B. DNC-A

SECTION 1 FUNCTIONS

DNC-A for the OKUMA OSP controls the transmission of NC programs and data between a CNC machine and the host processor through an RS232C interface. It provides the following two major functions:

- (1) Downloading Receives NC programs (or files) from the host computer.
 - [INPUT] The CNC machine can also verify a received NC program (file) by matching the received NC program (file) stored in its memory with the NC program (file) that is sent from the host computer for verification.
- (2) Uploading Uploads NC programs (or files) to the host computer.

[OUTPUT] The CNC machine can retransmit the NC programs (files) so that they can be verified at the host computer.

SECTION 2 OPERATING PROCEDURES

1. Operating Procedure for DNC

(1) Press the EDIT AUX key.



(2) The display shown below will appear on the screen.

PROG (PERATION				7/07/16 1	4:10:00
				5	1/0//15	4-10-00
		1	 1			

(3) Press function key [F8] (EXTEND) twice to cause "DNC" to be displayed in function key guide area corresponding to the [F4] key.

PROG OPERATION		 107/	07/16 14.	10:00
		97/	07/15 14.	10.00
=EX				
=EX =				
ROTECT	DNC	1	[EXTEND

(4) Press function key [F4] (DNC), and the display shown below will appear.

FRUG U		1110		 97	//07/15	14:10:00
=DNC						
>					DHO	1
INFUT	VULEVI		I		uurr	1

(5) Pressing function keys [F1] and [F2] at this moment will enable input and output processing, respectively. Press function key [F7] (DNC QUIT) to quit the DNC mode.

2. Operation Function in the DNC Mode

You can perform two types of functions in the DNC mode as explained below.

- (1) Downloading an NC Program (File)
 - Press function key [F1] (Input).
 - Enter the name of the NC program (file) to be downloaded.
 - Press the [WRITE] key.

The general format of the IN command is shown below.



- If main file name is omitted and extension name is specified, 'A' is assumed as main file name.
- If main file name is specified and extension name is omitted, 'MIN' is assumed as extension name.
- If both main file name and extension name are omitted, nothing is assumed by the CNC machine. The NC program to be transmitted is determined by the host computer.

If file name output mode is specified (bit 7 of NC optional parameter bit Nos. 8, 13, 14, 21 and 22 are set to setting 1), 'A.MIN' is transmitted to the host computer.

- (2) Uploading an NC Program (File)
 - Press function key [F2] (Output).
 - Enter the name of the NC program (file) to be uploaded.
 - Press the [WRITE] key.

The general format of the OUT command is shown below.



as extension name.

SECTION 3 SETTING UP NC OPTIONAL PARAMETERS

(1) NC Optional Parameter (Bit) No. 10

The NC optional parameter bit No. 10 specifies whether the verify data is to be transmitted in the upload mode and whether the NC program (file) name is to be transmitted.

· · · · ·		D# 0	Mada
	BIT 4	вкз	Wiode
А	1	1	Verify data transmitted on output, no NC program (file) name transmitted
в	1	0	Verify data transmitted on output, NC program (file) name transmitted
С	0	1	No verify data transmitted on output, no NC program (file) name transmitted
D	0	0	No verify data transmitted on output, NC program (file) name transmitted

Table 1

(2) NC Optional Parameter (Word) No. 43

The NC optional parameter word No. 43 selects the DNC-A inpuinoutput channel.

Parameter value	Channel
0	CN0: (TT:)
1	CN1:
2	CN2:
3	CN3:
4	CN4:

(3) NC Optional Parameter (Bit) No. 1

The NC optional parameter bit No. 1 defines the tape delimiter code.

Table 3

	Bit 3	Mode
А	1	% (A5 in hex)
В	0	NUL (00 in hex)

NC optional parameters described in (1) through (3) are enabled immediately whenever they are reset; the CNC machine need not be switched off and on.

Table 2

(4) NC Optional Parameter (Bit) Nos. 8, 13, 14, 21, 22

The NC optional parameter bit data Nos. 8, 13, 14, 21, 22 specify whether the request file name is to be transmitted from the host computer in the download mode.

Table 4

	Bit 7	Mode
A	1	Request file name transmitted on input.
В	0	No request file name transmitted on input.

(5) RS232C Interface Parameters for CN0: (TT:) through CN4:

Refer to SECTION 3, "TAPE PUNCHER INTERFACE" in Operation Manual (Publication No. 3754-E) for the parameter settings of the RS232C interface parameters for channels CN0: (TT:) through CN4:.

SECTION 4 ERROR MESSAGES

Two types of errors may occur in the DNC mode.

5244 DNC device

A device other than CN0:, CN1:, CN2:, CN3:, and CN4: is designated by parameter (bit) data. [Index] None

[Code] None

[Measures to Take] Designate the correct data.

5245 DNC verify

In reading operation with verify designation, data following "R" and that following "V" do not match. [Index] None

[Code] The number of records in which the verify error has occurred.

0306 Command character

A command that is not in the command table has been designated.

[Character-string] Command characters which have been input

[Code] None

[Probable Faulty Locations]

1) Spelling error of a command

2) Input of a command not allowed in the mode currently selected

[Measures to Take] Input the command using function keys.

SECTION 5 SPECIFICATIONS

1. Data Formats

Data is transferred all in ISO code. The end of data is identified by two consecutive NUL (00) or % (A5 in hex) codes.



- (1) When transmission of verify data is not specified, the control command V and the subsequent data are not transmitted; instead, two consecutive % or NUL codes are transmitted and transmission terminates (see Example 3 and 4 in 1-1 "Output Data Format Examples").
- (2) When transmission of the NC program (file) name is not specified, the NC program (file name following the control command is not transmitted (see Example 1 and 3 in 1-1 "Output Data Format Examples").
- (3) The NC program (file) name may be omitted in the download mode. In this case, the program (file) name 'A.MIN' is assumed if it is not specified on the CNC machine side (see Example 2 in 1-2 "Input Data Format Examples").
- (4) Either % or NUL code can be defined in a parameter as the tape delimiter code. The host computer must use the defined tape delimiter code when sending a NC program (file) to the CNC machine.
- (5) The host computer need not transmit the V control command and subsequent data in the download mode if verify processing is not required. In this case, the host computer must send two consecutive % (or NUL) codes instead of the V control command (see Example 2 in 1-2 "Input Data Format Examples").
- (6) Only the data between the LF code and the tape delimiter code (i.e., DATA 1) is stored in memory.

1-1. Output Data Format Examples

Example 1: When A is selected in parameter setting in (1) and (3) in Section 3



Example 2: When B is selected in parameter setting in (1) and A in (3) in Section 3



Example 3: When C is selected in parameter setting in (1) and B in (3) in Section 3



Example 4: When D is selected in parameter setting in (1) and B in (3) in Section 3



NC program (file) name

1-2. Input Data Format Examples

Example 1: When A is selected in parameter setting in (3) in Section 3 and verify data is present



Example 2: When A is selected in parameter setting in (3) in Section 3 and no verify data is present

				-		
Р	%	CR	LF	N	 NUL	NUL

When the NC program (file) name is not present

- (a) If the store file name is specified, the received data is stored in bubble memory under that name.
- (b) If the request file name is specified and the store file name is omitted, the received data is stored under the request file name.
- (c) If both the request and store file names are omitted, 'A.MIN' is assumed as the name of the received file.

2. Example RS232C Interface Connections and Timing Charts

Since the CNC machine and the host computer are likely to use different RS232C interface lines, it is necessary to check the RS232C interface lines used in the host computer system and use an appropriate, dedicated RS232C cable.

2-1. Start/Stop Synchronization Mode

This mode of communications is possible using optional interfaces CN1 - CN4. Note that this mode cannot be used with standard CN0 interface.

(1) Sample Connection Diagram

r					
NC machine			Host o	computer	
Signal name	Pin No.			Signal name	
FG	(1))(\diamond	FG	
TXD	(2))($\stackrel{\frown}{\rightarrow}$	RD	
RXD	(3))∢	5	SD	
RTS	(4)) (5		
стѕ	. (5)	، لـــر	$\stackrel{-}{\rightarrow}$		
DSR	(6))	Ç	ER	
SG	(7))(Ϋ́,	SG	
RG1	(9)	>►	¢	CS	
DTR	(20))•	\diamond	DR	
EX-INT	(23))	¢	RS	
L			L		





- 3) The CNC machine sends the Data Request signal RG1.
- 4) The host computer, on receiving RG1, starts transmitting a brie of serial data.
- 5) The Data Request signal is reset on the start bit of the serial data byte.
- (b) Upload mode timing chart



- 1) The CNC machine sends a byte of transmitted data when the Data Busy signal EX-INT is high.
- 2) The host computer resets the Data Busy signal when it reads the stop bit of the received serial data byte. The Data Busy signal must be reset each time a serial data brie is received.
- 3) The host computer sets the Data Busy signal when it completes processing of the received data byte.
- [Supplement] Since this example configuration uses the EX-INT signal, NC optional parameter bit for the "no EX-INT signal" mode (bit 1 of NC optional parameter bit Nos. 8, 13, 14, 21, 22) must be set to "0".

2-2. Control DC Code

The DC (Device Control) codes are defined as follows irrespective of the code of the NC program data to be transmitted (ISO or EIA):

	Character	8	7	6	5	4		3	2	1
DC1	Tape Reader Start				0		0			0
DC2	Tape Punch Start				0		0		0	
DC3	Tape Reader Stop	0			0		0		0	0
DC4	Tape Punch Stop				0		0	0		

[Supplement] 1. The RS232C interface parameters must be set to use DC codes (refer to SECTION 3, "Tape Puncher Interface" in Operation Manual (Publication No. 4106-E) for the parameter settings of the RS232C interface parameters).

2. DC codes are automatically generated by the NC machine. The program need not consider the DC codes.

Sample Connection Diagrams:

(1) Example 1



(a) Download mode timing charts

1) When request-file name output mode is not specified (B is set in (4) in Section 3 "SETTING UP NC OPTIONAL PARAMETERS")



2) When request-file name output mode is not specified (A is set in (4) in Section 3 "SETTING UP NC OPTIONAL PARAMETERS")



(b) Upload mode timing charts

1) When request-file name output mode is not specified (Either A or C is set in (1) in Section 3 "SETTING UP NC OPTIONAL PARAMETERS")



Received Data RXD

- [Supplement] 1. When CTS is set off during data transfer, the data transfer is suspended within two characters.
 - 2. Since this example configuration does not use the EX-INT signal, NC optional parameter bit for the "no EX-INT signal" mode (bit 1 of NC optional parameter bit Nos. 8, 13, 14, 21, 22) must be set to "1".

(2) Example 2



(a) Download mode timing charts

The timing chart in this mode is identical to that given in Example 1.

(b) Upload mode timing charts



[Supplement] Since this example configuration uses the EX-INT signal, NC optional parameter bit for the "no EX-INT signal" mode (bit 1 of NC optional parameter bit Nos. 8, 13, 14, 21,22) must be set to 0.

2-3. Control DC Code on Type 2

The Control DC code on type 2 configuration uses only DC codes to control data transfer between the host computer and a CNC machine through an RS232C interface.

- (1) While the standard Control DC code configuration allows only the CNC machine to generate DC codes, this configuration also allows the host computer to generate DC codes.
- (2) The CNC machine uses four device control codes (DC1, DC2, DC3, and DC4) and the host computer two codes (DC1 and DC3).

DC Code	NC Machine	Host Computer
DC1	Enables data read. (a) Initiates a read. (b) Resumes a read.	Enables data read. (a) Responds to DC2. (b) Resumes a read.
DC2	Placed before the transmitted data to request the host computer to receive the transmitted data.	
DC3	Requests suspension of data transmission.	Requests suspension of data transmission.
DC4	Identifies the end of data transmission.	

Table 5

(3) Sample Connection Diagrams



[Supplement] Since this example configuration does not use the EX-INT signal, NC optional parameter bit for the "no EX-INT signal" mode (bit 1 of NC optional parameter bit Nos. 8, 13, 14, 21 and 22) must be set to 1.

- (a) Download mode timing charts
- 1) When request-file name output mode is not specified (B is set in (4) in Section 3 "SETTING UP NC OPTIONAL PARAMETERS") The timing chart in this mode is identical to that given in 2-2, "Control DC Code".
- 2) When request-file name output mode is specified (A is set in (4) in Section 3 "SETTING UP NC OPTIONAL PARAMETERS")



- (b) Upload mode timing charts
- 1) When file name output mode is not specified (Either A or C is set in (1) in Section 3 "SETTING UP NC OPTIONAL PARAMETERS")



2) When file name output mode is not specified (Either B or D is set in (1) in Section 3 "SETTING UP NC OPTIONAL PARAMETERS")



C. DNC-B HIGH-SPEED RM BUFFER METHOD

SECTION 1 OVERVIEW

This section explains the communication link between the OSP and the host computer to transfer part programs between these two devices.

(1) There are two types of program transfer methods. One is the batch transfer method in which part programs are transferred independently of operation status of the OSP and the other is on-line mode program transfer in which part programs are transferred from the host computer to the buffer memory of the OSP and the machine is controlled by the program being sent. The latter mode of program transfer is called "buffer operation" in this manual.

Note that these two methods of program transfer cannot be selected at the same time.

- (2) The schedule operation is possible in the buffer operation mode by setting the parameters.
- (3) Two types of protocol used for communication between the host computer and the OSP are selectable by the setting of parameter. These are protocol A and protocol B.

Protocol A Shake hand method in which transmission and reception of data are repeated each other.

Protocol B Communication is controlled by the DC (device control) codes which are output from the OSP.

SECTION 2 DNC OPERATION PANEL



- (1) COMMUNICATION ON/OFF switch
 - (a) COMMUNICATION ON

Turning on power supply after placing the switch in the ON position establishes the communication mode between the OSP and the host computer. The COMMUNICATION lamp lights up.

(b) COMMUNICATION OFF

Turning on power supply after placing the switch in the OFF position disconnects communication line between the OSP and the host computer.

- 1) Once power supply has been turned off, changing the switch setting position has no effect and the established state cannot be changed.
- 2) With protocol A, turn the switch in the OFF position once and then back to the ON position to recover the communication alarm state* from the NC. Even in this case, the previously established communication ON state is not changed.
 - * The state in which either of the following alarm messages (see 12-1 "Communication Alarm") is displayed.
 - 4218 DNC-B communication error
 - 4219 DNC-B message format error

(2) BUFFER OPERATION ON/OFF switch

(a) BUFFER OPERATION ON

By setting the switch in the ON position with the DNC COMMUNICATION ON state, buffer operation is enabled and the BUFFER OPERATION ON lamp lights up.

(b) BUFFER OPERATION OFF

Buffer operation is disabled.

- 1) If the switch is set at the BUFFER OPERATION OFF position during buffer operation, the buffer operation enabled state is continued until the buffer operation has completed.
- 2) With protocol A, ON/OFF state of the buffer operation can be changed by the command from the host computer. If the command from the host computer does not match the switch setting, the command from the host computer is given priority.

However, if communication alarm occurs, ON/OFF state of the buffer operation is controlled by the setting of the BUFFER OPERATION ON/OFF switch setting at the OSP operation panel.

SECTION 3 BUFFER OPERATION

Buffer operation is possible in the automatic mode while the BUFFER OPERATION ON lamp at the DNC operation panel lights up.

Buffer operation function varies depending on the NC program transmission method (with or without file name designation).

Operation Type	Program Type	Operation Method	Buffer C (DNC m Without Designa	Deration ode: ON, Bu File Name ttion	uffer opera With F Desigr	ation: ON) ile Name nation	Norma Operat	l Memory ion
			Memory	Host Computer	Memory	Host Computer	Memory	Host Computer
Manual	Main	A	×	×	0	×	0	×
Mode	Program	В	×	×	0	×	0	Х
Operation		S	×	0	0	0	0	×
Operation According	Schedule Program	_	×	×	0	0	0	×
to	Main	A	×	х	0	×	0	×
Schedule	Program	В	×	×	0	×	0	×
Program		S	×	×	0	0	0	×

Table 1

[Supplement] 1. "O"indicates "operation possible" and " × " indicates "operation impossible".

- 2. Operation Methods:
 - A Normal operation
 - B Large-volume operation

S Subprogram and branch function are not checked in operation method B.

The following operations are possible depending on "with" and "without" file name designation.

Without file name designation Buffer operation of NC program

With file name designation Buffer operation of NC program Scheduled operation based on schedule

> program Memory mode operation based on programs stored in memory

1. Buffer Operation of NC Programs

- 1-1. Operation Methods
 - (1) If "file name not used" state is selected,
 - (a) Place the DNC COMMUNICATION ON/OFF switch at ON.
 - (b) Turn on power supply.
 - (c) Select the AUTO OPERATION mode by pressing the AUTO key.
 - (d) Place the BUFFER OPERATION ON/OFF switch at ON.
 - (e) Press the CYCLE START button. (PROGRAM SELECT operation is not necessary.)
 - (2) If "file name used" state is selected,
 - (a) Place the DNC COMMUNICATION ON/OFF switch at ON.
 - (b) Turn on power supply.
 - (c) Select the AUTO OPERATION mode by pressing the AUTO key.
 - (d) Place the BUFFER OPERATION ON/OFF switch at ON.
 - (e) After pressing function key [F1] (PROGRAM SELECT), input the main program file name.
 - (f) Press the [WRITE] key
 - (g) The screen displays prompt "Request file name data?!", requesting the operator to input the file address character-string managed by the host computer.
 - (h) Press the [WRITE] key.
 - (i) Press the CYCLE START button.

1-2. Command Format

(Possible only when "file name used" state is selected.)

= PS [main-program-file-name] [WRITE]

Request file name data?! file-address-character-string requested [WRITE]

(1) Main Program File Name

[program file name].[extension]

- (a) Designate a character-string of up to 16 characters beginning with an alphabet. Alphabets, numbers and hyphen (-) can be used.
- (b) The extension is MIN.
- (c) The main program file name designated in this step is registered as the file name for buffer operation.
- (d) If a main program file name is omitted, A.MIN is used.
- (e) To designate a device name in the program file name, designate the host computer (DNC:).
- (2) File Address Character-string Requested

Character-string of up to 30 characters

Following characters can be used:

0-9, A-Z, !, ", #, \$, %, &, ', <, >, (,), @,

Transmission of the NC program of the request-file-name designated in this step is requested to the host computer.

If the request-file-name is omitted, the main program file name is designated.

2. Scheduled Operation by Schedule Program

(Possible only when "file name used" state is selected.)

2-1. Operation Methods

- (1) Place the DNC COMMUNICATION ON/OFF switch at ON.
- (2) Turn on power supply.
- (3) Select the AUTO OPERATION mode by pressing the AUTO key.
- (4) Place the BUFFER OPERATION ON/OFF switch at ON.
- (5) After pressing function keys [F8] (EXTEND) two times and then [F4] (SP SELECT), input the schedule program file name.
- (6) Press the [WRITE] key.
- (7) The screen displays prompt "Request file name data?!", requesting the operator to input the file address character-string managed by the host computer.
- (8) Press the [WRITE] key.
- (9) Confirm that the schedule program is selected on the program display screen.
- (10) Press the CYCLE START button.

For the details of schedule program, refer to OSP Programming Manual.

2-2. Command Format for Schedule Program Selection

= SS [Schedule-program-file-name] [WRITE]

Request file name data?! file-address-character-string requested [WRITE]

(1) Schedule Program File Name

[program file name].[extension]

- (a) Designate a character-string of up to 16 characters beginning with an alphabet. Alphabets, numbers and hyphen (-) can be used.
- (b) The extension is SDF.
- (c) The schedule program file name designated in this step is registered as the file name for schedule operation.
- (d) If a schedule program file name is omitted, S.SDF is used.
- (e) To designate a device name in the program file name, designate the host computer (DNC:).
- (2) File Address Character-string Requested

Character-string of up to 30 characters

following characters can be used:

0-9, A-Z, !, ", #, \$, %, &, ', <, >, (,), @,

?, ¥, , [,], , , , , , +, -, *, /, =, ., SP

Transmission of the schedule program of the request-file-name designated in this step is requested to the host computer.

If the request-file-name is omitted, the schedule program file name is designated.

3. Memory Mode Operation Using a Program Stored in Memory

The operation method is quite the same as used for normal memory mode operation.

Only the difference is the designation of the memory (MD1:) as the device name when designating the schedule program file name and the main program file name (including main programs in the schedule program).

4. Supplements

- (1) Subprograms only registered in the library program can be used.
- (2) Size of part program has no limit for program transfer.
- (3) Only schedule programs or main programs can be transmitted.

If subprograms and/or other main programs continue following the M02 code of the main program, do not forget to set the "M02 reset output used" state by the parameter.

- (4) At the instant the CYCLE START button is pressed, transfer of a part program begins (GTD sent for protocol A, DC1 or DC2 sent for protocol B) and then the program execution begins.
- (5) Change of parameter setting for file name used or not-used status becomes active when power supply is turned off and then on again.
- (6) Even in the buffer operation mode, intervention of manual operation is possible as usual.
- (7) Even in the buffer operation ON mode, the return search and sequence restart commands can be executed.
- (8) In the buffer operation mode, when "file name not used" is selected, the following commands cannot be executed:
 - Schedule program selection
 - Number search
 - Sequence search using the cursor
 - Schedule program search
- (9) When "file name not used" state is selected, program selection is always required when buffer operation mode is switched form ON to OFF. If program selection is not carried out, program execution does not begin.
- (10) When "file name used" state is selected, program selection is always required when buffer operation mode is switched between ON and OFF. If program selection is not carried out, program execution does not begin.
- (11) When selecting a program in the file name used state, designation of a main program name and subprogram name is not possible.
- (12) Irrespective of the setting of the BUFFER OPERATION ON/OFF switch, the selected buffer operation on or off mode is continued until the operation in progress has been completed even if the setting of the switch is changed.

This function is effective for program transfer operation.

If the buffer operation on/off mode is switched by the command using protocol A, an alarm occurs if such an attempt is made during operation irrespective of the setting of the buffer operation on/off mode.

- (13) Batch transfer of NC program is impossible during buffer operation (buffer operation mode on and process in between cycle start and M02 execution, or NC reset).
- (14) After the execution of MDI mode operation, buffer operation is not possible unless the NC is once reset.

Interruption by MDI mode operation during buffer mode operation may be executed in normal operation intervention manner.

- (15) Automatic program selection when power is turned on:
 - (a) File name not used

BUFFER OPERATION ON Program selection is not executed. BUFFER OPERATION OFF Program selection is executed.

(b) File name used

The buffer operation on/off mode and the file name being selected when power has been turned off are stored in memory. If the buffer operation on/off mode currently active and the mode active before power off match, automatic program selection is executed. When buffer operation mode is on, the main program of the file name stored is requested to the host computer when the CYCLE START button is pressed.

If the previous and current buffer operation on/off modes do not match, automatic program selection is not executed. When buffer operation mode is on, no operation occurs when the CYCLE START button is pressed.

SECTION 4 BATCH TRANSFER OF NC PROGRAMS

NC programs can be transferred from the NC to the host computer or from the host computer to the NC in batch.

1. Operation Procedure

Follow the steps below:

- (1) Place the DNC COMMUNICATION ON/OFF switch at ON.
- (2) Turn on power supply.
- (3) Place the BUFFER OPERATION ON/OFF switch at OFF.
- (4) Select the PROG OPERATION mode by pressing the EDIT AUX key.
- (5) Press function keys [F8] (EXTEND) and then [F4] (DNC). This displays the DNC screen.In this status, batch transfer of the program is possible.

		·	 	· · ·			
PROG 0	PERATION	DNC-B] `
				97	7/07/15	14:10:00]
=EX							
=EX							
=DNC							
		· ···· · · · · · · · · · · · · · · · ·			DNC		-
INPLIT	оптрит	VERIEY					
	•••		 l 			1	/
(F 1				<u>ה ב</u>		رقيعا	
			Fig. 1				

1	c	١.
1	О)
۰.	_	5

(a) For program request to the host computer

After pressing function key [F1] (INPUT), input the file name of the file to be stored in the memory.

(b) For sending NC program to the host computer

After pressing function key [F2] (OUTPUT), input the file name of the file stored in the memory.

(c) For program verification

To verify the NC program already stored in the memory, press function key [F3] (VERIFY) and input the file name of the file stored in the memory.

(7) Press the [WRITE] key.

If "file name used" state is selected by the parameter, follow the step (8) and (9) below.

If such state is not selected, batch transfer of the designated file begins.

(8)

(a) For program request to the host computer

Key in the request-file name designation data.

(b) For sending NC program to the host computer

Key in the transmission-file-name designation data.

(c) For program verification

Key in the request-file-name designation data.

(9) Press the [WRITE] key.

This begins transmission of the NC program in batch.

- (10) After the completion of program transmission, press function key [F7] (DNC QUIT).
- [Supplement] 1. As request-file-name designation data and transmission-file-name designation data, input the program file name data (character-string) which is managed by the host computer. This allows the input data to be sent to the host computer.
 - 2. For program verify operation, the following message is displayed after the completion of verification in accordance with the results of the verification.

data all same

File and received NC data match.

DNC verify unsame-2

Although the file has terminated, received NC data is left.

DNC verify unsame-1

Although the received NC data has terminated, file data is left.

DNC verify unsame-n

The number (n) of mismatch data sets in verify operation.

2. Command Format

(1) Input



[Supplement] The "file-address-character-string requested" column becomes effective when "file name used" state is selected by parameter. If "file name used" state is not selected, it should be omitted.



[Supplement] The "file-address-character-string transmitted" column becomes effective when "file name used" state is selected by parameter. If "file name used" state is not selected, it should be omitted.
(3) Verify >V stored-file-name extension 1 WRITE ſ Request file name data?! file-address-character-WRITE string requested (Note) Character-string of up to 30 characters; following characters can be used: 0 - 9, A - Z, !, ", #, \$, %, &, ', <, >, (,), @, ?, ¥, , [,], , ;, ;, ,, +, -, *, /, =, ., SP Transmission of the NC program of the requestfile-name designated in this step is requested to the host computer. If the request-file-name is omitted, the stored-filename is designated. Three characters of alphabets Designate a character-string of up to 16 characters beginning with an alphabet. Alphabets, numbers and hyphen (-) can be used. The transmitted NC program is stored in the memory with the file name and extension designated in third step. If the designation of stored-file-name is omitted with only extension designated, "A" is assigned. If the designation of extension is omitted with only the stored-file-name designated, "MIN" is assigned.

[Supplement] The "file-address-character-string requested" column becomes effective when "file name used" state is selected by parameter. If "file name used" state is not selected, it should be omitted.

3. Supplements

- (1) Transmission and Reception of NC Programs
 - (a) Protocol A

Method 1 File name is not added to RTD command and the first GTD command.

- Method 2 File name is added to RTD command and the first GTD command.
- (b) Protocol B

Method 1 File name is not transmitted.

Method 2 For program transmission, file name is first transmitted; for program reception, DC2 code, file name and DC4 code are transmitted.

In each protocol, switching between method 1 and method 2 is made by the parameter. After changing parameter setting, it is necessary to turn off power supply and then turn it back on. Note that the parameter used for switching the method is used in common with the one used for switching the operation method in the buffer mode operation.

(2) For program "input" operation, if the file assigned with the file name and extension same as those designated is already existing, prompt "file exist overwrite? (Y/N)!" appears on the screen.

If "Y" is input for this prompt, the existing file is deleted and new file is input from the host computer.

If "N" is input, no processing occurs.

SECTION 5 PARAMETERS

1. Parameters which cannot be Set at OSP

The parameters indicated below cannot *be* set at the OSP and setting is possible only by using the SET command from the host computer.

(Parameters in the table below, conversion codes, codes after conversion (45th - 48th bytes of SET command))

(For protocol A only)

Parameter	Function	Unit	Range	Initial Value when Power is Turned On
Nb	Minimum buffer area of CNC when transmitting [GTD]	bytes	1 - 4000	2000
No	Maximum overrun amount in reception	bytes	2 - 2000	50
Ne	Number of retries allowed when transmission error is detected	times	0 - 100	10
Тр	[SAT] transmission polling time for DNC, or response time-out duration by CNC for host computer	S	1 - 999	5
То	Response time-out duration by host computer for CNC	s	1 - 999	20
Ti	Minimum time interval between transmission bytes	ms	0 - 10	10
Тх	Minimum switching time from reception to transmission	ms	0 - 100	100
Tw*	Standby time for reception of [WAT] used by both of CNC and host computer; upper limit value is Tp or To, whichever smaller.	S	0 - Tp 0 - To (Whichever smaller)	5

Table 2

*Tw: Communication is executed in the following manner when "Tw" value exceeding the specified range is set by the host computer using the SET command.

(1) When Tw value > Tp value

In the remote buffer mode operation or batch transmission mode, the OSP sends the GTD command after waiting for "Tw" when it received the WAT command from the host computer. The SAT command is not sent out during this period.

(2) When Tw value > To value

If program data to be transmitted is not ready in the NC program for transmission from the OSP to the host computer operation, the OSP sends the WAT command after and elapse of "Tp". If the host computer sends the GTD command in response to this after waiting for "Tw", the OSP regards that, after an elapse of "To", there is no answer to the WAT command. In this case the communication error occurs.

2. Parameters which can be Set at OSP

Some parameters are required to be changed frequently during operation while some are not changed once they have been set. The OSP differentiates these two types of parameters to allow easy setting of parameters. The former is assigned to NC optional parameter (long word), (word) and (bit), and the latter to the communication parameter (dedicated screen).

- (1) NC Optional Parameter (Bit)
 - (a) Bit 0 of No. 1 /Bit 1 of No. 11

Coding system of part programs

<u>Bit 0 of No. 1</u>	<u>Bit 1 of No. 11</u>	
	1	ASCII
1	0	ISO
0	0	EIA
Initial setting: 1		

[Supplement] ASCII code cannot be used if protocol B is selected.

For protocol B, do not set "1" for bit 1 of No. 11. The following alarm occurs if "1" set for this bit.

4037 Alarm D CCP-CPU error 4

(b) Bit 2 of No. 1

TV check, creation designation

This parameter determines whether or not the TV check, creation is made for the NC program to be received or transmitted - a space is inserted before LF (or CR LF) so that a total number of characters in a record including the LF (or CR LF) will be even, or whether the record contains an even number of characters is checked.

- 1: TV check, creation is executed.
- 2: TV check, creation is not executed.
- Initial setting: 0

(c) Bit 3 of No. 11

End of record code

1: LF 0: CR LF Initial setting: 0

(d) Bit 0 - bit 7 of No. 43 and No. 44

Data at the 41st to 44th bytes of [SAT] or [SET] command

[SAT] command From OSP to the host computer [SET] command From the host computer to OSP

Bit 0 of No. 44

Buffer is cleared when NC is reset.
 Buffer is not cleared when NC is reset.
 Initial setting: 0

[Supplement] Other bits have not been defined.

- (2) NC Optional Parameter (Word)
 - (e) No. 16

Number of bytes in one block for transmission of NC program from OSP to the host computer in protocol A.

If setting is "0", it follows Nb sent from the host computer.

Initial setting: 0

Setting range: 0 - 4000

(f) No. 24

File read-out waiting time T2 used for protocol B (Time duration between transmission of DC4 code and transmission of DC1 code)

Initial setting: 0 (s)

Setting range: 0 - 9999 (s)

If setting is "0", time duration of T1 (Parameter No. 35) is automatically adopted.

(g) No. 35

Response timer used for protocol B (Time duration between transmission of DC1 code and input of NC program)

Initial setting: 10 (s)

Setting range: 1 - 9999 (s)

- (3) NC Optional Parameter (Long Word)
 - (h) No. 13

In the remote mode operation, program is started after the specified number of character of the NC program is written to the buffer.

Initial setting: 0

Setting range: 0 - 99999999

- [Supplement] If the setting is smaller than 256, it is handled as 256. If the setting is greater than the main program buffer capacity, program is started when the main program buffer became full.
- (4) Communication Parameters

Communication parameters are displayed and set in the parameter setting mode.

- (a) Select the PARAMETER SET mode by pressing the PARAMETER key.
- (b) Display the COMMUNICATION PARAMETER screen.
- (c) Set the required parameters.

This setting is possible by using function key [F2] (SELECT). Each time this key is pressed, contents are automatically changed within a setting range.

- (d) Press function key [F5] (BACKUP). This operation is always required when data is set or changed.
- (e) Turn off power supply and then turn it back on.

The communication parameters become effective when power reapplied.

(5) Description of Communication Parameters

	*			<u>ا</u> ا	97/07/15	4:10:00
	* (0)	WINDERATIO	N PAHAMETE	:H *		
NU. 1 COMUNNIC, 2 BAUD RATI 3 RS232C S 4 RS232C P, 5 TRANSMIT 6 MESSAGE I 7 PROTOCOL 8 NC PROGR 9 LAST 'DC: 10 SYN/NAK I 11 M02 RESE ACT POSIT(WO	ATION DEVIC E TOP BITS ARITY CODE END CODE A/B MM TRANSMIT 3'CODE ENAL ENABLE T OUTPUT EI XABLE T OUTPUT EI RK) – R	CE T METHOD BLE NABLE (100.000 Mtd	¥ -200. 00	00	Ci 24 EVI 1: 1: 2 YI YI YI 2 -300.000	4A 000 EN 60 TX A A ES ES ES
=CMPS =			1			

F1F2F3F4F5F6F7FB

No.	Name	Description				
1	COMMUNICATION	Designation of device name used for communication				
	DEVICE	Select from CHA: and CHB:.				
		Initial setting: CHA:				
2	BAUD RATE (BPS)	Designation of baud rate				
		Select from 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 89300.				
		Initial setting: 2400				
3	RS232C STOP	Designation of number of stop bits				
	BIIS	Select from 1 and 2.				
		Initial setting: 1				
4	RS232C PARITY	Designation of parity added at RS232C interface				
		Select from NON, EVEN and ODD.				
		Initial setting: EVEN				
5	TRANSMIT CODE	Designation of transmission code (excluding NC programs)				
		Select from ISO and ASCII.				
		Initial setting: ISO				
		[Supplement] The transmission code is not used for protocol B.				
6	MESSAGE END	Designation of message end code				
	CODE	Select from ETX and CR.				
		Initial setting: ETX				
		[Supplement] The end code is not used in protocol B.				

No.	Name	Description
7	PROTOCOL A/B	Selection of protocol
		Select from A (protocol A) and B (protocol B).
		Initial setting: A
8	NC PROGRAM	Designation of "file name used" or "file name not used" state for
	METHOD	program transmission
		Select from A (not used) and B (used).
		Initial setting: A
9	LAST 'DC3' CODE	Designation whether or not DC3 code at the end of NC program
	ENABLE	reception is transmitted
		Select from YES (transmitted) and NO (not transmitted).
		Initial setting: YES
		[Supplement] The DC3 code is not used in protocol A.
10	SYN/NAK ENABLE	Designation whether or not [SYN] and [NAK] are transmitted at
		an occurrence of NC alarm or NC reset
		Select from YES (transmitted) and NO (not transmitted).
		Initial setting: YES
		[Supplement] This is not used in protocol A.
11	M02 RESET	Designation whether or not reset signal ([RST] command for
	OUTPUT ENABLE	protocol A, [SYN] code for protocol B) is transmitted to the host
		computer upon execution of M02 and M30.
		Select from YES (transmitted) and NO (not transmitted).
		Initial setting: YES

SECTION 6 PROTOCOL A

1. Communication Format

When the power is turned ON, the NC and host computer are prepared for operation. When this preparation is completed, transmissions from the NC and reception from the host computer begins. From this point on, transmissions and receptions are repeated in an alternating manner.



Fig. 2 Example of RS232C Link



Fig. 3 Timing Chart at Communication START

[Supplement] The initial transmission request occurs 2 seconds after a READY status is established at both the NC and host computer.





Minimum time interval between transmission bytes	: Ti ≦ t
"Transmission to reception" switching time	: $0 \leq ts \leq To$
"Reception to transmission" switching time	: $Tx \leq t \leq Tp$
Overrun which follows CTS signal OFF	:n ≦ 2 bytes
Overrun amount which follows reception RTS signal OFF	: n ≦ No
 To: Timeout period Tp: Polling time interval Tx: Minimum "reception to transmission" switching time No: Maximum overrun amount during reception 	
	 Minimum time interval between transmission bytes "Transmission to reception" switching time "Reception to transmission" switching time Overrun which follows CTS signal OFF Overrun amount which follows reception RTS signal OFF To: Timeout period Tp: Polling time interval Tx: Minimum "reception to transmission" switching time No: Maximum overrun amount during reception

[Supplement] There is no specific designation for "Ti".

2. Message Format

Data exchanges (hereafter referred to as "messages") between the NC and host computer occurs using the data format shown below.



All data, including the Check Sum, is comprised of ISO or ASCII codes (parameter switching).

However, when the "DATA" portion consists of NC program or NC data, EIA codes can be used for that data only.

(1)	Check Sum	The COMMAND to END code data total is shown at the Check Sum area, where the final 1-byte of the total is expressed as a hexadecimal, 2-digit value. (Transmission occurs in order, from high to low.)
(2)	Command	The COMMAND is comprised of 3 characters, and indicates the message type.
(3)	Data	This is the text data of variable length. The format and content of this data is determined according to the COMMAND. (Numeric data is transmitted in order, from high to low.)
(4)	END Code	This code indicates the end of the message. Either "ETX" or "CR" may be used as this code (parameter switching).
		When ISO code is used: ETX (03H) or CR (8DH) When ASCII code is used: ETX (03H) or CR (0DH)
		The message must not contain any data which appears in the same pattern as

the END code.

3. Command List

Command	Description	Data Area	Reply From Host
SYN	Initialize command	None	SYN
RDY	Initialize completed	None	SYN, RDY
RST	DNC reset notification	None	ARS
ALM	DNC alarm notification	None	AAL
SAT	DNC status notification	Status	SET, CLB, SYN
GTD	NC Program data transmission request	NC Program file name	DAT, EOD, WAT
RTY	Repeat request (retry)	Error status	Previous message
RTD	NC Program data upload request	NC Program file name	GTD
DAT	NC Program data upload	NC Program data	GTD
WAT	Wait	None	GTD
EOT	NC Program data uploading completed	None	SET

(1) Transmission Commands (NC \rightarrow host computer)

(2) Reception Commands (host computer→NC)

Command	Description	Data Area	Reply From NC
SYN	Initialize command	None	RDY
RDY	Initialize completed	None	RST, ALM, SAT,
			GTD
ARS	RST reply	None	Same as above
AAL	ALM reply	None	RST, SAT
CLB	Buffer delete	None	RST, ALM, SAT,
			GTD, RTD
SET	NC status change	Status	Same as above
DAT	NC Program data transmission	NC Program data	Same as above
EOD	NC Program data transmission	None	Same as above
	completed		
WAT	Wait command	None	GTD
RTY	Repeat transmission (retry)	Error status	Previous message
GTD	NC Program data transmission request	None	DAT, WAT, EOD

4. Data Reception

(1) When File Name is not Designated:



5. Data Transmission

(1) When File Name is not Designated:



(2) When File Name is Designated:



SECTION 7 PROTOCOL B

1. Communication Format

Data transmission/reception requests are always sent from the NC to the host computer using DC codes (Device Control Code).



Fig. 5 Example of RS232C Link

2. DC (Device Control) Codes

The DC codes will be as shown in the Table below, regardless of the code system (ISO or EIA) of the NC program data which is being transmitted.

	Character	8	7	6	5	4		3	2	1
DC1	Tape Reader START				0		0			0
DC2	Tape Puncher START				0		0		0	
DC3	Tape Reader STOP	0			0		0		0	0
DC4	Tape Puncher STOP				0		0	0		

[Supplement] DC codes are generated automatically by the NC, and need not be included in the program.

3. Data Reception

(1) When File Name is not Designated:





(2) When File Name is Designated:

1

4. Data Transmission

(1) When File Name is not Designated:



ī.

(2) When File Name is Designated:



4188-E C-32-R1 C. DNC-B HIGH-SPEED RM BUFFER METHOD

L

SECTION 8 DATA FORMAT

1. Input Format

<For ISO Code >



< For EIA Code >



- The transmission data must begin with a "%" or "ER" code, and must also end with a "%" or "ER" code. If the data does not begin with either a "%" or "ER" code, all the data (from the very beginning) will be processed as significant data, and the initial "%" or "ER" code which appears will be processed as the END code.
- When ISO code is used, an [LF] or [CR LF] code should be designated at the end of each record within the program. Switching between the "[LF] only" and the "[CR LF]" format is possible (parameter setting).
- When EIA code is used, a [CR] code should be designated at the end of each record within the program.
- [Supplement] 1. The continuing transfer of a subprogram following a main program is possible only during batch transfer operations. In such cases, a breakpoint code should not be used between the main program and the subprogram, or between two subprograms.
 - 2. The maximum record length is 156 bytes.

2. Output Format

<For ISO Code>



- When ISO code is used, the output will begin with a [CR LF] or [% LF] code. When EIA code is used, output will begin with a [ER CR] code.
- The machining program data will be output following the Program Name (No.).
- When ISO code is used, the output will end with a [CR LF] or [% LF] code. When EIA code is used, output will end with an [ER CR] code.

SECTION 9 SPECIFICATIONS

1. RS232C Interface

(1) Communication Format

Asynchronous Transmission

With this format, data is sent by preceding each character with a start bit and following it with a stop bit.

1 character consists of the ① START Bit (1 bit), ② Information Bit (8 bits), ③ Parity Bit (1 bit), and the ④ STOP Bit (2 bits), as shown in Fig. 6 below.



Fig. 6 Bit Configuration

- (2) Baud Rate (BPS)
 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 89300
- (3) Data Configuration
 - START Bit (1 bit)

Data Bits (8 bits)

Parity Bit ("1 bit" or "none" \rightarrow selected by parameter setting)

STOP bits ("1 bit" or "2 bits" \rightarrow selected by parameter setting)

(4) Parity Check (Character Parity)

"Odd/Even parity" or "no parity" (selected by parameter setting)

- (5) Maximum Data Transmission Distance
 - RS232C : Maximum cable length of 15 meters
 - RS-422 : Maximum cable length of 1200 meters (an RS232C RS422 converter is used)

Fiber Optics : Maximum cable length of 2000 meters (a Fiber Optics - RS232C converter is used)







(7) Signal Descriptions

Pin No. (DB25)	Signal Name	Signal Direction	Description
1	FG	_	Safety ground
2	TXD	Output	Transmission Data
			Data line from OSP to external device
3	RXD	Input	Transmission Data
			Data line from external device to OSP
4	RTS	Output	Transmission Request
			Switches ON when transmission or reception begins.
			It then remains ON.
5	CTS	Input	Transmission Possible
			When this signal is OFF, no data will output from the OSP.
			This signal is used for BUSY/READY control.
			When this signal is not used, the RTS signal at the NC should be connected.

Pin No. (DB25)	Signal Name	Signal Direction	Description
6	DSR	Input	Data Set Ready This signal indicates that a "communication enabled" status exists at the external
			device.
			If this signal switches OFF during communications, an error will be activated at the OSP.
			BUSY/READY control is not possible at this signal. When this signal is not used, the DTR signal at the OSP should be connected.
7	SG	_	For signal connection
20	D⊺R	Output	Operation Preparation Completed
			This signal switches ON when the OSP is ready for operation. When this signal is OFF, any data which is transmitted to the OSP will not be received.

(8) Connector Layout



SECTION 10 SCREEN DISPLAY

1. Check Screens

(1) Display the communication status and parameters on the CHECK DATA screen. (This screen is available only for protocol A.)

AUT	O OPERATI	ON				N	
CHE	ECK DATA		DNC (B)	97/ PAGE	<u>/07/15_1</u> 52	14:10:00 1mm
HO CN PA CO CO	ST CPU ST. C STATUS RAMETER I NVERT COD NVERTED O	ATUS No Ne Tp To Ti Tx Tw E ODE	1 2000 by 50 by 10 tir 5 sec 0 msc 100 msc 5 sec 00 00	te nes c c ec ec c			
=ex =ex >	0						
PROG	RAM ACTU CT POSI	AL PART T. PROGRA	BLOCK M DATA	SEARCH		CHECK DATA	[EXTEND]

F1F2F3F4F5F6F7F8

Table 3

No.	Name	Description
1	HOST CPU STATUS	Displays the second byte data in [SET] command. Select from CHA: and CHB:. Set "CHB:". Initial setting: CHA:
2	CNC STATUS	Displays the second byte data in [SAT] command. 0: Not ready status 1: CNC in normal status 2: Buffer operation status 3: Alarm status
3	PARAMETER Nb - Tw	Displays contents of [SET] and [SAT] commands from 9th to 40th bytes.
4	CONVERT CODE/CONVERTED CODE	Displays code conversion designation for NC programs.

AUTO OF	PERATION					<u>N</u> 97/07/15	<u>3</u> 14:10:00
CHECK (ATA		* DNC RE	CEIVE	DATA *	PAGE 50	1mm
\$0000	C644535	9 4E03B2	7B2 D24	45 9 03	444153C5	FDSYN. 72	2RDY. DASE
\$0010	D430B1A	O AOAOA	DAO AO3	0B744	30303033	T01	07D0003
\$0020	B230303	0 413030	030 353	030B1	B4303030	2000A000	050014000
\$0030	3030303	6 B43030	30 353	03030	30303030	00064000	1200000000
\$0040	3003050	6 53C5D4	103 C5C	65305	04030506	0.EFSET.	EFSELEF
\$0050	5305D40	13 C5C65	SC5 D40	30506	53C5D403	SET. EFSI	I.EFSEI.
\$0060	0506530	5 D403C	DCD 53C	50403	05065305	E-SET.E	-SET.EFSE
\$0070	D403050	5 53U5D4	103 C5C	00000	04030506	1.EPSEL	EFSEL EF
\$UU8U	5305040	13 UDUDD.	505 D40	36566	53050403	3E1.EF3	ILEFSEL.
20090	6566536	5 D403C	56 536	50403	65665365	EFSEI.E	-SELEFSE
REA	D POINTE	R \$C90C	TRANSFI	ER COL	DE ISO	DSR OFF	CTS OFF
WRI	TE POINT	ER \$001F	PROGRAM	I CODE	SO	DTR ON	RTS OFF
	RMto	t				·	
=EX							
=CH							
=F 50							
=							
ROGRAM	ACTUAL	PART	BLOCK			CHECK	
FLECT	POSIT	PROGRAM	ΩΔΤΔ	SEAR	∵H ATC/AF	C DATA	
						-1 2010	

(2) Display the RECEIVE DATA on the CHECK DATA screen.

The list of the data received from the host computer is displayed.

No.		Contents
1	The following four	(a) To position the display pointer at "0"
	methods can be used	CP [WRITE]
	pointer.	(b) To position the display pointer at the required position
		CP Pointer-value [WRITE]
		Designate the pointer value in hexadecimal number (\$ symbol is not necessary). When the designated value causes the pointer to move outside the receive buffer area, the pointer is replaced with the pointer of the last area of the receive buffer.
		(c) To return the display pointer from the current position CP ;B [WRITE]
		This replaces the currently displayed pointer with the "current display pointer - \$80 (hexadecimal)". If the above indicated command is input while the current display pointer value is 0 or smaller, it is replaced with "0".
		(d) To advance the display pointer from the current position
		CP ;N [WRITE]
		This replaces the currently displayed pointer with the "current display pointer + \$80 (hexadecimal)". If this replacement causes the pointer to move beyond the receive buffer, the pointer is replaced with the pointer of the last area in the receive buffer.
1	The display right	(a) ISO code
	character coding	CP ;I [WRITE]
	changed	(b) ASCII code
	as required.	CP ;S [WRITE]
		(c) EIA code
		CP ;E [WRITE]
		Note: The data of the code which cannot be expressed in characters are displayed in ".".
2	READ POINTER/WRITE POINTER	This displays the read-out pointer and write pointer of the received data.
3	TRANSFER CODE	The code used for transmission of data other than NC program is displayed.
4	PROGRAM CODE	The code used for transmission of NC program is displayed.

No.		Contents						
5	DSR signal (input)	Indicates the status of the data set ready (DSR) signal.						
		(a) Protocol A/B						
		If this signal is OFF, the following alarm/error is generated:						
		3218 DNC start condition 1*						
		2426 DNC-B Remote operation 305 '4218'						
		4218 DNC-B communication error 305						
		5290 DNC can not transmit 4*						
		5295 DNC transmitting 505 4216						
		 If the signal has not been turned on even once after 						
	DTD signal (output)	Curring on power supply.						
l °	DTR signal (output)	a) Protocol A						
		(a) Protocol A						
		(b) Protocol B						
		After power is turned on, the signal is turned on when the						
		buffer mode operation starts with the NC program transforred in batch. The signal is turned off if an alarm						
		transferred in batch. The signal is turned off if an alarm						
7	CTS signal (input)	Clear to send						
′		(a) Protocol A/B						
		If this signal is OFE the following alarm/error is concrated:						
		2426 DNC-B Remote operation 305 '4218'						
		4218 DNC-B communication error 305						
		5295 DNC transmitting 305 '4218'						
8	R⊤S signal (output)	Request to send						
		(a) Protocol A						
		Normally ON						
		(b) Protocol B						
		After power is turned on, the signal is turned on when the						
		buffer mode operation starts with the NC program						
		transferred in batch. The signal is turned off if an alarm						
		occurs or the NC is reset.						

AUTO OF	ERATION	1	DNC-PROGE	RAM		N	2
CHECK D	ATA	÷	* DNC HIS	STORY *	P/	/0//15 1 GE 51	4:10:00] 1mm
P-N0 C\$0000 C\$0002 C\$0003 C\$0004 C\$0005 C\$0006 C\$0007 C\$0008 C\$0009		TIME : 3:24, 11 : 3:24, 33 : 3:28, 80 : 3:28, 80 : 3:28, 90 : 3:33, 40 : 3:33, 40 : 3:33, 40 : 3:38, 10 : 3:38, 10	STA 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	TUS IT 2 5 2 4 2 5 2 4 2 5 2 4 2 5 2 4 2 5 2 4 2 5 2 4 2 5 3 C\$	EM CC 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Solution 54 5 6 7 5 54 6 7 5 54 6 7 5 54 6 7 5 54 5 6 7 5 54 5 6 7 5 5 6 7 5 5 6 7 5 5 4 5 5 5 4 5 5 5 4 5 5 5 4 5 5 5 4 5 5 5 4 5 5 5 4 5 5 4 5 5 5 4 5 5 5 4 5 5 5 4 5 5 4 5 5 5 4 5	
=EX =:CH =F 50 =			H-M1;	d			
PROGRAM SELECT	ACTUAL POSIT.	PART PROGRAM	BLOCK DATA	SEARCH		CHECK DATA	[EXTEND]

(3) Display the DNC HISTORY page on the CHECK DATA screen.

F1F2F3F4F5F6F7F8

No.		Description						
1	P-NO	The entry pointer of the DNC HISTORY saving area is						
		displayed. Character C at the beginning of the pointer						
		indicates that the information displayed is the contents in the						
		information saving area for normal operation. Character E at						
		the beginning of the pointer indicates that the information						
		displayed is the contents in the information saving area for the						
		occurrence of abnormality.						
		he display area can be changed in the following method.						
		(a) To display the information for the normal DNC HISTORY						
		saving area.						
		CP ;C [WRITE]						
		When the power is turned on, this display area is selected.						
		(b) To display the information for the abnormal DNC HISTORY saving area.						
		CP ;E [WRITE]						
		The display pointer can be changed in the same manner						
		as explained in (1).						
2	TIME	The time elapsed from the power on is displayed in						
		hour:minute: second.						

No.		Description
3	STATUS	The communication operation status is displayed in a coded
		number.
		0: Initial state
		1: Not ready for communication
		2: Ready for communication
		3: Communication in execution
		4: Communication alarm
		5: Communication system alarm
4	ITEM	The DNC HISTORY kind is displayed in a coded number.
		1: Command
		2: Notification for correct ending of command
		3: Notification for abnormal ending of command
		4: Internal request
		5: Transmission message
		6: Line event
5	CONTENTS	Details of DNC HISTORY kind is indicated in a coded number.
		For details, refer to Appended Table.
6	CURRENT POINTER	The latest information saving point for normal DNC HISTORY
7	LAST ERROR	The latest information saving point for abnormal DNC
	POINTER	HISTORY

2. Run Guide Screens

(1) BUFFER MODE

PRO	G OPERATION		RUN GL	IIDE	0		
	RUNNING	FILE		S	ELECT ERR	OR FILE	4.10.00
RM M E M E	BUFFER MODE AIN FILE NAM MPTY AIN PROGRAM MPTY	IE NAME	SELECTED	MAIN EMPTY MAIN EMPTY SUB F	FILE NAME PROGRAM N ILE NAME	i Iame	
R R	UNNING METHO ⊶Mitd	D		SELEC	TED RUNNI	NG METHO	D
=GD =GD =GD = TIME	INIT	DELETE	RENAME			RUN GUIDE	[EXTEND]
(F	1)(F 2)(F3) (F 4)	F 5) <u>F 6</u>)	(F7)	FB

(2) SCHEDULE MODE

$\left(\right)$	PROG 0	PERAT10N		RUN GL	JIDE				
		RUNNING	FILE		SE	elect err	7/07/15 1 OR FILE	4:10:00	i
	SCHEDULE MODE SCHEDULE PROGRAM FILE OMF.SDF MAIN FILE NAME OMF-4VA-A.NIN RUNNING MAIN PROGRAM NAME EMPTY REQUEST FILE NAME OMF-4VA-A.MIN RUNNING METHOD R-Mtd				MAIN FILE NAME EMPTY MAIN PROGRAM NAME EMPTY SUB FILE NAME EMPTY SELECTED RUNNING METHOD				
	=GD =GD =GD =								
	TIME	INIT	DELETE	RENAME			RUN GUIDE	[EXTEND]	
	(F 1)(F 2)(F 3)(F 4) <u>F5</u>) <u>F</u> 6)	(F7)	F 8	

SECTION 11 ERROR MESSAGES

5290 DNC can not transmit

An attempt is made to transfer an NC program in batch while DNC communication is impossible. [Character-string] None

[Code]

- 1-> Attempt during communication alarm
- 2-> DNC communication off
- 3-> Not in interruption mode (DNC-C2, C3)
- 4-> Not ready

5295 DNC transmitting

For data transfer by DNC-B

Communication error occurred during batch transfer of DNC data, resulting in abnormal end. [Character-string] Communication alarm number such as 4218, 4219, 4220, or 4037 [Code]

For the cause of the alarm, refer to the codes of the alarm indicated by the character-string. [Character-string] None

[Code] None

Data input/output or verification is impossible by setting the NC optional parameter bit No.1 bit0=0/No.11 bit1=0 (EIA).

This is because two or more same settings exist at the NC optional parameter (bit) No. 27, 28, 29, 30, 31, 49 (EIA code settings that represent '=','*','[',']','\$','#') or a code in the EIA code table is set.

Or, the parameter values from Nb to Tw set with the SET command from the host are abnormal. (For example, this error occurs if Tp=0 is set. For detail of each parameter, OSP-U100/U10M Special Functions Manual (No. 2) DNC-B high speed RM buffer system (SECTION 5 PARAMETER) and OSP -U100/U10M Operation Manual.

For data transfer by DNC-C

Attempt was made to execute a command that cannot be executed during communication with the host computer.

[Code]

- 1-> An attempt to execute the following commands while an NC program is being sent in the INDEPENDENT mode
 - Program selection
 - Schedule program selection
 - Number search
 - Restart
 - Number search using the cursor
 - Schedule program search
 - Sequence stop
 - Library
- [Measures to Take]

DNC-B

If a character-string appears indicating the alarm number, refer to the corresponding alarm.

If no character-string or code appears, check the communication parameter values.

DNC-C

Wait until the NC program transfer is completed.

5296 Remote operation mode

In the DNC-B mode operation, following operations are attempted while buffer operation is in progress with the buffer operation mode ON. This error occurs both with the protocol A and B.

[Character-string] None

[Code]

- 1-> Batch transfer of NC program (impossible only during buffer operation)
- 3-> Main program name or subprogram file name is designated when selecting a program in the NC program transfer method (2) during buffer operation mode.

5301 Check point setting

Illegal setting of check point

[Character-string] None

[Code]

1-> Input other than pointer value (hexadecimal) and option

SECTION 12 ALARM MESSAGE CHART

1. Communication Alarm

Communication alarm is the alarm which has occurred in communication link (protocol A) between the host computer and the OSP and does not have influence on NC operations. Once this alarm has occurred, it can be reset either by the reception of [SYN] command from the host computer or switching COMMUNICATION ON/OFF switch of the CNC from OFF to ON.

4218 DNC-B communication error

Communication error occurred during communication with the host computer using the protocol A/B.

[Character-string] None

[Code] YZZ (hexadecimal)

Y: OSP state where the error occurred

- 0-> Operation uncompleted state (DNC switch is OFF or CCP system is in abnormal state)
- 1-> OSP normal state
- 2-> Buffer operation state
- 3-> Alarm state or communication error state
- ZZ: Cause
- 01-> Check sum error occurred successively the number of times (Ne) set at the parameter. (Protocol A)
- 02-> Parity error occurred successively the number of times (Ne) set at the parameter. (Protocol A)
- 04-> No response *1
 - CTS signal OFF (Protocol A/B)
 - Response timer T1 time over (Protocol B)
- 05-> DSR signal OFF
- 06-> Invalid response or TV check error
 - NC program data codes specified at the NC optional parameter (bit) No.1 bit0/No.11 bit1 do not match the settings on the host.
 - The NC received a non-existing command. (Protocol A)
 - Transfer error was detected the number of times (Ne) set at the parameter. (Protocol A)
 - When TV check is executed, each record length is not composed of even number of characters.
 - Code conversion error
 - The NC received DC1, DC3, SYN, or NAK code while receiving the NC program. (Protocol B)
- 08-> Reception buffer overflow
- 09-> The NC received a signal from the host computer while not waiting for any response.
- 0A-> Overrun error (Protocol A/B)
- 0B-> Framing error (Protocol A/B)

[Probable Faulty Locations]

- 01-> Communication parameters or NC optional parameters are wrongly set.
- 02-> Communication cable or, in rare case, RS232C I/F is faulty.
- 03-> Hardware, software, or their parameters of the host computer are faulty.

[Measures to Take]

- 01-> Check the communication parameters related with the cable specifications (such as RS232C I/F channels used, parity, the number of stop bits, transfer code, end code, and baud rate) and the NC optional parameters. Correct improper parameters.
- 02-> Check the hardware, software, and their parameters of the host computer.
- 03-> Check if the NC is connected with the channel for DNC-B and the communication cable is in normal state.

[Related Specifications] DNC-B

4219 DNC-B message format error

Error has occurred in the reception message in the protocol A.

As for the cause of the alarm, "6. Reception of unexpected message" is reported to the host computer.

[Code]

None-> Message exceeds 72 bytes (4,000 bytes for NC program).

XXXXYY-> Mistake in the data designated by the [SET] command

XXXX-> Hexadecimal number of the wrong data (numerical data)

YY-> Byte position inside the data

[Probable Faulty Locations]

- 1) Defective software used at the host computer
- 2) Text format mismatch due to mismatch of the version of DNC-B specification at the CNC
- [Measures to Take]

Check the set data against the upper and lower limits of the text format specified in the DNC-B specification.

[Related Specifications] DNC-B

4220 DNC-B communication system abort

Unrestorable error has occurred in the protocol A/B. (This alarm is not cleared unless the power is turned on again.)

[Code]

- 10-> Overrun error has occurred.
- 11-> Framing error has occurred.

[Probable Faulty Locations]

- 1) Defective RS232C interface
- 2) Defective hardware or software of the host computer
- 3) Mismatch between the actual communication line specification (baud rate, code configuration, etc.) and the communication set by the communication parameters.

[Measures to Take]

- 1) Check the hardware and software of the host computer.
- 2) Check the following communication specifications between the actual communication line specification and the communication parameters:
 - RS232C interface channel being used
 - Parity
 - Number of stop bits
 - Transmission code
 - End code
 - Baud rate

[Related Specifications]

DNC-B

4037 CCP-CPU error

An error occurred with the CCP-CPU of the DNC-B specification.

This alarm is not cleared unless the power is turned off and then on again.

[Code]

- 1-> A memory parity error or write error occurred in the CCP memory test.
- 2-> The CCP control program cannot be loaded correctly.
- 3-> The CCP control program cannot be started correctly.
- 4-> The CCP communication channel cannot be opened correctly.

Or, the program data is written in ASCII codes though the protocol B is used (NC optional parameter bit No.11 bit1=1).

Or, data input/output or verification is impossible by setting the NC optional parameter bit No.1 bit0=0/No.11 bit1=0 (EIA). This is because two or more same settings exist at the NC optional parameter (bit) No. 27, 28, 29, 30, 31, 49 (EIA code settings that represent '=','*','[',']','\$','#') or a code in the EIA code table is set.

- 5--> A CCP self-diagnostics error occurred.
- 6--> An exception error occurred with the CCP CPU
- 7-> An error in the operation of the CCP control program occurred(task start control error).
- 8-> An error in the operation of the CCP control program occurred (real time task error).
- 9-> An error in the operation of the CCP control program occurred (time sharing task switching control error).

[Measures to Take]

- 1) NC optional parameter setting error
- 2) Defective CCP Board
- 3) CCP control software has not been stored in Memory.
- 4) Defective Memory.
- 5) Defective CCP control software.
- 6) CCP Board switch setting error.
2. NC Alarm

3218 ALARM C DNC start condition

In the DNC-B mode operation, communications cannot be done normally.

[Code]

- 1-> In the DNC-B buffer operation mode, the system is not in the ready state or the communication alarm state.
- 2-> In the DNC-B buffer operation mode, the schedule program is being executed.
- 5--> The main program buffer size is not greater than 12 m when the program runs using the buffer memory.

[Measures to Take]

Turn the DNC mode ON after pressing the RESET button.

[Related Specifications]

DNC-B

2426 ALARM B DNC-B remote operation

During DNC-B remote mode operations, an error has occurred.

[Character-string]

Communication alarm number (such as 4218, 4219, 4220 or 4037) or error number

[Code]

When a communication alarm occurs, the character-string shows the alarm number.

For the cause of the alarm, refer to the alarm D of the displayed number.

When an error occurs, the character-string shows the error number.

For the cause of the error, refer to the error of the displayed number.

[Probable Faulty Locations]

An error or a communication alarm occurred during remote operation through DNC-B. [Measures to Take]

Refer to the corresponding alarm or error.

[Related Specifications]

DNC-B

SECTION 13 APPENDIX

1. DNC HISTORY Contents Code Tables

(1) Kind = 1 (Command)

Upper Code	Lower Code
Command kind	Appended data length
1: Open	
2: Close	
3: Request for NC program	File name length
4: Call of NC program	
5: Transmission of NC program	File name length
6: Notification of NC reset	
7: Notification of NC alarm	

(2) Kind = 2 (Notification for correct ending of command)

Upper Code	Lower Code
Normal end code	Not used = 0
0: Processing completion	
1: Request for NC program	
2: Request for NC program	
transmission	
3: NC reset	
4: NC alarm	
5: NC reset/alarm	
6: Forced termination	

Upper Code	Lower Code		
Abnormal end code	Error detail code		
1: Temporary error	1: Check sum error		
2: Permanent error	2: Parity error		
3: NC reset	3:		
4: NC alarm	4: No answer signal		
5: Forced termination	5: DSR OFF		
6: Buffer clear	6: Ineffective answer signal		
7: Initialization	7: Record length overflow		
8: NC reset/alarm	8: Reception buffer overflow		
 -1: Command issuing sequence error 	9: Record reception in other than data reception standby state		
–14: Data error	10: Overrun error		
–15: Parameter error	11: Framing error		
-16: Command error	-59: Appended data length range error		
	-60: Command issuing error		
	–62: Error in selecting with/without significant data		
	-63: Command kind selection error		
	-64: Command request selection error		
	–91: Answer error for SAT		
	–92: NC program end code selection error		
	-93: EIA/ASCII conversion error		
	-94: NC program length range error		
	–95: NC program record end code selection error		
	–96: NC program data code selection error.		
	 –112: Answer signal monitoring time range error 		
	-128: SAT, SET command parameter selection error		

(3) Kind = 3 (Notification for abnormal ending of command)

(4) Kind = 4 (Internal request)

Upper Code	Lower Code	
Macro status	Macro event	
0: Initial state	1: Open	
1: Awaiting macro start	2: Close	
2: Awaiting request for	3: Request for reception	
reception	4: Request for transmission	
 Awaiting request for transmission 	5: NC alarm	
4: Awaiting reception of the first block 7	6: NC reset	
	7: Time-out	
*4 Only for protocol A	8: Request for forced termination	
	9:	
	10: Code conversion error	

Upper Code	Lower Code	
Message kind	Command data length	
(a) Protocol A		
1: GTD		
2: DAT	DAT : Data length/16	
3: RST	Others : Data length	
4: ALM		
5: SAT		
6: RTD		
7: RTY		
8: SYN		
9: RDY		
10: WAT		
11: EOD		
12: ARS		
13: AAL		
14: CLB		
15: SET		
(b) Protocol B	Data length/16 (incl. DC code)	
–127: DC1		
–128: DC3		
–129: Data		
–130: SYN		
–131: NAK		

(5) Kind = 5 (Transmission message)

(6) Kind = 6 (Line event)

	Upper Code		Lower Code
Line sta	tus	Line eve	ent
(a) Proto	Dool A		
0:	Awaiting answer signal for	1:	Reception of SYN
	initialization	2:	Reception of RDY
1:	Awaiting end of initialization	3:	Reception of ARS
2:	Data being received	4:	Reception of AAL
3:	Awaiting reception after	5:	Reception of CLB
	transmitting DAT/RTD	6:	Reception of SET
4:	Awaiting reception after	7:	Reception of DAT
_		8:	Reception of EOD
5:	Awaiting reception after	9:	Reception of WAT
6.	Awaiting reception after	10:	Reception of GTD
0. /	transmitting ALM	11:	Reception of RTY
7:	Awaiting reception after	12:	Reception of data other
	transmitting RST signal		than answer
8:	Awaiting reception after	13:	No answer back
	transmitting EOD	14:	DSR signal off
		15:	Transfer error 1
		16:	Transfer error 2
(b) Protocol B			
0:	Reception being requested	1:	Normal character
1:	Data being received	2:	Transfer error 1
2:	Transmission being requested	3:	Transfer error 2
3:	Data being transmitted	4:	No answer signal
4:	Alarm signal being requested	5:	CTS signal on
5:	Reset signal being requested	6:	CTS signal off
		7:	DSR signal off
		8:	Forced termination