 Information displayed at the right end of the Host Directory (Detail) screen is recognized as the file name. Therefore, to get a host file from the Host Directory (Detail) screen by specifying the file number, confirm that the file name is displayed at the right end of the screen, then specify the file number.
5 If a file name contains kanji, hiragana, or katakana characters, switch the Host Directory (Detail) screen to the Host Directory screen, specify the file number or select the file using the cursor keys, then get the host file. Be sure to specify the <transfer-destination-file-name>.
7 When only the transfer source file name is specified, if the file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically in order to GET the data onto the data server board built-in hard disk. See Subsection 5.1.5, "Hard Disk File Names," for explanations about the rules for converting file names to 8.3-format file names.

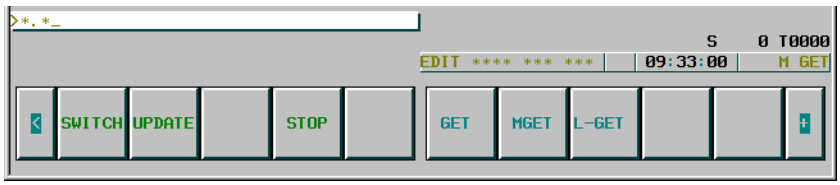
6.3.5 Executing Host File MGET

Using wild cards (*, ?) and FTP, transfer two or more files at one time from the host computer built-in hard disk to the data server board built-in hard disk.

Procedure

1 Display the Host Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [MGET].
4 Using the MDI keys, enter the name of a file (including wild cards) on the transfer source host computer built-in hard disk.
[Input format]
<transfer-source-file-name>
5 Press soft key [EXEC].
6 During an MGET operation, MGET blinks at the top of the screen.
7 To stop MGET, press soft key [STOP].

[Example]
Enter *.* as the file name to transfer all files in the work directory from the host computer built-in hard disk to the data server board built-in hard disk.



NOTE
1 Wild card interpretation depends on the host computer specifications.
2 If a work directory on the host computer built-in hard disk contains a subdirectory, and a wild card that can represent the subdirectory is used to specify a transfer source file name, an error may be detected or the files may be transferred from the subdirectory as directed by GET, depending on the type of the host computer.
3 If an error occurs, determine the cause of the error by referring to the Ethernet Error Message screen.
4 A file having the same name as a file for which a transfer attempt was made is not transferred if it already exists on the data server board built-in hard disk.
5 If the transfer source file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically in order to GET the data onto the data server board built-in hard disk. See Subsection 4.1.5, "Hard Disk File Names," for explanations about the rules for converting file names to 8.3-format file names.

6.3.6 Executing Host File LIST-GET

Transfer files from the host computer built-in hard disk to the data server board built-in hard disk according to the contents of the list file, using the FTP.

Procedure

1 Display the Host File Dir screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [GET LIST].
4 Enter the name of the list file held on the host computer built-in hard disk, using the MDI keys.
[Input format]
<number-of-list-file>
or
<name-of-list-file>
or
<Cursor>
5 Press soft key [EXEC].
6 During LIST-GET operation, "LGET" blinks in the lower-right part of the screen.
7 To stop LIST-GET, press soft key [STOP].

NOTE
1 If an error occurs, check the cause of the error using the Ethernet Error Message screen.
2 If the transfer destination file name is not in the 8.3 format, it is converted to an 8.3-format file name automatically in order to GET the data onto the data server board built-in hard disk. See Subsection 5.1.7, "List File Formats," for explanations about the list file.

6.4 INPUTTING AN NC PROGRAM

Input a file (NC program) from the data server board built-in hard disk or host computer built-in hard disk to tape memory.

For the Hard Disk File Directory screen or Host Directory screen

Procedure

1 In storage mode, display the Hard Disk File Directory screen. In FTP mode, display the Host Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [READ].
4 Using the MDI keys, enter the number or name of the NC program to be input. Alternatively, this NC program can also be selected using the cursor keys.
[Input format]
<file-number>, <file-name>, or <cursor>
5 Press soft key [ALL].
6 During input, READ blinks at the top of the screen.

⚠ CAUTION
1 If bit 1 of parameter No.2200 is set to 1, and an NC program having the same O number as the NC program to be input exists in the tape memory, it is overwritten.
2 If bit 0 of parameter No.2200 is set to 1, and an NC program is input, all NC programs in tape memory are automatically erased. Subsequently, the NC program is input.

[Example]
To input file O0001.DAT from the data server board built-in hard disk to tape memory, enter O0001.DAT. However, the O number to be input to tape memory depends on that described in file O0001.DAT.



NOTE
1 An NC program cannot be input concurrently with NC program input, DNC operation, and DNC operation by a subprogram call (M198).
2 The O number used for input to tape program memory depends on the description in the file.
3 In the buffer mode, neither the Hard Disk File Directory screen nor the Host File Directory screen can be used for NC program input.

For the Program (Edit) screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key PROG.
3 Press soft key [CHAPTER].
4 When you press soft key [TXT], the Program (Edit) screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [READ].
7 Using the MDI keys, enter the file number or name of the NC program to be input.
[Input format]
<file-number> or <file-name>
8 Press soft key [ALL].
9 During input, READ blinks at the top of the screen.

⚠ CAUTION
1 If bit 1 of parameter No.2200 is set to 1, and an NC program having the same O number as the NC program to be input exists in tape memory, it is overwritten.
2 If bit 0 of parameter No.2200 is set to 1, and an NC program is input, all NC programs in tape memory are automatically erased. Subsequently, the NC program is input.

NOTE
1 An NC program cannot be input concurrently with NC program output, DNC operation, or DNC operation by a subprogram call (M198).
2 The O number used for input to tape memory depends on the described in the file.
3 In the buffer mode, a specified file is assumed to represent a list of files resulting from NC program division. Therefore, an NC program is input by regarding the files in the file list as a virtually single continuous file.

6.5 OUTPUTTING AN NC PROGRAM

A file (NC program) is output from tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Hard Disk File Directory screen or Host Directory screen

Procedure

1 In storage mode, display the Hard Disk File Directory screen. In FTP mode, display the Host Directory screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [PUNCH].
4 From the MDI key, enter the O number of the NC program to be input. Alternatively, press soft key [PROGRAM].
[Input format]
<O-number>
5 Press soft key [ALL].
6 During output, PNCH blinks at the top of the screen.

[Example]
Enter O1 to output an NC program (O00000001) from tape memory to the data server board built-in hard disk.



NOTE
1 An NC program cannot be output concurrently with NC program input, DNC operation, or DNC operation by a subprogram call (M198).
2 A file name to be output to the data server board built-in hard disk becomes Oxxxx if the O number is between 1 and 9999. If the O number is between 10000 and 9999999, the file name becomes Oxxxxxx. If the O number is between 10000000 and 99999999, the file name becomes xxxxxxxx.
3 In NC program output in the storage mode, an attempt to output an NC program that is already stored on the data server built-in hard disk ends in an error.
4 In the buffer mode, neither the Hard Disk File Directory screen nor the Host File Directory screen can be used for NC program output.

For the Program (Edit) screen

Procedure

1 Place the CNC in EDIT mode.
2 Press function key PROG.
3 Press soft key [CHAPTER].
4 When you press [TXT], the Program (Edit) screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [PUNCH].
7 Using the MDI keys, enter the O number of the NC program to be output. Alternatively, press soft key [PROGRAM].
[Input format]
<O-number>
8 Press soft key [ALL].
9 During output, PNCH blinks at the top of the screen.

NOTE
1 An NC program cannot be output concurrently with NC program input, DNC operation, or DNC operation by a subprogram call (M198).
2 A file name to be output to the data server board built-in hard disk becomes Oxxxx if the O number is between 1 and 9999. If the O number is between 10000 and 9999999, the file name becomes Oxxxxxxx. If the O number is between 10000000 and 99999999, the file number becomes xxxxxxxx.
3 In the buffer mode, the output destination of NC programs is the data server built-in hard disk.
4 In NC program output in either the storage or buffer mode, an attempt to output an NC program that is already stored on the data server built-in hard disk ends in an error.

6.6 DNC OPERATIONS

DNC operation is performed by using an NC program stored on the data server board built-in hard disk or on the host computer built-in hard disk.

For DNC operation in storage mode

Procedure

1 Place the CNC in DNC mode.
2 Display the Hard Disk File Directory screen and move to the directory holding an NC program used to perform a DNC operation.
3 Press the operation menu key at the right end of the soft key menu.
4 Press soft key [DNC SET].
5 Using the MDI keys, enter the file number or name of the NC program for which DNC operation is to be performed. Alternatively, this NC program can also be selected using the cursor keys.
[Input format]
<file-number>, <file-name>, or <cursor>
6 Press soft key [EXEC]. The file name of the NC program for DNC operation is displayed in DNC FILE NAME on the screen.
7 When cycle start is performed, DNC operation is executed.

NOTE
DNC operation cannot be executed concurrently with NC program input, NC program output, or DNC operation by a subprogram call (M198).

For DNC operation in FTP mode

Procedure

1 Place the CNC in DNC mode.
2 Select the host number for the host holding a file list to be used for an DNC operation according to the procedure described in Subsection 5.9.2, "Reconnecting the Host," to display the Host Directory screen.
3 Press the operation menu key at the right end of the soft key menu.
4 Press soft key [DNC SET].
5 Using the MDI keys, enter the file number or name of the NC program for which DNC operation is to be performed. This NC program can also be selected using the cursor keys.
[Input format]
<file-number>, <file-name>, or <cursor>
6 Press soft key [EXEC]. The host number of a host connected for DNC operations is displayed to the right of "DNC HOST" on the screen, and the file name for an NC program for the DNC operations is displayed to the right of "DNC FILE NAME" on the screen.
7 When the cycle start is executed, DNC operation is performed.

NOTE
DNC operation cannot be performed concurrently with NC program input, NC program output, and DNC operation by a subprogram call (M198).

For DNC operation in buffer mode

Procedure

1 Place the CNC in DNC mode.
2 Select the host number for the host holding a file list to be used for an DNC operation according to the procedure described in Subsection 5.9.2, "Reconnecting the Host," to display the Host Directory screen.
3 Press the operation menu key at the right end of the soft key menu.
4 Press soft key [DNC SET].
5 Using the MDI keys, enter the file number or name of the NC program for which DNC operation is to be performed. This NC program can also be selected using the cursor keys.
[Input format]
<file-number>, <file-name>, or <cursor>
6 Press soft key [EXEC]. The host number of a host connected for DNC operations is displayed to the right of "DNC HOST" on the screen, and the file name for an NC program for the DNC operations is displayed to the right of "DNC FILE NAME" on the screen.
7 When the cycle start is executed, DNC operation is performed.

NOTE
DNC operation cannot be performed concurrently with NC program input, NC program output, and DNC operation by a subprogram call (M198).

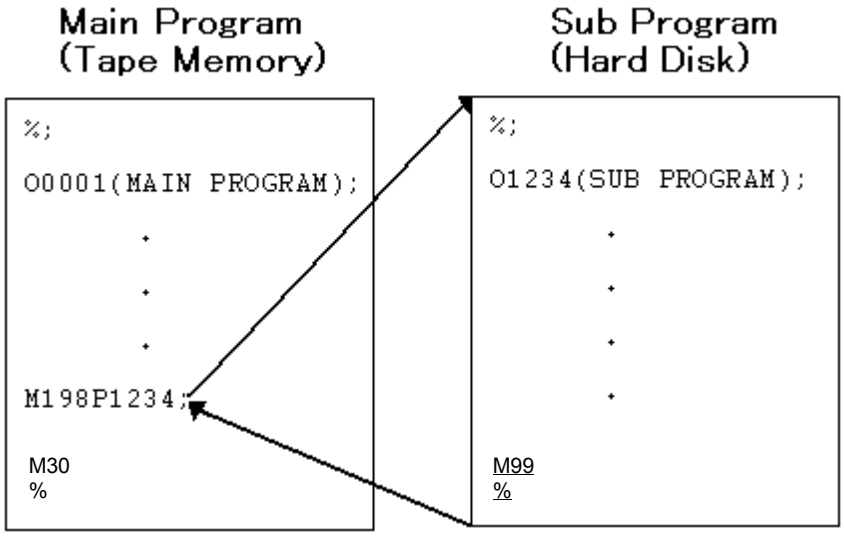
6.7 DNC OPERATION BY A SUBPROGRAM CALL (M198)

• Format for calling a subprogram from the main program

(1) For the Series 15 directive format
M198PΔΔΔΔΔΔΔΔL□□□□;
ΔΔΔΔΔΔΔΔ : NC program number on the hard disk
(8-digit numeral following O of the O number)
□□□□ : Repetition count (1 to 9999) (omissible, default: 1)

The M198 directive items conform to the program call function within general external input/output equipment. For details, refer to the Series 15*i*-A Operator's manual (B-63324EN).

Example: For the Series 15 directive format



For DNC operation by a subprogram call (M198) in storage mode

Procedure

1 Place the CNC in MDI mode.
2 Display the Hard Disk File Directory screen and move to the directory holding an NC program to be called by a subprogram.
3 Press the operation menu key at the right end of the soft key menu.
4 Press soft key [M198 DIR SET].
5 Press soft key [EXEC]. The current work directory name is displayed in M198 DIRECTORY on the screen.
6 The NC program containing the M198 directive is automatically executed.

NOTE
1 DNC operation by a subprogram call (M198) cannot be executed concurrently with NC program input, NC program output, and DNC operation.
2 The file name of the subprogram to be called during DNC operation by a subprogram call (M198) becomes Oxxxx if the O number is between 1 and 9999. If the O number is between 10000 and 9999999, the file name becomes Oxxxxxxx. If the O number is between 10000000 and 99999999, the file name becomes xxxxxxxx.
3 Assume that a subprogram call is further performed in the subprogram called by the DNC operation by a subprogram call (M198). If the subprogram to be called exists in tape memory, it can be executed as a subprogram. If, however, this subprogram exists on the hard disk, it cannot be executed as a subprogram.
4 When viewed from the CNC, the data server functions are handled in the same way as other input/output equipment. So, the subprogram call restrictions are equivalent to those for other input/output equipment.
5 If the CNC software series is the F001 or F601, the [SET M198DIR] operation is not available. The directory for M198 operation is always \NCDATA.

DNC operation by a subprogram call (M198) in FTP mode

Procedure

1 Place the CNC in MDI mode.
2 Select the host number for the host holding an NC program to be called by a subprogram according to the procedure described in Subsection 5.9.2, "Reconnecting the Host," to display the Host Directory screen.
3 Press the operation menu key at the right end of the soft key menu.
4 Press soft key [M198 HOST SET].
5 Press soft key [EXEC]. The current connection host number is displayed in M198 HOST on the screen.
6 The NC program containing the M198 directive is automatically executed.

NOTE
1 DNC operation by a subprogram call (M198) cannot be executed concurrently with NC program input, NC program output, or DNC operation.
2 The file name of the subprogram to be called by DNC operation by a subprogram call (M198) becomes Oxxxx if the O number is between 1 and 9999. If the O number is between 10000 and 9999999, the file name becomes Oxxxxxxx. If the O number is between 10000000 and 99999999, the file name becomes xxxxxxxx.
3 Assume that a subprogram call is further performed in the subprogram called by the DNC operation by a subprogram call (M198). If the subprogram to be called exists in tape memory, it can be executed as a subprogram. If, however, this subprogram exists in the hard disk, it cannot be executed as the subprogram.
4 When viewed from the CNC, the data server functions are handled in the same way as for other input/output equipment. So, the subprogram call restrictions are equivalent to those for other input/output equipment.
5 If the CNC software series is the F001 or F601, the [SET M198HOST] operation is not available.
The host for M198 operation is always HOST 1.

DNC operation by a subprogram call (M198) in buffer mode

Procedure

1 Place the CNC in MDI mode.
2 Select the host number for the host holding an NC program to be called by a subprogram according to the procedure described in Subsection 5.9.2, "Reconnecting the Host," to display the Host Directory screen.
3 Press the operation menu key at the right end of the soft key menu.
4 Press soft key [M198 HOST SET].
5 Press soft key [EXEC]. The current connection host number is displayed in M198 HOST on the screen.
6 The NC program containing the M198 directive is automatically executed.

NOTE
1 DNC operation by a subprogram call (M198) cannot be executed concurrently with NC program input, NC program output, or DNC operation.
2 The file name of the subprogram to be called by DNC operation by a subprogram call (M198) becomes Oxxxx if the O number is between 1 and 9999. If the O number is between 10000 and 9999999, the file name becomes Oxxxxxxx. If the O number is between 10000000 and 99999999, the file name becomes xxxxxxxx.
3 Assume that a subprogram call is further performed in the subprogram called by the DNC operation by a subprogram call (M198). If the subprogram to be called exists in tape memory, it can be executed as a subprogram. If, however, this subprogram exists in the hard disk, it cannot be executed as the subprogram.
4 When viewed from the CNC, the data server functions are handled in the same way as for other input/output equipment. So, the subprogram call restrictions are equivalent to those for other input/output equipment.
5 If the CNC software series is the F001 or F601, the [SET M198HOST] operation is not available.
The host for M198 operation is always HOST 1.

6.8 DATA INPUT/OUTPUT

The data listed below can be transferred between the data server board and CNC. How to transfer the data is explained later.

1 NC parameter
2 Tool offset value
3 Custom macro value
4 Workpiece zero point offset value
5 Pitch error compensation data
6 M code group
7 operation history data

NOTE
The transfer of the data listed above cannot be performed simultaneously with NC program input, NC program output, DNC operation, or DNC operation by a subprogram call (M198).

6.8.1 Inputting Parameters

A file (parameter) is input from the data server board built-in hard disk or host computer built-in hard disk to tape memory.

For the Parameter screen

Procedure

1 Place the CNC in the emergency stop status.
2 Press function key SYSTEM.
3 Press soft key [CHAPTER].
4 When you press soft key [PARAMETER], the Parameter screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [READ].
7 Enter the file name using the MDI keys.
8 Press soft key [PARAMETER].
9 During input, READ blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Input source

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

6.8.2 Outputting Parameters

A file (parameters) is output from the tape memory to the data server board built-in hard disk or host computer built-in hard disk.

To the Parameter screen

Procedure

1 Press function key SYSTEM.
2 Press soft key [CHAPTER].
3 When you press soft key [PARAMETER], the Parameter screen appears.
4 Press the operation menu key at the right end of the soft key menu.
5 Press soft key [PUNCH].
6 Enter the file name using the MDI keys.
7 Press soft key [PARAMETER].
8 During input, PNCH blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Output destination

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Data server board built-in hard disk

6.8.3 Inputting Tool Offsets

A file (tool offset values) is input from the data server board built-in hard disk or host computer built-in hard disk to the tape memory.

For the Tool Offset screen

Procedure

1 Place the CNC in MDI mode.
2 Press function key [OFFSET SETTING].
3 Press soft key [CHAPTER].
4 When you press soft key [TOOL OFFSET], the Tool Offset screen is displayed.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [READ].
7 Enter the file name using the MDI keys.
8 Press soft key [TOOL OFFSET].
9 During input, READ blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Input source

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

6.8.4 Outputting Tool Offsets

A file (tool offset values) is output from tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Tool Offset screen

Procedure

1 Press function key OFFSET SETTING.
2 Press soft key [CHAPTER].
3 When you press soft key [TOOL OFFSET], the Tool Offset screen appears.
4 Press the operation menu key at the right end of the soft key menu.
5 Press soft key [PUNCH].
6 Enter the file name using the MDI keys.
7 Press soft key [TOOL OFFSET].
8 During output, PNCH blinks at the top of the screen.

File formats and restrictions

Refer to . the Series 15*i*-A Operator's manual (B-63324EN)

Output destination

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Data server board built-in hard disk

6.8.5 Inputting Custom Macro Variables

A file (custom macro variables) is output from the data server board built-in hard disk or host computer built-in hard disk to tape memory.

For the Custom Macro screen

Procedure

1 Place the CNC in MDI mode.
2 Press function key [OFFSET SETTING].
3 Press soft key [CHAPTER].
4 When you press soft key [MACRO VARIABLE], the Custom Macro screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [READ].
7 Enter the file name using the MDI keys.
8 Press soft key [CMN VARIABLE2].
9 During input, READ blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Input source

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

6.8.6 Outputting Custom Macro Variables

A file (custom macro variables) is output from tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Custom Macro screen

Procedure

1 Press function key [OFFSET SETTING].
2 Press soft key [CHAPTER].
3 When you press soft key [MACRO VARIABLE], the Custom Macro screen appears.
4 Press the operation menu key at the right end of the soft key menu.
5 Press soft key [PUNCH].
6 Enter the file name using the MDI keys.
7 Press soft key [CMN VARIABLE2].
8 During output, PNCH blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Output destination

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Data server board built-in hard disk

6.8.7 Inputting Workpiece Origin Offsets

A file (workpiece origin offset) is input from the data server board built-in hard disk or host computer built-in hard disk to tape memory.

For the Workpiece Origin Offset screen

Procedure

1 Place the CNC in the emergency stop status.
2 Press function key [OFFSET SETTING].
3 Press soft key [CHAPTER].
4 When you press soft key [WORK OFFSET], the Workpiece Origin Offset screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [READ].
7 Enter the file name using the MDI keys.
8 Press soft key [WORK OFFSET].
9 During input, READ blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Input source

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

6.8.8 Outputting Workpiece Origin Offsets

A file (workpiece origin offset) is output from tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Workpiece Offset screen

Procedure

1 Press function key OFFSET SETTING.
2 Press soft key [CHAPTER].
3 When you press soft key [WORK OFFSET], the Workpiece Origin Offset screen appears.
4 Press the operation menu key at the right end of the soft key menu.
5 Press soft key [PUNCH].
6 Enter the file name using the MDI keys.
7 Press soft key [WORK OFFSET].
8 During output, PNCH blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Output destination

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Data server board built-in hard disk

6.8.9 Inputting Pitch Error Compensation Data

A file (pitch error compensation data) is input from the data server board built-in hard disk or host computer built-in hard disk to tape memory.

For the Pitch Error Compensation screen

Procedure

1 Place the CNC in emergency stop status.
2 Press function key SYSTEM.
3 Press soft key [CHAPTER].
4 When you press soft key [PITCH ERROR], the Pitch Error Compensation screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [READ].
7 Enter the file name using the MDI keys.
8 Press soft key [PITCH ERROR].
9 During input, READ blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Input source

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Host computer built-in hard disk

NOTE
In the buffer mode, a specified file behaves as a file list of files resulting from NC program division.

6.8.10 Outputting Pitch Error Compensation Data

A file (pitch error compensation data) is output from tape memory to the data server board built-in hard disk or host computer built-in hard disk.

For the Pitch Error Compensation screen

Procedure

1 Press function key SYSTEM.
2 Press soft key [CHAPTER].
3 When you press soft key [PITCH ERROR], the Pitch Error Compensation screen appears.
4 Press the operation menu key at the right end of the soft key menu.
5 Press soft key [PUNCH].
6 Enter the file name using the MDI keys.
7 Press soft key [PITCH ERROR].
8 During output, PNCH blinks at the top of the screen.

File formats and restrictions

Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Output destination

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Data server board built-in hard disk

6.8.11 Outputting Operation History Data

A file (operation history data) is output from tape memory to the data server board built-in hard disk or host computer built-in hard disk.

To the Operation History screen

Procedure

1 Press function key SYSTEM.
2 Press soft key [CHAPTER].
3 When you press soft key [OPE HIS], the Operation History screen appears.
4 Press the operation menu key at the right end of the soft key menu.
5 Press soft key [PUNCH].
6 Press soft key [OPE HIS].
7 During output, PNCH blinks at the top of the screen.

File formats and restrictions

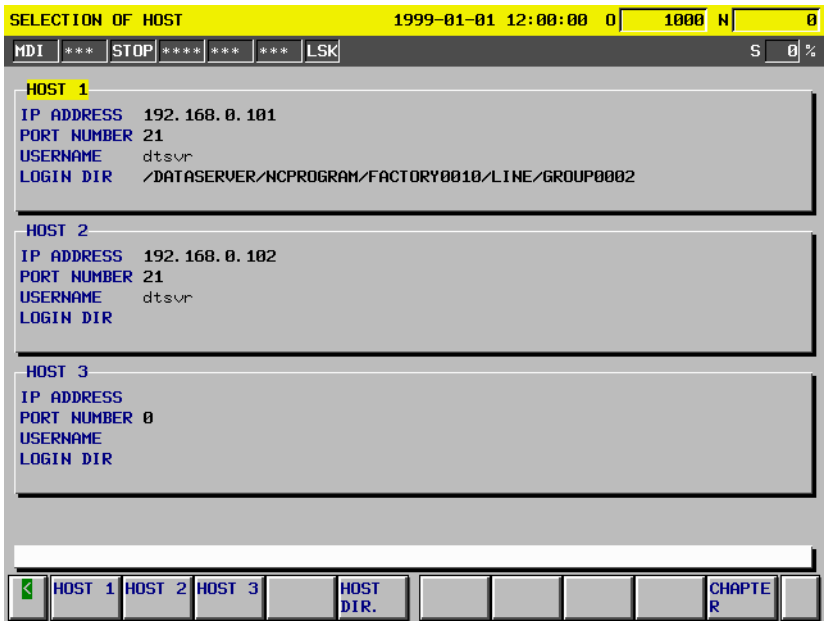
Refer to the Series 15*i*-A Operator's manual (B-63324EN).

Output destination

Storage mode : Data server board built-in hard disk
FTP mode : Host computer built-in hard disk
Buffer mode : Data server board built-in hard disk

6.9 SELECTION OF HOST SCREEN

The Selection of Host screen is used to check or change the host computer on which the FTP server is running.



Display items

- **PORT NUMBER, IP ADDRESS, USERNAME, and LOGIN DIR**

  Display the values set on the Ethernet Parameter screen.

Operations

- **HOST DIR.**

  Switches the current screen to the Host Directory screen.

- **HOST 1**

  Changes the connection host to host 1.

- **HOST 2**

  Changes the connection host to host 2.

- **HOST 3**

  Changes the connection host to host 3.

NOTE
If the CNC software series is the F001 or F601, the Selection of Host screen is not available.

6.9.1 Checking the Connected Host

Check the host computer on which the FTP server, or the connection destination of the current data server board, is running.

Procedure

1 Press function key PROG.
2 Press the operation menu key at the right end of the soft key menu.
3 When you press soft key [CHANGE HOST], the Selection of Host screen appears.

[Reference]
The title of the host computer, or communication destination of the current data server board, is displayed in reverse video.

6.9.2 Changing the Connected Host

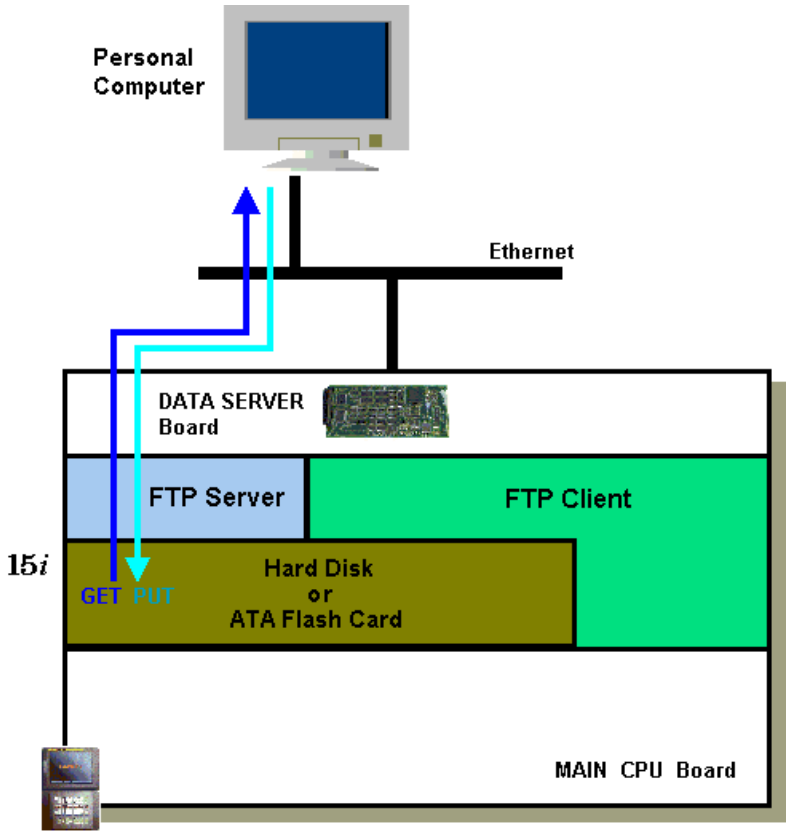
Change the host computer on which the FTP server, or communication destination of the current data server board, is running.

Procedure

1 Display the Selection of Host screen.
2 Press the operation menu key at the right end of the soft key menu.
3 Press soft key [HOST 1], [HOST 2], or [HOST 3].
4 Press soft key [EXEC].

6.10 FTP SERVER FUNCTIONS

Communication can be established with the FTP client which is running on the host computer (personal computer).



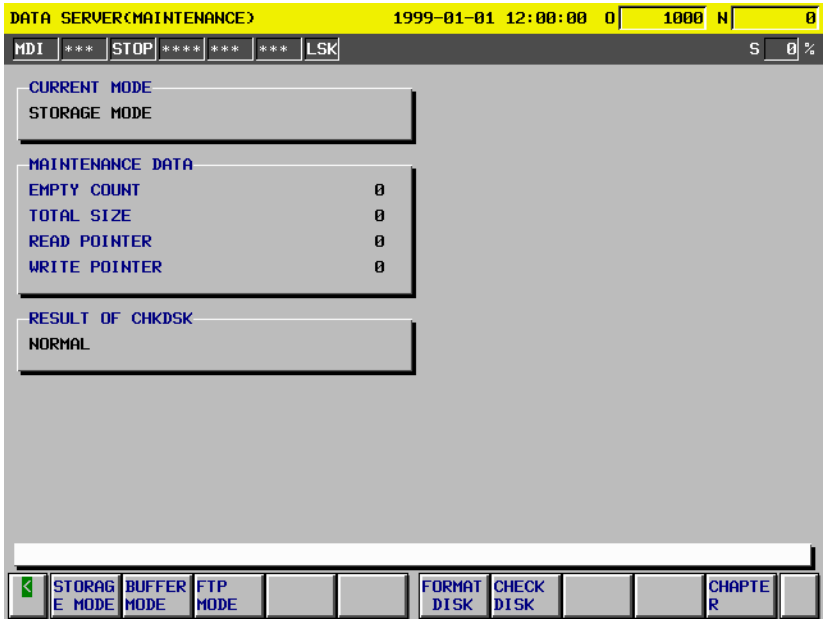
NOTE

1 Only one FTP client can be connected to the FTP server. If an attempt is made to connect two or more FTP clients to the FTP server, the second and subsequent FTP clients enter the connection wait status. Two or more FTP clients having a GUI attempt to connect to the FTP server. Such FTP clients cannot be used.

2 If the FTP client specifies a non-8.3-format file for registration with the FTP server, it is registered using an 8.3-format file name obtained from automatic conversion. See Subsection 5.1.5, "Hard Disk File Names," for explanations about the rules for converting file names to 8.3-format file names.

6.11 DATA SERVER (MAINTENANCE) SCREEN

The Data Server (Maintenance) screen is used to format (initialize) the data server board built-in hard disk, check for hard disk errors, switch data server modes, or display error examination data.



Display items

• CURRENT MODE, BUFFER MODE, and FTP MODE

Displays the current data server mode.

• EMPTY COUNT

Displays the number of times that buffer data became empty during transfer of an NC program from the data server board to the CNC. This item is initialized to 0 at power-on. Subsequently, this item is incremented whenever the conditions are satisfied. When DNC operation or DNC operation by a subprogram call (M198) is being performed, this item may be incremented. This indicates that data supply from the data server board to the CNC is insufficient.

• TOTAL SIZE

Total byte count when a single NC program is transferred from the data server board to the CNC

• READ POINTER and WRITE POINTER

Pointers used to manage the internal buffer for supplying an NC program between the data server board and CNC

- **RESULT OF CHKDSK**

Displays the results of the previous check disk execution.
NO EXEC : Check disk is not executed after power-on.
NORMAL : Normal
ABNORMAL : Abnormal
NONE : No hard disk is connected.

Operations

- **STORAGE MODE**

Changes the current mode to storage mode.

- **FTP MODE**

Changes the current mode to FTP mode.

- **BUFFER MODE**

Changes the current mode to buffer mode.

6.11.1 Checking the Hard Disk

Procedure

Check whether the hard disk contains a faulty sector.

1 Place the CNC in MDI mode.
2 Press function key SYSTEM.
3 Press soft key [CHAPTER].
4 When you press [MIN DATA SERVER], the Data Server (Maintenance) screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [CHECK DISK].
7 Press soft key [EXEC]. The results are displayed in RESULT OF CHKDSK
   - Normal status : NORMAL
   - Abnormal status : ABNORMAL

⚠ CAUTION
If an abnormal status arises, check the cause of the error by referring to the error message displayed on the Ethernet Error Message screen. Then, quickly back up the files stored on the hard disk. Subsequently, format the hard disk.

NOTE
An error occurs if other data server functions are executed concurrently with hard disk check.

6.11.2 Formatting the Hard Disk

Procedure

Format (initialize) the hard disk.

1 Place the CNC in MDI mode.
2 Press function key SYSTEM.
3 Press soft key [CHAPTER].
4 When you press soft key [MIN DATA SERVER], the Data Server (Maintenance) screen appears.
5 Press the operation menu key at the right end of the soft key menu.
6 Press soft key [FORMAT].
7 Press soft key [EXEC].
8 Message "HARD DISK FORMATTED?" is displayed. Press soft key [EXEC] again.
9 During formatting, FRMT blinks at the top of the screen.

⚠ CAUTION
1 If the CNC power is turned off during hard disk formatting, the hard disk may be destroyed. Never turn off the CNC power during hard disk formatting.
2 When the hard disk is formatted, all files in the hard disk are erased. Back up hard disk files as required before formatting the hard disk.

NOTE
An error will occur if other data server functions are performed concurrently with hard disk formatting.

6.11.3 Switching Data Server Modes

Procedure

Switch data server modes.

1 Place the CNC in MDI mode.
2 Press function key SYSTEM.
3 Press soft key [CHAPTER].
4 When you press soft key [MIN DATA SERVER], the Data Server (Maintenance) screen appears.
5 To change to storage mode, press soft key [STORAGE MODE]. To change to FTP mode, press soft key [FTP MODE]. To change to buffer mode, press soft key [BUFFER].
6 Press soft key [EXEC].

NOTE
Operations in the buffer mode need the optional buffer mode functions.

6.11.4 Displaying Error Examination Data

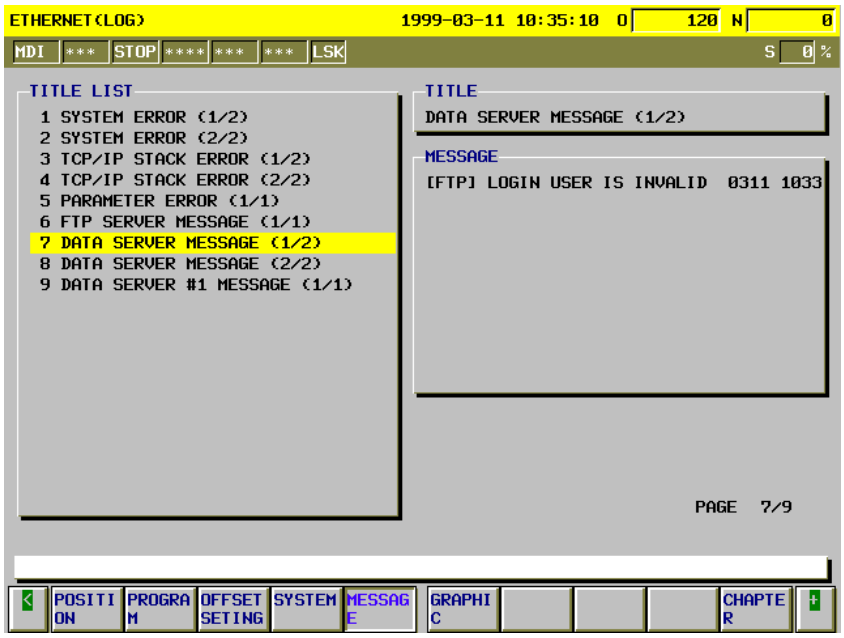
If an error occurs during DNC operation using the data server function, DNC operation by a subprogram call (M198), or NC program input, data is displayed as the key to the error examination.

Procedure

1 Press function key SYSTEM.
2 Press soft key [CHAPTER].
3 When you press soft key [MIN DATA SERVER], the Data Server (Maintenance) screen appears.

6.12 ETHERNET ERROR MESSAGE SCREEN

If an error occurs for the data server function, an error message is displayed on the error message screen dedicated to the Ethernet functions.



Display items

- **TITLE LIST**

  Displays a list of all titles of the Ethernet Error Message screen.

- **TITLE**

  Displays the title of the Ethernet Error Message screen displayed on the current page.

- **MESSAGE**

  Displays the message of the Ethernet Error Message screen displayed on the current page.

Display

Procedure

1 Press function key MESSAGE.
2 Press soft key [CHAPTER].
3 When you press soft key [ETHERNET LOG], the Ethernet (Log) screen appears.
4 Select the desired page using the PAGE ↑ PAGE ↓ page keys.

[Reference]
The latest error message is displayed at the top of the screen. The date and time at which the error occurred are displayed at the right end of the error message. The date and time are displayed in mmdd hhMM (mm: month, dd: time, hh: hour, MM: minute) format.

V. CONNECTION

1 PREFACE

In this manual, "data server board" refers to a board that can use the data server function, while "Ethernet board" refers to a board that cannot use this function.
Data server boards are classified into two types; "HDD data server boards" on which an HDD (hard disk drive) unit is mounted, and "ATA data server boards" on which an ATA flash card is mounted.

Board name	Supported function
Ethernet board	• FACTOLINK function • DNC1/Ethernet function • FOCAS1/Ethernet function
Data server board	• FACTOLINK function • DNC1/Ethernet function • FOCAS1/Ethernet function • Data server function
HDD data server board	
ATA data server board	

NOTE
The Ethernet board for the Power Mate *i* does not provide the FACTOLINK function.

2 SETTING

This chapter describes the information needed to install an Ethernet board and data server board.

2.1 Environmental Conditions for Installing a CNC

A CNC in which an Ethernet board or data server board is installed must be used in the following environment.

2.1.1 Installation environments for control units

	Condition	Ethernet board/ATA data server board	HDD data server board
Ambient temperature	Operation (Note 1)	0°C to 55°C (0°C to 58°C)	5°C to 50°C (5°C to 53°C)
	Storage or transportation	-20°C to 60°C	
Temperature variation		Maximum 1.1°C min.	Maximum 0.3°C/min.
Humidity		Relative humidity 75% or less No condensation	Relative humidity 10% to 75% or less No condensation
Vibration	Operation	0.5 G or less	
	Non-operation	1.0 G or less	
Altitude	Operation	Up to 1000 m	
	Non-operation	Up to 12000 m	
Atmosphere		Direct contact with cutting fluid, lubricant, or chips not allowed	

NOTE
1 The values enclosed in () apply to the LCD-mounted type Series 16*i*/18*i*/21*i*. However, the LCD-mounted type Series 21*i* -A and LCD-mounted type Series 16*i*/18*i*/21*i*-B are available only on the Ethernet board and ATA data servo board.
2 Refer to the respective CNC connection manuals.

⚠ CAUTION

Even if a control unit is installed in the environment described above, the contents on the hard disk or ATA flash card may be destroyed as a result of a misoperation or unexpected event. This tends to happen if the power is turned off while accessing the hard disk or ATA flash card. Therefore, never turn off the power while the disk or card is being accessed. Make a backup of data on the hard disk or ATA flash card to guard against data loss.

NOTE

On vibrations
Resonance of the hard disk drive unit installed in the cabinet may occur at a certain frequency.
Ensure that the hard disk drive unit is securely installed in the machine.

2.2 Heat Dissipation

The heat dissipation values for the Ethernet board and data server board are listed in the table below. For the heating values of the system unit of the CNC or other option units, refer to the connection manual supplied with the CNC.

	Ethernet board	HDD data server board	ATA data server board
Board only	6 W	6 W	6 W (Note 1)
Hard disk drive unit	-	13 W	-
ATA flash card	-	-	0.3 W (Note 2)
Total	6 W	19 W	6.3 W

NOTE
1 Some data server boards for indicator-separated control units (Series16*i*/18*i*-A) have the RISC option implemented on a printed circuit board. The dissipation values shown above do not include that for the RISC option. For details of the RISC option, refer to the connection manual supplied with the CNC.
2 The dissipation value of the ATA flash card may vary, depending on whether a large-capacity card is used or whether the card specification has been modified.

3 INSTALLATION

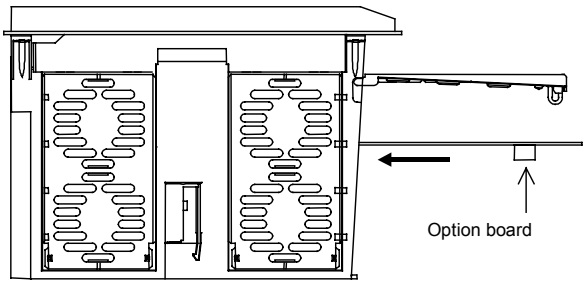
This chapter provides information relating to the installation of the Ethernet board and data server board.

3.1 LCD-Mounted type Series 16*i*/18*i*/21*i*-A/B

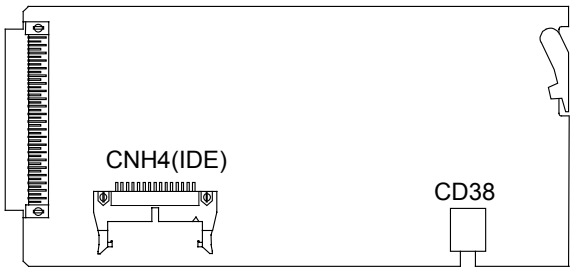
This section provides information on installing the Ethernet board and data server board in the LCD-mounted type Series 16*i*/18*i*/21*i*-A/B.

3.1.1 Installing an interface board

The interface board is installed in the option slot of the control unit. It occupies one slot. Some types of interface boards can be installed only in certain option slots.

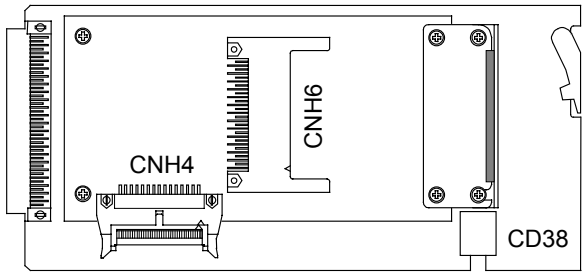


1) Installing an Ethernet board
There is a restriction related to the Ethernet board. The ethernet board cannot be installed in the following slots:
- Slot nearest to the LCD



	Drawing number	Remarks
Board drawing number	A20B-8100-0271	CNH4(IDE) installed
Order specification	A02B-0236-J292	For Series 16*i*/18*i*/21*i*-A CNH4(IDE) installed
	A02B-0281-J292	For Series 16*i*/18*i*/21*i*-B CNH4(IDE) installed

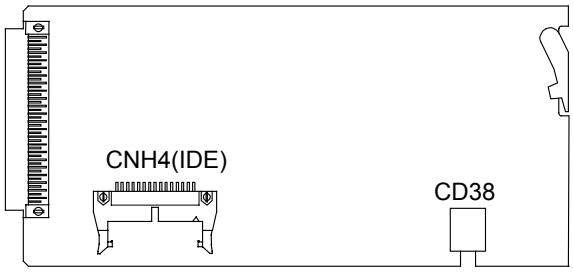
2) Installing an ATA data server board
With the ATA Card Adapter installed, the ATA data server board must be installed in an appropriate option slots. The ATA data server board cannot be installed in the following slots:
- Slot nearest to the LCD
- The 3-slot type slot located in the center
- The fourth slot, located farthest from the 4-slot type LCD



	Drawing number	Remarks
Board drawing number	A20B-8100-0271	CNH4 (IDE) installed
	A20B-2002-0960	ATA Card Adapter
Order specification	A02B-0236-J145	For Series 16*i*/18*i*/21*i*-A ATA Card Adapter, including flat cable
	A02B-0281-J145	For Series 16*i*/18*i*/21*i*-B ATA Card Adapter, including flat cable

NOTE
1 CNH4 on the motherboard and CNH4 on the ATA Card Adapter are connected with a flat cable.
2 Connect the ATA flash card to CNH6 before installing the ATA data server board in the option slot. The ATA flash card cannot be attached or removed while the ATA data server board is installed in the option slot.
3 Only an ATA flash card can be installed on the data server board for LCD-mounted type Series 21*i* -A and LCD-mounted type Series 16*i*/18*i*/21*i*-B. An hard disk drive unit cannot be installed.
4 Use the ATA flash card recommended by FANUC.

3) Installing an HDD data server board
There is a restriction related to the HDD data server board. The HDD data server board cannot be installed in the following slots:
- Slot nearest to the LCD



	Drawing number	Remarks
Board drawing number	A20B-8100-0271	CNH4 (IDE) installed
Order specification	A02B-0236-J292	For Series 16*i*/18*i*/21*i*-B CNH4 (IDE) installed

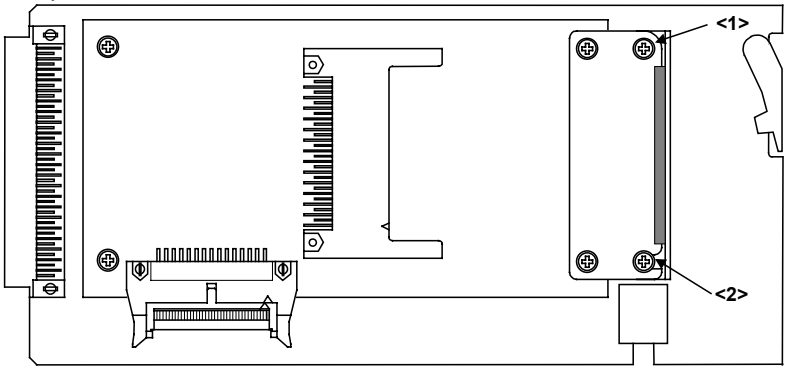
3.1.2 Installing an ATA flash card

Obtain the ATA flash card to be used as the external memory unit for the data server board from a machine tool builder. The table below lists the ATA flash cards that can be used.

Manufacturer	Product number	Capacity
Hitachi, Ltd.	HB288096A5	96MB
	HB288160A5	160MB
	HB288320A5	320MB
	HB288640A5	640MB
	HB2881000A5	1GB
San Disk	SDP3B-220-390	220MB
	SDP3B-280-390	280MB
	SDP3B-350-390	350MB
	SDP3B-440-390	440MB

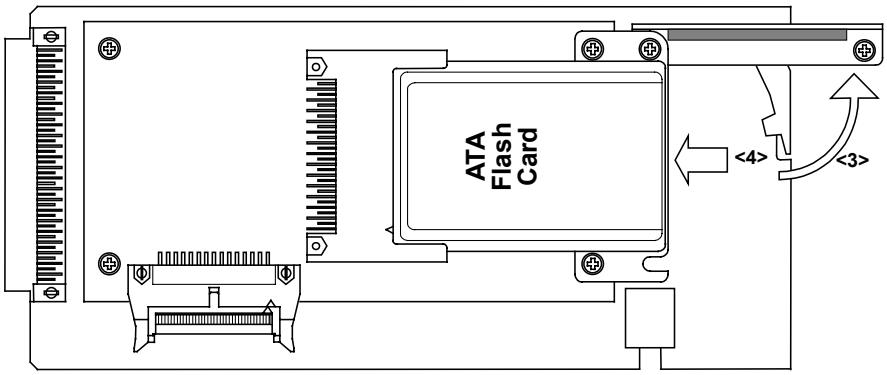
[Installing an ATA flash card]

<1>, **<2>** Loosen the screws that secure the retainer.



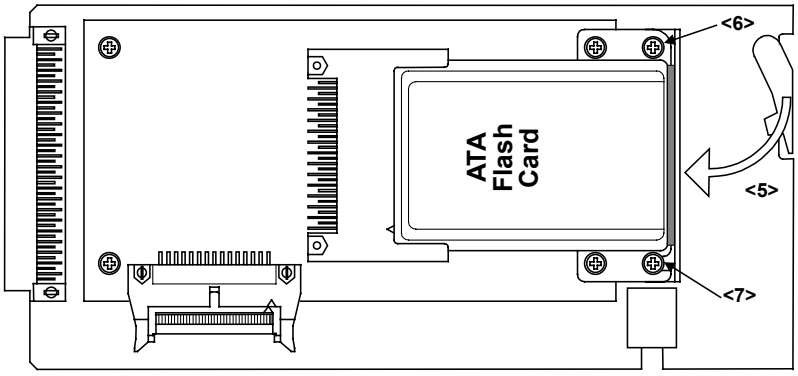
<3> Move the retainer so that the ATA flash card can be inserted into the connector.

<4> Insert the ATA flash card into the connector.

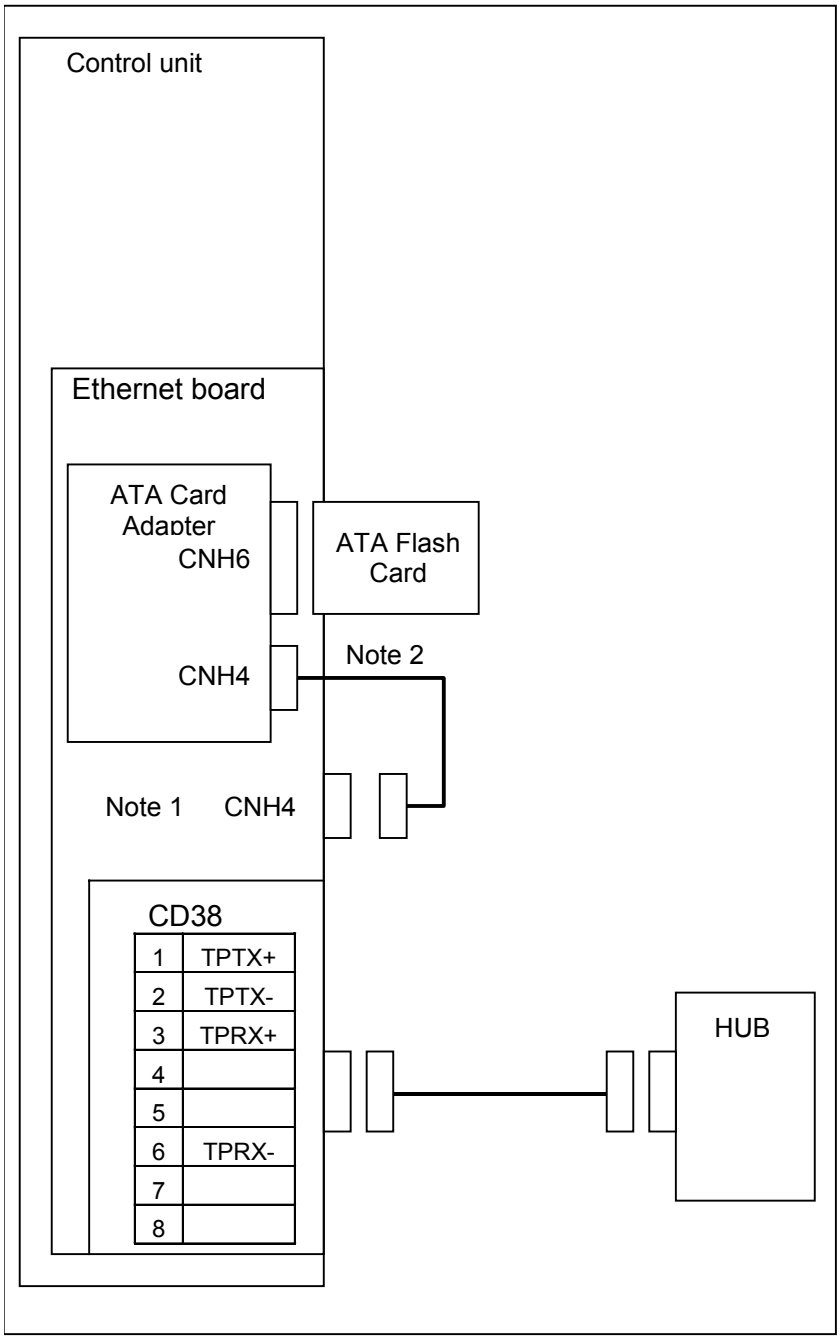


<5> Return the retainer to its original position.

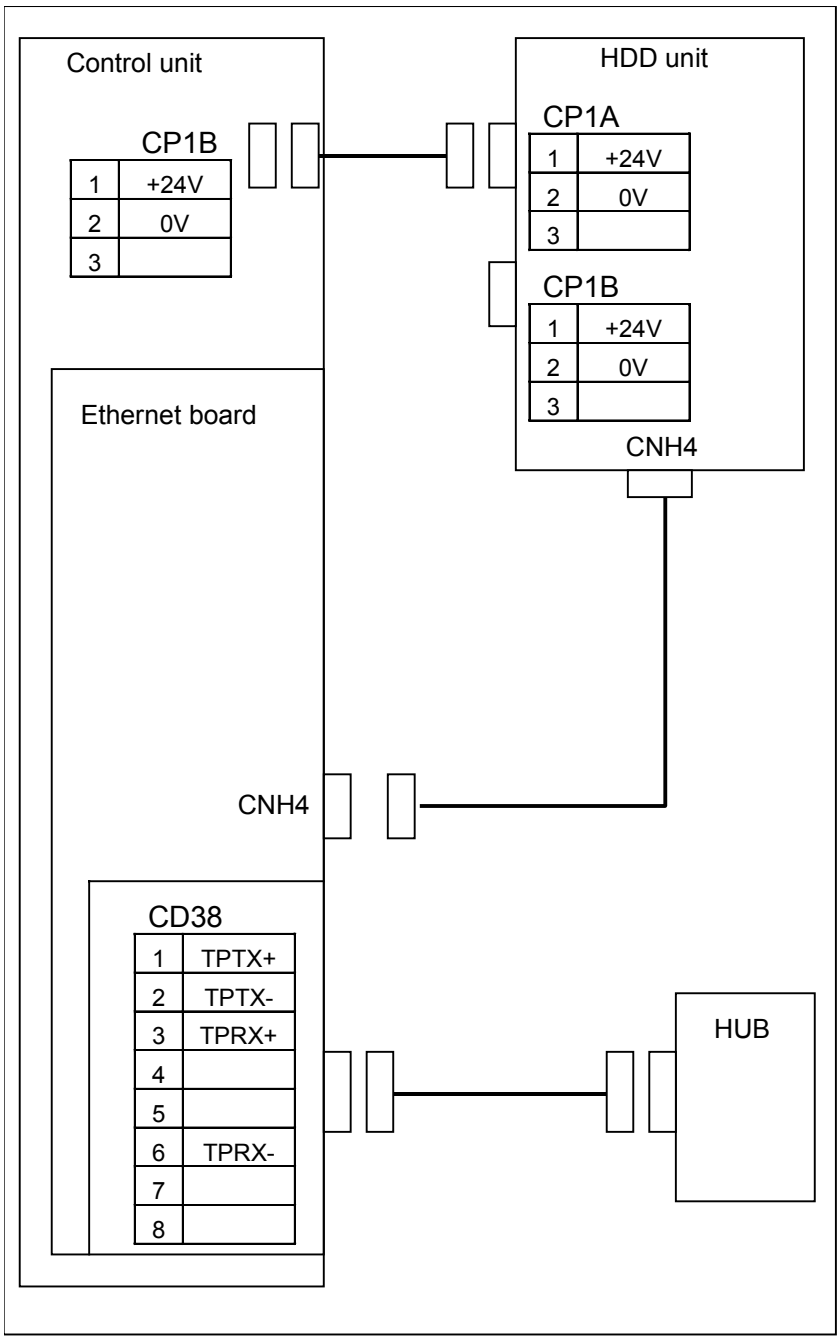
<6>, **<7>** Tighten the screws to secure the ATA flash card with the retainer.



3.1.3 Connection diagram



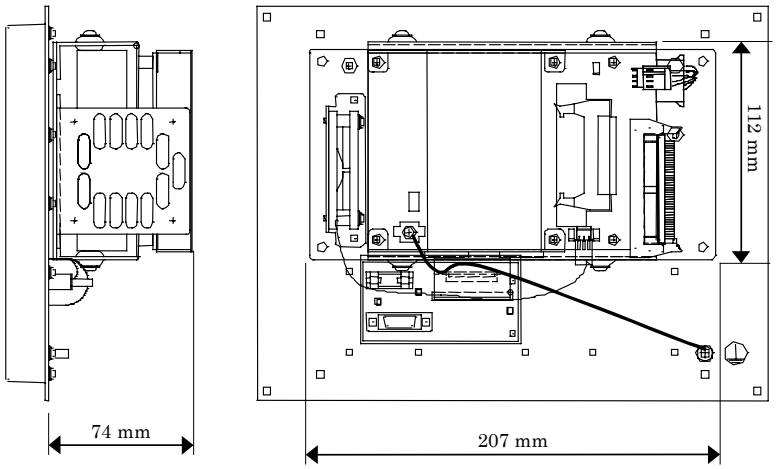
NOTE
1 When the data server function is not used, the ATA Card Adapter need not be connected to CNH4 on the Ethernet board.
2 CNH4 on the motherboard and CNH5 on the ATA Card Adapter are both connected to the interface board.



NOTE
When the data server function is not used, the ATA Card Adapter need not be connected to CNH4 on the Ethernet board.

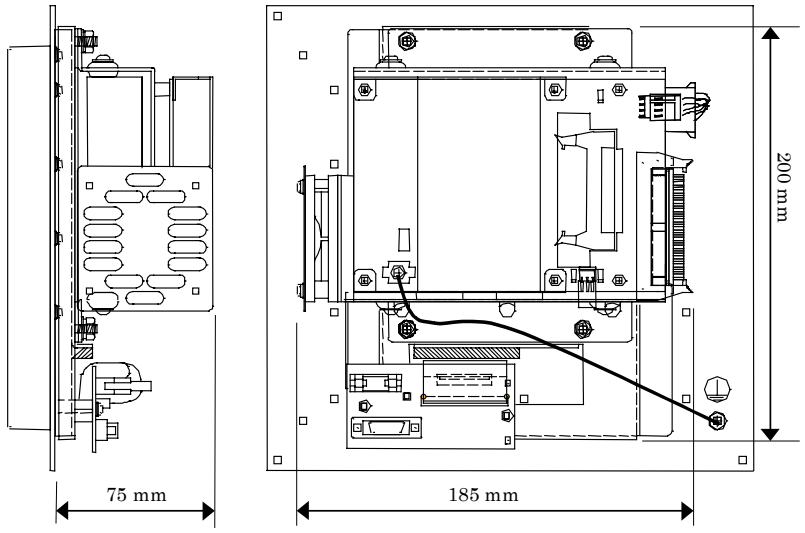
3.1.4 HDD Units

1) Stand-alone type MDI units A02B-0236-C121#T and A02B-0236-C121#M



NOTE
When HDD unit A02B-0236-C275 is installed in MDI unit A02B-0236-C121, bracket A250-0881-T007 (supplied with A02B-0236-J146) is required.

2) Stand-alone type MDI units A02B-0236-C125#T, A02B-0236-C125#M, and others



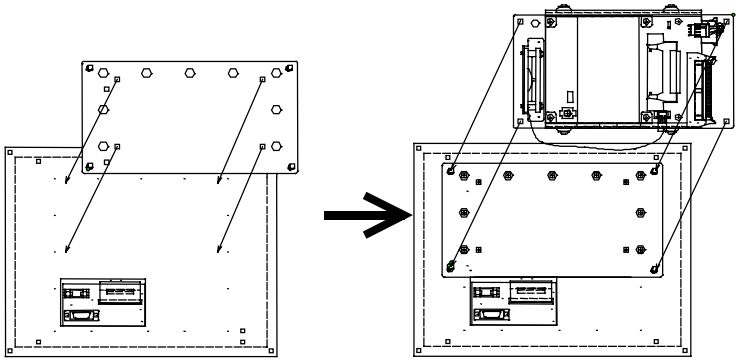
NOTE
When HDD unit A02B-0236-C277 is installed in MDI unit A02B-0236-C125, -C126, -C161, or -C162, bracket A250-0881-T006 (supplied with A02B-0236-J147) is required.

3.1.5 Installing HDD Units

1) Installation in MDI unit A02B-0236-C121

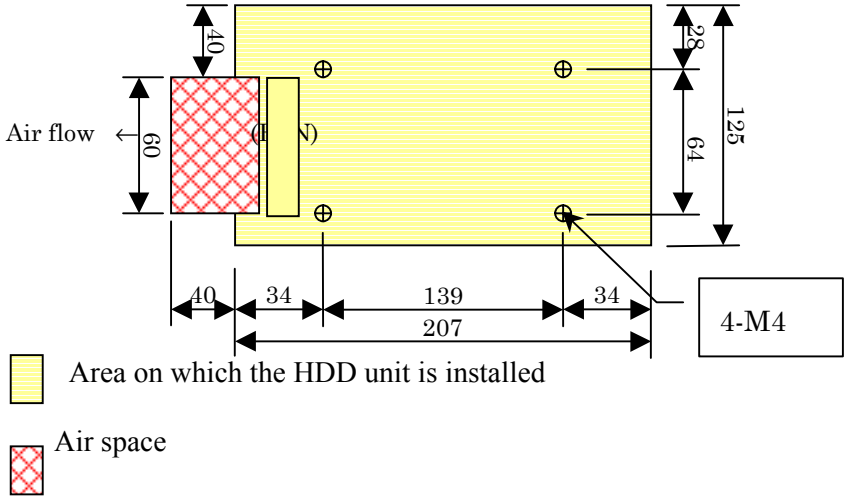
Below is an explanation of how to install the HDD unit in MDI unit A02B-0236-C121.

- Secure bracket A250-0081-T007 with the M4 screws. Secure the HDD unit with the M4 nuts.

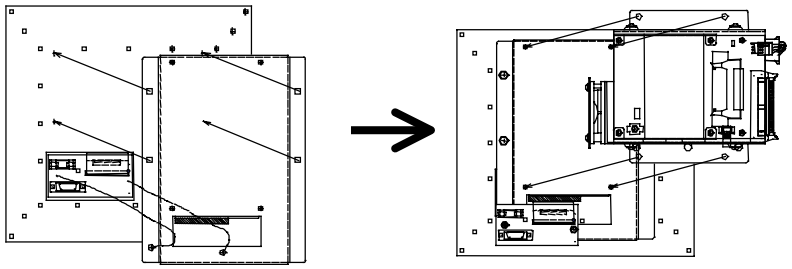


Attaching the bracket　　Installing the HDD unit

Connect the MDI unit or cabinet to signal ground terminal FG1 (M3) on the HDD unit with the ground cable. (See 3.1.7.)
The installation area on the MDI unit is shown below.

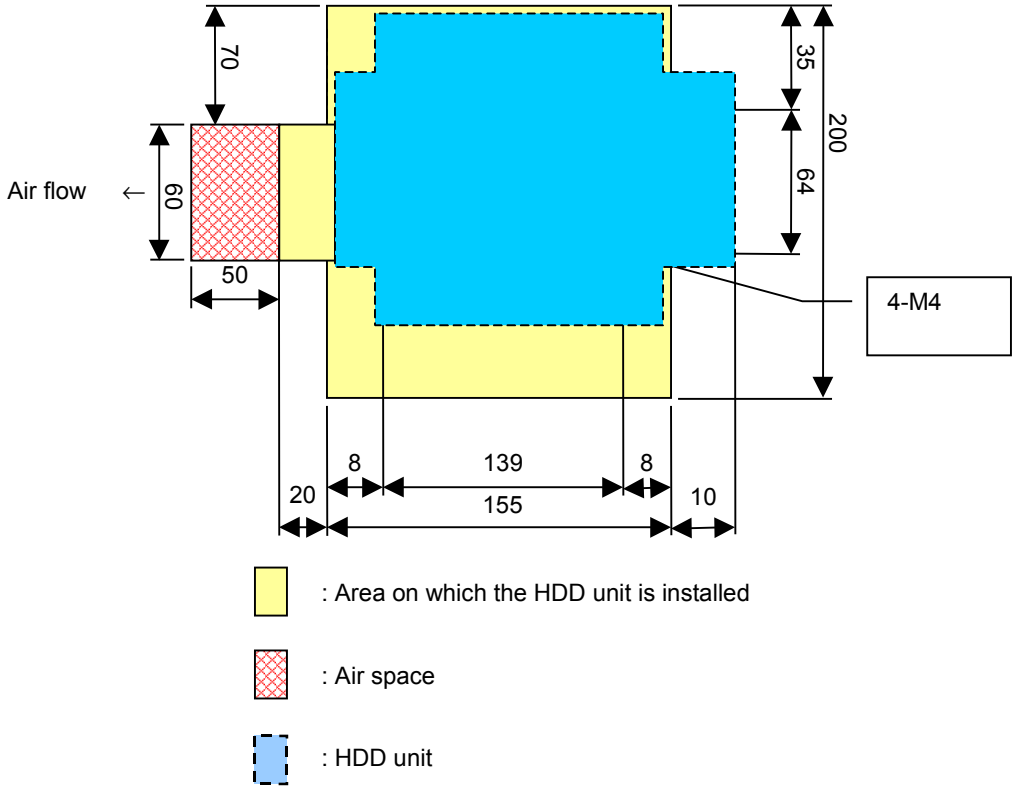


2) Installation in MDI unit A02B-0236-C125, -C126, or -C162
Below is an explanation of how to install the HDD unit in MDI unit A02B-0236-C125.
- Secure bracket A250-0081-T006 with the M4 screws. Secure the HDD unit with the M5 nuts.



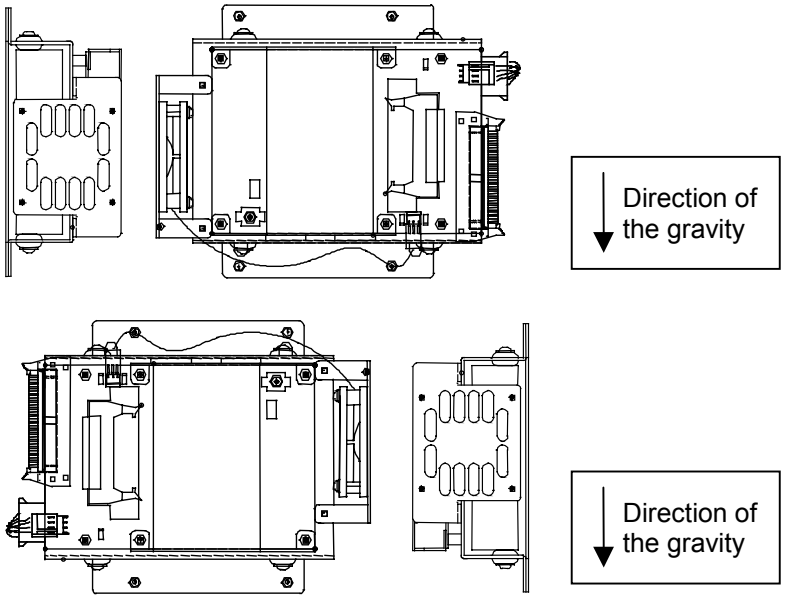
Attaching the bracket Installing the HDD unit

Connect the MDI unit to signal ground terminal FG1 (M3) on the HDD unit with the ground cable. (See 3.1.7.)
The installation area on the MDI unit is shown below.

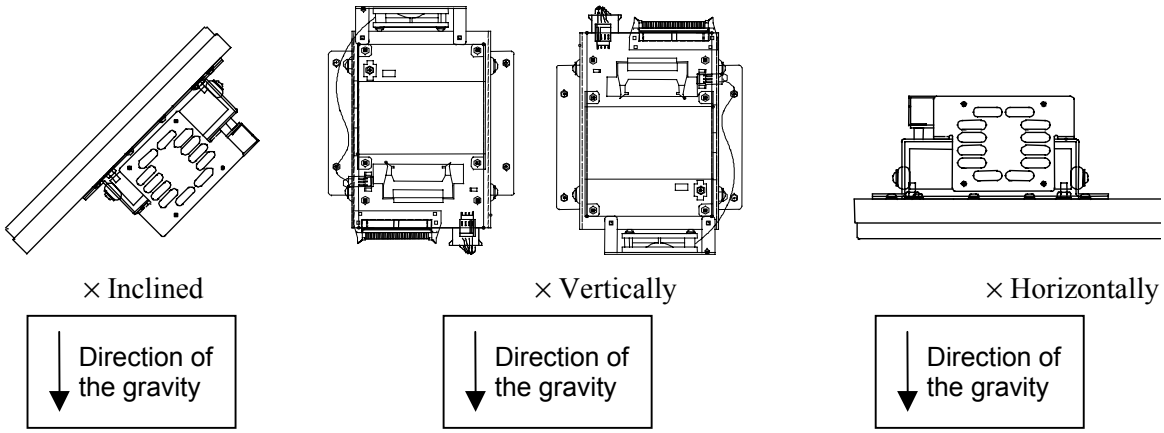


3.1.6 Direction of HDD Unit Installation

Install the HDD unit perpendicularly to the gravity.

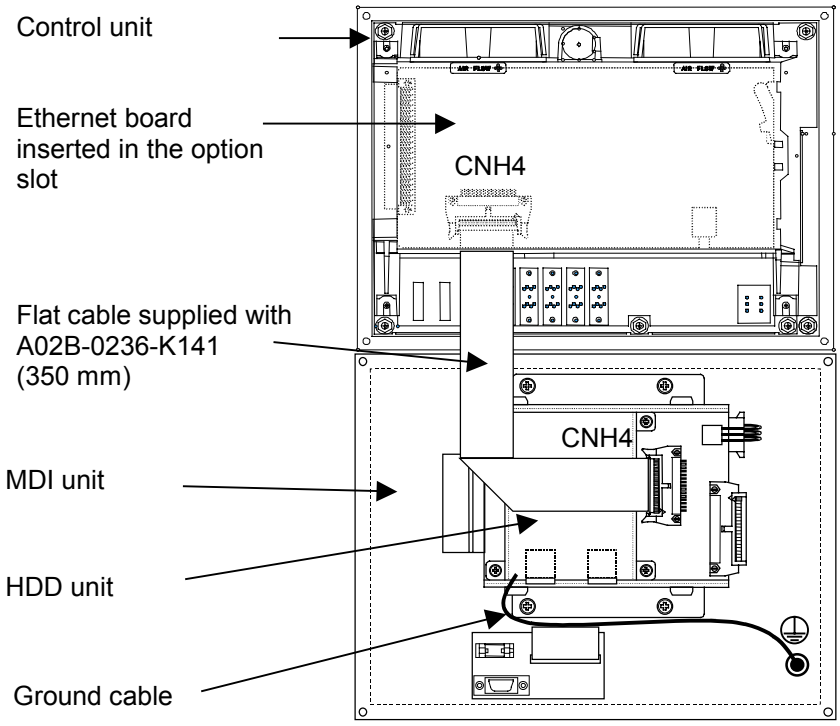


Do not install the HDD unit horizontally or vertically or at an angle.

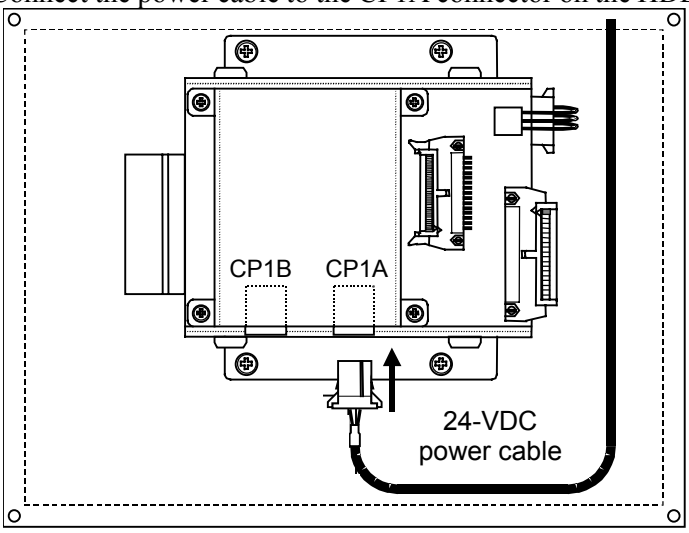


3.1.7 Connecting the HDD Unit

1) Connecting the signal lines
Connect CNH4 on the Ethernet board to CNH4 on the HDD unit with the flat cable.



2) Connecting the power cable
Connect the power cable to the CP1A connector on the HDD unit.



The HDD unit requires a 24-VDC power supply. Turn on or off this power supply together with the 24-VDC power supply for the control unit.

[Specifications for the supplied power]

24 VDC + 10%, 0.8 A (except when the spindle motor for the HDD is turned on)

[Specifications for the cable housing and contacts]

Connector	Housing	Contact	Manufacturer
CP1A	1-178288-3	1-175218-5	AMP Japan, Ltd.
CP2A	2-178288-3	1-175218-5	AMP Japan, Ltd.

[Connector pin assignment]

CP1A

1	+24V
2	0V
3	

CP1B

1	+24V
2	0V
3	

NOTE

The 24-VDC power supplied to CP1A can be output from CP1B. (CP1A is connected directly to CP1B in the unit.)

3.2 Stand-Alone type Series 16*i*/18*i*/21*i*-A, Power Mate *i*

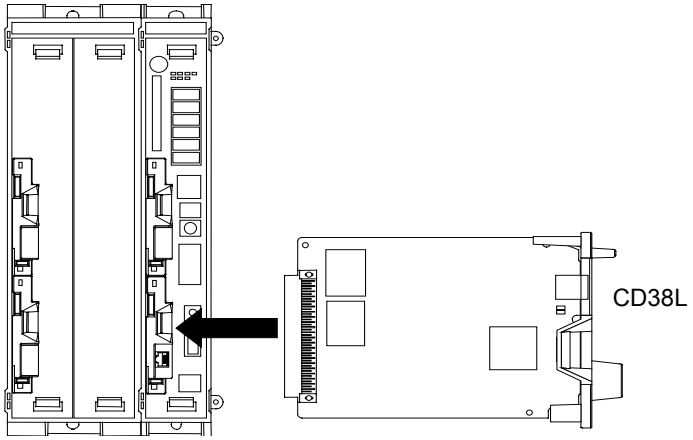
This section provides information on installing the Ethernet board and data server board in Stand-alone type Series 16*i*/18*i*/21*i*-A and power Mate *i*.

NOTE
In the Power Mate *i* series, only the Ethernet board can be connected.

3.2.1 Installing an interface board

Since the Ethernet board is shaped differently from data server board, both these boards can be installed only in certain option slots.

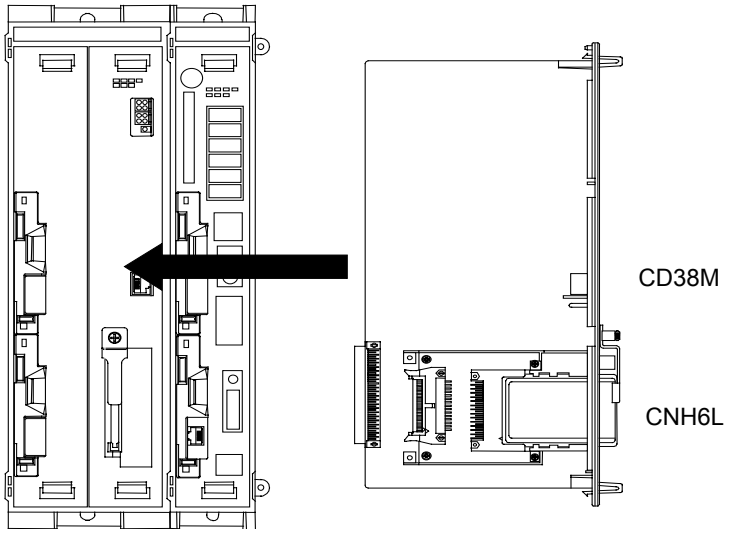
1) Installing an Ethernet board
The Ethernet board can be installed in a mini slot of the one-slot or three-slot basic unit. It can be installed in any mini slot.



	Drawing number	Remarks
Board drawing number	A20B-8100-0450	IDE not installed
Order specification	A02B-0265-J291	Series 16*i*/18*i*/21*i* -A
	A02B-0259-J230	Power Mate *i*

NOTE
This board cannot use the data server function.

2) Installing an ATA data server board
The ATA data server board can be installed only in "slot 2," located in the center of the three-slot basic unit. It cannot be installed in any other slot. Also, it cannot be installed in the one-slot basic unit.



	Drawing number	Remarks
Board drawing number	A16B-3200-0350	RISC installed
	A16B-3200-0352	RISC not installed
	A20B-2100-0560	ATA Card Adapter
Order specification	A02B-0265-J152	RISC installed Including ATA Card Adapter, flat cable
	A02B-0265-J145	RISC not installed Including ATA Card Adapter, flat cable

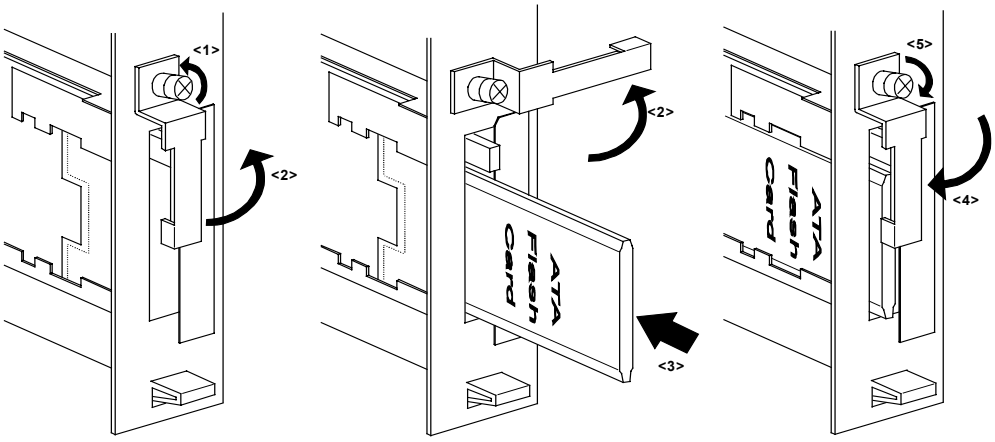
NOTE
1 Only an ATA flash card can be installed on the data server board for the Stand-alone type. An hard disk drive unit cannot be installed.
2 Use the ATA flash card recommended by FANUC.

3.2.2 Installing an ATA flash card

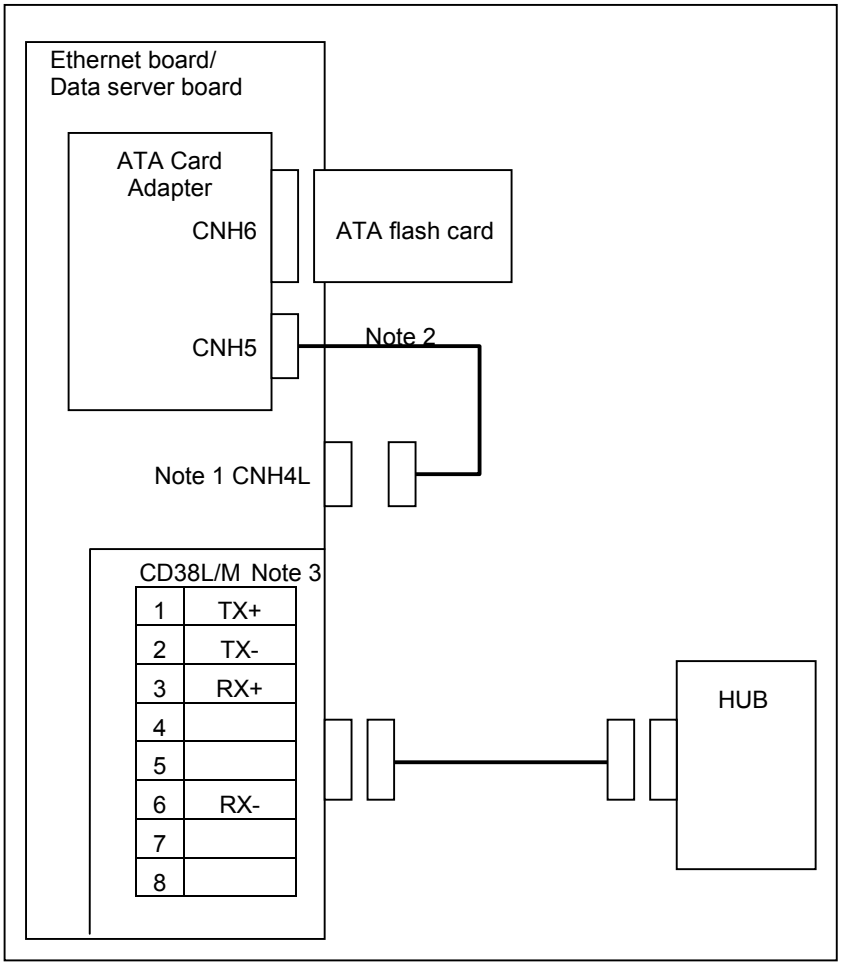
This section need be referenced only when the data server board is used.
You can obtain an ATA flash card to be used as the external memory unit of the data server board from the machine tool builder. The table below lists the ATA flash cards that can be used.

Manufacturer	Product number	Capacity
Hitachi, Ltd.	HB288096A5	96MB
	HB288160A5	160MB
	HB288320A5	320MB
	HB288640A5	640MB
	HB2881000A5	1GB
San Disk	SDP3B-220-390	220MB
	SDP3B-280-390	280MB
	SDP3B-350-390	350MB
	SDP3B-440-390	440MB

[Installing an ATA flash card]
<1> Loosen the setscrew.
<2> Move the retainer, so that the ATA flash card can be inserted into the connector.
<3> Insert the ATA flash card into the connector.
<4> Return the retainer to its original position and position it over the edge of the ATA flash card.
<5> Tighten the setscrew to secure the ATA flash card.



3.2.3 Connection diagram



NOTE
1 Connector CNH4L is not provided on the Ethernet board.
2 CNH4L on the data server board and CNH5 on the ATA Card Adapter are both connected to the interface board.
3 The Ethernet board and data server board are named CD38L and CD38M, respectively.

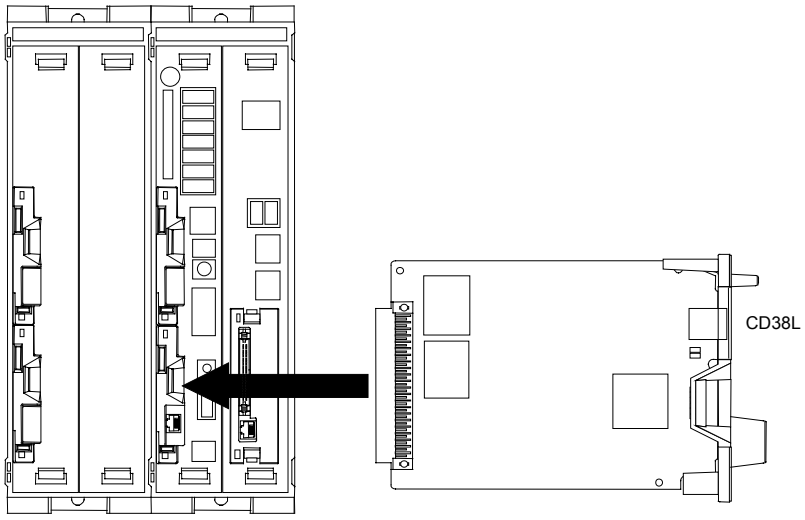
3.3 Series 15*i*-A Control Unit

This section provides information on installing the Ethernet board/DATA SERVER board for the Series 15*i*-A control unit.

3.3.1 Installing an interface board

The Ethernet board and data sever board have different shapes. Therefore, the option slots into which to insert them are different.

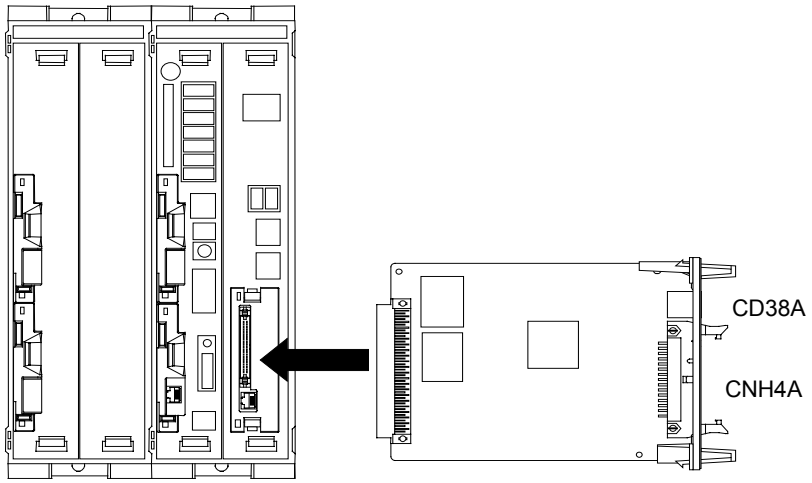
1) When the Ethernet board is used
   This board can be inserted into an arbitrary mini-slot of the two- or four-slot basic unit.



	Drawing number	Remarks
Board drawing number	A20B-8100-0450	without IDE
Order specification	A02B-0261-J151	

2) When the DATA SERVER board is used

This board can be installed in the wide mini slot under the power supply unit. It cannot be installed in any other slot.



	Drawing number	Remarks
Board drawing number	A20B-8100-0510	For HDD
	A20B-8100-051	For ATA card
Order specification	A02B-0262-J011	For HDD
	A02B-0262-J012	For ATA card (including the ATA card adapter and flat cable)

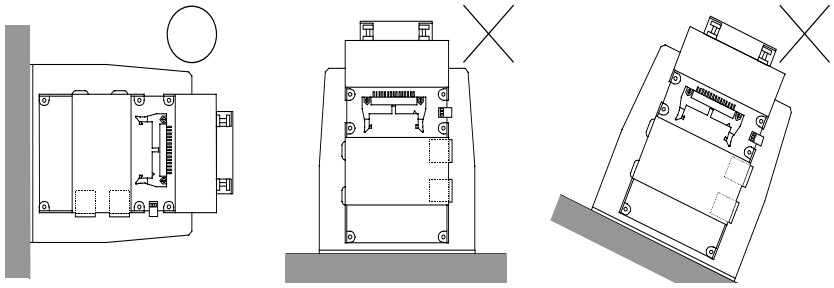
NOTE

Only an hard disk drive unit can be installed on the data server board of Series 15*i*-A control units. An ATA flash card cannot be installed.

3.3.2 Installing a hard disk drive unit

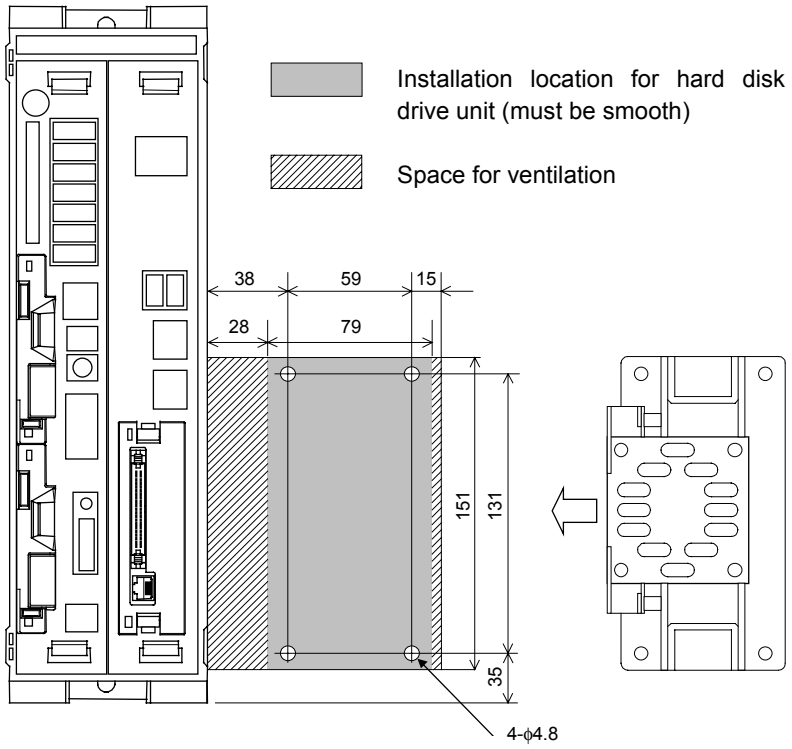
[Installing a hard disk drive unit]
Install the hard disk drive unit in the control unit.

- Orientation of hard disk drive unit. The hard disk drive unit must be installed on a vertical surface.
  It cannot be installed on a horizontal or inclined surface.

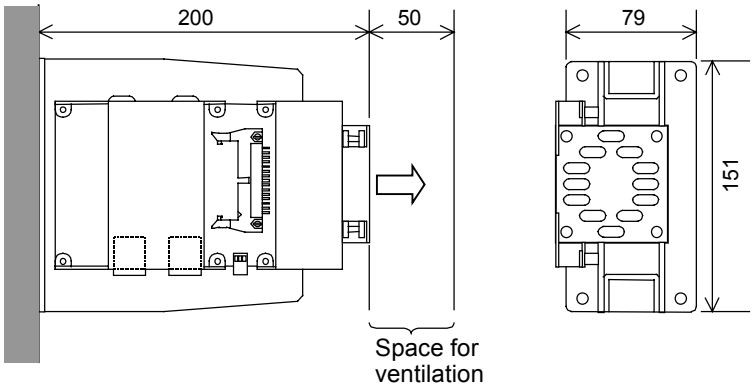


Vertical surface | Horizontal surface | Inclined surface

- Installation position of hard disk drive unit
  Install the hard disk drive unit on the right side the control unit. The figure below shows the area to be used for installing the hard disk drive unit.

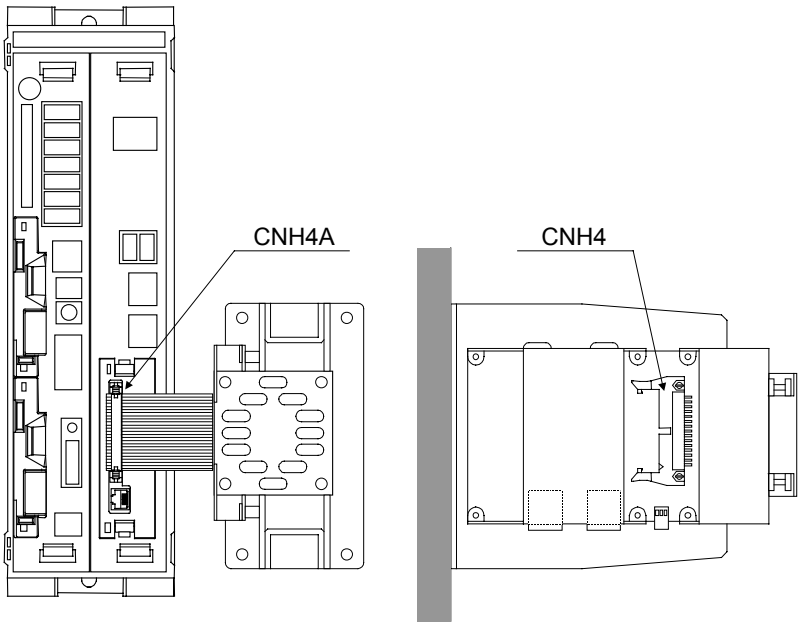


[Outline drawing of hard disk drive unit]

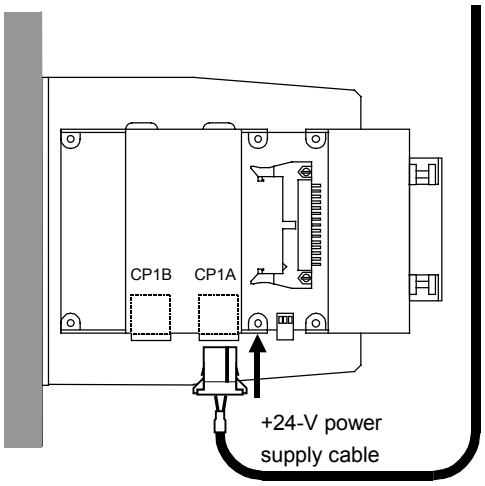


[Connecting the hard disk drive unit]

1) Connecting a signal line
Connect IDE connector "CNH4A" on the data server board to CNH4 on the hard disk drive unit with a flat cable.



2) Connecting the power supply
Connect the power supply cable to connector CP1A on the hard disk drive unit.



The hard disk drive unit must be connected to the 24-VDC power supply. Turn the hard disk power and the 24-VDC power supply for the control unit on or off at the same time.

[Power supply specification]
24 VDC ± 10%, 0.8 A (except when the HDD spindle motor is started)

[Specifications of housing and cable contact]

Connector	Housing	Contact	Manufacturer
CP1A	1-178288-3	1-175218-5	AMP Japan, Ltd.
CP2A	2-178288-3	1-175218-5	AMP Japan, Ltd.

[Connector pins]

CP1A

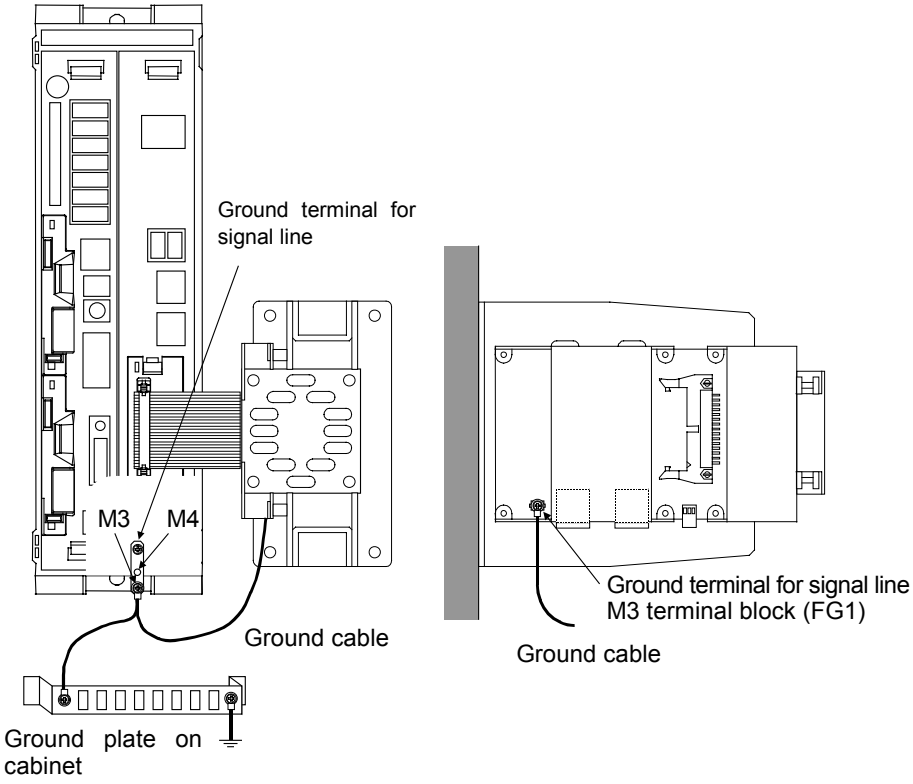
1	+24 V
2	0 V
3	

CP1B

1	+24 V
2	0 V
3	

NOTE
The 24 VDC power supplied to the hard disk drive unit through CP1A can be branched and taken out through CP1B. (CP1A and CP1B are directly connected to each other inside the unit.)

3) Connecting a ground cable



NOTE
Ground the ground cable of the hard disk drive unit through the ground terminal for a signal line. (Do not connect it directly to the ground plate on the cabinet.)

	Name	Drawing number	Remarks
Order specification	Hard disk drive unit	A02B-0261-C171	
	Connecting cable	A02B-0261-K001	Flat cable 150 mm Power supply cable 350 mm

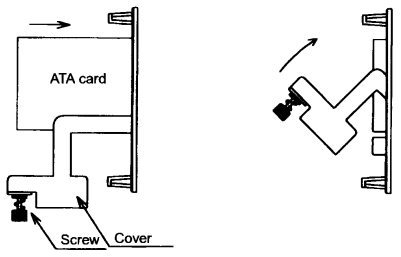
3.3.3 Installing an ATA Flash Card

This section need be referenced only when the data server board is used.
You can obtain an ATA flash card to be used as the external memory unit of the data server board from the machine tool builder. The table below lists the ATA flash cards that can be used.

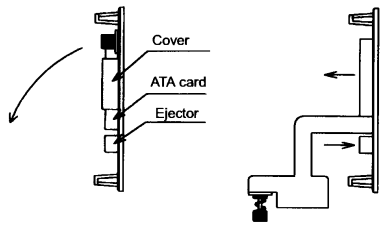
Manufacturer	Product number	Capacity
Hitachi, Ltd.	HB288096A5	96MB
	HB288160A5	160MB
	HB288320A5	320MB
	HB288640A5	640MB
	HB2881000A5	1GB
San Disk	SDP3B-220-390	220MB
	SDP3B-280-390	280MB
	SDP3B-350-390	350MB
	SDP3B-440-390	440MB

Mounting and removing the ATA card

Mounting procedure



Removal procedure



Mounting procedure

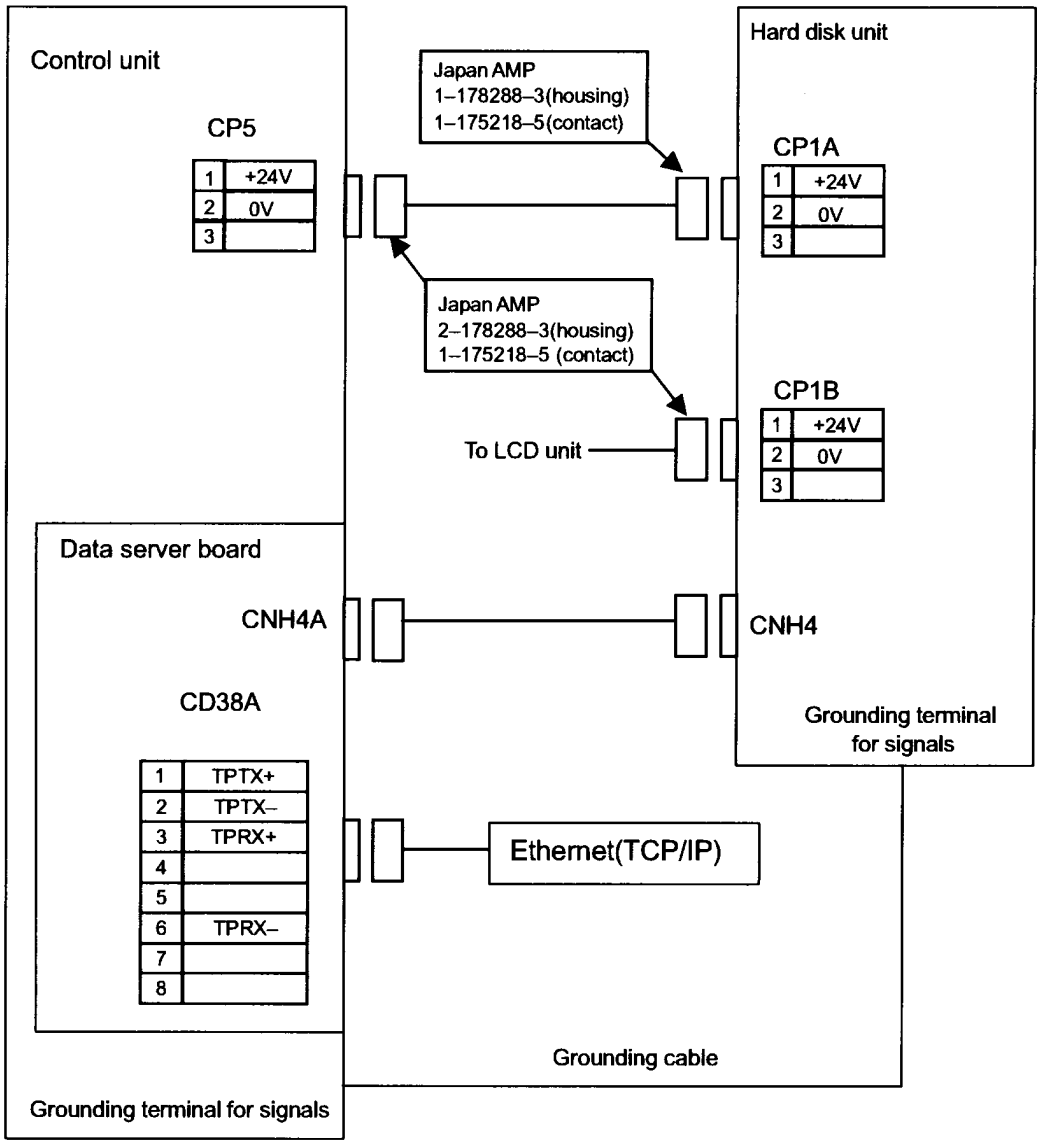
1. Remove the screw and pull the cover downward.
2. Insert the ATA card firmly as far as it can go.
3 Press the cover upward. Tighten the screw while pressing it.

Removal procedure

1. Remove the screw and pull the cover downward.
2. Press the ejector to pull out the card.

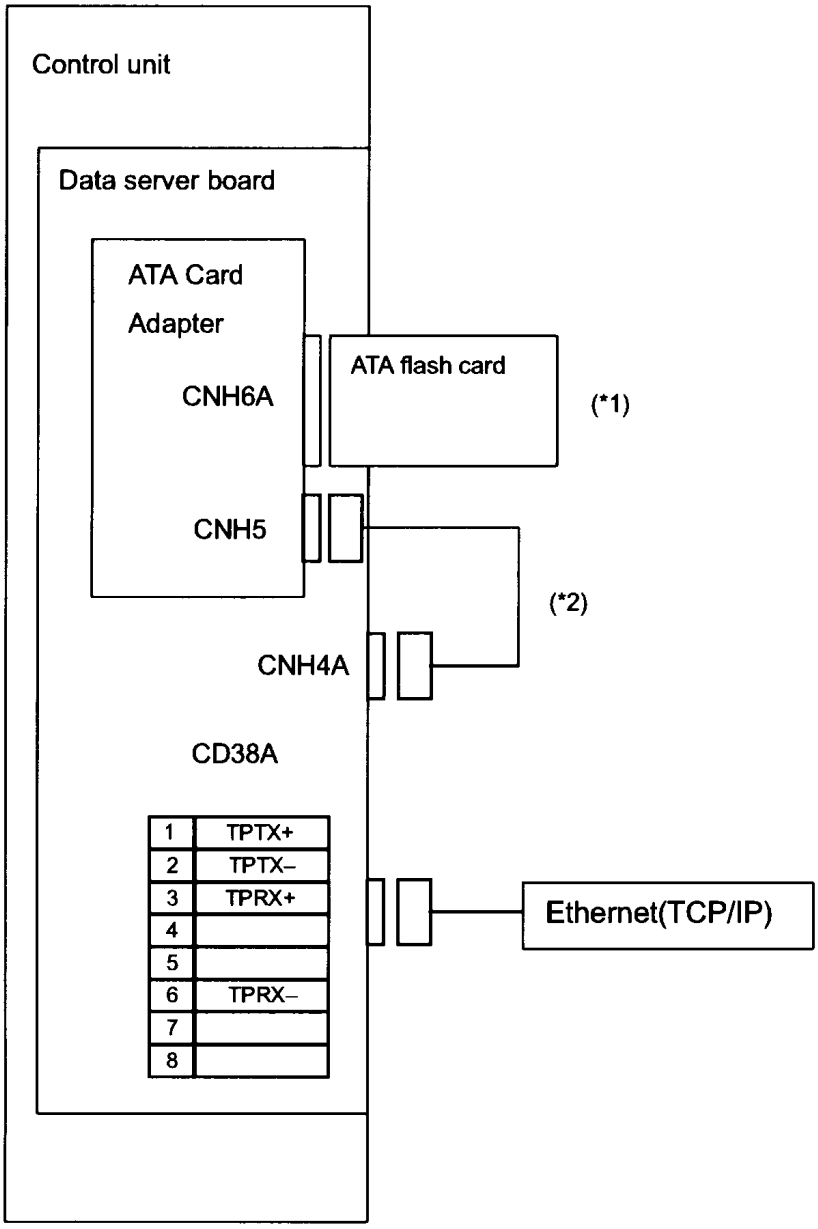
3.3.4 Connection Diagram

3.3.4.1 Data server board A1



NOTE
The 24 VDC input to CP1A can be taken from CP1B for branching.
CP1A and CP1B are directly connected together inside the unit.

3.3.4.2 Data server board A2



NOTE
1 Use the ATA flash card recommended by FANUC.
2 The CNH4A of the data server board and the CNH5 of the ATA Card Adapter are connected on the board.

4 HARDWARE CONNECTIONS

This section describes information relating to the physical Ethernet connection.

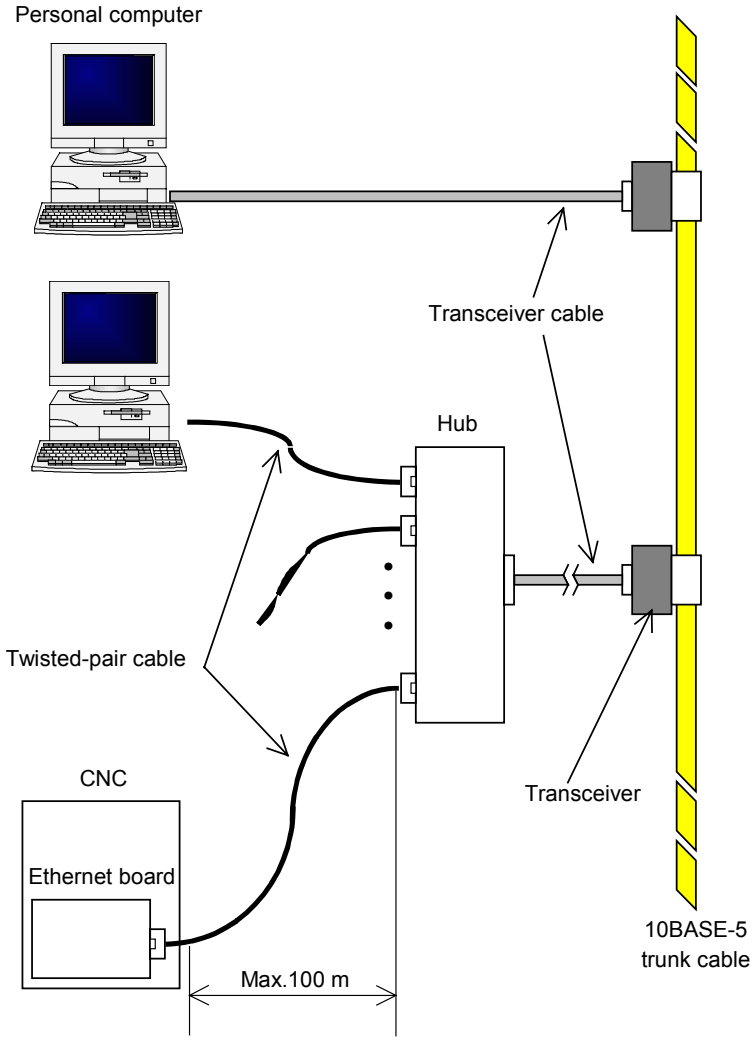
⚠ CAUTION

1 Before connecting or disconnecting cables to and from the Ethernet board, cut the power supply of CNC, and make sure that the power is off.

2 Please inqure of each manufacturer about the construction of network or the condition of using the equipment except the Ethernet board (hub, transceiver, cable etc.). When configuring your network, you must take other sources of electrical noise into consideration to prevent your network from being influenced by electrical noise. Make sure that network wiring is sufficiently separated from power lines and other sources of electrical noise such as motors, and ground each of the devices as necessary. Also, a high and insufficient ground impedance may cause interference during communications. After installing the machine, conduct a communications test before you actually start operating the machine.
We cannot ensure operation that is influenced by network trouble caused by a device other than the Ethernet board.

4.1 CONNECTING TO ETHERNET

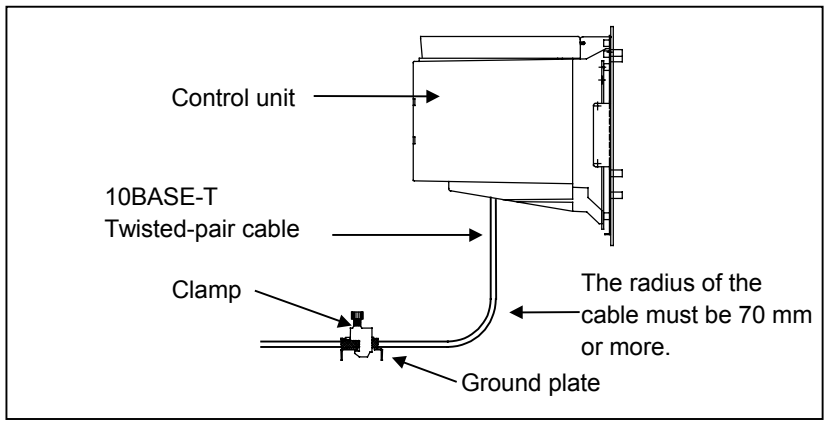
The Ethernet board is provided with a 10BASE-T interface.
Prepare a hub for connecting the Ethernet board to the Ethernet trunk.
The following shows an example of a general connection.



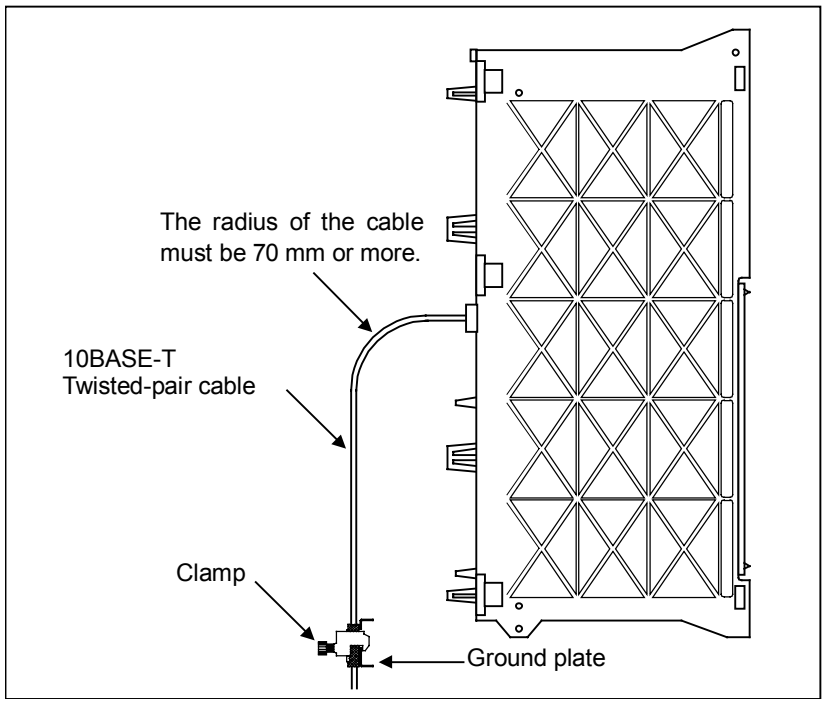
Some devices (hub, transceiver, etc.) that are needed for building a network do not come in a dust-proof construction. Using such devices in an atmosphere where they are subjected to dust or oil mist will interfere with communications or damage the Ethernet board. Be sure to install such devices in a dust-proof cabinet.

4.2 LEADING OUT THE ETHERNET CABLE

1) Stand-alone type Series 16*i*/18*i*/21*i*-A/B
For this type of control unit, the cable is led out from the bottom of the control unit. See the outline drawing of the board for the location of the connector.



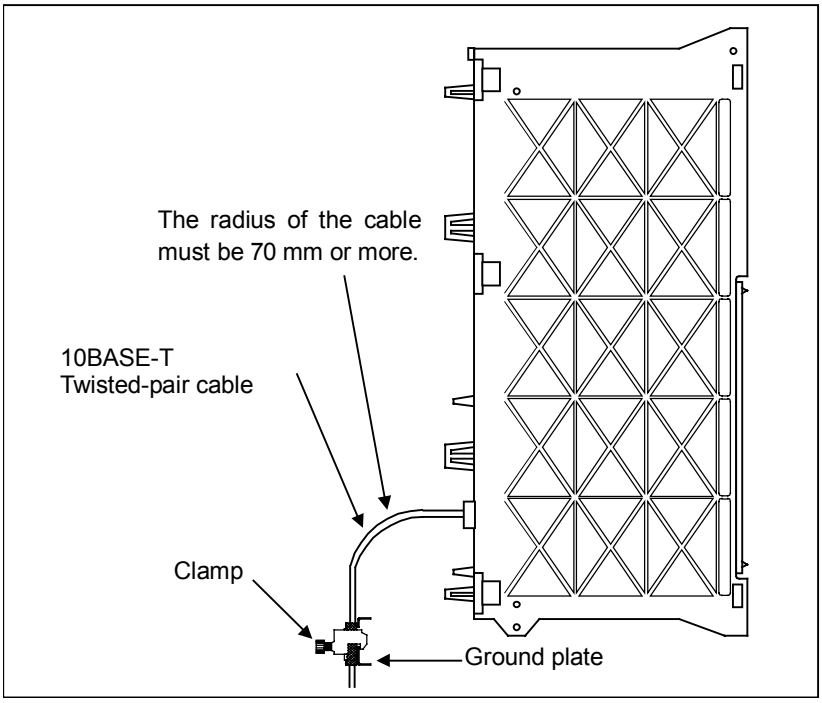
2) Stand-alone type Series 16*i*/18*i*/21*i*-A, Power Mate *i*
For this type of control unit, the cable is drawn out only from the front of the control unit. See the outline drawing of each type of board for the location of the connector.



The Ethernet cable must be fastened by a cable clamp to prevent tension being applied to the connector that connects the cable to the control unit (RJ-45) even if the Ethernet cable is pulled directly. This clamp is also used to ground the cable shield.

3) Stand-alone type Series 15*i*-A

For this type of control unit, the cable is drawn out only from the front of the control unit. See the outline drawing of each type of board for the location of the connector.



The Ethernet cable must be fastened by a cable clamp to prevent tension being applied to the connector that connects the cable to the control unit (RJ-45) even if the Ethernet cable is pulled directly. This clamp is also used to ground the cable shield.

4.3 10BASE-T CONNECTOR (CD38) PIN ASSIGNMENTS

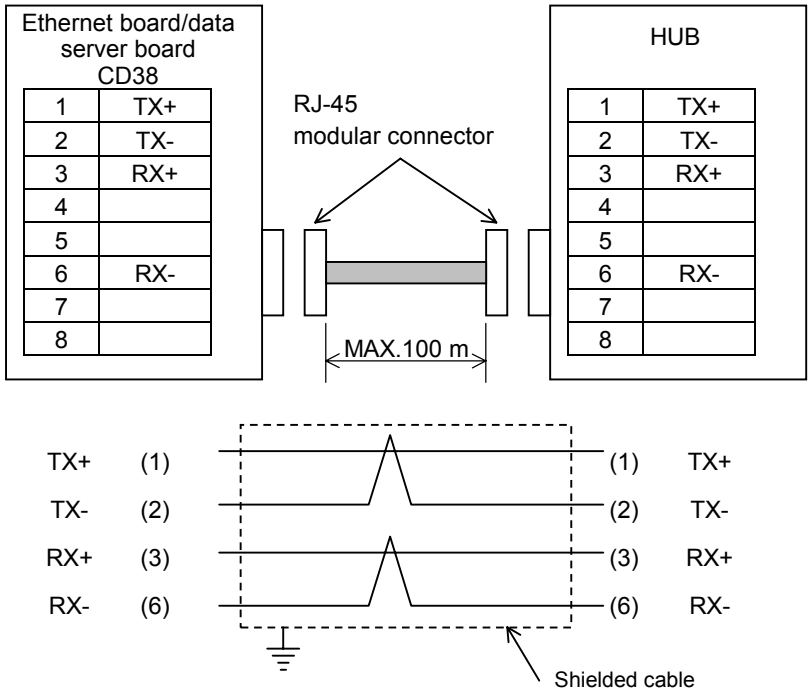
CD38

Pin No.	Signal name	Description
1	TX+	Send +
2	TX–	Send –
3	RX+	Receive +
4		Not used
5		Not used
6	RX–	Receive –
7		Not used
8		Not used

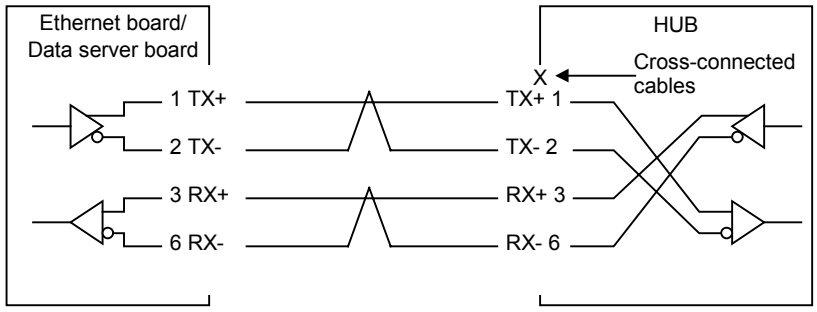
4.4 TWISTED-PAIR CABLE SPECIFICATION

4.4.1 Cable Connection

The figure below shows the cable connection between the 10BASE-T interface (CD38) on the Ethernet board or data server board and hub.



- Keep the total cable length within 100 m.
  Do not extend the cable more than is necessary.
- The figure above shows the cable connection when cables are crossed in the hub.
  "X" is usually indicated at the port of the hub to signify that cables are crossed in the hub.



4.4.2 Cable Materials

Unshielded cable (UTP cable) is commercially available as 10BASE-T twisted-pair cable: You should, however, use shielded Category 5 twisted-pair cable (STP cable) to improve the resistance to electrical noise in an FA environment.

Recommended Cables

Manufacturer	Specification	Remarks
Furukawa Electric Co., Ltd.	DTS5087C-4P	Twisted-pair cable
Nissei Electric Co., Ltd.	F-4PFWMF	Single-conductor cable

Inquiries

Manufacturer	Contact address
Furukawa Electric Co.,Ltd. Sales Headquarters	2-6-1 Marunouchi, Chiyoda-ku. Tokyo 100-8322 TEL: 03-3286-3126 FAX: 03-3286-3979
Remark	
Nissei Electric Co., Ltd. Machida Branch	3F MU Bldg., 1-9-1 Minami-narise, Machida City, Tokyo 194-0045 TEL: 0427-29-2531 FAX: 0427-29-3375
Overseas Sales Office	IWATANI International Corporation Tokyo Head Office 21-8 Nishi-shinbashi 3-chome, Minato-ku, TOKYO, 105-8458, JAPAN TEL: 03-5405-5810 FAX: 03-5405-5666 Telex: 2524256 IWATYO J

NOTE
The recommended cables cannot be connected to moving parts.

4.4.3 Connector Specification

Use an 8-pin modular connector (RJ-45) with the twisted-pair cable for the Ethernet connection. The following connectors or equivalents must be used.

	Specification	Manufacturer	Remarks
Solid wire	5-569530-3	AMP Japan, Ltd.	
Solid wire	MS8-RSZT-EMC	SK KOHKI Co., Ltd.	Special tools required
Twisted-pair cable	5-569552-3	AMP Japan, Ltd.	
Twisted-pair cable	TM11AP-88P	Hirose Electric Co.,Ltd.	Special tools required

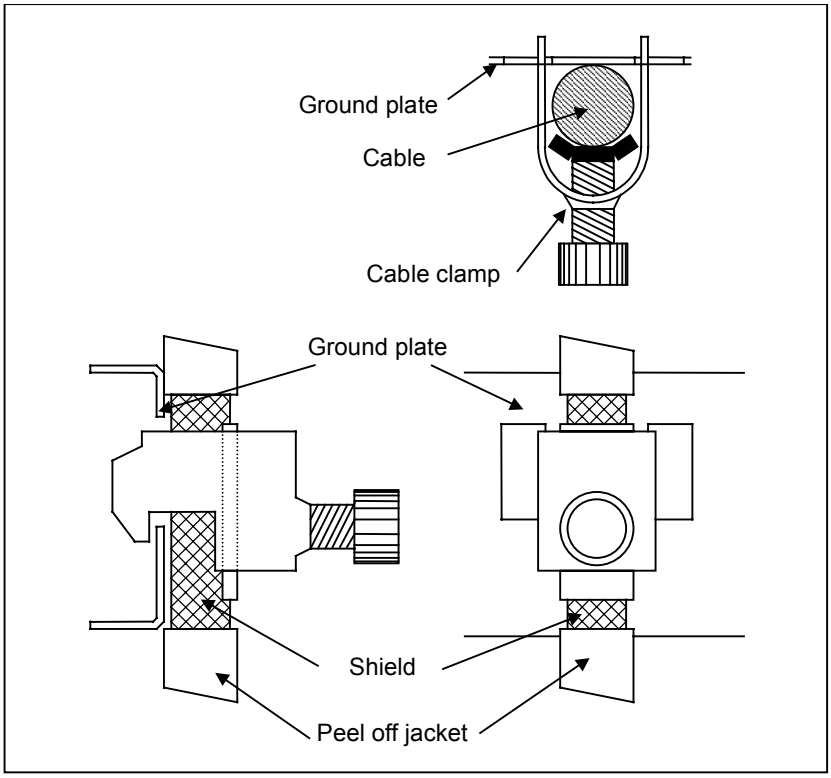
4.5 ELECTRICAL NOISE COUNTERMEASURES

4.5.1 Separating Signal Lines

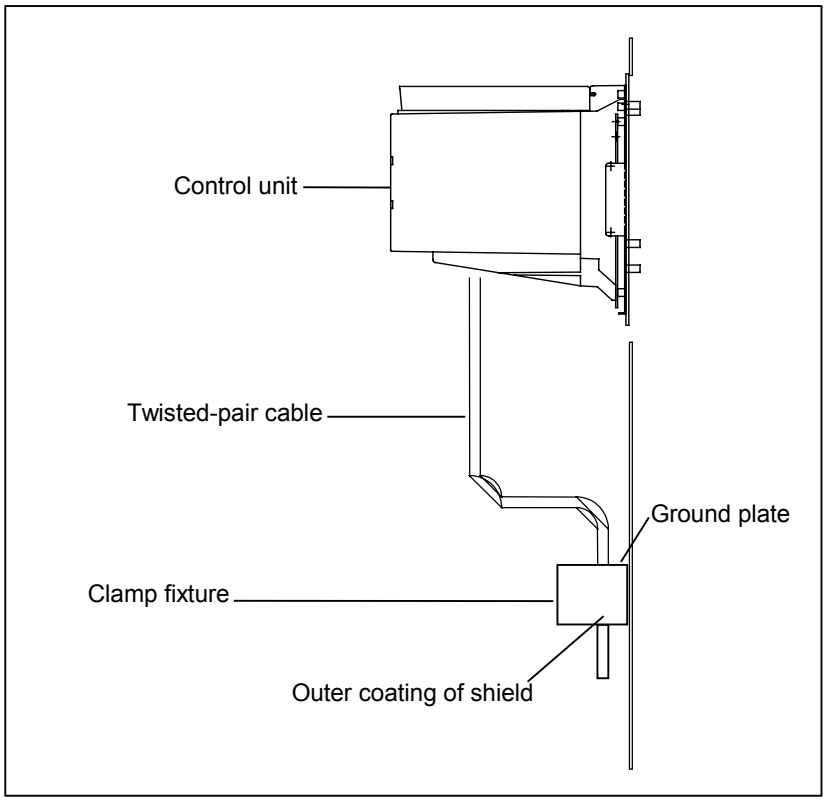
The wiring for the Ethernet cable is of group C. For details of how to separate group C wiring from that of group A and B, refer to the connection manual (hardware) (B-63003EN, B-63523EN,or B-63323EN).

4.5.2 Clamping and Shielding Cables

All cables that are led into the CNC and which require shielding must be clamped as shown in the figure below. Twisted-pair cables for Ethernet connection must be also shielded in the same way. Clamping cables provides support and shielding and is extremely important to the safe operation of the system. Never overlook cable clamping.
Peel off part of the jacket as shown in the figure to expose the outer coating of the shield, and press this outer coating against the ground plate with the clamp fixture.
The machine manufacturer must prepare the ground plate and install it as follows:

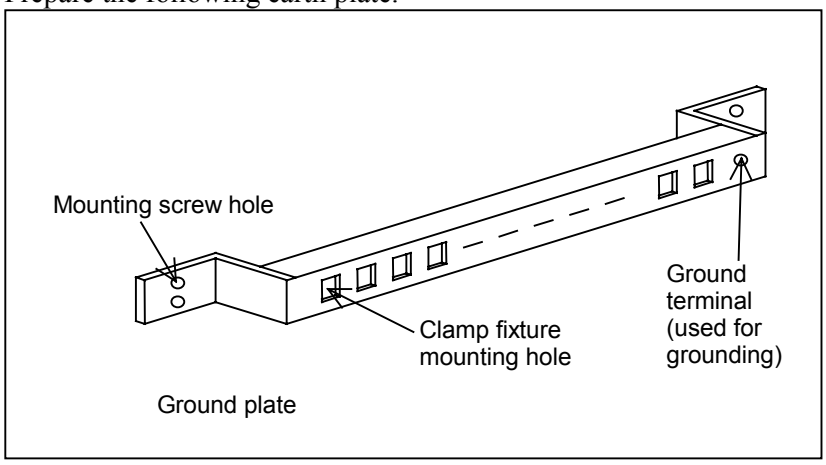


NOTE
To ensure the safe operation of the system, clamp and shield the cables.

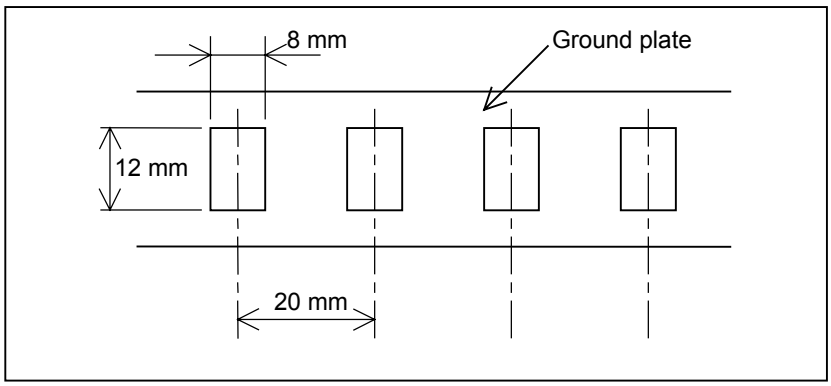


Example of Shielding of Transceiver Cable
(Case of LCD-mounted type Series16*i*/18*i*/21*i*-A)

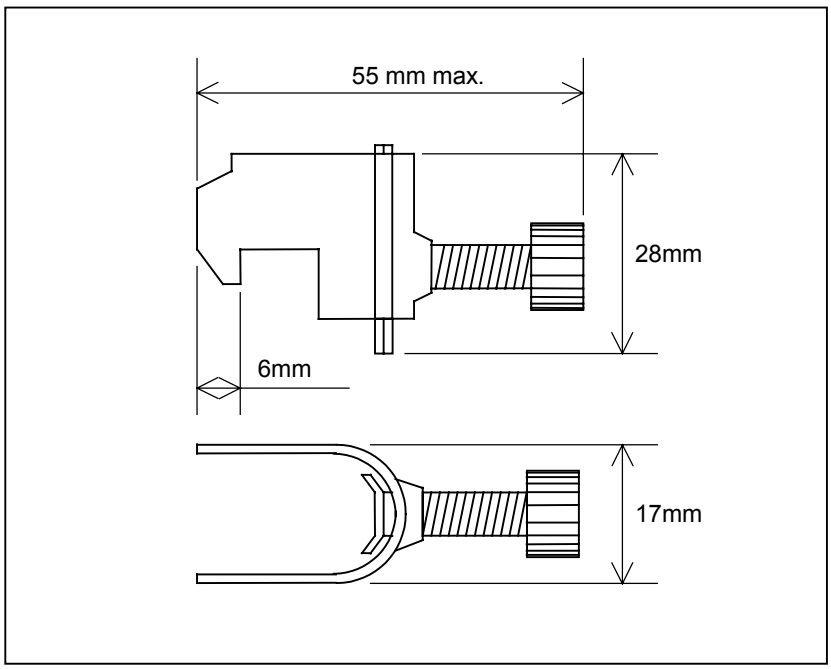
Prepare the following earth plate.



Use a nickel-plated iron plate at least 2 mm thick as the ground plate.



Details of Clamp Fixture Mounting Holes



External Dimensions of Clamp Fixture

Clamp Fixture Procurement Specifications
A02B-0083-K301 (five clamp fixtures)

4.5.3 Grounding the Network

Even if the grounding conditions on the machine are satisfied, electrical noise from the machine sometimes enters the communications line and causes communications interference depending on the installation conditions and the peripheral environment of the machine. To prevent the entry of such electrical noise, separating and insulating the machine from the Ethernet trunk cable and the personal computer effectively reduces the influence of electrical noise.
The following figure shows an example of such a connection.

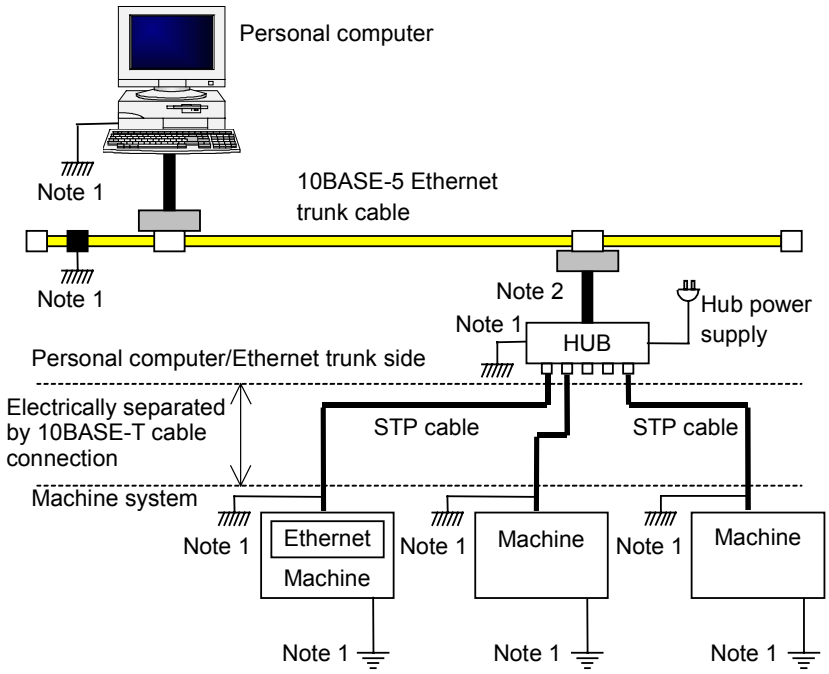


Fig.4.5.3(a) Large-Scale Network

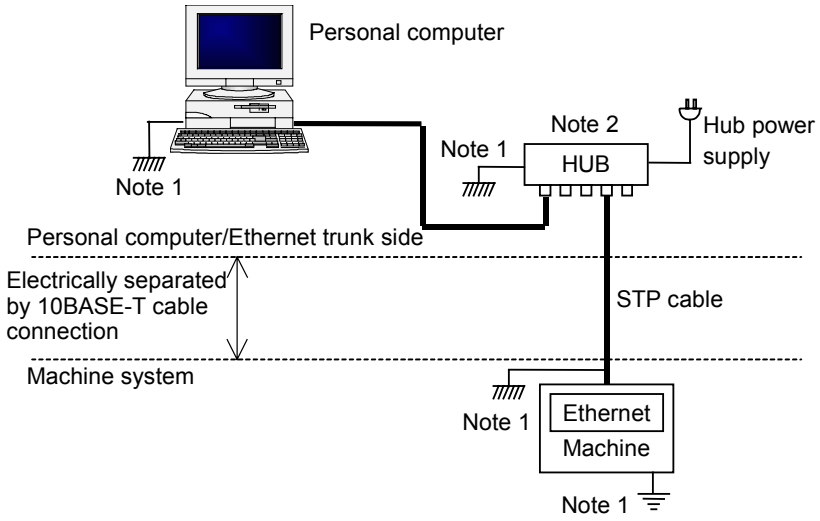


Fig.4.5.3(b) Small-Scale Network

NOTE

1 The ground between PC/Trunk line side and machine system side must be separated. If it is impossible to separate the ground because there is only one grounding point, connect the ground cable for each system to the grounding point independently. (Refer Fig.1)
The resistance for grounding must be less than 100-ohm (Class 3). The thickness of the ground cable is the same as the thickness of AC power cable or more. At least thickness of 5.5mm^2 is necessary.

2 Please use the HUB that has unshielded interface connector. FANUC recommends the HCN-7500 (Hitachi-Densen LTD) or equivalent.

3 There is possibility that noise makes the obstacle of communication even if the ground is separated using the 10BASE-T. In the case of using the Ethernet board under the worst environment, please separate between the PC/Trunk line side and machine system side completely using the 10BASE-FL (Optical fiber media).

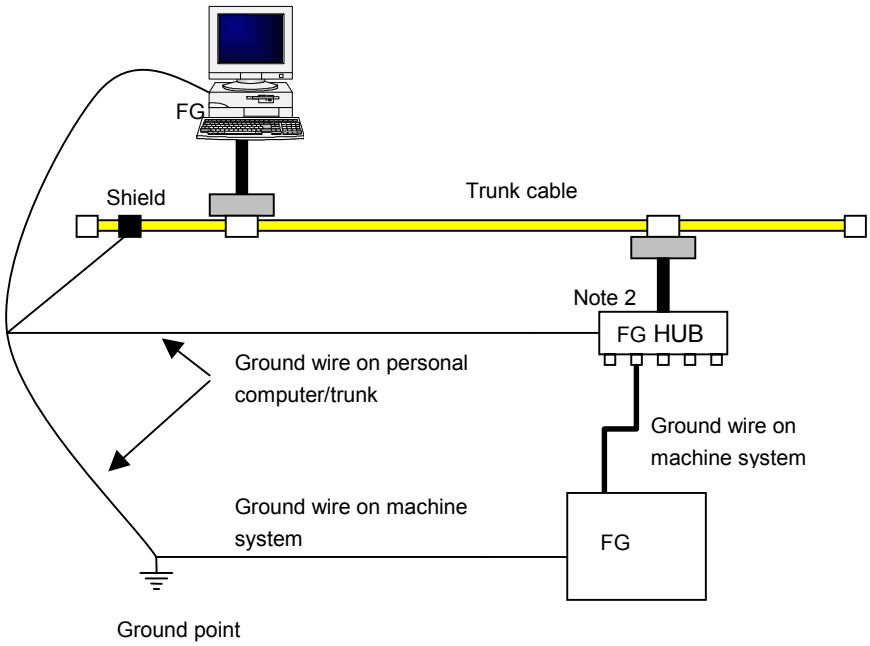


Fig.4.5.3(c) Wiring on a Single Ground Point

VI. MAINTENANCE

1 Series 16*i*/18*i*/21*i*-A/PM*i* MAINTENENCE INFORMATION

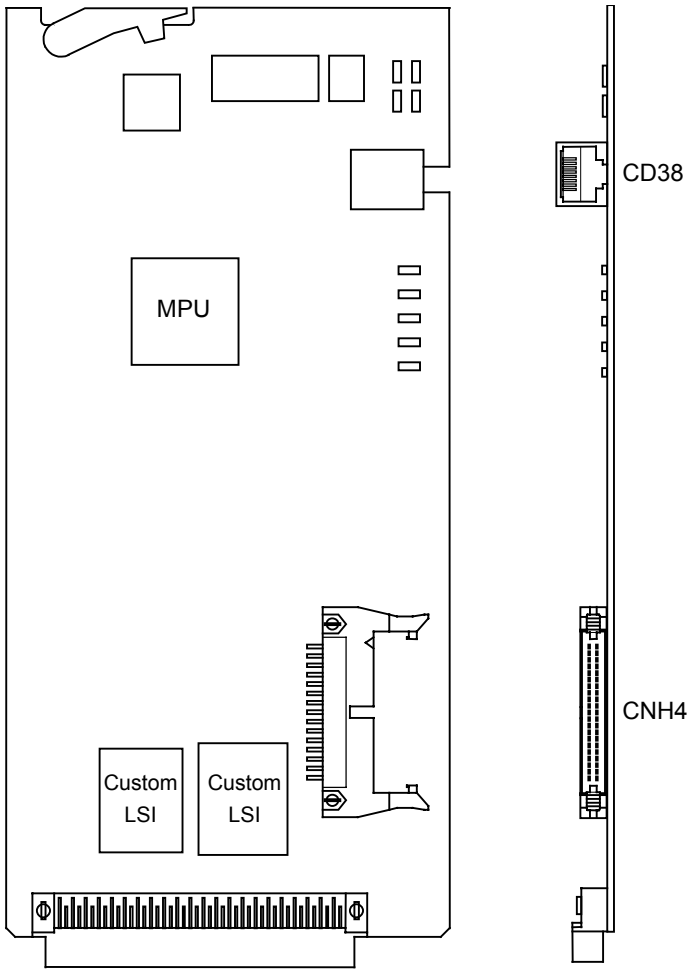
This chapter describes the maintenance information for the 16*i*/18*i*/21*i*-A/B, Power Mate *i*, Ethernet/data server board.

1.1 LCD-MOUNTED TYPE ETHERNET/DATA SERVER BOARD

This section describes the maintenance information for the 16*i*/18*i*/21*i*-A/B LCD-mounted type Ethernet/data server board.

1.1.1 Component Layout

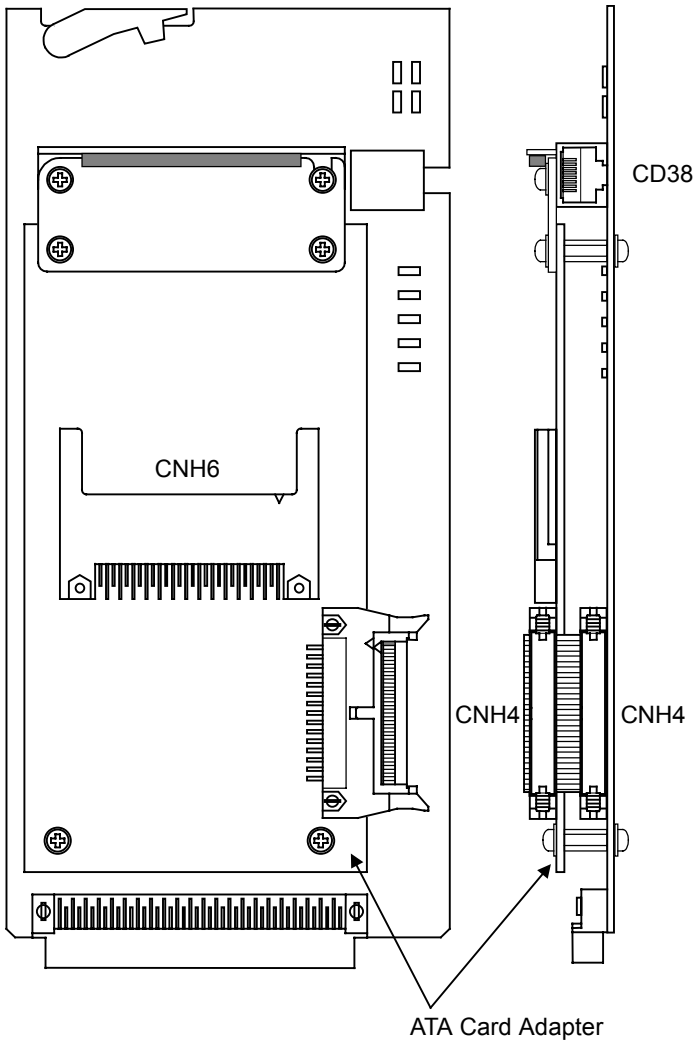
[Ethernet Board]



Name	Specification	Remarks
Ethernet board	A20B-8100-0270	CNH4 not installed
Ethernet board (with IDE)	A20B-8100-0271	

The Ethernet board with IDE can be used both as an Ethernet board and a data server board (the ATA Card Adapter is required).
The Ethernet board without IDE can be used only as an Ethernet board.

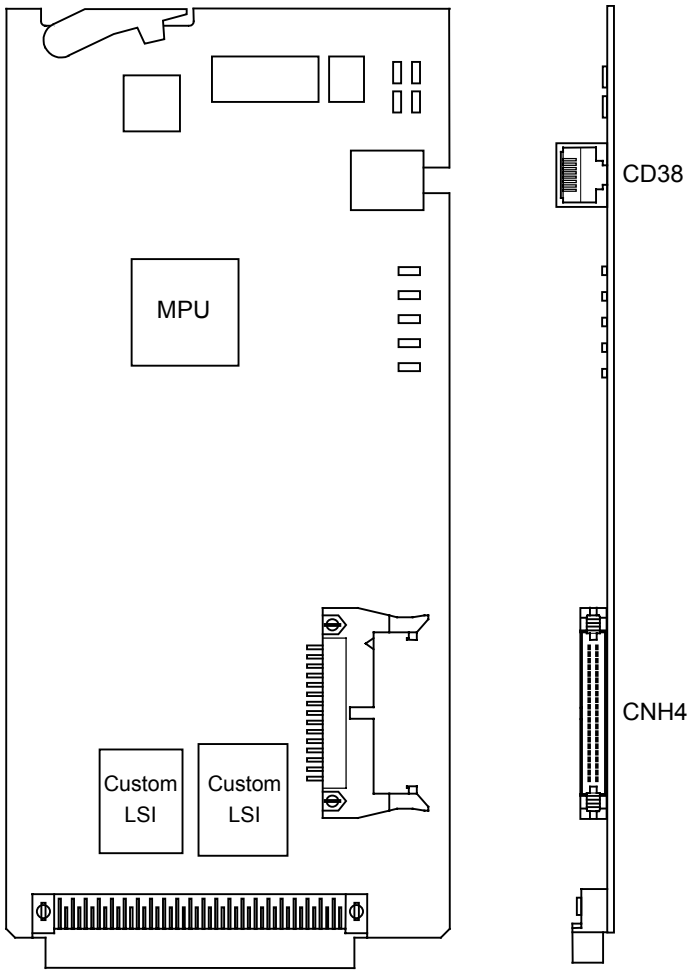
[ATA Data Server Board]



Name	Specification	Remarks
Ethernet board (with IDE)	A20B-8100-0271	
ATA card adapter	A20B-2002-0960	

NOTE
The ATA Card Adapter is mounted on the Ethernet board (with IDE). A flat cable is used for making the connection between the adapter and the board.

[HDD Data Server Board]



Name	Specification	Remarks
Ethernet board (with IDE)	A20B-8100-0271	

Order specification

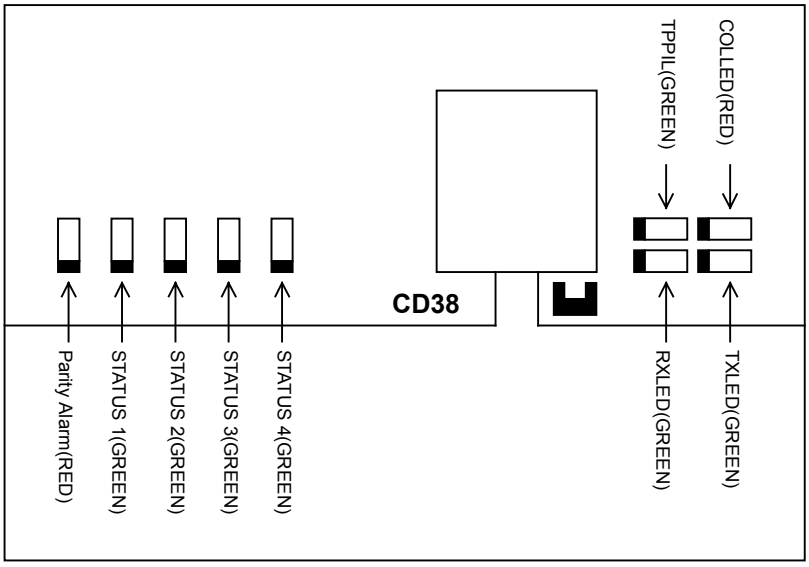
Specification	Remarks
A02B-0236-J146	3.5" hard disk unit (for MDI-C121)
A02B-0236-J147	3.5" hard disk unit (for MDI-C125, -C126, -C161, and -C162)
A02B-0236-K141	3.5" hard disk unit connection cable
A02B-0261-K121	Data server spare part (3.5" hard disk unit power supply fuse)

NOTE
1 Cables 1 and 2 can be ordered using A02B-0236-K141. Cable 1 is a 0.5-m power cable that connects the CNC to the HDD unit. Cable 2 is a 0.35-m signal cable that connects the data server board to the HDD unit.
2 The part number of the HDD interface board is A20B-2100-0490. A fuse for the power supply is installed on this board. The spare fuse can be ordered using A02B-0261-K121.

1.1.2 LED Indications

The 16*i*/18*i*/21*i* LCD-mounted Ethernet/data server board incorporates the following LEDs: Four green STATUS LEDs and one red ALARM LED for indicating the status. Three green LEDs and one red LED for indicating the communication status. The figure below shows the locations of these LEDs. The table below explains the LED lighting states.
In the following explanations, the LED lighting states are expressed as follows:

□: Off ■: On ☆: Blinking ◊: Don't care



LED lighting sequence at power on

No.	LED indication 1234	Ethernet/data server board state
1	STATUS □□□□	Power off
2	STATUS ■■■■	Initial state after power on
3	STATUS □■■■	MPU initialized.
4	STATUS □□■■	Firmware downloaded.
5	STATUS □□□■	Control migration to OS
6	STATUS ■■■□	OS PHASE1
7	STATUS □■■□	OS PHASE2
8	STATUS ■□■□	OS PHASE3
9	STATUS □□■□	OS PHASE4
10	STATUS ☆□□□	Startup completed.

The system enters the No.10 status when the Ethernet/data server board starts normally. This status is maintained until an error occurs.

STATUS LED indications if an error occurs

If an error occurs, the LEDs repeatedly flash "LONG" then "SHORT." (For "LONG," the LED lights for a long time. For "SHORT," the LED lights for a short time.)

No.	STATUS LED indication		Ethernet/data server board state	
	LONG 1234	SHORT 1234		
1	□□□■	■□□□	Failure caused by this board	System reset
2	□□□■	□■□□		Machine check
3	□□■■	■□□□		DRAM parity alarm
4	□□■■	□■□□	Failure caused by another board	NMI of another module

NOTE
If an error, indicated by repeatedly flashing a LONG and SHORT combination other than the above, occurs, contact FANUC.

ALARM LED indications if an error occurs

No.	LED indication		Ethernet/data server board state
1	Parity Alarm	■	Parity error occurred in main memory.

LED indications related to communication status

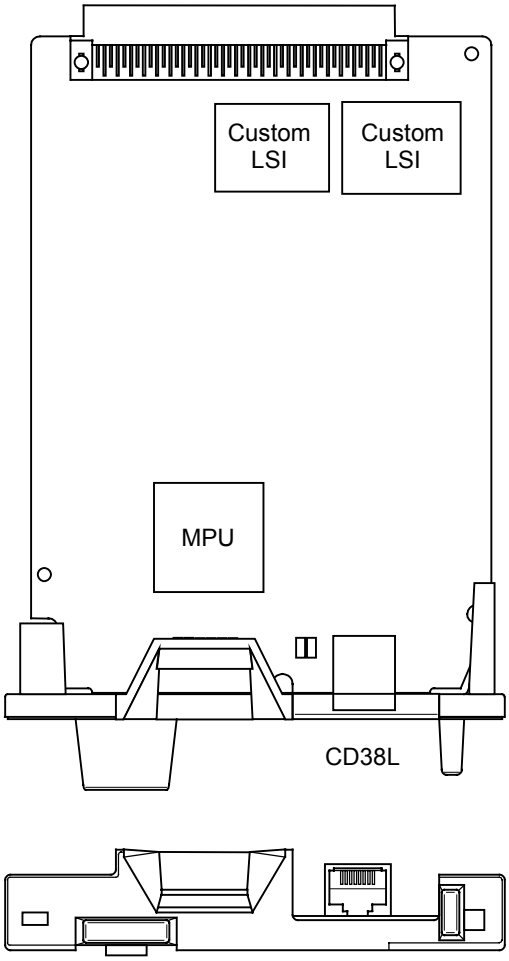
No.	LED indication		Communication status
1	RXLED	■	Lights when data is received.
2	TXLED	■	Lights when data is sent.
3	TPPIL	■	Lights when the Ethernet/data server board is successfully connected to the hub.
4	COLLED	■	Lights if a data collision occurs.

NOTE
TPPIL :
Communication is not performed while this LED is not lit. A probable reason for this is that the Ethernet/data server board is not properly connected to the hub, or that the hub is off. This LED should be lit at all times while the Ethernet/data server board is properly connected to the hub.
COLLED :
This LED lights frequently if there is excessive traffic on the communication line or if there is excessive peripheral electrical noise.

1.2 STAND-ALONE TYPE ETHERNET BOARD

This section describes the maintenance information for the Series 16*i*/18*i*/21*i*-A Stand-alone type or Power Mate *i* Ethernet board.

1.2.1 Component Layout

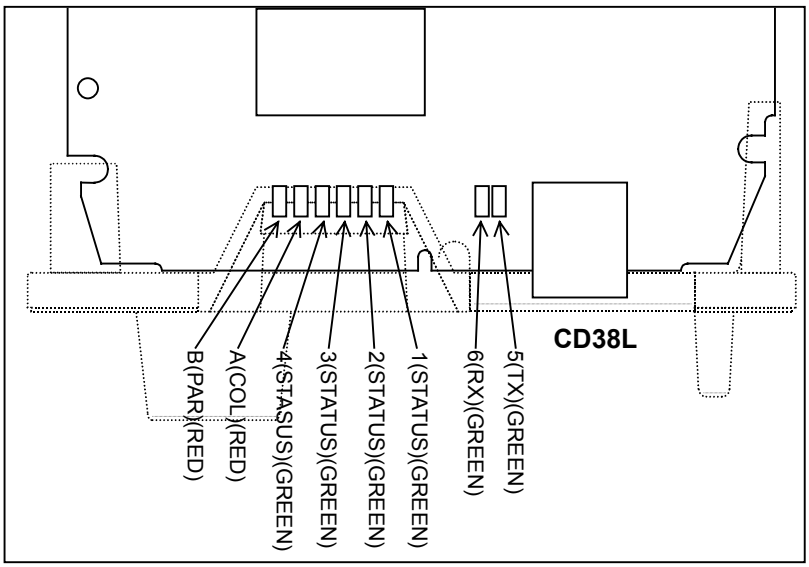


Name	Specification	Remarks
Ethernet board	A20B-8100-0450	

1.2.2 LED Indications

The 16*i*/18*i*/21*i*-A Stand-alone Ethernet board has the following LEDs: Four green STATUS LEDs and one red ALARM LED for indicating the status. Two green LEDs and one red LED for indicating the communication status. The figure below shows the locations of these LEDs. The table below explains the LED lighting states.
In the following explanations, the LED lighting states are expressed as follows:

□: Off ■: On ☆: Blinking ◊: Don't care



NOTE
The dashed lines indicate the faceplate.

LED lighting sequence at power on

No.	LED indication	Ethernet board state
1	STATUS □□□□	Power off
2	STATUS ■■■■	Initial state after power on
3	STATUS ■■■□	MPU initialized.
4	STATUS ■■□□	Firmware downloaded.
5	STATUS ■□□□	Control migration to OS
6	STATUS □■■■	OS PHASE1
7	STATUS □■■□	OS PHASE2
8	STATUS □■□■	OS PHASE3
9	STATUS □■□□	OS PHASE4
10	STATUS □□□☆	Startup completed.

The system enters No.10 status when the Ethernet board starts up normally. This status is maintained until an error occurs.

STATUS LED indications if an error occurs

If an error occurs, the LEDs repeatedly flash "LONG" then "SHORT." (For "LONG," the LED lights for a long time. For "SHORT," the LED lights for a short time.)

No.	STATUS LED indication		Ethernet/data server board state	
	LONG 1234	SHORT 1234		
1	□□□■	■□□□	Failure caused by this board	System reset
2	□□□■	□■□□		Machine check
3	□□■■	■□□□		DRAM parity alarm
4	□□■■	□■□□	Failure caused by another board	NMI of another module

NOTE
If an error, indicated by repeatedly flashing a LONG and SHORT combination other than the above, occurs, contact FANUC.

ALARM LED indications if an error occurs

No.	LED indication		Ethernet board state
1	B (PAR)	■	Parity error occurred in main memory.

LED indications related to communication status

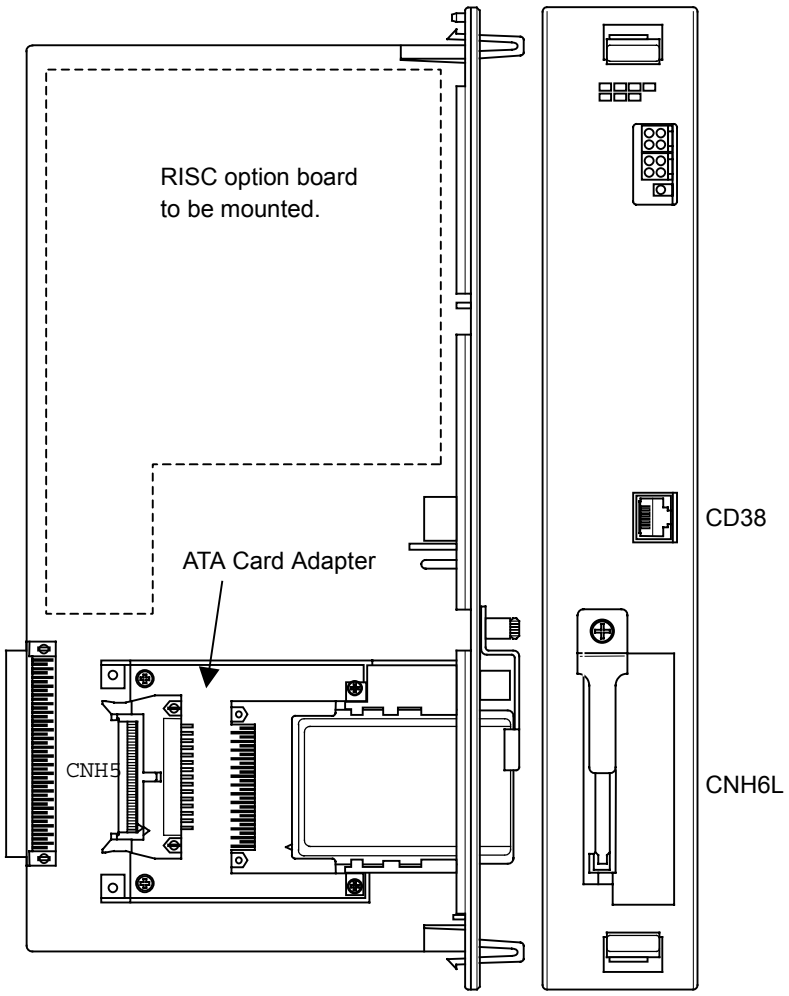
No.	LED indication		Ethernet communications status
1	5(TX)	■	Lights when data is sent.
2	6(RX)	■	Lights when data is received.
3	A(COL)	■	Lights if a data collision occurs.

NOTE
A (COL):
This LED lights frequently if there is excessive traffic on the communication line or if there is excessive peripheral electrical noise.

1.3 STAND-ALONE TYPE DATA SERVER BOARD

This section describes the maintenance information for the Series 16*i*/18*i*/21*i*-A Stand-alone type data server board.

1.3.1 Component Layout



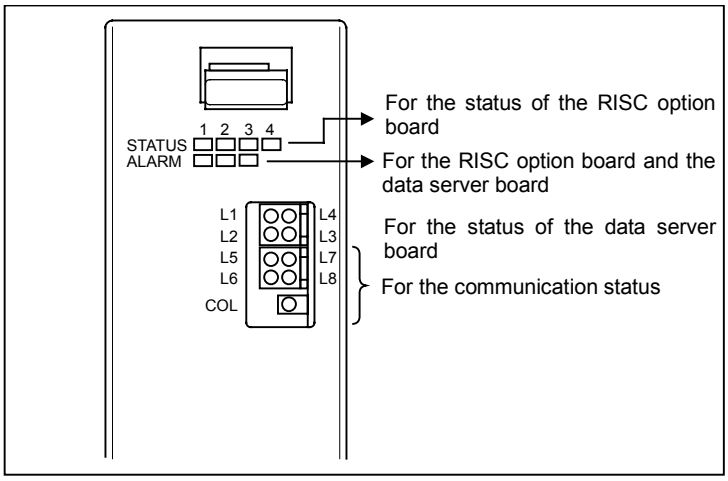
Name	Specification	Remarks
Data server board	A16B-3200-0350	RISC option board installed
Data server board	A16B-3200-0352	RISC option board not installed
ATA Card Adapter	A20B-2100-0560	

NOTE
The ATA Card Adapter is mounted on the data server board. A flat cable is used for the connection between the adapter and the board.

1.3.2 Description of LED Indication

The 16*i*/18*i*/21*i*-A Stand-alone type data server board incorporates the following LEDs: Four green STATUS LEDs and three red ALARM LEDs (for both the data server board and the RISC option board) for indicating the status. Four green LEDs and one red LED for indicating the communication status. The figure below shows the locations of these LEDs. The table below explains the LED lighting states.
In the following explanations, the LED lighting states are expressed as follows:

○: Off ●: On ☆: Blinking ◊: Don't care



LED lighting sequence at power on

No.	LED indication (L1 through L4)	Data server board state
1	○○ ○○	Power off
2	●● ●●	Initial state after power on
3	○● ●●	MPU initialized.
4	○● ○●	Firmware downloaded.
5	○● ○○	Control migration to OS
6	●○ ●●	OS PHASE1
7	○○ ●●	OS PHASE2
8	●○ ○●	OS PHASE3
9	○○ ○●	OS PHASE4
10	☆○ ○○	Startup completed.

The system enters the No.10 status when the Ethernet board starts normally. This status is maintained until an error occurs.

STATUS LED indications if an error occurs (LEDs L1 through L4)

If an error occurs, the LEDs repeatedly flash "LONG" then "SHORT." (For "LONG," the LED lights for a long time. For "SHORT," the LED lights for a short time.)

No.	STATUS LED indication		Ethernet/data server board state	
	LONG 1234	SHORT 1234		
1	○● ○○	●○ ○○	Failure caused by this board	System reset
2	○● ○○	○○ ●○		Machine check
3	○● ○○	●○ ●○		DRAM parity alarm
4	○● ○○	○○ ○●	Failure caused by another board	NMI of another module

NOTE
If an error, indicated by repeatedly flashing a LONG and SHORT combination other than the above, occurs, contact FANUC.

ALARM LED indications if an error occurs

No.	LED indication 123	Data server board state
1	■□■	MPU data transfer error occurred.
2	□■■	Parity error occurred in main memory.

NOTE
LED indications other than those listed above indicate an error that has occurred on the RISC option board.

LED indications related to communication status

Communication status (LEDs L5 through L8)

No.	LED indication	Communication status
1	◊◊ ●◊	Lights when data is sent.
2	◊◊ ◊●	Lights when data is received.
3	◊● ◊◊	Lights when the data server board is successfully connected to the hub.

Communication status (COL LED)

No.	LED indication	Communication status
1	●	Lights if a data collision occurs.

NOTE
COL:
This LED lights frequently if there is excessive traffic on the communication line or if there is excessive peripheral electrical noise.

1.4 HOW TO INVESTIGATE THE COMMUNICATION LINE STATUS

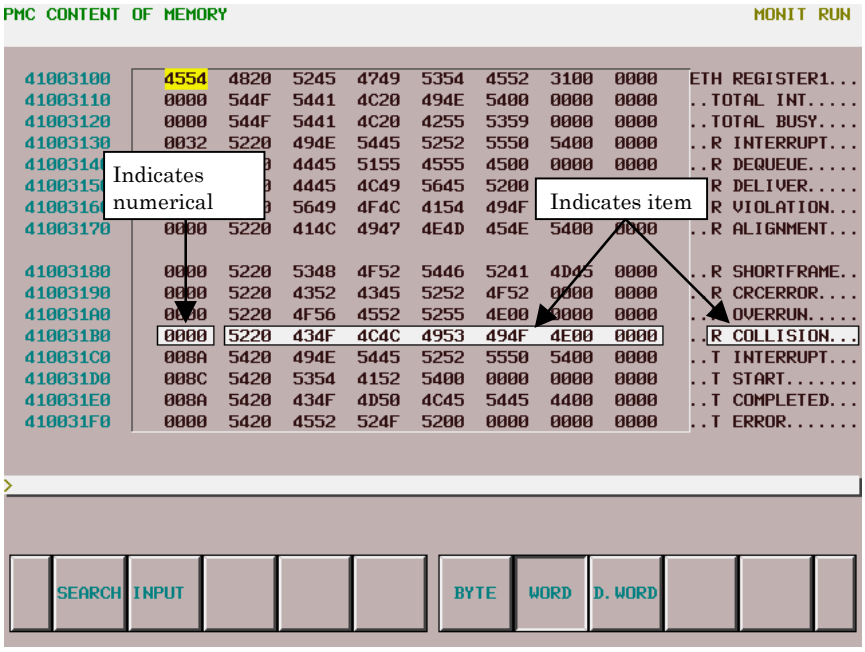
You can learn the communication line status by investigating the state of the communication LSI on the Ethernet board. You can confirm this state in the PMC CONTENTS OF MEMORY screen.
Follow the procedure below to investigate the communication line status.

Procedure

(1) Check the value (????????) in Maintenance Information = 0x???????? displayed on the SYSTEM ERROR screen that is one of the error message screens specific to the Ethernet functions. To display the SYSTEM ERROR screen, see "II Operation, 2.1 Error Message Screen."
Example:
Enter "41003100" using the MDI keys, and press soft key [SEARCH].
(2) Press function key SYSTEM.
(3) Press soft key [CONT] at the bottom right of the soft key menu.
(4) With Series16*i*/18*i*/21*i*-A, Press soft keys [PMC], [PMCDGN] and [M.SRCH] to display the PCM CONTENT OF MEMORY screen.
With Series16*i*/18*i*/21*i*-B, Press soft keys [PMC], [DGNOS] and [MEM] to display the PCM MEMORY DISPLAY screen.
Note that, with the Series 16*i*/18*i*/21*i*-B, soft keys [PMC], [PARAMETER], and [K RELAY] must be pressed in advance to set keep relay K900#3 to 1.
(5) Enter the address next to Maintenance Information checked in (1) using the MDI keys and a soft key.
Example:
Enter "41003100" using the MDI keys, and press soft key [SEARCH].
(6) Press soft key [WORD] to clean up the screen.
(7) The following screen is displayed.

⚠ CAUTION
If the wrong address in memory is displayed, a system error occurs. Pay special care when specifying the address.

NOTE
Sometimes the PMC CONTENT OF MEMORY screen is not displayed depending on the system. If this screen is not displayed, consult the manufacturer.


PMC CONTENT OF MEMORY
MONIT RUN
41003100 4554 4820 5245 4749 5354 4552 3100 0000 ETH REGISTER1...
41003110 0000 544F 5441 4C20 494E 5400 0000 0000 ..TOTAL INT.....
41003120 0000 544F 5441 4C20 4255 5359 0000 0000 ..TOTAL BUSY....
41003130 0032 5220 494E 5445 5252 5550 5400 0000 ..R INTERRUPT...
4100314 4445 5155 4555 4500 0000 0000 ..R DEQUEUE.....
4100315 4445 4C49 5645 5200 R DELIVER.....
4100316 5649 4F4C 4154 494F R VIOLATION...
41003170 0000 5220 414C 4947 4E4D 454E 5400 0000 ..R ALIGNMENT...
41003180 0000 5220 5348 4F52 5446 5241 4D45 0000 ..R SHORTFRAME..
41003190 0000 5220 4352 4345 5252 4F52 0000 0000 . R CRCERROR....
410031A0 0000 5220 4F56 4552 5255 4E00 0000 0000 .. OVERRUN.....
410031B0 0000 5220 434F 4C4C 4953 494F 4E00 0000 .. R COLLISION...
410031C0 008A 5420 494E 5445 5252 5550 5400 0000 ..T INTERRUPT...
410031D0 008C 5420 5354 4152 5400 0000 0000 0000 ..T START.....
410031E0 008A 5420 434F 4D50 4C45 5445 4400 0000 ..T COMPLETED...
410031F0 0000 5420 4552 524F 5200 0000 0000 0000 ..T ERROR.....
Indicates numerical
Indicates item
SEARCH
INPUT
BYTE
WORD
D.WORD

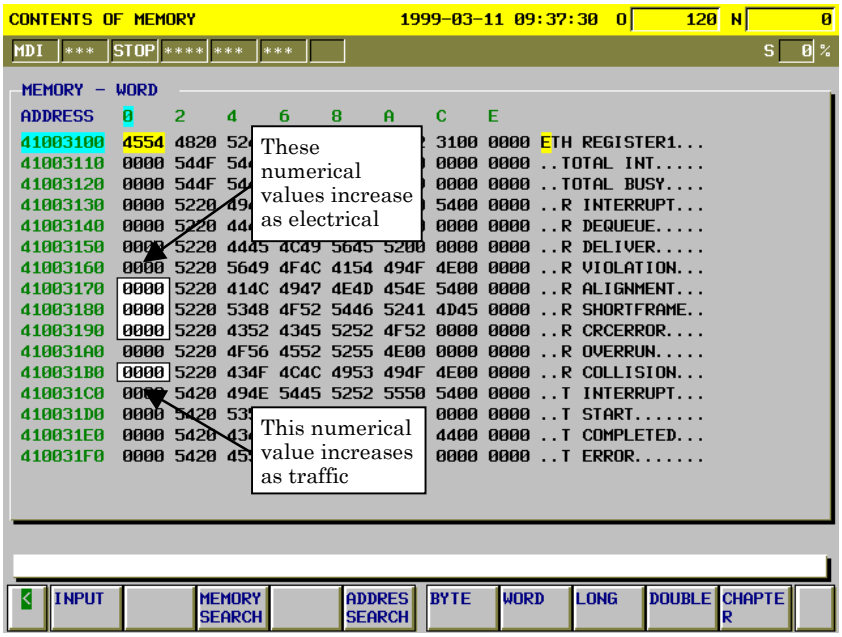
1.4.1 Determining the Communications Line Status

The most probable causes of a poor communications line status are as follows:

- ◆ Excessive traffic on the communications line.
- ◆ Excessive electrical noise on the communications line.

When there is a considerable amount of traffic on the communications line, the value of the R COLLISION item increases. In the figure below, the two bytes of data from address 0x410031B0 are the numerical values of R COLLISION.

When there is a considerable amount of electrical noise on the communications line, the values of the R ALIGNMENT, R SHORTFRAME and R CRCERROR items increase. In the figure below, the two bytes of data from address 0x41003170 are the numerical values of R ALIGNMENT. The two bytes of data from address 0x41003180 are the numerical values of R SHORTFRAME. The two bytes of data from address 0x41003190 are the numerical values of R CRCERROR.



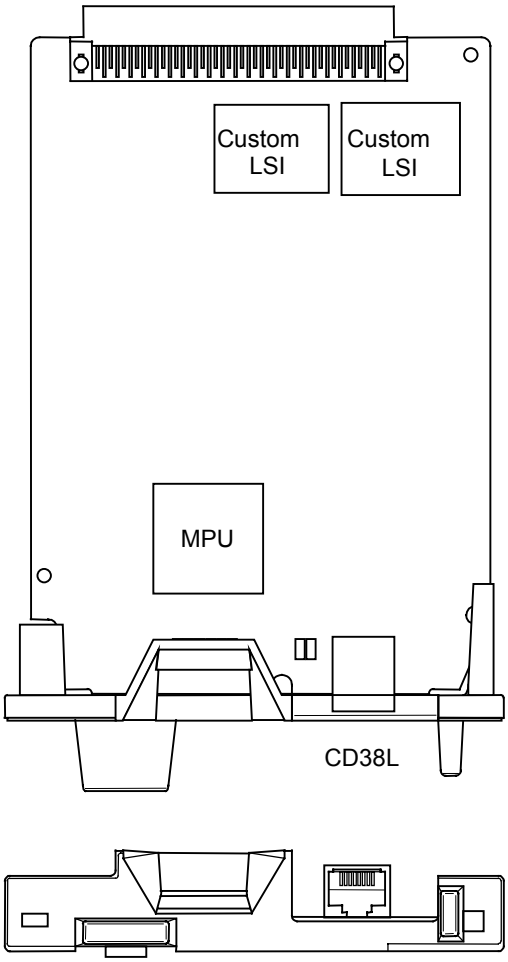
2 Series 15*i*-A MAINTENANCE INFORMATION

This chapter describes the maintenance information for the 15*i*-A data server board.

2.1 ETHERNEAT BOARD

This section describes the maintenance information for the Series 15*i*-A ethernet board.

2.1.1 Component Layout

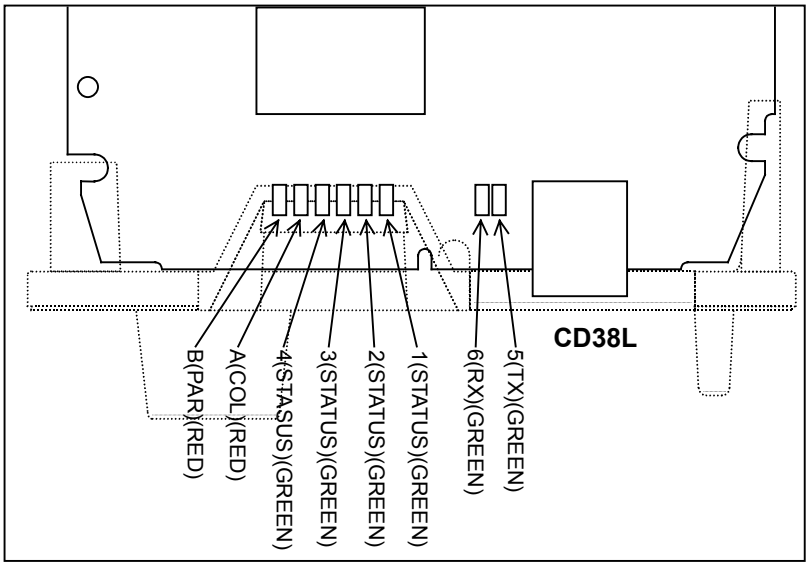


Name	Specification	Remarks
Ethernet board	A20B-8100-0450	

2.1.2 LED Indications

The Ethernet board has the following LEDs: Four green STATUS LEDs and one red ALARM LED for indicating the status. Two green LEDs and one red LED for indicating the communication status. The figure below shows the locations of these LEDs. The table below explains the LED lighting states.
In the following explanations, the LED lighting states are expressed as follows:

□: Off ■: On ☆: Blinking ◊: Don't care



NOTE
The dashed lines indicate the faceplate.

LED lighting sequence at power on

No.	LED indication	Ethernet board state
1	STATUS □□□□	Power off
2	STATUS ■■■■	Initial state after power on
3	STATUS ■■■□	MPU initialized.
4	STATUS ■■□□	Firmware downloaded.
5	STATUS ■□□□	Control migration to OS
6	STATUS □■■■	OS PHASE1
7	STATUS □■■□	OS PHASE2
8	STATUS □■□■	OS PHASE3
9	STATUS □■□□	OS PHASE4
10	STATUS □□□☆	Startup completed.

The system enters No.10 status when the Ethernet board starts up normally. This status is maintained until an error occurs.

STATUS LED indications if an error occurs

If an error occurs, the LEDs repeatedly flash "LONG" then "SHORT." (For "LONG," the LED lights for a long time. For "SHORT," the LED lights for a short time.)

No.	STATUS LED indication		Ethernet/data server board state	
	LONG 1234	SHORT 1234		
1	□□□■	■□□□	Failure caused by this board	System reset
2	□□□■	□■□□		Machine check
3	□□■■	■□□□		DRAM parity alarm
4	□□■■	□■□□	Failure caused by another board	NMI of another module

NOTE
If an error, indicated by repeatedly flashing a LONG and SHORT combination other than the above, occurs, contact FANUC.

ALARM LED indications if an error occurs

No.	LED indication		Ethernet board state
1	B (PAR)	■	Parity error occurred in main memory.

LED indications related to communication status

No.	LED indication		Ethernet communications status
1	5(TX)	■	Lights when data is sent.
2	6(RX)	■	Lights when data is received.
3	A(COL)	■	Lights if a data collision occurs.

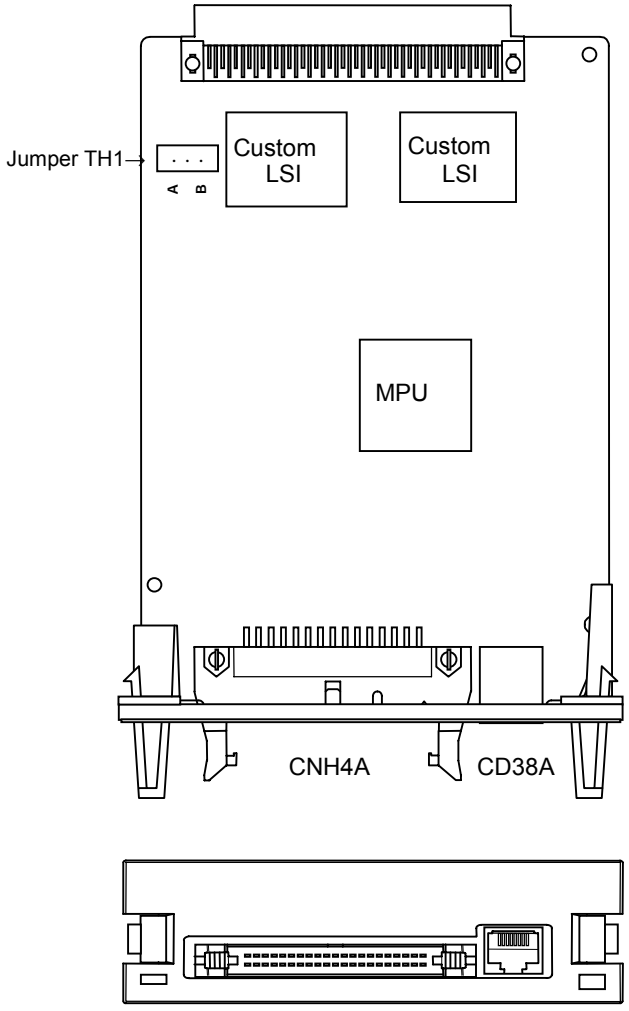
NOTE
A (COL):
This LED lights frequently if there is excessive traffic on the communication line or if there is excessive peripheral electrical noise.

2.2 DATA SERVER BOARD

This section describes the maintenance information for the Series 15*i*-A data server board.

2.2.1 Component Layout

2.2.1.1 Data server board A1

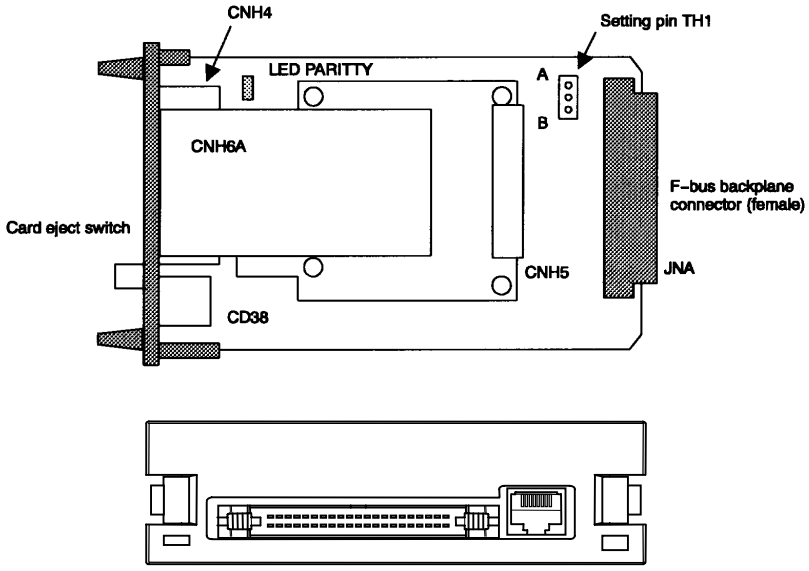


Name	Specification	Remarks
Data server board A1	A20B-8100-0510	

- Setting and adjustment points

Only one point (TH1) needs setting.
TH1: Must be set to position A (as factory-set).

2.2.1.2 Data server board A2



Name	Specification	Remarks
Data server board A2	A20B-8100-0511	
ATA card interface board	A20B-2100-0500	

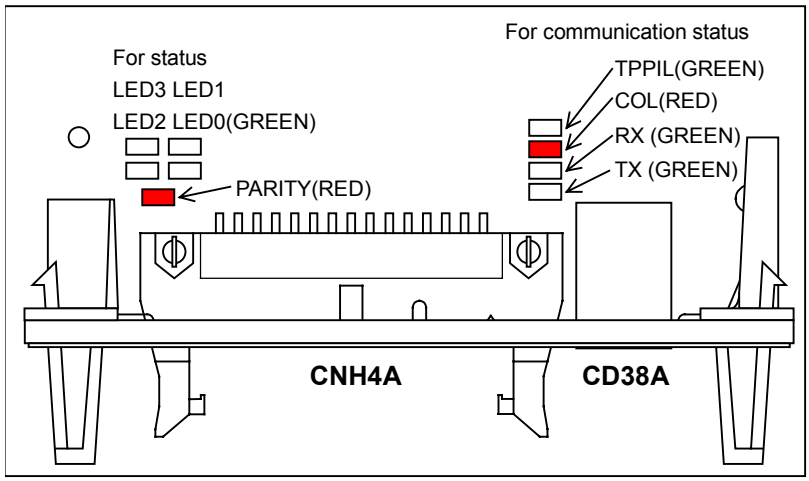
- Setting and adjustment points

Only one point (TH1) needs setting.
TH1: Must be set to position A (as factory-set).

2.2.2 LED Indications

The 15*i*-A data server board incorporates the following LEDs: Four green LEDs and one red PARITY LED for indicating the status. Three green LEDs and one red LED for indicating the communication status. The figure below shows the locations of these LEDs. The table below explains the LED lighting states.
In the following explanations, the LED lighting states are expressed as follows:

□: Off ■: On ☆: Blinking ◊: Don't care



LED lighting sequence at power on (LED0 through LED3)

No.	LED indication 3 1 2 0	Data server board state
1	□□ □□	Power off
2	■■ ■■	Initial state after power on
3	■■ ■□	MPU initialized.
4	■□ ■□	Firmware downloaded.
5	■□ □□	Control migration to OS
6	□■ ■■	OS PHASE1
7	□■ ■□	OS PHASE2
8	□□ ■■	OS PHASE3
9	□□ ■□	OS PHASE4
10	□□ □☆	Startup completed.

The system enters the No.10 status when the data server board starts normally. This status is maintained until an error occurs.

STATUS LED indications if an error occurs (LED0 through LED 3)

If an error occurs, the LEDs repeatedly flash "LONG" then "SHORT." (For "LONG," the LED lights for a long time. For "SHORT," the LED lights for a short time.)

No.	STATUS LED indication		Data server board state	
	LONG 3 1 2 0	SHORT 3 1 2 0		
1	■□ □□	□□ □■	Failure caused by this board	System reset
2	■□ □□	□■ □□		Machine check
3	■□ ■□	□□ □■		DRAM parity alarm
4	■□ ■□	□■ □□	Failure caused by another board	NMI of another module

NOTE
If an error, indicated by repeatedly flashing a LONG and SHORT combination other than the above, occurs, contact FANUC.

ALARM LED indications if an error occurs

No.	LED indication		Data server board state
1	PARITY	■	Parity error occurred in main memory.

LED indication related to communication status

No.	LED indication		Communication status
1	TPPIL	■	Lights when the data server board is successfully connected to the hub.
2	COL	■	Lights if a data collision occurs.
3	RX	■	Lights when data is received.
4	TX	■	Lights when data is sent.

NOTE
TPPIL:
Communication is not performed while this LED is off. A probable reason for this is that the data server board is not properly connected to the hub, or that the hub is off. This LED should be lit at all times while the Ethernet board is properly connected to the hub.
COL:
This LED lights frequently if there is excessive traffic on the communication line or if there is excessive peripheral electrical noise.

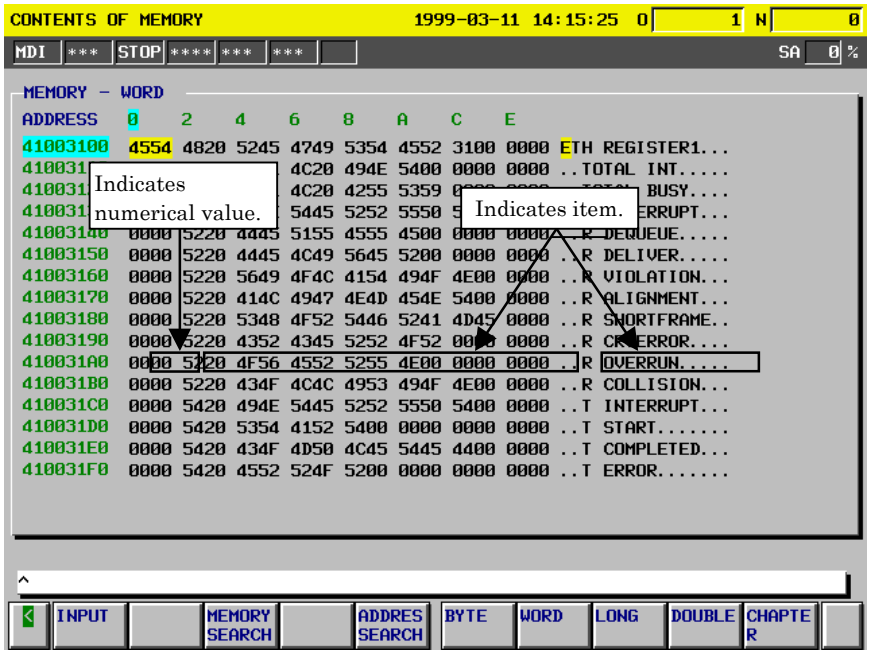
2.3 HOW TO INVESTIGATE THE COMMUNICATION LINE STATUS

You can learn the communication line status by investigating the state of the communication LSI on the Ethernet board. You can confirm this state in the PMC CONTENTS OF MEMORY screen.
Follow the procedure below to investigate the communication line status.

Procedure

(1) Press function key SYSTEM.
(2) Press soft keys [PMC], [PMCDGN] and [M.SRCH] to display the PCM CONTENT OF MEMORY screen.
(3) Press soft key [CONT] at the bottom right of the soft key menu.
(4) Read the value (????????) displayed in "Maintenance Information = 0x????????" in an Error Message screen for the Ethernet function, SYSTEM ERROR screen. Enter this value using the MDI keys or the soft keys. To display the SYSTEM ERROR screen, see "II Operation, 2.1 Error Message Screen." Example: Enter "48003800" using the MDI keys, and press soft key [SEARCH].
(5) Press soft key [WORD] to clean up the screen.
(6) The following screen is displayed.

> ⚠ **CAUTION**
> If the wrong address in memory is displayed, a system error occurs. Pay special care when specifying the address.


CONTENTS OF MEMORY
1999-03-11 14:15:25
MDI
STOP
MEMORY - WORD
ADDRESS 0 2 4 6 8 A C E
41003100 4554 4820 5245 4749 5354 4552 3100 0000 ETH REGISTER1...
410031 4C20 494E 5400 0000 0000 ..TOTAL INT.....
410031 4C20 4255 5359 BUSY....
410031 5445 5252 5550 ERRUPT...
41003140 0000 5220 4445 5155 4555 4500 0000 0000 ..R DEQUEUE.....
41003150 0000 5220 4445 4C49 5645 5200 0000 0000 ..R DELIVER.....
41003160 0000 5220 5649 4F4C 4154 494F 4E00 0000 ..R VIOLATION...
41003170 0000 5220 414C 4947 4E4D 454E 5400 0000 ..R ALIGNMENT...
41003180 0000 5220 5348 4F52 5446 5241 4D45 0000 ..R SHORTFRAME..
41003190 0000 5220 4352 4345 5252 4F52 0000 0000 ..R CRCERROR....
410031A0 0000 5220 4F56 4552 5255 4E00 0000 0000 ..R OVERRUN.....
410031B0 0000 5220 434F 4C4C 4953 494F 4E00 0000 ..R COLLISION...
410031C0 0000 5420 494E 5445 5252 5550 5400 0000 ..T INTERRUPT...
410031D0 0000 5420 5354 4152 5400 0000 0000 0000 ..T START.....
410031E0 0000 5420 434F 4D50 4C45 5445 4400 0000 ..T COMPLETED...
410031F0 0000 5420 4552 524F 5200 0000 0000 0000 ..T ERROR.....
Indicates numerical value.
Indicates item.
INPUT
MEMORY SEARCH
ADDRES SEARCH
BYTE
WORD
LONG
DOUBLE
CHAPTER

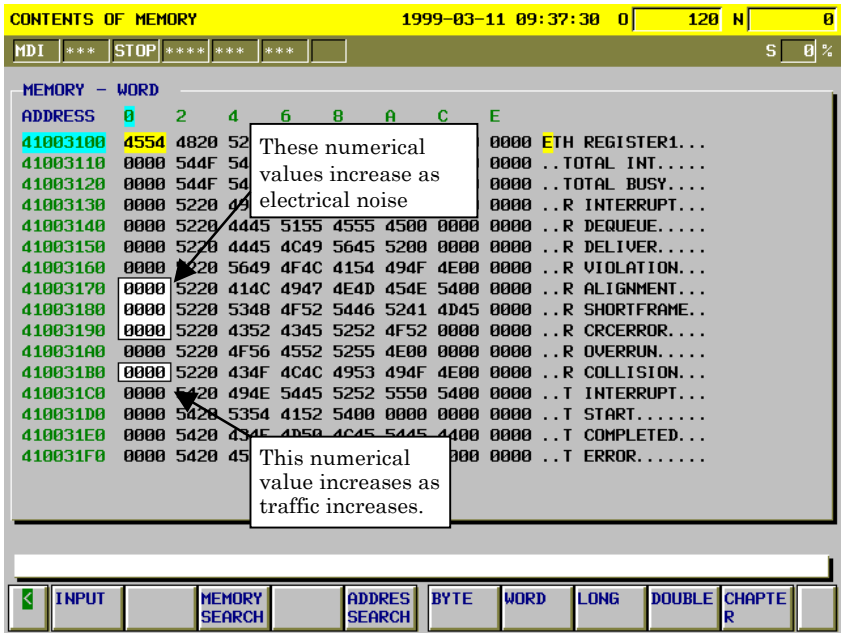
2.3.1 Determining the Communications Line Status

The most probable causes of a poor communications line status are as follows:

- Excessive traffic on the communications line.
- Excessive electrical noise on the communications line.

When there is a considerable amount of traffic on the communications line, the value of the R COLLISION item increases. In the figure below, the two bytes of data from address 0x410031B0 are the numerical values of R COLLISION.

When there is a considerable amount of electrical noise on the communications line, the values of the R ALIGNMENT, R SHORTFRAME and R CRCERROR items increase. In the figure below, the two bytes of data from address 0x41003170 are the numerical values of R ALIGNMENT. The two bytes of data from address 0x41003180 are the numerical values of R SHORTFRAME. The two bytes of data from address 0x41003190 are the numerical values of R CRCERROR.

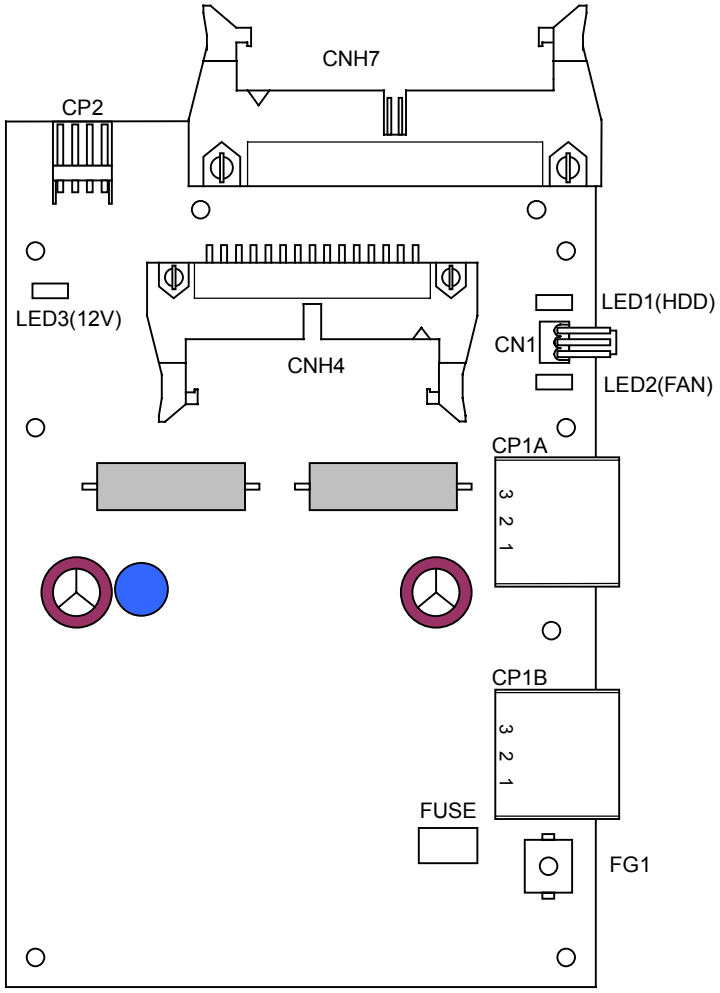


3 HARD DISK DRIVE UNIT MAINTENANCE INFORMATION

This chapter describes the maintenance information for the hard disk drive unit.

3.1 Component Layout

The figure below shows the outline and layout of the hard disk drive interface board that is used to connect the hard disk drive to the data server board.
When the interface board is connected to the hard disk drive unit, a protective metal plate is used.

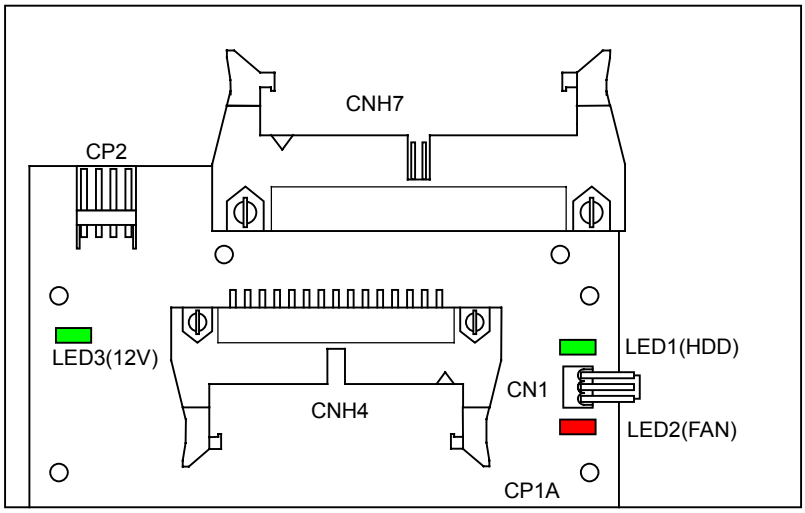


Name	Specification	Remarks
HDD interface board	A20B-2100-0490	

3.2 LED Indications

The hard disk drive interface board incorporates the following LEDs: Two green LEDs (LED1 and LED3) and one red LED (LED2). The figure below shows the locations of these LEDs. The table below explains the LED lighting states.
In the following explanations, the LED lighting states are expressed as follows:

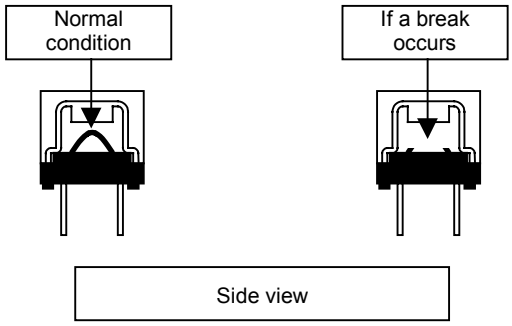
□: Off ■: On ☆: Blinking ◊: Don't care



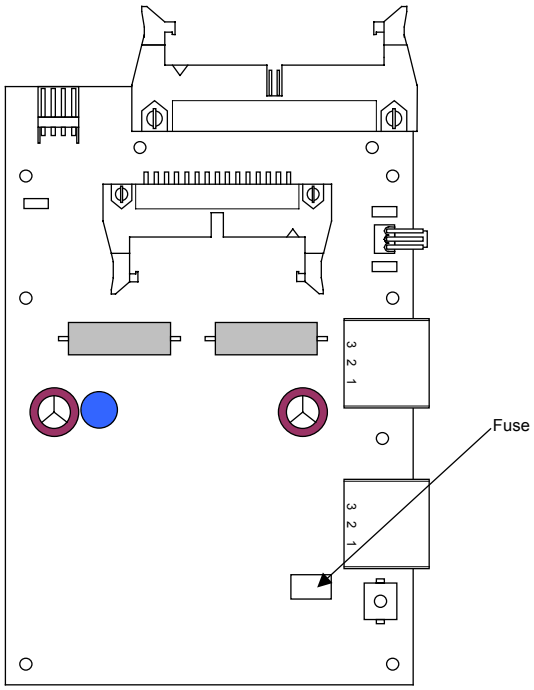
No.	LED indication	Ethernet communication status
1	LED1(HDD/GREEN) ■	Lights while the hard disk drive is being accessed.
2	LED2(FAN/RED) ■	LED indicating a fan alarm for the hard disk drive unit. Lights when a fan alarm condition occurs.
3	LED3(12V/GREEN) ■	Lights while +12 V is being supplied to the hard disk drive. Does not light immediately after the power is turned on. Turns off if a fuse blows.

3.3 Changing the Fuse

(1) Turn off the power to the hard disk drive unit and remove the blown fuse from the board. Then, inspect the fuse for a break. The fuse has a clear body, allowing you to check whether a break exists, as shown below.



(2) Insert a new fuse of the same specification into the fuse socket. The fuse can be inserted in either direction.



Name	Specification	Remarks
Spare fuse	A02B-0261-K121	2.0 A/fuse

[Remark]
The fuse can be removed with the protective metal plate attached.

APPENDIX

A TROUBLESHOOTING

This appendix describes how to check for and correct problems that may occur during communication over an Ethernet network.

A.1 CHECKING HUB CONNECTION

1) Make sure that the STP cable between the hub and the Ethernet board is connected.
2) Make sure that cables are properly wired.
   - Though communication is carried out when the cable pair (see "2.3.1 Cable connection") at the send and receive sides is not properly mounted, communications errors may occur more frequently.
3) Make sure that the hub for 10BASE-T is being used.
4) Make sure that the hub is ON.
5) Make sure that the TPPIL LED on the Ethernet board is lit at all times.
   - The TPPIL LED will not light if the Ethernet board is not connected to the hub or if the hub is not ON.
6) Make sure that the LED (LINK indicator LED) on the connected hub is lit at all times.
   - Some hubs do not have a LINK indicator LED.
   - The LINK indicator LED will not light if the hub is not connected to the Ethernet board or the Ethernet board is not ON.

- For details on how to connect, see "V. Connecting the FANUC Ethernet Board."

A.2 CHECKING TRUNK CONNECTIONS

The following does not apply when the network is configured by only a hub to which the Ethernet board is connected.
The following describes general precautions. Consult a specialist or the manufacturer when you are building your network. Wire cables away from sources of electrical noise

- When the trunk is 10BASE-5
  1) Make sure that the transceiver is properly mounted on the trunk.
     - If the transceiver is properly connected, the resistance between the shield and the center conductor of the trunk is about 25 Ω (when a terminator is connected).
     - A special tool for mounting the transceiver is needed. (Some manufacturers do not provide a special tool. For details, refer to the Operator's Manual for the respective transceiver.)
     - Do not mount the transceiver at the same location where a transceiver is already mounted. (Doing so might damage the cable.)
  2) Make sure that an appropriate distance is provided between transceivers.
     - At least 2.5 m must be provided between mounted transceivers. We recommend mounting transceivers at intervals of 2.5 m or multiples of 2.5 m. Normally, the trunk cable is marked with the transceiver mounting position.
  3) Make sure that terminators are mounted on the trunk cable.
     - Terminators having a terminal resistance of 50 Ω must be mounted to both ends of the trunk cable.
  4) Make sure that the total length of the trunk cable is within 500 m.
  5) Make sure that the transceiver cable connecting the transceiver and hub is within the specified length.
     - Normally, keep transceiver cables to within 50 m. However, note that the maximum length of transceiver cables having a small cable diameter is sometimes shorter than this figure. Check the cable specifications before use.

- When the trunk is 10BASE-2
  1) Make sure that each cable is at least 0.5 m long.
     - The minimum interval between nodes (units) on the network is 0.5 m.
  2) Make sure that the total length of the trunk cable is within 185 m.
  3) Make sure that terminators are mounted on the trunk cable.
     - Terminators having a terminal resistance of 50Ω must be mounted to both ends of the trunk cable.

A.3 CHECKING SETTINGS

The following describes how to check the minimum settings needed for communications.

NOTE
For details on IP addresses, subnet mask and other set values, consult with the network administrator.

- Checking settings on the Ethernet board
  1) Make sure that the MAC address of the Ethernet board is displayed.
     - This address is appended to each board before shipment from the factory, and is automatically displayed in the Setting screen. This address need not be set by the user. For details, see "IV Operation Manual, 1.4 Setting Screen."
  2) Make sure that the IP address is set.
  3) Make sure that the subnet mask is set.
  4) When a router is used, make sure that the router IP address is set.

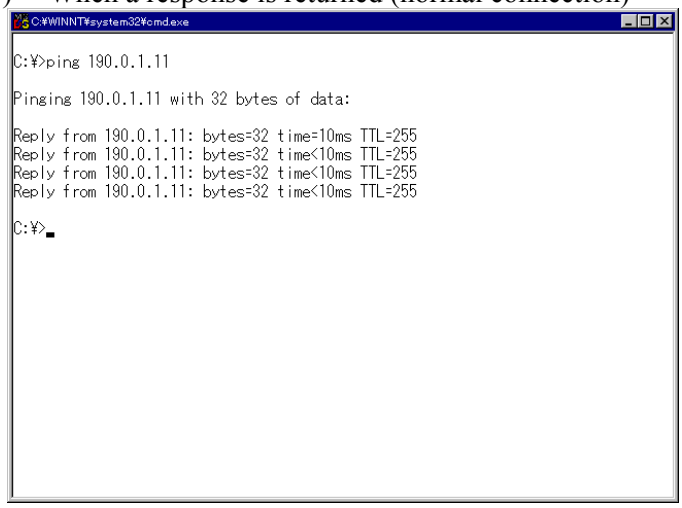
- Checking settings on the personal computer
  1) Make sure that the IP address is set.
  2) Make sure that the subnet mask is set.
  3) When a router is used, make sure that the router IP address is set.

- For details on how to set, see "IV. Operation."

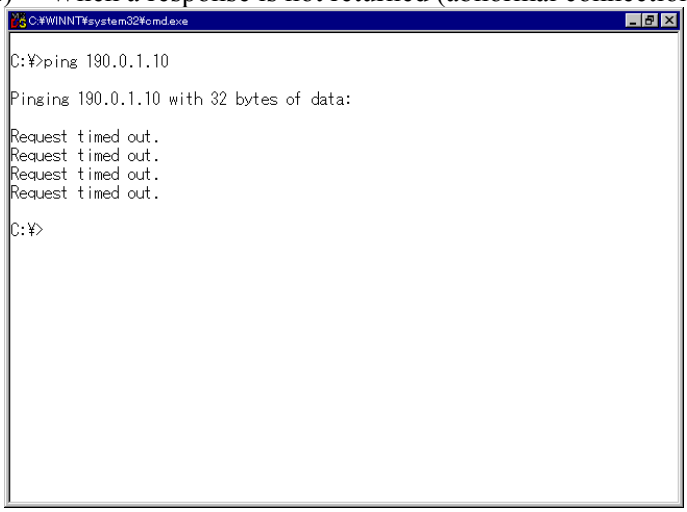
A.4 CHECKING COMMUNICATION

This section describes how to check the communication status between a CNC and the other communicating partner (personal computer). If communication with the CNC sometimes fails or is not possible, first make sure that the communication path is normal by the following procedure. The "ping" command is used to check communication.
In the following example, a personal computer running the WindowsNT4.0 is used.

- Checking the communication path
  Open the DOS window, and enter 'ping "IP address of CNC"'. If a response is returned from the CNC, the Ethernet board is connected to the CNC.
  1) When a response is returned (normal connection)



  2) When a response is not returned (abnormal connection)

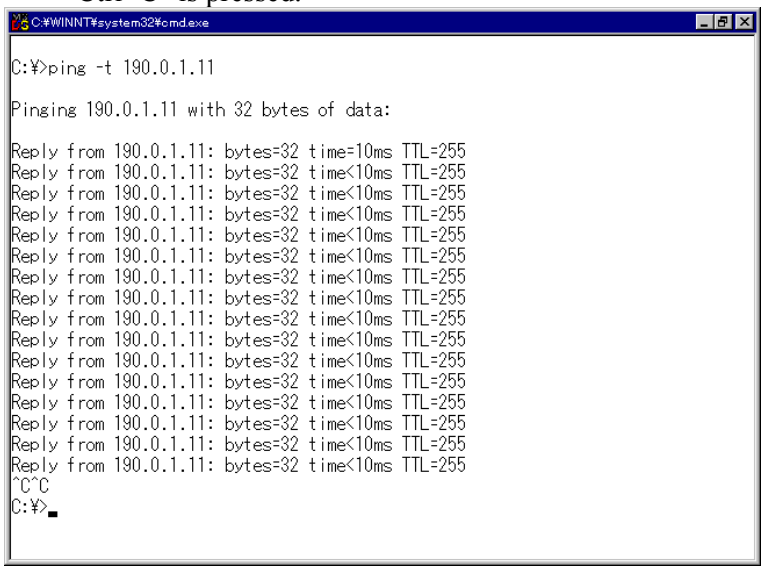


  When a response is not returned, probable causes are either the hardware connection or a software setting, or both. Check the hardware connections and software settings again.

- Checking IP addresses for duplication
  IP addresses can be checked for duplication by the procedure described below.
  1) Disconnect the Ethernet cable from the CNC to isolate it from the network.
  2) Execute a ping command on another personal computer as described in "Checking the communication path."
     Since the CNC is disconnected from the network, no response should be returned. If a response is returned, the IP address is in use on another unit. Therefore, the IP address cannot be used on the CNC from which the cable was disconnected.

> ⚠ **CAUTION**
> This procedure can be used to just check whether the IP address duplicates any one already in use at that time. It does not assure that the IP address is left non-duplicated because a unit having the same IP address may be turned on after the check or the same address may be set later.
> When setting an IP addressing, ask the network manager about duplication.

- Checking for influence of electrical noise
  The "ping" command "-t" option is used for checking for the influence of electrical noise. This option sends ping packets until "Ctrl+C" is pressed.



  1 About the influence of electrical noise from peripheral machinery (devices)
    1) Turn the machine in which the Ethernet board is mounted ON to enable communications.

2) Press the EMERGENCY STOP button on the machine with the servo/spindle amplifier OFF, and issue the "ping" command from the personal computer.
3) Count the number of lost packets (packets for which a response was not returned).
f a lost packet occurs in this state, the machine is probably being affected by electrical influence from peripheral machines.
Countermeasure:
Pin-point the source of the electrical noise, and check the wiring again to prevent the influence of electrical noise.

2 About the influence of electrical noise from mounted machinery
1) Start up the machine in the same way as 1. above.
2) Cancel the emergency stop on the machine with the servo/spindle amplifier ON, and issue the "ping" command from the personal computer.
3) Count the number of lost packets.
If more lost packets than in 1 above are occurring, a probable cause is the influence of electrical noise on the machine itself. General probable causes are the state of the ground on the machine or on the communicating party.
Countermeasure:
Check the state of the ground on the machine or on the communicating party, and insulate the communications trunk with the machine.

- For details on how to check the operating status or communications status of the Ethernet board other than the above, see "VI. Maintenance."

B TROUBLES & ERROR MESSAGES

Appendix B describes the relationship between troubles that may occur through use of the Ethernet functions and error messages that are displayed.
Note that Appendix B does not list error messages for all potential troubles; it lists only troubles that may occur during normal use.

When trouble occurs, an Error Message screen is displayed to identify the cause of the trouble. Check the details of the error in this screen. The following pages list the error messages that may be displayed when trouble occurs. For this reason, one error message may be displayed twice or more times when two or more troubles occur simultaneously.

B.1 COMMUNICATIONS DOWN (FACTOLINK FUNCTION)

PARAMETER ERROR screen

OWN IP ADDRESS(???) IS INVALID	The set value (???) of the own IP address is in error. Set the own IP address to the correct value.
SUBNET MASK(???) IS INVALID	The set value (???) of the subnet mask is in error. Set the subnet mask to the correct value.
ROUTER IP ADDRESS(???) IS INVALID	The set value (???) of the router IP address is in error. Set the router IP address to the correct value.
FACTOLINK#? IP ADDRESS(???) IS INVALID	The set value (???) of the IP address of the server that is connected by the FACTOLINK function is in error. Set the IP address of the server that is connected by the FACTOLINK function to the correct value.
FACTOLINK#? PORT(???) IS INVALID	The set value (???) of the port No. of the server that is connected by the FACTOLINK function is in error. Set the port No. of the server that is connected by the FACTOLINK function to the correct value.

FACTOLINK#? MESSAGE screen

PARAMETERS ARE INVALID. SO THIS TASK IS TERMINATED.	The parameters are in error. Cancel the services currently active on this port. Check the set values of the own IP address, subnet mask, router IP address, and IP address and port No. of the server that is connected by the FACTOLINK function, and set these parameters to their correct values.
ALREADY CONNECTED.	The connection request was issued again to an already connected port.
PARAMETERS ARE INVALID. PLEASE CHECK PARAMETERS.	The parameters are in error. Check the set values of the own IP address, subnet mask, router IP address, and IP address and port No. of the server that is connected by the FACTOLINK function, and set these parameters to their correct values.
FAIL TO CONNECT SOCKET. (???)	Failed to connect to the port. Error code is (???).
NOT CONNECTED	A disconnection request or data send request was issued to a non-connected port.

B.2 COMMUNICATIONS DOWN (DNC1/ETHERNET FUNCTION)

PARAMETER ERROR screen

OWN IP ADDRESS(???) IS INVALID	The set value (???) of the own IP address is in error. Set the own IP address to the correct value.
SUBNET MASK(???) IS INVALID	The set value (???) of the subnet mask is in error. Set the subnet mask to the correct value.
ROUTER IP ADDRESS(???) IS INVALID	The set value (???) of the router IP address is in error. Set the router IP address to the correct value.
DNC1/ETHER TCP-PORT(???) IS INVALID	The set value (???) of the TCP port No. by the DNC1/Ethernet function is in error. Set the TCP port No. to the correct value.
DNC1/ETHER UDP-PORT(???) IS INVALID	The set value (???) of the UDP port No. by the DNC1/Ethernet function is in error. Set the UDP port No. to the correct value.
CNC failed to initialize DNC1/Ethernet I/F	Failed to initialize the CNC unit by the DNC1/Ethernet function. Switch over to the CNC system supporting the DNC1/Ethernet function.
PMC failed to initialize DNC1/Ethernet I/F	Failed to initialize the PMC unit by the DNC1/Ethernet function. Switch over to the PCM system supporting the DNC1/Ethernet function.
Err boot_mmc(): ???	Error occurred on boot_mmc() by the DNC1/Ethernet function. Error code is ???.

DNC1/ETH TASK0 MESSAGE screen

Othe: illegal Tcp Port Number	The TCP port No. setting is in error. Set the TCP port No. to the correct value.
Othe: illegal Udp Port Number	The UDP port No. setting is in error. Set the UDP port No. to the correct value.
Othe: illegal Time Interval	The time interval setting is in error. Set the time interval setting to the correct value When only the FOCAS1/Ethernet function is used and the "0" is set for "Time Interval," this message does not indicate any problem.
Othe: illegal Broadcast IP Address	The broadcast address is in error. Set the own IP address and net mask to the correct values.
Othe: illegal Power On Date or Time	The time is in error when the power is turned ON. Set the CNC clock to the correct value.
Sock: Err Passive TcpOpen() [???]	Error occurred on function "PassiveTcpOpen()". Error code is [???].

Sock: Can't accept [???]	Could not accept. Error code is [???].
Prot: PDU mark was invalid [???]	A PDU [???] that is not related to the DNC1/Ethernet protocol mark was received. The PDU that was not related to the DNC1/Ethernet protocol was discarded.
Prot: PDU version was Invalid [???]	The version of the DNC1/Ethernet protocol supported by the personal computer is newer than the version of the DNC/Ethernet protocol supported by the CNC. Or, the version is incorrect. The version supported by the personal computer is [???].
Prot: Receive Invalid Initiate.Req	An incorrect "Initiate.Req" was received.

DNC1/ETH TASK1 #? MESSAGE screen

Eth: Err EthInit() [???]	Error occurred by function "EthInit()". Error code is [???].

DNC1/ETH TASK2 #? MESSAGE screen

Eth: Err EthInit() [???]	Error occurred by function "EthInit()". Error code is [???].

B.3 COMMUNICATIONS DOWN ONCE IN A WHILE (DNC1/ETHERNET FUNCTIONS)

DNC1/ETH TASK0 MESSAGE screen

Othe: All Category 1 Tasks are busy	All service Category 1 tasks have started. No more service Category 1 tasks can be started up. The maximum number of connectable clients has been exceeded.
Othe: All Category 2 Tasks are busy	All service Category 2 tasks have started. No more service Category 2 tasks can be started up. The maximum number of connectable clients has been exceeded.
Sock: Err doSend() [???]	Error occurred by function "doSend()". Error code is [???].

DNC1/ETH TASK1 #? MESSAGE screen and DNC1/ETH TASK2 #? MESSAGE screen

Prot: Err TakeOutPduHeader() [Close]	Error occurred by function "TakeOutPduHeader()". Cause: Socket was closed.
Prot: Err TakeOutPduHeader() [Timeout]	Error occurred by function "TakeOutPduHeader()". Cause: Personal computer was turned OFF, cable was disconnected, or excessive traffic or electrical noise on communications line.
Prot: Err TakeOutPduContents() [Close]	Error occurred by function "TakeOutPduContents()". Cause: Socket was closed.
Prot: Err TakeOutPduContents() [Timeout]	Error occurred by function "TakeOutPduContents()". Cause: Personal computer was turned OFF, cable was disconnected, or excessive traffic or electrical noise on communications line.
Sock: Err doSend() [???]	Error occurred by function "doSend()". Error code is [???].
Prot: Received PDU was Invalid Request	Received PDU was incorrect request.

B.4 COMMUNICATIONS DOWN (DATA SERVER FUNCTIONS)

PARAMETER ERROR screen	
OWN IP ADDRESS(???) IS INVALID	The value set (???) for the own IP address is invalid. Set a valid own IP address.
SUBNET MASK(???) IS INVALID	The value set (???) for the subnet mask is invalid. Set a valid value for the subnet mask.
ROUTER IP ADDRESS(???) IS INVALID	The value set (???) for the router IP address is invalid. Set a valid value for the router IP address.
FTP SERVER MESSAGE screen DATA SERVER MESSAGE screen DATA SERVER #? MESSAGE screen	
LOGIN USER IS INVALID	Login name of the host computer is invalid.
PARAMETERS ARE INVALID	The parameters of the host computer to which a connection is to be made are invalid.

B.5 COMMUNICATIONS DOWN ONCE IN A WHILE (DATA SERVER FUNCTIONS)

FTP SERVER MESSAGE screen
DATA SERVER MESSAGE screen
DATA SERVER #? MESSAGE screen

CANNOT CHANGE DIRECTORY	Cannot move the directory. Check that the specified directory exists.
CANNOT ESTABLISH CONNECTION	Cannot connect to the host computer. Check that the specified host computer is turned on and its data server board is connected to the network.
LOGIN FAILED	Cannot log on to the host computer. Check that the user name and password are correct.
GET ERROR	Cannot get a file.
PUT ERROR	Cannot write a file.
FORMAT ERROR (???)	Cannot format the hard disk drive. Error code is ???.
CHKDISK ERROR (???)	Cannot check the hard disk drive. Error code is ???.

C ETHERNET-RELATED TERMINOLOGY

This appendix briefly describes Ethernet-related terminology.
Note that this appendix describes only the minimum required terminology.

TCP/IP

A protocol called "TCP/IP" (Transmission Control Protocol/Internet Protocol) is generally used in communications using Ethernet. A "protocol" refers to an arrangement or a set of rules for enabling smooth communications between communications devices connected via an electrical communications line. The TCP/IP protocol is part of a layered structure comprising the following protocols and services.

Layer	Protocols, Network Services
Application Layer	User services as "FTP"
Transport Layer	Protocols as "TCP", "UDP"
Network Layer	Protocols as "IP", "ICMP"
Data Link Layer MAC Layer	Protocols as "ARP", "RARP"
Physical Layer	Hardware as cables, devices

Usually, "TCP/IP" protocol is a generic name including the protocols mounted on the two layers, transport layer and network layer, in the above table.

IP address (INET address)

TCP/IP uses an address called an IP address (INET address) for identifying a specified communications device among many communications devices that are connected by Ethernet. To carry out communications using TCP/IP, a unique IP address must be set to each of the communications devices that are connected by Ethernet.
An IP address is an address that is four octets (bytes) long. Normally, it is expressed in the form of four 8-bit fields (1 octet, 1 byte) each delimited by a period. Each of these octets are capable of having a value within the range 0 to 255.
IP addresses comprise a network address to which the communications device is connected and the host address of that communications device. IP addresses can be divided into three network classes, Classes A, B or C, depending on the size of the network group.

	Leading Octet Value	Network Address Part	Host Address Part
Class A	0 to 127	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx
Class B	128 to 191	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx
Class C	192 to 223	xxx.xxx.xxx.xxx	xxx.xxx.xxx.xxx

Hatched parts indicate the sections corresponding to the respective addresses.

Generally, Class C is used if a single network does not support 255 or more communications devices.
In a single network, the IP addresses of communications devices connected to that network all share the same network address, and each have unique values as their host address.
Network addresses and host addresses expressed as either all 0's or all 255's are not allowed.

IP addresses are managed in an integrated manner internationally. For this reason, to use an IP address, an official IP address must be acquired from an international organization.

However, note that if the network used by the user is a closed local network at the user site (a network built only inside the company that is not connected to an outside network), appropriate address can be set as the IP address under the user's management and responsibility. In the case of a local network, an IP address whose network address is one Class A address "10", 16 Class B addresses "172.16" to "172.31", or 256 Class C addresses "192.168.0" to "192.168.255" can be used without being officially registered. So, we recommend using IP addresses having these network addresses when the IP addresses are used within a local network.

Subnet mask (MASK address)

This is the address that constitutes the mask value for identifying the network address in the above IP address.
Specify "255.0.0.0" in the case of a Class A network.
Specify "255.255.0.0" in the case of a Class B network.
Specify "255.255.255.0" in the case of a Class C network.

MAC address (Ethernet address)

This address is assigned to the Ethernet control card of each communications device, and is used for identifying each control device at the MAC layer (Media Access Control layer, the lowest layer of the data link layer). A unique address acquired from an international organization is assigned as the MAC address to the manufacturer of the Ethernet control card.

Port Number.

This is a 16-bit integer value for linking the processes of the TCP/IP transport layer (TCP or UDP) and the application layer. Port Number. 0 to 8000 are assigned to standard applications such as Telnet or FTP generally referred to as "well-known port numbers." Assignment of Port Number. is described in Assigned Numbers [RFC1340].
When the DNC1/Ethernet or FACTOLINK functions are used, assign a Port Number. other than a well-known port number.

Broadcasting

The sending of messages to all nodes in the same segment

Client

The device or application that requests a service

Server

The device or application that provides a service

D RESTRICTIONS

This appendix describes the restrictions imposed on the FACTOLINK, DNC1/Ethernet, FOCAS1/Ethernet and data server functions.

D.1 RESTRICTIONS RELATED TO ETHERNET AND DATA SERVER BOARDS

There are restrictions on the number of sockets for the Ethernet board and data server board. The socket is a logical communication line used to communicate with the host computer.
The number of sockets that can be used is limited to within 24. An attempt to communicate using more than 24 sockets ends in an error.
The number of sockets used by each function is as follows:

FACTOLINK function

One socket is consumed when the optional FACTOLINK function is set up.

DNC1/Ethernet function
FOCAS1/Ethernet function

Three sockets are consumed when the optional DNC1/Ethernet or FOCAS1/Ethernet function is set up. Two more sockets are consumed by each application connected to the CNC.

Data server function

Six sockets are consumed when the optional data server function is set up. In the FTP or buffer mode, two more sockets are consumed for each CNC system.

NOTE
Basically, sockets are used only when communication is taking place. In some cases, therefore, communication is possible even if the total of the consumed sockets exceeds the maximum permitted number. In this case, communication may become impossible abruptly, however.

Examples of using sockets

Example 1)

If the FACTOLINK function is used simultaneously with the FOCAS1/Ethernet function, the FACTOLINK function consumes one socket, and the FOCAS1/Ethernet function consumes up to 23 sockets during communication with up to 10 applications. The total of consumed sockets is 24, which is not greater than the restriction.

Example 2)

If the FOCAS1/Ethernet function is used simultaneously with the data server function, the data server function consumes six sockets if it runs only in the storage mode. So, the FOCAS1/Ethernet function can communicate with up to 7 applications. In this case, the total of consumed sockets is 23.

Example 3)

If the FACTOLINK function is used simultaneously with the DNC1/Ethernet function and the data server function, and the data server function runs in the FTP mode (with one CNC system), the FACTOLINK function consumes one socket, and the data server function consumes 8 sockets. Therefore, the DNC1/Ethernet function can communicate with up to 6 applications. In this case, the total of consumed sockets is 24.

D.2 FACTOLINK FUNCTION RESTRICTIONS

The FACTOLINK function supports the connection of only one FACTOLINK server to one CNC. However, the CNC can store the IP addresses and port numbers of up to three FACTOLINK servers. You can select the FACTOLINK server to be connected by changing the setting of CNC parameter No.802. For each personal computer, there is one FACTOLINK server.

D.3 DNC1/ETHERNET AND FOCAS1/ETHERNET FUNCTION RESTRICTIONS

The DNC1/Ethernet or FOCAS1/Ethernet function supports the linkage of up to ten application software packages (process) to one CNC.
The DNC1/Ethernet or FOCAS1/Ethernet function establishes a communication line for each application software package (for each process). Therefore, when there is one DNC1/Ethernet or FOCAS1/Ehternet application software package for each personal computer, up to ten personal computers can be connected to one CNC. Also, more than one DNC1/Ethernet or FOCAS1/Ethernet application software package can run on each personal computer. When one DNC1/Ethernet application software package and two of FOCAS1/Ethernet application software packages are run on one personal computer, three personal computers can be connected to the CNC.

D.4 DATA SERVER FUNCTION RESTRICTIONS

The data server function (FTP client) supports the connection of only one FTP server to one CNC.
The data server function (FTP server) supports the connection of only one FTP client to one CNC.

E ASCII CODE TABLE

The following table shows the ASCII codes expressed by 20 to 7F (hex).
The left side of the colon ":" indicates the ASCII character, and the right indicates the code in decimal for that ASCII character.

	2	3	4	5	6	7
0	Blank: 032	0: 048	@: 064	P: 080	`: 096	p: 112
1	!: 033	1: 049	A: 065	Q: 081	a: 097	q: 113
2	": 034	2: 050	B: 066	R: 082	b: 098	r: 114
3	#: 035	3: 051	C: 067	S: 083	c: 099	s: 115
4	$: 036	4: 052	D: 068	T: 084	d: 100	t: 116
5	%: 037	5: 053	E: 069	U: 085	e: 101	u: 117
6	&: 038	6: 054	F: 070	V: 086	f: 102	v: 118
7	': 039	7: 055	G: 071	W: 087	g: 103	w: 119
8	(: 040	8: 056	H: 072	X: 088	h: 104	x: 120
9	): 041	9: 057	I: 073	Y: 089	i: 105	y: 121
A	*: 042	:: 058	J: 074	Z: 090	j: 106	z: 122
B	+: 043	;: 059	K: 075	[: 091	k: 107	{: 123
C	,: 044	<: 060	L: 076	¥: 092	l: 108	|: 124
D	-: 045	=: 061	M: 077	]: 093	m: 109	}: 125
E	.: 046	>: 062	N: 078	^: 094	n: 110	~: 126
F	/: 047	?: 063	O: 079	_: 095	o: 111	DL: 127

(Lines indicate 1-byte data of the upper 4 bits, and columns indicate 1-byte data of the lower 4 bits.)

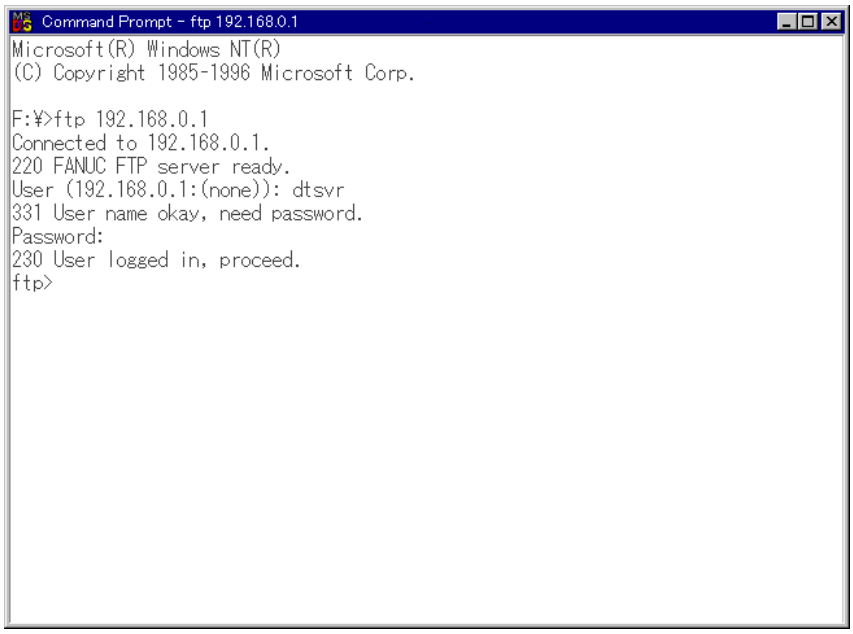
F FTP CLIENT OPERATION

This appendix describes how to operate an FTP client running on a personal computer that is used to enable the data server function.

F.1 FTP COMMANDS (FOR WINDOWS NT 4.0 WORKSTATIONS)

Login

1 Enter "ftp IP-address-of-NC" at the command prompt.
2 Enter a user name.
3 Enter a password.
4 The message, "230 User logged in, proceed." indicates that the login process has been completed successfully.



GET

1 Enter "get hard-disk-file-name."

```
ftp> get O0001.DAT
200 Command okay.
150 Opening data connection for (O0001.DAT) (192.168.0.101,1036).
226 Closing data connection.
1040102 bytes received in 13.28 seconds (78.33 Kbytes/sec)
ftp>
```

MGET

1 Enter "mget hard-disk-file-name (including a wildcard character)."

```
ftp> mget *.DAT
200 Command okay.
200 Command okay.
150 Opening data connection for (O0002.DAT) (192.168.0.101,1066).
226 Closing data connection.
2080120 bytes received in 27.45 seconds (75.78 Kbytes/sec)
200 Command okay.
150 Opening data connection for (PRG7.DAT) (192.168.0.101,1067).
226 Closing data connection.
1160 bytes received in 0.13 seconds (8.92 Kbytes/sec)
ftp>
```

PUT

1 Enter "put host-file-name hard-disk-file-name."

```
ftp> put O0001.DAT O0001
200 Command okay.
150 Opening data connection for (O0001) (192.168.0.101,1037).
226 Closing data connection.
1040102 bytes sent in 11.48 seconds (90.63 Kbytes/sec)
ftp>
```

MPUT

1 Enter "mput host-file-name (including a wildcard character)."

```
ftp> mput *.DAT
200 Command okay.
150 Opening data connection for (O0002.DAT) (192.168.0.101,1068).
226 Closing data connection.
2080120 bytes sent in 22.69 seconds (91.66 Kbytes/sec)
200 Command okay.
150 Opening data connection for (PRG7.DAT) (192.168.0.101,1069).
226 Closing data connection.
1160 bytes sent in 0.00 seconds (1160000.00 Kbytes/sec)
ftp>
```

DIR

1 Enter dir.

```
ftp> dir
200 Command okay.
150 Opening data connection for (LIST ) (192.168.0.101,1035).
d---------   1 owner    group               0 Feb 10 15:42 .
d---------   1 owner    group               0 Feb 10 15:42 ..
----------   1 owner    group         1040102 Feb 16 09:47 O0001.DAT
----------   1 owner    group         2080120 Feb 16 09:47 O0002.DAT
----------   1 owner    group           45448 Feb 24 16:57 PRAMETER
----------   1 owner    group           11092 Feb 24 17:02 TOOLOFS
----------   1 owner    group            4116 Feb 25 10:35 MACRO
----------   1 owner    group              74 Feb 16 09:47 O0199.PRG
----------   1 owner    group           12292 Feb 24 17:09 PITCH
----------   1 owner    group            2740 Feb 24 17:54 WORKOFS
----------   1 owner    group             462 Feb 24 20:28 HISTORY
----------   1 owner    group            6004 Feb 24 20:31 M-CODE
----------   1 owner    group            1160 Feb 16 09:48 PRG7.DAT
226 Closing data connection.
876 bytes received in 0.17 seconds (5.15 Kbytes/sec)
ftp>
```

DELETE

1 Enter "del hard-disk-file-name."

```
ftp> del O0001.DAT
250 Requested file action okay, completed.
ftp>
```

Logout

1 Enter bye.

```
ftp> bye
221 Service closing control connection.

F:¥>
```

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FANUC Ethernet Board/DATA SERVER Board OPERATOR'S MANUAL (B-63354EN)

03	Mar., 2000	- Addition of "Buffer mode" on the DATA SERVER functon - Addition of "LIST-GET/PUT/DELETE" on the DATA SERVER functon - Addition of "Making/Moving/Deleting a Directory" on the DATA SERVER functon - Addition of Power Mate *i*			
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